1 of 5

**TECHNICAL APPENDIX
FOR
DEVELOPMENT
OF
MODIFIED STREAMFLOWS**

1928-1989

COLUMBIA RIVER & COASTAL BASINS

prepared for
BONNEVILLE POWER ADMINISTRATION
CONTRACT NO. DE-AC79-92BP21985

A.G. CROOK COMPANY

June 1993

MASTER

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PREFACE

This report is the fourth of a series of reports that describe the development of 1990 level modified streamflows. The first three reports were:

1. ADJUSTED STREAMFLOW AND STORAGE 1928-1989
2. 1990 LEVEL MODIFIED STREAMFLOW 1928-1989
3. SEASON VOLUMES AND STATISTICS 1928-1989

This report contains the technical description and reference material that document the processes and calculations used. This technical appendix is presented in sections.

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Section A

HISTORICAL FLOW

COMPUTATIONAL PROCEDURES

I. INTRODUCTION

The report "Adjusted Streamflow and Storage 1928-1989" contains listings of historical flows for the sites in the Columbia River and Coastal Basins. This section of the Technical Appendix provides for the site specific procedures used to determine those historical flows. The study purpose, authority, and definitions are given in the main report. The purpose of this section of the Technical Appendix is to document the computational procedures used at each of the project sites to develop historical flows for the period July 1928 - September 1989.

II. HISTORICAL FLOW COMPUTATION

Historical flow as used in this appendix, and other companion reports, is the amount of water (in cubic feet per second (cfs)) that has been historically measured or otherwise determined to have occurred at a specified point in the stream system. In this study the specified points in the stream system are the projects and project sites, and the historical flow is the outflow. At some sites, the computational procedure outlines, instead, how to compute historical inflow (or adjusted flow). This difference is noted on individual computational procedure sheets. Flow data are water volumes expressed in terms of mean flow, in cfs, for whole and half month periods. For consistency, the half month periods are defined as (1) the first 15 days and (2) the remaining number of days of the month, i.e., 13, 14, 15, or 16 days.

Stream gaging stations recording daily flow data may or may not be located at a project site, and may or may not cover all of the 61-year study period. When the gaging record was missing for all or a part of the study period, the record for the gaging station was filled in by correlation with one or more nearby stations. These correlations were linear regressions for each of the 12 monthly and "15-day" values at the dependent and independent site. In some cases results of graphical correlations, and/or monthly ratios of average flows were obtained from an earlier report, "Adjusted Streamflow and Storage, 1928-1978", dated February 1982.

When the gaging site was not at the project location, it was necessary to move the record either up or downstream to the project. When the gaging location and the project site were extremely close with no incremental inflow from side streams, the project flow was taken as the gaged flow with no adjustment. On small streams with only one gaging site, the record was often moved to the project site by increasing or decreasing the gaged record by the ratio of the drainage areas of the two sites. Generally, a project site was located within a cluster of gage sites. To develop a record at the project location, gaging records were obtained both up and downstream from the project. The project flow was determined as the upstream flow plus a portion of the incremental (ungaged) inflow between the up and downstream gages. This allowance for the ungaged portion was based on the drainage area ratio.

The above is only a generalized description of the computational procedure. The individual computational procedures are explained within this section for each site.

III. STORAGE CHANGE COMPUTATION

Storage changes were derived from data either furnished by project owners or from CD-ROM files from EarthInfo Inc. These storage changes were converted to equivalent flow in mean monthly and 15-day flow in cfs. Storage changes for a few projects were furnished by Water Survey of Canada, and in some cases supplied by the project owner.

IV. PRESENTATION OF COMPUTATIONAL PROCEDURES

The site specific procedure sheets give a narrative description of the various procedures used to determine historical flows for the period July 1928 - September 1989. Included on each sheet is a schematic diagram that depicts pertinent gages, periods of record, and streams in the vicinity of the project site. These procedural sheets are assembled in a downstream order for the Columbia River Basin, the Puget Sound Drainage, Coastal streams in Oregon and Washington and the Klamath River Basin.

V. COMPUTER USAGE

This study required massive amounts of data handling. CD-ROM disks containing daily flow data compiled by US Geological Survey and Water Resources Branch of Environment Canada supplied most of the data. Some data were supplied by project owners on "floppy" disks. Desk top computers (PC), utilizing Microsoft EXCEL v4.0, were used. Numerous macros were written to combine daily flow data and storage data into monthly and two period per month flows, to compute linear regressions and to add/or subtract data sets.

In a few cases, short periods of record were entered by hand into the data sets.

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COLUMBIA RIVER

river mile 1018

D.A. 8,290 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Mar 1947, May 1960 - Sep 1960

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on a correlation between (08ND007) Columbia River above Nagle Cr. and developed streamflows for Revelstoke Dam.

B. Apr 1947 - Apr 1960, Oct 1960 - Sep 1983

Observed flow of (08ND007) Columbia River above Nagle Cr.

C. Oct 1983 - Sep 1989

Mica Dam project discharge (provided by BC Hydro).

2. HALF MONTH

A. Jul 1928 - Mar 1947, May 1960 - Sep 1960

Percentages taken from historic flows at Revelstoke (derived elsewhere in this report).

B. Apr 1947 - Apr 1960, Oct 1960 - Sep 1983

Observed flow of (08ND007) Columbia River above Nagle Cr.

C. Oct 1983 - Sep 1989

Mica Dam project discharge (provided by BC Hydro).

COLUMBIA RIVER

river mile 934

D.A. 10,200 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Aug 1928, Jan 1932 - May 1932

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was calculated by multiplying 0.99 (based on drainage area) times the observed flow of (08ND002) Columbia River at Revelstoke.* **

B. Sep 1928 - Dec 1931, Jun 1932 - Jun 1950

Flow computed by multiplying 0.99 (based on drainage area) times the observed flow of (08ND002) Columbia River at Revelstoke.* **

C. Jul 1950 - May 1955

Flow computed by multiplying 0.927 (based on drainage area) times the observed flows of (08ND006) Columbia River at Twelve Mile Ferry near Revelstoke.

D. Jun 1955 - Sep 1985

Observed flow of (08ND011) Columbia River above Steamboat Rapids near Revelstoke.

E. Oct 1985 - Sep 1989

Project outflows furnished by BC Hydro.

2. HALF MONTH

A. Jul 1928 - Aug 1928, Jan 1932 - May 1932

Mean fifteen day percent for period of record was used to compute these half month percentages.

B. Sep 1928 - Dec 1931, Jun 1932 - Jun 1950

Flow computed by multiplying 0.99 (based on drainage area) times the observed flow of (08ND002) Columbia River at Revelstoke.* **

C. Jul 1950 - May 1955

Flow computed by multiplying 0.927 (based on drainage area) times the observed flows of (08ND006) Columbia River at Twelve Mile Ferry near Revelstoke.

D. Jun 1955 - Sep 1985

Observed flow of (08ND011) Columbia River above Steamboat Rapids near Revelstoke.

E. Oct 1985 - Sep 1989

Project outflows furnished by BC Hydro.

- * Seven months of missing records in 1928 & 1932 were taken from an old study where the data were provisionally developed by Canadian authorities.
- ** Published streamflow values for Jan 1929, Mar 1937 & Mar 1943 are probably in error and were provisionally revised in 1980 by Canadian authorities.

COLUMBIA RIVER

river mile 780.6

D.A. 14,100 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Sep 1937

Observed flow of (08NE003) Columbia River at Trail minus observed flow of (08NJ001) Kootenay River at Glade.

B. Oct 1937 - May 1944

Observed flow of (08NE049) Columbia River at Birchbank minus observed flow of (08NJ001) Kootenay River at Glade.

C. Jun 1944 - Dec 1960

Observed flow of (08NE049) Columbia River at Birchbank minus observed flow of (08NJ158) Kootenay Lake outflow minus observed flow of (08NJ013) Slocan River near Crescent Valley.

D. Jan 1961 - Sep 1972

Observed flow of (08NE002) Columbia River at Castlegar.

E. Oct 1972 - Sep 1989

Arrow Dam project outflows furnished by BC Hydro.

2. HALF MONTH

A. Jul 1928 - Sep 1937

Observed flow of (08NE003) Columbia River at Trail minus observed flow of (08NJ001) Kootenay River at Glade.

B. Oct 1937 - May 1944

Observed flow of (08NE049) Columbia River at Birchbank minus observed flow of (08NJ001) Kootenay River at Glade.

C. Jun 1944 - Dec 1960

Observed flow of (08NE049) Columbia River at Birchbank minus observed flow of (08NJ158) Kootenay Lake outflow minus observed flow of (08NJ013) Slocan River near Crescent Valley.

D. Jan 1961 - Sep 1972

Observed flow of (08NE002) Columbia River at Castlegar.

E. Oct 1972 - Sep 1989

Arrow Dam project outflows furnished by BC Hydro.

KOOTENAI RIVER

river mile 221.7

D.A. 8,985 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Sep 1930

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on observed flow of (12303000) Kootenai R at Libby multiplied by a respective monthly weighting factor.

B. Oct 1930 - Jun 1961

Observed flow of (08NG042) Kootenay R at Newgate plus 0.5136* times the ungaged flow between the Newgate (08NG042) and Libby (12303000) gages.

C. Jul 1961 - Sep 1971

Observed flow of (12301850) Kootenai R at Warland Bridge plus 0.069* times the ungaged flow between the Warland Bridge (12301850) and Libby (12303000) gages.

D. Oct 1971 - Sep 1989

Observed flow of (12301933) Kootenai R below Libby Dam near Libby.

2. HALF MONTH

A. Jul 1928 - Sep 1971

Percentages derived from observed flow of (12303000) Kootenai R at Libby.

B. Oct 1971 - Sep 1989

Observed flow of (12301933) Kootenai R below Libby Dam near Libby.

* Based on drainage area.

BONNERS FERRY 12309501 (BFE)

KOOTENAI RIVER

river mile 152.8

D.A. 12,690 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Sep 1960

Observed flows of (12309500) Kootenai River at Bonners Ferry

B. Oct 1960 - Sep 1989

Flows derived from a correlation between (Q1) (12305000) Kootenai R at Leonia and (Q2) (12309500) Kootenai R at Bonners Ferry.

$$Q1 = a \cdot Q2 + b$$

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	
a	1.08636	1.13038	1.13102	1.12618	1.18066	1.12732	1.13429	1.09553	1.08478	1.0636	1.033056	Sep
b	-253.667	-350.707	-218.075	-184.109	-382.584	-156.237	165.613	589.954	-583.134	-374.088	-84.2357	1.03943
r ²	0.99801	0.99684	0.9979	0.99758	0.99652	0.99717	0.99885	0.99567	0.995	0.99805	0.998937	-108.282
												0.99934

2. HALF MONTH

A. Jul 1928 - Sep 1960

Observed flows of (12309500) Kootenai River at Bonners Ferry

B. Oct 1960 - Sep 1989

Flows derived from a correlation between (Q3) (12305000) Kootenai R at Leonia and (Q4) (12309500) Kootenai R at Bonners Ferry.

$$Q3 = c \cdot Q4 + d$$

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
c	1.05805	1.12095	1.1521	1.12742	1.16919	1.11621	1.13021	1.10013	1.08572	1.06212	1.033137	1.01926
d	-129.311	-352.664	-335.51	-187.39	-334.871	-157.019	95.8258	882.03	-446.975	-323.097	-76.9357	13.1941
r ²	0.99741	0.99615	0.99676	0.99745	0.99643	0.99573	0.99845	0.9966	0.99383	0.99723	0.998615	0.99906

DUNCAN RIVER

river mile 8.3

D.A. 942 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Jun 1934

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 by subtracting the change-in-contents at Duncan Lake from the computed adjusted streamflow at Duncan Dam (historic flows for this time period were not available).

B. Jul 1934 - Apr 1961, May 1966 - Mar 1967

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on observed flow of (08NH001) Duncan R near Howser plus flow of (08NH003) Glacier Cr near Howser as correlated with the inflow to Duncan Lake.

$$Q(08NH003) = a * (\text{Duncan Lake Inflow})$$

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	0.092	0.086	0.097	0.098	0.098	0.089	0.066	0.066	0.103	0.127	0.144	0.138

C. May 1961 - Apr 1966

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on observed flow of (08NH001) Duncan R near Howser plus observed flow of (08NH003) Glacier Cr near Howser.

D. Apr 1967 - Sep 1969

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on flows derived from once daily readings of project outflows.

E. Oct 1969 - Sep 1989

Observed flow of (08NH126) Duncan River below Duncan Dam.

2. HALF MONTH

A. Jul 1928 - Dec 1928, Feb 1932

Percentages derived from observed flow of (08NJ013) Slocan R near Crescent Valley. The percentages of these six months were taken to be the average of the other percentages for that particular month.

B. Jan 1929 - Jun 1934

Percentages derived from observed flow of (08NJ013) Slocan R near Crescent Valley.

C. Jul 1934 - Apr 1967

Percentages derived from observed flow of (08NH001) Duncan River near Howser.

D. May 1967 - Sep 1969

Percentages derived from Duncan Project outflows furnished by British Columbia Hydropower Authority.

E. Oct 1969 - Sep 1989

Observed flow of (08NH126) Duncan River below Duncan Dam.

CORRA LINN 12322730	(COR)
UP. BONNINGTON 12322750	(UBN)
LO. BONNINGTON 12322765	(LBN)
SLOCAN 12322770	(SLO)
KOOTENAY CANAL 12322745	(CAN)

KOOTENAY RIVER	river mile 16.1	D.A. 17600 sq. mi.
KOOTENAY RIVER	river mile 16.1	D.A. 17600 sq. mi.
KOOTENAY RIVER	river mile 14.8	D.A. 17600 sq. mi.
KOOTENAY RIVER	river mile 14.3	D.A. 17600 sq. mi.
KOOTENAY RIVER	river mile 13.4	D.A. 17600 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jun 1928 - Sep 1937

Observed flow (08NJ009) Kootenay River at Nelson.

B. Oct 1937 - Sep 1989

Observed flow of (08NJ158) Kootenay Lake outflow near Corra Linn.

2. HALF MONTH

A. Jun 1928 - Sep 1937

Observed flow (08NJ009) Kootenay River at Nelson.

B. Oct 1937 - Sep 1989

Observed flow of (08NJ158) Kootenay Lake outflow near Corra Linn.

KOOTENAY RIVER

river mile 1.9

D.A. 19,300 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - May 1944

Observed flow of (08NJ001) Kootenay R nr Glade.

B. Jun 1944 - Sep 1989

Observed flow of (08NJ158) Kootenay Lake outflow near Corra Linn plus observed flow of (08NJ013) Slocan River near Crescent Valley.

2. HALF MONTH

A. Jul 1928 - May 1944

Observed flow of (08NJ001) Kootenay R nr Glade.

B. Jun 1944 - Sep 1989

Observed flow of (08NJ158) Kootenay Lake outflow near Corra Linn plus observed flow of (08NJ013) Slocan River near Crescent Valley.

MURPHY CREEK 12323040 (MUC)

COLUMBIA RIVER

river mile 759.0

D.A. 34,000 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. July 1928 - September 1937

Observed flow of Columbia River at Trail (08NE003).

B. October 1937 - September 1989

Observed flow of Columbia River at Birchbank (08NE049).

2. HALF MONTH

A. July 1928 - September 1937

Observed flow of Columbia River at Trail (08NE003).

B. October 1937 - September 1989

Observed flow of Columbia River at Birchbank (08NE049).

SF FLATHEAD RIVER

river mile 5.2

D.A. 1,654 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

Jul 1928 - Sep 1989

Observed flow of (12362500) SF Flathead R near Columbia Falls.

2. HALF MONTH

Jul 1928 - Sep 1989

Observed flow of (12362500) SF Flathead R near Columbia Falls.

COLUMBIA FALLS 12363000 (CFM)

FLATHEAD RIVER

river mile 143

D.A. 4,464 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

Jul 1928 - Sep 1989

Observed flow of (12363000) Flathead R at Columbia Falls.

2. HALF MONTH

Jul 1928 - Sep 1989

Observed flow of (12363000) Flathead R at Columbia Falls.

FLATHEAD RIVER

river mile 72

D.A. 7,086 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

Jul 1928 - Sep 1989

Observed flow of (12372000) Flathead R near Polson.

2. HALF MONTH

Jul 1928 - Sep 1989

Observed flow of (12372000) Flathead R near Polson.

CLARK FORK

river mile 208

D.A. 20,968 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

- A. Jul 1928 - Sep 1951, Oct 1959 - Sep 1989
 [(12389000) Clark Fork near Plains adjusted for upstream change-of-contents] times
 1.0405* then readjusted for upstream change-of-contents after this multiplication to bring
 these adjusted streamflows back to historical streamflows.
- B. Oct 1951 - Sep 1959
 Observed flow of (12391000) Clark Fork at Thompson Falls.

2. HALF MONTH

- A. Jul 1928 - Sep 1951, Oct 1959 - Sep 1989
 [(12389000) Clark Fork near Plains adjusted for upstream change-of-contents] times
 1.0405* then readjusted for upstream change-of-contents after this multiplication to bring
 these adjusted streamflows back to historical streamflows.
- B. Oct 1951 - Sep 1959
 Observed flow of (12391000) Clark Fork at Thompson Falls.

* Correlation factor was based on ratio of volumetric adjusted runoff past the Plains and Thompson Falls gages during the concurrent period of record.

NOXON RAPIDS 12391301 (NOX)

CLARK FORK

river mile 169.7

D.A. 21,833 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - May 1960

Correlation between (Q1) (12391400) Clark Fork below Noxon Rapids Dam and (Q2) (12392000) Clark Fork at Whitehorse Rapids.*

$$Q1 = a \cdot Q2 + b$$

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	0.995	0.955	0.870	0.901	0.892	0.921	0.973	0.995	0.980	0.957	0.904	0.913
b	-1622	-1168	176	-271	-266	-789	-2285	-3950	-3415	-1936	-769	-565
r ²	0.976	0.953	0.977	0.981	0.984	0.993	0.992	0.992	0.997	0.996	0.970	0.987

B. Jun 1960 - Sep 1989

Observed flow of (12391400) Clark Fork below Noxon Rapids Dam.

2. HALF MONTH

A. Jul 1928 - May 1960

Correlation between (Q1) (12391400) Clark Fork below Noxon Rapids Dam and (Q2) (12392000) Clark Fork at Whitehorse Rapids.*

$$Q1 = a \cdot Q2 + b$$

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	0.972	0.938	0.891	0.877	0.891	0.908	0.937	1.000	0.971	0.972	0.894	0.920
b	-1248	-920	-98	118	-198	-607	-1353	-3823	-3035	-2471	-656	-659
r ²	0.976	0.974	0.974	0.970	0.988	0.990	0.992	0.991	0.996	0.997	0.978	0.991

B. Jun 1960 - Sep 1989

Observed flow of (12391400) Clark Fork below Noxon Rapids Dam.

- * Whitehorse Rapids streamflow for Jul - Sep 28 were provided unpublished and subject to revision by the USGS in Jan 1947 from a linear correlation with the Pend Oreille R at Priest R. (Clark Fork at Whitehorse Rapids was previously known as Clark Fork near Heron.)

CLARK FORK

river mile 149.9

D.A. 22,067 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

Jul 1928 - Sep 1989

Observed flow of (12392000) Clark Fork at Whitehorse Rapids minus 800 cfs to account for ground water inflow between stream gage and project site.

2. HALF MONTH

Jul 1928 - Sep 1989

Observed flow of (12392000) Clark Fork at Whitehorse Rapids minus 800 cfs to account for ground water inflow between stream gage and project site.

PRIEST LAKE 12393560 (PSL)

PRIEST RIVER

river mile 43.2

D.A. 572 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Sep 1928

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on observed flow of (12393500) Priest R at outlet of Priest Lake near Coolin.

B. Oct 1928 - Sep 1948

Observed flow of (12393500) Priest R at outlet of Priest Lake near Coolin.

C. Oct 1948 - Sep 1989

Observed flow of (12394000) Priest R near Coolin minus $0.134 \times$ times [(12394000) Priest R near Coolin minus (12395000) Priest R near Priest R.]

2. HALF MONTH

A. Oct 1928 - Sep 1948

Observed flow of (12393500) Priest R at outlet of Priest Lake near Coolin.

B. Oct 1948 - Sep 1989

Observed flow of (12394000) Priest R near Coolin minus $0.134 \times$ times [(12394000) Priest R near Coolin minus (12395000) Priest R near Priest R.]

* Based on drainage area.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Sep 1928

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on observed flow of (12395500) Pend Oreille River at Newport.*

B. Oct 1928 - Sep 1941, Oct 1952 - Sep 1989

Observed flow of (12395500) Pend Oreille River at Newport.*

C. Oct 1941 - Sep 1952

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was estimated based on a discharge relationship with elevations of Pend Oreille Lake at Hope.**

2. HALF MONTH

A. Jul 1928 - Sep 1928, Oct 1941 - Sep 1952

Percentages derived from observed flow of (12398500) Pend Oreille River below Z Canyon.

B. Oct 1928 - Sep 1941, Oct 1952 - Sep 1989

Observed flow of (12395500) Pend Oreille River at Newport.*

* Prior to Sep 37 published as Clark Fork at Priest R; Oct 37 - Sep 41 as Pend Oreille R at Priest R.

** Official estimate of flows at Albeni Falls from Oct 41 - Sep 52 by Geological Survey.

BOX CANYON 12396485 (BOX)

PEND O'REILLE RIVER

river mile 34.5

D.A. 24,900 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Sep 1952

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which which was based on the average of (12398500) Pend Oreille R below Z Canyon near Metaline Falls* and (12395500) Pend Oreille R at Newport.**

B. Oct 1952 - Sep 1989

Observed flows of (12396500) Pend Oreille R below Box Canyon near lone.

2. HALF MONTH

A. Jul 1928 - Sep 1952

Percentages derived from observed flows of (12398500) Pend Oreille R below Z Canyon near Metaline Falls.*

B. Oct 1952 - Sep 1989

Observed flows of (12396500) Pend Oreille R below Box Canyon near lone.

- * Formerly published as Clark Fork at Metaline Falls prior to Oct 1928 and as Clark Fork below Z Canyon near Metaline Falls for the period Oct 1928 - Sep 1937.
- ** Official estimation of streamflow for the period Oct 41 - Sep 52 by the USGS based on a relationship with elevation of Pend Oreille Lake at Hope.

BOUNDARY 12398555 (BDY)

PEND O'REILLE RIVER

river mile 17

D.A. 25,200 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Sep 1964

Observed flows of (12398500) Pend Oreille R below Z Canyon near Metaline Falls.*

B. Oct 1964 - Sep 1989

Observed flows of (12398600) Pend Oreille R at International Boundary.

2. HALF MONTH

A. Jul 1928 - Sep 1964

Observed flows of (12398500) Pend Oreille R below Z Canyon near Metaline Falls.*

B. Oct 1964 - Sep 1989

Observed flows of (12398600) Pend Oreille R at International Boundary.

* Formerly published as Clark Fork at Metaline Falls prior to Oct 1928 and as Clark Fork below Z Canyon near Metaline Falls for the period Oct 1928 - Sep 1937.

SEVEN MILE 12399100 (SEV)
WANETA 12399350 (WAT)

PEND O'REILLE RIVER	river mile 6	D.A. 25,700 sq. mi.
PEND O'REILLE RIVER	river mile 0.5	D.A. 25,800 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Mar 1936, Oct 1946 - Feb 1949

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on observed flow of (12398500) Pend Oreille R. below Z Canyon near Metaline Falls* plus the extended streamflow of Salmo River**.

B. Apr 1936 - Sep 1946

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on observed flow of (12398500) Pend Oreille R. below Z Canyon near Metaline Falls* plus observed flow of (08NE044) Salmo River near Waneta.

C. Mar 1949 - Sep 1964

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on observed flow of (12398500) Pend Oreille R. below Z Canyon near Metaline Falls* plus observed flow of (08NE074) Salmo River near Salmo.

D. Oct 1964 - Sep 1989

Observed flow of (12398600) Pend Oreille R at International Boundary plus observed flow of (08NE074) Salmo R near Salmo.

2. HALF MONTH

A. Jul 1928 - Sep 1964

Percentages derived from observed flow of (12398500) Pend Oreille R below Z Canyon near Metaline Falls.*

B. Oct 1964 - Sep 1978

Percentages derived from observed flow of (12398600) Pend Oreille R at International Boundary.

C. Oct 1978 - Sep 1989

Observed flow of (12398600) Pend Oreille R at International Boundary plus (08NE074) Salmo R near Salmo.

- * Formerly published as Clark Fork at Metaline Falls prior to Oct 1928 and as Clark Fork below Z Canyon near Metaline Falls for the period Oct 1928 - Sep 1937.
- ** Flow data extensions for the Salmo River were furnished by Water Survey of Canada and were determined by monthly coefficients from (12401500) Kettle River near Ferry.

COEUR D'ALENE 12418900 (COE)
POST FALLS (PFL)

SPOKANE RIVER river mile 102.1
SPOKANE RIVER river mile 102.1

D.A. 3,840 sq. mi.
D.A. 3,840 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

Jul 1928 - Sep 1989

Observed flow of (12419000) Spokane River near Post Falls.

2. HALF MONTH

Jul 1928 - Sep 1989

Observed flow of (12419000) Spokane River near Post Falls.

UPPER FALLS 12422150 (UPF)
MONROE STREET 12422280 (MON)

SPOKANE RIVER river mile 76.2
SPOKANE RIVER river mile 74.2

D.A. 4,290 sq. mi.
D.A. 4,290 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

Jul 1928 - Sep 1989

Observed flow of (12422500) Spokane River at Spokane.

2. HALF MONTH

Jul 1928 - Sep 1989

Observed flow of (12422500) Spokane River at Spokane.

SPOKANE RIVER

river mile 58.1

D.A. 5,204 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Feb 1948, Oct 1952 - Sep 1989

Flows are estimated as the adjusted flow at Long Lake which is computed by adding the change-in-storage at Long Lake to the historic flow at Long Lake (derived elsewhere in this report).

B. Mar 1948 - Sep 1950

Observed flow of (12426000) Spokane River below Nine Mile Dam near Spokane.

C. Oct 1950 - Sep 1952

Observed flow of (12424500) Spokane River above Seven Mile Bridge near Spokane.

2. HALF MONTH

A. Jul 1928 - Feb 1948, Oct 1952 - Sep 1989

Flows are estimated as the adjusted flow at Long Lake which is computed by adding the change-in-storage at Long Lake to the historic flow at Long Lake (derived elsewhere in this report).

B. Mar 1948 - Sep 1950

Observed flow of (12426000) Spokane River below Nine Mile Dam near Spokane.

C. Oct 1950 - Sep 1952

Observed flow of (12424500) Spokane River above Seven Mile Bridge near Spokane.

LONG LAKE 12432510 (LLK)
LITTLE FALLS 12433475 (LFL)

SPOKANE RIVER river mile 33.9
SPOKANE RIVER river mile 29.3

D.A. 6,020 sq. mi.
D.A. 6,283 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Sep 1929

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on observed flow of (12433500) Spokane R below Little Falls near Long Lake.

B. Oct 1929 - Mar 1939

Observed flow of (12433500) Spokane River below Little Falls near Long Lake.

C. Apr 1939 - Sep 1989

Observed flow of (12433000) Spokane River at Long Lake.

2. HALF MONTH

A. Jul 1928 - Sep 1929

Percentages derived from observed flow of (12422500) Spokane River at Spokane. 15 day values filled in by multiplying the appropriate percentage by whole month value for the purpose of computing hisoric flow at Nine Mile.

B. Oct 1929 - Mar 1939

Observed flow of (12433500) Spokane River below Little Falls near Long Lake.

C. Apr 1939 - Sep 1989

Observed flow of (12433000) Spokane River at Long Lake.

river mile

D.A.

sq. mi.

Historical Flow Computations

1. WHOLE MONTH

Jul 1928 - Sep 1989

Diversions to and returns from Banks Lake furnished by USBR.

2. HALF MONTH

Jul 1928 - Sep 1989

Diversions to and returns from Banks Lake furnished by USBR.

COLUMBIA RIVER

river mile 596.6

D.A. 74,700 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Sep 1929

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on observed flow of (12436500) Columbia River at Grand Coulee Dam.

B. Oct 1929 - Sep 1989

Observed flow of (12436500) Columbia River at Grand Coulee Dam.

2. HALF MONTH

A. Jul 1928 - Sep 1929

Percentages derived from observed flow of (12472800) Columbia R below Priest Rapids Dam.

B. Oct 1929 - Sep 1989

Observed flow of (12436500) Columbia River at Grand Coulee Dam.

COLUMBIA RIVER

river mile 545.1

D.A. 75,400 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Sep 1929

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on observed flow of (12436500) Columbia River at Grand Coulee Dam.

B. Oct 1929 - Mar 1952

Observed flow of (12436500) Columbia River at Grand Coulee Dam.

C. Apr 1952 - Sep 1989

Observed flow of (12438000) Columbia River at Bridgeport.

2. HALF MONTH

A. Jul 1928 - Sep 1929

Percentages derived from observed flow of (12472800) Columbia R bl Priest Rapids Dam.

B. Oct 1929 - Mar 1952

Observed flow of (12436500) Columbia River at Grand Coulee Dam.

C. Apr 1952 - Sep 1989

Observed flow of (12438000) Columbia River at Bridgeport.

COLUMBIA RIVER

river mile 515.9

D.A. 86,100 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Mar 1952

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on observed flow of (12436500) Columbia River at Grand Coulee Dam plus 0.38* times [(12464500) Columbia River at Trinidad minus (12436500) Columbia River at Grand Coulee Dam**].

B. Apr 1952 - Sep 1960

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on observed flow of (12438000) Columbia R at Bridgeport plus 0.32* times [(12464500) Columbia R at Trinidad minus (12438000) Columbia R at Bridgeport].

C. Oct 1960 - Sep 1967

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on observed flow of (12438000) Columbia R at Bridgeport plus 0.88* times [(12453700) Columbia R at Rocky Reach Dam minus (12438000) Columbia R at Bridgeport].

D. Oct 1967 - Sep 1989

Observed flow of (12450700) Columbia River below Wells Dam.

2. HALF MONTH

A. Jul 1928 - Sep 1929

Percentages derived from observed flow of (12472800) Columbia R below Priest Rapids Dam.

B. Oct 1929 - Sep 1960

Percentages derived from observed flow of (12436500) Columbia R at Grand Coulee Dam.

C. Oct 1960 - Sep 1967

Percentages derived from observed flow of (12453700) Columbia R at Rocky Reach Dam.

D. Oct 1967 - Sep 1989

Observed flow of (12450700) Columbia River below Wells Dam.

* Based on the ratio of contributing runoff between (the upstream gage and the dam) and (the upstream and downstream gages) during the periods of concurrent gaged records.

** Published as Columbia River at Vernita during the period Jul 28 - Sep 30.

CHELAN 12452400 (CHL)

CHELAN RIVER

river mile 4.3

D.A. 924 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

Jul 1928 - Sep 1989

Observed flow of (12452500) Chelan River at Chelan.

2. HALF MONTH

Jul 1928 - Sep 1989

Observed flow of (12452500) Chelan River at Chelan.

COLUMBIA RIVER

river mile 473.9

D.A. 87,800 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Mar 1952

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on observed flow of (12436500) Columbia River at Grand Coulee Dam. plus 0.63* times [(12464500) Columbia R at Trinidad minus (12436500) Columbia R at Grand Coulee Dam].

B. Apr 1952 - Sep 1960

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on observed flow of (12438000) Columbia R at Bridgeport plus 0.60* times [(12464500) Columbia R at Trinidad** minus (12438000) Columbia R at Bridgeport].

C. Oct 1960 - Sep 1989

Observed flow of (12453700) Columbia R at Rocky Reach Dam.

2. HALF MONTH

A. Jul 1928 - Sep 1930

Percentages derived from observed flow of (12472800) Columbia R below Priest Rapids Dam.

B. Oct 1930 - Sep 1960

Percentages derived from observed flow of (12464500) Columbia R at Trinidad.

C. Oct 1960 - Sep 1989

Observed flow of (12453700) Columbia R at Rocky Reach Dam.

- * Based on the ratio of contributing runoff between (the upstream gage and the dam) and (the upstream and downstream gages) during periods of concurrent gaged records.
- ** Published as Columbia River at Vernita during the period Jul 28 - Sep 30.

ROCK ISLAND 12462552 (RIS)
WANAPUM 12464612 (WAN)

COLUMBIA RIVER river mile 453.4
COLUMBIA RIVER river mile 415.8

D.A. 89,400 sq. mi.
D.A. 90,700 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Sep 1930

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on observed flow of (12464500) Columbia River at Trinidad.*

B. Oct 1930 - May 1961

Observed flow of (12464500) Columbia River at Trinidad.

C. Jun 1961 - Sep 1989

Observed flow of (12462600) Columbia River below Rock Island Dam.**

2. HALF MONTH

A. Jul 1928 - Sep 1930

Percentages derived from observed flow of (12472800) Columbia R bl Priest Rapids Dam.

B. Oct 1930 - May 1961

Observed flow of (12464500) Columbia River at Trinidad.

C. Jun 1961 - Sep 1989

Observed flow of (12462600) Columbia River below Rock Island Dam.**

* Published as Columbia River at Vernita for the period Jul 28 - Sep 30.

** Published as Columbia River at Trinidad for the period Oct 30 - May 61.

PRIEST RAPIDS 12472710 (PRD)

COLUMBIA RIVER

river mile 397.1

D.A. 95,500 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

Jul 1928 - Sep 1989

Observed flow of (12472800) Columbia River below Priest Rapids.

2. HALF MONTH

Jul 1928 - Sep 1989

Observed flow of (12472800) Columbia River below Priest Rapids.

YAKIMA RIVER

river mile 29.9

D.A. 5,615 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Sep 1933

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on observed flow of (12509500) Yakima River near Prosser.

B. Oct 1933 - Sep 1989

Observed flow of (12510500) Yakima River at Kiona.

2. HALF MONTH

A. Jul 1928 - Sep 1933

Percentages derived from observed flow of (12505000) Yakima River near Parker.

B. Oct 1933 - Sep 1989

Observed flow of (12510500) Yakima River at Kiona.

WEISER RIVER

river mile 14.9

D.A. 1,460 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Sep 1952

Observed flow of (13263500) Weiser River above Crane Creek near Wieser
plus observed flow of (13265500) Crane Creek at mouth nr Wieser.

B. Oct 1952 - Sep 1989

Observed flows of (13266000) Weiser River near Wieser.

2. HALF MONTH

A. Jul 1928 - Sep 1952

Observed flow of (13263500) Weiser River above Crane Creek near Wieser
plus observed flow of (13265500) Crane Creek at mouth nr Wieser.

B. Oct 1952 - Sep 1989

Observed flows of (13266000) Weiser River near Wieser.

BROWNLEE 13289710 (BRN)
 OXBOW 13290049 (OXB)

SNAKE RIVER
 SNAKE RIVER

river mile 285
 river mile 273

D.A. 72,590 sq. mi.
 D.A. 72,800 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

- A. Jul 1928 - Feb 1958
 Oct 1967 - Sep 1971
 Observed flow of (13290000) Snake River at Oxbow.
- B. Mar 1958 - Sep 1967
 Observed flow of (13290200) Snake River below Pine Creek at Oxbow, minus
 1.52* times the extended flow** of (13290190) Pine Creek near Oxbow.
- C. Oct 1971 - Sep 1989
 Observed flow of (13290450) Snake River at Hells Canyon Dam, minus 2.17* times
 the observed flow of (13290190) Pine Creek near Oxbow.

2. HALF MONTH

- A. Jul 1928 - Feb 1958
 Oct 1967 - Sep 1971
 Observed flow of (13290000) Snake River at Oxbow.
- B. Mar 1958 - Sep 1967
 Observed flow of (13290200) Snake River below Pine Creek at Oxbow, minus
 1.52* times the extended flow** of (13290190) Pine Creek near Oxbow.
- C. Oct 1971 - Sep 1989
 Observed flow of (13290450) Snake River at Hells Canyon Dam, minus 2.17* times
 the observed flow of (13290190) Pine Creek near Oxbow.

* Based on drainage area. Note - Although the flows for the two dam sites were taken as identical, the drainage area of Oxbow site was used for all computations.

** The flow record of Pine Creek near Oxbow was filled in for the period prior to Nov 1966 by the ratio of monthly flow of (13292000) Imnaha River at Imnaha, based on periods of concurrent records

Pine Cr (13290190) / Imnaha(13292000)											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1.6982	1.5427	1.2834	0.7609	0.5517	0.6009	0.3242	0.2387	0.3354	0.4161	0.6651	1.1408

SNAKE RIVER

river mile 247.6

D.A. 73,300 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Jan 1958

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on the observed flow of (13290000) Snake R at Oxbow plus 2.17* times the extended flow** of (13290190) Pine Cr near Oxbow.

B. Feb 1958 - Jul 1965

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on observed flow of (13290200) Snake R below Pine Cr at Oxbow plus 0.65* times the extended flow** of (13290190) Pine Cr near Oxbow.

C. Aug 1965 - Sep 1965

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on observed flow of (13290450) Snake R at Hells Canyon Dam.

D. Oct 1965 - Sep 1989

Observed flow of (13290450) Snake River at Hells Canyon Dam.

2. HALF MONTH

A. Jul 1928 Sep 1928

Percentages derived from observed flow of (13269000) Snake R at Weiser.

B. Oct 1928 - Jan 1958

Percentages derived from observed flow of (13290000) Snake R at Oxbow.

C. Feb 1958 - Sep 1965

Percentages derived from observed flow of (13290200) Snake R below Pine Cr at Oxbow.

D. Oct 1965 - Sep 1989

Observed flow of (13290450) Snake River at Hells Canyon Dam.

* Based on drainage area

** The flow record of Pine Cr near Oxbow was filled in for the period prior to Nov 1966 by the ratio of monthly flow of (13292000) Imnaha R at Imnaha based on periods of concurrent records.

WHITE BIRD 13317000 (WHB)

SALMON RIVER

river mile 53.7

D.A. 13,550 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

Jul 1928 - Sep 1989

Observed flow of (13317000) Salmon R at Whitebird.

2. HALF MONTH

Jul 1928 - Sep 1989

Observed flow of (13317000) Salmon R at Whitebird.

SNAKE RIVER

river mile 169.7

D.A. 88,000 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

Jul 1928 - Sep 1989

Observed flow of (13317000) Salmon R at Whitebird plus (13292000) Imnaha R at Imnaha plus the historic flow from Hells Canyon Dam (derived elsewhere in this report).

2. HALF MONTH

A. Jul 1928 - Sep 1965

Percentages were taken from the historic flows of Snake River at Anatone (derived elsewhere in this report).

B. Oct 1965 - Sep 1989

Observed flow of (13317000) Salmon R at Whitebird plus (13292000) Imnaha R at Imnaha plus the historic flow from Hells Canyon Dam (derived elsewhere in this report).

TROY 13333000 (TRY)

GRANDE RONDE RIVER

river mile 45.2

D.A. 3412 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Sep 1944

Based on a correlation between (Q1) (13333000) Grande Ronde River at Troy and (Q2) (13332500) Grande Ronde River at Rondowa.

$$Q1 = a \cdot Q2 + b$$

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	1.24475	1.37261	1.64665	1.50711	1.43835	1.40375	1.47305	1.34011	1.14572	1.07122	1.04798	1.07627
b	76.1362	36.9153	-113.92	12.4576	89.2971	120.839	-16.1374	-340.344	82.0946	240.483	190.246	171.7
r ²	0.97842	0.98551	0.97598	0.98177	0.98412	0.98304	0.9608	0.96103	0.97755	0.98287	0.94776	0.93262

B. Oct 1944 - Sep 1989

Observed flow of (13333000) Grande Ronde River at Troy.

2. HALF MONTH

A. Jul 1928 - Sep 1944

Based on a correlation between (Q3) (13333000) Grande Ronde River at Troy and (Q4) (13332500) Grande Ronde River at Rondowa.

$$Q3 = c \cdot Q4 + d$$

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
c	1.24684	1.32596	1.69746	1.48796	1.415	1.40327	1.4539	1.33423	1.15936	1.05924	1.065	1.10153
d	70.5867	41.5014	-167.159	41.9263	77.8655	100.393	177.422	27.5057	63.1203	301.701	184.245	156.675
r ²	0.97353	0.97887	0.96036	0.97896	0.98093	0.98971	0.95819	0.9481	0.97353	0.98077	0.95388	0.94627

B. Oct 1944 - Sep 1989

Observed flow of (13333000) Grande Ronde River at Troy.

ANATONE 13334300

(ANA)

SNAKE RIVER

river mile 167.2

D.A. 92,960 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Aug 1928

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on observed flow of (13343500) Snake River near Clarkston.

B. Sep 1928 - Jul 1958

Based on a correlation between (Q1) (13334300) Snake River near Anatone and (Q2) [(13343500) Snake River near Clarkston minus (13342500) Clearwater River at Spalding minus (13334500) Asotin Cr near Asotin].

$$Q1 = a \cdot Q2 + b$$

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	1.028	1.112	1.024	1.045	1.015	1.003	0.991	0.958	0.949	1.000	1.027	1.062
b	-773	-2730	-740	-1351	-776	-404	-285	1600	1979	-656	-848	-1596
r ²	0.980	0.982	0.989	0.996	0.997	0.999	0.999	0.999	0.998	0.998	0.988	0.968

C. Aug 1958 - Sep 1989

Observed flow of (13334300) Snake River near Anatone.

2. HALF MONTH

A. Jul 1928 - Aug 1928

Percentage derived from observed flow of (13343500) Snake River near Clarkston.

B. Sep 1928 - Jul 1958

Based on a correlation between (Q3) (13334300) Snake River at Anatone and (Q4) [(13343500) Snake River near Clarkston minus (13342500) Clearwater River at Spalding minus (13334500) Asotin Cr near Asotin].

$$Q3 = c \cdot Q4 + d$$

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
c	1.041	1.096	1.100	1.037	0.999	1.014	0.994	0.957	0.921	0.993	1.040	1.101
d	-999	-2335	-2584	-965	-261	-828	-270	1954	4200	-630	-1089	-2302
r ²	0.977	0.982	0.980	0.990	0.996	0.999	0.998	0.999	0.997	0.999	0.987	0.977

C. Aug 1958 - Sep 1989

Observed flow of (13334300) Snake River near Anatone.

OROFINO

(ORO)

CLEARWATER RIVER

river mile 44.6

D.A. 5,580 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Sep 1930, Oct 1938 - Sep 1964

Based on a linear correlation between (Q1) (13340000) Clearwater River at Orofino
and (Q2) (13339000) Clearwater River at Kamiah.

$$Q1 = a \cdot Q2 + b$$

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	1.084	1.115	1.163	1.176	1.076	1.018	1.037	1.053	0.921	1.019	1.024	1.022
b	-35	-34	-80	34	96	946	1239	-644	1377	86	46	50
r ²	0.995	0.994	0.999	0.997	0.996	0.980	0.981	0.981	0.995	0.999	0.960	0.984

B. Oct 1930 - Sep 1938, Oct 1964 - Sep 1989

Observed flow of (13340000) Clearwater River at Orofino.

2. HALF MONTH

A. Jul 1928 - Sep 1930, Oct 1938 - Sep 1964

Based on a linear correlation between (Q3) (13340000) Clearwater River at Orofino
and (Q4) (13339000) Clearwater River at Kamiah.

$$Q3 = c \cdot Q4 + d$$

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
c	1.068	1.122	1.347	1.146	1.084	1.106	1.017	1.011	0.907	1.010	1.122	0.817
d	-15	-92	-416	46	73	370	1319	627	1945	138	-68	244
r ²	0.993	0.997	0.989	0.998	0.996	0.985	0.986	0.985	0.994	0.999	0.924	0.952

B. Oct 1930 - Sep 1938, Oct 1964 - Sep 1989

Observed flow of (13340000) Clearwater River at Orofino.

NF CLEARWTR RIVER

river mile 1.9

D.A. 2,440 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Jan 1965

Observed flow of (13341000) NF Clearwater River near Ahsahka.

B. Feb 1965 - Sep 1989

Observed flows of (13341050) Clearwater River near Peck minus observed flow of (13340000) Clearwater River at Orofino.

2. HALF MONTH

A. Jul 1928 - Jan 1965

Observed flow of (13341000) NF Clearwater River near Ahsahka.

B. Feb 1965 - Sep 1989

Observed flows of (13341050) Clearwater River near Peck minus observed flow of (13340000) Clearwater River at Orofino.

CLEARWATER RIVER

river mile 11.6

D.A. 9,570 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

Jul 1928 - Sep 1989

Observed flow of (13342500) Clearwater River at Spalding.

2. HALF MONTH

Jul 1928 - Sep 1989

Observed flow of (13342500) Clearwater River at Spalding.

LOWER GRANITE 13343598 (LWG)
LITTLE GOOSE 13343930 (LGS)

SNAKE RIVER

river mile 107.5

D.A. 103,500 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Dec 1972

Observed flow of (13343500) Snake River at Clarkston.

B. Jan 1973 - Sep 1989

Observed flow of (13342500) Clearwater River at Spalding plus
observed flow of (13334300) Snake River near Anatone plus
extended* flow of (13334700) Asotin Cr below Kearney Gulch.
minus initial fill at Lower Granite.

2. HALF MONTH

A. Jul 1928 - Dec 1972

Observed flow of (13343500) Snake River at Clarkston.

B. Jan 1973 - Sep 1989

Observed flow of (13342500) Clearwater River at Spalding plus
observed flow of (13334300) Snake River near Anatone plus
extended* flow of (13334700) Asotin Cr below Kearney Gluch.
minus initial fill at Lower Granite.

* Flow at (Q1) (13334700) Asotin Cr below Kearney Gulch extended by linear correlation
with (Q2) (13345000) Palouse River near Potlatch; regression constants below:

Monthly Regression Constants

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	0.066	0.237	0.077	0.188	0.061	0.099	0.073	0.130	0.394	0.549	0.503	0.128
b	38	36	49	24	50	28	63	106	72	39	33	37
r ²	0.033	0.669	0.542	0.846	0.687	0.871	0.618	0.458	0.371	0.310	0.480	0.036

Half Monthly Regression Constants

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	0.044	0.277	0.121	0.374	0.045	0.099	0.079	0.082	0.307	0.528	0.814	0.381
b	38	35	44	15	58	28	47	114	90	44	30	33
r ²	0.008	0.605	0.728	0.807	0.350	0.879	0.749	0.362	0.413	0.294	0.584	0.394

LOWER MONUMENTAL 13352595 (LMN)

SNAKE RIVER

river mile 41.6

D.A. 108,500 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Mar 1962

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on linear correlation of (Q1) (13353000) Snake R. below Ice Harbor Dam with flow of (Q2) Snake R. at Lower Granite Dam minus the initial fill at Ice Harbor (Nov 61 - Jan 62).

$$Q1 = a * (Q2) + b$$

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	1.057	1.045	1.016	0.910	0.979	0.974	1.008	1.038	1.039	0.982	1.012	1.023
b	-698	1485	1096	1629	2154	2752	509	-825	-1245	1085	-59	118

B. Apr 1962 - Sep 1989

Observed flow of (13353000) Snake R. below Ice Harbor Dam minus the initial fill at Ice Harbor (Apr 62).

2. HALF MONTH

A. Jul 1928 - Mar 1962

Percentages derived from observed flow of (13343500) Snake River at Clarkston.

B. Apr 1962 - Sep 1989

Observed flow of (13353000) Snake R. below Ice Harbor Dam minus the initial fill at Ice Harbor (Apr 62).

SNAKE RIVER

river mile 9.7

D.A. 108,500 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Mar 1962

Flows are the historic flows at Lower Monumental (developed elsewhere in this report) minus the initial fill at Ice Harbor.

B. Apr 1962 - Sep 1989

Observed flow of (13353000) Snake River below Ice Harbor Dam.

2. HALF MONTH

A. Jul 1928 - Sep 1989

Percentages derived from daily flows at Lower Granite (developed elsewhere in this report).

B. Apr 1962 - Sep 1989

Observed flow of (13353000) Snake River below Ice Harbor Dam.

COLUMBIA RIVER

river mile 292

D.A. 213500 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Sep 1950

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on linear correlation of (Q1) (14019200) Columbia River at McNary Dam with (Q2) (14105700) Columbia River at The Dalles.*

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
a	0.844	0.882	0.895	0.960	0.976	0.983	0.989	1.000	1.016	1.000	0.984	0.880
b	5542	2566	1944	-3049	-337	-8073	-5057	-5675	-6956	5195	-4532	3364

B. Oct 1950 - Sep 1981

Observed flow of (14019200) Columbia River at McNary Dam.

C. Oct 1981 - Sep 1989

Project outflows provided by the Corps of Engineers.

2. HALF MONTH

A. Jul 1928 - Sep 1950

Percentages derived from observed flow of (14105700) Columbia River at The Dalles.

B. Oct 1950 - Sep 1981

Observed flow of (14019200) Columbia River at McNary Dam.

C. Oct 1981 - Sep 1989

Percentages derived from observed flow of (14105700) Columbia River at The Dalles.

* Correlation was based on Historical flows adjusted for upstream change-of-contents during the concurrent period of record Oct 50-Sep 78.

COLUMBIA RIVER

river mile 215.6

D.A. 226,000 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

Jul 1928 - Sep 1989

Observed flow of (14105700) Columbia River at The Dalles minus observed flow of (14103000) Deschutes River at Moody near Biggs plus initial fill at The Dalles Dam.

2. HALF MONTH

Jul 1928 - Sep 1989

Observed flow of (14105700) Columbia River at The Dalles minus observed flow of (14103000) Deschutes River at Moody near Biggs plus initial fill at The Dalles Dam.

ROUND BUTTE 14092150 (ROU)
 PELTON 14092455 (PEL)
 PELTON RFREG 14092495 (RER)

DESCHUTES RIVER	river mile 110.6	D.A. 7,490 sq. mi.
DESCHUTES RIVER	river mile 102.8	D.A. 7,800 sq. mi.
DESCHUTES RIVER	river mile 100.1	D.A. 7,820 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

Jul 1928 - Sep 1989

Observed flow of (14092500) Deschutes River near Madras.

2. HALF MONTH

Jul 1928 - Sep 1989

Observed flow of (14092500) Deschutes River near Madras.

COLUMBIA RIVER

river mile 191.5

D.A. 237000 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

Jul 1928 - Sep 1989

Observed flow of (14105700) Columbia River at The Dalles.

2. HALF MONTH

Jul 1928 - Sep 1989

Observed flow of (14105700) Columbia River at The Dalles.

BONNEVILLE 14128860 (BON)

COLUMBIA RIVER

river mile 146.1

D.A. 24000 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Jun 1958

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was computed* as the sum of the observed or extended** flow of

(14105700) Columbia River at The Dalles,
plus (14113000) Klickitat River near Pitt,
plus (14121001) Hood River near Hood River (incl. the power canal),
plus (14123500) White Salmon River near Underwood,
plus (14124500) Little White Salmon River at Willard,
plus (14128500) Wind River near Carson.

B. Jul 1958 - Sep 1978

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on flows furnished by Corps of Engineers and derived from project data.

C. Oct 1978 - Sep 1989

Flows furnished by Corps of Engineers.

2. HALF MONTH

A. Jul 1928 - Sep 1978

Percentages derived from observed flow of (14105700) Columbia River at The Dalles.

B. Oct 1978 - Sep 1989

Flows furnished by Corps of Engineers.

* Flow computation was performed in a previous study, and values just duplicated here.

** Any flow extensions required during this time frame were performed by the Geological Survey

MF WILLAMETTE RIVER

river mile 232.5

D.A. 392 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Sep 1935

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on graphical correlation of (14145500) MF Willamette River above Salt Cr. nr Oakridge and (14148000) MF Willamette River below North Fork near Oakridge.

B. Oct 1935 - Sep 1989

Observed flow of (14145500) MF Willamette River above Salt Cr near Oakridge.

2. HALF MONTH

A. Jul 1928 - Sep 1935

Percentages derived from observed flow of (14148000) MF Willamette River below N. Fork near Oakridge.

B. Oct 1935 - Sep 1989

Observed flow of (14145500) MF Willamette River above Salt Cr near Oakridge.

LOOKOUT POINT 14149050 (LOP)
DEXTER 14149150 (DEX)

MF WILL. RIVER river mile 206.9
MF WILL. RIVER river mile 203.8

D.A. 991 sq. mi.
D.A. 1,001 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Sep 1946

Flows based on drainage area ratio of (14148000) MF Willamette River below North Fork near Oakridge, formerly published as MF Willamette R at Eula, 1928-1950.

B. Oct 1946 - Sep 1989

Observed flow of (14150000) MF Willamette River near Dexter.

2. HALF MONTH

A. Jul 1928 - Sep 1946

Percentages derived from observed flow of (14148000) MF Willamette River below North Fork near Oakridge.

B. Oct 1946 - Sep 1989

Observed flow of (14150000) MF Willamette River near Dexter.

FALL CREEK

river mile 7.1

D.A. 186 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Sep 1935

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on a graphical correlation of (14151000) Fall Cr below Winberry Cr with flow of [(14152000) MF Willamette River at Jasper* minus (14150000) MF Willamette River near Dexter*]

B. Oct 1935 - Sep 1989

Observed flow of (14151000) Fall Cr below Winberry Cr.

2. HALF MONTH

A. Jul 1928 - Sep 1935

Percentages derived from observed flow at Dexter (developed elsewhere in this report).

B. Oct 1935 - Sep 1989

Observed flow of (14151000) Fall Cr below Winberry Cr.

* Flow records of (14152000) MF Willamette River at Jasper, and flow records of (14150000) MF Willamette River near Dexter were both extended by separate graphical correlation with (14148000) MF Willamette River below North Fork near Oakridge.

COTTAGE GROVE 14153100 (COT)

COAST FK WILLAMETTE RIVER

river mile 29.7

D.A. 104 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Sep 1935

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on a graphical correlation* of (14153500) Coast Fork Willamette River below Cottage Grove Dam with (14157000) Coast Fork Willamette River at Saginaw.

B. Oct 1935 - Dec 1938

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on a graphical correlation* of (14153500) Coast Fork Willamette River below Cottage Grove Dam with (14152500) Coast Fork Willamette River at London.

C. Jan 1939 - Sep 1989

Observed flow of (14153500) Coast Fork Willamette River below Cottage Grove Dam.

2. HALF MONTH

A. Jul 1928 - Sep 1935

Percentages derived from (14157000) Coast Fork Willamette River at Saginaw.

B. Oct 1935 - Dec 1938

Percentages derived from (14152500) Coast Fork Willamette River at London.

C. Jan 1939 - Sep 1989

Observed flow of (14153500) Coast Fork Willamette River below Cottage Grove Dam.

* Values taken from a previous study

ROW RIVER

river mile 7.6

D.A. 270 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Sep 1935

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on a graphical correlation* of (14155500) Row River near Cottage Grove with (14157000) Coast Fork Willamette River at Saginaw.

B. Oct 1935 - Dec 1938

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on a graphical correlation* of (14155500) Row River near Cottage Grove with (14154500) Row River above Pitcher Creek near Dorena.

C. Jan 1939 - Sep 1989

Observed flow of (14155500) Row River near Cottage Grove.

2. HALF MONTH

A. Jul 1928 - Sep 1935

Percentages derived from observed flow of (14157000) Coast Fk Willamette River at Saginaw.

B. Oct 1935 - Dec 1938

Percentages derived from observed flow of (14154500) Row River above Pitcher Creek near Dorena.

C. Jan 1939 - Sep 1989

Observed flow of (14155500) Row River near Cottage Grove.

* Values taken from a previous study

CARMEN DIVERSION INFLOW 14158690 (CAR)

MC KENZIE RIVER

river mile 87.6

D.A. 146 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Sep 1957, Nov 1962 - Sep 1989

Flow derived by linear correlation of (Q1) (14158700) McKenzie River near Belknap Springs with (Q2) (14158500) McKenzie River at outlet of Clear Lake*.

$$Q1 = a * (Q2) + b$$

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	0.910	1.103	1.048	1.003	1.111	0.998	1.248	1.552	1.001	0.761	0.731	0.055
b	197	150	151	167	115	174	-4	-209	177	269	256	414
r ²	0.787	0.951	0.991	0.989	0.996	0.989	0.978	0.941	0.944	0.811	0.396	0.002

* Flows for the period Jul 28 - Sep 47 for (Q2) (14158500) McKenzie River at outlet of Clear Lake were filled in by linear regression with (Q3) (114159000) McKenzie River at McKenzie Bridge.

$$Q2 = a * (Q3) + b$$

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	0.323	0.298	0.305	0.303	0.329	0.351	0.356	0.415	0.487	0.484	0.494	0.458
b	-138	-120	-107	-121	-172	-189	-151	-200	-318	-313	-314	-275
r ²	0.907	0.925	0.957	0.917	0.925	0.872	0.848	0.944	0.981	0.972	0.964	0.921

B. Oct 1957 - Oct 1962

Observed flow of (14158700) McKenzie River near Belknap Springs.

2. HALF MONTH

A. Jul 1928 - Sep 1957, Nov 1962 - Sep 1989

Same procedure as whole month with the following regression coefficients.

$$Q1 = a * (Q2) + b$$

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	0.810	1.158	0.976	1.035	1.075	1.016	0.980	1.219	1.048	0.670	0.817	0.508
b	220	137	181	153	134	172	174	8	149	310	233	304
r ²	0.616	0.852	0.980	0.997	0.990	0.998	0.976	0.835	0.975	0.791	0.538	0.172

$$Q2 = a * (Q3) + b$$

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	0.351	0.311	0.283	0.282	0.315	0.325	0.319	0.374	0.470	0.488	0.492	0.461
b	-168	-140	-71	-86	-139	-130	-107	-135	-288	-321	-312	-275
r ²	0.874	0.899	0.919	0.793	0.907	0.866	0.771	0.880	0.970	0.966	0.966	0.930

B. Oct 1957 - Oct 1962

Observed flow of (14158700) McKenzie River near Belknap Springs.

SMITH R. INFLOW TO RESERVOIR 14158795 (SMH)

SMITH RIVER

river mile 2.1

D.A. 18 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Sep 1957

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on extended** flow of (14158790) Smith River above Smith River Res. times 1.13*.

B. Oct 1957 - Sep 1960

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on observed flow of (14158800) Smith River near Belknap Springs times 0.77*.

C. Oct 1960 - Sep 1989

Observed flow of (14158790) Smith River above Smith River Res.

2. HALF MONTH

A. Jul 1928 - Sep 1960

Percentages derived from observed flow of (14159000) McKenzie River at McKenzie Bridge.

B. Oct 1960 - Sep 1989

Observed flow of (14158790) Smith River above Smith River Res.

* Based on drainage area.

** Flows for the period Jul 28 - Sep 57 for (14158790) were filled in by graphical correlation*** with (14162000) Blue River near Blue River.****

*** Values taken from a previous study.

**** Flows for the period Jul 28 - Aug 35 were filled in by a graphical correlation*** of (14162000) with [(14162500) McKenzie River near Vida minus (14159000) McKenzie River at McKenzie Bridge].

MC KENZIE RIVER

river mile 81.9

D.A. 184 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Sep 1960

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on a correlation of (14158850) McKenzie River below Trail Bridge Dam near Belknap Springs with (14159000) McKenzie River at McKenzie Bridge.

B. Oct 1960 - Sep 1989

Observed flow of (14158850) McKenzie River below Trail Bridge Dam near Belknap Springs.

2. HALF MONTH

A. Jul 1928 - Sep 1960

Percentages derived from observed flow of (14159000) McKenzie River at McKenzie Bridge.

B. Oct 1960 - Sep 1989

Observed flow of (14158850) McKenzie River below Trail Bridge Dam near Belknap Springs.

SF MC KENZIE RIVER

river mile 4.5

D.A. 208 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Sep 1947

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on a graphical correlation* between (14159500) SF McKenzie River near Rainbow with (14162500) McKenzie River near Vida.

B. Oct 1947 - Sep 1989

Observed flow of (14159500) SF McKenzie River near Rainbow.

2. HALF MONTH

A. Jul 1928 - Sep 1947

Percentages derived from observed flow of (14162500) McKenzie River near Vida.

B. Oct 1947 - Sep 1989

Observed flow of (14159500) SF McKenzie River near Rainbow.

* Values taken from an old study.

BLUE RIVER 14162150 (BLU)

BLUE RIVER

river mile 1.7

D.A. 88 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Dec 1964

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on 1.173* times extended flow** of (14162000) Blue River near Blue River.

B. Jan 1965 - Sep 1966

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was determined as 1.26* times flow of [(14161100) Blue River below Tidbits Cr near Blue River plus (14161500) Lookout Creek near Blue River].

C. Oct 1966 - Sep 1989

Observed flows of (14162200) Blue River at Blue River.

2. HALF MONTH

A. Jul 1928 - Aug 1935

Percentages derived from observed flow of (14162500) McKenzie River near Vida.

B. Sep 1935 - Dec 1964

Percentages derived from observed flow of (14162000) Blue River near Blue River.

C. Jan 1965 - Sep 1966

Percentages derived from observed flow of (14161100) Blue River below Tidbits Cr near Blue River.

D. Oct 1966 - Sep 89

Percentage derived from observed flow of (14162200) Blue River at Blue River.

* Based on drainage area.

** Flow for the period Jul 28 - Aug 35 were filled in by a graphical correlation*** of (14162000) Blue River near Blue River with [(14162500) McKenzie River near Vida minus (14159000) McKenzie River at McKenzie Bridge].

*** Values taken from a previous study.

MC KENZIE RIVER

river mile 38.8

D.A. 1,000 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Sep 1978

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on observed flow of (14162500) McKenzie River near Vida plus (1.52* times the computed flow for the Gate Creek Damsite**).

B. Oct 1978 - Sep 1989

Observed flow of (14162500) McKenzie River near Vida plus (1.47* times observed flow of (14163000) Gate Cr at Vida).

2. HALF MONTH

A. Jul 1928 - Sep 1978

Percentages derived from observed flow of (14162500) McKenzie River near Vida.

B. Oct 1978 - Sep 1989

Observed flow of (14162500) McKenzie River near Vida plus (1.47* times observed flow of (14163000) Gate Cr at Vida).

* Based on drainage area.

** Flows computed in Oct. 1981 report.

MC KENZIE RIVER

river mile 28.5

D.A. 1,050 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

Jul 1928 - Sep 1989

1.05 * times the computed flow for Leaburg (derived elsewhere in this report).

2. HALF MONTH

Jul 1928 - Sep 1989

1.05 * times the computed flow for Leaburg (derived elsewhere in this report).

LONG TOM RIVER

river mile 25.7

D.A. 252 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Sep 1939

Values obtained from Adjusted Streamflow and Storage report, Oct. 1981 which was based on a graphical correlation of (14169000) Long Tom River nr Alvadore, with (14170000) Long Tom river at Monroe.

B. Oct 1939 - Sep 1967

Observed flow of (14169000) Long Tom River near Alvadore.

C. Oct 1967 - Sep 1985

Observed flow of (14169001) Long Tom River + Diversion to Coyote Cr nr Alvadore.

D. Oct 1985 - Sep 1989

Observed flow of (14169000) Long Tom River near Alvadore plus 7 cfs for diversion flows to Coyote Cr nr Alvadore.

2. HALF MONTH

A. Jul 1928 - Sep 1939

Values obtained from Adjusted Streamflow and Storage report, Oct. 1981 which was based on a graphical correlation of (14169000) Long Tom River nr Alvadore, with (14170000) Long Tom river at Monroe.

B. Oct 1939 - Sep 1967

Observed flow of (14169000) Long Tom River near Alvadore.

C. Oct 1967 - Sep 1985

Observed flow of (14169001) Long Tom River + Diversion to Coyote Cr nr Alvadore.

D. Oct 1985 - Sep 1989

Observed flow of (14169000) Long Tom River near Alvadore plus 7 cfs for diversion flows to Coyote Cr nr Alvadore.

DETROIT 14180550 (DET)
BIG CLIFF 14180700 (BCL)

N. SANTIAM RIVER	river mile 60.9	D.A.	438 sq. mi.
N. SANTIAM RIVER	river mile 58.1	D.A.	453 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Sep 1935

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on flow estimated as 0.967* times the extended flow of (14181500) North Santiam River at Niagara.**

B. Oct 1935 - Sep 1938

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on observed flow of (14183000) North Santiam River at Mehama minus observed flow of (14182500) Little North Santiam River near Mehama minus 0.525* times [(14183000) North Santiam River at Mehama minus (14179000) Breitenbush River above Canyon Cr near Detroit minus (14178000) North Santiam River below Boulder Cr near Detroit].

C. Oct 1938 - Sep 1952

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on observed flow of (14181500) North Santiam River at Niagara. (During this period the gage was located above Mayflower Cr and had a drainage area of 438 square miles.

D. Oct 1952 - Sep 1978

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on observed flow of (14181500) North Santiam River at Niagara minus 0.115* times [(14181500) North Santiam River at Niagara minus (14179000) Breitenbush River above Canyon Cr near Detroit minus (14178000) North Santiam River below Boulder Cr near Detroit plus Detroit change-of-contents plus Big Cliff initial fill].

E. Oct 1979 - Sep 1989

The flows were determined as follows: (14179000) Breitenbush R above Canyon Cr near Detroit was extended by doing a correlation with (14178000) N Santiam R below Boulder Cr near Detroit. Then the flows were: (14181500) N Santiam R at Niagara minus 0.115 times [(14181500) N Santiam R at Niagara minus the extended flow of (14179000) Breitenbush R above Canyon Cr near Detroit minus (14178000) N Santiam R below Boulder Cr near Detroit plus the Detroit change-in-contents].

2. HALF MONTH

A. Jul 1928 - Sep 1938

Percentages were derived from the observed flow of (14183000) N Santiam R at Mehama.

B. Oct 1938 - Sep 1978

Percentages were derived from the observed flow of (14181500) N Santiam R at Niagara.

C. Oct 1978 - Sep 1989

The flows were determined as follows: (14179000) Breitenbush R above Canyon Cr near Detroit was extended by doing a correlation with (14178000) N Santiam R below Boulder Cr near Detroit. Then the flows were: (14181500) N Santiam R at Niagara minus 0.115 times [(14181500) N Santiam R at Niagara minus the extended flow of (14179000) Breitenbush R above Canyon Cr near Detroit minus (14178000) N Santiam R below Boulder Cr near Detroit plus the Detroit change-in-contents].

- * Based on drainage area
- ** Flow was estimated by a graphical correlation*** of (14181500) N Santiam R. at Niagara (at the gage site below Mayflower Cr having a drainage area of 453 sq. mi.) with (14183000) N Santiam R. at Mehama.
- ** Values taken from a previous study.

M. SANTIAM RIVER

river mile 5.7

D.A. 277 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Jul 1931, Oct 1947 - Sep 1950

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on the flow of (14186000) Middle Santiam R near Foster derived from graphical correlation* with (14187500) South Santiam R at Waterloo.

B. Aug 1931 - Sep 1947

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on observed flow of (14186000) Middle Santiam R near Foster.

C. Oct 1950 - Sep 1966

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on observed flow of (14186500) Middle Santiam R at mouth near Foster.

D. Oct 1966 - Sep 1980

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was obtained as follows:

Compute local inflow as follows: Foster adjusted flow** minus (14185000) South Santiam R below Cascadia minus (14185800) Middle Santiam R near Cascadia minus (14185900) Quartzville Cr. near Cascadia. Green Peter historical flow computed as [(14185800) Middle Santiam R. near Cascadia plus (14185900) Quartzville Cr near Cascadia plus 0.638*** times local inflow] minus Green Peter change of contents.

E. Oct 1980 - Sep 1989

Compute local inflow as follows: Foster adjusted flow** minus (1418500) South Santiam R below Cascadia minus (14185700) Middle Santiam R near Upper Soda minus (14185900) Quartzville Cr. near Cascadia. Green Peter historical flow computed as [(14185700) Middle Santiam R. near Upper Soda plus (141859000) Quartzville Cr. near Cascadia plus 0.711*** times local inflow] minus Green Peter change of contents.

2. HALF MONTH

A. Jul 1928 - Sep 1978

Percentages derived from the adjusted flow of Foster Dam

B. Oct 1978 - Sep 1980

Compute local inflow as follows: Foster adjusted flow** minus (14185000) South Santiam R below Cascadia minus (14185800) Middle Santiam R near Cascadia minus (14185900) Quartzville Cr. near Cascadia. Green Peter historical flow computed as [(14185800) Middle Santiam R. near Foster plus (141859000) Quartzville Cr near Cascadia plus 0.638*** times local inflow] minus Green Peter change of contents.

C. Oct 1980 - Sep 1989

Compute local inflow as follows: Foster adjusted flow** minus (14185000) South Santiam R below Cascadia minus (14185700) Middle Santiam R near Upper Soda minus (14185900) Quartzville Cr. near Cascadia. Green Peter historical flow computed as [(14185700) Middle Santiam R. near Upper Soda plus (141859000) Quartzville Cr. near Cascadia plus 0.711*** times local inflow] minus Green Peter change of contents.

- * Values taken from a previous study
- ** Foster adjusted flow determined by adding Foster and Green Peter change-in-contents to Foster historical flow (derived elsewhere in this report).
- *** Based on drainage area.

S. SANTIAM RIVER

river mile 37.7

D.A. 493 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Sep 1966

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on the extended flow of (14185000) South Santiam R below Cascadia* plus extended flow of (14186500) Middle Santiam R at mouth near Foster** plus local inflow***

B. Oct 1966 - Jul 1973

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on observed flow of (14186700) South Santiam R. at Foster.

C. Aug 1973 - Sep 1978

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on observed flow of (14187200) South Santiam R near Foster minus extended flow of (14187100) Wiley Cr at Foster.*****

D. Oct 1978 - Sep 1988

Observed flow of (14187200) South Santiam River near Foster minus (14187100) Wiley Cr at Foster.

E. Oct 1988 - Sep 1989

Observed flow of (14187200) South Santiam River near Foster minus (14187000) Wiley Cr near Foster.

2. HALF MONTH

A. Jul 1928 - Sep 1978

Percentages derived from observed flow of (14187500) South Santiam R at Waterloo.

B. Oct 1978 - Sep 1988

Observed flow of (14187200) South Santiam River near Foster minus (14187100) Wiley Cr at Foster.

C. Oct 1988 - Sep 1989

Observed flow of (14187200) South Santiam River near Foster minus (14187000) Wiley Cr near Foster.

* Flow extended as follows: Jul 28 - Sep 35; graphical correlation**** of (14185000) S Santiam R. bl Cascadia with (14187500) S Santiam R at Waterloo. Oct 35 - Sep 66; observed flow of (14185000) S Santiam R bl Cascadia.

** Flow extended as follows: Jul 28 - Jul 31, Oct 47 - Sep 50; graphical correlation**** of (14186500) Middle Santiam R at mouth nr Foster with (14187500) S Santiam R at Waterloo. Aug 31 - Sep 47; observed flow of (14186000) Middle Santiam R nr Foster. Oct 50 - Sep 66; observed flow of (14186500) Middle Santiam R at mouth nr Foster.

*** Local inflow determined as follows: Jul 28 - Sep 47; 0.75 (based on engineering judgement and drainage area) times flow of (14187000) Wiley Cr nr Foster which in turn was derived from a graphical correlation**** with (14187500) S Santiam R at Waterloo. Oct 47 - Sep 66; 0.75 (based on engineering judgement and drainage area) times (14187000) Wiley Cr nr Foster.

**** Values taken from a previous study.

***** Flow for Aug 1973 determined on the basis of engineering judgement and earlier and later recorded flows for Wiley Cr.

WILLAMETTE RIVER

river mile 26.6

D.A. 10,100 sq. mi.

Historical Flow Computations

Jul 1928 - Sep 1989

Streamflow for the entire period of record computed as the the sum of the following seven components:

1. Observed flow of (14191000) Willamette R at Salem.
2. Extended flow of (14194000) S Yamhill R near Whiteson.
 - (a) Jul 1928 - May 1934
Linear correlation of (Q1) S Yamhill R near Whiteson with (Q2) (14305500) Siletz R at Siletz ($Q1 = a*Q2 + b$)
 - (b) Jun 1934 - Jun 1940
Linear correlation of (Q3) S Yamhill R near Whiteson with (Q4) (14193000) Willamina Cr near Willamina ($Q3 = c*Q4 + d$).
 - (c) Jul 1940 - Sep 1989
Observed flow of (14194000) S Yamhill R near Whiteson.
3. Extended flow of (1419700) N Yamhill R at Pike.
 - (a) Jul 1928 - May 1934
Linear Correlation of (Q5) N Yamhill R at Pike with (Q6) (14305500) Siletz R at Siletz ($Q5 = e*Q6 + f$).
 - (b) Jun 1934 - Sep 1940, Oct 1973 - Sep 1989
Linear Correlation of (Q7) N Yamhill R at Pike with (Q8) (14193000) Willamina Cr near Willamina ($Q7 = g*Q8 + h$).
 - (c) Oct 1940 - Sep 1948
Flow of (14196500) N Yamhill R near Pike times 1.22**.
 - (d) Oct 1948 - Sep 1973
Observed flow of (14197000) N Yamhill R at Pike.
4. Extended flow of (14200000) Molalla R near Canby.
 - (a) Jul 1928
Flow determined from a graphical correlation withn (14210000) Clackamas R at Estacada and the value was taken from a previous study.
 - (b) Aug 1928 - Sep 1959, Oct 1963 Dec 1978, Feb 1979
Observed flow of (14200000) Molalla R near Canby.
 - (c) Oct 1959 - Sep 1963
Linear Correlation of (Q9) Molalla R near Canby with (Q10) (14202000) Pudding River at Aurora ($Q9 = i*Q10 + j$).
 - (d) Jan 79, Mar 79 - Sep 89
Linear Correlation of (Q10) Molalla R nr Canby with (Q11) (14198500) Molalla R ab PC nr Wilhoit ($Q10 = k*Q12 + l$)
5. Extended flow of (14202000) Pudding River at Aurora
 - (a) Jul 1928 - Sep 1928, Oct 1964 - Sep 1989
Linear correlation of (Q11) Pudding R at Aurora with (Q12) (14200000) Molalla R near Canby ($Q11 = m*Q12 + n$).
 - (b) Oct 1928 - Sep 1964

- Observed flow of (14202000) Pudding R at Aurora.
6. Extended flow of (14207500) Tualatin R at West Linn (including Oswego Canal).
 - (a) Jul 1928 - Sep 1928
Total flow (including Oswego Canal) based on engineering judgement of magnitude of summer flow of Oswego Canal and the partial record for (14207500) Tualatin R at West Linn.
The actual values were taken from a previous study.
 - (b) Oct 1928 - Sep 1989
Observed combined flow of (14207500) Tualatin R at West Linn and (14207000) Oswego Canal near Lake Oswego.
 7. Allowance for ungaged steamflow; Jul 1928 - Sep 1989.
 - (a) May-October
1.2 times extended flow of (14202000) Pudding R at Aurora.
 - (b) November-April
1.5 times extended flow of (14202000) Pudding R at Aurora.

Regression Coefficients

Monthly Averages

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	0.6	1.15284	1.41125	1.4246	1.48651	1.41332	1.48023	0.90094	0.58827	0.46192	0.38907	0.375829
b	-19	-643.942	-537.784	-147.791	-318.329	-241.133	-476.601	-2.25838	36.1123	5.81093	-3.30741	4.972381
r ²	0.9	0.85287	0.86479	0.91156	0.90535	0.90661	0.91484	0.80074	0.87413	0.7772	0.79172	0.900001
c	6.3	7.03386	7.17544	7.39007	7.71755	6.99463	7.67974	6.75758	6.11594	5.46596	4.35565	6.704458
d	-47	-174.292	-93.7336	-50.4593	-290.882	-206.849	-412.481	-194.109	-116.326	-73.7337	-37.8931	-71.1234
r ²	1	0.96861	0.94534	0.946	0.93362	0.94702	0.94267	0.95068	0.95679	0.88854	0.8351	0.927344
e	0.1	0.12095	0.17225	0.17047	0.18724	0.17303	0.14638	0.10879	0.0582	0.03804	0.03598	0.028764
f	-0.4	-24.8823	-54.9143	-1.06878	-18.0312	23.8411	11.9618	24.9474	25.405	12.8345	6.87654	7.550732
r ²	0.9	0.77423	0.81595	0.93797	0.90597	0.92859	0.92238	0.68988	0.50903	0.25293	0.54521	0.866188
g	0.7	0.81131	0.8632	0.91166	0.99838	0.88649	0.84021	0.88759	0.63923	0.79081	0.54428	0.557428
h	-2.4	1.47039	2.01365	-3.92705	-41.5851	2.54071	-1.74046	-8.41071	6.6813	-4.63155	0.73745	0.703055
r ²	0.9	0.97354	0.96094	0.96627	0.94129	0.96589	0.97838	0.93142	0.84247	0.84497	0.84143	0.918951
i	1.3	0.99846	0.79892	0.81069	0.73331	0.69427	0.71229	1.37073	1.48452	1.33535	1.16746	1.641895
j	9.7	142.787	164.038	-125.663	80.6092	317.224	448.963	22.2682	38.4737	6.93332	9.14502	-29.4114
r ²	1	0.91595	0.95624	0.92768	0.89615	0.84459	0.83829	0.85654	0.76437	0.79915	0.68776	0.866048
k	2	2.19731	2.21965	2.12005	1.86881	2.07335	1.9955	2.20356	1.85798	2.21898	1.94077	1.753951
l	-13	-50.4503	-4.15906	168.401	334.705	174.735	84.9905	-54.2319	73.4313	-20.8771	-1.04813	12.8188
r ²	0.9	0.9661	0.95445	0.92096	0.85052	0.91457	0.83031	0.75401	0.88489	0.94509	0.889	0.891469
m	0.7	0.92281	1.19677	1.16059	1.24841	1.25666	1.22146	0.67432	0.50749	0.60579	0.56982	0.527768
n	0	-27.1321	-88.6687	308.352	124.422	-130.448	-348.5	47.8906	79.5626	23.4553	18.1972	27.42059
r ²	1	0.92365	0.95869	0.93787	0.9164	0.87312	0.86634	0.92033	0.75841	0.80353	0.68452	0.865355

1st. Half Month Averages

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	0.5	0.92908	1.20946	1.47088	1.40877	1.34922	1.44923	0.91899	0.57154	0.44863	0.36222	0.350946
b	11	-381.147	-182.425	-280.498	-43.1119	-32.6995	-394.973	6.81149	70.241	22.0935	0.39408	4.802512
r ²	0.8	0.82917	0.8301	0.86957	0.86912	0.91384	0.92126	0.80981	0.89381	0.75223	0.65204	0.781845
c	6.1	6.39384	6.52439	7.57653	7.89104	7.22309	7.91655	7.05817	6.42255	5.61083	3.85586	6.421405
d	-43	-62.8867	122.304	-102.51	-240.952	-283.422	-492.474	-242.079	-141.565	-82.7151	-29.7908	-63.8051
r ²	0.9	0.96753	0.9426	0.89316	0.90406	0.95182	0.94205	0.94385	0.95172	0.89271	0.74835	0.927649
e	0	0.09365	0.16626	0.1877	0.15888	0.15635	0.14064	0.09662	0.05732	0.03554	0.03188	0.031325
f	6.4	-12.7174	-60.1342	-51.1223	68.684	69.0489	39.3052	40.861	32.6279	16.9633	7.60011	6.435369
r ²	0.8	0.74906	0.82853	0.93667	0.81487	0.92443	0.88833	0.67631	0.62742	0.2205	0.27901	0.672338
g	0.6	0.75416	0.84366	0.93758	0.92186	0.86064	0.86951	0.90437	0.59678	0.86471	0.57641	0.708355
h	-0.3	-2.78242	1.24797	-8.83614	13.3335	16.1277	-3.0933	-10.8598	12.5374	-7.02878	-0.02069	-2.25388
r ²	1	0.96712	0.97732	0.95605	0.89623	0.9691	0.98618	0.94936	0.86027	0.85196	0.72058	0.847805
i	1.5	1.00932	0.77541	0.804	0.76929	0.70175	0.70593	1.37743	1.47401	1.32648	1.12793	1.732113
j	9.1	160.612	271.369	-135.706	-39.4903	206.167	405.823	-14.9752	51.9356	14.8642	14.4698	-38.2529
r ²	0.9	0.87451	0.87329	0.83951	0.85694	0.85268	0.84237	0.75652	0.79709	0.81122	0.63048	0.854857
k	1.6	2.11937	2.23559	2.09923	1.72004	2.03453	1.94847	2.24865	1.89837	2.29636	1.92778	1.681467
l	56	-46.9087	-39.0631	194.68	430.388	225.85	144.011	-105.528	64.6395	-27.4589	-0.834	11.09815
r ²	0.8	0.93695	0.94007	0.87261	0.86968	0.93894	0.85712	0.74224	0.84076	0.95258	0.68887	0.887675
m	0.6	0.85457	1.13235	1.05838	1.14417	1.25495	1.24167	0.66041	0.53029	0.61766	0.55964	0.495481
n	14	-25.1545	-50.9856	554.679	376.575	-17.1957	-284.041	102.628	70.7301	25.5241	19.2427	30.22659
r ²	0.9	0.87799	0.88049	0.85137	0.88087	0.88063	0.87199	0.90918	0.78698	0.81526	0.66267	0.8587

OAK GROVE FK RIVER

river mile 15.8

D.A. 53 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Sep 1956

The change in contents at Timothy Lake for 1928 - 1989 were added to the observed flow of (14209000) Oak Grove Fork above powerplant intake for the same period to get an unregulated flow. Then the change in contents for Timothy Lake for the period Oct 56 - Sep 89 were added to the observed flow of (14208700) Oak Grove Fork near Government Camp to get an unregulated flow. These two were then regressed against each other to get the extended flow of (14208700) Oak Grove Fork near Gov't Camp.

B. Oct 1956 - Sep 1989

Observed flow of (14208700) Oak Grove Fork near Gov't Camp.

2. HALF MONTH

A. Jul 1928 - Sep 1956

The change in contents at Timothy Lake for 1928 - 1989 were added to the observed flow of (14209000) Oak Grove Fork above powerplant intake for the same period to get an unregulated flow. Then the change in contents for Timothy Lake for the period Oct 56 - Sep 89 were added to the observed flow of (14208700) Oak Grove Fork near Government Camp to get an unregulated flow. These two were then regressed against each other to get the extended flow of (14208700) Oak Grove Fork near Gov't Camp.

B. Oct 1956 - Sep 1989

Observed flow of (14208700) Oak Grove Fork near Gov't Camp.

OAK GROVE FK

river mile 5.1

D.A. 126 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

Jul 1928 - Sep 1989

Observed flow of (14209000) Oak Grove Fork above powerplant intake.

2. HALF MONTH

Jul 1928 - Sep 1989

Observed flow of (14209000) Oak Grove Fork above powerplant intake.

2 of 5

NORTH FORK 14209805 (NFK)

FARADAY 14209850 (FAR)

RIVER MILL 14209995 (RML)

CLACKAMAS RIVER river mile 31.1
CLACKAMAS RIVER river mile 26.2
CLACKAMAS RIVER river mile 23.3

D.A. 665 sq. mi.
D.A. 667 sq. mi.
D.A. 671 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

Jul 1928 - Sep 1989

Observed flow of (14210000) Clackamas River at Estacada.

2. HALF MONTH

Jul 1928 - Sep 1989

Observed flow of (14210000) Clackamas River at Estacada.

SWIFT 1 14217610 (SWF)
SWIFT 2 14217814 (SW2)

LEWIS RIVER
LEWIS RIVER

river mile 47.9
river mile 47.9

D.A. 480 sq. mi.
D.A. 480 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

Jul 1928 - Sep 1989

Project outflows furnished by Pacific Power and Light Co.

2. HALF MONTH

Jul 1928 - Sep 1989

Project outflows furnished by Pacific Power and Light Co.

LEWIS RIVER

river mile 34.2

D.A. 596 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

Jul 1928 - Sep 1989

Project outflows furnished by Pacific Power and Light Co.

2. HALF MONTH

Jul 1928 - Sep 1989

Project outflows furnished by Pacific Power and Light Co.

LEWIS RIVER

river mile 19.5

D.A. 730 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

Jul 1928 - Sep 1989

Project outflows furnished by Pacific Power and Light Co.

2. HALF MONTH

Jul 1928 - Sep 1989

Project outflows furnished by Pacific Power and Light Co.

PACKWOOD LAKE 14225420 (PKL)
PACKWOOD (PAK)

LAKE CREEK

river mile 5.3

D.A. 19 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

Jul 1928 - Sep 1989

Project outflows furnished by Washington Public Power Supply System.

2. HALF MONTH

Jul 1928 - Sep 1989

Project outflows furnished by Washington Public Power Supply System.

N. FK. SKOKOMISH RIVER river mile 19.6

D.A. 94 sq. mi.

Adjusted Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Sep 1930, Oct 1940 - Sep 1978

Observed flow of (12057500) North Fork Skokomish River near Hoodsport plus change in contents of Lake Cushman

B. Oct 1930 - Sep 1940

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which were obtained as the observed flow of (12057500) NF Skokomish River near Hoodsport plus change in contents of Lake Cushman.

C. Oct 1978 - Sep 1989

Adjusted flows furnished by Tacoma City Light.

2. HALF MONTH

A. Jul 1928 - Sep 1930, Oct 1940 - Sep 1978

Observed flow of (12057500) North Fork Skokomish River near Hoodsport plus change in contents of Lake Cushman

B. Oct 1930 - Sep 1940

Percentages were derived from the observed flow of (12056500) NF Skokomish River below Staircase Rapids near Hoodsport.

C. Oct 1978 - Sep 1989

Adjusted flows furnished by Tacoma City Light.

N FK SKOKOMISH RIVER

river mile 17.3

D.A. 99 sq. mi.

Adjusted Flow Computations

1. WHOLE MONTH

Jul 1928 - Sep 1989

Flows for Cushman 2 were taken to be the flows from Cushman 1 (derived elsewhere in this report) plus the following:

Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
3	10	15	18	15	11	6	4	3	1	0	1

1. HALF MONTH

Jul 1928 - Sep 1989

Flows for Cushman 2 were taken to be the flows from Cushman 1 (derived elsewhere in this report) plus the following:

Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
3	10	15	18	15	11	6	4	3	1	0	1

COWLITZ RIVER

river mile 65.5

D.A. 1,170 sq. mi.

Adjusted Flow Computations

1. WHOLE MONTH

- A. Jul 1928 - Jul 1932, Mar 1933 - Sep 1935, Oct 1947 - Sep 1959

Observed flow of (14235000) Cowlitz River at Mossyrock plus change in contents of Packwood Lake.

- B. Aug 1932 - Feb 1933, Oct 1935 - Sep 1946, Oct 1959 - Oct 1968

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was obtained as the extended flow (extended by linear correlation with nearby stations) of (14235000) Cowlitz River at Mossyrock plus change of contents of Packwood Lake.

- C. Nov 1968 - Sep 1989

Adjusted streamflows furnished by Tacoma City Light.

2. HALF MONTH

- A. Jul 1928 - Jul 1932, Mar 1933 - Sep 1935, Oct 1947 - Sep 1959

Observed flow of (14235000) Cowlitz River at Mossyrock plus change in contents of Packwood Lake.

- B. Aug 1932 - Feb 1933, Oct 1935 - Sep 1946

Percentages derived from observed flow of (14226500) Cowlitz River at Packwood, WA.

- C. Oct 1959 - Sep 1968

Percentages derived from observed flow of (14233500) Cowlitz River near Kosmos.

- D. Oct 1968

Percentages derived from observed flow of (14233500) Cowlitz River near Randle.

- E. Nov 1968 - Sep 1989

Adjusted streamflows furnished by Tacoma City Light.

COWLITZ RIVER

river mile 52

D.A. 1,400 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Mar 1934

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which were furnished by Tacoma City Light, and derived by linear correlation with nearby streamgages.

B. Apr 1934 - Sep 1989

Observed flow of (14238000) Cowlitz River below Mayfield Dam.

2. HALF MONTH

A. Jul 1928 - Jul 1932, Mar 1933 - Mar 1934

Percentages derived from observed flow of (14235000) Cowlitz at Mossyrock.

B. Aug 1932 - Feb 1933

Percentages derived from observed flow of (14226500) Cowlitz River at Packwood.

C. Apr 1934 - Sep 1989

Observed flow of (14238000) Cowlitz River below Mayfield Dam.

LAGRANDE 12085510 (LAG)
ALDER 12085010

NISQUALLY RIVER

river mile 42.5
river mile 44.2

D.A. 289 sq. mi.
D.A. 286 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Sep 1931, Oct 1943 - Sep 1989

Observed flow of (12086500) Nisqually River at La Grande.

B. Oct 1931 - Sep 1943

Values obtained from Adjusted Streamflow and Storage report, Oct 1981 which was based on observed flow of (12084000) Nisqually River near Alder plus 1.315* times (12084500) Little Nisqually River near Alder. **

2. HALF MONTH

A. Jul 1928 - Sep 1930, Oct 1943 - Sep 1989

Observed flow of (12086500) Nisqually River at La Grande.

B. Oct 1930 - Sep 1943

Percentages derived from observed flow of (12084000) Nisqually River near Alder.

* Based on drainage area.

** Record for the 4 month period Jun 43 - Sep 43 of the Little Nisqually was estimated from a correlation with (12026000) Skookumchuck R near Centralia (values from a previous study).

WHITE RIVER

river mile 24.3

D.A. 407 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

Jul 1928 - Sep 1989

Project outflows furnished by Puget Sound Power & Light Co.

2. HALF MONTH

Jul 1928 - Sep 1989

Project outflows furnished by Puget Sound Power & Light Co.

ROSS 12175010	(ROS)
DIABLO 12176510	(DIA)
GORGE 12177710	(GOR)

SKAGIT RIVER	river mile 105.2
SKAGIT RIVER	river mile 101
SKAGIT RIVER	river mile 96.6

D.A.	999 sq. mi.
D.A.	1,125 sq. mi.
D.A.	1,159 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

Jul 1928 - Sep 1989

Inflow furnished by City of Seattle.

2. HALF MONTH

Jul 1928 - Sep 1989

Inflow furnished by City of Seattle.

UPPER BAKER 12191610 (UBK)
LOWER BAKER 12193010 (SHA)

BAKER RIVER river mile 9.3
BAKER RIVER river mile 1.2

D.A. 215 sq. mi.
D.A. 297 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

Jul 1928 - Sep 1989

Project outflows furnished by Puget Sound Power and Light Co.

2. HALF MONTH

Jul 1928 - Sep 1989

Project outflows furnished by Puget Sound Power and Light Co.

LOST CREEK 14335050 (LOS)

ROGUE RIVER

river mile 157.2

D.A. 674 sq. mi.

Historical Flow Computations

WHOLE MONTH

A. Jul 1928 - Sep 1928, Oct 1965 - Sep 1967

Flow derived from (a correlation of (Q1) (14225000) Rogue River below South Fork Rogue River near Prospect with the flow of (Q2) (14328000) Rogue River above Prospect) times the monthly weighting factors* given in step B.

$$Q1 = a \cdot Q2 + b$$

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	1.828	1.752	2.126	2.188	2.057	1.906	1.823	1.745	1.827	2.170	2.115	2.068
b	225	242	22	73	181	315	240	318	349	145	152	145
r ²	0.961	0.985	0.989	0.954	0.928	0.821	0.902	0.981	0.984	0.974	0.953	0.942

B. Oct 1928 - Sep 1965

Observed flow of (14335000) Rogue River below South Fork Rogue River near Prospect times the monthly weighting factors.*

Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1.010	1.020	1.035	1.035	1.040	1.040	1.015	1.010	1.008	1.006	1.005	1.007

C. Oct 1967 - Sep 1989

[Observed flow of (14337600) Rogue River near McLeod minus observed flow of (14337500) Big Butte Cr near McLeod] times monthly weighting factors.*

Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
0.982	0.984	0.973	0.973	0.968	0.969	0.988	0.992	0.994	0.996	0.997	0.995

HALF MONTH

A. Jul 1928 - Sep 1928, Oct 1965 - Sep 1967

Flow derived from (a correlation of (Q3) (14225000) Rogue River below South Fork Rogue River near Prospect with the flow of (Q4) (14328000) Rogue River above Prospect) times the monthly weighting factors* given in step B.

$$Q3 = c \cdot Q4 + d$$

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
c	1.946	1.671	1.895	2.080	1.951	1.986	1.771	1.725	1.727	2.129	2.157	2.082
d	186	285	136	118	260	250	345	336	443	167	144	145
r ²	0.957	0.971	0.975	0.949	0.917	0.904	0.864	0.969	0.983	0.978	0.947	0.948

B. Oct 1928 - Sep 1965

Observed flow of (14335000) Rogue River below South Fork Rogue River near Prospect times the monthly weighting factors.*

Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1.010	1.020	1.035	1.035	1.040	1.040	1.015	1.010	1.008	1.006	1.005	1.007

C. Oct 1967 - Sep 1989

[Observed flow of (14337600) Rogue River near McLeod minus observed flow of (14337500) Big Butte Cr near McLeod] times monthly weighting factors. **

Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
0.992	0.984	0.973	0.973	0.969	0.969	0.988	0.992	0.994	0.996	0.997	0.995

- * Monthly weighting factors taken from "Lost Creek Reservoir Design Memorandum"
- ** These factors computed from the ones given in "Lost Creek Reservoir Design Memorandum" by adjusting for the incremental ungaged areas between the sites and gages involved.

"A" CANAL - 11507200 (ACL)

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Sep 1960

Flow data furnished by Portland District Office, U.S.G.S.

B. Oct 1960 - Sep 1981

Observed flow of (11507200) "A" Canal @ Klamath Falls.

C. Oct 1981 - Sep 1989

Flow data furnished by U.S.B.R.

2. HALF MONTH

A. Jul 1928 - Sep 1960

Flow data furnished by Portland District Office, U.S.G.S.

B. Oct 1960 - Sep 1981

Observed flow of (11507200) "A" Canal @ Klamath Falls.

C. Oct 1981 - Sep 1989

Flow data furnished by U.S.B.R.

LINK RIVER - 11507400 (LNK)

LINK RIVER

river mile 254.3

D.A. 3,810 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Sep 1983

Observed flow of (11507501) Link R & Keno Canal nr Klamath Falls.

B. Oct 1983 - Sep 1989

Observed flow of (11507500) Link R. @ Klamath Falls plus Westside (Keno) Canal (from PP&L).

2. HALF MONTH

A. Jul 1928 - Sep 1983

Observed flow of (11507501) Link R & Keno Canal nr Klamath Falls.

B. Oct 1983 - Sep 1989

Observed flow of (11507500) Link R. @ Klamath Falls plus Westside (Keno) Canal (from PP&L).

KLAMATH RIVER

river mile 224.7

D.A. 4,080 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Sep 1960

Flows derived from a correlation between (Q1)(11510700) Klamath R. bl John C. Boyle Power plant nr Keno plus Change of Storage and (Q2)(11509500) Klamath R. @ Keno.

$$Q1 = a * Q2 + b$$

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	0.96002	0.92842	0.95792	0.99095	0.98823	0.99531	0.9896	1.00667	1.03402	0.95068	0.96437	0.98615
b	267.428	318.114	278.563	221.156	219.543	206.236	299.05	265.038	244.443	268.868	266.665	247.376
r ²	0.99467	0.99521	0.99384	0.9975	0.99675	0.99732	0.99679	0.9967	0.99114	0.96295	0.93722	0.98474

B. Oct 1960 - Sep 1989

Observed flows of (11510700) Klamath R. bl John C. Boyle Power plant.

2. HALF MONTH

A. Jul 1928 - Sep 1960

Flows derived from a correlation between (Q3)(11510700) Klamath R. bl John C. Boyle Power plant nr Keno plus Change of Storage and (Q4)(11509500) Klamath R. @ Keno.

$$Q3 = c * Q4 + d$$

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
c	0.96956	0.93242	0.93326	0.97598	0.9846	1.01075	0.96697	0.99008	1.01414	0.97632	0.95184	0.99321
d	253.707	308.806	310.108	263.808	223.409	172.278	291.708	293.812	256.619	260.336	273.422	248.178
r ²	0.99157	0.99499	0.9901	0.99146	0.99648	0.99657	0.99611	0.99631	0.99458	0.98496	0.95238	0.97618

B. Oct 1960 - Sep 1989

Observed flows of (11510700) Klamath R. bl John C. Boyle Power plant.

KLAMATH RIVER

river mile 198.6

D.A. 4,300 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Sep 1961

Observed flow of (11512500) Klamath R. bl Fall Cr. nr Copco.

B. Oct 1961 - Sep 1989

Flows derived from a correlation between (Q1)(11512500) Klamath R. bl Fall Cr. nr Copco and (Q2)(11509500) Klamath R. @ Keno.

$$Q1 = a * Q2 + b$$

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	1.05423	1.00238	1.04874	1.0683	1.04283	1.02491	1.04834	1.05359	1.07093	1.04808	0.99792	1.04041
b	159.154	260.872	239.364	202.633	267.003	320.907	287.271	269.135	243.376	194.858	245.623	178.029
r ²	0.98977	0.9923	0.98761	0.99318	0.99182	0.99505	0.99295	0.99713	0.9948	0.97715	0.98745	0.98523

2. HALF MONTH

A. Jul 1928 - Sep 1961

Observed flow of (11512500) Klamath R. bl Fall Cr. nr Copco.

B. Oct 1961 - Sep 1989

Flows derived from a correlation between (Q3)(11512500) Klamath R. bl Fall Cr. nr Copco and (Q4)(11509500) Klamath R. @ Keno.

$$Q3 = a * Q4 + b$$

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
a	1.075	0.99868	1.00418	1.02035	1.03539	1.02292	1.03	1.03259	1.05058	1.04121	1.0133	1.02237
b	107.717	273.932	280.343	261.961	272.745	320.212	314.179	307.841	269.911	206.035	239.958	202.401
r ²	0.9823	0.98915	0.98256	0.98591	0.98768	0.99292	0.99244	0.99596	0.99387	0.97013	0.97969	0.97325

IRON GATE 11516515 (IRG)

KLAMATH RIVER

river mile 190.7

D.A. 4,63 sq. mi.

Historical Flow Computations

1. WHOLE MONTH

A. Jul 1928 - Sep 1961

Observed flow of (11512500) Klamath R. bl Fall Cr. nr Copco multiplied by 1.03 to adjust flows for the difference in drainage areas.

B. Oct 1961 - Sep 1989

Observed flow of (11516530) Klamath R bl Iron Gate Dam

2. HALF MONTH

A. Jul 1928 - Sep 1961

Observed flow of (11512500) Klamath R. bl Fall Cr. nr Copco multiplied by 1.03 to adjust flows for the difference in drainage areas.

B. Oct 1961 - Sep 1989

Observed flow of (11516530) Klamath R bl Iron Gate Dam

Section B

RESERVOIR CHANGE OF CONTENT COMPUTATIONAL PROCEDURES, CAPACITY TABLES, AND SOURCE CODE

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BPA Power Streamflow Project Reservoir Data

PURPOSE

The purpose of this section is to describe and document the data acquisition and computational procedures that were used for computing reservoir change of contents. A brief discussion of data sources and problems is followed by a discussion of capacity table development and a description of the several Basic Language programs used in the study. Specific details of methods and data quality analysis are given for each reservoir in the set of attached summary sheets. Also attached is a listing of the capacity table coefficients for each reservoir, in a format similar to that used by the Columbia River Water Management Group within the CROHMS system.

GENERAL

Reservoir data, unlike streamflow data, have been collected and published in widely different formats. The most common form of publication prior to the mid 1960's was as end of month contents. Daily elevations were often collected in the field but not published. With the advent of computer processing of surface water data in the middle 1960's priority was given to streamflow data. Starting about 1965 digital recorders were installed at streamflow stations. Installation of digital recorders at reservoir sites began during the late 1960's and early 1970's. At that time daily reservoir data became more readily available and was often published.

During the early 1970's a massive nation wide effort was made to keypunch the old daily discharge records for the entire period of record to build the USGS WATSTORE data base. Reservoir daily values were processed into the data base beginning whenever a digital recorder was installed at the site, but no effort was made, usually, to keypunch and enter the old reservoir records into WATSTORE.

WATSTORE was originally designed to process streamflow data. The system could not easily accommodate ranges of stage greater than about 100 feet. While extensive provision was made for storing and applying stage-discharge rating tables for streamflow stations, no provision was made for the much larger reservoir capacity tables. Provision was made to store daily reservoir data under any one of several parameter codes including gage height, mean daily elevation instantaneous elevation, and acre feet contents. It became common practice to subtract a constant value from elevations and store the result as a gage height with a value less than 100 feet. The result is that reservoir data for any given reservoir might be found in bits and pieces in WATSTORE under an assortment of different parameter codes. It is generally not possible to extract from WATSTORE a continuous record of elevation data for a specific reservoir, even for recent years. As noted above, WATSTORE contains no

reservoir data at all, for most reservoirs, prior to 1965.

In Canada, reservoir data were, at one time, published in feet, and sometimes a datum correction was applied as well. In later years the published elevation data were in metric units. When the early data were prepared for entry into computer data bases the elevations in feet were converted to meters. Canadian elevation data extracted from CDROM for this study had to be converted from meters to feet, and then adjusted by adding any necessary datum corrections. At some reservoirs the gage was moved from one location to another at various times. The data collected at the several sites were published under different names and station numbers.

During the course of the previous depletion studies, the end of month contents used for the Canadian reservoirs was usually not based directly on published elevations. It was derived from midnight elevations compiled by the U.S. Geological Survey and others either from published data or from operational data provided by the Canadian entities. The midnight elevations were computed by interpolating between 8 A.M readings etc., depending on what kind of data were available. No record of those derived end of month elevations has been preserved in the files in any usable form. For the present study it was necessary to use elevation data as available in Canadian data bases and publications. Therefore the computed change of contents values used in this study do not always agree with those developed for the previous study. We coordinated this work with the appropriate entities in Canada to achieve a reasonable balance between what was done last time and what is considered valid and acceptable to all parties for this study.

In summary, the monthly change of contents in mean cfs computed for this study sometimes differs from those used in the previous study. The change of contents values computed for this project for the period 1928-78 were compared to those published in the Depletions Task Force publication "Adjusted Streamflow and Storage" and every effort was made to locate and reconcile any discrepancies. The attached set of summary sheets documents the results of this comparison for each reservoir.

CAPACITY TABLES

Reservoir capacity tables required for this project have been prepared in the format adopted by the Columbia River Water Management Group for use in CROHMS. Where possible, the capacity tables used here are duplicates of those used by CROHMS.

For this project the historic (1928-89) change of contents were computed in a batch mode using various Basic Language programs to create and access the capacity tables. To facilitate future updates the capacity tables were re-formatted and placed into spreadsheet files; appropriate Macros were developed to use them in that context. The following discussion is restricted to the manner in which capacity tables were stored and used in the batch mode along with a brief description of the computational algorithm required for their use.

Each table is stored on disk as an unformatted ASCII file. The following is an example of such a file, for Cottage Grove Reservoir.

```
4
18
720,3,-710.8957,-12.1738
725,44,-717.101,12.4041
730,150,-719.562,38.6616
735,399,-723.6169,133.3932
740,925,-719.6485,-58.6556
745,1843,-710.5262,-742.5364
750,3139,-719.046,95.19459999999999
755,4865,-720.0439,227.4922
760,7153,-699.1717,-3390.5675
765,9973,-699.1539,-3393.7489
770,13255,-708.3537,-1231.872
775,17074,-696.9813,-4355.1386
780,21463,-682.3583,-8903.5594
785,26371,-683.4254,-8536.791300000001
790,31784,-665.5062,-15316.153
795,37690,-646.3509,-23157.042
800,44039,-639.466,-26167.849
805,50806,0,0
```

The first number in the file (4) is a type code. The second number (18) is the number of sets of data to follow. The remaining 18 sets of data contain elevation, contents and equation coefficients needed to define the capacity table. The type code distinguishes between two types of capacity tables, type 4 and type 7. Type 7 tables are used for some Canadian reservoirs and will be described in later paragraphs. Type 4 tables are used for all U.S. and some Canadian reservoirs.

For purposes of documentation and easier reference the ASCII files have been re-formatted, labeled and attached to this report in the following form:

```
COT.CAP
Cottage Grove Reservoir
01-01-68
Type code = 4   No. of points = 18
```


Elevation	Contents	A1	A3
720	3	-710.8957	-12.1738
725	44	-717.1010	12.4041
730	150	-719.5620	38.6616
735	399	-723.6169	133.3932
740	925	-719.6485	-58.6556
745	1843	-710.5262	-742.5364
750	3139	-719.0460	95.1946
755	4865	-720.0439	227.4922
760	7153	-699.1717	-3390.5675
765	9973	-699.1539	-3393.7489
770	13255	-708.3537	-1231.8720
775	17074	-696.9813	-4355.1386
780	21463	-682.3583	-8903.5594
785	26371	-683.4254	-8536.7913
790	31784	-665.5062	-15316.1530
795	37690	-646.3509	-23157.0420
800	44039	-639.4660	-26167.8490
805	50806	0.0000	0.0000

The coefficients used to define type 4 tables are necessary and sufficient to evaluate logarithmically linear equations, as follows.

Given an equation of the form $V = A_0 * ((E + A_1)^{A_2}) + A_3$ where V is volume in acre feet, E is elevation in feet, and $A_0..A_3$ are coefficients. The logarithmic form of this equation is

$$\text{LOG}(V - A_3) = \text{LOG } A_0 + A_2 * \text{LOG}(E + A_1)$$

and is therefore log-linear. It can be evaluated by interpolation procedures using the values of $\text{LOG}(V - A_3)$ and $\text{LOG}(E + A_1)$ so that there is no need to know or store the values of coefficients A_0 and A_2 . Referring to the reformatted version of the Cottage Grove table (above), the following interpretation applies. The A_1 and A_3 coefficients associated with elevation 720 feet ($A_1 = -710.8957$, $A_3 = -12.1738$) define a log-linear segment of the table beginning at elevation 720 and ending at elevation 725. The volume associated with any elevation, E_x , falling between 720 and 725 can be found by interpolating between $(\text{LOG}(720 - 710.8957), \text{LOG}(3 + 12.1738))$ and $(\text{LOG}(725 - 710.8957), \text{LOG}(44 + 12.1738))$.

Given an elevation E_x for which a volume V_x is required, first do a search of the capacity table to find the elevation interval which contains E_x , such that $E_1 \leq E_x \leq E_2$. Use the values of the A_1 and A_3 constants associated with elevation E_1 . Then

$$\frac{\text{Log}(E_x + A_1) - \text{Log}(E_1 + A_1)}{\text{Log}(E_3 + A_1) - \text{Log}(E_1 + A_1)} = \frac{\text{Log}(V_x - A_3) - \text{Log}(V_1 - A_3)}{\text{Log}(V_3 - A_3) - \text{Log}(V_1 - A_3)}$$

and

$$\text{Log}(V_x - A_3) = \frac{(\text{Log}(E_x + A_1) - \text{Log}(E_1 + A_1)) * (\text{Log}(V_3 - A_3) - \text{Log}(V_1 - A_3))}{\text{Log}(E_3 + A_1) - \text{Log}(E_1 + A_1)} + \text{Log}(V_1 - A_3)$$

Then

$$V_x = (\text{EXP}(\text{Log}(V_x - A_3)) + A_3, \text{ (where EXP is inverse Log)}$$

A complete theoretical description of the methods for deriving the necessary coefficients is beyond the scope of this report. In general the mathematical procedures applied in each case depend on the value of coefficient A2 which is, in turn, derived from the form of the capacity table itself. If any sequence of elevation-volume pairs is such that the differences between successive volumes are constant (constant first differences) the value of A1 is 1. That segment of the table is arithmetically linear, A3=0 and A1 can be derived by ordinary algebra. For a sequence of elevation-volume pairs such that the second differences (difference between first differences) are constant, then A2=2 and the values for A1 and A3 can be found by simple algorithms derived from the Calculus of finite differences. For those capacity tables originally generated from elevation-area pairs by the so-called "conic expansion method" as used by the U. S. Army Corps of Engineers, A2=3 and the remaining coefficients are derived directly from the elevation-area data and the formula for the volume of a right circular cone.

A few of the older reservoir capacity tables were originally created in such a way that the methods described above do not reproduce them adequately. Log linear equations were developed for such tables by the use of various curve fitting routines. This work was done several years ago by the U.S. Geological Survey and the results were reviewed and approved for use in the CROHMS environment by the Columbia River Water Management Group.

Some Canadian reservoirs, most notably Mica, and Upper and Lower Arrow, have capacity tables that were developed from a polynomial curve fitting routine. The resulting equations are not log-linear and cannot be evaluated by the algorithm discussed above. The general form of these equations is

$$V = A_0 * (E + A_1)^{A_2} + A_3 * E + A_4$$

An example of the way these equations are stored on disk for the BPA Power Flow project is given here for Upper Arrow Reservoir.

7
1
1370,117.0557,-1370,2.1435,51728.9237,-70868625,1450

For Canadian reservoirs of this kind, the type code is 7.

For this particular reservoir only one equation is required. It is applicable between elevations 1370 (the first value in the string) and 1450 (the last value). The other values in the string are the coefficients A0, A1, A2, A3, and A4 in that order.

The computation algorithm for this type of capacity table simply evaluates the entire equation directly.

BASIC LANGUAGE PROGRAMS

Computation of reservoir change of contents in mean cfs for the BPA Power Flow study required the use of reservoir capacity tables to convert elevation data to storage in acre feet. A group of special purpose computer programs were written in Quick Basic for the purpose of creating and using capacity tables. Subsequently the capacity tables and the table lookup routines were embedded in a spreadsheet macro for use in future updates, but this macro was not used in the initial development of the reservoir change of contents data. The purpose of the following discussion is to provide a brief description of each of the batch programs and their use. Four programs were used extensively. They are:

CAPTABLE
CANTABLE
CONVERT
REVERT

All four of these programs have been compiled into .EXE files so they can be run directly from DOS. The source code is also provided for the benefit of those who have access to Microsoft Quick Basic and wish to make changes to the programs.

Captable

This was designed primarily as a data entry program. It accepts keyboard input of reservoir capacity table coefficients and creates an ASCII file containing those values. The resulting ASCII text file contains a type code (4), a counter indicating how many sets of coefficients are contained in the file, and those sets of coefficients. When all the required

coefficients have been entered the program prompts for a file name under which to store the capacity table. File names used in the BPA Power Flow study take the form of xxx.CAP as, for example, HCR.CAP (Hills Creek Reservoir). The program then goes into a table lookup mode. It prompts for an elevation and returns the value of storage in acre feet associated with that elevation. This routine was designed primarily as a means of testing the newly entered capacity table, to make sure all the coefficients were entered correctly. It can be used for other purposes as well. When first executed, the program gives the user the option of creating a new table or reading an existing one from disk. If the first option is chosen, the program by-passes the data entry mode and goes directly to the table lookup routine.

Cantable

This program essentially duplicates the function of program CAPTABLE and is used exactly the same way. It differs in that the capacity table coefficients are different in number and are stored in a slightly different format. The program is designed to deal with those Canadian capacity tables that are not log-linear and require additional coefficients. The type code for this kind of table is 7. The appropriate type codes are automatically written to the capacity table file by programs CAPTABLE and CANTABLE.

Convert

This program requires no keyboard input other than file names for capacity table, input, and output files. The input file will have been prepared by printing to an ASCII text file from within a spreadsheet. Each line of the text file must begin with a water year and contain an additional twelve values of elevation. There must be no leading blank lines or headers in this file. Program CONVERT prompts for the name of the capacity table file and for the name of the text file. It reads the text file and converts all the elevations to acre feet. It can apply either the Canadian (type 7) or the U.S. (type 4) algorithm to the elevations depending upon what type code it reads in the capacity table file.

The acre-ft storage data are then written to a text file in the same basic format as the elevation data. The resulting output file is then ready to be imported back into a spreadsheet.

Revert

This program operates in the same manner as program CONVERT except that it has the opposite function. It converts a file of acre-ft data into a file of elevation data. It will not operate on Type 7 (Canadian) capacity tables. If it encounters the type 7 code in the capacity table file it displays a "sorry" message and prompts for a new capacity table file name.

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SUMMARY SHEETS

The following pages are summaries of the data and methods applied to compute change of contents for each reservoir.

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MCD MICA DAM 1222700 08ND017

Published elevation data obtained from CDROM for water years 1974-89. Reservoir began operation in February of 1973 water year.

The elevations were converted to storage using capacity table MCD.CAP dated 3-25-74.

The end of month change of contents derived from the computed acre feet checked the Pink Book for water years 1975-89. They did not check the PB for 1974 water year.

I assumed that the EOM contents for 1974 were furnished for the previous study by Canada and should be used unchanged. Therefore, I used the PB published change of contents and worked backwards from the 1975 water year to compute new acre-feet EOM contents for 1974 and continued the process to compute estimated EOM contents for Feb-Sept of the 1973 water year.

The split month contents for water years 1973 and 1974 were estimated by prorating the monthly EOM contents.

The elevations contained in the file 122270EL.Wk1 are those retrieved from CDROM. The elevations for 1973-1974 and for October 1975 water year were NOT changed to reflect the computed storage data for this period. If the elevations are ever run through the capacity table, the resulting storage data for 1973, 1974 and Oct 1975 water years will NOT agree with those values contained in file 122270AF.Wk1.

RVC REVELSTOKE PROJECT 12228962

Data sheets were provided by the Environmental Conservation Directorate, Canada containing end of day elevations and storage for October 1983 to September 1989.

These data were entered directly into the appropriate files (monthend and split month elev and contents) and the change of contents values were computed from them.

No capacity table is available.

UPA	UPPER ARROW RESERVOIR	12235000	08NE045
			08NE104

Prior to 1969 the records for this site were published under the name Upper Arrow Lake at Nakusp (08NE045). From 1969-89 it is published as Arrow Reservoir at Nakusp (08NE104).

Capacity table UPAOLD.CAP dated April 1968 was used to compute contents for water years 1968-73.

Capacity table UPA.CAP dated 2-21-73 is the current CROHMS table and was used for water years 1974-89.

Missing data for Jan-Apr 1969 was filled in from a copy, found in the files, of BC HYDRO operating records. Contents for August 1969 was estimated using published PB change of contents and working backwards from July contents. The transition between capacity tables (October 1974 water year) was accomplished by applying the Sept 1973 elevation to the new capacity table (UPA.CAP) and computing the change of contents for October by hand. The split month contents were adjusted or estimated for all the months for which the EOM contents were changed. The file of elevation data (122350EL.WK1) contains published elevations. The elevations were NOT altered to reflect the altered contents data in file 122350AF.WK1. The computed change of contents for March 1972 is 667 cfs. The PB shows a value of 606 cfs. When Canada reviewed the results of the previous study they said there was an error because the sum of the changes at Upper and Lower Arrow lakes should have been 526 cfs. The change of contents was adjusted accordingly, showing 606 cfs for Upper Arrow and -80 cfs for Lower Arrow. Even though the published data do not support these values, I altered the change of contents filed to reflect these same changes. There is no practical way to alter the contents data to make these changes come out right without introducing discrepancies in adjacent months. Therefore, if the file 122350AF.WK1 is ever used to re-compute change of contents, the results will not agree with the change of contents computed for this study.

(note..capacity table UPAOLD.CAP is a type 4 table, UPA.CAP is type 7)

LOA LOWER ARROW LAKE 12238000 08NE102

Published as Lower Arrow Lake at Needles, 08NE046, prior to calendar year 1969. Published as Arrow Reservoir at Fauquier, 08NE102, since 1969. The CDROM contained elevation data for the period Feb 1969 to date. Elevation data for the period June 1968 to Feb 1969 was taken from Canadian publications. Elevation data on CDROM and in recent publications are in meters. They were all converted to feet by dividing meters by 0.30048.

Capacity table LOAOLD.CAP (type 4 table) dated April 1968 was used for water years 1968-73. Capacity table LOA.CAP (Type 7) dated 1-29-73 was used for water years 1974-89. The change of contents for the transition month (October 1974 water year) was computed manually and entered into the final change of contents file. Apparently this was not done in the previous study.

For the period April 1970 to December 1970 the elevations on the CDROM differ from the published elevations by a constant of 0.31 feet. The published elevations were used for this study, since that is apparently what was done in the previous study. All changes for this period agreed with the PB except for the period April-June 1970, where there are minor discrepancies.

The computed change of contents for January 1971 does not check the PB exactly. No reason for the discrepancy could be found, so the computed values were used.

The computed values of change for March and April 1972 do not agree with those published in the previous study. In an old letter found in the files, the Canadian entity points to an "obvious error" in the value which represented the sum of changes at Upper and Lower Arrows for March 1972. The PB was changed to reflect the revisions submitted by Canada. For this study the PB values for change of contents were used, as provided by Canada before. The computed change for April does not agree with the PB no matter how March is adjusted, and there seemed to be no rational way to reconcile April with the PB using the available data.

November and December of 1971 water year do not check the PB exactly. No reason for the discrepancy could be found in the published data so the computed values were used.

Because of all the manual changes that had to be made, the final file of change of contents prepared for this study cannot be duplicated by re-computing the changes from the file acre feet contents data.

Elevation data taken from CDROM and from USGS data reports. Capacity table LIB.CAP, dated 3/1/80, used for the entire period.

End of month contents were computed for Jan-Sept 1972 by applying the published change of contents data and working backwards from October 1972. The split month contents were then estimated by prorating the monthly changes. Equivalent elevations were not computed for this period. Elevation data in the file 123019EL.WK1 are exactly as they appear on the CDROM.

The change of contents computed for this study do not agree with those published in the previous study (PB), for several reasons. Prior to the development of the current capacity table the published end of month contents were probably derived manually from an elevation-volume curve, and rounded to thousands. Also, the published values represented **USABLE** contents instead of **TOTAL** contents as represented by the current capacity table. The change of contents computed from **USABLE** rather than **TOTAL** should be the same so long as they are both based on the same curve but the use of graphical means instead of using a capacity table directly always introduces some uncertainties in the final result. For this study we used the capacity table and performed no rounding in order to preserve the integrity of the split month changes. The discrepancies between the change of contents data computed for this study and those of the PB range from 0 to plus or minus 500 cfs.

BACKGROUND: Duncan Reservoir was converted from natural storage to controlled storage in 1967. The 1980 study (PB) contains monthly storage changes for 1925-78. For the period 1925-34 those changes were estimated. For the period 1935-67 they were derived from elevation data.

For the present study we have elevation data from the CDROM but do not have the required information about datum corrections or capacity tables (1935-67) to allow use of these elevations. The computations performed by the Depletions Committee for the 1980 study were not approved by the Canadian entity (letter to James Anderson dated August 1980). They furnished a table of monthly storage changes for water years 1967-78, and those were used for the 1980 study.

CURRENT STUDY: By a letter dated August 20, 1992 to Mr. Neil Lyons of the Environmental Conservation Directorate, Gary Flightner explained the ramifications of the present study including the need to compute split month changes. In response, John Lee of the Environmental Conservation Directorate provided us with data sheets containing daily elevation and storage data for water years 1967-89 (letter dated Oct 21, 1992)

DATA SUMMARY: The elevations provided by John Lee do not agree with those available on CDROM. The furnished elevations and storages are identified as End Of Day (EOD) readings; apparently those on the CDROM are mean daily or taken from some other time of day. Two different capacity tables were used by Canada, one dated 1968 and one dated 1973. The 1973 table is the one currently used by CROHMS for daily operations and is the one documented in this study as DCD.CAP.

For the present study we created a file of EOD elevations (123224EL.WK1) for documentation purposes only. We did not apply these elevations to the capacity table. Instead we created the file of acre feet (123224AF.WK1) for monthly and split month directly from the daily EOD listings provided by John Lee.

The computed storage changes based on the furnished values check the PB for 1967-78 with only a few minor exceptions. We assume these discrepancies are the result of minor changes, updates, etc., made in Canada since the previous study. For the period October 1927 to May 1967 we used the mean cfs change of storage as published in the PB and applied the monthly changes to the split months without modification.

NOTE: It should be noted that if the elevation data contained in file 123224EL.WK1 is applied to the capacity table DCD.CAP the resulting storage and change of contents values will NOT be the same as those in 123224AF.WK1 and 123224CH.WK1 and will NOT agree with the values furnished and approved by the Environmental Conservation Directorate.

The change of contents developed for the 1980 study (PB) was based on monthly storage data provided by the U.S. Geological Survey. The storage data, in turn, was derived from midnight elevations applied to the several capacity tables which have been used at various times.

For the present study the end of month midnight elevations are not available and the corresponding midmonth elevations were never compiled. The published elevations (Canadian data reports and CDROM) are not instantaneous midnight values and do not agree with those used in the previous study. Therefore the following procedure was used for the present study and was approved by the relevant Canadian entities.

1. 1928-30 wy used end of month elevations compiled jointly by the USGS (Hollis Orem) and the Canadian entities. Computed end of month storage and estimated mid-month storage from these elevations using capacity table COROLD.CAP.

2. 1931-89 wy used published elevations and applied the following capacity tables:

1931-68 water years used capacity table COROLD.CAP based on a table dated Feb 16, 1953.

1969-89 water years used capacity table COR.CAP based on a table dated 3-24-69.

HGH HUNGRY HORSE RESERVOIR 12362000

Published elevations for 1951-89 were contained on CDROM. The end of month contents for the period of initial fill, August and September of the 1951 water year, were computed from the change of contents published in the previous study.

Capacity table HGH.CAP, dated 10/19/53 was used for the entire period except during the initial fill period, when the elevations were below the lowest value of the table (October 1951 to April 1952). A capacity table extension was prepared to cover these lower elevations and is contained in file HGHLOW.WK1. The extension was used manually for this study and was not converted to storage constants necessary for computer lookup procedures. It was prepared by plotting the published end of month elevations against the published end of month contents and then applying standard USGS smoothing techniques to the resulting curve.

All of the resulting change of contents data check those prepared for the previous study.

KER FLATHEAD LAKE AT SOMERS 12371500

Elevation data was available for water years 1929-89 and part of water year 1928. Published end of month contents were used for Oct-Apr 1928 water year and Dec-Jan 1929 water year to fill in missing data. Split month contents were estimated for these periods by prorating the monthly change of contents.

The published end of month contents used in the previous study for the period 1928-47 were apparently picked off of a curve rather than by direct application of a capacity table. A plot of published elevation vs end of month contents shows a great deal of scatter. Published end of month contents are rounded to thousands of acre feet. For this study no rounding was applied. Therefore, the change of contents computed for this study are not in exact agreement with those data published in the previous study (PB). The discrepancies are relatively minor and the results of this study are considered to be more precise.

Capacity table KER.CAP, dated 10-12-43, was used for the entire period.

NOX NOXON RAPIDS 12391300

There was no data available on the CDROM for this station. Published USGS data are monthend contents only. The daily elevation data used for this study were provided by Russ Morrow of the U.S. Army Corps of Engineers from a data base maintained by the Corps. Data for April-June 1986 were missing from this file and were estimated from published end of month contents. Data for all of the 1975 water year were also missing. A tabulation of daily elevations for 1975 was found in USGS correspondence files. Capacity table NOX.CAP, dated 6/30/60, was used for the entire period of record.

An error occurs in the previous study for May 1978. The published change of contents is 26 cfs and it should have been 260 cfs.

All other values of computed contents change check the PB.

PSL PRIEST LAKE AT OUTLET, NR COOLIN, ID 12393000

The CD ROM contained gage height data for water years 1966-89. End of month contents were published for water years 1951-89. Daily gage height data were available at the USGS office in Boise but were never published. At our request the USGS entered the daily values into the USGS computer system for 1928-65 and made them available to us. We applied the appropriate datum correction and used capacity table PSL.CAP dated 6-23-58 for the entire period of record.

Controlled storage began at Priest Lake in August 1950. Prior to 1950 the records reflect natural storage. The change of contents computed for this study check those published in the PB for water years 1951 to 1978. Prior to 1951 water year there are discrepancies. We have no record of what data was used for the PB study but from the magnitude of the discrepancies and from notes on the bottom of the original capacity table, it appears that prior to 1950 contents data were derived graphically from a set of curves. The relative magnitude of the computed changes and the direction of change is the same and the size of the discrepancies is not too large, so we believe the data presented here are valid.

For water years 1928 and 1929 there was much missing record in the USGS files so we used the estimated data as published in the PB for both monthly and split month change of contents.

The CDROM contained two data files for this station. One file contained elevations and the other contained gage heights. The appropriate datum correction was applied to the gage height file and it was then merged with the elevation file.

Capacity table ALF.CAP, dated 2-2-54, was applied to all elevations. The resulting change of contents data did not agree at all with those published in the previous study for the period prior to the 1951 water year. It appeared there had been an older capacity table in use during this period but no record could be found in the files of such a table. A preliminary effort was made to develop an old table from the available elevation-contents pairs. This plot showed a great deal of scatter. It was then discovered that at the end of the 1950 water year the gaging station had been relocated and set to a slightly different datum. The capacity table was revised to reflect the new datum (a change of 0.20 ft). The published contents data for this period may have been graphically determined, with the inherent inconsistencies of this method.

For this study a blanket correction of -0.20 was applied to the file of elevations of the period or record prior to 1951 water year. Further minor modifications to elevations for some months were necessary to make the elevations agree with the published end of month contents that were used in the previous study. Estimates of split month contents were made for these months, as well as for water years 1928 and 1929 where only end of month contents data were available.

The capacity table ALF.CAP then became applicable to all the elevations and was used for the entire period of record.

An error in the previous study occurred February 1928, when the value of 28 days was apparently used instead of 29 (leap year) to compute the change of contents.

COE COEUR D'ALENE LAKE 12415500

The CDROM contained two files for this station. One file was elevation data for water years 1904-66 and the other was gage height data for water years 1967-90. The appropriate datum correction was added to the gage height file and the two files were then merged. The elevation for February 1937 was below the bottom of the capacity table and the published EOM contents was substituted in the subsequent file containing storage in acre feet.

The preliminary computation of change of contents produced results that did not agree with the PB for the period 1946-52 water years. No explanation could be found; there was no indication in the USGS publications that any published record had been revised. It was, therefore, assumed that the published end of month contents were the more correct and so they were inserted into the acre feet data file and the split month contents were estimated. The data file containing elevations was not adjusted to reflect the changes made to the storage file for 1946-52. The elevation file should NOT be used to try to reconstitute the storage data used for this study.

Capacity table COE.CAP, dated 9/29/36, was used for the entire period except as noted above.

LLK

LONG LAKE

12432510

Washington Water Power furnished us with a disc containing daily elevations for water years 1939-83. CDROM daily elevations were available for water years 1978-89.

For the period 1978-83 the WWP elevations agree with the CDROM data. For earlier years, especially from 1939 to about 1960 the WWP elevations do not always yield the published values for end-of-month contents. Some months agree, others do not. Presumably the elevations provided by WWP at this time are not always the same elevations originally used to compute end of month contents for publication.

The WWP elevations were used to compute the change in elevation between the 15th of the month and the end of the month, for each month in the period 1939-60. The published end of month contents were applied in reverse to the capacity table to compute equivalent end of month elevations. The new split month elevations were generated by applying the previously computed elevation changes to the new end of month elevations.

For the period 1928-38 the published end of month contents were used and the split month contents were estimated.

The PB data for 1928 and part of 1929 is in error. The USGS published data for 1916-33 was originally published in error and later revised. The revised values were apparently used in the PB except for 1928 and 1929. There are a scattered few other minor discrepancies between these final computed values and those in the PB that could not be resolved; the conclusion is that the PB is in error for whatever reason.

Capacity table LLK.CAP, dated 9/7/61, was used for the entire period of record.

Published elevation data for the entire period 1938-89 was available on CDROM.

For water years 1938-1952 the published end of month contents were apparently derived graphically from a curve. A plot of the published elevation vs contents for this period shows a great deal of scatter. There was no record of a published capacity table that might have been used during this period. A copy of the old curve was obtained from the U.S. Bureau of Reclamation. Using this curve and the plot of published elevation vs storage pairs a capacity table was reconstructed and applied to the published elevations. The resulting change of contents data for 1938-52 do not check those published in the previous study, since those values were computed from published end of month contents.

Capacity table GCLOLD.CAP (developed as noted above) was used for water years 1938-52.

Capacity table FDROLD.CAP, dated 1/21/53, was used for water years 1953-1974. Capacity table FDR.CAP, dated 1/24/75, was used for water years 1975-1989.

The PB is in error for October of water year 1953 and water year 1975 because the transition between capacity tables was apparently neglected in the previous study.

CHJ CHIEF JOSEPH 12437990

Daily data was not available on CDROM. USGS publishes only end of month contents for this station.

Daily elevations for water years 1960-89 were extracted from the U.S. Army Corps of Engineers data base by Russ Morrow and made available for this study. Published end of month contents were used for water years 1955-60. Split month contents for this period were estimated by prorating the monthly change of contents.

Minor changes were applied to some of the elevations provided by the USCOE to make the computed EOM storage agree with published data. Split month contents for these few months were adjusted accordingly.

Capacity table CHJ.CAP, dated 1/10/55, was used for water years 1960-89.

CHL LAKE CHELAN 12452000

Daily elevations available from CDROM for the entire period of record except for some missing months and all of 1988 water year. The elevations for 1988 water year were taken from USGS annual data report; the missing months were estimated using published end of month contents.

The published end of month contents, used in the previous study, were based on mean daily elevations, whereas the elevations available on the CDROM are instantaneous midnight elevations. Therefore there are minor differences between the computed change of contents and those of the previous study.

Capacity table CHL.CAP, dated 10/01/27, was used for the entire period.

The change of contents published in the Pink Book for October of the 1928 water year is in error. An older capacity had been used prior to the 1928 water year and the transition between tables was neglected.

BRN BROWNLEE RESERVOIR 13289710

Daily values are not available on CDROM or from USGS files. The USGS publishes end of month contents only, as furnished to them by the Idaho Power Company. Published end of month contents were based on published end of month contents.

The published end of month contents were sometimes rounded to tens of thousands of acre feet and sometimes to thousands of acre feet. The change of contents published in the previous study were based on published end of month contents. The published end of month contents were based on midnight elevations at times, and on interpolated or mean daily elevations for other years.

For the present study daily elevation data were obtained from the operational data base maintained by the U.S. Army Corps of Engineers and the resulting contents data were used unrounded.

Therefore, the change of contents developed for this study do not agree with those prepared for the previous study.

Capacity table BRNOLD.CAP was used for water years 1958-83. It is derived from a published table where storage is expressed in units of cfs-days and defined power storage rather than total storage. For this study the table was modified to reflect total contents in acre-feet.

Capacity table BRN.CAP, dated 01/01/84, currently used in the CROHMS data base, was used for water years 1984-89.

The only other major discrepancy between the changes computed for this study and those published in the previous study occur during the period of initial fill. The PB values could not be reconciled with any data presently available.

The change of contents data computed for this study are considered to be consistent and to preserve the relative magnitude of the monthly changes computed for the previous study, while allowing the consistent computation of the split month change of contents.

The CDROM contained daily values of storage data. Daily elevation data was not available. The storage data on CDROM represents published daily contents. Data for 1986 water year was missing from CDROM and was taken from USGS annual data report. A few missing months in water years 1971 and 1974 were estimated.

For water year 1978 the computed changes do not agree with those published in the previous study. The previous study probably used provisional, unpublished, data for 1978 water year.

Capacity table DWR.CAP, dated 05/01/81, was not required because elevations were not used, but it was entered into the file for possible use in future updates.

The USGS does not collect or publish data for this station so no data are available from CDROM or USGS files. The USGS project office (Northwest Water Resources Data Center) did, however, compile and maintain an unpublished data base containing end of month contents. These storage values were derived from operational data as reported on the old CBTT network and, later, from the CROHMS system. Midnight elevations were applied to the 5-part wedge storage capacity table. The resulting end of month contents provided the basis for the change of contents data published in the previous modified flow study.

To accommodate computation of split month change of contents for this study it was necessary to use daily elevation values provided by the U.S. Army Corps of Engineers from the data base maintained by Russ Morrow.

The use of the wedge storage capacity table is not practical for this kind of study since it requires a knowledge of the inflows to the project as well as elevations. The published capacity table bears a statement that the USCE recommends that for system studies only the first part of the capacity table be used; this part of the table defines storage when the inflows are between one hundred thousand and two hundred thousand cfs. Capacity table JDA.CAP reflects this condition and was used for the entire period.

The change of contents values computed for this study do not agree with those published in the PB for the reasons noted above but will at least be consistent and will provide for ease of future update procedures.

ROU ROUND BUTTE (LAKE BILLY CHINOOK) 14092100

The previous study (PB) covered the period January 1964 to September 1978. The data available for this study consisted of Plant Data Sheets furnished by PGE covering the period January 1977 to September 1989. Extracted elevations for end of month and mid-month from the plant data sheets for water years 1978-89, and applied them the CROHMS capacity table dated 1-19-64 (ROU.CAP)

The computed change of contents for 1978 water year checks those values published in the PB within plus or minus 1 cfs.

For the period January 1964 to September 1977 the PB changes were entered for both monthly and midmonth in the CH file.

HCR HILLS CREEK RESERVOIR 14145100

The CDROM contained elevation data for water years 1961-65, and 1975-89. It contained storage data for water years 1966-72 and 1974. The storage data were converted to elevations using program REVERT in order to build a complete elevation file.

Missing data for 1973 water year was entered from USGS published data reports. Capacity table HCR.CAP, dated 01/01/68, was used for the entire period of record. All results agree well with those published in the previous study.

LOP LOOKOUT POINT RESERVOIR 14149000

The CDROM contained storage data for water years 1966-72 and 1974. It also contained elevation data for water years 1954-65 and for 1975-89. Missing data for 1973 water year was obtained from published USGS data reports. Storage data were converted to elevations using program REVERT in order to build a complete file of elevations. Capacity table LOP.CAP, dated 01/01/68, was used for the entire period of record.

The resulting computed change of contents check those computed for the previous study.

FAL FALL CREEK LAKE 14150900

The CDROM contained by elevation and storage data. The storage data was converted to elevations using program REVERT and merged to form a complete elevation file.

Capacity table FAL.CAP, dated 01/01/68, was used for the entire period of record. The results check those of the previous study.

COT

COTTAGE GROVE RESERVOIR 14153000

The CDROM contained storage data for water years 1966-74 and elevation data for 1975-89. The elevation data were converted to storage using program CONVERT, and merged with the storage data from CDROM. Storage data for water years 1943-65 was entered from USGS publications and internal files.

Capacity table COT.CAP, dated 1/1/68, was used for the entire period of record. The previous study (PB) contained an error January 1974. No apparent reason could be found, assume it was a key punch error. There was also an error in the October and November change of contents in the PB, for water year 1975, due to an error in the USGS published end of month contents for October.

DOR DORENA RESERVOIR 14155000

The CDROM contained storage data for water years 1966-74 and elevation data for water years 1975-89. The elevation data were converted to storage with program CONVERT and merged with the retrieved storage data. Storage data for water years 1950-65 was entered from USGS publications and internal files.

Capacity table DOR.CAP, dated 1/1/68 was used for the entire period of record. No errors were found in the PB and all computed changes agree with those in the PB for water years 1950-78.

SMH SMITH RESERVOIR 14158795

Daily values are not available in USGS files. EWEB furnished contents for the 15th and last day of each month for water years 1983-89.

For the period 1979-82 we used published end of month contents from USGS annual data reports and prorated the split month contents.

For water years 1963-78 the published PB change of contents was used for both monthly and midmonth changes.

The contents data furnished by EWEB for 1983-89 included storage in the Carmen diversion pool as well as in Smith Reservoir. The data prior to 1983 does not include the storage in Carmen. This probably has no significant effect; the Carmen pondage is probably nearly constant.

CGR COUGAR RESERVOIR 14159400

The CDROM contained elevation data for 1964-65 and 1975-89. It contained storage data for 1966-72. The missing data for 1973 was entered from USGS annual data reports. Elevations were converted to storage with program CONVERT and storage data were converted to elevations with program REVERT in order to form complete files for both parameters.

Capacity table CGR.CAP, dated 1/1/68, was used for the entire period of record. No errors or discrepancies were noted.

BLU BLUE RIVER RESERVOIR 14162100

The CDROM contained storage data for water years 1969-74 and elevation data for water years 1975-89. Storage data were converted to elevations using program REVERT and elevation data were converted to storage using program CONVERT to form complete files for both parameters.

Capacity table BLU.CAP, dated 1/1/68, was used for the entire period of record. No errors or discrepancies were noted.

FRN FERN RIDGE RESERVOIR 14168000

The CDROM contained storage data for water years 1966-72, and 1974. It contained elevation data for water years 1975-89.

Missing data for water year 1973 was obtained from USGS annual data report. Storage data for water years 1942-65 entered from USGS internal files.

A capacity table dated 6/8/43 is applicable to water years of 1943-66 but was not used in this study because published daily storage values were available. Capacity table FRN.CAP, dated 1/1/68 was used for water years 1975-89. No errors or discrepancies were noted.

DET DETROIT LAKE 14180500

The CDROM contained data for the entire period of record. Some of the data was elevations, some was gage heights requiring a datum correction, and some was storage. All elevations were converted to storage using program CONVERT and all storage was converted to elevation using program REVERT. The results were merged to form complete files of elevation and storage.

Capacity table DET.CAP, dated 1/1/68, was used for the entire period of record. No errors or discrepancies were noted.

GPR GREEN PETER RESERVOIR 14186100

The CDROM contained storage data for water years 1967-74, except Oct-Dec 1967, and elevation data for water years 1975-89. The missing data in 1967 water year was estimated by working backwards from published PB change contents. Split month contents was estimated by prorating the monthly storage changes.

Capacity table GPR.CAP, dated 1/1/68 was used for the entire period.

No errors or discrepancies were noted.

FOS FOSTER RESERVOIR 14186600

The CDROM contained storage data for water years 1967-74 and elevation data for water years 1975-89. The elevations were converted to storage using program CONVERT.

Capacity table FOS.CAP, dated 5/20/80, was used for conversion of elevations to storage.

An error was found in the PB for Jan and Feb of 1976 water year. Apparently the storage value used in the previous study for January was in error; some digits were transposed during the data entry process. No other errors were noted.

TMY TIMOTHY LAKE 14208600

No CDROM data. Daily elevations for May 1956-Sept 1964 obtained from USGS back files. Daily elevations for water year 1980 to wy 1989 obtained from PGE plant data sheets. End of month change of contents for 1979 water year obtained from USGS annual data report.

Change of contents for monthly and midmonth computed from daily values for water year 1956-64 and for 1980-89. For water years 1965-78 the PB change of contents values were used for both monthly and midmonth. For 1979 water year the published USGS change of contents were used for both monthly and midmonth.

Capacity table (TMY.CAP) dated May 28, 1956 was obtained from USGS files.

Pacificorp furnished elevation and storage data for July 1978 to Sept 1989. They also furnished ADJUSTED streamflow data for all the affected streamflow stations for the period prior to July 1978. Change of contents at Swift was therefore required only for July 1978 to Sept 1989.

The change of contents for July 15, 1978 was computed manually and inserted into the change of contents file. End of month change of contents for July 1978 was taken directly from the PB, as published in the previous study.

The computed change of contents for August and September of 1978 do not check the PB exactly. The transmittal letter from Pacificorp indicates they have revised some data slightly since the 1980 study was completed.

No capacity table was used at this station; daily storage data were furnished.

YAL YALE RESERVOIR nr YALE 14218500

Pacificorp furnished elevations and storage data for July 1978 to Sept 1989. They also furnished ADJUSTED streamflow for all relevant sites for the period prior to July 1978. Thus it was only necessary to compute change of contents for Yale reservoir for the period July 1978 to Sept 1989. The monthly and mid month change of contents for July 1978 were computed manually and entered into the change of contents file.

No capacity table was used at this site; daily storage data were used as furnished.

MER LAKE MERWIN at ARIEL 14220000

Pacificorp furnished elevations and storage data for July 1978 to Sept 1989. They also furnished ADJUSTED streamflow for all relevant sites for the period prior to July 1978. Thus it was only necessary to compute change of contents for Merwin reservoir for the period July 1978 to Sept 1989. The monthly and mid month change of contents for July 1978 were computed manually and entered into the change of contents file.

No capacity table was used at this site; daily storage data were used as furnished.

The previous study (PB) covers the period September 1959 to September 1978. Daily elevations available from CDROM and USGS data reports for water years 1970-81 only. USGS gage discontinued at the end of the 1981 water year.

By a letter dated October 9, 1992, V.L. Contini of Washington Public Power Supply System transmitted to Gary Flightner a set of plant data sheets containing daily elevations for water years 1979-89.

From Dick Griffith of R.W. Beck and Associates, Gary Flightner obtained information about surface area and total storage at Packwood Lake. We used this data to derive a capacity table, PKL.CAP, based on the conic expansion model.

The end of month elevations extracted from the plant data sheets were entered into the elevation file 142254EL.WK1 and converted to acre feet using the derived capacity table. The monthly change of contents was then computed, and these same values were used to represent the midmonth change of contents.

For the period prior to 1979 water year, the change of contents values published in the PB were entered for both monthly and mid-month changes in the file 142254CH.WK1.

MOS RIFFE LAKE NR MOSSYROCK, WA 14234800

Daily elevation data was obtained from CDROM for water years 1973-89. End of month elevation data for water years 1968-72 was taken from USGS publications.

Elevation data for the 15th of the month for water years 1968-72 was furnished by Tacoma Public Utilities. Missing data for split month elevations was estimated : April-Sept 1968, October 1969 wy, Sept 1989 and July-Sept 1988.(See NOTE)

Tacoma Public Utilities furnished a capacity table which was converted to reflect acre feet (MOS.CAP). This table is not the same as the total storage table used in Crohms, as it reflects some level of operational storage preferred by TPU. The shape of the two tables are the same and the change of contents is computed correctly from either table.

The computed change of contents for 1968-78 water years checks those published in the PB except for the 1973 water year. The computed changes do, however, check the published changes in the USGS annual data report for 1973 wy. The PB is apparently in error for some reason for water year 1973. NOTE: For water years 1968-72 Tacoma Public Utilities actually furnished elevations for the 1st and the 15th of each month. The first of the month elevations were not used because published end of month elevations were available in USGS publications. The difference between the published end of month elevations and the elevation for the first day of the following month is usually not large, but always different. Using the published end of month elevations provided better consistency with the monthly change of contents as published in the PB.

MAY MAYFIELD RESERVOIR 14237800

Daily elevations were obtained from CDROM for water years 1975-89. Tacoma Public Utilities furnished elevations for the 1st and 15th of each month from April 15, 1963 to October 1, 1974. Change of contents for April 1962 to March 1963 as published in the previous study (PB) were inserted directly into the monthly and split month change file.

Tacoma Public Utilities furnished a capacity table in units of cfs-days which was slightly smoothed and converted to acre-feet.(MAY.CAP, undated).

The computed change of contents check the PB fairly well. The discrepancies are mostly less than plus or minus 10 cfs and are mostly the result of using 1st of the month elevations instead of the elevations previously used to compute month end contents.

No data available on CDROM or in published USGS data reports. Tacoma Public Utilities furnished elevation data for the period December 1942 to September 1989. The furnished data consisted of elevations for the 1st and 15th of each month. They also furnished a capacity table.

For this study the furnished elevations for the 1st of the month were treated as representative of the elevation of the last day of the preceding month.

The furnished capacity table was in units of cfs-days and it was expanded to tenths of a foot. For purposes of this study the table was converted to acre-feet and a certain amount of smoothing was applied to reduce the number of points required for storage. The resulting table CS1.CAP was applied to all the furnished elevations.

Tacoma Public Utilities was unable to furnish elevation data for the period July 1928 to December 1942. For this period the published PB change of contents were used for monthly and split month change of contents.

For the period January 1943 to September 1978 the computed change of contents checks the PB within plus or minus 1 cfs for most months, but there are several instances where the discrepancies are rather large. Because there is no record of the data that was used for the previous study there seems no way to reconcile the discrepancies.

Tacoma Public Utilities furnished elevations for the end of month and the 15th of each month for the period December 1944 to October 1, 1973.

Daily elevations were extracted from CDROM for water years 1974-89.

A capacity table (ALD.CAP, undated) was furnished by TPU. It was converted from cfs-days to acre feet and applied to the entire period of record.

The entire file of elevations was applied to the capacity table furnished by Tacoma Public Utilities. The resulting computed change of contents for 1944-78 do not check those published in the previous study (PB).

It appears that the capacity table currently in use by Tacoma Public Utilities differs from that used historically and currently for publication (USGS Annual Data Report-Washington 1991). After discussing this question with TPU, it was their decision to use the capacity table they furnished. They indicated the capacity table has been changed because of sedimentation in the reservoir.

LOS

LOST CREEK LAKE

14335040

Storage began in February 1977. Daily elevations for entire period were obtained from CDROM and USGS publications.

The original capacity table dated 1977 currently used in CROHMS was used for this study (LOS.CAP).

This station was not included in the previous study (PB) so the published data and it is believed that all data are valid.

KLA

UPPER KLAMATH LAKE 11507000

Prior to the 1974 water year the published end-of-month contents were obtained by averaging the ending instantaneous elevations for the last three days of the month and the first three days of the following month to compensate for the significant wind effect at the gage. From the 1974 water year forward, daily elevations are the weighted mean of elevations at the base gage and supplementary gages elsewhere in the pool. The end of month contents were derived from the weighted elevations. This averaging and weighting procedure was done for publication of end of month contents only.

It was not possible to apply these procedures to obtain valid split month contents data for this study.

Prior to 1974 water year the capacity table in use reflected storage above elevation 4135.0 feet (KLAOLD.CAP). Beginning with the 1974 water year a new capacity table was used (KLA.CAP). The old table is dated 10-1-22, the new table is dated January 1974. For this study the following procedure was applied:

Published end of month contents were run backwards through the appropriate capacity tables using program REVERT, to obtain a file of equivalent end of month elevations. Then the published daily elevations were used to compute a differential elevation between the 1st and 15th of each month. These incrementals were then added to the equivalent end of month elevations to estimate equivalent split month elevations. These in turn were applied to the appropriate capacity tables to generate split month contents.

Three errors were found in the PB. September 1953 was in error, cause unknown. August 1976 the published EOM contents was in error and was reported to USGS for correction. October 1974 PB was in error because the transition between capacity tables was not taken into account in the previous study.

CAPACITY TABLE DOCUMENTATION

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MCD.CAP

Mica Dam

03-25-74

Type code = 7

No. of points = 7

Dates of use = Entire period of record

Elevation	A0	A1	A2	A3	A4
1865	0.000017511	-1865.0000	5.1300	228.09917	-425434.298
1940	23.0437	-1865.0000	2.0150	1497.52061	-2953551.037
2040	1.73461	-1865.0000	2.4150	4026.44613	-7802973.713
2140	8.89060e-10	-1865.0000	5.9210	10571.90000	-20707461.580
2240	2760.97873	-2200.0000	1.4763	11345.45412	-21532262.070
2340	0.000003644	-2200.0000	5.0390	45691.23796	-98070906.480
2400	142.04085	-2200.0000	2.0220	17101.48696	-34405893.780

UPAOLD.CAP
Upper Arrow Reservoir
April 1968
Type code = 4
No. of Points = 87
Dates of Use = Wy 1968-73

Elev	Contents	A1	A3=0	Elev	Contents	A1
				all points		
1360.0	0	-1360.0000		1416.0	3130711	-1368.4578
1361.0	50579	-1360.0039		1417.0	3196562	-1368.7485
1363.0	152132	-1360.0156		1418.0	3262810	-1369.1869
1364.0	203107	-1360.0310		1419.0	3329653	-1369.4808
1366.0	305455	-1360.0541		1420.0	3396892	-1369.6294
1367.0	356826	-1360.0808		1421.0	3464330	-1370.0787
1369.0	459967	-1360.1149		1422.0	3532364	-1370.5289
1370.0	511736	-1360.1527		1423.0	3600992	-1370.6801
1372.0	615669	-1360.1977		1424.0	3669818	-1371.1371
1373.0	667835	-1360.2462		1425.0	3739240	-1371.4432
1374.0	720198	-1360.2981		1426.0	3809058	-1371.7514
1377.0	877884	-1360.4232		1427.0	3879273	-1372.0618
1379.0	983802	-1360.4925		1428.0	3949884	-1372.5292
1381.0	1090116	-1360.5688		1429.0	4021091	-1372.6861
1383.0	1196826	-1360.6519		1430.0	4092496	-1373.1598
1385.0	1303934	-1360.7417		1431.0	4164496	-1373.4767
1386.0	1357686	-1360.8346		1432.0	4236892	-1373.7956
1388.0	1465587	-1360.9341		1433.0	4309686	-1374.1165
1389.0	1519735	-1361.0365		1434.0	4382876	-1374.2784
1390.0	1574083	-1361.1418		1435.0	4456264	-1374.7668
1391.0	1628628	-1361.3574		1436.0	4530248	-1375.0933
1393.0	1738512	-1361.6964		1437.0	4604628	-1375.2580
1394.0	1794050	-1361.8114		1438.0	4679206	-1375.7546
1395.0	1849785	-1362.0459		1439.0	4754380	-1375.9211
1396.0	1905917	-1362.4021		1440.0	4829752	-1376.2565
1397.0	1962645	-1362.6424		1441.0	4905520	-1376.4256
1398.0	2019769	-1363.0069		1442.0	4981487	-1376.9352
1399.0	2077488	-1363.2526		1443.0	5058049	-1377.1059
1400.0	2135603	-1363.6250		1444.0	5134810	-1377.2784
1401.0	2194314	-1364.0000		1445.0	5211768	-1377.6256
1402.0	2253620	-1364.2525		1446.0	5289124	-1377.8005
1403.0	2313322	-1364.5083		1447.0	5366677	-1378.1527
1404.0	2373421	-1364.8954		1448.0	5444628	-1378.3299
1405.0	2434116	-1365.1558		1449.0	5522777	-1378.6869
1406.0	2495207	-1365.4194		1451.0	5679868	-1379.0503

UPAOLD.CAP
Upper Arrow Reservoir
Cont'd.

Elev	Contents	A1	A3=0	Elev	Contents	A1
			all points			
1407.0	2556694	-1365.8179		1452.0	5758810	-1379.2331
1408.0	2618777	-1366.0857		1453.0	5837950	-1379.4175
1409.0	2681256	-1366.3565		1454.0	5917289	-1379.6035
1410.0	2744132	-1366.6301		1455.0	5996826	-1379.7910
1411.0	2807405	-1367.0435		1457.0	6156297	-1379.9826
1412.0	2871273	-1367.3210		1458.0	6236231	-1380.1755
1413.0	2935537	-1367.6012		1459.0	6316363	-1380.3704
1414.0	3000198	-1367.8841		1460.0	6396694	0.0000
1415.0	3065256	-1368.1697				

UPA.CAP
Upper Arrow Reservoir
02-21-73
Type Code = 7
No. of Points = 1
Dates of Use = Wy 1974-89

Elevation	A0	A1	A2	A3	A4
1370	117.0557	-1370.0000	2.1435	51728.92370	-70868625.000

LOAOLD.CAP

Lower Arrow Reservoir

April 1968

Type Code = 4

No. of Points = 61

Dates of Use = Wy 1968-73

Elev	Contents	A1	A3=0 all points	Elev	Contents	A1
1360.0	0	-1360.0000		1412.0	2214345	-1364.2927
1361.0	39075	-1360.0100		1413.0	2260760	-1364.4960
1364.0	157485	-1360.0301		1415.0	2353980	-1364.7120
1365.0	197155	-1360.0550		1417.0	2447600	-1365.1549
1366.0	237025	-1360.0840		1419.0	2542020	-1365.3709
1368.0	317155	-1360.1233		1421.0	2636820	-1365.8364
1369.0	357420	-1360.1672		1423.0	2732420	-1366.0746
1371.0	438350	-1360.2191		1425.0	2828420	-1366.3313
1373.0	519670	-1360.2817		1426.0	2876630	-1366.5590
1374.0	560530	-1360.3485		1427.0	2925025	-1366.8082
1376.0	642650	-1360.4206		1429.0	3022215	-1367.0633
1377.0	683900	-1360.5006		1431.0	3119805	-1367.3175
1379.0	766800	-1360.5939		1432.0	3168795	-1367.5805
1381.0	850120	-1360.7831		1433.0	3217985	-1367.8454
1384.0	976270	-1360.9992		1435.0	3316765	-1368.1095
1387.0	1103605	-1361.2389		1437.0	3415935	-1368.3863
1388.0	1146445	-1361.2420		1438.0	3465720	-1368.6648
1389.0	1189290	-1361.3678		1440.0	3565690	-1368.9420
1391.0	1275370	-1361.6406		1441.0	3615870	-1369.2281
1394.0	1405690	-1361.9286		1443.0	3716630	-1369.5198
1395.0	1449520	-1361.9324		1445.0	3817790	-1369.8022
1397.0	1537190	-1362.2455		1446.0	3868560	-1370.1161
1399.0	1625650	-1362.4110		1448.0	3970520	-1370.4053
1400.0	1670080	-1362.5794		1450.0	4072860	-1370.7152
1402.0	1759340	-1362.7511		1451.0	4124230	-1371.0266
1403.0	1804165	-1362.9295		1454.0	4278940	-1371.6652
1405.0	1894215	-1363.2958		1455.0	4330910	-1371.3432
1407.0	1985055	-1363.4872		1456.0	4382680	-1371.9843
1409.0	2076295	-1363.6858		1459.0	4539175	-1372.3083
1410.0	2122115	-1364.0822		1460.0	4591535	0.0000
1411.0	2168330	-1363.8772				

LOA.CAP
Lower Arrow Reservoir
01-29-73
Type Code = 7
No. of Points = 1
Dates of Use = Wy 1974-89

Elevation	A0	A1	A2	A3	A4
1360	430.6213	-1360.0000	1.6393	32211.56900	-43807734.000

LIB.CAP

Lake Koocanusa at Libby Dam

03-01-80

Type code = 4

No. of Points = 27

Dates of Use = entire period of record

Elev	Contents	A1	A3
2200.0	114669	-2110.1041	-13432.6800
2210.0	162351	-2080.8283	-64948.2050
2220.0	219333	-2062.5262	-102333.4300
2230.0	284587	-2109.1014	5270.9809
2240.0	359788	-2128.6575	58235.4110
2250.0	448554	-2090.1316	-65689.4960
2260.0	551216	-2083.1564	-91020.9230
2270.0	666443	-2026.3959	-321127.8200
2280.0	793124	-2135.2412	157102.2840
2290.0	934249	-2131.8979	140313.1430
2300.0	1094628	-2031.2493	-431069.4900
2310.0	1271354	-1946.5160	-948564.0300
2320.0	1459661	-2103.8187	65723.6859
2330.0	1662187	-1982.9870	-787146.3300
2340.0	1880098	-1971.2195	-875061.2500
2350.0	2110360	-1989.5045	-730945.4400
2360.0	2353430	-2064.8451	-103734.9000
2370.0	2611737	-1999.8683	-681941.7600
2380.0	2885975	-2031.6805	-383351.7000
2390.0	3175716	-2182.2029	1111737.1100
2400.0	3488266	-2204.6943	1357155.6000
2410.0	3832663	-2101.6150	114259.5730
2420.0	4206250	-2063.4321	-376479.3000
2430.0	4602734	-2030.0060	-830518.0300
2440.0	5020507	-2009.2692	-1126452.1000
2450.0	5458654	-1951.1212	-1995259.8000
2460.0	5915939	0.0000	0.0000

DCD.CAP

Duncan Reservoir

02-21-73

Type code = 4

No. of Points = 3

Dates of Use = not used for historical data.
optional for future updates.

Elev	Contents	A1	A3
1788.0	0.00	-1783.7400	-734.2251
1793.0	24049.43	-1790.7100	12079.2770
1900.0	1575192.53	0.0000	0.0000

This capacity table was not used. Storage data were furnished by Canada. This table should be used for future updates unless updated storage data are furnished, but should not be used to re-compute storages and storage changes for data prior to 1989 wy.

COROLD.CAP

Kootenay Lake at Queens Bay

02-16-53

Type code = 4

No. of Points = 76

Dates of Use = Wy 1931-68

Elev	Contents	A1	A3=0 all points	Elev	Contents	A1
1738.0	0	-1738.0000		1746.7	979800	-1738.4664
1738.2	21800	-1738.0018		1746.8	991700	-1738.3958
1738.3	32800	-1737.9991		1746.9	1003500	-1738.4672
1738.5	54600	-1738.0036		1747.9	1122500	-1738.5458
1738.6	65600	-1737.9982		1748.0	1134500	-1738.4664
1738.8	87400	-1738.0055		1748.1	1146400	-1738.5467
1738.9	98400	-1737.9972		1748.4	1182400	-1738.4639
1739.0	109300	-1738.0064		1748.5	1194300	-1738.5475
1739.1	120300	-1737.9963		1749.1	1266300	-1738.6347
1739.2	131200	-1738.0073		1749.2	1278400	-1738.5467
1739.4	153200	-1737.9945		1749.4	1302400	-1738.6364
1739.5	164100	-1738.0082		1749.5	1314500	-1738.5458
1739.7	186100	-1737.9927		1749.6	1326500	-1738.6372
1739.8	197000	-1738.0091		1749.7	1338600	-1738.5450
1739.9	208000	-1737.9917		1749.8	1350600	-1738.6380
1740.0	218900	-1738.0100		1750.5	1435300	-1738.7352
1741.1	339900	-1738.0378		1751.3	1532900	-1738.8374
1741.2	351000	-1738.0091		1752.0	1619000	-1738.9435
1741.3	362000	-1738.0387		1753.0	1743000	-1739.0560
1741.5	384200	-1738.0073		1753.4	1793000	-1739.1698
1741.6	395200	-1738.0396		1754.0	1868600	-1739.2866
1742.2	461800	-1738.0768		1754.5	1932100	-1739.4055
1742.3	473000	-1738.0387		1755.0	1996100	-1739.5264
1742.4	484100	-1738.0777		1755.6	2073500	-1739.6500
1743.0	551300	-1738.1212		1756.0	2125500	-1739.7748
1743.5	607800	-1738.1684		1756.9	2243400	-1739.9045
1743.6	619200	-1738.1204		1757.1	2269800	-1739.7733
1743.8	641800	-1738.1702		1757.2	2282900	-1739.9053
1744.0	664600	-1738.2209		1758.5	2454500	-1740.0451
1744.5	722100	-1738.2750		1760.5	2720500	-1740.1978
1744.6	733700	-1738.2200		1762.6	3001900	-1740.3637
1744.8	756700	-1738.2767		1763.1	3069400	-1740.1940
1745.0	779900	-1738.3342		1763.2	3082800	-1740.3644
1745.7	861800	-1738.3966		1763.3	3096300	-1740.1933
1745.8	873600	-1738.3333		1763.4	3109700	-1740.3652

COROLD.CAP
Kootenay Lake at Queens Bay
Cont'd.

Elev	Contents	A1	A3=0 all points	Elev	Contents	A1
1745.9	885300	-1738.3975		1763.5	3123200	-1740.1925
1746.4	944300	-1738.4647		1763.6	3136600	-1740.3659
1746.5	956200	-1738.3966		1765.4	3379600	0.0000

COR.CAP

Kootenay Lake at Queens Bay

03-24-69

Type code = 4

No. of Points = 23

Dates of Use = Wy 1969-89

Elev	Contents	A1	A3
1738.0	0.01	-1586.7681	-7890525.2000
1740.0	210080	-1738.0182	0.0000
1741.0	316080	-1738.0371	0.0000
1742.0	422760	-1738.0797	0.0000
1743.0	530600	-1738.1601	0.0000
1744.0	640230	-1738.2503	0.0000
1745.3	784983	-1738.3164	0.0000
1746.0	863640	-1738.3720	0.0000
1747.0	976860	-1738.4386	0.0000
1748.0	1090960	-1738.5167	0.0000
1749.0	1206000	-1738.6052	0.0000
1750.0	1322020	-1738.7161	0.0000
1751.0	1439180	-1738.8530	0.0000
1752.0	1557660	-1739.0130	0.0000
1753.0	1677600	-1739.1983	0.0000
1754.0	1799150	-1739.3632	0.0000
1755.0	1922070	-1739.5069	0.0000
1756.0	2046130	-1739.6454	0.0000
1757.0	2171240	-1739.7789	0.0000
1758.0	2297320	-1739.9223	0.0000
1759.0	2424400	-1740.0742	0.0000
1760.0	2552500	-1581.3750	-8933980.0000
1770.0	3874600	0.0000	0.0000

HGH.CAP

Hungry Horse Reservoir

10-19-53

Type code = 4

No. of Points = 30

Dates of Use = Entire record, except initial fill.

Elev	Contents	A1	A3
3360.0	590000	-3275.7143	0
3369.0	653000	-3181.3030	0
3379.0	728000	-3288.0000	0
3386.0	784000	-3288.1088	0
3394.0	852000	-3299.3333	0
3402.0	924000	-3307.9900	0
3407.0	971000	-3308.2036	0
3412.0	1018000	-3310.2000	0
3419.0	1088000	-3315.3810	0
3425.0	1151000	-3320.3636	0
3434.0	1249000	-3325.3913	0
3440.0	1318000	-3330.1667	0
3449.0	1426000	-3336.0495	0
3457.0	1527000	-3345.2683	0
3466.0	1650000	-3352.6412	0
3475.0	1781000	-3360.5071	0
3484.0	1921000	-3363.9375	0
3490.0	2017000	-3367.7576	0
3494.0	2083000	-3371.4706	0
3500.0	2185000	-3378.6111	0
3507.0	2311000	-3385.3158	0
3518.0	2520000	-3391.9500	0
3528.0	2720000	-3398.4762	0
3538.0	2930000	-3404.8182	0
3541.0	2996000	-3398.3333	0
3542.0	3017000	-3404.8636	0
3547.0	3127000	-3411.0435	0
3554.0	3288000	-3417.0000	0
3561.0	3452000	-3417.1667	0
3565.0	3548000	0.0000	0

KER.CAP

Flathead Lake at Somers

10-12-43

Type code = 4

No. of Points = 17

Dates of Use = entire period of record

Elev	Contents	A1	A3
2881.0	338500	-2878.0919	0
2882.0	454900	-2878.1252	0
2883.0	572300	-2878.1664	0
2884.0	690700	-2878.2152	0
2885.0	810100	-2878.2604	0
2886.0	930300	-2878.2925	0
2887.0	1051000	-2878.3140	0
2888.0	1172000	-2878.3934	0
2889.0	1294000	-2878.4797	0
2890.0	1417000	-2878.5726	0
2892.0	1665000	-2878.7857	0
2894.0	1917000	-2879.0234	0
2895.0	2045000	-2879.1473	0
2896.0	2174000	-2879.2769	0
2897.0	2304000	-2879.4122	0
2899.0	2566000	-2879.7068	0
2900.0	2699000	0.0000	0

NOX.CAP

Noxon Rapids

06-30-60

Type code = 4

No. of Points = 24

Dates of Use = Entire period of record

Elev	Contents	A1	A3
2270.1	357.02	-2270.0000	0
2273.0	10710.74	-2270.1579	0
2277.0	25785.12	-2270.5000	0
2281.0	41652.89	-2271.0000	0
2285.0	58314.05	-2271.6364	0
2288.0	71404.96	-2272.3478	0
2292.0	89652.89	-2273.1667	0
2295.0	103933.88	-2274.0400	0
2298.0	118809.91	-2274.9615	0
2301.0	134280.99	-2275.9259	0
2302.0	139636.36	-2276.8571	0
2304.0	150743.80	-2277.7931	0
2306.0	162247.93	-2278.7333	0
2308.0	174148.75	-2279.6774	0
2310.0	186446.27	-2280.6250	0
2312.0	199140.49	-2281.5758	0
2315.0	218776.85	-2282.5588	0
2318.0	239008.26	-2283.5714	0
2321.0	259834.70	-2284.6111	0
2323.0	274115.69	-2285.6486	0
2326.0	296132.22	-2286.7105	0
2328.0	311206.60	-2287.7692	0
2330.0	326677.67	-2288.8250	0
2331.0	334611.56	0.0000	0

PSL.CAP

Priest Lake

06-23-58

Type code = 4

No. of Points = 10

Dates of Use = Entire period of record

Elev	Contents	A1	A3
2433.9	31860	-2432.5843	0
2434.9	55360	-2432.5942	0
2436.1	83680	-2432.6092	0
2437.2	109750	-2432.6287	0
2438.3	135930	-2432.6526	0
2439.1	155050	-2432.6796	0
2440.2	181450	-2432.7110	0
2440.9	198320	-2432.7450	0
2441.6	215260	-2432.7816	0
2442.0	224008	0.0000	0

ALF.CAP

Pend Oreille Lake

02-02-54

Type code = 4

No. of Points = 29

Dates of Use = Entire period of record

Elev	Contents	A1	A3
2044.9	7900	-2044.8000	0
2045.6	63200	-2044.8100	0
2045.8	79200	-2044.8341	0
2046.9	169400	-2044.8590	0
2047.3	202600	-2044.8881	0
2048.2	278200	-2044.9271	0
2049.2	363200	-2044.9767	0
2050.4	466400	-2045.0391	0
2051.8	588200	-2045.1159	0
2053.3	720200	-2045.2079	0
2055.0	871500	-2045.3167	0
2056.6	1015500	-2045.4407	0
2058.2	1161100	-2045.5793	0
2059.6	1289900	-2045.7301	0
2061.0	1420100	-2045.8926	0
2062.3	1542300	-2046.0653	0
2063.4	1646800	-2046.2458	0
2064.6	1762000	-2046.4351	0
2065.7	1868700	-2046.6316	0
2066.7	1966700	-2046.8343	0
2067.7	2065700	-2047.0430	0
2068.9	2185700	-2047.2594	0
2070.1	2306900	-2047.4833	0
2071.4	2439500	-2047.7155	0
2073.0	2604300	-2047.9587	0
2074.8	2791500	-2048.2143	0
2077.0	3022500	-2048.4858	0
2079.0	3234500	-2048.7710	0
2079.8	3320100	0.0000	0

COE.CAP

Coeur D'Alene Lake

09-29-36

Type code = 4

No. of Points = 30

Dates of Use = entire period

Elev	Contents	A1	A3
2120.5	13400	-2119.9996	0.0000
2121.4	37500	-2120.0111	0.0000
2123.2	86100	-2120.0404	0.0000
2124.0	107900	-2120.0476	0.0000
2125.0	135200	-2100.5700	-196369.7200
2126.0	162900	-2120.6125	85499.5340
2126.6	181100	-2123.2500	124987.5000
2127.4	211100	-2123.1500	120787.5000
2127.6	219800	-2122.6056	107549.8610
2128.0	238500	-2113.6500	-104704.5100
2128.4	257900	-2123.2420	0.0000
2128.8	277900	-2123.3510	0.0000
2129.4	308500	-2123.4673	0.0000
2130.2	350100	-2123.5943	0.0000
2131.5	419000	-2123.7407	0.0000
2133.5	527000	-2123.9182	0.0000
2133.9	549000	-2123.7333	0.0000
2134.1	559800	-2123.9218	0.0000
2135.3	625800	-2124.0243	0.0000
2135.5	636900	-2123.9200	0.0000
2136.0	664400	-2124.0072	0.0000
2136.5	692100	-2124.0297	0.0000
2137.3	736500	-2124.1482	0.0000
2138.6	809300	-2124.4018	0.0000
2138.9	826400	-2124.2735	0.0000
2139.1	837700	-2124.4035	0.0000
2140.0	889000	-2124.6724	0.0000
2141.0	947000	-2124.9492	0.0000
2142.0	1006000	-2125.2333	0.0000
2146.0	1246000	0.0000	0.0000

For water years 1946-52 storage data were used directly.

This table should not be applied to the elevations for 1946-52.

3 of 5

LLK.CAP
 Long Lake
 09-07-61
 Type code = 4
 No. of Points = 15
 Dates of Use = entire period of record

Elev	Contents	A1	A3
1512.1	360	-1512.0000	0
1514.0	7200	-1512.1053	0
1517.0	18600	-1512.2308	0
1518.0	22500	-1512.3750	0
1519.0	26500	-1512.5366	0
1521.0	34700	-1512.7381	0
1522.0	38900	-1512.9535	0
1524.0	47500	-1513.2046	0
1526.0	56300	-1513.7609	0
1529.0	70100	-1514.0851	0
1530.0	74800	-1514.4167	0
1532.0	84400	-1514.7755	0
1534.0	94200	-1515.1600	0
1536.0	104200	-1515.5686	0
1537.0	109300	0.0000	0

GCLOLD.CAP

F.D.R Lake at Grand Coulee Dam

Developed for this project

Type code = 4

No. of Points = 35

Dates of Use = Wy 1938-52

Elev	Contents	A1	A3
957.0	18000	-948.0000	0
975.0	54000	-957.0000	0
988.0	93000	-964.7500	0
1004.0	157000	-972.6000	0
1016.0	217000	-979.8334	0
1030.0	301000	-987.0000	0
1040.0	371000	-993.6250	0
1050.0	451000	-999.8889	0
1060.0	541000	-1005.9000	0
1070.0	641000	-1016.5833	0
1080.0	761000	-1025.6429	0
1090.0	901000	-1029.9333	0
1100.0	1051000	-1038.1765	0
1110.0	1221000	-1042.1667	0
1120.0	1401000	-1049.9500	0
1127.0	1541000	-1057.2715	0
1130.0	1607300	-1063.0292	0
1140.0	1847300	-1074.0250	0
1143.0	1931300	-1078.6233	0
1156.0	2321300	-1083.4594	0
1162.0	2513300	-1088.0794	0
1163.0	2547300	-1088.2991	0
1164.0	2581400	-1094.0434	0
1168.0	2729000	-1094.2432	0
1170.0	2803000	-1098.1282	0
1180.0	3193000	-1100.1750	0
1190.0	3593000	-1102.3658	0
1200.0	4003000	-1112.9783	0
1208.0	4371000	-1122.2941	0
1230.0	5493000	-1145.4923	0
1270.0	8093000	-1162.0933	0
1278.0	8693000	-1165.1039	0
1280.0	8850000	-1169.3750	0
1285.0	9240000	-1173.6747	0
1291.0	9738000	0.0000	0

FDROLD.CAP

F.D.R. Lake at Grand Coulee Dam

01-21-53

Type code = 4

No. of Points = 83

Dates of Use = Wy 1953-74

Elev	Contents	A1	A3=0 all points	Elev	Contents	A1
1208.0	4330000	-1115.2805		1250.0	6663200	-1147.1728
1209.0	4376700	-1116.0764		1251.0	6728000	-1147.9678
1210.0	4423800	-1116.8674		1252.0	6793300	-1148.4436
1211.0	4471300	-1117.6534		1253.0	6858900	-1148.9196
1212.0	4519200	-1118.4348		1254.0	6924800	-1149.3958
1213.0	4567500	-1119.2115		1255.0	6991000	-1150.0300
1214.0	4616200	-1119.9837		1256.0	7057600	-1150.6627
1215.0	4665300	-1120.7515		1257.0	7124600	-1151.1367
1216.0	4714800	-1121.7040		1258.0	7191900	-1151.6109
1217.0	4764800	-1122.4603		1259.0	7259500	-1152.2426
1218.0	4815200	-1123.2126		1260.0	7327500	-1152.8728
1219.0	4866000	-1123.9609		1261.0	7395900	-1153.6575
1220.0	4917200	-1124.7054		1262.0	7464800	-1154.2828
1221.0	4968800	-1125.6296		1263.0	7534100	-1154.9067
1222.0	5020900	-1126.1813		1264.0	7603800	-1155.5292
1223.0	5073300	-1126.9148		1265.0	7673900	-1156.3045
1224.0	5126100	-1127.8255		1266.0	7744500	-1156.9225
1225.0	5179400	-1128.3694		1267.0	7815500	-1157.5392
1226.0	5233000	-1129.0926		1268.0	7886900	-1158.0014
1227.0	5287000	-1129.6335		1269.0	7958600	-1158.6172
1228.0	5341300	-1130.5310		1270.0	8030700	-1159.2317
1229.0	5396100	-1131.0672		1271.0	8103200	-1159.8450
1230.0	5451200	-1131.7802		1272.0	8176100	-1160.6090
1231.0	5506700	-1132.6661		1273.0	8249500	-1161.0665
1232.0	5562700	-1133.3706		1274.0	8323200	-1161.8275
1233.0	5619100	-1134.5919		1275.0	8397400	-1162.4343
1234.0	5676200	-1135.7958		1276.0	8472000	-1163.1904
1235.0	5734000	-1137.1502		1277.0	8547100	-1164.0925
1236.0	5792600	-1138.4815		1278.0	8622800	-1164.6912
1237.0	5852000	-1139.3038		1279.0	8698900	-1165.2889
1238.0	5911900	-1140.2826		1280.0	8775400	-1165.8856
1239.0	5972400	-1141.0918		1281.0	8852300	-1166.4812
1240.0	6033400	-1141.5759		1282.0	8929600	-1167.0759
1241.0	6094700	-1142.3803		1283.0	9007300	-1167.6697
1242.0	6156500	-1142.8615		1284.0	9085400	-1168.2624

1243.0	6218600	-1143.3429	1285.0	9163900	-1168.8542
1244.0	6281000	-1143.9841	1286.0	9242800	-1169.2980
1245.0	6343800	-1144.6234	1287.0	9322000	-1170.0364
1246.0	6407000	-1145.1024	1288.0	9401700	-1170.4788
1247.0	6470500	-1145.7402	1289.0	9481700	-1170.9215
1248.0	6534400	-1146.2181	1291.0	9642300	0.0000
1249.0	6598600	-1146.8545			

FDR.CAP
 F.D.R. Lake at Grand Coulee Dam
 01-24-75
 Type code = 4
 No. of Points = 19
 Dates of Use = Wy 1975-89

Elev	Contents	A1	A3
930.5	0	-894.6600	-6109.0675
980.0	76367	-881.6914	-18662.9740
1000.0	146966	-902.5078	10481.4476
1020.0	249373	-844.5684	-107347.5000
1060.0	553243	-931.5280	159266.0460
1120.0	1403168	-950.5080	284543.9710
1170.0	2713909	-973.6857	541006.0840
1180.0	3063165	-896.5147	-401975.5800
1190.0	3442953	-975.5884	633707.4740
1200.0	3854634	-923.6801	-111746.5600
1210.0	4301035	-969.8845	600542.5670
1220.0	4782896	-1008.8957	1253064.1900
1230.0	5308657	-995.0059	997732.1220
1240.0	5882754	-946.6990	34125.0552
1250.0	6501603	-950.6794	119162.4750
1260.0	7162905	-884.3520	-1387321.1000
1270.0	7864082	-901.4861	-978888.0600
1280.0	8603683	-1034.7930	2395223.7500
1291.0	9477261	0.0000	0.0000

CHJ.CAP

Chief Joseph

01-10-55

Type code = 4

No. of Points = 13

Dates of Use = Wy 1960-89

Elev	Contents	A1	A3
930.0	400800	-871.9130	0
932.0	414600	-872.7714	0
934.0	428600	-873.6338	0
936.0	442800	-874.5000	0
938.0	457200	-875.3699	0
941.0	479100	-876.2568	0
944.0	501300	-877.1600	0
947.0	523800	-878.0789	0
950.0	546600	-879.0130	0
953.0	569700	-879.9615	0
956.0	593100	-880.9240	0
959.0	616800	-881.9000	0
960.0	624800	0.0000	0

CHL.CAP

Lake Chelan

10-01-27

Type code = 4

No. of Points = 12

Dates of Use = Entire period of record

Elev	Contents	A1	A3
1079.1	3140	-1079.0000	0
1080.0	31400	-1079.0032	0
1081.0	62900	-1079.0095	0
1082.0	94500	-1079.0189	0
1083.5	142050	-1079.0330	0
1085.0	189750	-1079.0703	0
1088.0	285750	-1079.1258	0
1090.0	350150	-1079.1929	0
1093.0	447350	-1079.2776	0
1097.0	577750	-1079.3318	0
1097.3	587560	-1079.3866	0
1100.0	676120	0.0000	0

BRNOLD.CAP

Brownlee Reservoir

Undated

Type code = 4

No. of Points = 42

Dates of Use = Wy 1958-83

Elev	Contents	A1	A3
1977.0	453025	-1909.8255	0
1978.0	459769	-1911.7700	0
1979.0	466711	-1911.7893	0
1980.0	473655	-1913.6618	0
1991.0	552195	-1915.7691	0
1999.0	610915	-1917.8692	0
2000.0	618445	-1917.9237	0
2002.0	633515	-1920.0976	0
2004.0	648985	-1922.1608	0
2006.0	664845	-1924.2232	0
2008.0	681105	-1926.2347	0
2010.0	697765	-1928.1987	0
2013.0	723355	-1930.1415	0
2015.0	740815	-1932.0420	0
2017.0	758675	-1933.8120	0
2019.0	776915	-1935.6400	0
2025.0	832835	-1937.5173	0
2033.0	908995	-1939.5781	0
2034.0	918725	-1939.4810	0
2041.0	986765	-1941.5277	0
2043.0	1006605	-1943.5331	0
2044.0	1016725	-1945.2888	0
2046.0	1037325	-1947.6754	0
2048.0	1058425	-1949.0818	0
2049.0	1069125	-1950.9151	0
2051.0	1090925	-1952.7185	0
2052.0	1102025	-1954.4757	0
2053.0	1113325	-1956.1891	0
2054.0	1124825	-1957.8611	0
2055.0	1136525	-1959.4937	0
2056.0	1148425	-1961.0888	0
2058.0	1172625	-1964.1900	0
2059.0	1185125	-1965.6831	0
2060.0	1197825	-1967.1453	0
2063.0	1236525	-1967.8827	0

BRNOLD.CAP
Brownlee Reservoir
Cont'd.

Elev	Contents	A1	A3
2064.0	1249525	-1970.0508	0
2067.0	1289425	-1971.4870	0
2070.0	1329925	-1972.9252	0
2072.0	1357325	-1973.6431	0
2075.0	1398725	-1974.3723	0
2077.0	1426525	-1975.1054	0
2079.0	1454525	0.0000	0

BRN.CAP

Brownlee Reservoir

01-01-84

Type code = 4

No. of Points = 15

Dates of Use = Wy 1984-89

Elev	Contents	A1	A3
1801.0	0.31	-1799.9999	0.0000
1820.0	2484.73	-1774.8386	-3125.9701
1840.0	13727.38	-1763.8297	-5973.3064
1860.0	33677.07	-1787.9628	3976.5931
1880.0	65918.27	-1734.9375	-31709.7270
1900.0	112121.84	-1750.8971	-17802.9310
1920.0	171730.96	-1776.5838	10987.1884
1940.0	248794.29	-1790.6968	31524.7948
1960.0	348326.06	-1737.0506	-68858.3740
1980.0	470971.18	-1739.6799	-63016.0520
2000.0	615693.08	-1711.0080	-137769.7800
2020.0	783201.51	-1708.6216	-144882.4200
2040.0	973768.05	-1810.1528	197861.3020
2060.0	1194448.55	-1898.6472	550846.5650
2080.0	1464666.51	0.0000	0.0000

DWR.CAP

Dworshak Reservoir

05-01-81

Type code = 4

No. of Points = 6

Dates of Use = not used for historical data

Elev	Contents	A1	A3
1443.1	1435117	-1030.5523	-420015.2200
1445.0	1452244	-615.9876	-1044465.0000
1480.0	1782006	-1219.8524	930978.1600
1520.0	2238020	-881.8274	-541008.1900
1560.0	2794022	-1265.5149	1345839.0900
1600.0	3467928	0.0000	0.0000

This table should be used for future updates. It was not used for this project because daily storage values were available.

JDA.CAP

John Day

Undated

Type code = 4

No. of Points = 12

Dates of Use = Entire period of record

Elev	Contents	A1	A3
257.0	1990000	-209.6190	0
258.0	2032000	-212.8444	0
259.0	2077000	-213.8478	0
260.0	2123000	-214.8298	0
261.0	2170000	-215.7917	0
262.0	2218000	-216.7347	0
263.0	2267000	-217.6600	0
265.0	2367000	-218.5882	0
266.0	2418000	-220.3774	0
267.0	2471000	-221.2407	0
268.0	2525000	-222.0909	0
269.0	2580000	0.0000	0

ROU.CAP
 Round Butte
 01-19-64
 Type code = 4
 No. of Points = 11
 Dates of Use = Wy 1978-89

Elev	Contents	A1	A3
1860.0	260794	-1474.0699	0.0000
1870.0	286673	-1653.1968	0.0000
1880.0	314108	-1180.3663	0.0000
1890.0	343218	-1699.0558	0.0000
1900.0	374004	-1785.9880	195921.1780
1910.0	406613	-1749.2475	0.0000
1920.0	441054	-1805.9053	243187.9440
1930.0	477261	-1789.5349	0.0000
1940.0	515276	-1837.7919	320971.3150
1945.0	534739	-1837.8726	321280.1180
1950.0	555131	0.0000	0.0000

HCR.CAP

Hills Creek Reservoir

01-01-68

Type code = 4

No. of Points = 16

Dates of Use = Entire period of record

Elev	Contents	A1	A3
1260.0	175	-1244.7498	-2.1985
1280.0	2194	-1229.6341	-945.4749
1300.0	7616	-1229.3759	-976.5967
1320.0	17178	-1148.1174	-17255.8200
1340.0	30651	-1126.6382	-22618.3340
1360.0	47079	-1123.5704	-23534.6550
1380.0	66558	-1092.9682	-34285.8240
1400.0	89141	-1030.2633	-59493.1370
1420.0	114589	-1089.3355	-33107.8280
1440.0	143043	-1085.8174	-34874.7040
1460.0	174918	-1174.6008	14904.1932
1480.0	210970	-1149.2935	-1343.5679
1500.0	251867	-1067.5919	-60331.6560
1520.0	297223	-1161.5950	13963.5577
1540.0	347338	-1457.6664	274802.0650
1560.0	414079	0.0000	0.0000

LOP.CAP
 Lookout Point Reservoir
 01-01-68
 Type code = 4
 No. of Points = 13
 Dates of Use = Entire period of record

Elev	Contents	A1	A3
700.0	198	-657.1475	-1501.8145
720.0	3861	-664.1103	-908.2561
740.0	11032	-676.6385	1063.1200
760.0	23765	-671.8909	-230.0327
780.0	44095	-645.5012	-11049.5050
800.0	72535	-612.1538	-29089.7970
820.0	108573	-622.1399	-22476.3660
840.0	152466	-633.8095	-13104.9760
860.0	205471	-589.7726	-55658.7600
880.0	267848	-551.8195	-97963.8530
900.0	338887	-482.2121	-185297.5800
920.0	417829	-504.0431	-155220.9300
940.0	504528	0.0000	0.0000

FAL.CAP

Fall Creek Reservoir

01-01-68

Type code = 4

No. of Points = 17

Dates of Use = Entire period of record

Elev	Contents	A1	A3
680.0	93	-644.8096	-109.5381
690.0	814	-603.7926	-2346.9373
700.0	2046	-669.8624	669.7178
710.0	3921	-615.2506	-3753.6991
720.0	6617	-687.2410	3373.8631
730.0	10586	-647.4394	-3339.2275
740.0	16283	13.2023	-143395.8900
750.0	22728	-629.6242	-3473.8037
760.0	29816	-606.4198	-9398.1483
770.0	37985	-680.4840	12055.2038
780.0	47682	-377.2835	-96490.4930
790.0	58692	-677.7847	16499.0515
800.0	71007	-614.3203	-11806.1470
810.0	85120	-622.7988	-7607.0024
820.0	100789	-515.2625	-66715.0280
830.0	117826	-697.7183	40264.8529
840.0	136779	0.0000	0.0000

COT.CAP
 Cottage Grove Reservoir
 01-01-68
 Type code = 4
 No. of Points = 18
 Dates of Use = Entire period of record

Elev	Contents	A1	A3
720.0	3	-710.8957	-12.1738
725.0	44	-717.1010	12.4041
730.0	150	-719.5620	38.6616
735.0	399	-723.6169	133.3932
740.0	925	-719.6485	-58.6556
745.0	1843	-710.5262	-742.5364
750.0	3139	-719.0460	95.1946
755.0	4865	-720.0439	227.4922
760.0	7153	-699.1717	-3390.5675
765.0	9973	-699.1539	-3393.7489
770.0	13255	-708.3537	-1231.8720
775.0	17074	-696.9813	-4355.1386
780.0	21463	-682.3583	-8903.5594
785.0	26371	-683.4254	-8536.7913
790.0	31784	-665.5062	-15316.1530
795.0	37690	-646.3509	-23157.0420
800.0	44039	-639.4660	-26167.8490
805.0	50806	0.0000	0.0000

DOR.CAP

Dorena Reservoir

01-01-68

Type code = 4

No. of Points = 13

Dates of Use = Entire period of record

Elev	Contents	A1	A3
740.0	35	-733.2799	-12.0409
750.0	712	-730.8296	-118.7153
760.0	2809	-727.5365	-449.1737
770.0	6835	-671.6054	-10056.0680
780.0	12526	-699.5349	-4237.5539
790.0	19585	-708.2149	-1951.7438
800.0	28490	-691.0309	-7651.4261
810.0	39381	-710.7378	139.3389
820.0	52476	-728.4311	8614.4911
830.0	68473	-674.6879	-23057.6210
840.0	87315	-635.8160	-49011.8310
850.0	108342	-520.9572	-133394.7800
860.0	131059	0.0000	0.0000

CGR.CAP

Cougar Reservoir

01-01-68

Type code = 4

No. of Points = 22

Dates of Use = Entire period of record

Elev	Contents	A1	A3
1280.0	8	-1263.0429	-14.6094
1300.0	219	-1255.6494	-61.8869
1320.0	796	-1252.0232	-110.3577
1340.0	1855	-1254.4754	-55.0489
1360.0	3532	-1271.0102	506.3470
1380.0	6065	-1253.0378	-410.0711
1400.0	9633	-1216.0475	-2937.0872
1420.0	14194	-1223.8183	-2285.2592
1440.0	19766	-1318.4667	7369.6019
1460.0	26948	-1173.6708	-12660.8730
1480.0	35841	-876.4130	-59726.9460
1500.0	45660	-1233.6530	647.3575
1520.0	56580	-1224.4736	-1146.1479
1540.0	69111	-1069.5185	-35649.5540
1560.0	83047	-1110.2175	-25800.3660
1580.0	98223	-1111.0784	-25572.3110
1600.0	114748	-1111.8674	-25346.0520
1620.0	132684	-1091.8525	-31569.8760
1640.0	152060	-1145.8610	-13476.5620
1660.0	172984	-1187.2284	1525.5047
1680.0	195678	-1219.9270	14409.2455
1700.0	220361	0.0000	0.0000

BLU.CAP

Blue River Reservoir

01-01-68

Type code = 4

No. of Points = 18

Dates of Use = Entire period of record

Elev	Contents	A1	A3
1120.0	156	-995.1862	-925.7195
1140.0	763	-1100.1894	298.5433
1160.0	1874	-1092.7764	103.7791
1180.0	3971	-1040.9147	-2195.1168
1200.0	7031	-1061.7858	-985.4230
1220.0	11039	-1055.9984	-1425.1188
1240.0	16178	-1098.7069	2660.9645
1260.0	22769	-1138.2780	7594.3204
1280.0	31545	-1129.7909	6159.6538
1300.0	43095	-1061.9821	-8554.8747
1320.0	57240	-1051.0364	-11345.7090
1340.0	73706	-1025.2536	-18934.3500
1350.0	82820	-970.5320	-36079.9770
1357.0	89522	-770.5038	-101089.2600
1360.0	92462	-1096.3371	5892.6850
1362.0	94447	-982.0742	-32194.9180
1380.0	113314	-956.2683	-41630.5610
1400.0	136306	0.0000	0.0000

FRN.CAP

Fern Ridge Reservoir

01-01-68

Type code = 4

No. of Points = 7

Dates of Use = Wy 1975-89

Elev	Contents	A1	A3
345.0	318	-341.4530	92.1713
350.0	3252	-332.2103	-3324.2634
355.0	10501	-338.6460	579.5683
360.0	22667	-338.1797	97.5363
365.0	42009	-345.2955	11217.3742
370.0	71900	-342.1725	3546.3175
375.0	115761	0.0000	0.0000

A capacity table dated 06/08/43 is applicable to water years 1943-66 but was not used for this study because daily storage data was available for that period.

DET.CAP

Detroit Reservoir

01-01-68

Type code = 4

No. of Points = 22

Dates of Use = Entire period of record

Elev	Contents	A1	A3
1200.0	6	-1172.6795	-39.5342
1220.0	197	-1186.1959	27.9797
1240.0	710	-1205.5848	274.0743
1260.0	1997	-1217.6770	656.7707
1280.0	4936	-1209.7536	112.4156
1300.0	10341	-1191.5743	-1947.2416
1320.0	18472	-1157.9412	-7295.3497
1340.0	29238	-1223.7700	5914.5098
1360.0	43469	-1138.3805	-17624.1200
1380.0	61546	-1145.7237	-15218.5480
1400.0	82932	-1154.0642	-11999.2220
1420.0	108027	-1202.9308	10056.4416
1440.0	137679	-1145.7472	-20727.1030
1460.0	172224	-1060.4029	-73128.6360
1480.0	210939	-1205.7264	25255.7500
1500.0	254593	-1182.6739	7290.2137
1520.0	304363	-1166.0402	-7357.5726
1540.0	360245	-1284.6268	109213.1720
1560.0	423964	-1396.6310	0.0000
1565.0	441196	-1393.3050	0.0000
1569.0	455104	-1392.8890	0.0000
1575.0	476174	0.0000	0.0000

GPR.CAP
 Green Peter Reservoir
 01-01-68
 Type code = 4
 No. of Points = 30
 Dates of Use = Entire period of record

Elev	Contents	A1	A3
730.0	237	-699.0283	30.5222
740.0	508	-709.7840	155.4797
750.0	987	-711.1254	183.5908
760.0	1780	-718.5572	426.2007
770.0	3016	-729.5983	982.4457
780.0	4930	-730.6985	1068.0482
790.0	7789	-726.2331	562.0861
800.0	11750	-719.4589	-465.3965
810.0	16889	-709.4034	-2392.0118
820.0	23229	-704.0066	-3642.7990
830.0	30795	-699.0300	-5003.4618
840.0	39638	-662.4096	-16598.9460
850.0	49683	-668.4674	-14458.5330
860.0	60877	-658.4544	-18397.6140
870.0	73273	-665.1191	-15508.7170
880.0	86917	-663.2609	-16395.3080
890.0	101888	-676.4477	-9515.1048
900.0	118282	-673.8178	-11018.8140
910.0	136202	-685.1087	-3980.2142
920.0	155746	-667.8245	-15733.3520
930.0	176965	-673.0955	-11859.8410
940.0	199885	-670.6467	-13801.9680
950.0	224580	-675.6158	-9561.1855
960.0	251124	-665.6098	-18733.6660
970.0	279569	-585.7094	-97035.8070
980.0	309742	-575.7062	-107354.3900
990.0	341465	-578.8101	-103990.7600
1000.0	374762	-645.3259	-28384.2070
1010.0	409833	-653.3618	-18727.2220
1020.0	446904	0.0000	0.0000

FOS.CAP

Foster Reservoir

05-20-80

Type code = 4

No. of Points = 13

Dates of Use = Wy 1975-89

Elev	Contents	A1	A3
530.0	16	-522.0529	-10.4904
540.0	295	-517.7015	-84.0742
550.0	1068	-511.6079	-301.3187
560.0	2441	-524.4235	424.9960
570.0	4663	-528.0832	764.7370
580.0	8172	-531.5705	1262.7204
590.0	13396	-494.9600	-6340.6306
600.0	20305	-448.8139	-18045.8710
610.0	28429	-430.3879	-23359.1430
620.0	37570	-467.9836	-11277.9220
630.0	47858	-475.1564	-8659.9129
640.0	59531	-529.5996	13862.0411
650.0	73099	0.0000	0.0000

TMY.CAP
 Timothy Lake
 05-28-56
 Type code = 4
 No. of Points = 23
 Dates of Use = Entire period of record

Elev	Contents	A1	A3
3101.0	0	-3101.0000	0.0000
3103.0	10	-3102.5000	8.7500
3106.0	70	-3103.5000	23.1250
3108.0	175	-3103.8300	44.7917
3111.0	430	-3105.5000	127.5000
3115.0	1030	-3107.3000	288.8750
3118.0	1720	-3105.0000	30.0000
3122.0	2920	-3108.3000	573.8750
3125.0	4060	-3104.2500	-245.6250
3129.0	5880	-3104.0000	-370.0000
3132.0	7470	-3103.7500	-510.6250
3140.0	12630	-3067.5000	-13651.3000
3142.0	14100	-3067.0000	-14025.0000
3145.0	16395	-3092.8300	-4015.2100
3149.0	19645	-3092.5000	-4296.8800
3157.0	26905	-3092.8300	-3975.2100
3160.0	29860	-3109.5000	4357.5000
3163.0	32980	-3056.5000	-23731.3000
3166.0	36220	-3055.5000	-24831.3000
3184.0	57730	-3054.5000	-26121.3000
3188.0	62990	-3121.0000	18100.0000
3196.0	74350	-3145.8300	36599.5800
3200.0	80610	0.0000	0.0000

PKL.CAP

Packwood Lake

Undated

Type code = 4

No. of Points = 2

Dates of Use = Wy 1979-89

Elev	Contents	A1	A3
2843.5	0.0	-2645.3943	-25736.88262
2860.0	6981.3	0.0000	0

This table was developed for the BPA Power Streamflow study from elevation area data, using the conic expansion model.

MOS.CAP
 Riffe Lake near Mossyrock
 Undated
 Type code = 4
 No. of Points = 92
 Dates of Use = Wy 1968-89

Elev	Contents	A1	A3=0 all points	Elev	Contents	A1
640.0	100561.98	-623.1000		720.0	697388.40	-645.1915
641.0	106512.39	-623.6774		721.0	706710.72	-643.5435
642.0	112661.15	-623.0667		722.0	715834.68	-645.2128
643.0	118611.57	-623.7097		723.0	725157.00	-643.5217
644.0	124760.33	-623.0333		725.0	743404.93	-645.2553
646.0	136661.15	-623.7742		726.0	752727.24	-643.5000
647.0	142809.91	-623.0000		728.0	770975.18	-645.2979
649.0	154710.74	-623.8387		729.0	780297.49	-643.4783
650.0	160859.50	-624.6563		730.0	789421.46	-647.0833
653.0	179900.82	-625.5152		731.0	798942.12	-648.7959
654.0	186446.27	-624.6250		732.0	808661.13	-647.0625
658.0	211834.70	-625.6364		737.0	856264.43	-648.8980
659.0	218380.16	-624.5938		738.0	865983.44	-647.0417
660.0	224727.26	-626.6765		740.0	885024.76	-650.7600
661.0	231471.07	-627.6571		741.0	894942.12	-652.5294
662.0	238413.21	-626.6471		742.0	905057.82	-650.7400
664.0	251900.82	-627.7143		745.0	934809.88	-652.5882
665.0	258842.97	-626.6176		746.0	944925.58	-650.7200
666.0	265586.77	-627.7429		749.0	974677.65	-652.6471
667.0	272528.92	-626.5882		750.0	984793.35	-654.5192
669.0	286016.52	-627.8000		751.0	995107.40	-656.3396
670.0	292958.67	-630.0811		753.0	1016132.19	-654.4808
672.0	307636.35	-628.9167		754.0	1026446.24	-656.3585
673.0	314776.85	-630.1081		755.0	1036958.64	-654.4615
680.0	366148.75	-632.6667		756.0	1047272.69	-656.3774
686.0	412561.97	-631.2632		758.0	1068297.48	-654.4231
687.0	420099.16	-632.6923		759.0	1078611.53	-656.3962
690.0	443305.77	-635.4878		760.0	1089123.93	-660.1636
693.0	467702.46	-634.0500		761.0	1100033.02	-661.9643
694.0	475636.35	-635.5172		762.0	1111140.45	-660.1455
697.0	500033.04	-633.9750		763.0	1122049.54	-661.9821
698.0	507966.92	-635.5366		764.0	1133156.98	-660.1273
700.0	524231.39	-638.5349		765.0	1144066.07	-662.0000
701.0	532760.31	-637.0476		766.0	1155173.51	-660.1091
702.0	541090.89	-638.5581		767.0	1166082.60	-662.0179

705.0	566677.66	-636.9762	768.0	1177190.04	-660.0909
706.0	575008.24	-638.5814	769.0	1188099.13	-662.0357
709.0	600595.02	-636.9048	770.0	1199206.57	-665.7586
710.0	608925.60	-641.7778	771.0	1210710.70	-667.5424
712.0	626776.84	-640.1818	772.0	1222413.18	-665.7414
713.0	635504.11	-641.8000	773.0	1233917.31	-667.5593
714.0	644429.73	-640.1591	775.0	1257322.27	-665.7069
715.0	653157.00	-641.8222	776.0	1268826.40	-667.5763
717.0	671008.24	-640.1136	778.0	1292231.36	-665.6724
718.0	679735.51	-641.8444	779.0	1303735.49	-667.5932
719.0	688661.13	-640.0909	780.0	1315437.97	0.0000

MAY.CAP

Mayfield Reservoir

Undated

Type code = 4

No. of Points = 6

Dates of Use = Wy 1962-89

Elev	Contents	A1	A3
410.0	102456.2	-358.1688	0
415.0	112339.8	-361.0590	0
420.0	122753.1	-364.0232	0
425.0	133717.7	-367.3598	0
430.0	145317.0	-372.3799	0
434.0	155405.0	0.0000	0

CS1.CAP

Cushman No. 1

Undated

Type code = 4

No. of Points = 30

Dates of Use = Wy 1943-89

Elev	Contents	A1	A3
615.1	190.02	-615.0000	0
617.0	3800.33	-615.1003	0
622.0	13802.97	-615.4287	0
625.0	20104.46	-615.4737	0
626.0	22214.88	-615.8887	0
629.0	28805.95	-616.4802	0
632.0	35708.43	-617.1215	0
635.5	44108.43	-617.2721	0
635.6	44350.41	-617.1207	0
637.0	47710.41	-617.9221	0
643.0	62715.37	-618.8818	0
648.0	75717.02	-616.4773	0
649.0	78119.01	-622.0609	0
650.0	81018.84	-620.0013	0
658.0	102624.79	-621.3569	0
664.0	119428.76	-622.8247	0
670.0	136831.73	-624.4045	0
673.0	145834.71	-625.9670	0
692.0	204747.76	-628.0328	0
696.0	217551.07	-630.0952	0
700.0	230755.03	-632.1480	0
705.0	247759.33	-634.2283	0
711.0	268764.29	-636.3587	0
719.0	297570.24	-638.5900	0
723.0	312372.88	-640.8180	0
726.0	323775.86	-642.9981	0
729.0	335478.33	-645.1547	0
733.0	351482.96	-647.2897	0
737.0	367886.27	-649.4287	0
738.0	372087.26	0.0000	0

ALD.CAP
Alder Reservoir
Undated
Type Code = 4
No. of Points = 38
Dates of Use = Wy 1944-89

Elev	Contents	A1	A3
1116	793.388	-1114.67	0
1117	1388.43	-1115.6	0
1118	2380.17	-1115	0
1119	3173.55	-1115.8	0
1121	5157.02	-1114.5	0
1123	6743.8	-1116.2	0
1124	7735.54	-1117.5	0
1125	8925.62	-1116	0
1126	9917.36	-1117.67	0
1127	11107.4	-1115.8	0
1134	18049.6	-1118.83	0
1138	22809.9	-1115	0
1140	24793.4	-1119.17	0
1145	30743.8	-1122.86	0
1146	32132.2	-1119	0
1151	38082.6	-1123.57	0
1154	42247.9	-1118.5	0
1155	43438	-1123.71	0
1157	46214.9	-1127.88	0
1161	52562	-1131.56	0
1163	56132.2	-1127.63	0
1164	57719	-1131.67	0
1165	59504.1	-1127.5	0
1166	61090.9	-1131.78	0
1168	64661.2	-1135.4	0
1174	76562	-1138.91	0
1175	78743.8	-1135.3	0
1177	82710.7	-1139.09	0
1179	87074.4	-1142.42	0
1180	89454.5	-1139	0
1183	96000	-1142.67	0
1185	100760	-1145.92	0
1186	103339	-1142.58	0
1190	112859	-1146.23	0
1192	118017	-1149.5	0
1199	137455	-1152.8	0
1206	158281	-1156.13	0
1207.3	162407	0	0

LOS.CAP
 Lost Creek Lake
 1977
 Type code = 4
 No. of Points = 19
 Dates of Use = Wy 1977-89

Elev	Contents	A1	A3
1560.0	70	-1541.7030	-58.0793
1580.0	1116	-1540.2874	-101.8523
1600.0	4038	-1556.4636	1019.4786
1620.0	10402	-1510.7254	-5734.2150
1640.0	20982	-1495.8662	-8805.6565
1660.0	35183	-1449.4534	-21243.4800
1680.0	52839	-1486.8733	-9219.0600
1700.0	74184	-1497.2189	-5170.9890
1720.0	100056	-1488.1390	-9459.7023
1740.0	130911	-1450.5013	-30436.3010
1760.0	166715	-1492.1166	-3926.7130
1780.0	207860	-1430.7400	-49079.0200
1800.0	254576	-1361.1793	-106280.8700
1820.0	306199	-1401.5970	-69945.2400
1840.0	362759	-1427.3795	-44497.4570
1860.0	424897	-1402.7910	-71174.3800
1880.0	492887	-1387.7501	-88952.3540
1900.0	566727	-1280.6351	-226060.1000
1920.0	646035	0.0000	0.0000

KLAOLD.CAP

Upper Klamath Lake

10-01-22

Type code = 4

No. of Points = 30

Dates of Use = Wy 1928-1973

Elev	Contents	A1	A3
4135.0	0	-4135.0000	0
4135.8	47200	-4135.0067	0
4137.0	118600	-4135.0233	0
4137.7	160600	-4135.0479	0
4138.6	215100	-4135.0738	0
4139.3	257800	-4135.1419	0
4139.4	264000	-4135.2095	0
4139.5	270300	-4135.3415	0
4139.7	283300	-4135.4716	0
4139.8	290000	-4135.5971	0
4139.9	296900	-4135.7764	0
4140.0	304100	-4135.8342	0
4140.1	311400	-4135.8919	0
4140.2	318800	-4136.0053	0
4140.3	326400	-4136.1154	0
4140.5	342000	-4136.2250	0
4140.7	358000	-4136.2802	0
4140.8	366100	-4136.3354	0
4140.9	374300	-4136.3904	0
4141.0	382600	-4136.4452	0
4141.3	407800	-4136.5024	0
4141.5	424800	-4136.5605	0
4141.8	450600	-4136.6207	0
4142.0	468000	-4136.6575	0
4142.5	511800	-4136.7494	0
4142.8	538500	-4136.8167	0
4142.9	547500	-4136.8835	0
4143.2	574800	-4136.9522	0
4143.5	602400	-4137.0226	0
4143.7	621000	0.0000	0

KLA.CAP
 Upper Klamath Lake
 January 1974
 Type code = 4
 No. of Points = 10
 Dates of Use = Wy 1974-89

Elev	Contents	A1	A3
4136.0	0	-4121.0098	-286312.63
4137.0	61300	-4006.1019	-2783552.00
4138.0	127000	-4035.6563	-2131384.80
4139.0	193700	-4094.9572	-797262.43
4140.0	262600	-4110.6921	-427113.51
4141.0	335400	-4118.3049	-235760.12
4142.0	414400	-4060.6080	-1818454.40
4143.3	523700	-3350.0835	21937547.00
4144.0	583300	-2441.5002	47710944.00
4145.0	668400	0.0000	0.00

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**Listings of Quick Basic Source Code
for programs used in this study**

Contained in Directory\PGMS

CAPTABLE.BAS

```

1 'PROGRAM CAPTABLE.BAS
5 'program to enter capacity table and compute volume
CLS
6 DEFDBL A, E, T, V
10 DIM TBL(100, 4)
PRINT : PRINT : PRINT
PRINT "          PROGRAM CAPTABLE"
PRINT "          by. C. W. Alexander July 1992"
PRINT
PRINT "          To enter storage constants (Elev, Contents, A1 and A3"
PRINT "          to represent a Reservoir Capacity Table as used by CROHMS"
PRINT "          or"
PRINT "          To use a table previously stored on disk to convert "
PRINT "          elevations to contents in Acre Feet, one elevation at "
PRINT "          a time entered from the keyboard"
PRINT

11 INPUT "ENTER NEW TABLE = 1 OR READ ONE FROM DISK = 2 ? ", N
12 IF N = 2 THEN GOTO 330
16 Q = 0
20 PRINT "ENTER CAPACITY TABLE"
30 INPUT "HOW MANY POINTS ", PNTS
40 FOR I = 1 TO PNTS
50 INPUT "ELEV ", TBL(I, 1)
60 INPUT "CONTENTS ", TBL(I, 2)
70 INPUT "A1 ", TBL(I, 3)
80 INPUT "A3 ", TBL(I, 4)
90 NEXT I
95 INPUT "SAVE THE TABLE Y OR N ", Q$
96 IF Q$ = "Y" OR Q$ = "Y" THEN GOSUB 270
100 'ENTER ELEV, COMPUTE CONTENTS
105 PRINT "ENTER ZERO TO STOP"
110 INPUT "ENTER TARGET ELEVATION ", E2
112 IF E2 = 0 THEN GOTO 260
115 JFLG = 0
120 FOR I = 1 TO (PNTS - 1)
130 IF E2 >= TBL(I, 1) AND E2 <= TBL(I + 1, 1) GOTO 140 ELSE GOTO 180
140 E1 = TBL(I, 1): E3 = TBL(I + 1, 1)
150 V1 = TBL(I, 2): V3 = TBL(I + 1, 2)
160 A1 = TBL(I, 3): A3 = TBL(I, 4)
165 JFLG = 1
170 I = PNTS
180 NEXT I
185 IF JFLG = 0 GOTO 245
190 'COMPUTE TARGET VOLUME

' TEST FOR POSSIBLE LOG(0) AND IF FOUND USE ARITHMETIC INTERPOLATION

IF (E2 + A1) = 0 OR (E1 + A1) = 0 THEN 192 ELSE 200
192 V2 = (((E2 - E1) * (V3 - V1)) / (E3 - E1)) + V1
GOTO 245

' LOGARITHMIC INTERPOLATION ROUTINE

200 V2T = (LOG(E2 + A1) - LOG(E1 + A1)) * (LOG(V3 - A3) - LOG(V1 - A3)) / (LOG(E3 + A1) - LOG(E1 + A1))
210 V2T2 = V2T + LOG(V1 - A3)
220 V2 = EXP(V2T2) + A3
225 C = INT(V2 + .5)

```

CAPTABLE.BAS

```
230 PRINT
240 PRINT E2, C
241 GOTO 100
245 PRINT "ELEV "; E2; " IS OUTSIDE THE RANGE OF THE CAPACITY TABLE."
250 GOTO 100
260 CLS
    SYSTEM
268 'SUBROUTINE TO WRITE CAPACITY TABLE TO DISK
269 '
270 INPUT "ENTER FILE NAME ", F$
280 OPEN "O", 1, F$
    WRITE #1, 4
285 WRITE #1, PNTS
290 FOR I = 1 TO PNTS
300 WRITE #1, TBL(I, 1), TBL(I, 2), TBL(I, 3), TBL(I, 4)
310 NEXT I
315 CLOSE #1
320 RETURN
325 'ROUTINE TO LOAD CAPACITY TABLE FROM DISK
326 '
330 INPUT "ENTER FILE NAME ", F$
340 OPEN "I", 1, F$
    INPUT #1, ZTYP
350 INPUT #1, PNTS
360 FOR i = 1 TO PNTS
370 INPUT #1, TBL(i, 1)
380 INPUT #1, TBL(i, 2)
390 INPUT #1, TBL(i, 3)
400 INPUT #1, TBL(i, 4)
410 NEXT I
415 CLOSE #1
420 GOTO 100
    END
```

CANTABLE.BAS

```

1 'PROGRAM CANTABLE.BAS
5 'program to enter CANADIAN STYLE capacity table and compute volume
CLS
6 DEFDBL A, E, T, V
10 DIM TBL(100, 7)
PRINT : PRINT : PRINT
PRINT "          PROGRAM CANTABLE"
PRINT "          by. C. W. Alexander July 1992"
PRINT
PRINT "          To enter storage constants (Elev, Contents, A1,A2,A3 &A4"
PRINT "          to represent a Reservoir Capacity Table as used by CROHMS"
PRINT "          or"
PRINT "          To use a table previously stored on disk to convert "
PRINT "          elevations to contents in Acre Feet, one elevation at "
PRINT "          a time entered from the keyboard"
PRINT

11 INPUT "ENTER NEW TABLE =1 OR READ ONE FROM DISK =2 ? ", N
12 IF N = 2 THEN GOTO 330
16 Q = 0
20 PRINT "ENTER CAPACITY TABLE"
30 INPUT "HOW MANY POINTS ", PNTS
40 FOR I = 1 TO PNTS
50 INPUT "ELEV ", TBL(I, 1)
60 INPUT "AO ", TBL(I, 2)
70 INPUT "A1 ", TBL(I, 3)
80 INPUT "A2 ", TBL(I, 4)
  INPUT "A3 ", TBL(I, 5)
  INPUT "A4 ", TBL(I, 6)
  INPUT "END ELEV ", TBL(I, 7)

90 NEXT I
95 INPUT "SAVE THE TABLE Y OR N ", Q$
96 IF Q$ = "Y" OR Q$ = "Y" THEN GOSUB 270
100 'ENTER ELEV, COMPUTE CONTENTS
105 PRINT "ENTER ZERO TO STOP"
110 INPUT "ENTER TARGET ELEVATION ", E2
112 IF E2 = 0 THEN GOTO 280
115 JFLG = 0
120 FOR I = 1 TO PNTS
130 IF E2 >= TBL(I, 1) AND E2 <= TBL(I, 7) GOTO 140 ELSE GOTO 180
140 E1 = TBL(I, 1)
150 AO = TBL(I, 2)
160 A1 = TBL(I, 3): A2 = TBL(I, 4)
  A3 = TBL(I, 5): A4 = TBL(I, 6)
165 JFLG = 1
170 I = PNTS
180 NEXT I
185 IF JFLG = 0 GOTO 245
190 'COMPUTE TARGET VOLUME
200 V2 = AO * ((E2 + A1) ^ A2) + (A3 * E2) + A4

210 '

```

CANTABLE.BAS

```

230 PRINT
240 PRINT E2, CLNG(V2)
241 GOTO 100
245 PRINT "ELEV "; E2; " IS OUTSIDE THE RANGE OF THE CAPACITY TABLE."
250 GOTO 100
260 CLS
    SYSTEM
268 'SUBROUTINE TO WRITE CAPACITY TABLE TO DISK
269 '
270 INPUT "ENTER FILE NAME ", F$
280 OPEN "O", 1, F$
    WRITE #1, 7
285 WRITE #1, PNTS
290 FOR I = 1 TO PNTS
300 WRITE #1, TBL(I, 1), TBL(I, 2), TBL(I, 3), TBL(I, 4), TBL(I, 5), TBL(I, 6), TBL(I, 7)
310 NEXT I
315 CLOSE #1
320 RETURN
325 'ROUTINE TO LOAD CAPACITY TABLE FROM DISK
326 '
330 INPUT "ENTER FILE NAME ", F$
340 OPEN "I", 1, F$
    INPUT #1, ZTYP
350 INPUT #1, PNTS
360 FOR I = 1 TO PNTS
370 INPUT #1, TBL(I, 1)
380 INPUT #1, TBL(I, 2)
390 INPUT #1, TBL(I, 3)
400 INPUT #1, TBL(I, 4)
        INPUT #1, TBL(I, 5)
        INPUT #1, TBL(I, 6)
        INPUT #1, TBL(I, 7)
410 NEXT I
415 CLOSE #1
420 GOTO 100
    END

```


CONVERT.BAS

```

'PROGRAM CONVERT.BAS
'To read a .TXT file containing reservoir elevations and convert

'the elevations to contents in acre feet using a capacity table file.
CLS
PRINT "                Program CONVERT"
PRINT "                by C.W. Alexander  July 1992"
PRINT
PRINT "    To read a TEXT (.TXT) file of reservoir elevations created"
PRINT "    by a spreadsheet program, and apply the elevations to a "
PRINT "    capacity table generated by program CAPTABLE "
PRINT "    The result is a new .TXT file containing Contents in Acre-Ft"
PRINT "    ready to be imported back into a spreadsheet"
PRINT

DEFDBL A, E, T, V

DIM TBL(100, 7)
DIM ELTBL(80, 13), CONTBL(80, 13)
INPUT " txt FILE NAME ", F1$
OPEN F1$ FOR INPUT AS 1

J = 1
WHILE NOT EOF(1)
    FOR I = 1 TO 13
        INPUT #1, ELTBL(J, I)
    NEXT I
    J = J + 1
WEND

JPNT = J - 1
CLOSE #1

' ROUTINE TO LOAD CAPACITY TABLE FROM DISK
'
INPUT "NAME OF CAPACITY TABLE FILE ", F$
OPEN F$ FOR INPUT AS 1
INPUT #1, ZTYP
INPUT #1, PNTS
    FOR I = 1 TO PNTS
        FOR J = 1 TO ZTYP
            INPUT #1, TBL(I, J)
        NEXT J
    NEXT I
CLOSE #1

'LOAD WATER YEARS INTO COLUMN 1 OF CONTBL
'
    FOR I = 1 TO JPNT
        CONTBL(I, 1) = ELTBL(I, 1)
    NEXT I

'ROUTINE TO COMPUTE ACRE FEET AND STORE IN CONTBL
'
    IF ZTYP = 7 GOTO 350
    FOR I = 1 TO JPNT

```

CONVERT.BAS

```

FOR J = 2 TO 13
E2 = ELTBL(I, J)
JFLG = 0
  FOR K = 1 TO (PNTS - 1)
    IF E2 >= TBL(K, 1) AND E2 <= TBL(K + 1, 1) GOTO 140 ELSE GOTO 180
140   E1 = TBL(K, 1): E3 = TBL(K + 1, 1): V1 = TBL(K, 2): V3 = TBL(K + 1, 2)
      A1 = TBL(K, 3): A3 = TBL(K, 4)
      JFLG = 1
      K = PNTS
180   NEXT K
    IF JFLG = 0 GOTO 245
181   IF (E2 + A1) = 0 OR (E1 + A1) = 0 THEN 182 ELSE 190
182   V2 = (((E2 - E1) * (V3 - V1)) / (E3 - E1)) + V1

183 GOTO 245

190   V2T = (LOG(E2 + A1) - LOG(E1 + A1)) * (LOG(V3 - A3) - LOG(V1 - A3)) / (LOG(E3 + A1) - LOG(E1 + A1))
      V2T2 = V2T + LOG(V1 - A3)
      V2 = EXP(V2T2) + A3
245   IF JFLG = 0 THEN CONTBL(I, J) = 9999999 ELSE CONTBL(I, J) = INT(V2 + .5)
      NEXT J
      NEXT I
246   INPUT "PRINT THE RESULTS      Y or N ? ", Q$
      IF Q$ = "Y" OR Q$ = "y" THEN 250 ELSE 300

250   LPRINT CHR$(15);
      WIDTH LPRINT 132
' TEMPORARY PRINT ROUTINE
      FOR I = 1 TO JPNT
        FOR J = 1 TO 12
          LPRINT CONTBL(I, J);
        NEXT J
        LPRINT CONTBL(I, 13)
      NEXT I
      LPRINT CHR$(18);
      WIDTH LPRINT 80
300   INPUT "CREATE A DISK FILE OF CONTENTS DATA  Y or N ? "; Q$
      IF Q$ <> "y" AND Q$ <> "Y" THEN GOTO 400

' ROUTINE TO WRITE A DISK FILE
'
      INPUT "ENTER THE OUTPUT FILE NAME FOR CONTENT DATA ", F2$
      OPEN F2$ FOR OUTPUT AS 1
      FOR I = 1 TO JPNT
        PRINT #1, USING "####"; CONTBL(I, 1); SPC(2);
        FOR J = 2 TO 12
          PRINT #1, USING "#####"; CONTBL(I, J); SPC(2);
        NEXT J
        PRINT #1, USING "#####"; CONTBL(I, 13)
      NEXT I
      GOTO 400
350 ' ROUTINE TO EVALUATE CANADIAN CAPACITY TABLES
'
      FOR I = 1 TO JPNT
        FOR J = 2 TO 13
          E2 = ELTBL(I, J)
          JFLG = 0
          FOR K = 1 TO PNTS

```

CONVERT.BAS

```
      IF E2 >= TBL(K, 1) AND E2 <= TBL(K, 7) GOTO 355 ELSE GOTO 356
355  A0 = TBL(K, 2): A1 = TBL(K, 3): A2 = TBL(K, 4)
      A3 = TBL(K, 5): A4 = TBL(K, 6)
      JFLG = 1
      K = PNTS
356  NEXT K

      IF JFLG = 0 GOTO 357
      V2 = A0 * ((E2 + A1) ^ A2) + (A3 * E2) + A4
357  IF JFLG = 0 THEN CONTBL(I, J) = 99999999 ELSE CONTBL(I, J) = CLNG(V2)

      NEXT J
      NEXT I
      GOTO 246

400  CLOSE
      SYSTEM
      END
```

REVERT.BAS

```

'PROGRAM REVERT.BAS
'To read a .TXT file containing reservoir contents and convert

'the contents to elevations in feet using a capacity table file.
CLS
PRINT "
                                Program CONVERT"
PRINT "                                by C.W. Alexander July 1992"
PRINT
PRINT "    To read a TEXT (.TXT) file of reservoir contents created"
PRINT "    by a spreadsheet program, and apply the contents to a "
PRINT "    capacity table generated by program CAPTABLE "
PRINT "    The result is a new .TXT file containing Elevations in feet"
PRINT "    ready to be imported back into a spreadsheet"
PRINT

DEFDBL A, E, T, V

DIM TBL(100, 7)
DIM ELTBL(80, 13), CONTBL(80, 13)
INPUT " txt FILE NAME ", F1$
OPEN F1$ FOR INPUT AS 1

J = 1
WHILE NOT EOF(1)
    FOR I = 1 TO 13
        INPUT #1, CONTBL(J, I)
    NEXT I
    J = J + 1
WEND

JPNT = J - 1
CLOSE #1

' ROUTINE TO LOAD CAPACITY TABLE FROM DISK
,
INPUT "NAME OF CAPACITY TABLE FILE ", F$
OPEN F$ FOR INPUT AS 1
INPUT #1, ZTYP
INPUT #1, PNTS
    FOR I = 1 TO PNTS
        FOR J = 1 TO ZTYP
            INPUT #1, TBL(I, J)
        NEXT J
    NEXT I
    CLOSE #1
    IF ZTYP = 7 GOTO 390

'LOAD WATER YEARS INTO COLUMN 1 OF ELTBL
,
    FOR I = 1 TO JPNT
        ELTBL(I, 1) = CONTBL(I, 1)
    NEXT I

'ROUTINE TO COMPUTE ELEVATION AND STORE IN ELTBL
,
    FOR I = 1 TO JPNT

```

REVERT.BAS

```

FOR J = 2 TO 13
  V2 = CONTBL(I, J)
  JFLG = 0
  FOR K = 1 TO (PNTS - 1)
    IF V2 >= TBL(K, 2) AND V2 <= TBL(K + 1, 2) GOTO 140 ELSE GOTO 180
140   E1 = TBL(K, 1): E3 = TBL(K + 1, 1): V1 = TBL(K, 2): V3 = TBL(K + 1, 2)
      A1 = TBL(K, 3): A3 = TBL(K, 4)
      JFLG = 1
      K = PNTS
180   NEXT K
      IF JFLG = 0 GOTO 245

' TEST FOR LOG(0) AND IF FOUND USE ARITHMETIC INTERPOLATION
  IF (E1 + A1) <> 0 GOTO 190
  E2T = ((V2 - V1) * (E3 - E1)) / (V3 - V1)
  E2 = E2T + E1
  GOTO 245

' LOGARITHMIC INTERPOLATION ROUTINE

190  E2T = (LOG(V2 - A3) - LOG(V1 - A3)) * (LOG(E3 + A1) - LOG(E1 + A1)) / (LOG(V3 - A3)
      E2T2 = E2T + LOG(E1 + A1)
      E2 = EXP(E2T2) - A1
245  IF JFLG = 0 THEN ELTBL(I, J) = 9999.99 ELSE ELTBL(I, J) = (INT((E2 * 100) + .5)) / 100
      NEXT J
      NEXT I
INPUT "PRINT THE RESULTS      Y or N ? ", Q$
IF Q$ = "Y" OR Q$ = "y" THEN 250 ELSE 300

250 LPRINT CHR$(15);
    WIDTH LPRINT 132
' TEMPORARY PRINT ROUTINE
    FOR I = 1 TO JPNT
      FOR J = 1 TO 12
        LPRINT ELTBL(I, J);
      NEXT J
      LPRINT ELTBL(I, 13)
    NEXT I
    LPRINT CHR$(18);
    WIDTH LPRINT 80
300 INPUT "CREATE A DISK FILE OF ELEVATION DATA  Y or N ? "; Q$
    IF Q$ <> "y" AND Q$ <> "Y" THEN GOTO 400

' ROUTINE TO WRITE A DISK FILE
'
  INPUT "ENTER THE OUTPUT FILE NAME FOR ELEVATION DATA ", F2$
  OPEN F2$ FOR OUTPUT AS 1
  FOR I = 1 TO JPNT
    PRINT #1, USING "####"; ELTBL(I, 1); SPC(2);
    FOR J = 2 TO 12
      PRINT #1, USING "####.##"; ELTBL(I, J); SPC(2);
    NEXT J
    PRINT #1, USING "####.##"; ELTBL(I, 13)
  NEXT I
390 IF ZTYP = 7 THEN PRINT "CANADIAN TABLES DON'T REVERT"
400 CLOSE
    SYSTEM
  END

```

Section C

MUNICIPAL AND INDUSTRIAL WATER SUPPLY

MUNICIPAL AND INDUSTRIAL WATER SUPPLY

General

The economy of the Columbia Basin has been largely influenced by the development of natural resources. The most important single category of economic development has been the harvesting of products grown on the land. These products include those from forestry and from agriculture. Lumber and wood products, food and kindred products, and paper and allied products constitute the major classes of manufacturing activity. Transportation equipment is also an important activity in the Pacific Northwest due in large part to the Boeing airplane manufacturing operations. The primary metals industry is the next most important activity.

Withdrawal uses are diversion of surface or groundwater from its source of supply, such as irrigation and water supply.

Water for offstream uses typically is diverted from a stream or withdrawn from a well and conveyed to the place of use. During most conveyances, some water is lost as a result of leakage from pipelines and canals and evaporation from open-water surfaces. Therefore, for nearly all uses, more water is withdrawn than is annually used. During the various uses, a portion of the water withdrawn is consumptively used by being incorporated into products, by evaporation, or by transpiration. The water that remains after the various uses typically is returned to a surface-water body, with or without some form of treatment, or infiltrates into the ground, and is referred to as return flow.

Consumptive uses are that portion of withdrawn quantity which is no longer available for further use because it is used up by crops, human beings, industrial plant processes, evapotranspiration, etc.

Consumptive use should not be thought of as a permanent loss of the water resource. In the context of the global water supply, there are virtually no losses attributable to human uses of water resources; there are only changes in the physical state and location of the water. In the western United States, for example, although water that is evaporated or transpired by plants during irrigation is effectively eliminated (at least temporarily) from further use at the site, the moisture could fall as precipitation that nourishes crops in the Midwest a few days later. Even the moisture incorporated into a product--grain for example--is not "used up," because the moisture in the grain ultimately will be released back to the environment.

Water supply requirements usually have the highest priority among the developmental uses, and water of good quality is needed. Although the total quantity of withdrawal in large cities may be relatively large, the consumptive water use is much less since 80 to 90% of the total intake

is returned to the river system.

Water Use by Major Categories

Water use is described in categories consisting of public supply, domestic and commercial, industrial and mining, thermoelectric power, and agricultural (irrigation and livestock). With the exception of mining and agricultural use, these categories of use include water obtained from public-supply and self-supplied systems; all water for mining and agricultural use is self-supplied.

Public Supply

Public-supply use refers to water withdrawn by public and private water suppliers and delivered to a variety of users for domestic, commercial, industrial, thermoelectric power, and public uses.

Domestic and Commercial

Domestic water use includes water for normal household purposes such as drinking, food preparation, bathing, washing clothes and dishes, and watering lawns and gardens. Commercial water use includes water for hotels and motels, restaurants, office buildings, retail and other commercial facilities, and civilian and military institutions. These two types of water use are closely related because they both are largely dependent on public supplies and their wastewaters are disposed of largely through communal sewer systems. Moreover, both types of use are concentrated in urban and suburban areas. Although most of the fresh water for domestic and commercial use is delivered from public supplies in urban areas, a considerable amount of water for these purposes is used in rural or nonurban areas and is self-supplied.

Industrial and Mining

Industrial water use includes water for manufacturing processes and mining activities. The largest water-using industries are those that manufacture steel and primary metals, chemicals and allied products, paper and allied products, and petroleum refining. The water for manufacturing use includes self-supplied and public-supply deliveries of freshwater which is mostly from surface-water sources. Mining use includes water for extraction of naturally occurring mineral materials, including petroleum, and withdrawals for dewatering and for milling, washing, and other mineral-preparation steps that are part of mining activities. Thermoelectric power generation also is an industrial use, but because of the quantity of the water it requires it is presented as a separate category.

Thermoelectric Power

The thermoelectric power category refers to the water used in the production of electrical power by steam using fossil-fuel, nuclear, or geothermal energy. It represents a special type of industrial use, which, because of its magnitude and other special characteristics is presented as a separate category.

Agriculture

Agricultural uses include irrigation and livestock. Irrigation depletions methodologies are presented in detail in Section D of this Technical Appendix.

Municipal and Industrial Water Use in the Pacific Northwest

An analysis was made to determine the relative magnitude of the 1990 level of Municipal and Industrial depletions in the Pacific Northwest. Data was obtained on the total water withdrawals by water-use category for the four northwest states of Idaho, Montana, Oregon, and Washington. This data is shown in Table 1.

TABLE 1
1990 TOTAL WATER WITHDRAWALS BY WATER-USE CATEGORY
(CFS)

STATE	PUBLIC SUPPLY	DOMES- TIC	COMM- ERCIAL	IRRI- GATION	LIVE- STOCK	INDUS- TRY	MINING	THERMAL ELECTRIC
Idaho	312	74	25	28985	868	304	13	9
Montana	209	25	0	13950	81	88	10	51
Oregon	729	99	1102	10633	33	440	2	23
Wash.	1356	161	42	9347	47	777	5	518
Total	2606	360	1169	62915	1028	1609	30	602
Per Cent	3.7	.5	1.7	89.4	1.5	2.3	.1	.8

Approximately 90 percent of the total water withdrawal in the Pacific Northwest is for irrigation. Public water supply and domestic account for about four percent, commercial about two percent, and industrial about two percent with the remaining amount shared by livestock, mining, and thermoelectric.

As mentioned previously water used for the non-agricultural categories have a return flow rate of 80 to 90 percent which is much greater than the average return rate of approximately 50 percent for agriculture. This coupled with the fact that nonagricultural withdrawals are only ten percent of the total withdrawals results in a total depletion for this group of less than two percent.

To further illustrate the minor significance of municipal and industrial depletions the following information is presented for the Kootenai and Clark Fork rivers in Montana, Spokane river in Washington, and for the Yakima and Columbia river reach in the Tri-Cities area. This information is presented in Table 2.

TABLE 2
1985
MONTANA
CONSUMPTIVE USE IN CFS

BASIN	COMMERCIAL	DOMESTIC	INDUSTRIAL	THERMAL POWER	MINING	AGRI. NON-IRRIG	AGRI.	TTL.
Kootenai	0.2	1.7	3.0	0.0	1.0	0.2	16.6	22.7
Clark Fork	5.0	23.5	7.1	0.0	0.0	8.2	428.9	472.7
TOTAL	5.2	25.2	10.1	0.0	1.0	8.4	445.5	495.4

1985
WASHINGTON
CONSUMPTIVE USE IN CFS

BASIN	COMMERCIAL	DOMESTIC	INDUSTRIAL	FOSSIL POWER	NUCLEAR POWER	MINING	AGRICULTURE	LIVESTOCK	TOTAL
Spokane Basin	5.7	11.8	8.6	0.2	0.0	0.0	35.4	1.1	62.8
Tri-Cities Area (Incl. Yakima)	2.2	6.5	3.7	0.0	12.5	0.0	1824.7	9.5	1859.1
TOTAL	7.9	18.3	12.3	0.2	12.5	0.0	1860.1	10.6	1921.9

Inspection of Table 2 shows that for the Montana Kootenai and Clark Fork Basins that agricultural uses account for 92% of the consumptive use. For the Spokane Basin and Tri-Cities areas agricultural uses account for 97% of the consumptive use.

Conclusion

The magnitude of Municipal and Industrial consumptive use in the Pacific Northwest is minor when compared to the consumptive use of agriculture. This coupled with the fact that the magnitude of the streamflows are large in comparison to the Municipal and Industrial depletions results in the conclusion that the estimate of Municipal and Industrial depletion is not required in the derivation of modified streamflows in the Pacific Northwest.

Section D

IRRIGATION DEPLETION

METHODOLOGY

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IRRIGATION DEPLETION METHODOLOGY

Irrigated Acres

The methodology utilized to estimate the irrigated acreage varied by locality in accordance with the availability of data. Sources of data were the Province of British Columbia Ministry of Environment Lands and Parks, States of Idaho, Montana, Oregon and Washington, the 1987 Census of Agriculture, and the U. S. Bureau of Reclamation. Table 1 and Table 2 contain the irrigated acreage information. These irrigated areas were not utilized in the derivation of irrigation depletion for all localities. Examples of areas where these acreages were not used and other methods were employed are the Snake River Basin above Brownlee, the Columbia Basin project, and the Yakima and Deschutes basins. The acreage shown on Table 1 for 1928, 1966, 1980 and 1990 have also been derived by different methods for each of the time periods. It must be recognized that the irrigated acreage determination for each time period and locality are estimates that have been made utilizing the best information available even though the acreages have been derived by a variety of methods.

Estimating Evapotranspiration

Many factors influence the amount of irrigation water required by crops. The most significant are: (1) climate, (2) available water supply or soil moisture, (3) plant growth characteristics, and (4) cultural practices. The climatic factors influencing water requirements, particularly evapotranspiration are: (1) solar radiation, (2) precipitation, (3) temperature, (4) humidity, and (5) wind. The most significant climatic factor affecting evapotranspiration is solar radiation because it is the source of energy necessary to transfer water from a liquid to the vapor phase in plants and soil. It is not practical to directly determine the water requirement information by local field measurements. Consequently for planning purposes, theoretical methods must be employed to quantify these important parameters.

In areas where few or no measurements of consumptive use are available, it is usually necessary to estimate consumptive use of crops from climatological data. For this purpose the Soil Conservation Service's Blaney-Criddle method was used. A complete description of this method is contained in Technical Release No. 21, Irrigation Water Requirements, USDA, SCS, April 1967 (Revised September 1970). A computer program "TR21" developed by John Dalton, SCS, Bozeman, Montana was utilized for computing monthly consumptive use.

Data Base Preparation

The SCS monitors a climatic data base as part of the Centralized Forecast System (CFS) at the West Technical Service Center at Portland, Oregon. Average monthly temperature and precipitation data can be downloaded for all available stations using the TAPS utility. First

and last average frost data are available using the FROST utility. The LIST utility provides a list of stations with station latitude and elevation data. This can be done via modem. The data base operates on a menu system which provides directions to the user.

Climatological sites were selected for use in determining monthly consumptive use for the crops being grown in each of the sub-basins of the Columbia River Basin. A list of these sites is contained in Table 3.

The data base includes average monthly precipitation, average monthly temperature, first and last average frost date and latitude for each weather station in the data base.

Crop Pattern

The crop composition for each of the subregions was estimated from data contained in the 1987 Census of Agriculture and the 1986 British Columbia Agriculture Census. Table 4 contains a summary of the crop composition for each subregion or subbasin.

Crop Irrigation Requirement

The crop irrigation requirement represents the amount of water that must be applied to the crop by irrigation. The crop irrigation requirement is estimated by deducting effective precipitation from the estimated crop evapotranspiration. The "TR 21" computer program was utilized to compute the crop irrigation requirement.

Farm Delivery Requirement

The amount of water required at the farm to supply the crop irrigation requirement and allow for on-farm losses is the farm delivery requirement. These on-farm losses occur as: (1) deep percolation due to nonuniform application; (2) field runoff because of inadequate facilities and/or poor management; (3) evaporation, particularly in the case of sprinkler application; and, (4) farm distribution system losses as from ditches used in surface irrigation. The farm delivery requirement is estimated by dividing the crop irrigation requirement by a farm irrigation efficiency. Irrigation efficiency was estimated for both sprinkler and gravity irrigation application for each subbasin as tabulated in Table 5.

Conveyance Losses and Operational Waste

Conveyance losses are water losses in transit from the source of supply to the point of service. They comprise evaporation from the water surfaces, seepage, and incidental transpiration by vegetation growing in the water or along the banks of natural channels, canals, and laterals. Operational waste is an allowance to ensure that adequate water is in the system so that the last user will have an adequate water supply. Water left over after supplying all users is normally returned directly to the stream.

Consumptive-Use Coefficients

Consumptive-use coefficients have been determined experimentally at numerous locations for most crops grown in the western states. Consumptive-use values utilized in the "TR 21" program have been measured and correlated with temperature and growing season.

TABLE 1

IRRIGATED AREA 1928, 1966, 1980, & 1990
COLUMBIA RIVER BASIN ABOVE MOUTH OF SNAKE RIVER
(THOUSANDS OF ACRES)

	BRITISH COLUMBIA				MONTANA				IDAHO				WASHINGTON				TOTAL			
	1928	1966	1979	1990	1928	1966	1980	1990	1928	1966	1980	1990	1928	1966	1980	1990	1928	1966	1980	1990
UPPER COLUMBIA ABOVE MICA	4.7	8.6	11.8	14													4.7	8.6	11.8	14
MICA TO HUGH KEENEYSIDE	0.7	1.3	2.1	4.6													0.7	1.3	2.1	4.6
HUGH KEENEYSIDE TO PEND OREILLE	0.3	0.8	0.9	1.8													0.3	0.8	0.9	1.8
EAST KOOTENAY (ABOVE LIBBY)	4.7	12.7	18.6	26.6													4.7	12.7	18.6	26.6
WEST KOOTENAY	2.3	7.5	15.7	14.5					1	1.4	3	2.3					8.3	14.5	27.1	23.6
UPPER CLARK FORK					125	131	129.5	146.8									125	131	129.5	146.8
BITTERROOT					108	109	112.8	95.4									108	109	112.8	95.4
FLATHEAD	0	0	0		39.8	153	174.9	162.2									39.8	153	174.9	162.2
LOWER CLARK FORK					15.5	29	31.7	20.3	0	0	0.8	0					15.5	29	32.5	20.3
PEND OREILLE	0.2	0.6	1.1	0.9					1.8	2.5	6	4.9	1.8	4.5	4.5	2.4	3.8	7.6	11.6	8.2
SPOKANE	4.6	10.7	21.1	27.1					12.3	21.5	27.5	18.5	12.3	20.5	27.9	34.1	24.6	42	55.4	52.6
KETTLE-FERRY STEVENS									5.7	23	23	24.1	5.7	23	23	24.1	10.3	33.7	44.1	51.2
TOTAL ABOVE GRAND COULEE	17.5	42.2	71.3	89.5	255.3	429.6	480.2	433.7	15.1	25.4	37.3	25.7	19.8	48	55.4	60.6	347.7	545.2	624.2	609.5
OKANAGAN-SIMILKAMEEN																				
METHOW	80.4	117.1	133.7	103.2									19.4	24	30	33.2	99.8	141.1	163.7	138.4
CHELAN													11.9	13	14.5	16.3	11.9	13	14.5	16.3
ENTIA													5.3	6	6.4	6	5.3	6	6.4	6
WENATCHEE													1.9	2	2.1	2	1.9	2	2.1	2
BO BEHO													24.6	26	28	26.8	24.6	26	28	26.8
YAKIMA													11.3	635	840	879.2	11.3	635	840	879.2
TOTAL ABOVE MOUTH SNAKE	97.9	159.3	205	192.7	255.3	429.6	480.2	433.7	15.1	25.4	37.3	25.7	427.3	1259	1582.4	1570.3	835.6	1673.3	2284.9	2222.4

IRRIGATED AREA, 1928, 1966, 1980 & 1990
SNAKE RIVER BASIN
(THOUSANDS OF ACRES)

	NEVADA				IDAHO				UTAH				WYOMING				TOTAL			
	1928	1966	1980	1990	1928	1966	1980	1990	1928	1966	1980	1990	1928	1966	1980	1990	1928	1966	1980	1990
SOUTH FORK					17.8	17.8	15.5	6.1					81.4	92.4	90	90	99.2	110.2	105.5	96.1
HENRY'S FORK					63.2	209.2	319.1	300.6					4.1	4.1	4.1	4.1	67.3	213.3	323.2	304.7
HEISE - MEELEY					520.9	767	789.1	684.7									520.9	767	789.1	684.7
MEELEY - MALNER	1.6	1.6	2.8	2.8	478.4	445	503.3	440.1	3	7	5.6	5.6					483	453.6	571.7	448.5
NORTH STREAMS					98.6	210	278.9	202.9									98.6	210	278.9	202.9
WEST SIDE	4	4	2.8	2.8	172.2	678	737.5	809									176.2	682	740.3	811.8
SUBTOTAL	5.6	5.6	5.6	5.6	1351.1	2327	2703.4	2443.4	3	7	5.6	5.6	85.5	96.5	94.1	94.1	1445.2	2436.1	2808.7	2548.7
	NEVADA				IDAHO				OREGON				WASHINGTON				TOTAL			
BRUNEAU	1928	1966	1980	1990	1928	1966	1980	1990	1928	1966	1980	1990	1928	1966	1980	1990	1928	1966	1980	1990
BOISE	4.2	4.2	4.4	4.4	8	187	190.9	127	18	18	17	17					20.2	209.2	212.3	148.4
PAYETTE					343.9	465	495.6	438.1									343.9	465	495.6	438.1
WEISER					130.3	150	157.8	127.8									130.3	150	157.8	127.8
OWYHEE					37.6	62	64.9	36.3									37.6	62	64.9	36.3
MALHEUR	34.3	60.1	60.4	60.4	16	16	15.2	0	32.4	77.5	60	59.9	63.1	174.1	197.8	181.1	82.7	153.6	135.6	120.3
BURNT POWDER									145.4	168.4	174.2	141.5					145.4	168.4	174.2	141.5
SUBTOTAL	38.5	64.3	64.8	64.8	535.8	860	924.4	731.2	258.9	438	449	399.5	0	0	0	0	833.2	1382.3	1438.2	1195.5
GRANDE RONDE									92.1	101	100.2	102.4					92.1	101	100.2	102.4
UPPER SALMON					84.3	124.8	126.6	111.3									84.3	124.8	126.6	111.3
SALMON					16.6	16.6	17.6	15.6									16.6	16.6	17.6	15.6
CLEARWATER					3.4	1.6	2.4	5									3.4	1.6	2.4	5
PALOUSE-LOWER SNAKE									26.6	32	69.6	77.3	26.6	32	69.6	77.3	26.6	32	69.6	77.3
SUBTOTAL	0	0	0	0	104.3	143	148.6	131.9	92.1	101	100.2	102.4	26.6	32	69.6	77.3	223	278	316.4	311.6
TOTAL ABOVE ICE HARBOR	44.1	69.9	70.4	70.4	1991.2	3350	3774.4	3306.5	354	546	554.8	507.5	112.1	128.5	183.7	171.4	2501.4	4094.4	4563.3	4055.8

TABLE 1

IRRIGATED AREA, 1928, 1966, 1980 & 1990
LOWER COLUMBIA, PUGET SOUND, COASTAL, AND CLOSED BASIN
(THOUSANDS OF ACRES)

	OREGON				WASHINGTON				TOTAL			
	1928	1966	1980	1990	1928	1966	1980	1990	1928	1966	1980	1990
WALLA WALLA	13.2	25.9	25.9	31.91	18.6	38.6	69.4	84.14	31.8	64.5	95.3	116.1
UMATILLA	50.6	64.6	180.9	215.4					50.6	64.6	180.9	215.4
JOHN DAY	47.1	71	58.8	42.75					47.1	71	58.8	42.75
DESCHUTES	81.5	256.8	216.2	208.4					81.5	256.8	216.2	208.4
HOOD	25.2	41.2	35	32.94					25.2	41.2	35	32.94
NORTH SIDE					15.2	43.9	104.1	123.8	15.2	43.9	104.1	123.8
TOTAL ICE HARBOR TO BONNEVILLE	217.6	459.5	516.8	531.5	33.8	82.5	173.5	208	251.4	542	690.3	739.4
LOWER COLUMBIA TRIBUTARIES IN WASHINGTON	0	2	1	1.09	0	16	14.5	23.31	0	18	15.5	24.4
WILLAMETTE	4	244	295.1	282					4	244	295.1	282
WASHINGTON COAST					13.4	20.2	20.31		0	13.4	20.2	20.31
ROGUE	118.2	77.5	66.18						0	118.2	77.5	66.18
UMPQUA	17.2	21.5	16.15						0	17.2	21.5	16.15
OREGON COAST	32.2	32.9	32.11						0	32.2	32.9	32.11
SUBTOTAL	0	167.6	131.9	114.4	0	13.4	20.2	20.31	0	181	152.1	134.8
PUGET SOUND					18	68	111.2	80.63	18	68	111.2	80.63
FORT ROCK	52.1	103.1	112.3						0	52.1	103.1	112.3
SILVLES	196.9	295.4	132.9						0	196.9	295.4	132.9
ALVORD	78	69.3	53.16						0	78	69.3	53.16
TOTAL CLOSED BASIN IN OREGON	327	467.8	298.4						0	327	467.8	298.4
KLAMATH		417.8	302.5						0	0	417.8	302.5
BEAR RIVER & GREAT SALT LAKE IN S. E. IDAHO					IRRIGATED AREA, 1928, 1966, 1980 & 1991				157.1	238.2	136.3	

TABLE 2

IRRIGATED AREA 1000 ACRES
1980

		TOTAL	WATER SOURCE			WATER SHORTAGE			IRRIGATION METHOD	
		IRRIGATED	SURFACE	GROUND	COMB	SURFACE	GROUND	TOTAL	GRAVITY	SPRINKLER
SUBREGION 1										
SUBAREA 1	BITTERROOT	95.41	94.26	1.14	0.00	28.39	0.00	28.39	38.95	56.46
SUBAREA 2	UPPER CLARK FORK	146.55	144.03	2.51	0.00	62.79	0.00	62.79	107.41	39.14
SUBAREA 3	LOWER CLARK FORK	20.34	19.13	1.16	0.00	5.15	0.00	5.15	5.61	14.72
SUBAREA 4	FLATHEAD	162.24	150.84	11.40	0.00	89.13	0.00	89.13	57.30	104.94
SUBAREA 5	KOOTENAI	11.49	10.86	0.55	0.08	4.22	0.00	4.22	4.35	7.15
SUBAREA 6	PEND OREILLE	7.66	7.18	0.48	0.00	0.00	0.00	0.00	2.45	5.21
SUBAREA 7	SPOKANE	52.66	5.77	46.89	0.00	0.24	3.16	3.40	0.05	52.61
TOTAL SUBREGION 1		496.34	432.09	64.13	0.08	189.91	3.16	193.08	216.11	280.23
SUBREGION 2										
SUBAREA 8	FERRY - STEVENS	24.06	22.65	1.40	0.00	1.37	0.31	1.68	0.46	23.60
SUBAREA 9	METHOW - OKANOGAN	49.52	43.84	5.68	0.00	4.67	0.00	4.67	0.94	48.58
SUBAREA 10	WENATCHEE - CHELAN	35.50	33.93	1.57	0.00	0.00	0.00	0.00	0.00	35.50
SUBAREA 11	BIG BEND	879.22	617.45	257.06	4.70	2.40	18.08	20.48	209.50	669.72
TOTAL SUBREGION 2		988.29	717.89	265.70	4.70	8.45	18.39	26.84	210.90	777.39
SUBREGION 3										
SUBAREA 12	YAKIMA	545.69	516.75	28.94	0.00	123.20	10.16	133.36	257.50	288.19
TOTAL SUBREGION 3		545.69	516.75	28.94	0.00	123.20	10.16	133.36	257.50	288.19
SUBREGION 4										
SUBAREA 13	SOUTH FORK	6.10	5.54	0.00	0.56	4.77	0.00	4.77	2.93	3.17
SUBAREA 14	HENRYS FORK	300.59	224.45	71.90	4.24	50.82	0.00	50.82	74.87	225.73
SUBAREA 15	HEISE - NEELY	684.74	354.72	295.39	34.63	33.80	0.00	33.80	271.38	413.36
SUBAREA 16	NEELEY - MILNER	449.49	135.50	295.73	17.25	24.37	8.76	33.13	273.20	175.29
SUBAREA 17	NORTH STREAMS	202.81	64.33	105.23	33.22	30.71	0.00	30.71	123.48	79.43
SUBAREA 18	WEST SIDE	811.75	580.61	194.64	36.50	70.52	20.44	90.96	485.52	326.23
TOTAL SUBREGION 4		2454.58	1365.16	962.89	126.40	214.98	29.20	244.18	1231.38	1223.20
SUBREGION 5										
SUBAREA 19	BRUNEAU	148.35	117.89	23.90	6.56	24.23	5.52	29.75	96.63	51.72
SUBAREA 20	BOISE	438.12	344.90	79.96	13.26	24.72	0.31	25.03	306.40	131.72
SUBAREA 21	PAYETTE	127.83	120.57	0.51	0.93	21.54	0.00	21.54	107.02	20.81
SUBAREA 22	WEISER	38.32	32.31	2.64	0.00	9.39	0.57	9.96	28.99	9.33
SUBAREA 23	OWYHEE	59.92	58.42	1.50	0.00	4.59	0.00	4.59	54.34	5.58
SUBAREA 24	MALHEUR	181.12	175.21	5.90	0.00	25.54	0.00	25.54	162.40	18.72
SUBAREA 25	BURNT - POWDER	141.54	136.64	4.91	0.00	59.05	1.42	60.48	119.99	21.55
TOTAL SUBREGION 5		1135.20	985.94	119.32	20.75	169.06	7.82	176.89	875.76	259.44
SUBREGION 6										
SUBAREA 26	GRANDE RONDE	102.44	79.00	12.96	10.48	56.84	0.00	56.84	35.97	66.46
SUBAREA 27	UPPER SALMON	111.26	104.88	3.16	0.00	31.25	0.00	31.25	82.14	29.12
SUBAREA 28	SALMON	15.60	12.68	0.00	0.00	5.01	0.00	5.01	10.26	5.34
SUBAREA 29	CLEARWATER	5.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00	5.00
SUBAREA 30	PALOUSE - LOWER SNAKE	77.32	63.76	13.56	0.00	2.92	1.46	4.38	0.00	77.32
TOTAL SUBREGION 6		311.61	260.45	29.68	10.48	96.02	1.46	97.49	128.37	183.24
SUBREGION 7										
SUBAREA 31	WALLA WALLA	116.05	91.89	24.36	0.00	57.10	10.35	67.45	3.10	112.95
SUBAREA 32	UMATILLA	215.43	178.30	37.13	0.00	9.08	3.81	12.89	19.53	195.90
SUBAREA 33	JOHN DAY	42.75	41.84	0.91	0.00	30.75	0.00	30.75	23.82	18.93
SUBAREA 34	DESCHUTES	208.43	197.92	7.02	3.48	104.05	0.00	104.05	66.78	141.65
SUBAREA 35	HOOD	32.94	32.94	0.00	0.00	5.06	0.00	5.06	0.68	32.26
SUBAREA 36	NORTH SIDE	123.83	106.47	17.37	0.00	0.00	1.29	1.29	3.20	120.63
TOTAL SUBREGION 7		739.43	649.16	86.79	3.48	206.04	15.45	221.48	117.11	622.32

TABLE 2

		IRRIGATED AREA 1000 ACRES 1990								
SUBAREA		TOTAL IRRIGATED	WATER SOURCE		COMB	WATER SHORTAGE		TOTAL	IRRIGATION METHOD	
			SURFACE	GROUND		SURFACE	GROUND		GRAVITY	SPRINKLER
SUBAREA 37	LOWER COLUMBIA	24.40	13.81	10.59	0.00	0.43	0.33	0.77	0.00	24.40
TOTAL SUBREGION 8		24.40	13.81	10.59	0.00	0.43	0.33	0.77	0.00	24.40
SUBREGION 9										
SUBAREA 38	WILLAMETTE	282.01	210.99	71.02	0.00	15.80	5.99	21.79	1.07	280.94
TOTAL SUBREGION 9		282.01	210.99	71.02	0.00	15.80	5.99	21.79	1.07	280.94
SUBREGION 10										
SUBAREA 39	10 N	20.31	13.01	7.30	0.00	0.36	0.00	0.36	0.00	20.31
SUBAREA 40	ROGUE	66.18	60.95	5.23	0.00	26.48	0.00	26.48	36.39	29.79
SUBAREA 41	UMPQUA	16.15	15.62	0.53	0.00	7.96	0.00	7.96	1.00	15.15
SUBAREA 42	COASTAL	32.11	31.59	0.53	0.00	8.52	0.00	8.52	0.71	31.40
TOTAL SUBREGION 10		134.75	121.17	13.58	0.00	43.33	0.00	43.33	38.10	96.65
SUBREGION 11										
SUBAREA 43	PUGET SOUND	80.63	35.60	45.03	0.00	0.00	0.00	0.00	0.00	80.63
TOTAL SUBREGION 11		80.63	35.60	45.03	0.00	0.00	0.00	0.00	0.00	80.63
SUBREGION 12										
SUBAREA 44	FORT ROCK	112.29	57.83	54.46	0.00	36.59	0.00	36.59	59.53	52.76
SUBAREA 45	SILVIE	132.94	93.19	35.35	4.40	78.88	0.00	78.88	105.85	27.09
SUBAREA 46	ALVORD	53.16	48.86	4.30	0.00	41.16	0.04	41.20	35.34	17.82
TOTAL SUBREGION 12		298.39	199.88	94.10	4.40	156.63	0.04	156.67	200.72	97.67
SUBREGION 13										
SUBAREA 47	KLAMATH	302.52	283.47	19.04	0.00	94.18	1.07	95.24	222.57	79.95
TOTAL SUBREGION 13		302.52	283.47	19.04	0.00	94.18	1.07	95.24	222.57	79.95
SUBREGION 14										
SUBAREA 48	BEAR RIVER	132.52	114.75	15.32	2.45	36.38	0.00	36.38	67.81	64.71
SUBAREA 49	GREAT SALT LAKE	3.78	0.66	3.12	0.00	0.66	0.00	0.66	2.65	1.14
TOTAL SUBREGION 14		136.31	115.40	18.45	2.45	37.04	0.00	37.04	70.46	65.84
REGION TOTALS		7930.15	5907.75	1829.29	172.75	1355.09	93.07	1448.16	3570.05	4360.10

TABLE 3
Climatological Station Utilized in Determining
Crop Consumptive Use by Blaney-Criddle Method

<u>Subbasin</u>	<u>Climatological Station</u>
Columbia above Mica Dam	Revelstoke AP, BC
Mica to Keenleyside	Revelstoke AP, BC
Keenleyside to Pend Oreille	Castlegar AP, BC
Slocan River Basin	Castlegar AP, BC
Okanagan-Similkameen, BC	Princeton AP, BC
Kettle River Basin, BC	Castlegar AP, BC
East Kootenay, BC	Eureka R.S., MT
Bitterroot	Hamilton, MT
Upper Clark Fork	Deer Lodge, MT
Lower Clark Fork	Missoula WSO AP, MT
Upper Flathead	Kalispell WSO AP, MT
Flathead Irr. Dist.	Polson-Kerr Dam, MT
West Kootenay-Int'l. Border	Castlegar AP, BC
Pend d'Oreille, BC	Castlegar AP, BC
Spokane Basin	Spokane, WSO, AP, WA
Ferry-Stevens, Wa.	Colville A.P., WA
Okanagan-Methow, Wa.	Omak 2 NW, WA
Chelan and Entiat	Chelan, WA
Wenatchee	Wenatchee FAA, AP, WA
West of Banks Lake	Ephrata FAA AP, WA
Yakima	Yakima WSO AP, WA
Baker	La Grande, OR
Grande Ronde	La Grande, OR
Upper Salmon	Salmon 1 N, ID
Lower Salmon	Riggins, ID
Clearwater	Orofino, ID
Palouse-Lower Snake	Lewiston AP, ID
Walla Walla	Walla Walla, WSO, WA
Pumping John Day-Umatilla	Hermiston, 2 S., OR
Umatilla R. & Willow Cr.	Hermiston, 2 S., OR
John Day R. Basin	John Day, OR
White R.-Wapinita Proj.	Bend, OR
Hood R. Basin	Hood R. Exp. Sta., OR
Pumping to N.S. and Umatilla	Hermiston, 2 S., OR
Klickitat, White Salmon	Goldendale, 2 E, WA
Willamette Basin	Eugene WSO AP, OR
Fern Ridge	Eugene WSO AP, OR

TABLE 4
CROP COMPOSITION

<u>Section</u>	<u>Subregion/Basin</u>	<u>Crop Composition in Percent</u>				
		<u>Hay</u>	<u>Pasture</u>	<u>Grain</u>	<u>Veg./Potatoes</u>	<u>Orchard</u>
A	Upper Columbia abv. Mica	75	15	10		
A	Mica to Keenleyside	80	14	4		2
A	East Kootenay	84	9	7		
A	West Kootenay-Int'l Border	45	10		12	33
A	Keenleyside to Pend Oreille	45	10		12	33
A	Slocan	45	10		12	33
B	Upper Clark Fork & Bitterroot	60	30	10		
B	Lower Clark Fork	50	40	10		
B	Upper Flathead & Flathead Irrigation District	47	29	24		
B	Pend Oreille, ID, WA & BC	86		9	5	
C	Kettle in Canada	50		50		
C	Okanagan in Canada	50		50		
C	Ferry Stevens, WA	86	13			1
C	Methow - Okanagan	35				65
C	Chelan - Entiat	4				96
C	Wenatchee	4				96
C	West of Banks Lake	38	43			19
E	Upper Salmon	92	8			
E	Lower Salmon	91	6	3		
E	Grande Ronde	77	22			1
E	Clearwater	50		50		
E	Palouse - Lower Snake	46	29			25
F	Walla Walla	22		52		26
F	Umatilla River & Willow Cr.	72		7		21
F	John Day	100				
F	Pumping from McNary to North Side	72		7		21
F	Pumping from McNary to Umatilla	72		7		21
F	Pumping from John Day to North Side	72		7		21
F	White R., Wapinita Proj. Deschutes River	87		2		11
F	Klickitat, White Salmon, & Klickitat-White Salmon	30		29		41
F	Hood River	30		2		68
G	Willamette	22		1		77

TABLE 5**IRRIGATION EFFICIENCY**

Section	Subregion/Basin	Gravity %	Sprinkler %
A	Upper Columbia abv. Mica Dam	50	63
A	Mica to Keenleyside	50	63
A	Keenleyside to Pend Oreille	50	63
A	E. Kootenay, ID, MT & BC abv. Newgate	50	63
A	West Kootenay, Int'l Border to Corra Linn	50	63
A	Slocan River	50	63
B	Upper Clark Fork & Bitterroot	50	67
B	Lower Clark Fork, Idaho & Montana	50	68
B	Upper Flathead & Flathead Irrigation District	50	63
B	Pend Oreille, ID, WA & BC	50	74
C	Kettle River in BC	50	63
C	Ferry-Stevens, WA	45	81
C	Okanagan, Similkameen, BC	50	63
C	Okanagan-Methow, WA	50	57
C	West of Banks Lake	50	57
C	Chelan, Entiat, Wenatchee	50	55
E	Upper Salmon, ID	50	67
E	Lower Salmon, ID	50	66
E	Grande Ronde, OR	45	86
E	Clearwater, ID	50	76
E	Palouse - Lower Snake	50	76
F	Walla Walla	50	80
F	Umatilla & Willow Cr.	45	90
F	John Day River	50	78
F	Pumping from Columbia to N. Side & Umatilla	-	75
F	Pumping from John Day Pool to Umatilla	-	75
F	Klickitat, White Salmon, & Klickitat-White Salmon Combined Sprinkler & Gravity	50	50
F	White River, Wapinita (Deschutes River) Combined Sprinkler & Gravity Applications	50	50
F	Hood River	45	84
F	Willamette River Basin	50	76

Streamflow Depletion Computation

Water requirements for various crops were determined by the Blaney-Criddle method as described in the Soil Conservation Service Technical Release No. 21 dated April 1967 and revised September 1970. These determinations were made utilizing computer program Version 3.4 dated October 1, 1990 developed by John Dalton, USDA - Soil Conservation Service, Bozeman, Montana. The computed water requirements are based on crop, latitude, average annual precipitation and temperature, and length of growing season. For example, the following basic data was provided for the Palouse-Lower Snake subbasin:

- Weather Station data base for Lewiston, W.B. AP, ID
- Crop Composition - Grain 29%, Hay 46%, Orchard 25%

The referenced "TR-21" computer program utilizing these data inputs computed the water requirements for the Palouse-Lower Snake subbasins as follows:

MONTHLY CONSUMPTIVE USE (Inches)

Lewiston, W.B. AP, ID				Palouse-Lower Snake, WA				
	1980	HAY Requirements (1) (inches) 46%		SPRING GRAIN Requirements (1) (inches) 29%		ORCHARD Requirements (1) (inches) 25%		AVE
JAN								
FEB								
MAR			0	0.05	0		0	
APR	9	1.43	5	1.38	9	1.42	4	6
MAY	14	4.09	13	4.59	32	4.13	13	18
JUN	27	6.05	19	6.15	42	6.05	19	26
JUL	25	8.49	27	2.38	16	8.49	27	24
AUG	17	7.03	23		0	7.03	22	16
SEP	8	3.95	13		0	3.95	12	9
OCT		0.17	1		0	0.88	3	1
NOV							0	0
DEC								
TOTALS	100	31.2	100	14.54	100	31.95	100	100

The consumptive use requirements were then utilized to compute subbasin water requirements per 1000 acre units as follows:

<u>Crop</u>	<u>% of Acres</u>	<u>Crop Requirement</u> <u>Inches Feet</u>		<u>Water Requirement</u> <u>Per 1000 Acres</u>
Hay	46	31.2	2.60	1200 Acre-Feet
Grain	29	14.54	1.21	352 Acre-Feet
Orchard	<u>25</u>	31.95	2.66	<u>661</u> Acre-Feet
Total	100			2212 Acre-Feet

The diversion requirement of each subbasin was computed for both gravity and sprinkler applications based on the estimated irrigation efficiencies. For the Palouse-Lower Snake subbasin the computation is as follows:

Gravity Efficiency = 50%

Sprinkler Efficiency = 76%

Gravity Diversion Requirement = $\frac{2212}{0.5} = 4424$ Ac. Ft.

Sprinkler Diversion Requirement = $\frac{2212}{.76} = 2910$ Ac. Ft.

The monthly diversion requirement is assumed to be equal to the monthly consumptive use divided by their irrigation efficiencies for both gravity and sprinkler applications.

The total return flow is that portion of the water diverted for irrigation but not consumptively used. The net return flow is the amount that returns to the streams directly through was ditches and drainage channels, or indirectly through groundwater movement but not lost to deep groundwater percolation, evaporation, or consumed by nonproductive vegetation. Information from the 1980 modified flow study was used for estimating monthly return flow patterns for each of the subbasins.

Continuing with the Palouse-Lower Snake subbasin example, the net return flow per 1000 acres is computed for gravity and sprinkler applications based on values contained in Table 6 as follows:

Sprinkler net return flow = 2910 Acre-Feet (.20) = 580 AF/1000 Acres

Gravity net return flow = 4424 Acre-Feet (.45) = 1990 AF/1000 Acres

The total irrigation depletion is equal to the diversion minus net return flows. A table that summarizes the diversion, return flow, and depletion computations for the Palouse-Lower Snake subbasin for both sprinkler and gravity applications is shown below.

LOWER SNAKE RIVER BASIN
1990 LEVEL OF DEVELOPMENT

PALOUSE-LOWER SNAKE, WASHINGTON													
SPRINKLER SYSTEM ONLY							GRAVITY SYSTEM ONLY						
MONTH	DIVERSION		RETURN FLOW		DEPLETION		MONTH	DIVERSION		RETURN FLOW		DEPLETION	
	%	AF PER 1000 AC	%	AF PER 1000 AC	AF PER 1000 AC	CFS PER 1000 AC		%	AF PER 1000 AC	%	AF PER 1000 AC	AF PER 1000 AC	CFS PER 1000 AC
APR	6	-174	7	41	-133	-2.23777	APR	6	-264	7	139	-125	-2.09986
MAY	18	-538	9	52	-484	-7.87015	MAY	18	-815	9	179	-636	-10.3435
JUN	26	-755	11	64	-691	-11.6095	JUN	26	-1147	11	219	-928	-15.6002
JUL	24	-696	11	64	-632	-10.2758	JUL	24	-1058	11	219	-839	-13.6402
AUG	16	-462	11	64	-398	-6.46639	AUG	16	-702	11	219	-483	-7.84995
SEP	9	-259	11	64	-195	-3.28289	SEP	9	-394	11	219	-175	-2.94506
OCT	1	-27	8	47	19	0.314815	OCT	1	-41	8	159	118	1.917767
NOV	0	0	7	41	41	0.684908	NOV	0	0	7	139	139	2.342377
DEC	0	0	7	41	41	0.662812	DEC	0	0	7	139	139	2.266816
JAN	0	0	7	41	41	0.662812	JAN	0	0	7	139	139	2.266816
FEB	0	0	6	35	35	0.628895	FEB	0	0	6	119	119	2.151162
MAR	0	0	5	29	29	0.473437	MAR	0	0	5	100	100	1.619155
TOTAL	100	-2908	100	582	-2327		TOTAL	100	-4422	100	1991	-2431	

Incremental Irrigation Depletions

Incremental irrigation depletions are computed to allow for the variation in irrigated acres during the 1928 to 1990 period. Method of irrigation, gravity or sprinkler, is also recognized in these computations. The Palouse-Lower Snake subbasin is used as an example to illustrate the computational procedure. The irrigated acreage for the Palouse-Lower Snake has been estimated as follows:

Palouse-Lower Snake Subbasin

Irrigated Area
Supplied by Surface Water
(1000's of acres)

<u>Year</u>	<u>Sprinkler</u>	<u>Gravity</u>	<u>Total</u>
1925	0	27.6	27.6
1928	0	26.6	26.6
1946	0	26.6	26.6
1950	13.3	14.3	27.6
1966	23.0	3.0	26.0
1980	56.1	0.1	56.2
1990	63.8	0.0	63.8

EXCEL macros have been developed to compute the incremental irrigation adjustments. The resulting incremental irrigation adjustment for the Palouse-Lower Snake subbasin is shown in Table 7. These incremental adjustments are then applied at site and downstream to adjust for the effects of actual irrigation in each year up to that which would have been experienced under 1990 conditions.

Pages D-21 through D-79 contain the computed incremental irrigation adjustments for each of the subbasins.

Review of Irrigation Depletion Computation Methods

As mentioned previously in this section the methods of estimating irrigation depletions varied by locality due to the variability of data. The purpose of this subsection is to present information that will illustrate the relative magnitude of the effect on modified streamflows that results from the application of each of the several methods employed.

Blaney-Criddle Method--The tabulation shown below lists the subbasins where the Blaney-Criddle method was utilized to estimate incremental irrigation depletions for the 1928-1989 period.

IRRIGATION DEPLETIONS ESTIMATED BY USE OF BLANEY-CRIDDLE

SUBBASIN	NAME	1928 JULY DEPLET. (CFS) (1)	1928 AVERAGE ANNUAL DEPLETION (CFS) (2)	CHANGE ACREAGE 1928-1990 (1000 acres) (3)	AT SITE 81 YEAR AVERAGE ANNUAL MODIFIED FLOW (CFS) (4)
Section A					
UPC3D9	UPPER COLUMBIA ABOVE MICA	-86	-18	9.3	
ARD3U9	MICA TO KEENLEYSIDE	-37	-8	3.9	
EKO3D9	EAST KOOTENAY ABOVE NEWGATE	-249	-48	21.9	
MT3D9	KOOTENAI BASIN IN MONTANA	-18	-5	2.2	
KID3D9	KOOTENAI BASIN IN IDAHO	-12	-3	1.3	
WKO3D9	WEST KOOTENAY-- INT'L BORDER TO CORRA LINN	-155	-31	12.7	
BRI3D9	SLOCAN BASIN	-44	-9	3.7	
CTR3D9	KEENLEYSIDE TO PEND OREILLE	-17	-4	1.5	
CTR3DD9	ACCUMULATED DEPLETIONS COLUMBIA RIVER AT TRAIL	-618	-124	56.5	71100
Section B					
FID3U9	FLATHEAD IRRIGATION DISTRICT	-1015	-180	82.2	
FLT3D9	UPPER FLATHEAD	-365	-64	28.8	
UCF3D9	UPPER CLARK FORK	-257	-45	19	
BIT3D9	BITTER ROOT	598	40	-13.7	
LCF3D9	LOWER CLARK FORK	-17	-7	3.6	
PEN3D9	PEND OREILLE	-33	-7	3.6	
POC3D9	PEND d'OREILLE (CANADA)	-8	-1	0.7	
SEV3DD9	ACCUMULATED DEPLETIONS PEND OREILLE AT SEVEN MILE	-1086	-262	124.2	27900
Section C					
KET3D9	KETTLE IN CANADA	-287	-45	22.5	
FER3D9	FERRY- STEVENS, WASHINGTON	-150	-40	17	
OKA3D9	OKANAGAN IN CANADA	-121	-38	22.7	
OKM3D9	OKANAGAN-METHOW (U.S.)	-145	-40	12.5	
WSB3D9	WEST OF BANKS LAKE	-253	-69	22.9	
CHE3D9	CHELAN-ENTIAT	14	2	-0.4	
WNA3D9	WENATCHEE	-15	-8	2.6	
Subtotal Section C		-837	-238	99.8	117700
Section E					
UPS3D9	UPPER SALMON	-256	-51	20.5	
LWS3D9	LOWER SALMON	76	16	-3.9	
WEN3D9	GRANDE RONDE	489	27	-12.3	
CLR3D9	CLEARWATER	-1	-4	1.6	
PLS3D9	PALOUSE, LOWER SNAKE	-292	-116	37.2	
Subtotal Section E		16	-128	43.1	50700
Section F					
KEN3D9	KENNEWICK RETURN FLOW			24	
NSM3D9	PUMPING FROM MC NARY TO NORTH SIDE	-562	-200	38.3	
UMP3D9	PUMPING FROM MC NARY POOL TO UMATILLA SUBAREA	-554	-197	44.6	
WWA3D9	WALLA WALLA RIVER	-328	-186	65.9	
NSJ3D9	PUMPING FROM JOHN DAY TO NORTH SIDE	-285	-95	18.1	
UMW3D9	UMATILLA RIVER & WILLOW CREEK	311	27	-6	
JDP3D9	PUMPING JOHN DAY TO MORROW & GILLIAM COUNTIES	-793	-251	89.2	
JDA3D9	JOHN DAY BASIN	155	17	-5.2	
WHT3D9	WHITERIVER-WAPINITA PROJECT	-121	-23	8.3	
HOD3D9	HOOD RIVER BASIN	51	-20	7.7	
WHS3D9	WHITE SALMON RIVER BASIN	-7	-1	1.6	
KWS3D9	KLICHTAT-WHITE SALMON	-47	-7	4.3	
KLC3D9	KLICHTAT BASIN	-68	-13	4.5	
COLUMBIA RIVER AT THE DALLES					185900
Subtotal Section F		-2224	-849	295.3	
Total Section A-F		-4859	-1702	618.9	

Column (1) contains the July 1928 incremental streamflow adjustment. The year 1928 was chosen because the adjustment increases from a minimal adjustment beginning in 1989 increasing to a maximum adjustment in 1928. July was chosen for this column because it is indicative of the largest monthly adjustment that occurs because this is at the height of the irrigation season. Column (2) contains the 1928 average annual depletion which is at a maximum in 1928. Column (3) contains the change in irrigated acres during the period 1928 to 1990. Column (4) contains the average annual 1990 modified flow near the lower river reach of each of the sections. This is presented so that a comparison of the effect of irrigation depletion adjustments contained in columns (1) and (2) can be compared with the magnitude of the modified streamflow shown in column (4).

Section A--Upper Columbia and Kootenay- The Blaney-Criddle method was the only method used for this section of the basin. As shown on the tabulation the effect of irrigation depletions on the computation of modified flows is minor especially if considered in relation to the magnitude of the modified flows. The July 1928 incremental depletion is 618 cfs and the 1928 average annual depletion is 124 cfs compared to a average annual flow at Trail of 71,100 cfs. The irrigated acreage increased 56,500 acres from 1928 to 1990.

Section B--Clark Fork & Pend Oreille- The Blaney-Criddle method was used on the Clark Fork and Pend Oreille basins with a different approach being applied for the Spokane basin which will be discussed in a subsequent paragraph. The effect of irrigation depletions on the computation of modified flows results in a reduction of 1096 cfs in July 1928 and the average annual reduction in 1928 is 262 cfs which can be compared to the average annual flow at the mouth of the Pend Oreille river of 27900 cfs. The irrigated acreage increased 124,200 acres from 1928 to 1990 in the subareas where the Blaney Criddle method was applied.

Section C-- Mid-Columbia- The Blaney-Criddle method was used on portions of this section but other methods were applied on two major irrigated areas--the Columbia Basin Project and the Yakima basin. The methods used on the Columbia Basin Project and the Yakima basin will be discussed in subsequent paragraphs. For the areas analyzed by the Blaney-Criddle method the effect of irrigation depletions on the computation of modified flows results in a reduction of 937 cfs in July 1928 and the average annual reduction in 1928 is 239 cfs. These reductions when compared to the average annual flow of the Columbia River in this reach of 117700 cfs result in the conclusion that additional refinement in the computation of irrigation depletions is not warranted. The irrigated acreage increased 99,800 acres from 1928 to 1990 in the subareas where Blaney-Criddle method was applied.

Section E-- Lower Snake- The Blaney Criddle method was used on the portions of the Snake basin located downstream of Brownlee reservoir. The method used above Brownlee will be presented in a subsequent paragraph. Irrigation depletions computed utilizing Blaney-Criddle resulted in only minor reductions to the modified streamflows in comparison to the Snake River average annual flow of 50,700 cfs at Ice Harbor. The irrigated acreage increased 43,100 acres from 1928 to 1990 in the subareas where the Blaney-Criddle method was applied.

Section F--Lower Columbia- The Blaney-Criddle method was used on all subareas in this section except for the Deschutes basin located above Round Butte reservoir. The method used for the Deschutes basin will be presented in a subsequent paragraph. Irrigation has expanded significantly in this subbasin since 1928 with the irrigation water source being primarily pumping from the reservoirs that have been developed on the Columbia river. Irrigated acreage for these subbasins has increased by 271,300 acres during the period 1928 to 1990. The July 1928 incremental depletion is estimated to be 2224 cfs and the incremental average annual reduction is estimated to be 949 cfs. The Columbia river 1990 modified flow in this river reach is estimated to be approximately 186,000 cfs. Therefore the reduction in modified flow from irrigation depletions occurring in this river reach represents a reduction of approximately .5%.

Summary for Sections A through F- For the Columbia river above Bonneville the Blaney-Criddle method was utilized to estimate the incremental depletions during the 1928-1990 period for the incremental increase of 594,900 acres. The estimated 1928 average annual incremental depletion is approximately 1700 cfs which represents a reduction of the modified flow at The Dalles of approximately 0.9 %. The total increase in irrigated acreage for the Columbia basin above Bonneville during the 1928-1990 period is estimated to be 3,426,600 acres. The Blaney-Criddle method was utilized on 594,900 acres or approximately 17% of the incremental increase in irrigated acreage during the 1928-1990 period.

Irrigation Depletion Methods for Specific Basins-- The tabulation shown below lists the subbasins where methods other than Blaney-Criddle were utilized to estimate irrigation depletions or in some cases an alternative approach of providing regulation inflows based on 1990 conditions of development and operation of reservoir and river systems was utilized.

IRRIGATION DEPLETIONS ESTIMATED BY OTHER METHODS
SUCH AS REGULATION STUDIES AND DIVERSIONS

SUBBASIN	NAME	CHANGE IN IRRIGATED ACREAGE 1928-1989 ACRES (1000 acres)
	Section B	
UPF3DD9	SPOKANE RIVER BASIN	28.1
	Section C	
GCL3D9	COLUMBIA BASIN PROJECT	552.5
	BIG BEND EAST (NO IRRIGATION DEPLETION ESTIMATE)	287
YAK3DD9	YAKIMA BASIN REGULATION ADJUSTMENT	212.6
	Section D	
	UPPER AND CENTRAL SNAKE RIVER	1481
	Section F	
	DESCHUTES PROJECT	109.1
	TOTAL IRRIGATED ACREAGE INCREASE	<hr/> 2670.3

Review of the above tabulation shows that approximately 2,700,000 acres of the 3,400,000 acres of the increase in irrigated acres that has occurred in the 1928 to 1990 period falls in the category of "Other Methods" for estimating irrigation depletions. Three locations account for approximately 2,250,000 acres or 83% of the 2,700,000 acres. These three locations (Columbia Basin Project, Yakima Basin, and the Snake River above Brownlee) as well as the other smaller areas and the methods used to estimate irrigation depletions are described in the following paragraphs.

Spokane Basin--Groundwater in the Spokane Basin flows through the aquifer essentially as an underground river that eventually provides inflow to the Spokane River. Because of this all lands in this basin, regardless of water supply source, were included in the incremental irrigation adjustment. The average annual incremental adjustment was less than 100 cfs for this basin.

Columbia Basin Project--Water is pumped from Franklin D. Roosevelt (FDR) Lake into the equalizing reservoir, Banks Lake. From there, water is routed through the Columbia Basin Project distribution system. Return flows from the northern portion of the Project flow to Potholes Reservoir, where they are reused to irrigate other Project lands. Return flows from the Project also reach the Columbia River at the Wanapum, Priest Rapids, and McNary reservoirs. Part of the return flow to McNary reservoir comes from blocks 2

and 3 of the Columbia Basin Project, which are located south of the Snake River. Diversion of water from FDR is by pumping which provides accurate information on the amount of water that is diverted. The estimation of the amount of water that reenters the Columbia as return flow is sufficiently complex and a special study was conducted to determine return flows for a 1990 level of irrigation development. This study is contained in Section E of this Technical Appendix. Average annual diversion from FDR at the 1990 level of development are approximately 3600 cfs. The return flow for the 1990 level of irrigation development is estimated to be approximately 800 cfs resulting in a net average annual depletion of approximately 2800 cfs. The magnitude of the Columbia Basin Project depletion is approximately 1.6 times greater than the total of the depletions computed for the subbasins analyzed through application of the Blaney-Criddle method.

Big Bend East--The irrigated lands in the Big Bend East area are located on the high plateau east of the Columbia Basin Project. Water supply is derived from both groundwater and surface sources. Surface streams through the area are discontinuous and intermittent. Irrigation in this area is considered to have no return flow or depletion effect upon the Columbia River and this area was not included in the computation of estimated depletions.

Yakima Basin--The Yakima Basin contains one of the major irrigated areas in the Pacific Northwest. The irrigated area is estimated to have increased from 333,100 acres in 1928 to 545,700 acres in 1990 resulting in an incremental increase of 212,600 acres which represents about 6% of the total incremental increase in irrigated acreage that occurred above Bonneville Dam during the 1928-1990 period. The Yakima basin contains an extensive system of reservoirs and irrigation facilities and because of this a special study was required to determine the irrigation adjustments for the Yakima basin. This study was performed by the Bureau of Reclamation and is described in a separate report. The output from this study was a set of regulated 1990 level modified streamflows at the mouth of the Yakima River. These flows were subtracted from the historically observed regulated flows and this adjustment was applied at McNary Dam and downstream.

Upper and Central Snake--The vast amount of irrigation in relation to the available water and the extensive system of reservoirs located in the Snake River Basin above Brownlee reservoir precludes this area from using methods such as Blaney-Criddle for estimating irrigation depletions. Also the hydrology, irrigation growth patterns, and water supply problems are unique and complex. Therefore, regulation studies were utilized to reflect the net effect on streamflow of the changes in irrigated acreage in terms of corresponding changes in storage regulation and in the amount of water depleted and diverted from and returned to the river system. The regulation study for 1990 conditions was conducted by the Idaho Department of Water Resources. The end product of the basin simulation is 61 years of regulated

inflow to Brownlee reservoir that are based on 1990 conditions. The incremental increase in irrigated area from 1928 to 1990 is approximately 1,480,000 acres which represents about 43% of the total incremental increase in irrigated acreage above Bonneville Dam for the 61 years of this study.

Deschutes Basin--The Bureau of Reclamation developed an irrigation system in the Deschutes Basin in the vicinity of Bend called the Deschutes Project. Because of the use of storage reservoirs, a special study was utilized to determine the irrigation adjustments to be applied at Round Butte and Pelton Dams. The regulated study was conducted for the 1980 level of modified flows and because the level of irrigation has remained nearly constant for the 1980 to 1990 period the 1980 study was also used for the 1990 level of irrigation adjustments. The incremental increase of irrigated acreage from 1980 to 1990 is approximately 110,000 acres which represents only 3% of the increase in irrigated acreage above Bonneville Dam during the 1928 to 1990 period.

TABLE 6
RETURN FLOW PERCENT OF DIVERSION

<u>Section</u>	<u>Subregion/Basin</u>	<u>RETURN FLOW % OF DIVERSIONS</u>	
		<u>Gravity</u> — %	<u>Sprinkler</u> — %
A	Upper Columbia abv. Mica Dam	45	33
A	Mica to Keenleyside	45	33
A	Keenleyside to Pend Oreille	45	33
A	E. Kootenay, ID, MT & BC abv. Newgate	45	33
A	West Kootenay, Int'l Border to Corra Linn	45	33
A	Slocan River	45	33
B	Upper Clark Fork & Bitterroot	45	29
B	Lower Clark Fork, Idaho & Montana	45	28
B	Upper Flathead & Flathead Irrigation District	45	33
B	Pend Oreille, ID, WA & BC	45	22
C	Kettle River in BC	45	33
C	Ferry-Stevens, WA	50	16
C	Okanagan, Similkameen, BC	45	33
C	Okanagan-Methow, WA	45	39
C	West of Banks Lake	50	15
C	Chelan, Entiat, Wenatchee	45	41
E	Upper Salmon, ID	45	29
E	Lower Salmon, ID	45	30
E	Grande Ronde, OR	50	10
E	Clearwater, ID	45	20
E	Palouse - Lower Snake	45	20
F	Walla Walla	45	16
F	Umatilla & Willow Cr.	50	06
F	John Day River	45	18
F	Return Flow from Kennewick Project	USE 1980 TABLE	
F	Pumping from Columbia to N. Side & Umatilla	--	20
F	Return Flow from Columbia River Pumping	USE 760 AF/1000 acres	
F	Pumping from John Day Pool to Umatilla	--	20
F	Klickitat, White Salmon, & Klickitat-White		
	Salmon Combined Sprinkler & Gravity	40	40
F	White River, Wapinita (Deschutes River)		
	Combined Sprinkler & Gravity Application	40	40
F	Hood River	50	12
F	Willamette River Basin	45	20

TABLE 7

Name: PALOUSE, LOWER SNAKE RIVER BASINS, WASHINGTON

At site incremental irrigation adjustment, in cfs, to a 1990 level of development.

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	AVE.
1928-29	-292	-203	-131	-31	-19	-18	-18	-17	-13	-87	-227	-325	-116
1929-30	-292	-203	-131	-31	-19	-18	-18	-17	-13	-87	-227	-325	-116
1930-31	-292	-203	-131	-31	-19	-18	-18	-17	-13	-87	-227	-325	-116
1931-32	-292	-203	-131	-31	-19	-18	-18	-17	-13	-87	-227	-325	-115
1932-33	-292	-203	-131	-31	-19	-18	-18	-17	-13	-87	-227	-325	-116
1933-34	-292	-203	-131	-31	-19	-18	-18	-17	-13	-87	-227	-325	-116
1934-35	-292	-203	-131	-31	-19	-18	-18	-17	-13	-87	-227	-325	-116
1935-36	-292	-203	-131	-31	-19	-18	-18	-17	-13	-87	-227	-325	-115
1936-37	-292	-203	-131	-31	-19	-18	-18	-17	-13	-87	-227	-325	-116
1937-38	-292	-203	-131	-31	-19	-18	-18	-17	-13	-87	-227	-325	-116
1938-39	-292	-203	-131	-31	-19	-18	-18	-17	-13	-87	-227	-325	-116
1939-40	-292	-203	-131	-31	-19	-18	-18	-17	-13	-87	-227	-325	-115
1940-41	-292	-203	-131	-31	-19	-18	-18	-17	-13	-87	-227	-325	-116
1941-42	-292	-203	-131	-31	-19	-18	-18	-17	-13	-87	-227	-325	-116
1942-43	-292	-203	-131	-31	-19	-18	-18	-17	-13	-87	-227	-325	-116
1943-44	-292	-203	-131	-31	-19	-18	-18	-17	-13	-87	-227	-325	-115
1944-45	-292	-203	-131	-31	-19	-18	-18	-17	-13	-87	-227	-325	-116
1945-46	-292	-203	-131	-31	-19	-18	-18	-17	-13	-87	-227	-325	-116
1946-47	-292	-203	-131	-31	-19	-18	-18	-17	-13	-86	-232	-335	-117
1947-48	-300	-206	-129	-26	-14	-13	-13	-13	-8	-85	-238	-344	-116
1948-49	-308	-209	-127	-21	-9	-9	-9	-8	-6	-84	-244	-353	-116
1949-50	-316	-211	-125	-16	-4	-4	-4	-4	-3	-83	-249	-363	-116
1950-51	-323	-214	-124	-12	1	1	1	1	1	-83	-252	-367	-115
1951-52	-327	-216	-124	-10	2	2	2	2	2	-83	-254	-371	-115
1952-53	-330	-217	-124	-9	4	3	3	3	2	-83	-257	-375	-116
1953-54	-334	-219	-124	-8	5	5	5	4	3	-83	-259	-379	-116
1954-55	-337	-221	-124	-7	6	6	6	6	4	-84	-262	-383	-116
1955-56	-340	-222	-124	-6	7	7	7	7	5	-84	-264	-387	-117
1956-57	-344	-224	-124	-5	8	8	8	8	6	-84	-267	-391	-117
1957-58	-347	-225	-124	-3	10	9	9	9	7	-84	-269	-395	-118
1958-59	-351	-227	-124	-2	11	11	11	10	8	-84	-272	-399	-118
1959-60	-354	-229	-124	-1	12	12	12	11	8	-84	-275	-403	-118
1960-61	-357	-230	-124	0	13	13	13	12	9	-84	-277	-407	-119
1961-62	-361	-232	-125	1	15	14	14	13	10	-84	-280	-410	-119
1962-63	-364	-234	-125	2	16	15	15	15	11	-85	-282	-414	-120
1963-64	-368	-235	-125	4	17	17	17	16	12	-85	-285	-418	-120
1964-65	-371	-237	-125	5	18	18	18	17	13	-85	-287	-422	-121
1965-66	-375	-238	-125	6	20	19	19	18	14	-85	-290	-426	-121
1966-67	-378	-240	-125	7	21	20	20	19	14	-80	-273	-402	-117
1967-68	-386	-226	-118	7	20	19	19	18	14	-75	-257	-378	-110
1968-69	-335	-213	-111	6	19	18	18	17	13	-70	-240	-354	-103
1969-70	-314	-199	-104	6	17	17	17	16	12	-65	-224	-330	-96
1970-71	-292	-185	-96	6	16	16	16	15	11	-61	-207	-305	-90
1971-72	-271	-172	-89	5	15	15	15	14	11	-56	-191	-281	-82
1972-73	-249	-158	-82	5	14	14	14	13	10	-51	-175	-257	-76
1973-74	-228	-144	-75	5	13	13	13	12	9	-46	-158	-233	-69
1974-75	-208	-131	-68	4	12	11	11	11	8	-41	-142	-208	-62
1975-76	-185	-117	-61	4	11	10	10	10	7	-36	-125	-184	-55
1976-77	-163	-103	-53	4	10	9	9	9	7	-31	-109	-160	-48
1977-78	-142	-90	-46	3	8	8	8	8	6	-27	-92	-136	-41
1978-79	-120	-78	-39	3	7	7	7	7	5	-22	-76	-112	-34
1979-80	-99	-62	-32	3	6	6	6	6	4	-17	-59	-87	-27
1980-81	-77	-49	-25	2	5	5	5	5	3	-15	-54	-79	-23
1981-82	-70	-44	-22	2	5	5	5	4	3	-13	-47	-69	-20
1982-83	-61	-39	-20	2	4	4	4	4	3	-11	-40	-59	-18
1983-84	-53	-33	-17	2	4	3	3	3	2	-10	-34	-50	-15
1984-85	-44	-28	-14	1	3	3	3	3	2	-8	-27	-40	-12
1985-86	-35	-22	-11	1	2	2	2	2	2	-6	-20	-30	-9
1986-87	-26	-17	-8	1	2	2	2	2	1	-4	-14	-20	-7
1987-88	-18	-11	-6	1	1	1	1	1	1	-2	-7	-10	-4
1988-89	-9	-6	-3	0	1	1	1	1	0	0	0	0	-1
1989-90	0	0	0										
AVE.	-255	-169	-98	-10	0	0	0	0	0	-65	-196	-285	-91
PLS3D9													

UPPER COLUMBIA ABOVE MICA

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												-86	
1928-29	-56	0	10	9	7	6	6	4	2	-43	-74	-85	-18
1929-30	-56	0	10	9	7	6	5	4	2	-42	-73	-84	-18
1930-31	-55	0	10	9	7	6	5	4	2	-42	-72	-83	-18
1931-32	-55	0	10	9	7	6	5	4	2	-41	-71	-82	-17
1932-33	-54	0	9	9	7	6	5	4	2	-41	-70	-81	-17
1933-34	-53	0	9	9	6	6	5	4	2	-40	-70	-80	-17
1934-35	-53	-1	9	8	6	5	5	4	2	-40	-69	-79	-17
1935-36	-52	-1	9	8	6	5	5	4	2	-39	-68	-78	-17
1936-37	-52	-1	6	8	6	5	5	3	2	-39	-67	-77	-17
1937-38	-51	-1	9	8	6	5	5	3	2	-38	-66	-76	-16
1938-39	-50	-1	8	8	6	5	5	3	2	-38	-65	-75	-16
1939-40	-50	-1	8	8	6	5	5	3	2	-37	-65	-74	-16
1940-41	-49	-1	8	7	6	5	4	3	2	-37	-64	-73	-16
1941-42	-49	-1	8	7	5	5	4	3	2	-36	-63	-72	-16
1942-43	-48	-1	8	7	5	5	4	3	1	-36	-62	-71	-16
1943-44	-47	-1	8	7	5	5	4	3	1	-35	-61	-70	-15
1944-45	-47	-1	7	7	5	4	4	3	1	-35	-60	-70	-15
1945-46	-46	-1	7	7	5	4	4	3	1	-35	-60	-69	-15
1946-47	-46	-1	7	7	5	4	4	3	1	-34	-59	-68	-15
1947-48	-45	-1	7	6	5	4	4	3	1	-34	-58	-67	-15
1948-49	-44	-1	7	6	5	4	4	3	1	-33	-57	-66	-14
1949-50	-44	-1	7	6	5	4	4	3	1	-33	-56	-65	-14
1950-51	-43	-1	7	6	5	4	4	3	1	-32	-55	-63	-14
1951-52	-42	-1	6	6	5	4	4	3	1	-31	-54	-62	-14
1952-53	-42	-1	6	6	4	4	4	3	1	-31	-53	-61	-13
1953-54	-41	-1	6	6	4	4	3	3	1	-30	-52	-60	-13
1954-55	-40	-1	6	6	4	4	3	2	1	-30	-52	-59	-13
1955-56	-39	-1	6	6	4	4	3	2	1	-29	-51	-58	-13
1956-57	-39	-1	6	6	4	4	3	2	1	-29	-50	-57	-12
1957-58	-38	-1	6	6	4	4	3	2	1	-28	-49	-56	-12
1958-59	-37	-1	6	5	4	4	3	2	1	-28	-48	-55	-12
1959-60	-36	-1	6	5	4	3	3	2	1	-27	-47	-54	-12
1960-61	-36	-1	6	5	4	3	3	2	1	-27	-46	-53	-12
1961-62	-35	-1	6	5	4	3	3	2	1	-26	-45	-52	-11
1962-63	-34	-1	6	5	4	3	3	2	1	-26	-44	-51	-11
1963-64	-34	-1	5	5	4	3	3	2	1	-25	-43	-50	-11
1964-65	-33	-1	5	5	4	3	3	2	1	-24	-42	-49	-11
1965-66	-32	-1	5	5	4	3	3	2	1	-23	-40	-46	-10
1966-67	-31	-1	5	5	3	3	3	2	1	-22	-38	-44	-10
1967-68	-29	-1	5	4	3	3	3	2	1	-21	-36	-42	-9
1968-69	-28	-1	4	4	3	3	2	2	1	-20	-34	-40	-9
1969-70	-26	-1	4	4	3	2	2	2	1	-19	-32	-37	-8
1970-71	-25	-1	4	3	3	2	2	1	1	-18	-31	-35	-8
1971-72	-23	-1	3	3	2	2	2	1	1	-17	-29	-33	-7
1972-73	-22	-1	3	3	2	2	2	1	0	-15	-27	-31	-7
1973-74	-21	-1	3	3	2	2	2	1	0	-14	-25	-28	-6
1974-75	-19	-1	2	2	2	1	1	1	0	-13	-23	-26	-6
1975-76	-18	-1	2	2	2	1	1	1	0	-12	-21	-24	-5
1976-77	-16	-1	2	2	1	1	1	1	0	-11	-19	-22	-5
1977-78	-15	-1	1	1	1	1	1	1	0	-10	-17	-19	-5
1978-79	-13	-1	1	1	1	1	1	0	0	-9	-15	-17	-4
1979-80	-12	-1	1	1	1	1	1	0	0	-8	-13	-15	-4
1980-81	-11	-1	1	1	1	0	0	0	0	-7	-12	-14	-3
1981-82	-9	-1	1	1	1	0	0	0	0	-6	-10	-12	-3
1982-83	-8	-1	1	1	0	0	0	0	0	-5	-9	-10	-3
1983-84	-7	-1	1	1	0	0	0	0	0	-4	-7	-9	-2
1984-85	-6	-1	0	0	0	0	0	0	0	-4	-6	-7	-2
1985-86	-5	-1	0	0	0	0	0	0	0	-3	-4	-5	-1
1986-87	-4	0	0	0	0	0	0	0	0	-2	-3	-3	-1
1987-88	-2	0	0	0	0	0	0	0	0	-1	-1	-2	0
1988-89	-1	0	0	0	0	0	0	0	0	0	0	0	0
1989-90	0	0											
MEAN	-33	-1	5	5	4	3	3	2	1	-25	-43	-50	-11

UPC3D9

MICA TO KEENLEYSIDE

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												-37	
1928-29	-24	-1	4	5	3	3	3	2	1	-19	-32	-37	-8
1929-30	-24	-1	4	4	3	3	3	2	1	-19	-32	-37	-8
1930-31	-24	-1	4	4	3	3	3	2	1	-19	-32	-37	-8
1931-32	-24	-1	4	4	3	3	3	2	1	-19	-32	-37	-8
1932-33	-23	-1	4	4	3	3	3	2	1	-19	-32	-37	-8
1933-34	-23	-1	4	4	3	3	3	2	1	-19	-32	-36	-8
1934-35	-23	-1	4	4	3	3	3	2	1	-19	-32	-36	-8
1935-36	-23	-1	4	4	3	3	3	2	1	-19	-31	-36	-8
1936-37	-23	-1	4	4	3	3	3	2	1	-19	-31	-36	-8
1937-38	-23	-1	4	4	3	3	3	2	1	-19	-31	-36	-7
1938-39	-23	-1	4	4	3	3	3	2	1	-18	-31	-35	-7
1939-40	-23	-1	4	4	3	3	3	2	1	-18	-31	-35	-7
1940-41	-23	-1	4	4	3	3	3	2	1	-18	-31	-35	-7
1941-42	-22	-1	4	4	3	3	3	2	1	-18	-30	-35	-7
1942-43	-22	-1	4	4	3	3	3	2	1	-18	-30	-35	-7
1943-44	-22	-1	4	4	3	3	3	2	1	-18	-30	-35	-7
1944-45	-22	-1	4	4	3	3	3	2	1	-18	-30	-34	-7
1945-46	-22	-1	4	4	3	3	3	2	1	-18	-30	-34	-7
1946-47	-22	-1	4	4	3	3	3	2	1	-18	-30	-34	-7
1947-48	-22	-1	4	4	3	3	3	2	1	-18	-30	-34	-7
1948-49	-22	-1	4	4	3	3	3	2	1	-18	-29	-34	-7
1949-50	-22	-1	4	4	3	3	3	2	1	-17	-29	-34	-7
1950-51	-22	-1	4	4	3	3	2	2	1	-17	-29	-34	-7
1951-52	-21	-1	4	4	3	3	2	2	1	-17	-29	-33	-7
1952-53	-21	-1	4	4	3	3	2	2	1	-17	-29	-33	-7
1953-54	-21	-1	4	4	3	3	2	2	1	-17	-29	-33	-7
1954-55	-21	-1	4	4	3	3	2	2	1	-17	-29	-33	-7
1955-56	-21	-1	4	4	3	3	2	2	1	-17	-29	-33	-7
1956-57	-21	-1	4	4	3	3	2	2	1	-17	-28	-33	-7
1957-58	-21	-1	4	4	3	3	2	2	1	-17	-28	-33	-7
1958-59	-21	-1	4	4	3	3	2	2	1	-17	-28	-32	-7
1959-60	-21	-1	4	4	3	3	2	2	1	-17	-28	-32	-7
1960-61	-21	-1	4	4	3	3	2	2	1	-17	-28	-32	-7
1961-62	-21	-1	4	4	3	3	2	2	1	-17	-28	-32	-7
1962-63	-20	-1	4	4	3	3	2	2	1	-17	-28	-32	-7
1963-64	-20	-1	4	4	3	3	2	2	1	-16	-28	-32	-7
1964-65	-20	-1	4	4	3	3	2	2	1	-16	-28	-32	-7
1965-66	-20	-1	4	4	3	3	2	2	1	-16	-27	-31	-6
1966-67	-20	-1	4	4	3	3	2	2	1	-16	-27	-30	-6
1967-68	-19	-1	4	4	3	2	2	2	1	-15	-26	-30	-6
1968-69	-19	-1	3	4	3	2	2	2	1	-15	-25	-29	-6
1969-70	-19	-1	3	3	3	2	2	2	1	-15	-25	-29	-6
1970-71	-18	-1	3	3	3	2	2	2	1	-15	-24	-28	-6
1971-72	-18	-1	3	3	3	2	2	2	1	-14	-24	-27	-6
1972-73	-18	-1	3	3	2	2	2	2	1	-14	-23	-27	-6
1973-74	-17	-1	3	3	2	2	2	2	1	-14	-23	-26	-6
1974-75	-17	-1	3	3	2	2	2	1	1	-13	-22	-26	-5
1975-76	-16	-1	3	3	2	2	2	1	1	-13	-22	-25	-5
1976-77	-16	-1	3	3	2	2	2	1	1	-13	-21	-25	-5
1977-78	-16	-1	3	3	2	2	2	1	1	-12	-21	-24	-5
1978-79	-15	-1	3	3	2	2	2	1	1	-12	-20	-23	-5
1979-80	-15	-1	3	3	2	2	2	1	0	-11	-18	-21	-4
1980-81	-14	-1	2	2	2	2	2	1	0	-10	-16	-19	-4
1981-82	-12	-1	2	2	2	1	1	1	0	-8	-14	-16	-3
1982-83	-11	-1	2	2	1	1	1	1	0	-7	-12	-14	-3
1983-84	-9	0	2	2	1	1	1	1	0	-6	-10	-12	-2
1984-85	-8	0	1	1	1	1	1	1	0	-5	-8	-9	-2
1985-86	-6	0	1	1	1	1	1	1	0	-4	-6	-7	-1
1986-87	-5	0	1	1	1	1	1	0	0	-2	-4	-5	-1
1987-88	-3	0	1	1	0	0	0	0	0	-1	-2	-2	0
1988-89	-2	0	0	0	0	0	0	0	0	0	0	0	0
1989-90	0	0											
MEAN	-18	-1	3	3	3	2	2	2	1	-15	-25	-29	-6

ARD

EAST KOOTENAY ABOVE NEWGATE

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												-249	
1928-29	-169	-8	29	30	24	21	20	15	9	-105	-181	-248	-48
1929-30	-169	-8	29	30	23	20	19	15	9	-105	-181	-248	-47
1930-31	-168	-8	29	30	23	20	19	15	9	-104	-180	-245	-47
1931-32	-167	-8	29	30	23	20	19	14	9	-104	-179	-244	-47
1932-33	-166	-8	29	30	23	20	19	14	8	-103	-178	-243	-47
1933-34	-165	-8	28	29	23	20	19	14	8	-103	-177	-242	-47
1934-35	-165	-8	28	29	23	20	19	14	8	-102	-176	-240	-46
1935-36	-164	-8	28	29	22	20	19	14	8	-102	-175	-239	-46
1936-37	-163	-8	28	29	22	20	19	14	8	-101	-174	-238	-46
1937-38	-162	-8	28	29	22	19	18	14	8	-101	-174	-237	-46
1938-39	-162	-8	27	28	22	19	18	14	8	-100	-173	-235	-46
1939-40	-161	-8	27	28	22	19	18	14	8	-100	-172	-234	-45
1940-41	-160	-8	27	28	22	19	18	14	8	-99	-171	-233	-45
1941-42	-159	-8	27	28	22	19	18	13	8	-99	-170	-232	-45
1942-43	-158	-8	27	28	21	19	18	13	8	-98	-169	-231	-45
1943-44	-158	-8	26	27	21	19	18	13	8	-98	-168	-229	-44
1944-45	-157	-8	26	27	21	18	17	13	8	-97	-167	-228	-44
1945-46	-156	-8	26	27	21	18	17	13	8	-96	-166	-227	-44
1946-47	-155	-8	26	27	21	18	17	13	8	-96	-166	-226	-44
1947-48	-154	-8	26	27	21	18	17	13	8	-95	-165	-225	-44
1948-49	-154	-8	25	26	20	18	17	13	7	-94	-162	-220	-43
1949-50	-151	-8	25	26	20	18	17	13	7	-92	-158	-216	-42
1950-51	-148	-8	24	25	20	17	16	12	7	-90	-155	-212	-41
1951-52	-145	-8	24	25	19	17	16	12	7	-88	-152	-207	-40
1952-53	-142	-8	23	24	19	16	16	12	7	-86	-149	-203	-40
1953-54	-139	-8	23	24	18	16	15	11	7	-85	-146	-199	-39
1954-55	-136	-8	22	23	18	16	15	11	6	-83	-143	-195	-38
1955-56	-133	-7	22	22	17	15	14	11	6	-81	-140	-190	-37
1956-57	-130	-7	21	22	17	15	14	11	6	-79	-136	-186	-36
1957-58	-127	-7	20	21	17	14	14	10	6	-77	-133	-182	-36
1958-59	-125	-7	20	21	16	14	13	10	6	-75	-130	-177	-35
1959-60	-122	-7	19	20	16	14	13	10	6	-74	-127	-173	-34
1960-61	-119	-7	19	20	15	13	13	9	5	-72	-124	-169	-33
1961-62	-116	-7	18	19	15	13	12	9	5	-70	-121	-164	-32
1962-63	-113	-7	18	18	14	13	12	9	5	-68	-118	-160	-32
1963-64	-110	-7	17	18	14	12	12	9	5	-66	-114	-156	-31
1964-65	-107	-7	17	17	13	12	11	8	5	-65	-111	-152	-30
1965-66	-104	-7	16	17	13	11	11	8	4	-62	-108	-146	-29
1966-67	-101	-6	15	16	12	11	10	8	4	-60	-104	-141	-28
1967-68	-97	-6	15	15	12	10	10	7	4	-58	-100	-136	-27
1968-69	-94	-6	14	15	11	10	9	7	4	-56	-96	-131	-26
1969-70	-91	-6	13	14	11	9	9	7	4	-54	-93	-126	-25
1970-71	-87	-6	13	13	10	9	9	6	3	-52	-89	-121	-24
1971-72	-84	-6	12	13	10	9	8	6	3	-49	-85	-116	-23
1972-73	-80	-6	11	12	9	8	8	6	3	-47	-81	-111	-22
1973-74	-77	-6	11	11	9	8	7	5	3	-45	-78	-106	-22
1974-75	-74	-6	10	10	8	7	7	5	3	-43	-74	-101	-21
1975-76	-70	-6	9	10	8	7	6	5	2	-41	-70	-96	-20
1976-77	-67	-6	8	9	7	6	6	4	2	-39	-67	-90	-19
1977-78	-63	-6	8	8	6	6	5	4	2	-36	-63	-85	-18
1978-79	-60	-6	7	8	6	5	5	4	2	-34	-59	-80	-17
1979-80	-57	-6	6	7	5	5	4	3	2	-31	-53	-72	-15
1980-81	-51	-5	6	6	5	4	4	3	1	-27	-47	-64	-13
1981-82	-45	-4	5	6	4	4	4	3	1	-24	-41	-56	-12
1982-83	-40	-4	4	5	4	3	3	2	1	-21	-35	-48	-10
1983-84	-34	-3	4	4	3	3	3	2	1	-17	-30	-40	-8
1984-85	-28	-3	3	3	3	2	2	2	1	-14	-24	-32	-7
1985-86	-23	-2	3	3	2	2	2	1	1	-10	-18	-24	-5
1986-87	-17	-2	2	2	2	1	1	1	0	-7	-12	-16	-3
1987-88	-11	-1	1	1	1	1	1	1	0	-3	-6	-8	-1
1988-89	-6	-1	1	1	1	0	0	0	0	0	0	0	0
1989-90	0	0											
MEAN	-112	-6	18	19	15	13	12	9	5	-69	-118	-163	-32

EKO3D9

KOOTENAI BASIN IN MONTANA

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												-18	
1928-29	-13	-3	0	0	0	0	0	0	0	-8	-13	-18	-5
1929-30	-13	-3	0	0	0	0	0	0	0	-8	-13	-18	-5
1930-31	-13	-3	0	0	0	0	0	0	0	-8	-13	-18	-5
1931-32	-13	-3	0	0	0	0	0	0	0	-8	-13	-18	-5
1932-33	-13	-3	0	0	0	0	0	0	0	-8	-13	-18	-5
1933-34	-13	-3	0	0	0	0	0	0	0	-8	-13	-18	-5
1934-35	-13	-3	0	0	0	0	0	0	0	-8	-13	-18	-5
1935-36	-13	-3	0	0	0	0	0	0	0	-8	-13	-18	-5
1936-37	-13	-3	0	0	0	0	0	0	0	-8	-13	-18	-5
1937-38	-13	-3	0	0	0	0	0	0	0	-8	-13	-18	-5
1938-39	-13	-3	0	0	0	0	0	0	0	-8	-13	-18	-5
1939-40	-13	-3	0	0	0	0	0	0	0	-8	-13	-18	-5
1940-41	-13	-3	0	0	0	0	0	0	0	-8	-13	-18	-5
1941-42	-13	-3	0	0	0	0	0	0	0	-8	-13	-18	-5
1942-43	-13	-3	0	0	0	0	0	0	0	-8	-13	-18	-5
1943-44	-13	-3	0	0	0	0	0	0	0	-8	-13	-18	-5
1944-45	-13	-3	0	0	0	0	0	0	0	-8	-13	-18	-5
1945-46	-13	-3	0	0	0	0	0	0	0	-8	-13	-18	-5
1946-47	-13	-3	0	0	0	0	0	0	0	-8	-13	-18	-5
1947-48	-13	-3	0	0	0	0	0	0	0	-8	-13	-18	-5
1948-49	-13	-3	0	0	0	0	0	0	0	-8	-13	-18	-5
1949-50	-13	-3	0	0	0	0	0	0	0	-8	-13	-18	-5
1950-51	-13	-3	0	0	0	0	0	0	0	-8	-13	-17	-4
1951-52	-13	-2	0	0	0	0	0	0	0	-7	-12	-17	-4
1952-53	-12	-2	0	0	0	0	0	0	0	-7	-12	-16	-4
1953-54	-12	-2	0	0	0	0	0	0	0	-7	-11	-15	-4
1954-55	-11	-2	0	0	0	0	0	0	0	-6	-11	-15	-4
1955-56	-11	-2	0	0	0	0	0	0	0	-6	-10	-14	-4
1956-57	-10	-2	0	0	0	0	0	0	0	-6	-10	-13	-3
1957-58	-10	-2	0	0	0	0	0	0	0	-5	-9	-13	-3
1958-59	-9	-2	0	0	0	0	0	0	0	-5	-9	-12	-3
1959-60	-9	-2	0	0	0	0	0	0	0	-5	-8	-11	-3
1960-61	-8	-2	0	0	0	0	0	0	0	-5	-8	-10	-3
1961-62	-8	-2	0	0	0	0	0	0	0	-4	-7	-10	-3
1962-63	-7	-2	0	0	0	0	0	0	0	-4	-7	-9	-2
1963-64	-7	-2	0	0	0	0	0	0	0	-4	-6	-8	-2
1964-65	-6	-2	0	0	0	0	0	0	0	-3	-6	-8	-2
1965-66	-6	-1	0	0	0	0	0	0	0	-3	-5	-7	-2
1966-67	-5	-1	0	0	0	0	0	0	0	-2	-3	-4	-1
1967-68	-4	-1	-1	-1	0	0	0	0	0	-1	-2	-2	-1
1968-69	-2	-1	-1	-1	-1	-1	-1	0	0	0	0	1	0
1969-70	0	-1	-1	-1	-1	-1	-1	-1	0	1	2	3	0
1970-71	1	-1	-1	-1	-1	-1	-1	-1	-1	2	4	5	1
1971-72	3	-1	-2	-2	-1	-1	-1	-1	-1	3	6	8	1
1972-73	5	-1	-2	-2	-1	-1	-1	-1	-1	4	8	10	2
1973-74	7	-1	-2	-2	-2	-1	-1	-1	-1	5	9	13	2
1974-75	8	0	-2	-2	-2	-2	-2	-1	-1	6	11	15	3
1975-76	10	0	-3	-3	-2	-2	-2	-1	-1	8	13	18	3
1976-77	12	0	-3	-3	-2	-2	-2	-1	-1	9	15	20	4
1977-78	13	0	-3	-3	-2	-2	-2	-2	-1	10	17	23	4
1978-79	15	0	-3	-3	-3	-2	-2	-2	-1	11	19	26	5
1979-80	17	0	-4	-4	-3	-3	-2	-2	-1	10	17	24	4
1980-81	16	0	-3	-3	-3	-2	-2	-2	-1	9	15	21	4
1981-82	14	0	-3	-3	-2	-2	-2	-1	-1	8	13	18	3
1982-83	12	0	-3	-3	-2	-2	-2	-1	-1	7	11	16	3
1983-84	10	0	-2	-2	-2	-2	-1	-1	-1	6	10	13	2
1984-85	9	0	-2	-2	-1	-1	-1	-1	0	4	8	10	2
1985-86	7	0	-1	-1	-1	-1	-1	-1	0	3	6	8	1
1986-87	5	0	-1	-1	-1	-1	-1	-1	0	2	4	5	1
1987-88	3	0	-1	-1	-1	-1	0	0	0	1	2	3	0
1988-89	2	0	0	0	0	0	0	0	0	0	0	0	0
1989-90	0	0											
MEAN	-5	-2	-1	-1	0	0	0	0	0	-2	-4	-6	-2

KMT3D9

KOOTENAI BASIN IN IDAHO

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												-12	
1928-29	-9	-1	1	1	1	1	1	0	0	-5	-9	-12	-3
1929-30	-9	-1	1	1	1	1	1	0	0	-5	-9	-12	-3
1930-31	-9	-1	1	1	1	1	1	0	0	-5	-9	-12	-3
1931-32	-9	-1	1	1	1	1	1	0	0	-5	-9	-12	-3
1932-33	-9	-1	1	1	1	1	1	0	0	-5	-9	-12	-3
1933-34	-9	-1	1	1	1	1	1	0	0	-5	-9	-12	-3
1934-35	-9	-1	1	1	1	1	1	0	0	-5	-9	-12	-3
1935-36	-9	-1	1	1	1	1	1	0	0	-5	-9	-12	-3
1936-37	-9	-1	1	1	1	1	1	0	0	-5	-9	-12	-3
1937-38	-9	-1	1	1	1	1	1	0	0	-5	-9	-12	-3
1938-39	-9	-1	1	1	1	1	1	0	0	-5	-9	-12	-3
1939-40	-9	-1	1	1	1	1	1	0	0	-5	-9	-12	-3
1940-41	-9	-1	1	1	1	1	1	0	0	-5	-9	-12	-3
1941-42	-9	-1	1	1	1	1	1	0	0	-5	-9	-12	-3
1942-43	-9	-1	1	1	1	1	1	0	0	-5	-9	-12	-3
1943-44	-9	-1	1	1	1	1	1	0	0	-5	-9	-12	-3
1944-45	-9	-1	1	1	1	1	1	0	0	-5	-9	-12	-3
1945-46	-9	-1	1	1	1	1	1	0	0	-5	-9	-12	-3
1946-47	-9	-1	1	1	1	1	1	0	0	-5	-9	-12	-3
1947-48	-9	-1	1	1	1	1	1	0	0	-5	-9	-12	-3
1948-49	-9	-1	1	1	1	1	1	0	0	-5	-9	-12	-3
1949-50	-9	-1	1	1	1	1	1	0	0	-5	-9	-12	-3
1950-51	-9	-1	1	1	1	1	1	0	0	-5	-9	-12	-3
1951-52	-9	-1	1	1	1	1	1	0	0	-5	-9	-12	-3
1952-53	-9	-1	1	1	1	1	0	0	0	-5	-9	-12	-3
1953-54	-8	-1	1	1	1	1	0	0	0	-5	-9	-12	-3
1954-55	-8	-1	1	1	1	1	0	0	0	-5	-8	-11	-3
1955-56	-8	-1	1	1	1	1	0	0	0	-5	-8	-11	-2
1956-57	-8	-1	1	1	1	0	0	0	0	-5	-8	-11	-2
1957-58	-8	-1	1	1	1	0	0	0	0	-5	-8	-11	-2
1958-59	-8	-1	1	1	1	0	0	0	0	-4	-8	-10	-2
1959-60	-7	-1	1	1	1	0	0	0	0	-4	-8	-10	-2
1960-61	-7	-1	1	1	1	0	0	0	0	-4	-7	-10	-2
1961-62	-7	-1	1	1	1	0	0	0	0	-4	-7	-10	-2
1962-63	-7	-1	1	1	1	0	0	0	0	-4	-7	-10	-2
1963-64	-7	-1	1	1	1	0	0	0	0	-4	-7	-9	-2
1964-65	-7	-1	1	1	1	0	0	0	0	-4	-7	-9	-2
1965-66	-6	-1	1	1	1	0	0	0	0	-4	-7	-9	-2
1966-67	-6	-1	1	1	0	0	0	0	0	-3	-6	-8	-2
1967-68	-5	-1	0	1	0	0	0	0	0	-3	-5	-6	-1
1968-69	-5	-1	0	0	0	0	0	0	0	-2	-4	-5	-1
1969-70	-4	-1	0	0	0	0	0	0	0	-2	-3	-4	-1
1970-71	-3	0	0	0	0	0	0	0	0	-1	-2	-3	-1
1971-72	-2	0	0	0	0	0	0	0	0	-1	-1	-1	0
1972-73	-1	0	0	0	0	0	0	0	0	0	0	0	0
1973-74	0	0	0	0	0	0	0	0	0	0	1	1	0
1974-75	1	0	0	0	0	0	0	0	0	1	2	2	0
1975-76	1	0	0	0	0	0	0	0	0	1	3	4	1
1976-77	2	0	-1	-1	0	0	0	0	0	2	3	5	1
1977-78	3	0	-1	-1	-1	0	0	0	0	3	4	6	1
1978-79	4	0	-1	-1	-1	-1	-1	0	0	3	6	8	2
1979-80	5	0	-1	-1	-1	-1	-1	0	0	3	5	7	1
1980-81	5	0	-1	-1	-1	-1	-1	0	0	3	5	6	1
1981-82	4	0	-1	-1	-1	-1	-1	0	0	2	4	5	1
1982-83	4	0	-1	-1	-1	0	0	0	0	2	3	5	1
1983-84	3	0	-1	-1	0	0	0	0	0	2	3	4	1
1984-85	3	0	0	0	0	0	0	0	0	1	2	3	1
1985-86	2	0	0	0	0	0	0	0	0	1	2	2	0
1986-87	2	0	0	0	0	0	0	0	0	1	1	2	0
1987-88	1	0	0	0	0	0	0	0	0	0	1	1	0
1988-89	1	0	0	0	0	0	0	0	0	0	0	0	0
1989-90	0	0											
MEAN	-5	-1	0	0	0	0	0	0	0	-3	-5	-7	-2

KID3D9

WEST KOOTENAY - INT'L BORDER TO CORRA LINN

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												-155	
1928-29	-125	-17	22	21	16	14	13	10	8	-62	-108	-153	-30
1929-30	-124	-17	22	20	16	14	13	10	8	-61	-107	-151	-30
1930-31	-123	-17	21	20	16	14	13	10	8	-60	-106	-150	-30
1931-32	-121	-17	21	20	15	13	13	10	8	-60	-105	-148	-29
1932-33	-120	-16	21	20	15	13	13	9	8	-59	-103	-147	-29
1933-34	-119	-16	20	19	15	13	12	9	8	-59	-102	-145	-29
1934-35	-118	-16	20	19	15	13	12	9	7	-58	-101	-144	-29
1935-36	-117	-16	20	19	14	13	12	9	7	-57	-100	-142	-28
1936-37	-115	-16	20	18	14	12	12	9	7	-57	-99	-141	-28
1937-38	-114	-16	19	18	14	12	12	9	7	-56	-98	-139	-28
1938-39	-113	-16	19	18	14	12	11	9	7	-55	-97	-137	-28
1939-40	-112	-16	19	18	14	12	11	9	7	-55	-96	-136	-27
1940-41	-110	-16	18	17	13	12	11	8	7	-54	-95	-134	-27
1941-42	-109	-15	18	17	13	12	11	8	7	-54	-94	-133	-27
1942-43	-108	-15	18	17	13	11	11	8	7	-53	-93	-131	-27
1943-44	-107	-15	18	17	13	11	11	8	6	-52	-91	-130	-26
1944-45	-105	-15	17	16	13	11	10	8	6	-52	-90	-128	-26
1945-46	-104	-15	17	16	12	11	10	8	6	-51	-89	-127	-26
1946-47	-103	-15	17	16	12	11	10	8	6	-50	-88	-125	-25
1947-48	-102	-15	16	15	12	10	10	7	6	-50	-87	-123	-25
1948-49	-101	-15	16	15	12	10	10	7	6	-49	-86	-122	-25
1949-50	-99	-15	16	15	12	10	10	7	6	-49	-85	-120	-25
1950-51	-98	-14	16	15	11	10	10	7	6	-48	-84	-119	-24
1951-52	-97	-14	16	15	11	10	9	7	6	-47	-83	-117	-24
1952-53	-96	-14	15	14	11	10	9	7	6	-47	-82	-116	-24
1953-54	-94	-14	15	14	11	10	9	7	6	-46	-81	-114	-23
1954-55	-93	-14	15	14	11	10	9	7	6	-46	-80	-113	-23
1955-56	-92	-13	15	14	11	9	9	7	6	-45	-78	-111	-23
1956-57	-91	-13	15	14	11	9	9	7	5	-44	-77	-110	-22
1957-58	-89	-13	14	14	11	9	9	7	5	-44	-76	-108	-22
1958-59	-88	-13	14	13	10	9	9	7	5	-43	-75	-107	-22
1959-60	-87	-13	14	13	10	9	9	6	5	-42	-74	-105	-21
1960-61	-86	-12	14	13	10	9	8	6	5	-42	-73	-104	-21
1961-62	-84	-12	14	13	10	9	8	6	5	-41	-72	-102	-21
1962-63	-83	-12	14	13	10	9	8	6	5	-41	-71	-100	-20
1963-64	-82	-12	13	13	10	9	8	6	5	-40	-70	-99	-20
1964-65	-80	-12	13	12	10	8	8	6	5	-39	-69	-97	-20
1965-66	-79	-11	13	12	9	8	8	6	5	-37	-65	-92	-19
1966-67	-75	-11	12	12	9	8	7	6	4	-35	-62	-87	-18
1967-68	-71	-10	11	11	8	7	7	5	4	-33	-58	-82	-17
1968-69	-67	-10	11	10	8	7	6	5	4	-31	-55	-77	-16
1969-70	-63	-9	10	9	7	6	6	5	3	-29	-51	-72	-15
1970-71	-59	-9	9	9	7	6	6	4	3	-27	-47	-67	-14
1971-72	-55	-8	8	8	6	5	5	4	3	-25	-44	-62	-13
1972-73	-51	-8	8	7	6	5	5	3	3	-23	-40	-57	-12
1973-74	-47	-7	7	6	5	4	4	3	2	-21	-37	-52	-11
1974-75	-43	-7	6	6	4	4	4	3	2	-19	-33	-47	-10
1975-76	-39	-6	5	5	4	3	3	2	2	-17	-30	-42	-9
1976-77	-35	-6	5	4	3	3	3	2	1	-15	-26	-37	-8
1977-78	-31	-5	4	4	3	2	2	2	1	-13	-23	-32	-7
1978-79	-27	-5	3	3	2	2	2	1	1	-11	-19	-27	-6
1979-80	-23	-4	2	2	2	1	1	1	1	-10	-17	-24	-5
1980-81	-20	-4	2	2	1	1	1	1	1	-9	-15	-22	-5
1981-82	-18	-3	2	2	1	1	1	1	1	-8	-13	-19	-4
1982-83	-16	-3	2	1	1	1	1	1	1	-7	-11	-16	-4
1983-84	-14	-3	1	1	1	1	1	1	0	-5	-10	-13	-3
1984-85	-11	-2	1	1	1	1	1	1	0	-4	-8	-11	-2
1985-86	-9	-2	1	1	1	1	1	0	0	-3	-6	-8	-2
1986-87	-7	-1	1	1	0	0	0	0	0	-2	-4	-5	-1
1987-88	-5	-1	0	0	0	0	0	0	0	-1	-2	-3	-1
1988-89	-2	0	0	0	0	0	0	0	0	0	0	0	0
1989-90	0	0											
MEAN	-75	-11	12	12	9	8	8	6	5	-37	-65	-93	-19

WK03D9

SLOCAN BASIN

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												-44	
1928-29	-36	-5	6	5	4	4	3	3	2	-18	-31	-43	-9
1929-30	-35	-5	6	5	4	4	3	3	2	-17	-30	-43	-9
1930-31	-35	-5	6	5	4	4	3	3	2	-17	-30	-43	-9
1931-32	-35	-5	6	5	4	4	3	3	2	-17	-30	-43	-9
1932-33	-35	-5	5	5	4	3	3	2	2	-17	-30	-42	-9
1933-34	-34	-5	5	5	4	3	3	2	2	-17	-30	-42	-9
1934-35	-34	-5	5	5	4	3	3	2	2	-17	-29	-42	-9
1935-36	-34	-5	5	5	4	3	3	2	2	-17	-29	-41	-8
1936-37	-34	-5	5	5	4	3	3	2	2	-17	-29	-41	-8
1937-38	-34	-5	5	5	4	3	3	2	2	-16	-29	-41	-8
1938-39	-33	-5	5	5	4	3	3	2	2	-16	-29	-41	-8
1939-40	-33	-5	5	5	4	3	3	2	2	-16	-28	-40	-8
1940-41	-33	-5	5	5	4	3	3	2	2	-16	-28	-40	-8
1941-42	-33	-5	5	5	4	3	3	2	2	-16	-28	-40	-8
1942-43	-32	-5	5	5	4	3	3	2	2	-16	-28	-39	-8
1943-44	-32	-5	5	5	4	3	3	2	2	-16	-28	-39	-8
1944-45	-32	-5	5	5	4	3	3	2	2	-16	-27	-39	-8
1945-46	-32	-5	5	5	3	3	3	2	2	-16	-27	-39	-8
1946-47	-32	-5	5	4	3	3	3	2	2	-15	-27	-38	-8
1947-48	-31	-5	5	4	3	3	3	2	2	-15	-27	-38	-8
1948-49	-31	-5	5	4	3	3	3	2	2	-15	-27	-38	-8
1949-50	-31	-5	5	4	3	3	3	2	2	-15	-26	-37	-8
1950-51	-31	-5	5	4	3	3	3	2	2	-15	-26	-37	-8
1951-52	-31	-5	5	4	3	3	3	2	2	-15	-26	-37	-8
1952-53	-31	-5	5	4	3	3	3	2	2	-15	-26	-37	-8
1953-54	-30	-5	5	4	3	3	3	2	2	-15	-26	-37	-8
1954-55	-30	-5	5	4	3	3	3	2	2	-15	-26	-37	-8
1955-56	-30	-5	5	4	3	3	3	2	2	-15	-26	-37	-8
1956-57	-30	-5	5	4	3	3	3	2	2	-15	-26	-36	-8
1957-58	-30	-5	5	4	3	3	3	2	2	-15	-26	-36	-8
1958-59	-30	-5	5	4	3	3	3	2	2	-15	-25	-36	-7
1959-60	-29	-4	4	4	3	3	3	2	2	-14	-25	-36	-7
1960-61	-29	-4	4	4	3	3	3	2	2	-14	-25	-36	-7
1961-62	-29	-4	4	4	3	3	3	2	2	-14	-25	-35	-7
1962-63	-29	-4	4	4	3	3	3	2	2	-14	-25	-35	-7
1963-64	-29	-4	4	4	3	3	3	2	2	-14	-25	-35	-7
1964-65	-29	-4	4	4	3	3	3	2	2	-14	-25	-35	-7
1965-66	-29	-4	4	4	3	3	3	2	2	-13	-23	-33	-7
1966-67	-27	-4	4	4	3	3	2	2	1	-12	-21	-30	-6
1967-68	-25	-4	4	3	3	2	2	2	1	-11	-20	-28	-6
1968-69	-23	-4	3	3	2	2	2	1	1	-10	-18	-25	-5
1969-70	-21	-3	3	3	2	2	2	1	1	-9	-16	-23	-5
1970-71	-19	-3	3	2	2	2	2	1	1	-8	-15	-21	-4
1971-72	-17	-3	2	2	2	1	1	1	1	-7	-13	-18	-4
1972-73	-15	-3	2	2	1	1	1	1	1	-7	-11	-16	-4
1973-74	-13	-3	1	1	1	1	1	1	0	-6	-10	-14	-3
1974-75	-11	-2	1	1	1	1	1	0	0	-5	-8	-11	-3
1975-76	-10	-2	1	1	1	0	0	0	0	-4	-6	-9	-2
1976-77	-8	-2	0	0	0	0	0	0	0	-3	-5	-7	-2
1977-78	-6	-2	0	0	0	0	0	0	0	-2	-3	-4	-1
1978-79	-4	-1	0	0	0	0	0	0	0	-1	-1	-2	-1
1979-80	-2	-1	-1	-1	-1	-1	0	0	0	-1	-1	-1	-1
1980-81	-2	-1	-1	-1	-1	0	0	0	0	-1	-1	-1	-1
1981-82	-2	-1	-1	-1	0	0	0	0	0	-1	-1	-1	-1
1982-83	-1	-1	-1	-1	0	0	0	0	0	0	-1	-1	-1
1983-84	-1	-1	0	0	0	0	0	0	0	0	-1	-1	0
1984-85	-1	-1	0	0	0	0	0	0	0	0	-1	-1	0
1985-86	-1	0	0	0	0	0	0	0	0	0	0	-1	0
1986-87	-1	0	0	0	0	0	0	0	0	0	0	0	0
1987-88	0	0	0	0	0	0	0	0	0	0	0	0	0
1988-89	0	0	0	0	0	0	0	0	0	0	0	0	0
1989-90	0	0											
MEAN	-23	-4	3	3	2	2	2	2	1	-11	-19	-28	-6

BRI3D9

KEENLEYSIDE TO PEND OREILLE

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												-17	
1928-29	-14	-2	2	2	1	1	1	1	1	-7	-12	-17	-4
1929-30	-14	-2	2	2	1	1	1	1	1	-7	-12	-17	-4
1930-31	-14	-2	2	2	1	1	1	1	1	-7	-12	-17	-4
1931-32	-14	-2	2	2	1	1	1	1	1	-6	-12	-17	-4
1932-33	-14	-2	2	2	1	1	1	1	1	-6	-12	-17	-3
1933-34	-14	-2	2	2	1	1	1	1	1	-6	-12	-16	-3
1934-35	-14	-2	2	2	1	1	1	1	1	-6	-11	-16	-3
1935-36	-14	-2	2	2	1	1	1	1	1	-6	-11	-16	-3
1936-37	-14	-2	2	2	1	1	1	1	1	-6	-11	-16	-3
1937-38	-13	-2	2	2	1	1	1	1	1	-6	-11	-16	-3
1938-39	-13	-2	2	2	1	1	1	1	1	-6	-11	-16	-3
1939-40	-13	-2	2	2	1	1	1	1	1	-6	-11	-16	-3
1940-41	-13	-2	2	2	1	1	1	1	1	-6	-11	-15	-3
1941-42	-13	-2	2	2	1	1	1	1	1	-6	-11	-15	-3
1942-43	-13	-2	2	2	1	1	1	1	1	-6	-11	-15	-3
1943-44	-13	-2	2	2	1	1	1	1	1	-6	-11	-15	-3
1944-45	-13	-2	2	2	1	1	1	1	1	-6	-10	-15	-3
1945-46	-13	-2	2	1	1	1	1	1	1	-6	-10	-15	-3
1946-47	-12	-2	2	1	1	1	1	1	1	-6	-10	-15	-3
1947-48	-12	-2	2	1	1	1	1	1	1	-6	-10	-14	-3
1948-49	-12	-2	2	1	1	1	1	1	1	-6	-10	-14	-3
1949-50	-12	-2	2	1	1	1	1	1	1	-5	-10	-14	-3
1950-51	-12	-2	2	1	1	1	1	1	1	-5	-10	-14	-3
1951-52	-12	-2	2	1	1	1	1	1	1	-5	-10	-14	-3
1952-53	-12	-2	2	1	1	1	1	1	1	-5	-9	-13	-3
1953-54	-11	-2	2	1	1	1	1	1	1	-5	-9	-13	-3
1954-55	-11	-2	2	1	1	1	1	1	1	-5	-9	-13	-3
1955-56	-11	-2	1	1	1	1	1	1	1	-5	-9	-13	-3
1956-57	-11	-1	1	1	1	1	1	1	1	-5	-9	-13	-3
1957-58	-11	-1	1	1	1	1	1	1	1	-5	-9	-12	-3
1958-59	-10	-1	1	1	1	1	1	1	1	-5	-9	-12	-3
1959-60	-10	-1	1	1	1	1	1	1	1	-5	-8	-12	-3
1960-61	-10	-1	1	1	1	1	1	0	0	-5	-8	-12	-3
1961-62	-10	-1	1	1	1	1	1	0	0	-5	-8	-12	-3
1962-63	-10	-1	1	1	1	1	1	0	0	-4	-8	-11	-2
1963-64	-10	-1	1	1	1	1	1	0	0	-4	-8	-11	-2
1964-65	-9	-1	1	1	1	1	1	0	0	-4	-8	-11	-2
1965-66	-9	-1	1	1	1	1	1	0	0	-4	-8	-11	-2
1966-67	-9	-1	1	1	1	1	1	0	0	-4	-8	-11	-2
1967-68	-9	-1	1	1	1	1	1	0	0	-4	-8	-11	-2
1968-69	-9	-1	1	1	1	1	1	0	0	-4	-8	-11	-2
1969-70	-9	-1	1	1	1	1	1	0	0	-4	-8	-11	-2
1970-71	-9	-1	1	1	1	1	1	0	0	-4	-7	-11	-2
1971-72	-9	-1	1	1	1	1	1	0	0	-4	-7	-11	-2
1972-73	-9	-1	1	1	1	1	1	0	0	-4	-7	-10	-2
1973-74	-9	-1	1	1	1	1	1	0	0	-4	-7	-10	-2
1974-75	-9	-1	1	1	1	1	1	0	0	-4	-7	-10	-2
1975-76	-9	-1	1	1	1	1	1	0	0	-4	-7	-10	-2
1976-77	-9	-1	1	1	1	1	1	0	0	-4	-7	-10	-2
1977-78	-9	-1	1	1	1	1	1	0	0	-4	-7	-10	-2
1978-79	-9	-1	1	1	1	1	1	0	0	-4	-7	-10	-2
1979-80	-8	-1	1	1	1	1	1	0	0	-4	-6	-9	-2
1980-81	-8	-1	1	1	1	1	1	0	0	-3	-6	-8	-2
1981-82	-7	-1	1	1	1	1	0	0	0	-3	-5	-7	-1
1982-83	-6	-1	1	1	1	0	0	0	0	-2	-4	-6	-1
1983-84	-5	-1	1	1	0	0	0	0	0	-2	-4	-5	-1
1984-85	-4	-1	1	0	0	0	0	0	0	-2	-3	-4	-1
1985-86	-3	0	0	0	0	0	0	0	0	-1	-2	-3	-1
1986-87	-3	0	0	0	0	0	0	0	0	-1	-1	-2	0
1987-88	-2	0	0	0	0	0	0	0	0	0	-1	-1	0
1988-89	-1	0	0	0	0	0	0	0	0	0	0	0	0
1989-90	0	0											
MEAN	-10	-1	1	1	1	1	1	1	1	-5	-8	-12	-3

CTR3D9

FLATHEAD IRRIGATION DISTRICT

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
												-1015	
1927-28													-177
1928-29	-543	-63	93	107	81	69	64	58	23	-334	-674	-975	-170
1929-30	-522	-62	88	102	76	66	60	55	21	-321	-647	-936	-164
1930-31	-502	-61	83	96	72	62	57	52	20	-309	-620	-896	-157
1931-32	-482	-60	78	90	68	58	54	49	18	-296	-593	-856	-152
1932-33	-461	-59	73	85	64	55	50	46	16	-283	-566	-817	-145
1933-34	-441	-58	68	79	60	51	47	43	15	-270	-539	-777	-139
1934-35	-421	-57	62	74	55	47	44	40	13	-257	-512	-738	-132
1935-36	-400	-56	57	68	51	44	40	37	11	-245	-485	-698	-127
1936-37	-380	-55	52	62	47	40	37	34	9	-232	-458	-659	-120
1937-38	-360	-54	47	57	43	37	34	31	8	-219	-431	-619	-114
1938-39	-339	-53	42	51	38	33	30	27	6	-206	-404	-579	-107
1939-40	-319	-52	37	46	34	29	27	24	4	-193	-377	-540	-102
1940-41	-299	-51	32	40	30	26	24	21	3	-180	-350	-500	-95
1941-42	-278	-50	26	34	26	22	20	18	1	-168	-324	-461	-89
1942-43	-258	-49	21	29	22	19	17	15	-1	-155	-297	-421	-83
1943-44	-238	-48	16	23	17	15	14	12	-3	-142	-270	-381	-77
1944-45	-217	-47	11	17	13	11	10	9	-4	-129	-243	-342	-70
1945-46	-197	-46	6	12	9	8	7	6	-6	-116	-216	-302	-64
1946-47	-177	-45	1	6	5	4	4	3	-8	-103	-189	-263	-58
1947-48	-156	-44	-4	1	0	0	0	0	-9	-91	-162	-223	-52
1948-49	-136	-43	-10	-5	-4	-3	-3	-3	-11	-78	-135	-184	-45
1949-50	-116	-42	-15	-11	-8	-7	-6	-6	-13	-65	-108	-144	-43
1950-51	-95	-41	-20	-16	-12	-10	-10	-9	-13	-59	-96	-128	-39
1951-52	-86	-40	-21	-17	-13	-11	-10	-9	-13	-53	-85	-112	-36
1952-53	-78	-38	-22	-19	-14	-12	-11	-10	-13	-48	-74	-95	-33
1953-54	-69	-37	-23	-20	-15	-13	-12	-11	-14	-42	-62	-79	-30
1954-55	-60	-35	-24	-21	-16	-14	-13	-12	-14	-36	-51	-63	-27
1955-56	-51	-34	-25	-23	-17	-15	-14	-12	-14	-31	-40	-47	-24
1956-57	-42	-33	-26	-24	-18	-16	-14	-13	-14	-25	-29	-30	-21
1957-58	-33	-31	-27	-25	-19	-16	-15	-14	-14	-19	-17	-14	-17
1958-59	-24	-30	-28	-27	-20	-17	-16	-14	-15	-13	-6	2	-14
1959-60	-15	-28	-30	-28	-21	-18	-17	-15	-15	-8	5	18	-11
1960-61	-6	-27	-31	-29	-22	-19	-18	-16	-15	-2	17	34	-8
1961-62	3	-26	-32	-31	-23	-20	-18	-17	-15	4	28	51	-5
1962-63	11	-24	-33	-32	-24	-21	-19	-17	-15	10	39	67	-2
1963-64	20	-23	34	-33	-25	-22	-20	-18	-16	15	51	83	2
1964-65	29	-21	-35	-35	-26	-22	-21	-19	-16	21	62	99	5
1965-66	38	-20	-36	-36	-27	-23	-21	-19	-16	27	73	115	6
1966-67	47	-19	-37	-37	-28	-24	-22	-20	-15	28	75	118	7
1967-68	49	-17	-36	-36	-27	-23	-21	-19	-14	30	77	120	9
1968-69	51	-15	-34	-34	-26	-22	-21	-19	-13	32	79	122	10
1969-70	53	-13	-32	-33	-25	-21	-20	-18	-13	33	81	124	12
1970-71	56	-11	-31	-32	-24	-20	-19	-17	-12	35	83	126	13
1971-72	58	-9	-29	-30	-23	-19	-18	-16	-11	36	85	129	14
1972-73	60	-7	-28	-29	-22	-19	-17	-15	-10	38	87	131	16
1973-74	62	-6	-26	-27	-21	-18	-16	-15	-9	40	89	133	17
1974-75	64	-4	-25	-26	-19	-17	-15	-14	-9	41	91	135	19
1975-76	66	-2	-23	-24	-18	-16	-15	-13	-8	43	93	138	20
1976-77	69	0	-21	-23	-17	-15	-14	-12	-7	44	95	140	22
1977-78	71	2	-20	-22	-16	-14	-13	-12	-6	46	97	142	23
1978-79	73	4	-18	-20	-15	-13	-12	-11	-5	48	99	144	24
1979-80	75	5	-17	-19	-14	-12	-11	-10	-4	49	101	146	12
1980-81	77	7	-15	-17	-13	-11	-10	-9	-1	24	47	68	11
1981-82	37	5	-5	-6	-5	-4	-4	-3	-1	20	41	59	9
1982-83	32	4	-5	-6	-4	-4	-3	-3	-1	17	34	49	8
1983-84	27	4	-4	-5	-3	-3	-3	-2	-1	14	28	40	6
1984-85	22	3	-3	-4	-3	-2	-2	-2	0	11	21	30	4
1985-86	17	2	-2	-3	-2	-2	-2	-1	0	7	15	21	2
1986-87	12	2	-1	-2	-1	-1	-1	-1	0	4	8	12	1
1987-88	7	1	-1	-1	-1	-1	-1	0	0	1	2	2	0
1988-89	1	0	0	0	0	0	0	0	0	0	0	0	0
1989-90	0	0											
MEAN	-107	-27	0	3	3	2	2	2	-4	-66	-121	-182	-41

UPPER FLATHEAD

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												-365	
1928-29	-194	-20	36	41	31	26	24	22	10	-123	-251	-363	-64
1929-30	-193	-20	36	41	30	26	24	22	10	-123	-249	-362	-64
1930-31	-192	-20	35	40	30	26	24	22	10	-122	-248	-360	-64
1931-32	-191	-20	35	40	30	26	24	22	10	-122	-247	-358	-63
1932-33	-191	-20	35	40	30	26	24	21	10	-121	-246	-357	-63
1933-34	-190	-20	35	40	30	26	24	21	10	-121	-245	-355	-63
1934-35	-189	-20	35	39	30	25	23	21	10	-120	-244	-353	-63
1935-36	-188	-20	34	39	29	25	23	21	9	-119	-243	-352	-62
1936-37	-187	-20	34	39	29	25	23	21	9	-119	-242	-350	-62
1937-38	-186	-20	34	39	29	25	23	21	9	-118	-240	-349	-62
1938-39	-185	-20	34	38	29	25	23	21	9	-118	-239	-347	-62
1939-40	-185	-20	33	38	29	25	23	21	9	-117	-238	-345	-61
1940-41	-184	-20	33	38	29	24	23	20	9	-117	-237	-344	-61
1941-42	-183	-20	33	38	28	24	22	20	9	-116	-236	-342	-61
1942-43	-182	-20	33	37	28	24	22	20	9	-116	-235	-340	-61
1943-44	-181	-20	33	37	28	24	22	20	9	-115	-234	-339	-60
1944-45	-180	-20	32	37	28	24	22	20	9	-115	-233	-337	-60
1945-46	-180	-20	32	37	28	24	22	20	9	-114	-231	-335	-60
1946-47	-179	-20	32	37	27	24	22	20	9	-114	-230	-334	-60
1947-48	-178	-20	32	36	27	23	22	20	9	-113	-229	-332	-59
1948-49	-177	-20	32	36	27	23	21	19	9	-113	-228	-330	-59
1949-50	-176	-20	31	36	27	23	21	19	8	-112	-227	-329	-59
1950-51	-175	-19	31	36	27	23	21	19	8	-107	-217	-314	-56
1951-52	-168	-19	30	34	25	22	20	18	8	-102	-207	-300	-53
1952-53	-160	-18	28	32	24	21	19	17	7	-97	-197	-285	-51
1953-54	-152	-17	26	30	23	20	18	16	7	-93	-187	-271	-48
1954-55	-145	-17	25	29	22	18	17	15	6	-88	-177	-256	-46
1955-56	-137	-16	23	27	20	17	16	14	6	-83	-167	-242	-43
1956-57	-130	-15	22	25	19	16	15	13	5	-78	-157	-227	-41
1957-58	-122	-15	20	23	18	15	14	13	5	-73	-147	-213	-38
1958-59	-114	-14	19	22	16	14	13	12	4	-68	-137	-198	-36
1959-60	-107	-13	17	20	15	13	12	11	4	-64	-127	-184	-33
1960-61	-99	-13	15	18	14	12	11	10	3	-59	-117	-169	-31
1961-62	-91	-12	14	16	12	10	10	9	3	-54	-107	-155	-28
1962-63	-84	-11	12	15	11	9	9	8	2	-49	-97	-140	-26
1963-64	-76	-11	11	13	10	8	8	7	2	-44	-87	-126	-23
1964-65	-68	-10	9	11	8	7	7	6	1	-39	-77	-111	-21
1965-66	-61	-9	8	9	7	6	5	5	1	-34	-67	-97	-19
1966-67	-53	-9	6	7	6	5	4	4	1	-32	-62	-89	-18
1967-68	-49	-8	6	7	5	4	4	4	1	-29	-57	-82	-16
1968-69	-45	-7	5	6	5	4	4	3	1	-27	-52	-74	-15
1969-70	-41	-7	5	6	4	4	3	3	1	-24	-47	-67	-13
1970-71	-37	-6	4	5	4	3	3	3	1	-21	-42	-60	-12
1971-72	-33	-6	4	5	3	3	3	2	0	-19	-37	-52	-10
1972-73	-29	-5	3	4	3	3	2	2	0	-16	-31	-45	-9
1973-74	-25	-4	3	3	3	2	2	2	0	-13	-26	-38	-7
1974-75	-21	-4	2	3	2	2	2	1	0	-11	-21	-30	-6
1975-76	-17	-3	2	2	2	1	1	1	0	-8	-16	-23	-4
1976-77	-13	-2	1	2	1	1	1	1	0	-6	-11	-16	-3
1977-78	-9	-2	1	1	1	1	1	1	0	-3	-6	-8	-2
1978-79	-5	-1	0	0	0	0	0	0	0	0	-1	-1	0
1979-80	-1	0	0	0	0	0	0	0	0	2	4	6	1
1980-81	3	0	-1	-1	-1	0	0	0	0	1	2	3	0
1981-82	2	0	0	0	0	0	0	0	0	1	2	3	0
1982-83	1	0	0	0	0	0	0	0	0	1	2	2	0
1983-84	1	0	0	0	0	0	0	0	0	1	1	2	0
1984-85	1	0	0	0	0	0	0	0	0	0	1	1	0
1985-86	1	0	0	0	0	0	0	0	0	0	1	1	0
1986-87	1	0	0	0	0	0	0	0	0	0	0	1	0
1987-88	0	0	0	0	0	0	0	0	0	0	0	0	0
1988-89	0	0	0	0	0	0	0	0	0	0	0	0	0
1989-90	0	0											
MEAN	-102	-12	18	20	15	13	12	11	5	-64	-130	-191	-34

FLT3D9

UPPER CLARK FORK

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												-257	
1928-29	-111	0	0	0	0	0	0	0	-1	-28	-137	-254	-45
1929-30	-110	0	0	0	0	0	0	0	-1	-28	-136	-251	-44
1930-31	-109	-1	-1	0	0	0	0	0	-1	-28	-134	-248	-44
1931-32	-108	-1	-1	-1	-1	0	0	0	-1	-28	-133	-245	-44
1932-33	-107	-2	-1	-1	-1	-1	-1	-1	-1	-28	-131	-241	-43
1933-34	-106	-2	-2	-1	-1	-1	-1	-1	-1	-28	-129	-238	-43
1934-35	-105	-3	-2	-1	-1	-1	-1	-1	-2	-28	-128	-235	-43
1935-36	-103	-3	-2	-2	-1	-1	-1	-1	-2	-28	-126	-232	-42
1936-37	-102	-4	-3	-2	-2	-1	-1	-1	-2	-27	-125	-229	-42
1937-38	-101	-4	-3	-2	-2	-1	-1	-1	-2	-27	-123	-226	-42
1938-39	-100	-4	-3	-2	-2	-2	-1	-1	-2	-27	-121	-222	-41
1939-40	-99	-5	-4	-3	-2	-2	-2	-1	-2	-27	-120	-219	-41
1940-41	-98	-5	-4	-3	-2	-2	-2	-2	-2	-27	-118	-216	-41
1941-42	-97	-6	-4	-3	-3	-2	-2	-2	-2	-27	-117	-213	-40
1942-43	-96	-6	-5	-3	-3	-2	-2	-2	-3	-27	-115	-210	-40
1943-44	-95	-7	-5	-4	-3	-2	-2	-2	-3	-27	-113	-207	-39
1944-45	-94	-7	-5	-4	-3	-3	-2	-2	-3	-27	-112	-203	-39
1945-46	-93	-8	-6	-4	-3	-3	-2	-2	-3	-27	-110	-200	-39
1946-47	-92	-8	-6	-4	-4	-3	-3	-2	-3	-26	-109	-197	-38
1947-48	-91	-8	-6	-5	-4	-3	-3	-3	-3	-26	-107	-194	-38
1948-49	-90	-9	-7	-5	-4	-3	-3	-3	-3	-26	-105	-191	-38
1949-50	-89	-9	-7	-5	-4	-3	-3	-3	-3	-26	-104	-188	-37
1950-51	-88	-10	-7	-5	-4	-4	-3	-3	-3	-26	-105	-190	-38
1951-52	-88	-9	-7	-5	-4	-3	-3	-3	-3	-26	-106	-193	-38
1952-53	-89	-8	-6	-4	-4	-3	-3	-2	-3	-26	-108	-196	-38
1953-54	-90	-8	-6	-4	-3	-3	-2	-2	-3	-26	-109	-199	-38
1954-55	-90	-7	-5	-4	-3	-3	-2	-2	-2	-26	-110	-202	-38
1955-56	-91	-6	-5	-3	-3	-2	-2	-2	-2	-26	-112	-204	-38
1956-57	-92	-5	-4	-3	-2	-2	-2	-2	-2	-25	-113	-207	-39
1957-58	-92	-5	-3	-2	-2	-2	-1	-1	-2	-25	-114	-210	-39
1958-59	-93	-4	-3	-2	-2	-1	-1	-1	-1	-25	-116	-213	-39
1959-60	-94	-3	-2	-2	-1	-1	-1	-1	-1	-25	-117	-216	-39
1960-61	-95	-2	-2	-1	-1	-1	-1	-1	-1	-25	-118	-218	-39
1961-62	-95	-2	-1	-1	-1	-1	-1	0	-1	-25	-120	-221	-39
1962-63	-96	-1	-1	0	0	0	0	0	-1	-25	-121	-224	-40
1963-64	-97	0	0	0	0	0	0	0	0	-25	-122	-227	-40
1964-65	-97	1	1	0	0	0	0	0	0	-24	-124	-230	-40
1965-66	-98	1	1	1	1	1	0	0	0	-24	-125	-233	-40
1966-67	-99	2	2	1	1	1	1	1	1	-24	-129	-242	-41
1967-68	-101	6	4	3	2	2	2	2	2	-23	-134	-252	-41
1968-69	-102	9	7	5	4	3	3	3	3	-22	-138	-261	-41
1969-70	-104	12	9	6	5	4	4	4	4	-21	-143	-271	-41
1970-71	-106	15	11	8	7	6	5	5	5	-20	-147	-281	-42
1971-72	-108	19	14	10	8	7	6	6	6	-20	-151	-290	-42
1972-73	-110	22	16	12	10	8	7	7	7	-19	-156	-300	-42
1973-74	-112	25	19	14	11	9	8	7	8	-18	-160	-310	-42
1974-75	-114	28	21	15	13	11	9	8	9	-17	-165	-319	-42
1975-76	-115	32	24	17	14	12	10	9	10	-17	-169	-329	-42
1976-77	-117	35	26	19	16	13	12	10	11	-16	-173	-339	-43
1977-78	-119	38	28	21	17	14	13	11	12	-15	-178	-348	-43
1978-79	-121	41	31	22	19	15	14	12	13	-14	-182	-358	-43
1979-80	-123	45	33	24	20	17	15	13	14	-13	-187	-368	-43
1980-81	-125	48	36	26	21	18	16	14	0	-3	-19	-37	-1
1981-82	-15	1	1	1	1	1	0	0	0	-3	-15	-28	-5
1982-83	-12	1	1	0	0	0	0	0	0	-2	-10	-19	-3
1983-84	-8	0	0	0	0	0	0	0	0	-2	-6	-11	-2
1984-85	-5	-1	-1	0	0	0	0	0	0	-1	-2	-2	-1
1985-86	-2	-2	-1	-1	-1	-1	-1	0	-1	-1	3	6	0
1986-87	1	-2	-2	-1	-1	-1	-1	-1	-1	0	7	15	1
1987-88	4	-3	-2	-2	-1	-1	-1	-1	-1	0	12	24	2
1988-89	8	-4	-3	-2	-2	-1	-1	-1	0	0	0	0	-1
1989-90	0	0											
MEAN	-87	3	2	2	1	1	1	1	0	-21	-110	-207	-35

UCF3D9

BITTERROOT

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												598	
1928-29	160	-140	-104	-75	-63	-52	-46	-42	-41	-13	288	598	40
1929-30	160	-140	-104	-75	-63	-52	-46	-42	-41	-13	288	598	40
1930-31	160	-140	-104	-75	-63	-52	-46	-42	-41	-13	288	598	40
1931-32	160	-140	-104	-75	-63	-52	-46	-42	-41	-13	288	598	40
1932-33	160	-140	-104	-75	-63	-52	-46	-42	-41	-13	288	598	40
1933-34	160	-140	-104	-75	-63	-52	-46	-42	-41	-13	288	598	40
1934-35	160	-140	-104	-75	-63	-52	-46	-42	-41	-13	288	598	40
1935-36	160	-140	-104	-75	-63	-52	-46	-42	-41	-13	288	598	40
1936-37	160	-140	-104	-75	-63	-52	-46	-42	-41	-13	288	598	40
1937-38	160	-140	-104	-75	-63	-52	-46	-42	-41	-13	288	598	40
1938-39	160	-140	-104	-75	-63	-52	-46	-42	-41	-13	288	598	40
1939-40	160	-140	-104	-75	-63	-52	-46	-42	-41	-13	288	598	40
1940-41	160	-140	-104	-75	-63	-52	-46	-42	-41	-13	288	598	40
1941-42	160	-140	-104	-75	-63	-52	-46	-42	-41	-13	288	598	40
1942-43	160	-140	-104	-75	-63	-52	-46	-42	-41	-13	288	598	40
1943-44	160	-140	-104	-75	-63	-52	-46	-42	-41	-13	288	598	40
1944-45	160	-140	-104	-75	-63	-52	-46	-42	-41	-13	288	598	40
1945-46	160	-140	-104	-75	-63	-52	-46	-42	-41	-13	288	598	40
1946-47	160	-140	-104	-75	-63	-52	-46	-42	-41	-13	288	598	40
1947-48	160	-140	-104	-75	-63	-52	-46	-42	-41	-13	288	598	40
1948-49	160	-140	-104	-75	-63	-52	-46	-42	-41	-13	288	598	40
1949-50	160	-140	-104	-75	-63	-52	-46	-42	-41	-13	288	598	40
1950-51	160	-140	-104	-75	-63	-52	-46	-42	-40	-12	282	584	39
1951-52	157	-136	-101	-73	-61	-51	-45	-40	-39	-11	275	570	38
1952-53	153	-132	-98	-71	-59	-49	-43	-39	-37	-11	269	555	38
1953-54	150	-127	-95	-69	-57	-47	-42	-38	-36	-10	262	541	37
1954-55	147	-123	-92	-66	-55	-46	-41	-37	-35	-9	255	527	36
1955-56	144	-119	-88	-64	-53	-44	-39	-35	-34	-8	249	513	36
1956-57	141	-115	-85	-62	-51	-43	-38	-34	-32	-7	242	498	35
1957-58	138	-110	-82	-59	-49	-41	-36	-33	-31	-6	235	484	35
1958-59	135	-106	-79	-57	-47	-39	-35	-32	-30	-6	229	470	34
1959-60	131	-102	-76	-55	-45	-38	-34	-30	-29	-5	222	456	34
1960-61	128	-97	-73	-52	-44	-36	-32	-29	-27	-4	215	441	33
1961-62	125	-93	-69	-50	-42	-35	-31	-28	-26	-3	209	427	33
1962-63	122	-89	-66	-48	-40	-33	-29	-26	-25	-2	202	413	32
1963-64	119	-85	-63	-46	-38	-32	-28	-25	-23	-1	195	399	32
1964-65	116	-80	-60	-43	-36	-30	-26	-24	-22	-1	189	384	31
1965-66	112	-76	-57	-41	-34	-28	-25	-23	-21	0	182	370	31
1966-67	109	-72	-53	-39	-32	-27	-24	-21	-20	1	182	368	32
1967-68	110	-70	-52	-37	-31	-26	-23	-21	-20	3	182	367	32
1968-69	111	-67	-50	-36	-30	-25	-22	-20	-19	4	181	365	33
1969-70	112	-65	-48	-35	-29	-24	-21	-19	-18	5	181	364	34
1970-71	113	-63	-47	-34	-28	-23	-21	-19	-17	6	181	362	35
1971-72	114	-60	-45	-32	-27	-22	-20	-18	-17	7	180	361	36
1972-73	115	-58	-43	-31	-26	-22	-19	-17	-16	8	180	359	36
1973-74	116	-56	-41	-30	-25	-21	-18	-17	-15	9	180	357	37
1974-75	117	-53	-40	-29	-24	-20	-18	-16	-15	10	180	356	38
1975-76	118	-51	-38	-27	-23	-19	-17	-15	-14	12	179	354	39
1976-77	119	-49	-36	-26	-22	-18	-16	-14	-13	13	179	353	40
1977-78	120	-46	-35	-25	-21	-17	-15	-14	-13	14	179	351	40
1978-79	120	-44	-33	-24	-20	-16	-15	-13	-12	15	178	349	41
1979-80	121	-42	-31	-22	-19	-16	-14	-12	-11	16	178	348	42
1980-81	122	-39	-29	-21	-18	-15	-13	-12	-3	9	75	144	17
1981-82	54	-12	-9	-6	-5	-4	-4	-3	-3	8	65	124	17
1982-83	47	-10	-7	-5	-4	-4	-3	-3	-2	7	54	104	15
1983-84	39	-8	-6	-4	-4	-3	-3	-2	-2	6	44	83	12
1984-85	32	-6	-5	-3	-3	-2	-2	-2	-1	4	33	63	9
1985-86	24	-5	-3	-2	-2	-2	-1	-1	-1	3	22	43	6
1986-87	17	-3	-2	-1	-1	-1	-1	-1	0	2	12	22	4
1987-88	9	-1	-1	-1	0	0	0	0	0	1	1	2	1
1988-89	1	1	1	0	0	0	0	0	0	0	0	0	0
1989-90	0	0											
MEAN	123	-92	-69	-50	-42	-35	-31	-28	-27	-4	211	435	33

BIT3D9

LOWER CLARK FORK

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												-17	
1928-29	-18	-15	-10	-6	-4	-2	-1	0	0	-5	-13	-14	-7
1929-30	-17	-14	-10	-7	-4	-2	-1	0	0	-4	-11	-12	-7
1930-31	-15	-14	-11	-7	-4	-2	-1	0	0	-3	-9	-8	-6
1931-32	-14	-14	-11	-7	-4	-2	-1	0	1	-2	-8	-7	-6
1932-33	-12	-13	-11	-8	-4	-2	-1	0	1	-1	-6	-4	-5
1933-34	-11	-13	-12	-8	-5	-2	-1	0	1	0	-4	-2	-5
1934-35	-9	-12	-12	-8	-5	-2	-1	0	1	1	-3	1	-4
1935-36	-8	-12	-13	-9	-5	-2	-1	0	1	2	-1	3	-4
1936-37	-6	-12	-13	-9	-5	-3	-1	0	1	3	0	6	-3
1937-38	-5	-11	-13	-10	-5	-3	-1	0	2	4	2	8	-3
1938-39	-3	-11	-14	-10	-5	-3	-2	0	2	5	4	11	-2
1939-40	-2	-10	-14	-10	-6	-3	-2	0	2	6	5	13	-2
1940-41	0	-10	-15	-11	-6	-3	-2	0	2	7	7	16	-1
1941-42	1	-10	-15	-11	-6	-3	-2	0	2	8	9	18	-1
1942-43	3	-9	-15	-11	-6	-3	-2	0	2	8	10	21	0
1943-44	4	-9	-16	-12	-6	-3	-2	0	2	9	12	23	0
1944-45	6	-8	-16	-12	-7	-3	-2	0	3	10	13	26	1
1945-46	7	-8	-17	-12	-7	-3	-2	0	3	11	15	28	1
1946-47	9	-8	-17	-13	-7	-4	-2	0	3	12	17	31	2
1947-48	10	-7	-18	-13	-7	-4	-2	0	3	13	18	33	2
1948-49	12	-7	-18	-13	-7	-4	-2	0	3	14	20	36	3
1949-50	13	-6	-18	-14	-8	-4	-2	0	3	15	22	38	3
1950-51	15	-6	-19	-14	-8	-4	-2	0	4	17	25	42	4
1951-52	18	-5	-19	-14	-8	-4	-2	0	4	18	27	47	5
1952-53	20	-4	-19	-15	-8	-4	-2	0	4	20	30	51	6
1953-54	23	-3	-20	-15	-8	-4	-2	0	4	21	33	55	7
1954-55	26	-1	-20	-15	-8	-4	-2	0	5	23	36	60	8
1955-56	29	0	-20	-16	-9	-4	-2	0	5	25	39	64	9
1956-57	32	1	-20	-16	-9	-4	-2	0	5	26	42	68	10
1957-58	35	2	-21	-16	-9	-4	-2	0	5	28	45	73	11
1958-59	38	3	-21	-16	-9	-5	-3	0	5	29	48	77	12
1959-60	41	4	-21	-17	-9	-5	-3	0	6	31	51	81	13
1960-61	44	5	-21	-17	-9	-5	-3	0	6	33	54	86	15
1961-62	47	7	-22	-17	-10	-5	-3	0	6	34	57	90	16
1962-63	49	8	-22	-18	-10	-5	-3	0	6	36	60	94	17
1963-64	52	9	-22	-18	-10	-5	-3	0	7	37	63	99	18
1964-65	55	10	-22	-18	-10	-5	-3	0	7	39	66	103	19
1965-66	58	11	-23	-18	-10	-5	-3	0	7	41	69	107	20
1966-67	61	12	-23	-19	-10	-5	-3	0	7	41	69	108	20
1967-68	62	13	-22	-18	-10	-5	-3	0	7	41	70	108	20
1968-69	63	14	-21	-18	-10	-5	-3	0	7	41	71	109	21
1969-70	64	15	-20	-17	-9	-5	-3	0	7	41	71	110	21
1970-71	65	16	-20	-17	-9	-5	-3	0	7	41	72	110	22
1971-72	66	17	-19	-16	-9	-4	-2	0	7	41	72	111	22
1972-73	66	18	-18	-16	-9	-4	-2	0	7	42	73	111	23
1973-74	67	19	-17	-15	-8	-4	-2	0	7	42	74	112	23
1974-75	68	20	-17	-15	-8	-4	-2	0	7	42	74	112	23
1975-76	69	21	-16	-14	-8	-4	-2	0	7	42	75	113	24
1976-77	70	22	-15	-13	-7	-4	-2	0	7	42	75	113	24
1977-78	71	23	-14	-13	-7	-4	-2	0	7	42	76	114	25
1978-79	72	23	-14	-12	-7	-3	-2	0	7	43	77	115	25
1979-80	73	24	-13	-12	-7	-3	-2	0	7	43	77	115	25
1980-81	74	25	-12	-11	-6	-3	-2	0	3	24	44	64	17
1981-82	43	16	-4	-5	-3	-1	-1	0	3	21	38	55	14
1982-83	37	14	-4	-4	-2	-1	-1	0	3	17	32	47	12
1983-84	31	12	-3	-3	-2	-1	-1	0	2	14	26	38	10
1984-85	26	10	-2	-3	-1	-1	0	0	2	11	20	30	8
1985-86	20	8	-2	-2	-1	-1	0	0	1	8	15	21	6
1986-87	14	6	-1	-1	-1	0	0	0	1	5	9	13	4
1987-88	9	4	-1	-1	0	0	0	0	0	2	3	4	2
1988-89	3	1	0	0	0	0	0	0	0	0	0	0	0
1989-90	0	0											
MEAN	28	3	-15	-12	-7	-3	-2	0	4	21	34	53	9

POND O'REILLE

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												-33	
1928-29	-23	-1	1	1	1	1	1	1	0	-12	-22	-32	-7
1929-30	-22	-1	1	1	1	1	0	0	0	-11	-21	-31	-7
1930-31	-22	-1	1	1	0	0	0	0	0	-11	-21	-30	-7
1931-32	-21	-2	0	0	0	0	0	0	0	-11	-20	-28	-7
1932-33	-20	-2	0	0	0	0	0	0	0	-10	-19	-27	-7
1933-34	-20	-2	0	0	0	0	0	0	0	-10	-18	-26	-6
1934-35	-19	-2	0	0	0	0	0	0	0	-9	-18	-25	-6
1935-36	-18	-2	0	0	0	0	0	0	0	-9	-17	-24	-6
1936-37	-17	-2	0	0	0	0	0	0	0	-9	-16	-23	-6
1937-38	-17	-2	-1	-1	0	0	0	0	-1	-8	-15	-22	-6
1938-39	-16	-2	-1	-1	-1	-1	-1	0	-1	-8	-14	-21	-6
1939-40	-15	-2	-1	-1	-1	-1	-1	-1	-1	-8	-14	-20	-5
1940-41	-14	-2	-1	-1	-1	-1	-1	-1	-1	-7	-13	-18	-5
1941-42	-14	-3	-1	-1	-1	-1	-1	-1	-1	-7	-12	-17	-5
1942-43	-13	-3	-2	-1	-1	-1	-1	-1	-1	-6	-11	-16	-5
1943-44	-12	-3	-2	-2	-1	-1	-1	-1	-1	-6	-11	-15	-5
1944-45	-11	-3	-2	-2	-1	-1	-1	-1	-1	-6	-10	-14	-5
1945-46	-11	-3	-2	-2	-2	-2	-1	-1	-1	-5	-9	-13	-4
1946-47	-10	-3	-2	-2	-2	-2	-1	-1	-1	-5	-8	-12	-4
1947-48	-9	-3	-2	-2	-2	-2	-1	-1	-2	-5	-8	-11	-4
1948-49	-9	-3	-3	-2	-2	-2	-2	-1	-2	-4	-7	-10	-4
1949-50	-8	-3	-3	-3	-2	-2	-2	-2	-2	-4	-6	-8	-4
1950-51	-7	-3	-3	-3	-2	-2	-2	-2	-2	-4	-6	-8	-4
1951-52	-7	-3	-3	-3	-2	-2	-2	-1	-1	-3	-6	-8	-3
1952-53	-7	-3	-2	-2	-2	-2	-1	-1	-1	-3	-5	-8	-3
1953-54	-6	-3	-2	-2	-2	-2	-1	-1	-1	-3	-5	-7	-3
1954-55	-6	-2	-2	-2	-1	-1	-1	-1	-1	-3	-5	-7	-3
1955-56	-6	-2	-2	-2	-1	-1	-1	-1	-1	-3	-5	-7	-3
1956-57	-5	-2	-1	-1	-1	-1	-1	-1	-1	-3	-5	-7	-2
1957-58	-5	-2	-1	-1	-1	-1	-1	-1	-1	-3	-5	-6	-2
1958-59	-5	-1	-1	-1	-1	-1	-1	-1	0	-2	-4	-6	-2
1959-60	-5	-1	-1	-1	0	0	0	0	0	-2	-4	-6	-2
1960-61	-4	-1	0	0	0	0	0	0	0	-2	-4	-6	-2
1961-62	-4	-1	0	0	0	0	0	0	0	-2	-4	-5	-1
1962-63	-4	0	0	0	0	0	0	0	0	-2	-4	-5	-1
1963-64	-4	0	0	0	0	0	0	0	0	-2	-3	-5	-1
1964-65	-3	0	1	1	0	0	0	0	0	-2	-3	-5	-1
1965-66	-3	1	1	1	1	1	1	0	1	-1	-3	-4	-1
1966-67	-3	1	1	1	1	1	1	1	1	-1	-3	-4	0
1967-68	-2	1	1	1	1	1	1	1	1	-1	-3	-4	0
1968-69	-2	1	1	1	1	1	1	1	1	-1	-2	-3	0
1969-70	-2	1	2	1	1	1	1	1	1	-1	-2	-3	0
1970-71	-1	1	2	2	1	1	1	1	1	-1	-2	-2	0
1971-72	-1	2	2	2	1	1	1	1	1	0	-1	-2	0
1972-73	-1	2	2	2	1	1	1	1	1	0	-1	-2	1
1973-74	-1	2	2	2	2	2	1	1	1	0	-1	-1	1
1974-75	0	2	2	2	2	2	1	1	1	0	-1	-1	1
1975-76	0	2	2	2	2	2	1	1	1	0	0	-1	1
1976-77	0	2	2	2	2	2	1	1	1	0	0	0	1
1977-78	1	3	3	2	2	2	2	1	2	1	0	0	1
1978-79	1	3	3	3	2	2	2	2	2	1	0	1	2
1979-80	1	3	3	3	2	2	2	2	2	1	1	1	2
1980-81	2	3	3	3	2	2	2	2	-2	13	25	36	8
1981-82	25	-1	-3	-3	-2	-2	-2	-2	-1	11	22	32	6
1982-83	22	-1	-3	-3	-2	-2	-2	-1	-1	10	20	28	6
1983-84	19	0	-2	-2	-2	-2	-1	-1	-1	9	17	24	5
1984-85	16	0	-2	-2	-2	-2	-1	-1	-1	7	14	20	4
1985-86	14	0	-2	-2	-1	-1	-1	-1	-1	6	11	16	3
1986-87	11	0	-2	-1	-1	-1	-1	-1	-1	4	8	12	2
1987-88	8	0	-1	-1	-1	-1	-1	-1	0	3	6	8	2
1988-89	5	0	-1	-1	-1	-1	-1	-1	0	0	0	0	0
1989-90	0	0											
MEAN	-5	-1	0	0	0	0	0	0	0	-2	-4	-7	-2

PEN3D9

PEND D'OREILLE IN CANADA

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												-8	
1928-29	-5	0	1	1	1	1	0	0	0	-3	-5	-8	-1
1929-30	-5	0	1	1	0	0	0	0	0	-3	-5	-8	-1
1930-31	-5	0	1	1	0	0	0	0	0	-3	-5	-7	-1
1931-32	-5	0	1	1	0	0	0	0	0	-3	-5	-7	-1
1932-33	-5	0	1	1	0	0	0	0	0	-3	-5	-7	-1
1933-34	-5	0	1	1	0	0	0	0	0	-3	-5	-7	-1
1934-35	-5	0	1	1	0	0	0	0	0	-2	-5	-7	-1
1935-36	-5	0	1	1	0	0	0	0	0	-2	-5	-7	-1
1936-37	-5	0	1	0	0	0	0	0	0	-2	-5	-7	-1
1937-38	-5	0	1	0	0	0	0	0	0	-2	-5	-6	-1
1938-39	-4	0	0	0	0	0	0	0	0	-2	-4	-6	-1
1939-40	-4	0	0	0	0	0	0	0	0	-2	-4	-6	-1
1940-41	-4	0	0	0	0	0	0	0	0	-2	-4	-6	-1
1941-42	-4	0	0	0	0	0	0	0	0	-2	-4	-6	-1
1942-43	-4	0	0	0	0	0	0	0	0	-2	-4	-6	-1
1943-44	-4	0	0	0	0	0	0	0	0	-2	-4	-6	-1
1944-45	-4	0	0	0	0	0	0	0	0	-2	-4	-6	-1
1945-46	-4	0	0	0	0	0	0	0	0	-2	-4	-5	-1
1946-47	-4	0	0	0	0	0	0	0	0	-2	-4	-5	-1
1947-48	-4	0	0	0	0	0	0	0	0	-2	-4	-5	-1
1948-49	-4	0	0	0	0	0	0	0	0	-2	-4	-5	-1
1949-50	-4	0	0	0	0	0	0	0	0	-2	-3	-5	-1
1950-51	-3	0	0	0	0	0	0	0	0	-2	-3	-5	-1
1951-52	-3	0	0	0	0	0	0	0	0	-2	-3	-5	-1
1952-53	-3	0	0	0	0	0	0	0	0	-2	-3	-5	-1
1953-54	-3	0	0	0	0	0	0	0	0	-2	-3	-5	-1
1954-55	-3	0	0	0	0	0	0	0	0	-2	-3	-4	-1
1955-56	-3	0	0	0	0	0	0	0	0	-2	-3	-4	-1
1956-57	-3	0	0	0	0	0	0	0	0	-2	-3	-4	-1
1957-58	-3	0	0	0	0	0	0	0	0	-1	-3	-4	-1
1958-59	-3	0	0	0	0	0	0	0	0	-1	-3	-4	-1
1959-60	-3	0	0	0	0	0	0	0	0	-1	-3	-4	-1
1960-61	-3	0	0	0	0	0	0	0	0	-1	-3	-4	-1
1961-62	-3	0	0	0	0	0	0	0	0	-1	-3	-4	-1
1962-63	-3	0	0	0	0	0	0	0	0	-1	-2	-4	-1
1963-64	-2	0	0	0	0	0	0	0	0	-1	-2	-3	-1
1964-65	-2	0	0	0	0	0	0	0	0	-1	-2	-3	-1
1965-66	-2	0	0	0	0	0	0	0	0	-1	-2	-3	-1
1966-67	-2	0	0	0	0	0	0	0	0	-1	-2	-3	-1
1967-68	-2	0	0	0	0	0	0	0	0	-1	-2	-2	0
1968-69	-2	0	0	0	0	0	0	0	0	-1	-1	-2	0
1969-70	-1	0	0	0	0	0	0	0	0	-1	-1	-2	0
1970-71	-1	0	0	0	0	0	0	0	0	0	-1	-1	0
1971-72	-1	0	0	0	0	0	0	0	0	0	0	-1	0
1972-73	0	0	0	0	0	0	0	0	0	0	0	0	0
1973-74	0	0	0	0	0	0	0	0	0	0	0	0	0
1974-75	0	0	0	0	0	0	0	0	0	0	0	1	0
1975-76	0	0	0	0	0	0	0	0	0	0	1	1	0
1976-77	1	0	0	0	0	0	0	0	0	0	1	1	0
1977-78	1	0	0	0	0	0	0	0	0	1	1	2	0
1978-79	1	0	0	0	0	0	0	0	0	1	2	2	0
1979-80	2	0	0	0	0	0	0	0	0	1	2	3	0
1980-81	2	0	0	0	0	0	0	0	0	0	0	0	0
1981-82	0	0	0	0	0	0	0	0	0	0	0	0	0
1982-83	0	0	0	0	0	0	0	0	0	0	0	0	0
1983-84	0	0	0	0	0	0	0	0	0	0	0	0	0
1984-85	0	0	0	0	0	0	0	0	0	0	0	0	0
1985-86	0	0	0	0	0	0	0	0	0	0	0	0	0
1986-87	0	0	0	0	0	0	0	0	0	0	0	0	0
1987-88	0	0	0	0	0	0	0	0	0	0	0	0	0
1988-89	0	0	0	0	0	0	0	0	0	0	0	0	0
1989-90	0	0											
MEAN	-2	0	0	0	0	0	0	0	0	-1	-2	-3	-1

POC3D9

RATHDRUM PRAIRIE CANAL

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												0	
1928-29	0	0	0	0	0	0	0	0	0	0	0	0	0
1929-30	0	0	0	0	0	0	0	0	0	0	0	0	0
1930-31	0	0	0	0	0	0	0	0	0	0	0	0	0
1931-32	0	0	0	0	0	0	0	0	0	0	0	0	0
1932-33	0	0	0	0	0	0	0	0	0	0	0	0	0
1933-34	0	0	0	0	0	0	0	0	0	0	0	0	0
1934-35	0	0	0	0	0	0	0	0	0	0	0	0	0
1935-36	0	0	0	0	0	0	0	0	0	0	0	0	0
1936-37	0	0	0	0	0	0	0	0	0	0	0	0	0
1937-38	0	0	0	0	0	0	0	0	0	0	0	0	0
1938-39	0	0	0	0	0	0	0	0	0	0	0	0	0
1939-40	0	0	0	0	0	0	0	0	0	0	0	0	0
1940-41	0	0	0	0	0	0	0	0	0	0	0	0	0
1941-42	0	0	0	0	0	0	0	0	0	0	0	0	0
1942-43	0	0	0	0	0	0	0	0	0	0	0	0	0
1943-44	0	0	0	0	0	0	0	0	0	0	0	0	0
1944-45	0	0	0	0	0	0	0	0	0	0	0	0	0
1945-46	0	0	0	0	0	0	0	0	1	6	22	39	6
1946-47	40	5	0	0	0	0	0	0	0	32	36	60	15
1947-48	55	7	0	0	0	0	0	0	0	2	6	50	10
1948-49	58	36	0	0	0	0	0	0	0	26	51	56	19
1949-50	57	26	0	0	0	0	0	0	0	16	19	55	15
1950-51	55	34	0	0	0	0	0	0	0	29	48	58	19
1951-52	56	26	0	0	0	0	0	0	0	28	37	57	17
1952-53	60	29	0	0	0	0	0	0	0	27	29	54	17
1953-54	56	43	0	0	0	0	0	0	0	33	21	52	17
1954-55	42	18	0	0	0	0	0	0	0	3	42	36	12
1955-56	54	43	0	0	0	0	0	0	0	30	25	55	18
1956-57	45	35	0	0	0	0	0	0	0	9	16	55	13
1957-58	56	28	0	0	0	0	0	0	5	27	36	53	17
1958-59	54	28	0	0	0	0	0	0	2	28	44	53	18
1959-60	50	25	0	0	0	0	0	0	1	18	46	49	16
1960-61	53	25	0	0	0	0	0	0	4	28	49	54	18
1961-62	55	41	0	0	0	0	0	0	5	30	45	53	19
1962-63	58	29	0	0	0	0	0	0	1	29	54	58	19
1963-64	58	32	0	0	0	0	0	0	1	31	44	50	18
1964-65	40	3	0	0	0	0	0	0	2	38	46	55	15
1965-66	45	16	0	0	0	0	0	0	7	39	48	50	17
1966-67	49	35	0	0	0	0	0	0	0	22	46	53	17
1967-68	54	31	1	0	0	0	0	0	3	47	50	53	20
1968-69	50	17	0	0	0	0	0	0	0	28	46	47	16
1969-70	52	32	0	0	0	0	0	0	0	37	51	54	19
1970-71	53	31	0	0	0	0	0	0	0	36	31	51	17
1971-72	51	21	0	0	0	0	0	0	0	24	40	48	15
1972-73	43	34	0	0	0	0	0	0	0	30	46	50	17
1973-74	50	32	0	0	0	0	0	0	0	9	47	44	15
1974-75	58	24	0	0	0	0	0	0	0	29	47	49	17
1975-76	34	23	3	0	0	0	0	0	0	21	39	55	15
1976-77	35	22	0	0	0	0	0	0	5	24	46	42	14
1977-78	53	22	0	0	0	0	0	0	0	16	41	38	14
1978-79	38	12	0	0	0	0	0	0	0	17	43	43	13
1979-80	36	14	0	0	0	0	0	0	0	13	23	43	11
1980-81	46	12	0	0	0	0	0	0	0	6	12	47	10
1981-82	44	23	0	0	0	0	0	0	0	24	43	34	14
1982-83	38	22	0	0	0	0	0	0	0	22	35	20	11
1983-84	32	13	0	0	0	0	0	0	0	7	33	48	11
1984-85	37	14	0	0	0	0	0	0	0	21	32	46	13
1985-86	39	13	0	0	0	0	0	0	1	19	46	41	13
1986-87	41	19	0	0	0	0	0	0	3	44	45	37	16
1987-88	37	25	0	0	0	0	0	0	0	22	37	41	14
1988-89	41	17	0	0	0	0	0	0	0	18	46	50	14
1989-90	27	26											
MEAN	34	17	0	0	0	0	0	0	1	17	28	34	11

RAT3D9

SPOKANE

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												254	
1928-29	231	208	0	0	0	0	0	0	22	162	208	209	86
1929-30	221	188	0	0	0	0	0	0	114	195	202	213	95
1930-31	234	189	0	0	0	0	0	0	87	209	239	245	99
1931-32	254	108	0	0	0	0	0	0	0	173	251	254	87
1932-33	241	221	0	0	0	0	0	0	73	214	249	221	102
1933-34	240	199	0	0	0	0	0	0	0	258	287	248	102
1934-35	239	216	0	0	0	0	0	9	69	243	279	270	111
1935-36	259	127	0	0	0	0	0	0	0	239	288	266	99
1936-37	243	111	0	0	0	0	0	0	0	152	266	266	87
1937-38	252	113	0	0	0	0	0	0	16	180	265	273	92
1938-39	264	130	11	2	0	0	0	3	84	280	274	261	108
1939-40	263	120	6	0	0	0	0	0	25	195	274	260	96
1940-41	250	118	6	3	0	0	0	2	79	227	247	258	100
1941-42	251	80	4	0	0	0	0	0	75	157	214	272	88
1942-43	269	114	8	0	0	0	0	0	33	134	243	271	90
1943-44	271	101	9	0	0	0	0	0	66	188	258	265	97
1944-45	236	113	0	0	0	0	0	0	75	194	235	260	93
1945-46	251	120	0	0	0	0	0	20	69	196	238	261	97
1946-47	251	106	0	0	0	0	0	0	4	150	286	275	90
1947-48	259	91	0	0	0	0	0	0	40	29	156	282	72
1948-49	265	93	1	1	1	1	0	0	23	182	243	268	91
1949-50	240	104	0	0	0	0	0	0	6	136	229	275	83
1950-51	270	124	5	0	0	0	0	0	0	116	252	290	89
1951-52	257	102	2	0	0	0	0	0	27	174	241	257	89
1952-53	243	104	2	0	1	1	1	0	21	158	193	272	84
1953-54	262	110	0	0	1	2	1	0	26	199	194	260	89
1954-55	227	78	1	1	0	0	0	0	18	126	262	251	81
1955-56	248	132	0	0	0	0	0	0	20	237	292	260	100
1956-57	248	99	0	0	0	0	0	0	32	157	261	269	89
1957-58	235	123	0	0	0	0	8	7	48	183	269	241	93
1958-59	237	111	0	0	0	0	0	0	56	147	214	262	86
1959-60	245	111	1	0	0	0	0	0	43	155	231	262	88
1960-61	242	113	0	0	0	0	0	0	41	177	259	259	91
1961-62	238	124	2	1	1	1	1	0	46	178	229	268	91
1962-63	242	123	0	0	0	0	0	0	47	181	270	254	94
1963-64	249	121	0	0	0	0	0	0	38	198	231	258	92
1964-65	229	107	0	0	0	0	0	0	30	207	249	230	88
1965-66	208	121	7	0	0	0	0	0	36	102	103	114	58
1966-67	115	69	0	0	0	0	0	0	0	0	0	0	15
1967-68	0	0	0	0	0	0	0	0	0	0	0	0	0
1968-69	0	0	0	0	0	0	0	0	0	0	0	0	0
1969-70	0	0	0	0	0	0	0	0	0	0	0	0	0
1970-71	0	0	0	0	0	0	0	0	0	0	0	0	0
1971-72	0	0	0	0	0	0	0	0	0	0	0	0	0
1972-73	0	0	0	0	0	0	0	0	0	0	0	0	0
1973-74	0	0	0	0	0	0	0	0	0	0	0	0	0
1974-75	0	0	0	0	0	0	0	0	0	0	0	0	0
1975-76	0	0	0	0	0	0	0	0	0	0	0	0	0
1976-77	0	0	0	0	0	0	0	0	0	0	0	0	0
1977-78	0	0	0	0	0	0	0	0	0	0	0	0	0
1978-79	0	0	0	0	0	0	0	0	0	0	0	0	0
1979-80	0	0	0	0	0	0	0	0	0	0	0	0	0
1980-81	0	0	0	0	0	0	0	0	0	0	0	0	0
1981-82	0	0	0	0	0	0	0	0	0	0	0	0	0
1982-83	0	0	0	0	0	0	0	0	0	0	0	0	0
1983-84	0	0	0	0	0	0	0	0	0	0	0	0	0
1984-85	0	0	0	0	0	0	0	0	0	0	0	0	0
1985-86	0	0	0	0	0	0	0	0	0	0	0	0	0
1986-87	0	0	0	0	0	0	0	0	0	0	0	0	0
1987-88	0	0	0	0	0	0	0	0	0	0	0	0	0
1988-89	0	0	0	0	0	0	0	0	0	0	0	0	0
1989-90	0	0											
MEAN	153	78	1	0	0	0	0	1	24	111	150	160	89

SPO3D9

RATHDRUM PRAIRIE CANAL

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												-50	
1928-29	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1929-30	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1930-31	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1931-32	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1932-33	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1933-34	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1934-35	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1935-36	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1936-37	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1937-38	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1938-39	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1939-40	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1940-41	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1941-42	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1942-43	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1943-44	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1944-45	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1945-46	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1946-47	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1947-48	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1948-49	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1949-50	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1950-51	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1951-52	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1952-53	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1953-54	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1954-55	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1955-56	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1956-57	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1957-58	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1958-59	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1959-60	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1960-61	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1961-62	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1962-63	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1963-64	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1964-65	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1965-66	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1966-67	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1967-68	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1968-69	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1969-70	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1970-71	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1971-72	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1972-73	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1973-74	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1974-75	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1975-76	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1976-77	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1977-78	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1978-79	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1979-80	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1980-81	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1981-82	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1982-83	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1983-84	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1984-85	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1985-86	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1986-87	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1987-88	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1988-89	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18
1989-90	-50	-30											
MEAN	-50	-30	0	0	0	0	0	0	0	-30	-50	-50	-18

RPR3D9

SPOKANE VALLEY FARMS

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												-45	
1928-29	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
1929-30	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
1930-31	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
1931-32	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
1932-33	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
1933-34	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
1934-35	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
1935-36	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
1936-37	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
1937-38	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
1938-39	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
1939-40	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
1940-41	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
1941-42	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
1942-43	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
1943-44	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
1944-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
1945-46	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
1946-47	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
1947-48	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
1948-49	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
1949-50	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
1950-51	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
1951-52	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
1952-53	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
1953-54	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
1954-55	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
1955-56	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
1956-57	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
1957-58	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
1958-59	-45	-45	-45	-45	-45	-45	-45	-45	-40	-40	-40	-40	-43
1959-60	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40
1960-61	-40	-40	-40	-40	-40	-40	-40	-40	-30	-30	-30	-30	-37
1961-62	-30	-30	-30	-30	-30	-30	-30	-30	-30	-30	-30	-30	-30
1962-63	-30	-30	-30	-30	-30	-30	-30	-30	-20	-20	-20	-20	-27
1963-64	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20
1964-65	-20	-20	-20	-20	-20	-20	-20	-20	0	0	0	0	-13
1965-66	0	0	0	0	0	0	0	0	0	0	0	0	0
1966-67	0	0	0	0	0	0	0	0	0	0	0	0	0
1967-68	0	0	0	0	0	0	0	0	0	0	0	0	0
1968-69	0	0	0	0	0	0	0	0	0	0	0	0	0
1969-70	0	0	0	0	0	0	0	0	0	0	0	0	0
1970-71	0	0	0	0	0	0	0	0	0	0	0	0	0
1971-72	0	0	0	0	0	0	0	0	0	0	0	0	0
1972-73	0	0	0	0	0	0	0	0	0	0	0	0	0
1973-74	0	0	0	0	0	0	0	0	0	0	0	0	0
1974-75	0	0	0	0	0	0	0	0	0	0	0	0	0
1975-76	0	0	0	0	0	0	0	0	0	0	0	0	0
1976-77	0	0	0	0	0	0	0	0	0	0	0	0	0
1977-78	0	0	0	0	0	0	0	0	0	0	0	0	0
1978-79	0	0	0	0	0	0	0	0	0	0	0	0	0
1979-80	0	0	0	0	0	0	0	0	0	0	0	0	0
1980-81	0	0	0	0	0	0	0	0	0	0	0	0	0
1981-82	0	0	0	0	0	0	0	0	0	0	0	0	0
1982-83	0	0	0	0	0	0	0	0	0	0	0	0	0
1983-84	0	0	0	0	0	0	0	0	0	0	0	0	0
1984-85	0	0	0	0	0	0	0	0	0	0	0	0	0
1985-86	0	0	0	0	0	0	0	0	0	0	0	0	0
1986-87	0	0	0	0	0	0	0	0	0	0	0	0	0
1987-88	0	0	0	0	0	0	0	0	0	0	0	0	0
1988-89	0	0	0	0	0	0	0	0	0	0	0	0	0
1989-90	0	0											
MEAN	-25	-25	-26	-26	-26	-26	-26	-26	-25	-25	-25	-25	-42

SVF3D9

KETTLE IN CANADA

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												-287	
1928-29	-91	19	31	26	19	17	15	11	5	-92	-230	-266	-45
1929-30	-90	19	30	26	19	17	15	11	5	-92	-229	-265	-45
1930-31	-90	19	30	26	19	17	15	11	5	-92	-228	-265	-45
1931-32	-90	19	30	26	19	16	15	11	5	-91	-228	-264	-45
1932-33	-89	19	30	25	19	16	15	11	4	-91	-227	-263	-45
1933-34	-89	19	30	25	19	16	15	11	4	-91	-226	-262	-45
1934-35	-89	19	30	25	19	16	15	11	4	-91	-225	-261	-44
1935-36	-89	19	30	25	19	16	15	11	4	-90	-225	-260	-44
1936-37	-88	19	30	25	19	16	15	11	4	-90	-224	-260	-44
1937-38	-88	18	29	25	19	16	15	11	4	-90	-223	-259	-44
1938-39	-88	18	29	25	19	16	15	11	4	-89	-222	-258	-44
1939-40	-88	18	29	25	19	16	15	11	4	-89	-222	-257	-44
1940-41	-87	18	29	24	18	16	15	11	4	-89	-221	-256	-44
1941-42	-87	18	29	24	18	16	15	10	4	-89	-220	-255	-44
1942-43	-87	18	29	24	18	16	14	10	4	-88	-219	-254	-43
1943-44	-87	18	29	24	18	16	14	10	4	-88	-219	-254	-43
1944-45	-86	18	28	24	18	16	14	10	4	-88	-218	-253	-43
1945-46	-86	18	28	24	18	15	14	10	4	-87	-217	-252	-43
1946-47	-86	17	28	24	18	15	14	10	4	-87	-217	-251	-43
1947-48	-86	17	28	24	18	15	14	10	4	-87	-216	-250	-43
1948-49	-85	17	28	24	18	15	14	10	4	-86	-213	-247	-42
1949-50	-84	17	28	23	18	15	14	10	4	-85	-210	-244	-42
1950-51	-83	17	27	23	17	15	14	10	4	-83	-207	-240	-41
1951-52	-82	17	27	23	17	15	13	10	4	-82	-204	-237	-40
1952-53	-81	16	26	22	17	14	13	10	4	-81	-201	-233	-40
1953-54	-80	16	26	22	17	14	13	9	4	-80	-198	-230	-39
1954-55	-78	16	26	22	16	14	13	9	4	-79	-196	-227	-39
1955-56	-77	16	25	21	16	14	13	9	4	-78	-193	-223	-38
1956-57	-76	15	25	21	16	14	13	9	4	-76	-190	-220	-37
1957-58	-75	15	25	21	16	13	12	9	4	-75	-187	-217	-37
1958-59	-74	15	24	20	15	13	12	9	4	-74	-184	-213	-36
1959-60	-73	15	24	20	15	13	12	9	3	-73	-181	-210	-36
1960-61	-72	15	23	20	15	13	12	9	3	-72	-178	-207	-35
1961-62	-70	14	23	20	15	13	12	8	3	-71	-175	-203	-35
1962-63	-69	14	23	19	14	12	11	8	3	-69	-172	-200	-34
1963-64	-68	14	22	19	14	12	11	8	3	-68	-169	-196	-33
1964-65	-67	14	22	19	14	12	11	8	3	-67	-167	-193	-33
1965-66	-66	13	22	18	14	12	11	8	3	-64	-159	-184	-31
1966-67	-63	13	20	17	13	11	10	7	3	-61	-151	-175	-30
1967-68	-60	12	19	16	12	11	10	7	3	-58	-143	-165	-28
1968-69	-57	11	18	15	12	10	9	7	2	-54	-135	-156	-27
1969-70	-54	10	17	14	11	9	9	6	2	-51	-127	-147	-25
1970-71	-51	9	16	13	10	9	8	6	2	-48	-119	-137	-23
1971-72	-47	9	15	12	9	8	7	5	2	-45	-111	-128	-22
1972-73	-44	8	13	11	9	7	7	5	2	-42	-103	-119	-20
1973-74	-41	7	12	10	8	7	6	4	1	-38	-95	-110	-19
1974-75	-38	6	11	9	7	6	6	4	1	-35	-87	-100	-17
1975-76	-35	5	10	8	6	5	5	4	1	-32	-79	-91	-16
1976-77	-32	4	9	7	6	5	4	3	1	-29	-71	-82	-14
1977-78	-29	4	7	6	5	4	4	3	1	-26	-63	-73	-13
1978-79	-26	3	6	5	4	3	3	2	0	-23	-55	-63	-11
1979-80	-23	2	5	4	3	3	3	2	0	-20	-49	-57	-10
1980-81	-21	2	5	4	3	3	2	2	0	-18	-44	-51	-9
1981-82	-19	2	4	3	3	2	2	1	0	-16	-38	-44	-8
1982-83	-16	1	4	3	2	2	2	1	0	-14	-33	-38	-7
1983-84	-14	1	3	3	2	2	2	1	0	-11	-27	-32	-6
1984-85	-12	1	3	2	2	1	1	1	0	-9	-22	-25	-5
1985-86	-9	1	2	2	1	1	1	1	0	-7	-16	-19	-3
1986-87	-7	1	2	1	1	1	1	1	0	-5	-11	-13	-2
1987-88	-5	0	1	1	1	1	1	0	0	-2	-5	-6	-1
1988-89	-2	0	1	0	0	0	0	0	0	0	0	0	0
1989-90	0	0											
MEAN	-62	12	20	17	13	11	10	7	3	-62	-154	-180	-31

KET3D9

4 of 5

FERRY - STEVENS, WASHINGTON

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												-150	
1928-29	-107	-28	-4	-2	-2	-2	-2	-1	-3	-67	-115	-147	-40
1929-30	-105	-28	-4	-2	-2	-2	-2	-1	-3	-68	-113	-144	-39
1930-31	-103	-28	-5	-3	-3	-2	-2	-2	-3	-65	-111	-141	-39
1931-32	-101	-28	-5	-3	-3	-2	-3	-2	-3	-64	-109	-138	-38
1932-33	-100	-28	-6	-3	-3	-3	-3	-2	-3	-63	-106	-135	-38
1933-34	-98	-27	-6	-4	-4	-3	-3	-2	-4	-62	-104	-131	-37
1934-35	-96	-27	-7	-4	-4	-3	-3	-2	-4	-61	-102	-128	-37
1935-36	-94	-27	-7	-4	-4	-3	-4	-2	-4	-59	-100	-125	-36
1936-37	-92	-27	-8	-5	-4	-4	-4	-3	-4	-58	-98	-122	-36
1937-38	-90	-27	-8	-5	-5	-4	-4	-3	-5	-57	-95	-119	-35
1938-39	-88	-27	-9	-5	-5	-4	-4	-3	-5	-56	-93	-116	-35
1939-40	-86	-28	-10	-5	-5	-4	-5	-3	-5	-55	-91	-113	-34
1940-41	-84	-28	-10	-6	-6	-4	-5	-3	-5	-54	-89	-110	-34
1941-42	-82	-28	-11	-6	-6	-5	-5	-4	-6	-53	-87	-107	-33
1942-43	-80	-28	-11	-6	-6	-5	-6	-4	-6	-52	-84	-104	-33
1943-44	-78	-28	-12	-7	-7	-5	-6	-4	-6	-51	-82	-101	-32
1944-45	-76	-29	-12	-7	-7	-5	-6	-4	-6	-50	-80	-98	-32
1945-46	-74	-29	-13	-7	-7	-6	-6	-4	-6	-48	-78	-95	-31
1946-47	-72	-29	-13	-8	-7	-6	-7	-4	-7	-47	-76	-92	-31
1947-48	-70	-29	-14	-8	-8	-6	-7	-5	-7	-46	-73	-89	-30
1948-49	-68	-29	-14	-8	-8	-6	-7	-5	-7	-45	-71	-86	-30
1949-50	-66	-29	-15	-9	-8	-7	-7	-5	-7	-44	-69	-82	-29
1950-51	-64	-30	-16	-9	-9	-7	-8	-5	-8	-41	-63	-75	-28
1951-52	-59	-29	-16	-9	-9	-7	-8	-5	-8	-38	-58	-68	-26
1952-53	-54	-28	-16	-9	-9	-7	-8	-5	-8	-35	-53	-61	-24
1953-54	-49	-28	-17	-10	-9	-7	-8	-6	-8	-32	-47	-54	-23
1954-55	-44	-27	-17	-10	-9	-8	-8	-6	-8	-29	-42	-47	-21
1955-56	-39	-26	-17	-10	-10	-8	-8	-6	-8	-26	-36	-39	-19
1956-57	-34	-26	-18	-10	-10	-8	-9	-6	-8	-23	-31	-32	-17
1957-58	-30	-25	-18	-10	-10	-8	-9	-6	-8	-20	-25	-25	-16
1958-59	-25	-24	-18	-10	-10	-8	-9	-6	-8	-17	-20	-18	-14
1959-60	-20	-24	-19	-11	-10	-8	-8	-6	-9	-14	-14	-11	-12
1960-61	-15	-23	-19	-11	-11	-8	-9	-6	-9	-11	-9	-3	-11
1961-62	-10	-22	-19	-11	-11	-9	-8	-6	-9	-8	-3	4	-9
1962-63	-5	-22	-20	-11	-11	-9	-10	-7	-9	-5	2	11	-7
1963-64	0	-21	-20	-11	-11	-9	-10	-7	-9	-2	8	18	-6
1964-65	5	-21	-20	-12	-11	-9	-10	-7	-9	1	13	25	-4
1965-66	10	-20	-21	-12	-11	-9	-10	-7	-9	4	19	32	-2
1966-67	15	-19	-21	-12	-12	-9	-10	-7	-9	4	17	30	-3
1967-68	14	-18	-20	-11	-11	-9	-10	-7	-8	3	16	28	-3
1968-69	13	-17	-19	-11	-10	-8	-9	-6	-8	3	14	25	-3
1969-70	11	-16	-17	-10	-10	-8	-9	-6	-7	2	13	23	-3
1970-71	10	-15	-16	-9	-9	-7	-8	-5	-7	2	11	21	-3
1971-72	9	-14	-15	-9	-8	-7	-7	-5	-6	2	10	18	-3
1972-73	8	-13	-14	-8	-8	-6	-7	-5	-6	1	9	16	-3
1973-74	7	-12	-12	-7	-7	-5	-6	-4	-5	1	7	14	-3
1974-75	6	-11	-11	-6	-6	-5	-5	-4	-4	0	6	11	-3
1975-76	4	-10	-10	-6	-6	-4	-5	-3	-4	0	4	9	-3
1976-77	3	-9	-9	-5	-5	-4	-4	-3	-3	-1	3	7	-3
1977-78	2	-7	-7	-4	-4	-3	-4	-2	-3	-1	1	4	-2
1978-79	1	-6	-6	-4	-3	-3	-3	-2	-2	-2	0	2	-2
1979-80	0	-5	-5	-3	-3	-2	-2	-2	-2	-2	-1	0	-2
1980-81	-2	-4	-4	-2	-2	-2	-2	-1	1	-12	-22	-29	-8
1981-82	-20	-2	2	1	1	1	1	1	1	-11	-20	-26	-6
1982-83	-18	-2	2	1	1	1	1	1	1	-9	-17	-23	-5
1983-84	-15	-2	1	1	1	1	1	0	1	-8	-15	-19	-4
1984-85	-13	-1	1	1	1	1	1	0	0	-7	-12	-16	-4
1985-86	-11	-1	1	1	1	1	1	0	0	-5	-10	-13	-3
1986-87	-9	-1	1	1	1	0	1	0	0	-4	-7	-10	-2
1987-88	-7	0	1	1	0	0	0	0	0	-3	-5	-6	-1
1988-89	-4	0	1	0	0	0	0	0	0	0	0	0	0
1989-90	0	0											
MEAN	-38	-19	-11	-6	-6	-5	-5	-4	-5	-26	-39	-48	-18

FER3D9

Accumulated depletions at site (1990 level of development).

GCL3D9

OKANAGAN IN CANADA

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												-121	
1928-29	-69	-34	-20	-17	-13	-11	-10	-7	-10	-54	-103	-113	-39
1929-30	-67	-36	-22	-18	-14	-12	-11	-8	-11	-50	-95	-105	-37
1930-31	-64	-37	-23	-20	-15	-13	-12	-8	-11	-47	-87	-96	-36
1931-32	-61	-38	-24	-21	-16	-13	-12	-9	-11	-43	-79	-88	-35
1932-33	-58	-39	-26	-22	-16	-14	-13	-9	-11	-40	-71	-79	-33
1933-34	-56	-40	-27	-23	-17	-15	-14	-10	-12	-37	-63	-71	-32
1934-35	-53	-41	-29	-24	-18	-16	-14	-10	-12	-33	-55	-62	-31
1935-36	-50	-42	-30	-25	-19	-16	-15	-11	-12	-30	-47	-54	-29
1936-37	-47	-43	-31	-27	-20	-17	-16	-11	-13	-26	-40	-46	-28
1937-38	-45	-44	-33	-28	-21	-18	-17	-12	-13	-23	-32	-37	-27
1938-39	-42	-45	-34	-28	-22	-19	-17	-12	-13	-20	-24	-29	-26
1939-40	-39	-46	-36	-30	-23	-19	-18	-13	-14	-16	-16	-20	-24
1940-41	-36	-47	-37	-31	-24	-20	-19	-13	-14	-13	-8	-12	-23
1941-42	-34	-49	-38	-33	-24	-21	-19	-14	-14	-9	0	-3	-22
1942-43	-31	-50	-40	-34	-25	-22	-20	-14	-14	-6	8	5	-20
1943-44	-28	-51	-41	-35	-26	-23	-21	-15	-15	-3	16	13	-19
1944-45	-25	-52	-43	-36	-27	-23	-21	-16	-15	1	24	22	-18
1945-46	-23	-53	-44	-37	-28	-24	-22	-16	-15	4	32	30	-16
1946-47	-20	-54	-45	-38	-29	-25	-23	-17	-16	7	40	39	-15
1947-48	-17	-55	-47	-40	-30	-26	-24	-17	-16	11	48	47	-14
1948-49	-14	-56	-48	-41	-31	-26	-24	-18	-16	16	58	58	-12
1949-50	-10	-56	-48	-41	-31	-26	-24	-18	-16	20	68	69	-9
1950-51	-5	-55	-49	-41	-31	-27	-25	-18	-15	25	78	80	-7
1951-52	0	-54	-49	-41	-31	-27	-25	-18	-15	30	88	91	-4
1952-53	5	-54	-49	-42	-31	-27	-25	-18	-15	35	99	102	-1
1953-54	10	-53	-49	-42	-31	-27	-25	-18	-15	39	109	113	1
1954-55	14	-53	-50	-42	-32	-27	-25	-18	-15	44	119	124	4
1955-56	19	-52	-50	-42	-32	-27	-25	-18	-15	49	129	135	6
1956-57	24	-52	-50	-42	-32	-27	-25	-18	-15	54	140	147	9
1957-58	29	-51	-50	-43	-32	-28	-25	-18	-14	58	150	158	11
1958-59	33	-51	-51	-43	-32	-28	-26	-18	-14	63	160	169	14
1959-60	38	-50	-51	-43	-32	-28	-26	-19	-14	68	170	180	16
1960-61	43	-49	-51	-43	-33	-28	-26	-19	-14	73	180	191	19
1961-62	48	-49	-51	-43	-33	-28	-26	-19	-14	77	191	202	22
1962-63	52	-48	-52	-44	-33	-28	-26	-19	-14	82	201	213	24
1963-64	57	-48	-52	-44	-33	-28	-26	-19	-13	87	211	224	27
1964-65	62	-47	-52	-44	-33	-28	-26	-19	-13	92	221	235	29
1965-66	67	-47	-52	-44	-33	-29	-26	-19	-13	96	232	247	32
1966-67	71	-47	-54	-45	-34	-29	-27	-19	-14	101	244	259	34
1967-68	76	-48	-55	-46	-35	-30	-28	-20	-14	106	255	271	36
1968-69	80	-48	-56	-47	-36	-31	-28	-20	-14	111	266	282	39
1969-70	84	-49	-57	-48	-36	-31	-29	-21	-14	116	277	294	41
1970-71	89	-50	-58	-49	-37	-32	-29	-21	-14	121	288	306	43
1971-72	93	-50	-60	-50	-38	-33	-30	-22	-14	126	299	318	45
1972-73	98	-51	-61	-51	-39	-33	-31	-22	-14	131	310	330	48
1973-74	102	-51	-62	-52	-39	-34	-31	-23	-15	136	321	342	50
1974-75	107	-52	-63	-53	-40	-34	-32	-23	-15	141	333	354	52
1975-76	111	-52	-64	-54	-41	-35	-32	-23	-15	146	344	366	54
1976-77	116	-53	-66	-56	-42	-36	-33	-24	-15	151	355	378	57
1977-78	120	-54	-67	-57	-43	-36	-34	-24	-15	156	366	390	59
1978-79	125	-54	-68	-58	-43	-37	-34	-25	-15	161	377	402	62
1979-80	129	-55	-69	-59	-44	-38	-35	-25	-14	145	339	361	53
1980-81	116	-49	-62	-53	-40	-34	-31	-23	-12	129	302	321	48
1981-82	103	-44	-55	-47	-35	-30	-28	-20	-11	112	264	281	41
1982-83	90	-38	-48	-41	-31	-26	-24	-18	-9	96	226	241	35
1983-84	77	-33	-42	-35	-26	-23	-21	-15	-8	80	188	201	29
1984-85	65	-27	-35	-29	-22	-19	-17	-13	-6	64	151	161	23
1985-86	52	-22	-28	-23	-18	-15	-14	-10	-5	48	113	120	17
1986-87	39	-16	-21	-18	-13	-11	-10	-8	-3	32	75	80	11
1987-88	26	-11	-14	-12	-9	-8	-7	-5	-2	16	38	40	5
1988-89	13	-5	-7	-6	-4	-4	-3	-3	0	0	0	0	-2
1989-90	0	0											
MEAN	26	-45	-45	-38	-29	-25	-23	-16	-13	49	128	130	9

OKA3D9

D-45

OKANAGAN METHOW (U.S.)

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												-145	
1928-29	-116	-40	7	4	4	3	3	2	-12	-73	-108	-142	-39
1929-30	-114	-40	6	4	4	3	3	2	-12	-72	-106	-140	-39
1930-31	-112	-39	6	3	3	3	3	2	-12	-71	-104	-137	-38
1931-32	-110	-39	5	3	3	2	3	2	-12	-69	-102	-134	-37
1932-33	-108	-38	5	3	3	2	2	2	-11	-68	-100	-131	-37
1933-34	-105	-38	4	2	2	2	2	1	-11	-67	-98	-129	-36
1934-35	-103	-38	4	2	2	2	2	1	-11	-65	-96	-126	-36
1935-36	-101	-37	3	2	2	1	2	1	-11	-64	-94	-123	-35
1936-37	-99	-37	3	2	2	1	1	1	-11	-63	-92	-120	-35
1937-38	-97	-36	2	1	1	1	1	1	-11	-62	-90	-117	-34
1938-39	-95	-36	2	1	1	1	1	1	-11	-60	-88	-115	-33
1939-40	-93	-35	1	1	1	1	1	0	-11	-59	-86	-112	-33
1940-41	-90	-35	1	0	0	0	0	0	-11	-58	-84	-109	-32
1941-42	-88	-34	0	0	0	0	0	0	-10	-56	-82	-106	-32
1942-43	-86	-34	0	0	0	0	0	0	-10	-55	-80	-104	-31
1943-44	-84	-34	-1	0	0	0	0	0	-10	-54	-78	-101	-30
1944-45	-82	-33	-1	-1	-1	-1	-1	0	-10	-53	-77	-98	-30
1945-46	-80	-33	-2	-1	-1	-1	-1	-1	-10	-51	-75	-95	-29
1946-47	-78	-32	-2	-1	-1	-1	-1	-1	-10	-50	-73	-93	-29
1947-48	-75	-32	-3	-2	-2	-1	-1	-1	-10	-49	-71	-90	-28
1948-49	-73	-31	-3	-2	-2	-2	-2	-1	-10	-47	-69	-87	-27
1949-50	-71	-31	-4	-2	-2	-2	-2	-1	-9	-46	-67	-84	-27
1950-51	-69	-30	-4	-3	-2	-2	-2	-1	-9	-47	-68	-86	-27
1951-52	-70	-30	-4	-2	-2	-2	-2	-1	-9	-48	-69	-88	-28
1952-53	-72	-30	-3	-2	-2	-1	-1	-1	-9	-48	-70	-90	-28
1953-54	-73	-30	-2	-1	-1	-1	-1	-1	-9	-49	-72	-92	-28
1954-55	-75	-30	-1	-1	-1	0	-1	0	-9	-50	-73	-94	-28
1955-56	-76	-30	0	0	0	0	0	0	-9	-51	-74	-96	-28
1956-57	-78	-30	1	0	0	0	0	0	-9	-51	-75	-98	-29
1957-58	-79	-30	1	1	1	1	1	0	-9	-52	-77	-100	-29
1958-59	-80	-30	2	1	1	1	1	1	-9	-53	-78	-102	-29
1959-60	-82	-30	3	2	2	1	1	1	-9	-54	-79	-104	-29
1960-61	-83	-30	4	2	2	2	2	1	-9	-54	-80	-106	-29
1961-62	-85	-30	5	3	3	2	2	2	-9	-55	-81	-108	-30
1962-63	-86	-29	5	3	3	2	3	2	-9	-56	-83	-110	-30
1963-64	-87	-29	6	4	4	3	3	2	-9	-57	-84	-111	-30
1964-65	-89	-29	7	4	4	3	4	2	-9	-57	-85	-113	-30
1965-66	-90	-29	8	5	4	4	4	3	-9	-58	-86	-115	-30
1966-67	-92	-29	9	5	5	4	4	3	-8	-56	-84	-112	-29
1967-68	-89	-28	9	5	5	4	4	3	-8	-54	-81	-109	-28
1968-69	-86	-27	9	5	5	4	4	3	-7	-53	-78	-105	-27
1969-70	-83	-26	9	5	5	4	5	3	-7	-51	-76	-102	-26
1970-71	-80	-24	9	5	5	4	5	3	-7	-49	-73	-98	-25
1971-72	-78	-23	10	5	5	4	5	3	-6	-47	-70	-95	-24
1972-73	-75	-22	10	6	5	4	5	3	-6	-45	-68	-92	-23
1973-74	-72	-21	10	6	5	4	5	3	-6	-43	-65	-88	-22
1974-75	-69	-20	10	6	6	4	5	3	-5	-42	-63	-85	-21
1975-76	-67	-18	10	6	6	5	5	3	-5	-40	-60	-82	-20
1976-77	-64	-17	10	6	6	5	5	3	-4	-38	-57	-78	-19
1977-78	-61	-16	10	6	6	5	5	3	-4	-36	-55	-75	-18
1978-79	-58	-15	11	6	6	5	5	4	-4	-34	-52	-71	-16
1979-80	-56	-14	11	6	6	5	5	4	-3	-32	-49	-68	-15
1980-81	-53	-12	11	6	6	5	5	4	-2	-22	-33	-45	-9
1981-82	-35	-8	7	4	4	3	3	2	-2	-19	-28	-39	-9
1982-83	-31	-7	6	3	3	3	3	2	-2	-16	-24	-33	-7
1983-84	-26	-6	5	3	3	2	2	2	-1	-13	-20	-28	-6
1984-85	-21	-5	4	2	2	2	2	1	-1	-10	-16	-22	-5
1985-86	-17	-4	3	2	2	1	2	1	-1	-8	-11	-16	-3
1986-87	-12	-3	2	1	1	1	1	1	-1	-5	-7	-10	-2
1987-88	-8	-2	1	1	1	1	1	0	0	-2	-3	-4	-1
1988-89	-3	-1	1	0	0	0	0	0	0	0	0	0	0
1989-90	0	0											
MEAN	-74	-26	4	2	2	2	2	1	-8	-47	-69	-92	-25

OKM3D9

WEST OF BANKS LAKE

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												-253	
1928-29	-142	-38	-10	-1	-1	-1	-1	-1	-17	-135	-226	-244	-69
1929-30	-139	-39	-11	-2	-2	-2	-2	-1	-17	-131	-218	-235	-67
1930-31	-135	-39	-13	-3	-3	-3	-3	-2	-17	-127	-210	-227	-66
1931-32	-131	-40	-14	-4	-4	-3	-4	-2	-17	-122	-202	-218	-64
1932-33	-127	-41	-15	-5	-5	-4	-4	-3	-17	-118	-194	-209	-62
1933-34	-123	-42	-17	-6	-6	-5	-5	-4	-17	-114	-187	-201	-61
1934-35	-120	-42	-18	-7	-7	-6	-6	-4	-17	-110	-179	-192	-59
1935-36	-116	-43	-19	-8	-8	-6	-7	-5	-17	-105	-171	-183	-58
1936-37	-112	-44	-20	-9	-9	-7	-8	-5	-17	-101	-163	-175	-56
1937-38	-108	-44	-22	-10	-10	-8	-9	-6	-17	-97	-155	-166	-55
1938-39	-104	-45	-23	-11	-11	-8	-9	-6	-17	-93	-147	-157	-53
1939-40	-101	-46	-24	-12	-11	-9	-10	-7	-17	-88	-139	-149	-51
1940-41	-97	-46	-26	-13	-12	-10	-11	-7	-17	-84	-131	-140	-50
1941-42	-93	-47	-27	-14	-13	-11	-12	-8	-18	-80	-123	-131	-48
1942-43	-89	-48	-28	-15	-14	-11	-13	-9	-18	-76	-115	-123	-47
1943-44	-86	-48	-30	-16	-15	-12	-13	-9	-18	-72	-108	-114	-45
1944-45	-82	-49	-31	-17	-16	-13	-14	-10	-18	-67	-100	-106	-44
1945-46	-78	-50	-32	-18	-17	-14	-15	-10	-18	-63	-92	-97	-42
1946-47	-74	-50	-34	-19	-18	-14	-16	-11	-18	-59	-84	-88	-41
1947-48	-70	-51	-35	-19	-19	-15	-17	-11	-18	-55	-76	-80	-39
1948-49	-67	-52	-36	-20	-20	-16	-18	-12	-18	-50	-68	-71	-37
1949-50	-63	-53	-38	-21	-21	-17	-18	-12	-18	-46	-60	-62	-36
1950-51	-59	-53	-39	-22	-22	-17	-19	-13	-17	-44	-57	-59	-35
1951-52	-57	-52	-38	-22	-21	-17	-19	-13	-17	-42	-54	-56	-34
1952-53	-54	-50	-37	-21	-20	-16	-18	-12	-16	-40	-51	-53	-32
1953-54	-52	-48	-35	-20	-20	-16	-18	-12	-15	-38	-48	-50	-31
1954-55	-49	-47	-34	-20	-19	-15	-17	-12	-15	-36	-45	-46	-30
1955-56	-47	-45	-33	-19	-19	-15	-17	-11	-14	-34	-42	-43	-28
1956-57	-44	-43	-32	-19	-18	-14	-16	-11	-14	-32	-39	-40	-27
1957-58	-42	-42	-31	-18	-17	-14	-15	-10	-13	-29	-36	-37	-25
1958-59	-39	-40	-30	-17	-17	-13	-15	-10	-12	-27	-33	-34	-24
1959-60	-37	-38	-29	-17	-16	-13	-14	-10	-12	-25	-30	-30	-23
1960-61	-35	-36	-28	-16	-16	-13	-14	-9	-11	-23	-27	-27	-21
1961-62	-32	-35	-27	-16	-15	-12	-13	-9	-11	-21	-24	-24	-20
1962-63	-30	-33	-25	-15	-14	-12	-13	-9	-10	-19	-21	-21	-18
1963-64	-27	-31	-24	-14	-14	-11	-12	-8	-10	-17	-18	-18	-17
1964-65	-25	-30	-23	-14	-13	-11	-12	-8	-9	-15	-15	-14	-16
1965-66	-22	-28	-22	-13	-13	-10	-11	-8	-8	-13	-12	-11	-14
1966-67	-20	-26	-21	-12	-12	-10	-11	-7	-8	-11	-9	-9	-13
1967-68	-18	-24	-19	-12	-11	-9	-10	-7	-7	-9	-7	-6	-12
1968-69	-15	-22	-18	-11	-10	-8	-9	-6	-6	-8	-5	-4	-10
1969-70	-13	-20	-17	-10	-10	-8	-9	-6	-6	-6	-3	-2	-9
1970-71	-11	-18	-15	-9	-9	-7	-8	-5	-5	-4	0	1	-8
1971-72	-9	-16	-14	-8	-8	-6	-7	-5	-4	-2	2	3	-6
1972-73	-6	-14	-12	-7	-7	-6	-6	-4	-4	-1	4	5	-5
1973-74	-4	-12	-11	-7	-6	-5	-6	-4	-3	1	6	8	-3
1974-75	-2	-10	-9	-6	-5	-4	-5	-3	-2	3	9	10	-2
1975-76	0	-8	-8	-5	-5	-4	-4	-3	-2	5	11	12	-1
1976-77	3	-6	-6	-4	-4	-3	-3	-2	-1	6	13	15	1
1977-78	5	-4	-5	-3	-3	-2	-3	-2	0	8	16	17	2
1978-79	7	-2	-3	-2	-2	-2	-2	-1	0	10	18	19	3
1979-80	9	0	-2	-1	-1	-1	-1	-1	1	12	20	22	5
1980-81	11	2	0	-1	-1	0	-1	0	1	10	18	19	5
1981-82	10	2	0	-1	-1	0	0	0	1	9	16	17	4
1982-83	9	1	0	0	0	0	0	0	1	8	13	15	4
1983-84	8	1	0	0	0	0	0	0	1	6	11	12	3
1984-85	6	1	0	0	0	0	0	0	0	5	9	10	3
1985-86	5	1	0	0	0	0	0	0	0	4	7	7	2
1986-87	4	1	0	0	0	0	0	0	0	3	4	5	1
1987-88	3	0	0	0	0	0	0	0	0	1	2	2	1
1988-89	1	0	0	0	0	0	0	0	0	0	0	0	0
1989-90	0	0											
MEAN	-47	-29	-19	-10	-10	-8	-9	-6	-10	-39	-58	-65	-26

WSB3D9

CHELAN - ENTIAT

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												14	
1928-29	11	3	-2	-3	-3	-3	-3	-2	0	6	10	14	2
1929-30	11	3	-2	-3	-3	-3	-3	-2	0	6	10	14	2
1930-31	11	3	-2	-3	-3	-3	-3	-2	0	6	10	14	2
1931-32	11	3	-2	-3	-3	-3	-3	-2	0	6	10	14	2
1932-33	11	3	-2	-3	-3	-3	-3	-2	0	6	10	14	2
1933-34	11	3	-2	-3	-3	-3	-3	-2	0	6	10	14	2
1934-35	11	3	-2	-3	-3	-3	-3	-2	0	6	10	14	2
1935-36	11	3	-2	-3	-3	-3	-3	-2	0	6	10	14	2
1936-37	11	3	-2	-3	-3	-3	-3	-2	0	6	10	14	2
1937-38	11	3	-2	-3	-3	-3	-3	-2	0	6	10	14	2
1938-39	11	3	-2	-3	-3	-3	-3	-2	0	6	10	14	2
1939-40	11	3	-2	-3	-3	-3	-3	-2	0	6	10	14	2
1940-41	11	3	-2	-3	-3	-3	-3	-2	0	6	10	14	2
1941-42	11	3	-2	-3	-3	-3	-3	-2	0	6	10	14	2
1942-43	11	3	-2	-3	-3	-3	-3	-2	0	6	10	14	2
1943-44	11	3	-2	-3	-3	-3	-3	-2	0	6	10	14	2
1944-45	11	3	-2	-3	-3	-3	-3	-2	0	6	10	14	2
1945-46	11	3	-2	-3	-3	-3	-3	-2	0	6	10	14	2
1946-47	11	3	-2	-3	-3	-3	-3	-2	0	6	10	14	2
1947-48	11	3	-2	-3	-3	-3	-3	-2	0	6	10	14	2
1948-49	11	3	-2	-3	-3	-3	-3	-2	0	6	10	14	2
1949-50	11	3	-2	-3	-3	-3	-3	-2	0	6	10	14	2
1950-51	11	3	-2	-3	-3	-3	-3	-2	0	5	9	13	2
1951-52	10	3	-2	-3	-3	-2	-3	-2	0	5	9	12	2
1952-53	9	2	-2	-3	-3	-2	-3	-2	0	5	8	11	2
1953-54	9	2	-2	-3	-3	-2	-2	-2	0	4	7	10	2
1954-55	8	2	-2	-3	-3	-2	-2	-2	0	4	7	9	1
1955-56	7	2	-2	-3	-2	-2	-2	-1	0	3	6	8	1
1956-57	6	1	-2	-2	-2	-2	-2	-1	0	3	5	7	1
1957-58	6	1	-2	-2	-2	-2	-2	-1	0	3	5	7	1
1958-59	5	1	-2	-2	-2	-2	-2	-1	0	2	4	6	1
1959-60	4	1	-2	-2	-2	-1	-2	-1	0	2	3	5	0
1960-61	4	0	-2	-2	-2	-1	-2	-1	0	1	3	4	0
1961-62	3	0	-2	-2	-2	-1	-1	-1	0	1	2	3	0
1962-63	2	0	-1	-1	-1	-1	-1	-1	0	0	1	2	0
1963-64	1	0	-1	-1	-1	-1	-1	-1	0	0	1	1	0
1964-65	1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	-1
1965-66	0	-1	-1	-1	-1	-1	-1	-1	0	-1	-1	-1	-1
1966-67	-1	-1	-1	-1	-1	-1	-1	-1	0	-1	-1	-1	-1
1967-68	-1	-1	-1	-1	-1	-1	-1	0	0	-1	-1	-1	-1
1968-69	-1	-1	-1	-1	-1	-1	-1	0	0	-1	-1	-1	-1
1969-70	-1	-1	-1	-1	-1	0	-1	0	0	-1	-2	-2	-1
1970-71	-2	-1	-1	-1	0	0	0	0	0	-1	-2	-2	-1
1971-72	-2	-1	-1	0	0	0	0	0	0	-1	-2	-2	-1
1972-73	-2	-1	-1	0	0	0	0	0	0	-2	-2	-3	-1
1973-74	-2	-1	-1	0	0	0	0	0	0	-2	-2	-3	-1
1974-75	-3	-1	-1	0	0	0	0	0	0	-2	-3	-3	-1
1975-76	-3	-1	0	0	0	0	0	0	0	-2	-3	-4	-1
1976-77	-3	-2	0	0	0	0	0	0	0	-2	-3	-4	-1
1977-78	-3	-2	0	0	0	0	0	0	0	-2	-3	-4	-1
1978-79	-3	-2	0	0	0	0	0	0	0	-2	-3	-4	-1
1979-80	-4	-2	0	0	0	0	0	0	0	-2	-4	-5	-1
1980-81	-4	-2	0	1	0	0	0	0	0	-2	-3	-4	-1
1981-82	-3	-1	0	0	0	0	0	0	0	-2	-3	-4	-1
1982-83	-3	-1	0	0	0	0	0	0	0	-2	-2	-3	-1
1983-84	-3	-1	0	0	0	0	0	0	0	-1	-2	-3	-1
1984-85	-2	-1	0	0	0	0	0	0	0	-1	-2	-2	-1
1985-86	-2	-1	0	0	0	0	0	0	0	-1	-1	-2	0
1986-87	-1	-1	0	0	0	0	0	0	0	-1	-1	-1	0
1987-88	-1	0	0	0	0	0	0	0	0	0	0	-1	0
1988-89	0	0	0	0	0	0	0	0	0	0	0	0	0
1989-90	0	0											
MEAN	4	1	-1	-2	-2	-1	-2	-1	0	2	4	6	1

CHE3D9

WENATCHEE

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												-15	
1928-29	-14	-12	-8	-4	-4	-3	-4	-2	-4	-11	-14	-15	-8
1929-30	-14	-12	-8	-4	-4	-3	-4	-3	-4	-10	-14	-15	-8
1930-31	-14	-11	-8	-4	-4	-3	-4	-3	-4	-10	-14	-14	-8
1931-32	-13	-11	-8	-4	-4	-3	-4	-3	-4	-10	-14	-14	-8
1932-33	-13	-11	-8	-4	-4	-3	-4	-3	-4	-10	-13	-14	-8
1933-34	-13	-11	-8	-4	-4	-3	-4	-3	-4	-10	-13	-14	-8
1934-35	-13	-11	-8	-5	-4	-4	-4	-3	-4	-10	-13	-13	-8
1935-36	-12	-11	-8	-5	-4	-4	-4	-3	-4	-10	-13	-13	-7
1936-37	-12	-11	-8	-5	-4	-4	-4	-3	-4	-9	-12	-13	-7
1937-38	-12	-11	-8	-5	-4	-4	-4	-3	-4	-9	-12	-12	-7
1938-39	-12	-11	-8	-5	-5	-4	-4	-3	-4	-9	-12	-12	-7
1939-40	-11	-11	-8	-5	-5	-4	-4	-3	-4	-9	-12	-12	-7
1940-41	-11	-10	-8	-5	-5	-4	-4	-3	-4	-9	-11	-11	-7
1941-42	-11	-10	-8	-5	-5	-4	-4	-3	-3	-9	-11	-11	-7
1942-43	-11	-10	-8	-5	-5	-4	-4	-3	-3	-9	-11	-11	-7
1943-44	-10	-10	-8	-5	-5	-4	-4	-3	-3	-8	-11	-11	-7
1944-45	-10	-10	-8	-5	-5	-4	-4	-3	-3	-8	-10	-10	-7
1945-46	-10	-10	-8	-5	-5	-4	-4	-3	-3	-8	-10	-10	-7
1946-47	-10	-10	-8	-5	-5	-4	-4	-3	-3	-8	-10	-10	-7
1947-48	-9	-10	-8	-5	-5	-4	-4	-3	-3	-8	-10	-9	-7
1948-49	-9	-10	-8	-5	-5	-4	-4	-3	-3	-8	-9	-9	-6
1949-50	-9	-10	-8	-5	-5	-4	-4	-3	-3	-8	-9	-9	-6
1950-51	-9	-9	-8	-5	-5	-4	-4	-3	-3	-7	-9	-8	-6
1951-52	-8	-9	-8	-5	-5	-4	-4	-3	-3	-7	-9	-8	-6
1952-53	-8	-9	-7	-5	-5	-4	-4	-3	-3	-7	-9	-8	-6
1953-54	-8	-9	-7	-5	-5	-4	-4	-3	-3	-7	-8	-8	-6
1954-55	-8	-8	-7	-4	-4	-3	-4	-3	-3	-7	-8	-8	-6
1955-56	-8	-8	-7	-4	-4	-3	-4	-3	-3	-6	-8	-7	-5
1956-57	-7	-8	-7	-4	-4	-3	-4	-2	-3	-6	-8	-7	-5
1957-58	-7	-8	-6	-4	-4	-3	-3	-2	-3	-6	-7	-7	-5
1958-59	-7	-7	-6	-4	-4	-3	-3	-2	-2	-6	-7	-7	-5
1959-60	-7	-7	-6	-4	-4	-3	-3	-2	-2	-6	-7	-7	-5
1960-61	-7	-7	-6	-4	-3	-3	-3	-2	-2	-5	-7	-6	-5
1961-62	-6	-7	-5	-3	-3	-3	-3	-2	-2	-5	-6	-6	-4
1962-63	-6	-6	-5	-3	-3	-2	-3	-2	-2	-5	-6	-6	-4
1963-64	-6	-6	-5	-3	-3	-2	-3	-2	-2	-5	-6	-6	-4
1964-65	-6	-6	-5	-3	-3	-2	-2	-2	-2	-5	-6	-6	-4
1965-66	-5	-5	-4	-3	-3	-2	-2	-2	-2	-4	-6	-5	-4
1966-67	-5	-5	-4	-3	-2	-2	-2	-1	-2	-5	-6	-6	-4
1967-68	-6	-5	-4	-2	-2	-2	-2	-1	-2	-5	-7	-7	-4
1968-69	-7	-5	-4	-2	-2	-2	-2	-1	-2	-5	-7	-8	-4
1969-70	-7	-5	-3	-2	-2	-1	-1	-1	-2	-6	-8	-9	-4
1970-71	-8	-6	-3	-1	-1	-1	-1	-1	-2	-6	-9	-10	-4
1971-72	-9	-6	-3	-1	-1	-1	-1	-1	-2	-6	-9	-11	-4
1972-73	-9	-6	-3	-1	-1	-1	-1	0	-2	-7	-10	-12	-4
1973-74	-10	-6	-2	0	0	0	0	0	-2	-7	-10	-13	-4
1974-75	-11	-6	-2	0	0	0	0	0	-2	-7	-11	-13	-4
1975-76	-11	-6	-2	0	0	0	0	0	-2	-8	-12	-14	-4
1976-77	-12	-6	-2	0	0	0	0	0	-2	-8	-12	-15	-5
1977-78	-13	-6	-1	1	1	1	1	0	-2	-8	-13	-16	-5
1978-79	-13	-6	-1	1	1	1	1	1	-2	-9	-13	-17	-5
1979-80	-14	-6	-1	1	1	1	1	1	-2	-9	-14	-18	-5
1980-81	-15	-6	-1	2	2	1	1	1	-3	-16	-25	-33	-8
1981-82	-27	-11	0	4	3	3	3	2	-3	-14	-22	-29	-8
1982-83	-23	-10	0	3	3	2	3	2	-2	-12	-19	-25	-7
1983-84	-20	-8	0	3	3	2	2	2	-2	-10	-16	-21	-6
1984-85	-17	-7	0	2	2	2	2	1	-2	-8	-13	-17	-5
1985-86	-14	-6	0	2	2	1	2	1	-1	-7	-10	-13	-4
1986-87	-11	-5	0	1	1	1	1	1	-1	-5	-7	-10	-3
1987-88	-8	-3	0	1	1	1	1	1	0	-3	-4	-6	-2
1988-89	-5	-2	0	1	1	1	1	0	0	0	0	0	0
1989-90	0	0											
MEAN	-10	-8	-5	-3	-2	-2	-2	-1	-3	-8	-10	-11	-6

RETURN FLOW TO WANAPUM POOL

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												93	
1928-29	109	117	105	81	73	64	62	58	80	79	80	93	84
1929-30	109	117	105	81	73	64	62	58	80	79	80	93	84
1930-31	109	117	105	81	73	64	62	58	80	79	80	93	84
1931-32	109	117	105	81	73	64	62	58	80	79	80	93	83
1932-33	109	117	105	81	73	64	62	58	80	79	80	93	84
1933-34	109	117	105	81	73	64	62	58	80	79	80	93	84
1934-35	109	117	105	81	73	64	62	58	80	79	80	93	84
1935-36	109	117	105	81	73	64	62	58	80	79	80	93	83
1936-37	109	117	105	81	73	64	62	58	80	79	80	93	84
1937-38	109	117	105	81	73	64	62	58	80	79	80	93	84
1938-39	109	117	105	81	73	64	62	58	80	79	80	93	84
1939-40	109	117	105	81	73	64	62	58	80	79	80	93	83
1940-41	109	117	105	81	73	64	62	58	80	79	80	93	84
1941-42	109	117	105	81	73	64	62	58	80	79	80	93	84
1942-43	109	117	105	81	73	64	62	58	80	79	80	93	84
1943-44	109	117	105	81	73	64	62	58	80	79	80	93	83
1944-45	109	117	105	81	73	64	62	58	80	79	80	93	84
1945-46	109	117	105	81	73	64	62	58	80	79	80	93	84
1946-47	109	117	105	81	73	64	62	58	80	79	80	93	84
1947-48	109	117	105	81	73	64	62	58	80	79	80	93	83
1948-49	109	117	105	81	73	64	62	58	80	79	80	93	84
1949-50	109	117	105	81	73	64	62	58	80	79	80	93	84
1950-51	109	117	105	81	73	64	62	58	80	79	80	93	84
1951-52	109	117	105	81	73	64	62	58	80	79	80	93	83
1952-53	109	117	105	81	73	64	62	58	80	79	80	93	84
1953-54	109	117	105	81	73	64	62	58	80	79	80	93	84
1954-55	109	117	105	81	73	64	62	58	80	79	80	93	84
1955-56	109	117	105	81	73	64	62	58	80	79	80	93	83
1956-57	109	117	105	81	73	64	62	58	80	79	80	93	84
1957-58	109	117	105	81	73	64	62	58	80	79	80	93	84
1958-59	109	117	105	81	73	64	62	58	80	79	80	93	84
1959-60	109	117	105	81	73	64	62	54	74	73	73	85	80
1960-61	100	108	97	74	67	59	57	50	69	67	66	77	73
1961-62	91	99	88	67	61	53	51	45	63	61	59	69	67
1962-63	82	91	80	61	55	48	46	41	58	54	52	61	60
1963-64	73	82	72	54	49	43	41	37	52	48	45	53	53
1964-65	64	73	64	47	43	37	36	33	47	42	38	46	47
1965-66	56	64	55	40	36	32	30	28	41	36	30	38	40
1966-67	47	55	47	33	30	26	25	24	35	30	23	30	33
1967-68	38	46	39	26	24	21	20	20	30	24	16	22	26
1968-69	29	38	31	20	18	16	15	16	24	17	9	14	20
1969-70	20	29	22	13	12	10	9	11	19	11	2	6	13
1970-71	11	20	14	6	6	5	4	7	13	5	-5	-2	6
1971-72	2	11	13	6	6	5	4	7	12	5	-5	-2	5
1972-73	2	10	12	5	5	4	3	7	11	4	-5	-1	5
1973-74	2	9	11	5	5	4	3	8	11	4	-5	-1	5
1974-75	2	7	10	4	4	4	3	8	10	3	-5	0	4
1975-76	2	6	9	4	4	4	3	8	9	3	-5	0	4
1976-77	2	5	7	4	4	3	2	8	8	2	-4	0	3
1977-78	2	4	6	3	3	3	2	8	7	2	-4	1	3
1978-79	2	3	5	3	3	3	2	9	7	1	-4	1	3
1979-80	2	1	4	2	2	2	1	9	6	1	-4	2	2
1980-81	2	0	3	2	2	2	1	9	5	0	-4	2	2
1981-82	2	-1	3	2	2	2	1	8	4	0	-4	2	2
1982-83	2	-1	2	2	2	2	1	7	4	0	-3	2	1
1983-84	2	-1	2	1	1	1	1	6	3	0	-3	1	1
1984-85	1	-1	2	1	1	1	1	5	3	0	-2	1	1
1985-86	1	-1	1	1	1	1	0	3	2	0	-2	1	1
1986-87	1	0	1	1	1	1	0	2	1	0	-1	1	0
1987-88	1	0	0	0	0	0	0	1	1	0	-1	0	0
1988-89	0	0	0	0	0	0	0	0	0	0	0	0	0
1989-90	0	0											
MEAN	67	73	67	50	46	40	38	37	51	48	46	56	52

WRF3D9

RETURN FLOW TO PRIEST RAPIDS

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												234	
1928-29	295	278	305	197	168	182	158	156	227	251	215	234	223
1929-30	295	278	305	197	168	182	158	156	227	251	215	234	223
1930-31	295	278	305	197	168	182	158	156	227	251	215	234	223
1931-32	295	278	305	197	168	182	158	156	227	251	215	234	222
1932-33	295	278	305	197	168	182	158	156	227	251	215	234	223
1933-34	295	278	305	197	168	182	158	156	227	251	215	234	223
1934-35	295	278	305	197	168	182	158	156	227	251	215	234	223
1935-36	295	278	305	197	168	182	158	156	227	251	215	234	222
1936-37	295	278	305	197	168	182	158	156	227	251	215	234	223
1937-38	295	278	305	197	168	182	158	156	227	251	215	234	223
1938-39	295	278	305	197	168	182	158	156	227	251	215	234	223
1939-40	295	278	305	197	168	182	158	156	227	251	215	234	222
1940-41	295	278	305	197	168	182	158	156	227	251	215	234	223
1941-42	295	278	305	197	168	182	158	156	227	251	215	234	223
1942-43	295	278	305	197	168	182	158	156	227	251	215	234	223
1943-44	295	278	305	197	168	182	158	156	227	251	215	234	222
1944-45	295	278	305	197	168	182	158	156	227	251	215	234	223
1945-46	295	278	305	197	168	182	158	156	227	251	215	234	223
1946-47	295	278	305	197	168	182	158	156	227	251	215	234	223
1947-48	295	278	305	197	168	182	158	156	227	251	215	234	222
1948-49	295	278	305	197	168	182	158	156	227	251	215	234	223
1949-50	295	278	305	197	168	182	158	156	227	251	215	234	223
1950-51	295	278	305	197	168	182	158	156	227	251	215	234	223
1951-52	295	278	305	197	168	182	158	156	227	251	215	234	222
1952-53	295	278	305	197	168	182	158	156	227	251	215	234	223
1953-54	295	278	291	183	154	168	146	145	216	241	204	226	212
1954-55	285	266	277	168	141	154	134	133	204	231	193	218	200
1955-56	275	253	263	154	127	141	123	122	193	221	182	210	188
1956-57	265	241	249	140	114	127	111	110	181	210	171	202	176
1957-58	255	228	235	128	100	113	99	99	170	200	160	194	164
1958-59	246	216	221	111	86	99	87	87	158	190	149	186	153
1959-60	236	203	207	97	73	86	75	76	147	180	138	178	141
1960-61	226	191	193	83	59	72	63	64	135	170	127	170	129
1961-62	216	178	179	69	46	58	52	53	124	160	116	163	117
1962-63	206	166	165	54	32	44	40	41	112	149	104	155	105
1963-64	196	154	151	40	18	30	28	30	101	139	93	147	93
1964-65	186	141	137	26	5	17	16	18	89	129	82	139	82
1965-66	176	129	123	11	-9	3	4	7	78	119	71	131	70
1966-67	166	116	109	-3	-23	-11	-8	-5	66	109	60	123	58
1967-68	157	104	95	-17	-36	-25	-20	-17	55	99	49	115	46
1968-69	147	91	81	-31	-50	-38	-31	-28	43	88	38	107	34
1969-70	137	79	67	-46	-63	-52	-43	-40	32	78	27	99	23
1970-71	127	66	53	-60	-77	-66	-55	-51	20	68	16	91	11
1971-72	117	54	48	-56	-74	-60	-51	-47	18	59	8	82	8
1972-73	107	43	42	-52	-70	-54	-48	-43	15	49	0	74	5
1973-74	98	32	37	-48	-67	-49	-44	-39	13	40	-8	65	2
1974-75	88	22	31	-44	-63	-43	-40	-35	10	31	-16	56	-1
1975-76	79	11	26	-41	-60	-37	-37	-31	8	22	-25	48	-4
1976-77	69	0	21	-37	-56	-31	-33	-27	5	12	-33	39	-6
1977-78	59	-11	15	-33	-53	-25	-29	-23	3	3	-41	30	-9
1978-79	50	-22	10	-29	-49	-20	-25	-19	0	-6	-49	21	-12
1979-80	40	-32	4	-25	-46	-14	-22	-15	-3	-16	-57	13	-15
1980-81	31	-43	-1	-21	-42	-8	-18	-11	-5	-25	-65	4	-18
1981-82	21	-54	-1	-18	-37	-7	-16	-10	-4	-22	-57	4	-17
1982-83	18	-47	-1	-16	-32	-6	-14	-8	-4	-19	-49	3	-14
1983-84	16	-41	-1	-13	-26	-5	-11	-7	-3	-16	-41	3	-12
1984-85	13	-34	-1	-11	-21	-4	-9	-6	-3	-13	-33	2	-10
1985-86	11	-27	0	-8	-16	-3	-7	-4	-2	-9	-24	2	-8
1986-87	8	-20	0	-5	-11	-2	-5	-3	-1	-6	-16	1	-5
1987-88	5	-14	0	-3	-5	-1	-2	-1	-1	-3	-8	1	-3
1988-89	3	-7	0	0	0	0	0	0	0	0	0	0	-1
1989-90	0	0											
MEAN	194	159	180	91	68	84	71	72	129	150	112	151	122

PRF3D9

YAKIMA BASIN REGULATION ADJUSTMENT

Accumulated depletions at site and upstream (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												-202	
1928-29	105	151	459	370	368	403	706	-112	15	-1993	-1316	100	-51
1929-30	288	311	468	825	507	205	92	125	-428	-756	-245	-412	38
1930-31	-215	30	241	489	215	419	401	1009	290	-2608	-328	-195	4
1931-32	140	307	526	412	414	128	517	-1063	-1021	-2884	-730	-167	-275
1932-33	311	999	1432	2274	1403	189	189	-623	-946	-1188	889	-1891	210
1933-34	-131	-767	1267	2588	2250	-1839	-2223	2302	7	-1640	-140	134	191
1934-35	148	213	-4	644	-279	-1165	-1945	-353	-584	-458	-837	-187	-399
1935-36	48	18	-337	320	353	315	249	-12	-247	-3167	-2193	-33	-384
1936-37	145	208	456	413	402	410	353	13	-403	-1062	-4073	-805	-337
1937-38	28	117	211	527	549	-410	-323	-219	-1292	-222	-1127	-129	-186
1938-39	45	141	257	326	124	391	248	-231	162	-2051	-824	-6	-126
1939-40	1	152	369	370	338	282	317	234	-212	-3331	-320	56	-138
1940-41	133	80	-71	339	274	325	281	323	174	-383	-396	-510	-8
1941-42	-498	-379	-349	323	492	210	319	215	504	-527	-207	-148	28
1942-43	-85	-183	-170	255	261	136	171	14	-554	-2060	-2583	-1364	-513
1943-44	-42	96	216	251	307	367	284	139	-104	-436	-284	-17	73
1944-45	54	-49	-57	328	293	410	447	249	-306	-1294	-1003	-77	-96
1945-46	-64	-39	-160	110	-168	-27	112	-59	-375	-3158	-425	-687	-422
1946-47	-107	-25	-22	-793	-429	768	770	343	402	-128	-1334	-209	-67
1947-48	-108	-70	86	188	-1859	195	106	-303	-494	81	-849	-816	-333
1948-49	-226	-128	-215	-7	-2127	-815	-292	-1369	-989	5005	-80	-430	-149
1949-50	-381	-714	-2316	358	884	-19	-221	-1123	-1518	846	4047	-1043	-131
1950-51	-672	-889	-794	1495	915	-1389	131	-2159	1111	4002	-424	-438	101
1951-52	-323	-117	-197	106	-72	-43	-141	-141	1215	1113	-789	-472	-4
1952-53	-502	-122	-37	368	335	294	-158	336	-173	678	-897	-974	-58
1953-54	-368	-72	-286	141	1376	-1320	-1145	-892	-811	3152	1329	-1309	-41
1954-55	-745	-768	-895	1507	738	119	254	0	-697	-651	1805	-1473	-56
1955-56	-513	-386	58	1698	-849	-1820	-939	-2447	-1247	5589	13	-1152	-156
1956-57	-425	-194	-356	886	2461	-615	323	-19	-596	-859	-1105	-265	-48
1957-58	-225	-108	-79	349	217	288	362	304	-375	263	-314	-182	41
1958-59	-218	-44	-260	509	723	878	-1354	-227	824	422	790	-171	161
1959-60	-252	-569	-559	3325	-1033	-1858	587	111	87	-63	1216	-329	49
1960-61	-163	-114	-93	160	106	481	56	-690	-211	-282	1820	-131	75
1961-62	-163	-62	-36	266	114	-18	-63	-58	990	154	455	-171	109
1962-63	-245	-73	-294	248	115	267	1897	185	-1041	-1088	-340	-129	-44
1963-64	-125	13	-18	232	213	236	114	-317	-302	-475	2729	-403	140
1964-65	-272	-227	-18	680	1357	115	-453	-1885	1137	1465	683	-272	184
1965-66	-384	-119	-187	296	347	393	305	78	242	372	55	-315	103
1966-67	-211	-66	40	241	251	556	-58	156	-298	148	1995	-396	195
1967-68	-216	-100	-461	252	1537	1708	1400	-2071	-361	444	-126	-134	144
1968-69	-310	-134	-207	386	-10	627	-80	-587	-1495	2813	145	-201	90
1969-70	-236	-158	-91	195	108	260	85	153	-620	325	1449	-335	95
1970-71	-220	-138	-12	234	154	212	402	-344	-3261	1707	2166	499	108
1971-72	-343	-330	-683	670	524	215	361	-1506	-6758	4929	2812	329	18
1972-73	-444	-619	-444	1007	1896	-294	177	48	-167	-408	-135	103	108
1973-74	121	296	363	750	568	205	70	26	-2030	-2338	3262	-153	13
1974-75	-783	-365	-712	629	1661	771	-2469	-639	-797	-111	3723	-1140	9
1975-76	-577	-43	56	2139	1845	-921	-424	-623	-2164	1934	1457	-801	154
1976-77	-616	-286	-76	849	806	954	739	713	127	16	-98	-135	279
1977-78	-230	-334	-351	341	163	-662	212	-235	-1337	-1565	-1153	-633	-552
1978-79	-1001	-945	-287	-45	-160	318	270	-105	-528	839	-459	-241	-104
1979-80	87	368	248	463	-1093	-284	24	-476	-1761	-1340	-1052	-334	-469
1980-81	-369	-255	-210	-178	520	19	382	-206	-597	-579	-589	-479	-137
1981-82	-361	-393	-350	-209	-162	-179	-119	-848	-497	-634	1861	-2095	-353
1982-83	-520	-472	-222	-244	-67	1007	-201	-524	-1488	1250	-503	-650	-217
1983-84	-568	-406	-432	-375	-464	2517	-328	-241	-747	-870	-334	-936	-253
1984-85	-453	-485	-115	-96	-106	-116	-174	-169	-356	2041	1252	-53	138
1985-86	0	-46	-685	235	-95	-128	30	-625	415	494	-185	31	-48
1986-87	16	105	-388	248	103	43	59	327	682	-632	-32	21	57
1987-88	178	381	-7	384	168	226	207	843	567	-726	-157	-4	151
1988-89	-52	96	-226	237	170	13	168	-85	-117	-1381	-32	-50	-105
1989-90	-11	63											
MEAN	-212	-123	-115	513	327	65	34	-251	-514	-54	130	-403	-52

YAK3DD9

RETURN FLOW TO McNARY POOL

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												698	
1928-29	720	758	629	320	267	344	332	434	563	551	592	698	518
1929-30	720	758	629	320	267	344	332	434	563	551	592	698	518
1930-31	720	758	629	320	267	344	332	434	563	551	592	698	518
1931-32	720	758	629	320	267	344	332	434	563	551	592	698	518
1932-33	720	758	629	320	267	344	332	434	563	551	592	698	518
1933-34	720	758	629	320	267	344	332	434	563	551	592	698	518
1934-35	720	758	629	320	267	344	332	434	563	551	592	698	518
1935-36	720	758	629	320	267	344	332	434	563	551	592	698	518
1936-37	720	758	629	320	267	344	332	434	563	551	592	698	518
1937-38	720	758	629	320	267	344	332	434	563	551	592	698	518
1938-39	720	758	629	320	267	344	332	434	563	551	592	698	518
1939-40	720	758	629	320	267	344	332	434	563	551	592	698	518
1940-41	720	758	629	320	267	344	332	434	563	551	592	698	518
1941-42	720	758	629	320	267	344	332	434	563	551	592	698	518
1942-43	720	758	629	320	267	344	332	434	563	551	592	698	518
1943-44	720	758	629	320	267	344	332	434	563	551	592	698	518
1944-45	720	758	629	320	267	344	332	434	563	551	592	698	518
1945-46	720	758	629	320	267	344	332	434	563	551	592	698	518
1946-47	720	758	629	320	267	344	332	434	563	551	592	698	518
1947-48	720	758	629	320	267	344	332	434	563	551	592	698	518
1948-49	720	758	629	320	267	344	332	434	563	551	592	698	518
1949-50	720	758	629	320	267	344	332	434	563	551	592	698	518
1950-51	720	758	629	320	267	344	332	434	563	551	592	698	518
1951-52	720	758	629	320	267	344	332	434	563	551	592	698	518
1952-53	720	758	629	320	267	344	332	434	563	551	592	698	518
1953-54	720	758	599	300	250	327	316	412	536	523	562	662	495
1954-55	684	721	569	279	232	311	300	390	508	496	531	626	468
1955-56	647	684	539	259	215	294	284	368	481	468	501	589	442
1956-57	611	647	509	238	198	278	268	346	454	441	470	553	415
1957-58	574	609	479	218	181	261	253	324	427	413	440	517	389
1958-59	538	572	449	197	163	245	237	302	399	385	410	481	362
1959-60	501	535	419	177	146	228	221	280	372	358	379	444	336
1960-61	465	498	389	156	129	212	205	258	345	330	349	408	309
1961-62	428	461	359	136	112	195	189	237	318	303	319	372	283
1962-63	392	424	328	116	94	178	173	215	290	275	288	336	256
1963-64	356	386	298	95	77	162	157	193	263	247	258	300	230
1964-65	319	349	268	75	60	145	141	171	236	220	227	263	203
1965-66	283	312	236	54	42	129	125	149	208	192	197	227	177
1966-67	246	275	208	34	25	112	110	127	181	164	167	191	150
1967-68	210	238	178	13	8	96	94	105	154	137	136	155	124
1968-69	173	201	148	-7	-9	79	78	83	127	109	106	118	97
1969-70	137	163	118	-28	-27	63	62	61	99	82	75	82	71
1970-71	100	126	88	-48	-44	46	46	39	72	54	45	46	44
1971-72	64	89	82	-53	-48	42	42	37	68	52	45	46	39
1972-73	62	83	75	-58	-52	38	38	36	65	51	45	46	36
1973-74	61	77	69	-62	-56	34	35	34	61	49	44	47	32
1974-75	59	71	62	-67	-60	30	31	33	58	47	44	47	29
1975-76	57	65	56	-72	-65	26	27	31	54	46	44	47	26
1976-77	56	60	49	-77	-69	22	23	29	50	44	44	47	23
1977-78	54	54	43	-82	-73	18	19	28	47	42	44	47	20
1978-79	52	48	36	-86	-77	14	16	26	43	40	43	48	17
1979-80	50	42	30	-91	-81	10	12	25	40	39	43	48	14
1980-81	49	36	23	-96	-85	6	8	23	36	37	43	48	11
1981-82	47	30	20	-84	-74	5	7	20	32	32	38	42	9
1982-83	41	26	17	-72	-64	5	6	17	27	28	32	36	8
1983-84	35	23	14	-60	-53	4	5	14	23	23	27	30	7
1984-85	29	19	12	-48	-43	3	4	12	18	19	22	24	5
1985-86	24	15	9	-36	-32	2	3	9	14	14	16	18	4
1986-87	18	11	6	-24	-21	2	2	6	9	9	11	12	3
1987-88	12	8	3	-12	-11	1	1	3	5	5	5	6	2
1988-89	6	4	0	0	0	0	0	0	0	0	0	0	0
1989-90	0	0											
MEAN	422	446	369	151	124	200	194	251	331	320	342	406	297

MRF3D9

MCNARY PUMPING

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												-63	
1928-29	-61	-53	-28	0	0	0	0	-5	-53	-49	-60	-63	-31
1929-30	-61	-53	-28	0	0	0	0	-5	-53	-49	-60	-63	-31
1930-31	-61	-53	-28	0	0	0	0	-5	-53	-49	-60	-63	-31
1931-32	-61	-53	-28	0	0	0	0	-5	-53	-49	-60	-63	-31
1932-33	-61	-53	-28	0	0	0	0	-5	-53	-49	-60	-63	-31
1933-34	-61	-53	-28	0	0	0	0	-5	-53	-49	-60	-63	-31
1934-35	-61	-53	-28	0	0	0	0	-5	-53	-49	-60	-63	-31
1935-36	-61	-53	-28	0	0	0	0	-5	-53	-49	-60	-63	-31
1936-37	-61	-53	-28	0	0	0	0	-5	-53	-49	-60	-63	-31
1937-38	-61	-53	-28	0	0	0	0	-5	-53	-49	-60	-63	-31
1938-39	-61	-53	-28	0	0	0	0	-5	-53	-49	-60	-63	-31
1939-40	-61	-53	-28	0	0	0	0	-5	-53	-49	-60	-63	-31
1940-41	-61	-53	-28	0	0	0	0	-5	-53	-49	-60	-63	-31
1941-42	-61	-53	-28	0	0	0	0	-5	-53	-49	-60	-63	-31
1942-43	-61	-53	-28	0	0	0	0	-5	-53	-49	-60	-63	-31
1943-44	-61	-53	-28	0	0	0	0	-5	-53	-49	-60	-63	-31
1944-45	-61	-53	-28	0	0	0	0	-5	-53	-49	-60	-63	-31
1945-46	-61	-53	-28	0	0	0	0	-5	-53	-49	-60	-63	-31
1946-47	-61	-53	-28	0	0	0	0	-5	-53	-49	-60	-63	-31
1947-48	-61	-53	-28	0	0	0	0	-5	-53	-49	-60	-63	-31
1948-49	-61	-53	-28	0	0	0	0	-5	-53	-49	-60	-63	-31
1949-50	-61	-53	-28	0	0	0	0	-5	-53	-49	-60	-63	-31
1950-51	-61	-53	-28	0	0	0	0	-5	-53	-49	-60	-63	-31
1951-52	-61	-53	-28	0	0	0	0	-5	-53	-49	-60	-63	-31
1952-53	-61	-53	-28	0	0	0	0	-5	-53	-49	-60	-63	-31
1953-54	-61	-53	-28	0	0	0	0	-5	-53	-49	-60	-63	-31
1954-55	-61	-53	-28	0	0	0	0	-5	-53	-49	-60	-63	-31
1955-56	-61	-53	-28	0	0	0	0	-5	-53	-49	-60	-63	-31
1956-57	-61	-53	-28	0	0	0	0	-5	-53	-49	-60	0	-21
1957-58	0	0	0	0	0	0	0	0	0	0	0	0	0
1958-59	0	0	0	0	0	0	0	0	0	0	0	0	0
1959-60	0	0	0	0	0	0	0	0	0	0	0	0	0
1960-61	0	0	0	0	0	0	0	0	0	0	0	0	0
1961-62	0	0	0	0	0	0	0	0	0	0	0	0	0
1962-63	0	0	0	0	0	0	0	0	0	0	0	0	0
1963-64	0	0	0	0	0	0	0	0	0	0	0	0	0
1964-65	0	0	0	0	0	0	0	0	0	0	0	0	0
1965-66	0	0	0	0	0	0	0	0	0	0	0	0	0
1966-67	0	0	0	0	0	0	0	0	0	0	0	0	0
1967-68	0	0	0	0	0	0	0	0	0	0	0	0	0
1968-69	0	0	0	0	0	0	0	0	0	0	0	0	0
1969-70	0	0	0	0	0	0	0	0	0	0	0	0	0
1970-71	0	0	0	0	0	0	0	0	0	0	0	0	0
1971-72	0	0	0	0	0	0	0	0	0	0	0	0	0
1972-73	0	0	0	0	0	0	0	0	0	0	0	0	0
1973-74	0	0	0	0	0	0	0	0	0	0	0	0	0
1974-75	0	0	0	0	0	0	0	0	0	0	0	0	0
1975-76	0	0	0	0	0	0	0	0	0	0	0	0	0
1976-77	0	0	0	0	0	0	0	0	0	0	0	0	0
1977-78	0	0	0	0	0	0	0	0	0	0	0	0	0
1978-79	0	0	0	0	0	0	0	0	0	0	0	0	0
1979-80	0	0	0	0	0	0	0	0	0	0	0	0	0
1980-81	0	0	0	0	0	0	0	0	0	0	0	0	0
1981-82	0	0	0	0	0	0	0	0	0	0	0	0	0
1982-83	0	0	0	0	0	0	0	0	0	0	0	0	0
1983-84	0	0	0	0	0	0	0	0	0	0	0	0	0
1984-85	0	0	0	0	0	0	0	0	0	0	0	0	0
1985-86	0	0	0	0	0	0	0	0	0	0	0	0	0
1986-87	0	0	0	0	0	0	0	0	0	0	0	0	0
1987-88	0	0	0	0	0	0	0	0	0	0	0	0	0
1988-89	0	0	0	0	0	0	0	0	0	0	0	0	0
1989-90	0	0											
MEAN	-29	-25	-13	0	0	0	0	-3	-25	-23	-28	-29	-31

MPU3D9

UPPER SALMON R. BASIN

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												-256	
1928-29	-184	18	21	14	14	12	13	9	12	-103	-190	-239	-51
1929-30	-172	15	18	13	12	10	11	8	10	-96	-177	-222	-48
1930-31	-161	13	16	11	11	9	10	7	8	-89	-164	-205	-45
1931-32	-149	10	13	9	9	7	8	6	6	-82	-151	-189	-42
1932-33	-137	7	11	7	7	6	7	5	5	-76	-138	-172	-39
1933-34	-126	5	8	6	6	5	5	4	3	-69	-124	-155	-37
1934-35	-114	2	6	4	4	3	4	3	1	-62	-111	-138	-34
1935-36	-103	-1	3	2	2	2	2	1	-1	-55	-98	-121	-31
1936-37	-91	-3	1	1	1	0	1	0	-3	-49	-85	-105	-28
1937-38	-80	-6	-2	-1	-1	-1	-1	-1	-5	-42	-72	-88	-25
1938-39	-68	-9	-4	-3	-3	-2	-3	-2	-7	-35	-59	-71	-22
1939-40	-56	-11	-7	-5	-4	-4	-4	-3	-9	-28	-46	-54	-19
1940-41	-45	-14	-9	-6	-6	-5	-6	-4	-11	-22	-33	-38	-17
1941-42	-33	-17	-12	-8	-8	-6	-7	-5	-13	-15	-19	-21	-14
1942-43	-22	-19	-14	-10	-9	-8	-9	-6	-15	-8	-6	-4	-11
1943-44	-10	-22	-16	-11	-11	-9	-10	-7	-17	-1	7	13	-8
1944-45	1	-25	-19	-13	-13	-11	-12	-8	-19	5	20	30	-5
1945-46	13	-27	-21	-15	-14	-12	-13	-10	-21	12	33	46	-2
1946-47	24	-30	-24	-16	-16	-13	-15	-11	-23	19	48	63	1
1947-48	36	-33	-26	-18	-18	-15	-16	-12	-24	25	59	80	3
1948-49	48	-35	-29	-20	-19	-16	-18	-13	-26	32	73	97	6
1949-50	59	-38	-31	-22	-21	-17	-19	-14	-28	39	86	113	9
1950-51	71	-41	-34	-23	-23	-19	-21	-15	-30	45	97	128	12
1951-52	81	-43	-36	-25	-24	-20	-22	-16	-31	50	108	142	14
1952-53	90	-45	-38	-26	-25	-21	-23	-17	-32	56	119	156	17
1953-54	100	-47	-40	-27	-26	-22	-24	-18	-33	62	130	170	19
1954-55	110	-49	-41	-29	-28	-23	-26	-18	-35	68	141	184	22
1955-56	120	-51	-43	-30	-29	-24	-27	-19	-36	74	153	199	24
1956-57	130	-53	-45	-31	-30	-25	-28	-20	-37	79	164	213	27
1957-58	140	-55	-47	-33	-31	-26	-29	-21	-38	85	175	227	29
1958-59	150	-57	-49	-34	-33	-27	-30	-22	-40	91	186	241	32
1959-60	159	-59	-51	-35	-34	-28	-31	-23	-41	97	197	255	34
1960-61	169	-61	-53	-36	-35	-29	-33	-24	-42	102	208	269	37
1961-62	179	-63	-55	-38	-37	-30	-34	-24	-44	108	219	284	40
1962-63	189	-65	-57	-39	-38	-32	-35	-25	-45	114	230	298	42
1963-64	199	-67	-59	-40	-39	-33	-36	-26	-46	120	242	312	45
1964-65	209	-69	-61	-42	-40	-34	-37	-27	-47	125	253	326	47
1965-66	218	-71	-62	-43	-42	-35	-38	-28	-49	131	264	340	50
1966-67	228	-73	-64	-44	-43	-36	-40	-29	-45	129	259	333	49
1967-68	224	-70	-62	-43	-41	-34	-38	-28	-42	127	253	326	48
1968-69	220	-67	-60	-41	-40	-33	-37	-27	-39	124	248	319	48
1969-70	215	-64	-57	-40	-38	-32	-35	-26	-35	122	243	312	48
1970-71	211	-62	-55	-38	-37	-31	-34	-25	-32	120	238	305	48
1971-72	207	-59	-53	-36	-35	-29	-33	-23	-29	117	232	298	47
1972-73	203	-56	-51	-35	-34	-28	-31	-22	-26	115	227	291	47
1973-74	198	-53	-48	-33	-32	-27	-30	-21	-22	113	222	284	47
1974-75	194	-50	-46	-32	-31	-26	-28	-20	-19	110	216	277	46
1975-76	190	-48	-44	-30	-29	-24	-27	-19	-16	108	211	270	46
1976-77	185	-45	-41	-28	-28	-23	-25	-18	-12	106	206	263	46
1977-78	181	-42	-39	-27	-26	-22	-24	-17	-9	103	201	256	45
1978-79	177	-39	-37	-25	-24	-20	-23	-16	-6	101	195	249	45
1979-80	173	-36	-34	-24	-23	-19	-21	-15	-3	99	190	242	44
1980-81	168	-34	-32	-22	-21	-18	-20	-14	3	6	-1	10	3
1981-82	10	11	1	1	1	1	1	1	1	12	11	24	6
1982-83	19	8	-1	-1	-1	-1	-1	0	1	9	7	17	5
1983-84	14	7	0	0	0	0	0	0	1	6	3	11	3
1984-85	9	6	0	0	0	0	0	0	1	3	-1	4	2
1985-86	4	6	1	1	1	0	1	0	1	0	-5	-3	1
1986-87	-1	5	1	1	1	1	1	1	1	-3	-9	-9	-1
1987-88	-5	5	2	1	1	1	1	1	1	-6	-13	-16	-2
1988-89	-10	4	3	2	2	1	2	1	1	-9	-17	-22	-4
1989-90	-15	4											
MEAN	64	-30	-26	-18	-18	-15	-16	-12	-18	38	80	99	11

UPS3D9

LOWER SALMON R. BASIN

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												76	
1928-29	55	20	-13	-12	-12	-10	-11	-8	8	35	55	76	16
1929-30	55	20	-13	-12	-12	-10	-11	-8	8	35	55	76	16
1930-31	55	20	-13	-12	-12	-10	-11	-8	8	35	55	76	16
1931-32	55	20	-13	-12	-12	-10	-11	-8	8	35	55	76	15
1932-33	55	20	-13	-12	-12	-10	-11	-8	8	35	55	76	16
1933-34	55	20	-13	-12	-12	-10	-11	-8	8	35	55	76	16
1934-35	55	20	-13	-12	-12	-10	-11	-8	8	35	55	76	16
1935-36	55	20	-13	-12	-12	-10	-11	-8	8	35	55	76	15
1936-37	55	20	-13	-12	-12	-10	-11	-8	8	35	55	76	16
1937-38	55	20	-13	-12	-12	-10	-11	-8	8	35	55	76	16
1938-39	55	20	-13	-12	-12	-10	-11	-8	8	35	55	76	16
1939-40	55	20	-13	-12	-12	-10	-11	-8	8	35	55	76	15
1940-41	55	20	-13	-12	-12	-10	-11	-8	8	35	55	76	16
1941-42	55	20	-13	-12	-12	-10	-11	-8	8	35	55	76	16
1942-43	55	20	-13	-12	-12	-10	-11	-8	8	35	55	76	16
1943-44	55	20	-13	-12	-12	-10	-11	-8	8	35	55	76	15
1944-45	55	20	-13	-12	-12	-10	-11	-8	8	35	55	76	16
1945-46	55	20	-13	-12	-12	-10	-11	-8	8	35	55	76	16
1946-47	55	20	-13	-12	-12	-10	-11	-8	8	35	55	76	16
1947-48	55	20	-13	-12	-12	-10	-11	-8	8	35	55	76	15
1948-49	55	20	-13	-12	-12	-10	-11	-8	8	35	55	76	16
1949-50	55	20	-13	-12	-12	-10	-11	-8	8	35	55	76	16
1950-51	55	20	-13	-12	-12	-10	-11	-8	8	34	55	76	15
1951-52	54	20	-13	-12	-12	-10	-11	-8	8	34	55	76	15
1952-53	54	20	-13	-12	-12	-10	-11	-8	8	34	55	76	15
1953-54	54	20	-13	-12	-12	-10	-11	-8	8	34	55	76	15
1954-55	54	20	-13	-12	-11	-10	-11	-8	8	34	55	76	15
1955-56	54	20	-13	-12	-11	-10	-11	-8	8	34	55	75	15
1956-57	54	20	-13	-12	-11	-9	-10	-8	7	34	55	75	15
1957-58	54	20	-12	-12	-11	-9	-10	-8	7	34	54	75	15
1958-59	54	20	-12	-12	-11	-9	-10	-7	7	34	54	75	15
1959-60	54	20	-12	-11	-11	-9	-10	-7	7	34	54	75	15
1960-61	53	20	-12	-11	-11	-9	-10	-7	7	34	54	74	15
1961-62	53	20	-12	-11	-11	-9	-10	-7	7	34	54	74	15
1962-63	53	20	-12	-11	-11	-9	-10	-7	7	34	54	74	15
1963-64	53	20	-12	-11	-11	-9	-10	-7	6	34	54	74	15
1964-65	53	20	-12	-11	-11	-9	-10	-7	6	34	54	74	15
1965-66	53	20	-12	-11	-11	-9	-10	-7	6	33	53	73	15
1966-67	53	20	-12	-11	-11	-9	-10	-7	6	34	54	74	15
1967-68	53	20	-12	-11	-11	-9	-10	-7	6	34	55	75	16
1968-69	54	21	-12	-11	-11	-9	-10	-7	6	35	55	76	16
1969-70	55	21	-12	-11	-11	-9	-10	-7	6	35	56	77	16
1970-71	55	21	-12	-11	-11	-9	-10	-7	5	36	57	77	16
1971-72	56	22	-11	-11	-11	-9	-10	-7	5	36	57	78	16
1972-73	57	22	-11	-11	-11	-9	-10	-7	5	36	58	79	17
1973-74	57	22	-11	-11	-11	-9	-10	-7	5	37	58	80	17
1974-75	58	23	-11	-11	-11	-9	-10	-7	5	37	59	81	17
1975-76	59	23	-11	-11	-11	-9	-10	-7	5	38	60	82	17
1976-77	59	24	-11	-11	-11	-9	-10	-7	4	38	60	82	18
1977-78	60	24	-11	-11	-11	-9	-10	-7	4	39	61	83	18
1978-79	61	24	-11	-11	-11	-9	-10	-7	4	39	62	84	18
1979-80	61	25	-11	-11	-11	-9	-10	-7	4	39	62	85	18
1980-81	62	25	-11	-11	-11	-9	-10	-7	-9	-5	-8	-10	-6
1981-82	-7	-3	2	2	2	1	2	1	-7	-1	-2	-3	-1
1982-83	-2	0	1	1	1	1	1	0	-7	-2	-3	-4	-1
1983-84	-3	-1	1	1	1	1	1	1	-7	-2	-3	-5	-1
1984-85	-3	-1	1	1	1	1	1	1	-7	-3	-4	-6	-2
1985-86	-4	-1	1	1	1	1	1	1	-7	-3	-5	-7	-2
1986-87	-5	-2	1	1	1	1	1	1	-7	-3	-6	-8	-2
1987-88	-5	-2	1	1	1	1	1	1	-7	-4	-6	-8	-2
1988-89	-6	-2	1	1	1	1	1	1	-7	-4	-7	-9	-3
1989-90	-7	-3											
MEAN	46	17	-11	-10	-10	-8	-9	-6	5	29	47	65	13

LWS3D9

GRANDE RONDE

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
												489	
1927-28												492	27
1928-29	204	-15	-172	-178	-157	-125	-139	-94	-68	165	398	496	28
1929-30	206	-14	-173	-179	-157	-126	-139	-94	-68	167	401	499	28
1930-31	207	-14	-173	-179	-158	-126	-140	-95	-68	168	403	502	29
1931-32	209	-13	-174	-180	-158	-126	-140	-95	-68	169	406	505	30
1932-33	211	-13	-174	-180	-159	-127	-140	-95	-68	170	409	508	30
1933-34	212	-13	-175	-181	-159	-127	-141	-95	-68	171	411	511	31
1934-35	214	-12	-176	-181	-160	-128	-141	-96	-68	173	414	514	31
1935-36	216	-12	-176	-182	-160	-128	-142	-96	-69	174	416	518	32
1936-37	217	-11	-177	-182	-161	-128	-142	-96	-69	175	419	521	32
1937-38	219	-11	-177	-183	-161	-129	-143	-97	-69	176	421	524	33
1938-39	220	-11	-178	-184	-161	-129	-143	-97	-69	178	424	527	33
1939-40	222	-10	-178	-184	-162	-130	-143	-97	-69	179	427	530	34
1940-41	224	-10	-179	-185	-162	-130	-144	-97	-69	180	429	533	34
1941-42	225	-9	-179	-185	-163	-130	-144	-98	-69	181	432	537	35
1942-43	227	-9	-180	-186	-163	-131	-145	-98	-70	182	434	540	35
1943-44	229	-9	-180	-186	-164	-131	-145	-98	-70	184	437	543	36
1944-45	230	-8	-181	-187	-164	-131	-146	-99	-70	185	440	546	36
1945-46	232	-8	-181	-187	-165	-132	-146	-99	-70	186	442	549	37
1946-47	233	-7	-182	-188	-165	-132	-146	-99	-70	187	445	552	37
1947-48	235	-7	-182	-188	-166	-133	-147	-100	-70	189	447	556	38
1948-49	237	-6	-183	-189	-166	-133	-147	-100	-71	190	450	559	38
1949-50	238	-6	-183	-190	-167	-133	-148	-100	-70	191	452	552	37
1950-51	240	-6	-184	-190	-167	-134	-148	-98	-68	189	447	545	37
1951-52	238	-5	-181	-187	-164	-131	-145	-87	-67	187	441	538	37
1952-53	235	-4	-177	-183	-161	-129	-143	-85	-66	185	436	531	38
1953-54	233	-2	-174	-179	-158	-126	-140	-85	-66	183	430	524	38
1954-55	231	-1	-170	-176	-155	-124	-137	-85	-64	181	425	518	37
1955-56	228	0	-167	-172	-152	-121	-134	-83	-63	179	419	511	38
1956-57	226	1	-163	-169	-149	-119	-132	-82	-62	177	414	504	38
1957-58	224	2	-160	-165	-145	-116	-129	-81	-61	175	408	497	39
1958-59	221	3	-157	-162	-142	-114	-126	-80	-60	173	403	490	38
1959-60	219	4	-153	-158	-139	-111	-123	-79	-59	171	397	483	39
1960-61	217	5	-150	-155	-136	-109	-121	-78	-58	169	392	476	39
1961-62	214	6	-146	-151	-133	-106	-118	-77	-57	167	386	469	39
1962-63	212	7	-143	-148	-130	-104	-115	-76	-56	165	381	463	39
1963-64	210	8	-139	-144	-127	-101	-112	-75	-55	162	375	456	40
1964-65	207	9	-136	-141	-124	-99	-110	-74	-54	160	370	449	40
1965-66	205	10	-133	-137	-121	-96	-107	-73	-53	158	364	422	36
1966-67	202	11	-129	-134	-117	-94	-104	-72	-50	149	342	394	34
1967-68	191	12	-120	-123	-109	-87	-96	-71	-49	140	320	367	33
1968-69	180	13	-110	-113	-100	-80	-88	-70	-48	131	298	340	31
1969-70	169	14	-100	-103	-91	-73	-81	-69	-47	122	276	313	30
1970-71	157	15	-90	-93	-82	-66	-73	-68	-46	113	254	285	28
1971-72	146	16	-81	-83	-73	-59	-65	-67	-45	104	232	258	27
1972-73	135	17	-71	-73	-65	-52	-57	-66	-44	95	210	231	25
1973-74	123	18	-61	-63	-56	-45	-49	-65	-43	85	188	204	24
1974-75	112	19	-52	-53	-47	-38	-42	-64	-42	76	166	176	22
1975-76	101	20	-42	-43	-38	-30	-34	-63	-41	67	144	149	21
1976-77	89	20	-32	-33	-29	-23	-26	-62	-40	58	122	122	19
1977-78	78	21	-22	-23	-20	-16	-18	-61	-39	49	100	94	18
1978-79	67	22	-13	-13	-12	-9	-10	-60	-38	40	78	67	16
1979-80	55	23	-3	-3	-3	-2	-2	-59	-37	31	56	0	3
1980-81	44	24	7	7	6	5	5	-58	-36	0	0	0	-2
1981-82	0	0	0	0	0	0	0	-57	-35	0	0	0	-2
1982-83	0	0	0	0	0	0	0	-56	-34	0	0	0	-2
1983-84	0	0	0	0	0	0	0	-55	-33	0	0	0	-2
1984-85	0	0	0	0	0	0	0	-54	-32	0	0	0	-2
1985-86	0	0	0	0	0	0	0	-53	-31	0	0	0	-2
1986-87	0	0	0	0	0	0	0	-52	-30	0	0	0	-2
1987-88	0	0	0	0	0	0	0	-51	-29	0	0	0	-2
1988-89	0	0	0	0	0	0	0	-50	-28	0	0	0	-2
1989-90	0	0											
MEAN	166	1	-121	-125	-110	-88	-97	-66	-51	130	305	379	28

WEN3D9

CLEARWATER

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												-1	
1928-29	-4	-6	-6	-6	-5	-4	-5	-3	-3	-2	-1	-1	-4
1929-30	-4	-6	-6	-6	-5	-4	-5	-3	-3	-2	-1	-1	-4
1930-31	-4	-6	-6	-6	-5	-4	-5	-3	-3	-2	-1	-1	-4
1931-32	-4	-6	-6	-6	-5	-4	-5	-3	-3	-2	-1	-1	-4
1932-33	-4	-6	-6	-6	-5	-4	-5	-3	-3	-2	-1	-1	-4
1933-34	-4	-6	-6	-6	-5	-4	-5	-3	-3	-2	-1	-1	-4
1934-35	-4	-6	-6	-6	-5	-4	-5	-3	-3	-2	-1	-1	-4
1935-36	-4	-6	-6	-6	-5	-4	-5	-3	-3	-2	-1	-1	-4
1936-37	-4	-6	-6	-6	-5	-4	-5	-3	-3	-2	-1	0	-4
1937-38	-4	-6	-6	-6	-5	-4	-5	-3	-3	-2	-1	0	-4
1938-39	-4	-6	-6	-6	-5	-4	-5	-3	-3	-2	-1	0	-4
1939-40	-4	-6	-6	-6	-6	-4	-5	-3	-3	-2	-1	0	-4
1940-41	-4	-6	-6	-6	-6	-4	-5	-3	-3	-2	-1	0	-4
1941-42	-4	-6	-6	-6	-6	-4	-5	-3	-3	-2	0	0	-4
1942-43	-4	-6	-6	-6	-6	-4	-5	-3	-3	-2	0	0	-4
1943-44	-4	-6	-6	-6	-6	-4	-5	-3	-3	-2	0	0	-4
1944-45	-4	-6	-6	-6	-6	-4	-5	-3	-3	-2	0	0	-4
1945-46	-4	-6	-6	-6	-6	-4	-5	-3	-3	-2	0	0	-4
1946-47	-4	-6	-6	-6	-6	-4	-5	-3	-3	-2	0	0	-4
1947-48	-4	-6	-6	-6	-6	-4	-5	-3	-3	-2	0	1	-4
1948-49	-4	-6	-6	-6	-6	-4	-5	-3	-3	-2	0	1	-4
1949-50	-4	-6	-6	-6	-6	-5	-5	-3	-3	-2	0	1	-4
1950-51	-4	-6	-6	-6	-6	-5	-5	-3	-3	-2	-1	-1	-4
1951-52	-4	-6	-6	-6	-5	-4	-5	-3	-3	-3	-2	-2	-4
1952-53	-4	-5	-5	-6	-5	-4	-4	-3	-3	-3	-3	-4	-4
1953-54	-5	-5	-5	-5	-5	-4	-4	-3	-3	-3	-4	-5	-4
1954-55	-5	-5	-5	-5	-4	-3	-4	-3	-3	-4	-5	-6	-4
1955-56	-5	-5	-5	-5	-4	-3	-4	-2	-3	-4	-6	-8	-4
1956-57	-6	-5	-4	-4	-4	-3	-3	-2	-2	-4	-7	-9	-5
1957-58	-6	-5	-4	-4	-3	-3	-3	-2	-2	-5	-8	-11	-5
1958-59	-7	-5	-4	-3	-3	-2	-3	-2	-2	-5	-9	-12	-5
1959-60	-7	-5	-3	-3	-3	-2	-2	-2	-2	-5	-10	-13	-5
1960-61	-7	-5	-3	-3	-2	-2	-2	-1	-2	-6	-12	-15	-5
1961-62	-8	-5	-3	-2	-2	-2	-2	-1	-2	-6	-13	-16	-5
1962-63	-8	-4	-3	-2	-2	-1	-1	-1	-2	-6	-14	-18	-5
1963-64	-8	-4	-2	-2	-1	-1	-1	-1	-2	-7	-15	-19	-5
1964-65	-9	-4	-2	-1	-1	-1	-1	-1	-2	-7	-16	-21	-5
1965-66	-9	-4	-2	-1	-1	-1	-1	0	-1	-7	-17	-22	-5
1966-67	-9	-4	-1	0	0	0	0	0	-1	-8	-18	-23	-6
1967-68	-10	-4	-1	0	0	0	0	0	-1	-8	-18	-24	-6
1968-69	-10	-4	-1	0	0	0	0	0	-1	-8	-19	-25	-6
1969-70	-10	-4	-1	0	0	0	0	0	-1	-8	-20	-26	-6
1970-71	-11	-4	-1	0	0	0	0	0	-1	-9	-21	-27	-6
1971-72	-11	-4	-1	1	1	0	0	0	-1	-9	-22	-28	-6
1972-73	-11	-4	-1	1	1	1	1	0	-1	-9	-22	-29	-6
1973-74	-12	-4	0	1	1	1	1	1	-1	-10	-23	-30	-6
1974-75	-12	-4	0	1	1	1	1	1	-1	-10	-24	-31	-7
1975-76	-12	-4	0	1	1	1	1	1	-1	-10	-25	-33	-7
1976-77	-13	-4	0	2	1	1	1	1	-1	-10	-26	-34	-7
1977-78	-13	-4	0	2	2	1	1	1	-1	-11	-26	-35	-7
1978-79	-13	-4	0	2	2	1	2	1	-1	-11	-27	-36	-7
1979-80	-14	-4	0	2	2	2	2	1	-1	-11	-28	-37	-7
1980-81	-14	-4	1	2	2	2	2	1	-1	-10	-25	-33	-6
1981-82	-12	-4	1	2	2	1	2	1	-1	-9	-22	-29	-6
1982-83	-11	-3	0	2	2	1	1	1	-1	-8	-19	-24	-5
1983-84	-9	-3	0	2	1	1	1	1	0	-6	-16	-20	-4
1984-85	-8	-2	0	1	1	1	1	1	0	-5	-12	-16	-3
1985-86	-6	-2	0	1	1	1	1	1	0	-4	-9	-12	-2
1986-87	-5	-1	0	1	1	1	1	0	0	-3	-6	-8	-2
1987-88	-3	-1	0	1	0	0	0	0	0	-1	-3	-4	-1
1988-89	-2	0	0	0	0	0	0	0	0	0	0	0	0
1989-90	0	0											
MEAN	-7	-5	-3	-3	-2	-2	-2	-1	-2	-5	-10	-12	-5

CLR3D9

PALOUSE-LOWER SNAKE

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												-292	
1928-29	-203	-131	-31	-19	-18	-18	-17	-13	-87	-227	-325	-292	-116
1929-30	-203	-131	-31	-19	-18	-18	-17	-13	-87	-227	-325	-292	-116
1930-31	-203	-131	-31	-19	-18	-18	-17	-13	-87	-227	-325	-292	-116
1931-32	-203	-131	-31	-19	-18	-18	-17	-13	-87	-227	-325	-292	-115
1932-33	-203	-131	-31	-19	-18	-18	-17	-13	-87	-227	-325	-292	-116
1933-34	-203	-131	-31	-19	-18	-18	-17	-13	-87	-227	-325	-292	-116
1934-35	-203	-131	-31	-19	-18	-18	-17	-13	-87	-227	-325	-292	-116
1935-36	-203	-131	-31	-19	-18	-18	-17	-13	-87	-227	-325	-292	-115
1936-37	-203	-131	-31	-19	-18	-18	-17	-13	-87	-227	-325	-292	-116
1937-38	-203	-131	-31	-19	-18	-18	-17	-13	-87	-227	-325	-292	-116
1938-39	-203	-131	-31	-19	-18	-18	-17	-13	-87	-227	-325	-292	-116
1939-40	-203	-131	-31	-19	-18	-18	-17	-13	-87	-227	-325	-292	-115
1940-41	-203	-131	-31	-19	-18	-18	-17	-13	-87	-227	-325	-292	-116
1941-42	-203	-131	-31	-19	-18	-18	-17	-13	-87	-227	-325	-292	-116
1942-43	-203	-131	-31	-19	-18	-18	-17	-13	-87	-227	-325	-292	-116
1943-44	-203	-131	-31	-19	-18	-18	-17	-13	-87	-227	-325	-292	-115
1944-45	-203	-131	-31	-19	-18	-18	-17	-13	-87	-227	-325	-292	-116
1945-46	-203	-131	-31	-19	-18	-18	-17	-13	-87	-227	-325	-292	-116
1946-47	-203	-131	-31	-19	-18	-18	-17	-13	-86	-232	-335	-300	-117
1947-48	-206	-129	-26	-14	-13	-13	-13	-9	-85	-238	-344	-308	-117
1948-49	-209	-127	-21	-9	-9	-9	-8	-6	-84	-244	-353	-316	-117
1949-50	-211	-125	-16	-4	-4	-4	-4	-3	-83	-249	-363	-323	-116
1950-51	-214	-124	-12	1	1	1	1	1	-83	-252	-367	-327	-115
1951-52	-216	-124	-10	2	2	2	2	2	-83	-254	-371	-330	-115
1952-53	-217	-124	-9	4	3	3	3	2	-83	-257	-375	-334	-116
1953-54	-219	-124	-8	5	5	5	4	3	-83	-259	-379	-337	-116
1954-55	-221	-124	-7	6	6	6	6	4	-84	-262	-383	-340	-117
1955-56	-222	-124	-6	7	7	7	7	5	-84	-264	-387	-344	-117
1956-57	-224	-124	-5	8	8	8	8	6	-84	-267	-391	-347	-118
1957-58	-225	-124	-3	10	9	9	9	7	-84	-269	-395	-351	-118
1958-59	-227	-124	-2	11	11	11	10	8	-84	-272	-399	-354	-118
1959-60	-229	-124	-1	12	12	12	11	8	-84	-275	-403	-357	-118
1960-61	-230	-124	0	13	13	13	12	9	-84	-277	-407	-361	-119
1961-62	-232	-125	1	15	14	14	13	10	-84	-280	-410	-364	-120
1962-63	-234	-125	2	16	15	15	15	11	-85	-282	-414	-368	-120
1963-64	-235	-125	4	17	17	17	16	12	-85	-285	-418	-371	-120
1964-65	-237	-125	5	18	18	18	17	13	-85	-287	-422	-375	-121
1965-66	-238	-125	6	20	19	19	18	14	-85	-290	-426	-378	-121
1966-67	-240	-125	7	21	20	20	19	14	-80	-273	-402	-356	-115
1967-68	-226	-118	7	20	19	19	18	14	-75	-257	-378	-335	-108
1968-69	-213	-111	6	19	18	18	17	13	-70	-240	-354	-314	-102
1969-70	-199	-104	6	17	17	17	16	12	-65	-224	-330	-292	-95
1970-71	-185	-96	6	16	16	16	15	11	-61	-207	-305	-271	-88
1971-72	-172	-89	5	15	15	15	14	11	-56	-191	-281	-249	-81
1972-73	-158	-82	5	14	14	14	13	10	-51	-175	-257	-228	-74
1973-74	-144	-75	5	13	13	13	12	9	-46	-158	-233	-206	-67
1974-75	-131	-68	4	12	11	11	11	8	-41	-142	-208	-185	-60
1975-76	-117	-61	4	11	10	10	10	7	-36	-125	-184	-163	-53
1976-77	-103	-53	4	10	9	9	9	7	-31	-109	-160	-142	-46
1977-78	-90	-46	3	8	8	8	8	6	-27	-92	-136	-120	-39
1978-79	-76	-39	3	7	7	7	7	5	-22	-76	-112	-99	-32
1979-80	-62	-32	3	6	6	6	6	4	-17	-59	-87	-77	-25
1980-81	-49	-25	2	5	5	5	5	3	-15	-54	-79	-70	-22
1981-82	-44	-22	2	5	5	5	4	3	-13	-47	-69	-61	-20
1982-83	-39	-20	2	4	4	4	4	3	-11	-40	-59	-53	-17
1983-84	-33	-17	2	4	3	3	3	2	-10	-34	-50	-44	-14
1984-85	-28	-14	1	3	3	3	3	2	-8	-27	-40	-35	-11
1985-86	-22	-11	1	2	2	2	2	2	-6	-20	-30	-26	-9
1986-87	-17	-8	1	2	2	2	2	1	-4	-14	-20	-18	-6
1987-88	-11	-6	1	1	1	1	1	1	-2	-7	-10	-9	-3
1988-89	-6	-3	0	1	1	1	1	0	0	0	0	0	0
1989-90	0	0											
MEAN	-169	-98	-10	0	0	0	0	0	-65	-196	-285	-255	-91

PLS3D9

PUMPING FROM McNARY TO NORTH SIDE

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												-562	
1928-29	-449	-266	-68	0	0	0	0	0	-173	-366	-503	-562	-200
1929-30	-449	-266	-68	0	0	0	0	0	-173	-366	-503	-562	-200
1930-31	-449	-266	-68	0	0	0	0	0	-173	-366	-503	-562	-200
1931-32	-449	-266	-68	0	0	0	0	0	-173	-366	-503	-562	-200
1932-33	-449	-266	-68	0	0	0	0	0	-173	-366	-503	-562	-200
1933-34	-449	-266	-68	0	0	0	0	0	-173	-366	-503	-562	-200
1934-35	-449	-266	-68	0	0	0	0	0	-173	-366	-503	-562	-200
1935-36	-449	-266	-68	0	0	0	0	0	-173	-366	-503	-562	-200
1936-37	-449	-266	-68	0	0	0	0	0	-173	-366	-503	-562	-200
1937-38	-449	-266	-68	0	0	0	0	0	-173	-366	-503	-562	-200
1938-39	-449	-266	-68	0	0	0	0	0	-173	-366	-503	-562	-200
1939-40	-449	-266	-68	0	0	0	0	0	-173	-366	-503	-562	-200
1940-41	-449	-266	-68	0	0	0	0	0	-173	-366	-503	-562	-200
1941-42	-449	-266	-68	0	0	0	0	0	-173	-366	-503	-562	-200
1942-43	-449	-266	-68	0	0	0	0	0	-173	-366	-503	-562	-200
1943-44	-449	-266	-68	0	0	0	0	0	-173	-366	-503	-562	-200
1944-45	-449	-266	-68	0	0	0	0	0	-173	-366	-503	-562	-200
1945-46	-449	-266	-68	0	0	0	0	0	-173	-366	-503	-562	-200
1946-47	-449	-266	-68	0	0	0	0	0	-173	-366	-503	-562	-200
1947-48	-449	-266	-68	0	0	0	0	0	-173	-366	-503	-562	-200
1948-49	-449	-266	-68	0	0	0	0	0	-173	-366	-503	-562	-200
1949-50	-449	-266	-68	0	0	0	0	0	-173	-366	-503	-562	-200
1950-51	-449	-266	-68	0	0	0	0	0	-173	-366	-502	-561	-200
1951-52	-449	-265	-68	0	0	0	0	0	-173	-365	-501	-560	-199
1952-53	-448	-265	-68	0	0	0	0	0	-173	-365	-501	-559	-199
1953-54	-447	-264	-68	0	0	0	0	0	-172	-364	-500	-558	-199
1954-55	-447	-264	-68	0	0	0	0	0	-172	-364	-499	-558	-199
1955-56	-446	-264	-68	0	0	0	0	0	-172	-363	-498	-557	-198
1956-57	-445	-263	-68	0	0	0	0	0	-172	-362	-498	-556	-198
1957-58	-445	-263	-67	0	0	0	0	0	-171	-362	-497	-555	-198
1958-59	-444	-263	-67	0	0	0	0	0	-171	-361	-496	-554	-198
1959-60	-443	-262	-67	0	0	0	0	0	-171	-361	-495	-553	-197
1960-61	-443	-262	-67	0	0	0	0	0	-171	-360	-495	-553	-197
1961-62	-442	-261	-67	0	0	0	0	0	-170	-360	-494	-552	-197
1962-63	-441	-261	-67	0	0	0	0	0	-170	-359	-493	-551	-196
1963-64	-441	-261	-67	0	0	0	0	0	-170	-359	-492	-550	-196
1964-65	-440	-260	-67	0	0	0	0	0	-170	-358	-492	-549	-196
1965-66	-439	-260	-67	0	0	0	0	0	-169	-358	-491	-549	-196
1966-67	-439	-259	-67	0	0	0	0	0	-160	-337	-463	-517	-186
1967-68	-414	-245	-63	0	0	0	0	0	-150	-317	-435	-486	-174
1968-69	-389	-230	-59	0	0	0	0	0	-140	-296	-407	-454	-163
1969-70	-363	-215	-55	0	0	0	0	0	-131	-276	-378	-423	-152
1970-71	-338	-200	-51	0	0	0	0	0	-121	-255	-350	-391	-141
1971-72	-313	-185	-48	0	0	0	0	0	-111	-235	-322	-360	-130
1972-73	-288	-170	-44	0	0	0	0	0	-101	-214	-294	-329	-119
1973-74	-263	-155	-40	0	0	0	0	0	-92	-194	-266	-297	-107
1974-75	-238	-141	-36	0	0	0	0	0	-82	-173	-238	-266	-96
1975-76	-213	-126	-32	0	0	0	0	0	-72	-153	-210	-234	-85
1976-77	-188	-111	-28	0	0	0	0	0	-63	-132	-182	-203	-74
1977-78	-162	-96	-25	0	0	0	0	0	-53	-112	-154	-172	-63
1978-79	-137	-81	-21	0	0	0	0	0	-43	-91	-125	-140	-52
1979-80	-112	-66	-17	0	0	0	0	0	-34	-71	-97	-109	-40
1980-81	-87	-51	-13	0	0	0	0	0	-30	-63	-87	-97	-35
1981-82	-77	-46	-12	0	0	0	0	0	-26	-55	-76	-85	-31
1982-83	-68	-40	-10	0	0	0	0	0	-22	-47	-65	-73	-26
1983-84	-58	-34	-9	0	0	0	0	0	-19	-39	-54	-60	-22
1984-85	-48	-29	-7	0	0	0	0	0	-15	-32	-43	-48	-18
1985-86	-39	-23	-6	0	0	0	0	0	-11	-24	-32	-36	-14
1986-87	-29	-17	-4	0	0	0	0	0	-7	-16	-22	-24	-9
1987-88	-19	-11	-3	0	0	0	0	0	-4	-8	-11	-12	-5
1988-89	-10	-6	-1	0	0	0	0	0	0	0	0	0	-1
1989-90	0	0											
MEAN	-343	-203	-53	0	0	0	0	0	-132	-278	-382	-429	-153

NSM3D9

KENNEWICK PROJECT RETURN FLOW

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												105	
1928-29	105	109	105	79	67	67	74	57	49	67	89	105	81
1929-30	105	109	105	79	67	67	74	57	49	67	89	105	81
1930-31	105	109	105	79	67	67	74	57	49	67	89	105	81
1931-32	105	109	105	79	67	67	74	57	49	67	89	105	81
1932-33	105	109	105	79	67	67	74	57	49	67	89	105	81
1933-34	105	109	105	79	67	67	74	57	49	67	89	105	81
1934-35	105	109	105	79	67	67	74	57	49	67	89	105	81
1935-36	105	109	105	79	67	67	74	57	49	67	89	105	81
1936-37	105	109	105	79	67	67	74	57	49	67	89	105	81
1937-38	105	109	105	79	67	67	74	57	49	67	89	105	81
1938-39	105	109	105	79	67	67	74	57	49	67	89	105	81
1939-40	105	109	105	79	67	67	74	57	49	67	89	105	81
1940-41	105	109	105	79	67	67	74	57	49	67	89	105	81
1941-42	105	109	105	79	67	67	74	57	49	67	89	105	81
1942-43	105	109	105	79	67	67	74	57	49	67	89	105	81
1943-44	105	109	105	79	67	67	74	57	49	67	89	105	81
1944-45	105	109	105	79	67	67	74	57	49	67	89	105	81
1945-46	105	109	105	79	67	67	74	57	49	67	89	105	81
1946-47	105	109	105	79	67	67	74	57	49	67	89	105	81
1947-48	105	109	105	79	67	67	74	57	49	67	89	105	81
1948-49	105	109	105	79	67	67	74	57	49	67	89	105	81
1949-50	105	109	105	79	67	67	74	57	49	67	89	105	81
1950-51	105	109	105	79	67	67	74	57	49	67	89	105	81
1951-52	105	109	105	79	67	67	74	57	49	67	89	105	81
1952-53	105	109	105	79	67	67	74	57	49	67	89	105	81
1953-54	105	109	105	79	67	67	74	57	49	67	89	105	81
1954-55	105	109	105	79	67	67	74	57	49	67	89	105	81
1955-56	105	109	105	79	67	67	74	57	49	67	89	105	81
1956-57	105	109	105	79	67	67	74	57	49	67	89	105	81
1957-58	105	109	105	79	67	67	74	57	44	60	80	94	78
1958-59	94	98	94	71	60	60	67	51	39	53	71	84	69
1959-60	84	86	84	63	53	53	59	46	29	40	53	62	57
1960-61	62	64	62	47	40	40	44	34	19	26	34	41	41
1961-62	41	42	41	31	26	26	29	22	9	12	16	19	24
1962-63	19	20	19	14	12	12	14	11	9	12	16	19	15
1963-64	19	20	19	14	12	12	14	11	9	12	16	19	15
1964-65	19	20	19	14	12	12	14	11	9	12	16	19	15
1965-66	19	20	19	14	12	12	14	11	9	12	16	19	15
1966-67	19	20	19	14	12	12	14	11	9	12	16	19	15
1967-68	19	20	19	14	12	12	14	11	9	12	16	19	15
1968-69	19	20	19	14	12	12	14	11	9	12	16	19	15
1969-70	19	20	19	14	12	12	14	11	9	12	16	19	15
1970-71	19	20	19	14	12	12	14	11	9	12	16	19	15
1971-72	19	20	19	14	12	12	14	11	9	12	16	19	15
1972-73	19	20	19	14	12	12	14	11	9	12	16	19	15
1973-74	19	20	19	14	12	12	14	11	9	12	16	19	15
1974-75	19	20	19	14	12	12	14	11	9	12	16	19	15
1975-76	19	20	19	14	12	12	14	11	9	12	16	19	15
1976-77	19	20	19	14	12	12	14	11	9	12	16	19	15
1977-78	19	20	19	14	12	12	14	11	9	12	16	19	15
1978-79	19	20	19	14	12	12	14	11	9	12	16	19	15
1979-80	19	20	19	14	12	12	14	11	9	12	16	19	15
1980-81	19	20	19	14	12	12	14	11	8	11	14	17	14
1981-82	17	18	17	13	11	11	12	9	7	10	13	15	13
1982-83	15	15	15	11	10	10	11	8	6	8	11	13	11
1983-84	13	13	13	10	8	8	9	7	5	7	9	11	9
1984-85	11	11	11	8	7	7	8	6	4	5	7	9	8
1985-86	9	9	9	6	5	5	6	5	3	4	5	6	6
1986-87	6	7	6	5	4	4	5	4	2	3	4	4	4
1987-88	4	4	4	3	3	3	3	2	1	1	2	2	3
1988-89	2	2	2	2	1	1	2	1	0	0	0	0	1
1989-90	0	0											
MEAN	63	65	64	48	40	40	45	35	29	39	52	63	49

KEN3D9

McNARY NORTHSIDE RETURN FLOW

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												46	
1928-29	58	52	46	36	23	12	13	12	12	35	48	46	33
1929-30	58	52	46	36	23	12	13	12	12	35	48	46	33
1930-31	58	52	46	36	23	12	13	12	12	35	48	46	33
1931-32	58	52	46	36	23	12	13	12	12	35	48	46	33
1932-33	58	52	46	36	23	12	13	12	12	35	48	46	33
1933-34	58	52	46	36	23	12	13	12	12	35	48	46	33
1934-35	58	52	46	36	23	12	13	12	12	35	48	46	33
1935-36	58	52	46	36	23	12	13	12	12	35	48	46	33
1936-37	58	52	46	36	23	12	13	12	12	35	48	46	33
1937-38	58	52	46	36	23	12	13	12	12	35	48	46	33
1938-39	58	52	46	36	23	12	13	12	12	35	48	46	33
1939-40	58	52	46	36	23	12	13	12	12	35	48	46	33
1940-41	58	52	46	36	23	12	13	12	12	35	48	46	33
1941-42	58	52	46	36	23	12	13	12	12	35	48	46	33
1942-43	58	52	46	36	23	12	13	12	12	35	48	46	33
1943-44	58	52	46	36	23	12	13	12	12	35	48	46	33
1944-45	58	52	46	36	23	12	13	12	12	35	48	46	33
1945-46	58	52	46	36	23	12	13	12	12	35	48	46	33
1946-47	58	52	46	36	23	12	13	12	12	35	48	46	33
1947-48	58	52	46	36	23	12	13	12	12	35	48	46	33
1948-49	58	52	46	36	23	12	13	12	12	35	48	46	33
1949-50	58	52	46	36	23	12	13	12	12	35	48	46	33
1950-51	58	52	46	36	23	12	13	12	12	35	48	46	33
1951-52	58	52	46	36	23	12	13	12	12	35	48	46	33
1952-53	58	52	46	36	23	12	13	12	12	35	48	46	33
1953-54	58	52	46	36	23	12	13	12	12	35	48	46	33
1954-55	58	52	46	36	23	12	13	12	12	35	48	46	33
1955-56	58	52	46	36	23	12	13	12	12	34	47	46	33
1956-57	57	51	46	36	23	11	13	11	12	34	47	46	33
1957-58	57	51	46	36	23	11	13	11	12	34	47	46	32
1958-59	57	51	46	36	23	11	13	11	12	34	47	46	32
1959-60	57	51	46	35	23	11	13	11	12	34	47	45	32
1960-61	57	51	45	35	23	11	13	11	12	34	47	46	32
1961-62	57	51	46	35	23	11	13	11	12	34	47	46	32
1962-63	57	51	46	35	23	11	13	11	12	34	47	45	32
1963-64	57	51	45	35	23	11	13	11	12	34	47	45	32
1964-65	57	51	45	35	23	11	13	11	12	34	47	45	32
1965-66	57	51	45	35	23	11	13	11	12	34	47	45	32
1966-67	57	51	45	35	23	11	13	11	11	32	44	43	31
1967-68	53	48	43	33	21	11	12	11	10	30	41	40	30
1968-69	50	45	40	31	20	10	11	10	10	28	39	37	28
1969-70	47	42	37	29	19	9	10	9	9	26	36	35	26
1970-71	44	39	35	27	17	9	10	9	8	24	33	32	24
1971-72	40	36	32	25	16	8	9	8	8	22	31	30	22
1972-73	37	33	30	23	15	7	8	7	7	20	28	27	20
1973-74	34	30	27	21	14	7	8	7	6	18	25	25	19
1974-75	31	27	25	19	12	6	7	6	6	16	23	22	17
1975-76	27	25	22	17	11	5	6	5	5	15	20	19	15
1976-77	24	22	19	15	10	5	5	5	4	13	17	17	13
1977-78	21	19	17	13	8	4	5	4	4	11	15	14	11
1978-79	18	16	14	11	7	4	4	4	3	9	12	12	9
1979-80	14	13	12	9	6	3	3	3	2	7	9	9	8
1980-81	11	10	9	7	4	2	2	2	2	6	8	8	6
1981-82	10	9	8	6	4	2	2	2	2	5	7	7	5
1982-83	9	8	7	5	3	2	2	2	2	4	6	6	5
1983-84	7	7	6	5	3	1	2	1	1	4	5	5	4
1984-85	6	6	5	4	2	1	1	1	1	3	4	4	3
1985-86	5	4	4	3	2	1	1	1	1	2	3	3	3
1986-87	4	3	3	2	1	1	1	1	1	1	2	2	2
1987-88	2	2	2	2	1	0	1	0	0	1	1	1	1
1988-89	1	1	1	1	0	0	0	0	0	0	0	0	0
1989-90	0	0											
MEAN	44	40	36	28	18	9	10	9	9	26	36	35	25

NSR3D9

PUMPING FROM McNARY TO UMATILLA SUBAREA

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
												-554	
1927-28									-171	-361	-496	-554	-197
1928-29	-443	-262	-67	0	0	0	0	0	-171	-361	-496	-554	-197
1929-30	-443	-262	-67	0	0	0	0	0	-171	-361	-496	-554	-197
1930-31	-443	-262	-67	0	0	0	0	0	-171	-361	-496	-554	-197
1931-32	-443	-262	-67	0	0	0	0	0	-171	-361	-496	-554	-197
1932-33	-443	-262	-67	0	0	0	0	0	-171	-361	-496	-554	-197
1933-34	-443	-262	-67	0	0	0	0	0	-171	-361	-496	-554	-197
1934-35	-443	-262	-67	0	0	0	0	0	-171	-361	-496	-554	-197
1935-36	-443	-262	-67	0	0	0	0	0	-171	-361	-496	-554	-197
1936-37	-443	-262	-67	0	0	0	0	0	-171	-361	-496	-554	-197
1937-38	-443	-262	-67	0	0	0	0	0	-171	-361	-496	-554	-197
1938-39	-443	-262	-67	0	0	0	0	0	-171	-361	-496	-554	-197
1939-40	-443	-262	-67	0	0	0	0	0	-171	-361	-496	-554	-197
1940-41	-443	-262	-67	0	0	0	0	0	-171	-361	-496	-554	-197
1941-42	-443	-262	-67	0	0	0	0	0	-171	-361	-496	-554	-197
1942-43	-443	-262	-67	0	0	0	0	0	-171	-361	-496	-554	-197
1943-44	-443	-262	-67	0	0	0	0	0	-171	-361	-496	-554	-197
1944-45	-443	-262	-67	0	0	0	0	0	-171	-361	-496	-554	-197
1945-46	-443	-262	-67	0	0	0	0	0	-171	-361	-496	-554	-197
1946-47	-443	-262	-67	0	0	0	0	0	-171	-361	-496	-554	-197
1947-48	-443	-262	-67	0	0	0	0	0	-171	-361	-496	-554	-197
1948-49	-443	-262	-67	0	0	0	0	0	-171	-361	-496	-554	-197
1949-50	-443	-262	-67	0	0	0	0	0	-171	-361	-496	-554	-197
1950-51	-443	-262	-67	0	0	0	0	0	-169	-356	-489	-547	-195
1951-52	-437	-259	-66	0	0	0	0	0	-166	-352	-483	-539	-192
1952-53	-431	-255	-65	0	0	0	0	0	-164	-347	-476	-532	-190
1953-54	-425	-251	-65	0	0	0	0	0	-162	-342	-469	-524	-187
1954-55	-420	-248	-64	0	0	0	0	0	-160	-337	-463	-517	-185
1955-56	-414	-244	-63	0	0	0	0	0	-157	-332	-456	-510	-181
1956-57	-408	-241	-62	0	0	0	0	0	-155	-327	-449	-502	-179
1957-58	-402	-237	-61	0	0	0	0	0	-153	-323	-443	-495	-177
1958-59	-396	-234	-60	0	0	0	0	0	-150	-318	-436	-487	-174
1959-60	-390	-230	-59	0	0	0	0	0	-134	-284	-390	-435	-157
1960-61	-348	-206	-53	0	0	0	0	0	-146	-308	-423	-472	-167
1961-62	-378	-223	-57	0	0	0	0	0	-144	-303	-416	-465	-166
1962-63	-372	-220	-56	0	0	0	0	0	-141	-298	-410	-458	-163
1963-64	-366	-216	-56	0	0	0	0	0	-139	-294	-403	-450	-160
1964-65	-360	-213	-55	0	0	0	0	0	-137	-289	-396	-443	-158
1965-66	-354	-209	-54	0	0	0	0	0	-134	-284	-390	-435	-156
1966-67	-348	-206	-53	0	0	0	0	0	-125	-264	-362	-404	-146
1967-68	-323	-191	-49	0	0	0	0	0	-115	-243	-334	-373	-134
1968-69	-299	-176	-45	0	0	0	0	0	-106	-223	-306	-342	-123
1969-70	-274	-162	-42	0	0	0	0	0	-96	-203	-278	-311	-112
1970-71	-249	-147	-38	0	0	0	0	0	-86	-182	-250	-280	-101
1971-72	-224	-132	-34	0	0	0	0	0	-77	-162	-223	-249	-90
1972-73	-199	-118	-30	0	0	0	0	0	-67	-142	-195	-218	-79
1973-74	-174	-103	-26	0	0	0	0	0	-58	-122	-167	-187	-68
1974-75	-149	-88	-23	0	0	0	0	0	-48	-101	-139	-155	-57
1975-76	-124	-74	-19	0	0	0	0	0	-38	-81	-111	-124	-46
1976-77	-100	-59	-15	0	0	0	0	0	-29	-61	-83	-93	-35
1977-78	-75	-44	-11	0	0	0	0	0	-19	-41	-56	-62	-24
1978-79	-50	-29	-8	0	0	0	0	0	-10	-20	-28	-31	-13
1979-80	-25	-15	-4	0	0	0	0	0	0	0	0	0	-2
1980-81	0	0	0	0	0	0	0	0	0	0	0	0	0
1981-82	0	0	0	0	0	0	0	0	0	0	0	0	0
1982-83	0	0	0	0	0	0	0	0	0	0	0	0	0
1983-84	0	0	0	0	0	0	0	0	0	0	0	0	0
1984-85	0	0	0	0	0	0	0	0	0	0	0	0	0
1985-86	0	0	0	0	0	0	0	0	0	0	0	0	0
1986-87	0	0	0	0	0	0	0	0	0	0	0	0	0
1987-88	0	0	0	0	0	0	0	0	0	0	0	0	0
1988-89	0	0	0	0	0	0	0	0	0	0	0	0	0
1989-90	0	0											
MEAN	-302	-178	-47	0	0	0	0	0	-116	-244	-335	-377	-157

UMP3D9

WALLA WALLA RIVER

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												-326	
1928-29	-217	-130	-54	-9	-6	-6	-6	-4	-245	-590	-629	-326	-186
1929-30	-217	-130	-54	-9	-6	-6	-6	-4	-245	-590	-629	-326	-186
1930-31	-217	-130	-54	-9	-6	-6	-6	-4	-245	-590	-629	-326	-186
1931-32	-217	-130	-54	-9	-6	-6	-6	-4	-245	-590	-629	-326	-186
1932-33	-217	-130	-54	-9	-6	-6	-6	-4	-245	-590	-629	-326	-186
1933-34	-217	-130	-54	-9	-6	-6	-6	-4	-245	-590	-629	-326	-186
1934-35	-217	-130	-54	-9	-6	-6	-6	-4	-245	-590	-629	-326	-186
1935-36	-217	-130	-54	-9	-6	-6	-6	-4	-245	-590	-629	-326	-186
1936-37	-217	-130	-54	-9	-6	-6	-6	-4	-245	-590	-629	-326	-186
1937-38	-217	-130	-54	-9	-6	-6	-6	-4	-245	-590	-629	-326	-186
1938-39	-217	-130	-54	-9	-6	-6	-6	-4	-245	-590	-629	-326	-186
1939-40	-217	-130	-54	-9	-6	-6	-6	-4	-245	-590	-629	-326	-186
1940-41	-217	-130	-54	-9	-6	-6	-6	-4	-245	-590	-629	-326	-186
1941-42	-217	-130	-54	-9	-6	-6	-6	-4	-245	-590	-629	-326	-186
1942-43	-217	-130	-54	-9	-6	-6	-6	-4	-245	-590	-629	-326	-186
1943-44	-217	-130	-54	-9	-6	-6	-6	-4	-245	-590	-629	-326	-186
1944-45	-217	-130	-54	-9	-6	-6	-6	-4	-245	-590	-629	-326	-186
1945-46	-217	-130	-54	-9	-6	-6	-6	-4	-245	-590	-629	-326	-186
1946-47	-217	-130	-54	-9	-6	-6	-6	-4	-234	-581	-599	-312	-179
1947-48	-209	-127	-54	-11	-8	-8	-8	-6	-224	-533	-569	-298	-172
1948-49	-202	-124	-54	-13	-10	-10	-10	-7	-213	-504	-539	-284	-165
1949-50	-194	-121	-54	-15	-12	-12	-12	-9	-202	-475	-509	-271	-158
1950-51	-186	-118	-54	-17	-15	-15	-14	-10	-198	-483	-496	-265	-155
1951-52	-183	-118	-54	-19	-16	-16	-15	-12	-194	-450	-483	-260	-152
1952-53	-181	-118	-55	-21	-18	-18	-17	-13	-190	-437	-470	-255	-150
1953-54	-178	-117	-56	-22	-20	-20	-19	-14	-185	-425	-458	-250	-148
1954-55	-176	-117	-57	-24	-22	-22	-21	-15	-181	-412	-445	-244	-145
1955-56	-173	-117	-58	-26	-23	-23	-22	-17	-177	-400	-432	-239	-142
1956-57	-171	-117	-59	-28	-25	-25	-24	-18	-173	-387	-419	-234	-140
1957-58	-168	-117	-60	-29	-27	-27	-26	-19	-168	-375	-406	-229	-138
1958-59	-166	-117	-60	-31	-29	-29	-27	-21	-164	-362	-393	-223	-136
1959-60	-163	-116	-61	-33	-31	-31	-29	-22	-160	-350	-380	-218	-133
1960-61	-161	-116	-62	-35	-32	-32	-31	-23	-156	-337	-367	-213	-131
1961-62	-158	-116	-63	-37	-34	-34	-32	-24	-151	-325	-355	-208	-129
1962-63	-156	-116	-64	-38	-36	-36	-34	-26	-147	-312	-342	-202	-126
1963-64	-153	-116	-65	-40	-38	-38	-36	-27	-143	-300	-329	-197	-124
1964-65	-151	-116	-65	-42	-40	-40	-38	-28	-139	-287	-316	-192	-121
1965-66	-148	-116	-66	-44	-41	-41	-39	-30	-134	-275	-303	-187	-119
1966-67	-146	-115	-67	-46	-43	-43	-41	-31	-129	-263	-291	-179	-116
1967-68	-139	-110	-64	-43	-41	-41	-39	-29	-123	-252	-278	-171	-111
1968-69	-133	-105	-61	-41	-39	-39	-37	-28	-117	-241	-265	-162	-106
1969-70	-126	-99	-57	-38	-36	-36	-34	-26	-111	-229	-253	-154	-100
1970-71	-120	-94	-54	-36	-34	-34	-32	-24	-106	-218	-240	-146	-95
1971-72	-113	-88	-51	-34	-32	-32	-30	-23	-100	-207	-228	-138	-90
1972-73	-107	-83	-47	-31	-30	-30	-28	-21	-94	-196	-215	-130	-85
1973-74	-100	-78	-44	-29	-27	-27	-26	-19	-88	-184	-203	-122	-79
1974-75	-94	-72	-41	-27	-25	-25	-24	-18	-83	-173	-190	-114	-74
1975-76	-87	-67	-38	-24	-23	-23	-22	-16	-77	-162	-177	-106	-68
1976-77	-81	-61	-34	-22	-21	-21	-19	-15	-71	-150	-165	-98	-63
1977-78	-74	-56	-31	-19	-18	-18	-17	-13	-65	-139	-152	-90	-58
1978-79	-67	-50	-28	-17	-16	-16	-15	-11	-59	-128	-140	-81	-53
1979-80	-61	-45	-25	-15	-14	-14	-13	-10	-54	-117	-127	-73	-47
1980-81	-54	-40	-21	-12	-11	-11	-11	-8	-110	-285	-299	-142	-84
1981-82	-86	-40	-9	13	14	14	13	10	-97	-252	-264	-126	-68
1982-83	-76	-35	-7	12	13	13	12	9	-84	-219	-230	-109	-59
1983-84	-66	-30	-6	11	11	11	11	8	-71	-185	-195	-92	-50
1984-85	-55	-25	-5	9	10	10	9	7	-58	-152	-160	-75	-41
1985-86	-45	-20	-4	8	8	8	8	6	-45	-119	-125	-59	-32
1986-87	-35	-15	-2	7	7	7	7	5	-33	-86	-90	-42	-23
1987-88	-25	-10	-1	5	6	6	5	4	-20	-53	-56	-25	-14
1988-89	-14	-5	0	4	4	4	4	3	0	0	0	0	0
1989-90	0	0											
MEAN	-150	-98	-47	-17	-15	-15	-14	-11	-160	-371	-398	-216	-127

WWA3D9

PUMPING FROM JOHN DAY TO NORTH SIDE

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												-265	
1928-29	-212	-126	-32	0	0	0	0	0	-82	-173	-238	-265	-95
1929-30	-212	-126	-32	0	0	0	0	0	-82	-173	-238	-265	-95
1930-31	-212	-126	-32	0	0	0	0	0	-82	-173	-238	-265	-95
1931-32	-212	-126	-32	0	0	0	0	0	-82	-173	-238	-265	-94
1932-33	-212	-126	-32	0	0	0	0	0	-82	-173	-238	-265	-95
1933-34	-212	-126	-32	0	0	0	0	0	-82	-173	-238	-265	-95
1934-35	-212	-126	-32	0	0	0	0	0	-82	-173	-238	-265	-95
1935-36	-212	-126	-32	0	0	0	0	0	-82	-173	-238	-265	-94
1936-37	-212	-126	-32	0	0	0	0	0	-82	-173	-238	-265	-95
1937-38	-212	-126	-32	0	0	0	0	0	-82	-173	-238	-265	-95
1938-39	-212	-126	-32	0	0	0	0	0	-82	-173	-238	-265	-95
1939-40	-212	-126	-32	0	0	0	0	0	-82	-173	-238	-265	-94
1940-41	-212	-126	-32	0	0	0	0	0	-82	-173	-238	-265	-95
1941-42	-212	-126	-32	0	0	0	0	0	-82	-173	-238	-265	-95
1942-43	-212	-126	-32	0	0	0	0	0	-82	-173	-238	-265	-95
1943-44	-212	-126	-32	0	0	0	0	0	-82	-173	-238	-265	-94
1944-45	-212	-126	-32	0	0	0	0	0	-82	-173	-238	-265	-95
1945-46	-212	-126	-32	0	0	0	0	0	-82	-173	-238	-265	-95
1946-47	-212	-126	-32	0	0	0	0	0	-82	-173	-238	-265	-95
1947-48	-212	-126	-32	0	0	0	0	0	-82	-173	-238	-265	-94
1948-49	-212	-126	-32	0	0	0	0	0	-82	-173	-238	-265	-95
1949-50	-212	-126	-32	0	0	0	0	0	-82	-173	-238	-265	-95
1950-51	-212	-126	-32	0	0	0	0	0	-82	-173	-238	-265	-95
1951-52	-212	-126	-32	0	0	0	0	0	-82	-173	-238	-265	-94
1952-53	-212	-126	-32	0	0	0	0	0	-82	-173	-238	-265	-95
1953-54	-212	-126	-32	0	0	0	0	0	-82	-173	-238	-265	-95
1954-55	-212	-126	-32	0	0	0	0	0	-82	-173	-238	-265	-95
1955-56	-212	-126	-32	0	0	0	0	0	-82	-173	-238	-265	-94
1956-57	-212	-126	-32	0	0	0	0	0	-82	-173	-238	-265	-95
1957-58	-212	-126	-32	0	0	0	0	0	-82	-173	-238	-265	-95
1958-59	-212	-126	-32	0	0	0	0	0	-82	-173	-238	-265	-95
1959-60	-212	-126	-32	0	0	0	0	0	-82	-173	-238	-265	-94
1960-61	-212	-126	-32	0	0	0	0	0	-82	-173	-238	-265	-95
1961-62	-212	-126	-32	0	0	0	0	0	-82	-173	-238	-265	-95
1962-63	-212	-126	-32	0	0	0	0	0	-82	-173	-238	-265	-95
1963-64	-212	-126	-32	0	0	0	0	0	-82	-173	-238	-265	-94
1964-65	-212	-126	-32	0	0	0	0	0	-82	-173	-238	-265	-95
1965-66	-212	-126	-32	0	0	0	0	0	-82	-173	-238	-265	-95
1966-67	-212	-126	-32	0	0	0	0	0	-77	-163	-224	-250	-90
1967-68	-200	-118	-30	0	0	0	0	0	-72	-153	-209	-234	-84
1968-69	-187	-111	-28	0	0	0	0	0	-67	-142	-195	-218	-79
1969-70	-175	-103	-27	0	0	0	0	0	-63	-132	-181	-203	-73
1970-71	-162	-96	-25	0	0	0	0	0	-58	-122	-167	-187	-67
1971-72	-150	-88	-23	0	0	0	0	0	-53	-112	-153	-171	-62
1972-73	-137	-81	-21	0	0	0	0	0	-48	-101	-139	-156	-56
1973-74	-124	-74	-19	0	0	0	0	0	-43	-91	-125	-140	-51
1974-75	-112	-66	-17	0	0	0	0	0	-38	-81	-111	-124	-45
1975-76	-99	-59	-15	0	0	0	0	0	-33	-71	-97	-108	-39
1976-77	-87	-51	-13	0	0	0	0	0	-29	-60	-83	-93	-34
1977-78	-74	-44	-11	0	0	0	0	0	-24	-50	-69	-77	-28
1978-79	-62	-36	-9	0	0	0	0	0	-19	-40	-55	-61	-23
1979-80	-49	-29	-7	0	0	0	0	0	-14	-30	-41	-46	-17
1980-81	-36	-22	-6	0	0	0	0	0	-13	-26	-36	-41	-15
1981-82	-32	-19	-5	0	0	0	0	0	-11	-23	-32	-35	-13
1982-83	-28	-17	-4	0	0	0	0	0	-9	-20	-27	-30	-11
1983-84	-24	-14	-4	0	0	0	0	0	-8	-17	-23	-25	-9
1984-85	-20	-12	-3	0	0	0	0	0	-6	-13	-18	-20	-7
1985-86	-16	-10	-2	0	0	0	0	0	-5	-10	-14	-15	-6
1986-87	-12	-7	-2	0	0	0	0	0	-3	-7	-9	-10	-4
1987-88	-8	-5	-1	0	0	0	0	0	-2	-3	-5	-5	-2
1988-89	-4	-2	-1	0	0	0	0	0	0	0	0	0	0
1989-90	0	0											
MEAN	-163	-96	-25	0	0	0	0	0	-62	-132	-181	-203	-72

NSJ3D9

UMATILLA RIVER AND WILLOW CREEK

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												311	
1928-29	177	-44	-148	-128	-74	-49	-41	-25	-38	149	223	312	27
1929-30	178	-44	-148	-128	-74	-49	-41	-25	-38	150	224	314	27
1930-31	179	-44	-149	-128	-74	-50	-41	-25	-39	150	225	316	28
1931-32	180	-43	-149	-129	-75	-50	-41	-25	-39	151	227	317	28
1932-33	181	-43	-150	-129	-75	-50	-41	-25	-39	152	228	319	28
1933-34	182	-43	-150	-129	-75	-50	-42	-25	-39	153	229	320	28
1934-35	183	-43	-150	-130	-75	-50	-42	-25	-39	154	230	322	29
1935-36	184	-43	-151	-130	-75	-50	-42	-25	-39	154	231	323	29
1936-37	185	-43	-151	-130	-76	-50	-42	-25	-39	155	232	325	29
1937-38	186	-43	-152	-131	-76	-51	-42	-25	-39	156	234	326	30
1938-39	187	-43	-152	-131	-76	-51	-42	-25	-39	157	235	328	30
1939-40	188	-43	-152	-131	-76	-51	-42	-25	-39	157	236	330	30
1940-41	189	-43	-153	-132	-76	-51	-42	-25	-40	158	237	331	30
1941-42	190	-43	-153	-132	-77	-51	-42	-26	-40	159	238	333	31
1942-43	191	-43	-154	-132	-77	-51	-42	-26	-40	160	239	334	31
1943-44	192	-43	-154	-133	-77	-51	-43	-26	-40	161	241	336	31
1944-45	193	-42	-154	-133	-77	-51	-43	-26	-40	161	242	337	31
1945-46	194	-42	-155	-133	-77	-52	-43	-26	-40	162	243	339	32
1946-47	195	-42	-155	-134	-78	-52	-43	-26	-37	154	231	321	28
1947-48	186	-37	-143	-123	-71	-48	-40	-24	-34	146	219	303	28
1948-49	177	-31	-131	-113	-65	-44	-36	-22	-31	138	207	285	28
1949-50	168	-26	-119	-102	-59	-40	-33	-20	-27	129	194	267	28
1950-51	159	-20	-106	-92	-53	-35	-29	-18	-26	124	186	255	29
1951-52	152	-19	-102	-88	-51	-34	-28	-17	-25	118	177	243	27
1952-53	145	-19	-98	-84	-49	-33	-27	-16	-24	112	168	231	26
1953-54	138	-18	-93	-80	-47	-31	-26	-16	-23	106	159	220	24
1954-55	130	-18	-89	-77	-44	-30	-25	-15	-22	100	151	208	22
1955-56	123	-17	-85	-73	-42	-28	-23	-14	-21	95	142	196	21
1956-57	116	-17	-80	-69	-40	-27	-22	-13	-20	89	133	184	19
1957-58	109	-16	-76	-65	-38	-25	-21	-13	-19	83	125	172	18
1958-59	101	-16	-72	-62	-36	-24	-20	-12	-17	77	116	160	16
1959-60	94	-15	-67	-58	-34	-22	-19	-11	-16	71	107	148	15
1960-61	87	-14	-63	-54	-31	-21	-17	-10	-15	66	98	136	13
1961-62	80	-14	-59	-51	-29	-20	-16	-10	-14	60	90	124	11
1962-63	72	-13	-54	-47	-27	-18	-15	-9	-13	54	81	112	10
1963-64	65	-13	-50	-43	-25	-17	-14	-8	-12	48	72	101	8
1964-65	58	-12	-46	-39	-23	-15	-13	-8	-11	42	63	89	7
1965-66	51	-12	-41	-36	-21	-14	-11	-7	-10	37	55	77	5
1966-67	43	-11	-37	-32	-19	-12	-10	-6	-8	30	45	63	3
1967-68	35	-11	-33	-28	-16	-11	-9	-5	-7	23	34	49	1
1968-69	26	-11	-29	-25	-14	-10	-8	-5	-6	16	24	36	-1
1969-70	18	-11	-24	-21	-12	-8	-7	-4	-5	10	14	22	-3
1970-71	9	-11	-20	-17	-10	-7	-6	-3	-4	3	4	9	-5
1971-72	0	-11	-16	-14	-8	-5	-4	-3	-3	-4	-6	-5	-7
1972-73	-8	-11	-12	-10	-6	-4	-3	-2	-2	-11	-16	-19	-9
1973-74	-17	-11	-8	-7	-4	-3	-2	-1	-1	-17	-26	-32	-12
1974-75	-25	-11	-4	-3	-2	-1	-1	-1	0	-24	-36	-46	-14
1975-76	-34	-11	1	0	0	0	0	0	1	-31	-47	-60	-16
1976-77	-42	-11	5	4	2	2	1	1	2	-37	-57	-73	-18
1977-78	-51	-11	9	8	4	3	2	1	3	-44	-67	-87	-20
1978-79	-60	-12	13	11	7	4	4	2	4	-51	-77	-100	-22
1979-80	-68	-12	17	15	9	6	5	3	6	-58	-87	-114	-24
1980-81	-77	-12	21	18	11	7	6	4	0	-10	-15	-19	0
1981-82	-15	-6	-2	-1	-1	-1	0	0	0	-8	-13	-15	-5
1982-83	-12	-5	-2	-1	-1	-1	0	0	0	-6	-10	-12	-4
1983-84	-9	-5	-2	-2	-1	-1	0	0	0	-5	-7	-8	-3
1984-85	-7	-4	-2	-2	-1	-1	-1	0	-1	-3	-4	-5	-2
1985-86	-4	-3	-2	-2	-1	-1	-1	0	-1	-1	-1	-1	-1
1986-87	-2	-2	-2	-2	-1	-1	-1	0	-1	1	1	2	0
1987-88	1	-1	-2	-2	-1	-1	-1	0	-1	3	4	6	1
1988-89	3	0	-2	-2	-1	-1	-1	0	0	0	0	0	-1
1989-90	0	0											
MEAN	88	-22	-75	-65	-38	-25	-21	-13	-19	73	109	155	12

UMW3D9

UMATILLA RETURN FLOW

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												54	
1928-29	67	60	54	42	27	13	15	13	14	40	56	54	38
1929-30	67	60	54	42	27	13	15	13	14	40	56	54	38
1930-31	67	60	54	42	27	13	15	13	14	40	56	54	38
1931-32	67	60	54	42	27	13	15	13	14	40	56	54	38
1932-33	67	60	54	42	27	13	15	13	14	40	56	54	38
1933-34	67	60	54	42	27	13	15	13	14	40	56	54	38
1934-35	67	60	54	42	27	13	15	13	14	40	56	54	38
1935-36	67	60	54	42	27	13	15	13	14	40	56	54	38
1936-37	67	60	54	42	27	13	15	13	14	40	56	54	38
1937-38	67	60	54	42	27	13	15	13	14	40	56	54	38
1938-39	67	60	54	42	27	13	15	13	14	40	56	54	38
1939-40	67	60	54	42	27	13	15	13	14	40	56	54	38
1940-41	67	60	54	42	27	13	15	13	14	40	56	54	38
1941-42	67	60	54	42	27	13	15	13	14	40	56	54	38
1942-43	67	60	54	42	27	13	15	13	14	40	56	54	38
1943-44	67	60	54	42	27	13	15	13	14	40	56	54	38
1944-45	67	60	54	42	27	13	15	13	14	40	56	54	38
1945-46	67	60	54	42	27	13	15	13	14	40	56	54	38
1946-47	67	60	54	42	27	13	15	13	14	40	56	54	38
1947-48	67	60	54	42	27	13	15	13	14	40	56	54	38
1948-49	67	60	54	42	27	13	15	13	14	40	56	54	38
1949-50	67	60	54	42	27	13	15	13	14	40	56	54	38
1950-51	67	60	54	42	27	13	15	13	14	40	56	53	38
1951-52	67	60	53	41	27	13	15	13	14	40	54	53	38
1952-53	66	59	53	41	26	13	15	13	13	39	54	52	37
1953-54	65	58	52	40	26	13	14	13	13	39	53	51	37
1954-55	64	58	51	40	26	13	14	13	13	38	53	51	36
1955-56	64	57	51	39	25	13	14	13	13	38	52	50	36
1956-57	63	56	50	39	25	13	14	13	13	37	51	50	35
1957-58	62	56	50	38	25	12	14	12	13	37	51	49	35
1958-59	61	55	49	38	25	12	14	12	13	36	50	48	35
1959-60	61	54	48	38	24	12	13	12	11	33	46	44	33
1960-61	55	49	44	34	22	11	12	11	12	35	49	47	32
1961-62	59	53	47	37	24	12	13	12	12	35	48	47	33
1962-63	58	52	47	36	23	12	13	12	12	34	48	46	33
1963-64	57	51	46	36	23	11	13	11	12	34	47	45	32
1964-65	57	51	45	35	23	11	13	11	12	34	46	45	32
1965-66	56	50	45	35	22	11	12	11	11	33	46	44	32
1966-67	55	49	44	34	22	11	12	11	11	31	43	42	31
1967-68	52	47	42	32	21	10	12	10	10	29	40	39	29
1968-69	49	44	39	30	20	10	11	10	9	27	38	36	27
1969-70	46	41	36	28	18	9	10	9	9	25	35	34	25
1970-71	42	38	34	26	17	8	9	8	8	23	32	31	23
1971-72	39	35	31	24	16	8	9	8	7	22	30	29	21
1972-73	36	32	29	22	14	7	8	7	7	20	27	26	20
1973-74	33	29	26	20	13	7	7	7	6	18	24	24	18
1974-75	30	26	24	18	12	6	7	6	5	16	22	21	16
1975-76	26	24	21	16	11	5	6	5	5	14	19	18	14
1976-77	23	21	18	14	9	5	5	5	4	12	16	16	12
1977-78	20	18	16	12	8	4	4	4	3	10	14	13	11
1978-79	17	15	13	10	7	3	4	3	3	8	11	11	9
1979-80	13	12	11	8	5	3	3	3	2	6	8	8	7
1980-81	10	9	8	6	4	2	2	2	2	5	8	7	6
1981-82	9	8	7	6	4	2	2	2	2	5	7	6	5
1982-83	8	7	6	5	3	2	2	2	1	4	6	5	4
1983-84	7	6	5	4	3	1	2	1	1	3	5	5	4
1984-85	6	5	5	4	2	1	1	1	1	3	4	4	3
1985-86	5	4	4	3	2	1	1	1	1	2	3	3	2
1986-87	3	3	3	2	1	1	1	1	0	1	2	2	2
1987-88	2	2	2	1	1	0	1	0	0	1	1	1	1
1988-89	1	1	1	1	0	0	0	0	0	0	0	0	0
1989-90	0	0											
MEAN	48	43	39	30	20	10	11	10	10	29	40	39	28

UMR3D9

PUMPING JOHN DAY TO MORROW & GILLIAM COUNTIES

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												-793	
1928-29	-595	-318	-18	69	44	22	25	22	-249	-509	-698	-793	-251
1929-30	-595	-318	-18	69	44	22	25	22	-249	-509	-698	-793	-251
1930-31	-595	-318	-18	69	44	22	25	22	-249	-509	-698	-793	-251
1931-32	-595	-318	-18	69	44	22	25	22	-249	-509	-698	-793	-251
1932-33	-595	-318	-18	69	44	22	25	22	-249	-509	-698	-793	-251
1933-34	-595	-318	-18	69	44	22	25	22	-249	-509	-698	-793	-251
1934-35	-595	-318	-18	69	44	22	25	22	-249	-509	-698	-793	-251
1935-36	-595	-318	-18	69	44	22	25	22	-249	-509	-698	-793	-251
1936-37	-595	-318	-18	69	44	22	25	22	-249	-509	-698	-793	-251
1937-38	-595	-318	-18	69	44	22	25	22	-249	-509	-698	-793	-251
1938-39	-595	-318	-18	69	44	22	25	22	-249	-509	-698	-793	-251
1939-40	-595	-318	-18	69	44	22	25	22	-249	-509	-698	-793	-251
1940-41	-595	-318	-18	69	44	22	25	22	-249	-509	-698	-793	-251
1941-42	-595	-318	-18	69	44	22	25	22	-249	-509	-698	-793	-251
1942-43	-595	-318	-18	69	44	22	25	22	-249	-509	-698	-793	-251
1943-44	-595	-318	-18	69	44	22	25	22	-249	-509	-698	-793	-251
1944-45	-595	-318	-18	69	44	22	25	22	-249	-509	-698	-793	-251
1945-46	-595	-318	-18	69	44	22	25	22	-249	-509	-698	-793	-251
1946-47	-595	-318	-18	69	44	22	25	22	-249	-509	-698	-793	-251
1947-48	-595	-318	-18	69	44	22	25	22	-249	-509	-698	-793	-251
1948-49	-595	-318	-18	69	44	22	25	22	-249	-509	-698	-793	-251
1949-50	-595	-318	-18	69	44	22	25	22	-249	-509	-698	-793	-251
1950-51	-595	-318	-18	69	44	22	25	22	-249	-509	-698	-793	-251
1951-52	-595	-318	-18	69	44	22	25	22	-249	-509	-698	-793	-251
1952-53	-595	-318	-18	69	44	22	25	22	-249	-509	-698	-793	-251
1953-54	-595	-318	-18	69	44	22	25	22	-249	-509	-698	-793	-251
1954-55	-595	-318	-18	69	44	22	25	22	-249	-509	-698	-793	-251
1955-56	-595	-318	-18	69	44	22	25	22	-249	-509	-698	-793	-251
1956-57	-595	-318	-18	69	44	22	25	22	-249	-509	-698	-793	-251
1957-58	-595	-318	-18	69	44	22	25	22	-249	-509	-698	-793	-251
1958-59	-595	-318	-18	69	44	22	25	22	-249	-509	-698	-793	-251
1959-60	-595	-318	-18	69	44	22	25	22	-249	-509	-698	-793	-251
1960-61	-595	-318	-18	69	44	22	25	22	-249	-509	-698	-793	-251
1961-62	-595	-318	-18	69	44	22	25	22	-249	-509	-698	-793	-251
1962-63	-595	-318	-18	69	44	22	25	22	-249	-509	-698	-793	-251
1963-64	-595	-318	-18	69	44	22	25	22	-249	-509	-698	-793	-251
1964-65	-595	-318	-18	69	44	22	25	22	-249	-509	-698	-793	-251
1965-66	-595	-318	-18	69	44	22	25	22	-249	-509	-698	-793	-251
1966-67	-595	-318	-18	69	44	22	25	22	-232	-472	-648	-737	-234
1967-68	-552	-295	-17	64	41	21	23	21	-214	-436	-598	-680	-216
1968-69	-510	-272	-16	59	38	19	21	19	-196	-400	-548	-623	-198
1969-70	-467	-250	-14	54	35	17	19	17	-178	-363	-498	-567	-181
1970-71	-425	-227	-13	49	32	16	18	16	-160	-327	-449	-510	-163
1971-72	-352	-204	-12	44	29	14	16	14	-143	-291	-399	-453	-144
1972-73	-340	-182	-10	39	25	13	14	13	-125	-254	-349	-397	-127
1973-74	-297	-159	-9	34	22	11	12	11	-107	-218	-299	-340	-109
1974-75	-255	-136	-8	30	19	10	11	10	-89	-182	-249	-283	-91
1975-76	-212	-113	-6	25	16	8	9	8	-71	-145	-199	-227	-73
1976-77	-170	-91	-5	20	13	6	7	6	-53	-109	-150	-170	-55
1977-78	-127	-68	-4	15	10	5	5	5	-36	-73	-100	-113	-37
1978-79	-85	-45	-3	10	6	3	4	3	-18	-36	-50	-57	-19
1979-80	-42	-23	-1	5	3	2	2	2	0	0	0	0	-1
1980-81	0	0	0	0	0	0	0	0	0	0	0	0	0
1981-82	0	0	0	0	0	0	0	0	0	0	0	0	0
1982-83	0	0	0	0	0	0	0	0	0	0	0	0	0
1983-84	0	0	0	0	0	0	0	0	0	0	0	0	0
1984-85	0	0	0	0	0	0	0	0	0	0	0	0	0
1985-86	0	0	0	0	0	0	0	0	0	0	0	0	0
1986-87	0	0	0	0	0	0	0	0	0	0	0	0	0
1987-88	0	0	0	0	0	0	0	0	0	0	0	0	0
1988-89	0	0	0	0	0	0	0	0	0	0	0	0	0
1989-90	0	0											
MEAN	-436	-233	-14	51	33	17	18	17	-182	-371	509	582	215

JDP3D9

JOHN DAY

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												155	
1928-29	113	-39	-58	-50	-29	-19	-16	-10	-15	55	108	158	17
1929-30	115	-39	-59	-51	-29	-20	-16	-10	-15	58	108	161	17
1930-31	117	-39	-59	-51	-30	-20	-16	-10	-15	57	110	164	18
1931-32	119	-39	-60	-52	-30	-20	-17	-10	-16	58	112	166	18
1932-33	122	-40	-61	-52	-30	-20	-17	-10	-16	59	114	169	19
1933-34	124	-40	-61	-53	-31	-20	-17	-10	-16	60	116	172	19
1934-35	126	-40	-62	-53	-31	-21	-17	-10	-16	61	118	174	20
1935-36	128	-40	-62	-54	-31	-21	-17	-10	-16	62	120	177	20
1936-37	130	-40	-63	-54	-31	-21	-17	-10	-16	63	122	180	21
1937-38	132	-41	-63	-54	-32	-21	-18	-11	-16	64	124	183	21
1938-39	134	-41	-64	-55	-32	-21	-18	-11	-17	65	126	185	22
1939-40	136	-41	-64	-55	-32	-21	-18	-11	-17	66	127	188	22
1940-41	138	-41	-65	-56	-32	-22	-18	-11	-17	67	129	191	23
1941-42	140	-42	-66	-56	-33	-22	-18	-11	-17	68	131	193	23
1942-43	143	-42	-66	-57	-33	-22	-18	-11	-17	69	133	196	23
1943-44	145	-42	-67	-57	-33	-22	-18	-11	-17	70	135	199	24
1944-45	147	-42	-67	-58	-34	-22	-19	-11	-17	71	137	202	24
1945-46	149	-42	-68	-58	-34	-23	-19	-11	-18	72	139	204	25
1946-47	151	-43	-68	-59	-34	-23	-19	-11	-18	74	142	208	26
1947-48	154	-42	-68	-59	-34	-23	-19	-11	-17	76	145	212	27
1948-49	157	-41	-68	-58	-34	-23	-19	-11	-17	77	147	215	28
1949-50	160	-40	-67	-58	-34	-22	-19	-11	-17	79	150	219	29
1950-51	163	-40	-67	-58	-34	-22	-19	-11	-17	81	153	223	30
1951-52	167	-39	-67	-58	-33	-22	-18	-11	-17	82	156	226	31
1952-53	170	-38	-66	-57	-33	-22	-18	-11	-17	84	159	230	32
1953-54	173	-37	-66	-57	-33	-22	-18	-11	-17	85	162	234	33
1954-55	176	-37	-66	-57	-33	-22	-18	-11	-17	87	164	237	34
1955-56	179	-36	-66	-56	-33	-22	-18	-11	-17	89	167	241	35
1956-57	182	-35	-65	-56	-33	-22	-18	-11	-17	90	170	245	37
1957-58	185	-34	-65	-56	-32	-22	-18	-11	-17	92	173	248	38
1958-59	188	-34	-65	-56	-32	-22	-18	-11	-17	93	176	252	39
1959-60	192	-33	-64	-55	-32	-21	-18	-11	-17	95	179	256	40
1960-61	195	-32	-64	-55	-32	-21	-18	-11	-16	95	179	256	40
1961-62	195	-32	-64	-55	-32	-21	-18	-11	-16	95	179	255	40
1962-63	195	-31	-63	-54	-32	-21	-17	-11	-16	95	179	255	41
1963-64	195	-31	-63	-54	-31	-21	-17	-10	-16	95	179	255	41
1964-65	195	-30	-62	-54	-31	-21	-17	-10	-16	95	178	255	41
1965-66	195	-30	-62	-53	-31	-21	-17	-10	-17	103	193	275	45
1966-67	211	-31	-66	-56	-33	-22	-18	-11	-16	95	178	255	41
1967-68	195	-29	-61	-52	-30	-20	-17	-10	-16	95	178	254	41
1968-69	195	-29	-60	-52	-30	-20	-17	-10	-15	95	178	254	41
1969-70	196	-28	-60	-52	-30	-20	-17	-10	-15	95	178	254	42
1970-71	195	-28	-59	-51	-30	-20	-16	-10	-15	95	178	254	42
1971-72	195	-27	-59	-51	-29	-20	-16	-10	-15	95	178	254	42
1972-73	195	-27	-59	-50	-29	-20	-16	-10	-15	95	178	254	42
1973-74	195	-27	-58	-50	-29	-19	-16	-10	-15	95	178	253	42
1974-75	195	-26	-58	-50	-29	-19	-16	-10	-15	95	178	253	42
1975-76	195	-26	-57	-49	-29	-19	-16	-10	-15	96	178	253	42
1976-77	195	-25	-57	-49	-28	-19	-16	-9	-15	96	178	253	43
1977-78	195	-25	-56	-48	-28	-19	-16	-9	-14	96	178	253	43
1978-79	195	-24	-56	-48	-28	-19	-15	-9	-14	96	178	253	43
1979-80	195	-24	-55	-48	-28	-18	-15	-9	-14	96	178	252	43
1980-81	195	-23	-55	-47	-27	-18	-15	-9	-13	85	158	224	39
1981-82	173	-21	-49	-42	-24	-16	-13	-8	-11	74	139	196	34
1982-83	151	-18	-43	-37	-21	-14	-12	-7	-9	64	119	168	29
1983-84	130	-16	-37	-31	-18	-12	-10	-6	-8	53	99	140	24
1984-85	108	-13	-30	-26	-15	-10	-8	-5	-6	43	79	112	19
1985-86	86	-10	-24	-21	-12	-8	-7	-4	-5	32	59	84	14
1986-87	65	-8	-18	-16	-9	-6	-5	-3	-3	21	40	56	10
1987-88	43	-5	-12	-10	-6	-4	-3	-2	-2	11	20	28	5
1988-89	22	-3	-6	-5	-3	-2	-2	-1	0	0	0	0	0
1989-90	0	0	0	0	0	0	0	0	0	0	0	0	0
MEAN	155	-31	-58	-50	-29	-19	-16	-10	-15	76	143	206	30

JDA3D9

D-69

PELTON

Accumulated depletions at site and upstream (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												278	
1928-29	355	-313	-201	-622	-603	-563	-526	-822	-772	63	157	426	-282
1929-30	182	180	-87	-523	572	-499	-455	-674	-413	257	130	367	-78
1930-31	22	91	-92	-434	-355	-338	-368	-503	-544	314	228	-98	-172
1931-32	-76	78	33	-346	-391	-334	-439	-1202	-964	40	174	420	-249
1932-33	257	328	-24	-564	-515	-521	-491	-631	-1209	79	-175	284	-262
1933-34	217	222	-175	-673	-624	-591	-550	-502	-471	221	181	305	-201
1934-35	167	140	44	-366	-406	-444	-498	-566	-1271	-151	96	102	-260
1935-36	112	89	-98	-398	-423	-453	-447	-893	-1118	-235	22	210	-301
1936-37	320	299	-70	-432	-465	-459	-461	-754	-1198	-68	-26	204	-257
1937-38	224	290	23	-396	-431	-456	-604	-1037	-1290	-473	-189	161	-346
1938-39	207	72	-270	-677	-450	-459	-459	-775	-1013	-52	-39	205	-307
1939-40	221	305	11	-378	-392	-396	-408	-825	-1064	66	55	412	-198
1940-41	628	294	65	-339	-349	-344	-343	-712	-740	154	91	116	-121
1941-42	60	207	257	-288	-322	-323	-330	-732	-901	307	190	-34	-157
1942-43	-48	222	224	-324	-350	-365	-449	-796	-1252	-255	-315	176	-292
1943-44	104	-240	-441	-889	-731	-481	-333	-602	-683	7	8	313	-329
1944-45	203	126	21	-167	-182	-145	-79	-467	-872	63	33	256	-100
1945-46	114	165	-276	-591	34	-140	-194	-571	-884	-253	-69	170	-207
1946-47	69	-141	-473	-427	-296	-251	-92	-495	-812	-94	-128	2	-262
1947-48	123	7	-202	-55	-95	21	29	-148	-774	3	-132	-81	-108
1948-49	41	-274	-155	78	158	304	198	-230	-473	-115	-57	37	-41
1949-50	59	143	159	33	32	31	30	-361	-687	-115	-149	32	-66
1950-51	77	168	203	33	32	31	30	-361	-472	-115	-82	37	-35
1951-52	87	55	162	33	32	31	30	-362	-472	-115	-132	6	-45
1952-53	62	150	239	33	32	31	30	-362	-472	-123	-139	6	-43
1953-54	57	138	272	33	32	31	30	-361	-687	-125	-137	50	-55
1954-55	83	163	172	33	32	31	30	-158	-551	-451	-84	22	-57
1955-56	69	157	174	33	32	31	30	-361	-679	-120	-139	-12	-65
1956-57	67	146	273	33	32	31	30	-631	-691	-115	-92	30	-74
1957-58	65	141	187	33	33	31	26	-357	-687	-117	-153	1	-66
1958-59	78	150	241	34	34	31	29	-231	-490	-166	-39	-40	-31
1959-60	-26	54	118	34	937	27	31	-357	-688	-124	-83	31	-2
1960-61	50	138	212	32	71	101	553	160	-16	-20	-144	-50	88
1961-62	-31	53	333	31	35	30	33	25	-9	-41	-17	-55	32
1962-63	-50	-21	-31	7	19	4	5	4	-13	-34	-40	-57	-17
1963-64	-48	-23	-16	7	31	1	-18	-5	-33	19	-22	-16	-10
1964-65	-10	-24	-16	53	-28	24	-4	9	3	-18	-40	-85	-11
1965-66	-51	11	4	-33	47	5	-3	-17	8	15	-55	-26	-8
1966-67	-12	19	-23	23	10	9	-34	19	-20	-12	-5	-22	-4
1967-68	5	-24	2	-67	63	23	161	-10	-12	19	7	0	14
1968-69	0	0	0	0	0	0	0	0	0	0	0	0	0
1969-70	0	0	0	0	0	0	0	0	0	0	0	0	0
1970-71	0	0	0	0	0	0	0	0	0	0	0	0	0
1971-72	0	0	0	0	0	0	0	0	0	0	0	0	0
1972-73	0	0	0	0	0	0	0	0	0	0	0	0	0
1973-74	0	0	0	0	0	0	0	0	0	0	0	0	0
1974-75	0	0	0	0	0	0	0	0	0	0	0	0	0
1975-76	0	0	0	0	0	0	0	0	0	0	0	0	0
1976-77	0	0	0	0	0	0	0	0	0	0	0	0	0
1977-78	0	0	0	0	0	0	0	0	0	0	0	0	0
1978-79	0	0	0	0	0	0	0	0	0	0	0	0	0
1979-80	0	0	0	0	0	0	0	0	0	0	0	0	0
1980-81	0	0	0	0	0	0	0	0	0	0	0	0	0
1981-82	0	0	0	0	0	0	0	0	0	0	0	0	0
1982-83	0	0	0	0	0	0	0	0	0	0	0	0	0
1983-84	0	0	0	0	0	0	0	0	0	0	0	0	0
1984-85	0	0	0	0	0	0	0	0	0	0	0	0	0
1985-86	0	0	0	0	0	0	0	0	0	0	0	0	0
1986-87	0	0	0	0	0	0	0	0	0	0	0	0	0
1987-88	0	0	0	0	0	0	0	0	0	0	0	0	0
1988-89	0	0	0	0	0	0	0	0	0	0	0	0	0
1989-90	0	0											
MEAN	65	62	13	-138	-84	-110	-103	-289	-416	-31	-21	66	-125

PEL3DD9

WHITE R.- WAPINITIA PROJECT

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												-121	
1928-29	-58	-7	22	17	11	6	6	6	2	-53	-108	-118	-23
1929-30	-58	-6	22	17	11	5	6	5	2	-51	-105	-115	-22
1930-31	-55	-6	21	16	11	5	6	5	2	-50	-102	-112	-22
1931-32	-53	-6	20	16	10	5	6	5	2	-49	-99	-108	-21
1932-33	-52	-6	20	15	10	5	5	5	2	-47	-96	-105	-20
1933-34	-50	-6	19	15	10	5	5	5	2	-46	-93	-102	-20
1934-35	-49	-5	19	14	9	5	5	5	2	-44	-90	-99	-19
1935-36	-47	-5	18	14	9	5	5	5	2	-43	-87	-95	-18
1936-37	-45	-5	17	14	9	4	5	4	2	-41	-84	-92	-18
1937-38	-44	-5	17	13	8	4	5	4	2	-40	-81	-89	-17
1938-39	-42	-5	16	13	8	4	5	4	2	-38	-78	-86	-17
1939-40	-41	-5	16	12	8	4	4	4	1	-37	-75	-82	-16
1940-41	-39	-4	15	12	8	4	4	4	1	-35	-72	-79	-15
1941-42	-38	-4	14	11	7	4	4	4	1	-34	-69	-76	-15
1942-43	-36	-4	14	11	7	3	4	3	1	-32	-66	-73	-14
1943-44	-35	-4	13	10	7	3	4	3	1	-31	-63	-69	-13
1944-45	-33	-4	13	10	6	3	4	3	1	-30	-60	-66	-13
1945-46	-32	-4	12	9	6	3	3	3	1	-22	-45	-50	-10
1946-47	-24	-3	9	7	5	2	3	2	1	-27	-54	-60	-12
1947-48	-28	-3	11	8	5	3	3	3	1	-25	-51	-56	-11
1948-49	-27	-3	10	8	5	3	3	3	1	-24	-48	-53	-10
1949-50	-25	-3	10	8	5	2	3	2	1	-22	-45	-50	-10
1950-51	-24	-3	9	7	5	2	3	2	1	-21	-42	-47	-9
1951-52	-22	-2	9	7	4	2	2	2	1	-19	-40	-43	-8
1952-53	-21	-2	8	6	4	2	2	2	1	-18	-37	-40	-8
1953-54	-19	-2	7	6	4	2	2	2	1	-17	-34	-37	-7
1954-55	-18	-2	7	5	3	2	2	2	1	-15	-31	-34	-7
1955-56	-16	-2	6	5	3	2	2	2	1	-14	-28	-31	-6
1956-57	-15	-2	6	4	3	1	2	1	0	-12	-25	-27	-5
1957-58	-13	-1	5	4	3	1	1	1	0	-11	-22	-24	-5
1958-59	-12	-1	4	3	2	1	1	1	0	-9	-19	-21	-4
1959-60	-10	-1	4	3	2	1	1	1	0	1	1	1	0
1960-61	1	0	0	0	0	0	0	0	0	-7	-13	-15	-3
1961-62	-7	-1	3	2	1	1	1	1	0	-5	-10	-11	-2
1962-63	-5	-1	2	2	1	1	1	1	0	-4	-8	-8	-2
1963-64	-4	0	2	1	1	0	0	0	0	-2	-5	-5	-1
1964-65	-2	0	1	1	0	0	0	0	0	-1	-2	-2	0
1965-66	-1	0	0	0	0	0	0	0	0	1	1	1	0
1966-67	1	0	0	0	0	0	0	0	0	2	4	5	1
1967-68	2	0	-1	-1	0	0	0	0	0	3	7	8	2
1968-69	4	0	-1	-1	-1	0	0	0	0	5	10	11	2
1969-70	5	1	-2	-2	-1	-1	-1	-1	0	6	13	14	3
1970-71	7	1	-3	-2	-1	-1	-1	-1	0	8	16	17	3
1971-72	8	1	-3	-2	-2	-1	-1	-1	0	9	19	21	4
1972-73	10	1	-4	-3	-2	-1	-1	-1	0	11	22	24	5
1973-74	11	1	-4	-3	-2	-1	-1	-1	0	12	25	27	5
1974-75	13	1	-5	-4	-2	-1	-1	-1	-1	14	28	30	6
1975-76	15	2	-6	-4	-3	-1	-2	-1	-1	15	31	34	7
1976-77	16	2	-6	-5	-3	-2	-2	-2	-1	17	34	37	7
1977-78	18	2	-7	-5	-3	-2	-2	-2	-1	18	37	40	8
1978-79	19	2	-7	-6	-4	-2	-2	-2	-1	19	39	43	8
1979-80	21	2	-8	-6	-4	-2	-2	-2	-1	21	42	47	9
1980-81	22	2	-9	-7	-4	-2	-2	-2	-1	19	38	41	8
1981-82	20	2	-8	-6	-4	-2	-2	-2	-1	16	33	36	7
1982-83	17	2	-7	-5	-3	-2	-2	-2	-1	14	28	31	6
1983-84	15	2	-6	-4	-3	-1	-2	-1	0	12	24	26	5
1984-85	12	1	-5	-4	-2	-1	-1	-1	0	9	19	21	4
1985-86	10	1	-4	-3	-2	-1	-1	-1	0	7	14	16	3
1986-87	7	1	-3	-2	-1	-1	-1	-1	0	5	9	10	2
1987-88	5	1	-2	-1	-1	0	-1	0	0	2	5	5	1
1988-89	2	0	-1	-1	0	0	0	0	0	0	0	0	0
1989-90	0	0											
MEAN	-13	-2	5	4	3	1	1	1	0	-12	-24	-28	-5

HOOD RIVER BASIN

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												51	
1928-29	0	-38	-85	-76	-49	-25	-27	-25	-2	13	24	55	-19
1929-30	3	-37	-88	-77	-50	-25	-28	-25	-2	15	26	58	-19
1930-31	5	-36	-87	-78	-50	-25	-28	-25	-1	17	29	62	-18
1931-32	7	-35	-87	-79	-51	-25	-28	-25	-1	19	31	65	-17
1932-33	10	-34	-88	-80	-51	-26	-28	-26	0	21	34	69	-16
1933-34	12	-33	-89	-81	-52	-26	-29	-26	0	22	37	72	-16
1934-35	15	-32	-89	-81	-53	-26	-29	-26	0	24	39	76	-15
1935-36	17	-31	-90	-82	-53	-27	-29	-27	1	26	42	79	-14
1936-37	19	-30	-91	-83	-54	-27	-30	-27	1	28	44	83	-13
1937-38	22	-29	-91	-84	-54	-27	-30	-27	2	29	47	86	-13
1938-39	24	-28	-92	-85	-55	-27	-30	-27	2	31	50	90	-12
1939-40	27	-27	-92	-86	-55	-28	-31	-28	3	33	52	93	-11
1940-41	29	-26	-93	-86	-56	-28	-31	-28	3	35	55	96	-10
1941-42	31	-25	-94	-87	-56	-28	-31	-28	3	37	57	100	-10
1942-43	34	-24	-94	-88	-57	-28	-31	-28	4	38	60	103	-9
1943-44	36	-23	-95	-89	-57	-29	-32	-29	4	40	63	107	-8
1944-45	39	-22	-96	-90	-58	-29	-32	-29	5	42	65	110	-7
1945-46	41	-21	-96	-90	-58	-29	-32	-29	5	44	68	114	-7
1946-47	43	-20	-97	-91	-59	-29	-33	-29	6	46	71	117	-6
1947-48	46	-19	-98	-92	-59	-30	-33	-30	6	47	73	121	-5
1948-49	48	-18	-98	-93	-60	-30	-33	-30	6	49	76	124	-4
1949-50	51	-17	-99	-94	-60	-30	-33	-30	7	51	78	128	-4
1950-51	53	-16	-100	-95	-61	-30	-34	-30	7	52	79	128	-4
1951-52	54	-14	-97	-92	-59	-30	-33	-30	7	52	80	128	-2
1952-53	56	-12	-94	-90	-58	-29	-32	-29	8	53	81	128	-1
1953-54	57	-10	-91	-87	-56	-28	-31	-28	8	53	81	128	0
1954-55	59	-7	-88	-85	-55	-27	-30	-27	9	54	82	128	1
1955-56	60	-5	-85	-82	-53	-27	-29	-27	9	55	83	128	3
1956-57	62	-3	-82	-80	-51	-26	-28	-26	9	55	84	128	4
1957-58	63	-1	-79	-77	-50	-25	-28	-25	10	56	85	128	5
1958-59	64	1	-76	-75	-48	-24	-27	-24	10	57	85	129	6
1959-60	66	3	-73	-72	-47	-23	-26	-23	10	57	86	129	7
1960-61	67	5	-71	-70	-45	-23	-25	-23	11	58	87	129	9
1961-62	69	7	-68	-67	-43	-22	-24	-22	11	58	88	129	10
1962-63	70	9	-65	-65	-42	-21	-23	-21	11	59	88	129	11
1963-64	72	11	-62	-62	-40	-20	-22	-20	12	60	89	129	12
1964-65	73	13	-59	-60	-39	-19	-21	-19	12	60	90	129	14
1965-66	75	15	-56	-57	-37	-19	-21	-19	12	61	91	129	15
1966-67	76	17	-53	-55	-35	-18	-20	-18	12	57	85	121	14
1967-68	72	17	-49	-51	-33	-16	-18	-16	11	54	80	113	13
1968-69	67	16	-45	-47	-30	-15	-17	-15	10	50	74	105	13
1969-70	63	16	-41	-43	-28	-14	-15	-14	10	47	69	97	12
1970-71	59	15	-37	-39	-25	-13	-14	-13	9	43	64	89	11
1971-72	54	15	-33	-35	-23	-11	-12	-11	8	39	58	82	11
1972-73	50	14	-29	-31	-20	-10	-11	-10	8	36	53	74	10
1973-74	46	14	-25	-27	-17	-9	-10	-9	7	32	47	66	9
1974-75	41	13	-21	-23	-15	-7	-8	-7	6	29	42	58	9
1975-76	37	12	-17	-19	-12	-6	-7	-6	6	25	37	50	8
1976-77	33	12	-13	-15	-10	-5	-5	-5	5	21	31	42	7
1977-78	28	11	-9	-11	-7	-3	-4	-3	4	18	26	34	7
1978-79	24	11	-5	-7	-4	-2	-2	-2	4	14	20	26	6
1979-80	20	10	-1	-3	-2	-1	-1	-1	3	11	15	18	5
1980-81	15	10	3	1	1	0	0	0	4	15	21	27	9
1981-82	21	12	1	-1	-1	0	-1	0	3	13	19	24	7
1982-83	19	10	1	-1	-1	0	0	0	3	11	16	20	6
1983-84	16	9	0	-1	-1	0	0	0	2	10	14	17	5
1984-85	14	7	0	-1	-1	0	0	0	2	8	11	14	4
1985-86	11	6	0	-1	-1	0	0	0	2	6	9	11	3
1986-87	8	5	0	-1	0	0	0	0	1	4	6	8	2
1987-88	6	3	0	-1	0	0	0	0	1	2	3	4	1
1988-89	3	2	0	0	0	0	0	0	0	0	0	0	0
1989-90	0	0											
MEAN	38	-6	-60	-57	-37	-19	-20	-19	5	35	54	84	0

HOOD3D9

WHITE SALMON RIVER BASIN

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												-7	
1928-29	-3	1	1	1	0	0	0	0	0	-2	-5	-7	-1
1929-30	-3	1	1	1	0	0	0	0	0	-2	-5	-7	-1
1930-31	-3	1	1	1	0	0	0	0	0	-2	-5	-7	-1
1931-32	-3	1	1	1	0	0	0	0	0	-2	-5	-7	-1
1932-33	-3	1	1	1	0	0	0	0	0	-2	-5	-7	-1
1933-34	-3	1	1	1	0	0	0	0	0	-2	-5	-7	-1
1934-35	-3	1	1	1	0	0	0	0	0	-2	-5	-7	-1
1935-36	-3	1	1	1	0	0	0	0	0	-2	-5	-7	-1
1936-37	-3	1	1	1	0	0	0	0	0	-2	-5	-7	-1
1937-38	-3	1	1	1	0	0	0	0	0	-2	-5	-7	-1
1938-39	-3	1	1	1	0	0	0	0	0	-2	-5	-7	-1
1939-40	-3	1	1	1	0	0	0	0	0	-2	-5	-7	-1
1940-41	-3	1	1	1	0	0	0	0	0	-2	-5	-7	-1
1941-42	-3	1	1	1	0	0	0	0	0	-2	-5	-7	-1
1942-43	-3	1	1	1	0	0	0	0	0	-2	-5	-7	-1
1943-44	-3	1	1	1	0	0	0	0	0	-2	-5	-7	-1
1944-45	-3	1	1	1	0	0	0	0	0	-2	-5	-7	-1
1945-46	-3	1	1	1	0	0	0	0	0	-2	-5	-7	-1
1946-47	-3	1	1	1	0	0	0	0	0	-2	-5	-7	-1
1947-48	-3	1	1	1	0	0	0	0	0	-2	-5	-7	-1
1948-49	-3	1	1	1	0	0	0	0	0	-2	-5	-7	-1
1949-50	-3	1	1	1	0	0	0	0	0	-2	-5	-7	-1
1950-51	-3	1	1	1	0	0	0	0	0	-2	-5	-7	-1
1951-52	-3	1	1	1	0	0	0	0	0	-2	-5	-7	-1
1952-53	-3	1	1	1	0	0	0	0	0	-2	-4	-6	-1
1953-54	-3	1	1	1	0	0	0	0	0	-1	-4	-6	-1
1954-55	-2	1	1	1	0	0	0	0	0	-1	-4	-6	-1
1955-56	-2	1	1	1	0	0	0	0	0	-1	-4	-6	-1
1956-57	-2	1	1	1	0	0	0	0	0	-1	-4	-5	-1
1957-58	-2	1	1	1	0	0	0	0	0	-1	-3	-5	-1
1958-59	-2	1	1	1	0	0	0	0	0	-1	-3	-5	-1
1959-60	-2	1	1	1	0	0	0	0	0	-1	-2	-3	0
1960-61	-1	0	0	0	0	0	0	0	0	-1	-3	-4	-1
1961-62	-2	1	1	0	0	0	0	0	0	-1	-3	-4	-1
1962-63	-2	1	1	0	0	0	0	0	0	-1	-3	-4	-1
1963-64	-1	1	1	0	0	0	0	0	0	-1	-2	-3	0
1964-65	-1	1	0	0	0	0	0	0	0	-1	-2	-3	0
1965-66	-1	0	0	0	0	0	0	0	0	-1	-2	-3	0
1966-67	-1	0	0	0	0	0	0	0	0	-1	-2	-3	0
1967-68	-1	0	0	0	0	0	0	0	0	-1	-2	-2	0
1968-69	-1	0	0	0	0	0	0	0	0	-1	-2	-2	0
1969-70	-1	0	0	0	0	0	0	0	0	0	-1	-2	0
1970-71	-1	0	0	0	0	0	0	0	0	0	-1	-2	0
1971-72	-1	0	0	0	0	0	0	0	0	0	-1	-2	0
1972-73	-1	0	0	0	0	0	0	0	0	0	-1	-1	0
1973-74	-1	0	0	0	0	0	0	0	0	0	-1	-1	0
1974-75	0	0	0	0	0	0	0	0	0	0	-1	-1	0
1975-76	0	0	0	0	0	0	0	0	0	0	-1	-1	0
1976-77	0	0	0	0	0	0	0	0	0	0	0	-1	0
1977-78	0	0	0	0	0	0	0	0	0	0	0	0	0
1978-79	0	0	0	0	0	0	0	0	0	0	0	0	0
1979-80	0	0	0	0	0	0	0	0	0	0	0	0	0
1980-81	0	0	0	0	0	0	0	0	0	0	0	0	0
1981-82	0	0	0	0	0	0	0	0	0	0	0	0	0
1982-83	0	0	0	0	0	0	0	0	0	0	0	0	0
1983-84	0	0	0	0	0	0	0	0	0	0	0	0	0
1984-85	0	0	0	0	0	0	0	0	0	0	0	0	0
1985-86	0	0	0	0	0	0	0	0	0	0	0	0	0
1986-87	0	0	0	0	0	0	0	0	0	0	0	0	0
1987-88	0	0	0	0	0	0	0	0	0	0	0	0	0
1988-89	0	0	0	0	0	0	0	0	0	0	0	0	0
1989-90	0	0											
MEAN	-2	1	1	0	0	0	0	0	0	-1	-3	-4	-1

WHS3D9

KLICKITAT-WHITE SALMON

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												-47	
1928-29	-19	7	6	5	3	2	2	2	2	-11	-33	-47	-7
1929-30	-19	7	6	5	3	2	2	2	2	-11	-33	-47	-7
1930-31	-19	7	6	5	3	2	2	2	2	-11	-33	-47	-7
1931-32	-19	7	6	5	3	2	2	2	2	-11	-33	-47	-7
1932-33	-19	7	6	5	3	2	2	2	2	-11	-33	-47	-7
1933-34	-19	7	6	5	3	2	2	2	2	-11	-33	-47	-7
1934-35	-19	7	6	5	3	2	2	2	2	-11	-33	-47	-7
1935-36	-19	7	6	5	3	2	2	2	2	-11	-33	-47	-7
1936-37	-19	7	6	5	3	2	2	2	2	-11	-33	-47	-7
1937-38	-19	7	6	5	3	2	2	2	2	-11	-33	-47	-7
1938-39	-19	7	6	5	3	2	2	2	2	-11	-33	-47	-7
1939-40	-19	7	6	5	3	2	2	2	2	-11	-33	-47	-7
1940-41	-19	7	6	5	3	2	2	2	2	-11	-33	-47	-7
1941-42	-19	7	6	5	3	2	2	2	2	-11	-33	-47	-7
1942-43	-19	7	6	5	3	2	2	2	2	-11	-33	-47	-7
1943-44	-19	7	6	5	3	2	2	2	2	-11	-33	-47	-7
1944-45	-19	7	6	5	3	2	2	2	2	-11	-33	-47	-7
1945-46	-19	7	6	5	3	2	2	2	2	-11	-33	-47	-7
1946-47	-19	7	6	5	3	2	2	2	2	-11	-33	-47	-7
1947-48	-19	7	6	5	3	2	2	2	2	-11	-33	-47	-7
1948-49	-19	7	6	5	3	2	2	2	2	-11	-33	-47	-7
1949-50	-19	7	6	5	3	2	2	2	2	-11	-33	-47	-7
1950-51	-19	7	6	5	3	2	2	2	2	-11	-33	-47	-7
1951-52	-19	7	6	5	3	2	2	2	2	-11	-33	-47	-7
1952-53	-19	7	6	5	3	2	2	2	2	-11	-33	-47	-7
1953-54	-19	7	6	5	3	2	2	2	2	-11	-33	-47	-7
1954-55	-19	7	6	5	3	2	2	2	2	-11	-33	-47	-7
1955-56	-19	7	6	5	3	2	2	2	2	-11	-33	-47	-7
1956-57	-19	7	6	5	3	2	2	2	2	-11	-33	-47	-7
1957-58	-19	7	6	5	3	2	2	2	2	-11	-33	-47	-7
1958-59	-19	7	6	5	3	2	2	2	2	-11	-33	-47	-7
1959-60	-19	7	6	5	3	2	2	2	2	-11	-33	-47	-7
1960-61	-19	7	6	5	3	2	2	2	2	-11	-33	-47	-7
1961-62	-19	7	6	5	3	2	2	2	2	-11	-33	-47	-7
1962-63	-19	7	6	5	3	2	2	2	2	-11	-33	-47	-7
1963-64	-19	7	6	5	3	2	2	2	2	-11	-33	-47	-7
1964-65	-19	7	6	5	3	2	2	2	2	-11	-33	-47	-7
1965-66	-19	7	6	5	3	2	2	2	2	-11	-33	-47	-7
1966-67	-19	7	6	5	3	2	2	2	2	-11	-30	-44	-6
1967-68	-17	7	6	5	3	2	2	2	1	-10	-28	-41	-6
1968-69	-16	6	6	4	3	1	2	1	1	-9	-26	-37	-5
1969-70	-15	6	5	4	3	1	1	1	1	-8	-23	-34	-5
1970-71	-13	5	5	4	2	1	1	1	1	-7	-21	-30	-4
1971-72	-12	5	4	3	2	1	1	1	1	-6	-19	-27	-4
1972-73	-11	4	4	3	2	1	1	1	1	-6	-16	-24	-3
1973-74	-9	4	3	3	2	1	1	1	1	-5	-14	-20	-3
1974-75	-8	3	3	2	1	1	1	1	1	-4	-12	-17	-2
1975-76	-7	3	2	2	1	1	1	1	0	-3	-9	-14	-2
1976-77	-5	2	2	1	1	0	1	0	0	-2	-7	-10	-1
1977-78	-4	2	1	1	1	0	0	0	0	-2	-5	-7	-1
1978-79	-3	1	1	1	0	0	0	0	0	-1	-2	-3	0
1979-80	-1	1	0	0	0	0	0	0	0	0	0	0	0
1980-81	0	0	0	0	0	0	0	0	0	0	0	0	0
1981-82	0	0	0	0	0	0	0	0	0	0	0	0	0
1982-83	0	0	0	0	0	0	0	0	0	0	0	0	0
1983-84	0	0	0	0	0	0	0	0	0	0	0	0	0
1984-85	0	0	0	0	0	0	0	0	0	0	0	0	0
1985-86	0	0	0	0	0	0	0	0	0	0	0	0	0
1986-87	0	0	0	0	0	0	0	0	0	0	0	0	0
1987-88	0	0	0	0	0	0	0	0	0	0	0	0	0
1988-89	0	0	0	0	0	0	0	0	0	0	0	0	0
1989-90	0	0											
MEAN	-14	5	5	4	2	1	1	1	1	-8	-24	-35	-6

KWS3D9

D-74

KLICKITAT BASIN

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												-86	
1928-29	-31	-4	12	9	6	3	3	3	1	-29	-60	-65	-13
1929-30	-31	-4	12	9	6	3	3	3	1	-29	-59	-65	-13
1930-31	-31	-3	12	9	6	3	3	3	1	-29	-59	-65	-13
1931-32	-31	-3	12	9	6	3	3	3	1	-29	-59	-64	-12
1932-33	-31	-3	12	9	6	3	3	3	1	-29	-58	-64	-12
1933-34	-30	-3	12	9	6	3	3	3	1	-28	-58	-63	-12
1934-35	-30	-3	12	9	6	3	3	3	1	-28	-57	-63	-12
1935-36	-30	-3	12	9	6	3	3	3	1	-28	-57	-63	-12
1936-37	-30	-3	11	9	6	3	3	3	1	-28	-57	-62	-12
1937-38	-30	-3	11	9	6	3	3	3	1	-28	-56	-62	-12
1938-39	-30	-3	11	9	6	3	3	3	1	-28	-56	-61	-12
1939-40	-29	-3	11	9	6	3	3	3	1	-27	-56	-61	-12
1940-41	-29	-3	11	9	6	3	3	3	1	-27	-55	-61	-12
1941-42	-29	-3	11	9	6	3	3	3	1	-27	-55	-60	-12
1942-43	-29	-3	11	9	6	3	3	3	1	-27	-55	-60	-12
1943-44	-29	-3	11	9	5	3	3	3	1	-27	-54	-60	-12
1944-45	-28	-3	11	8	5	3	3	3	1	-26	-54	-59	-11
1945-46	-28	-3	11	8	5	3	3	3	1	-26	-52	-57	-11
1946-47	-27	-3	10	8	5	3	3	3	1	-26	-53	-58	-11
1947-48	-28	-3	11	8	5	3	3	3	1	-26	-53	-58	-11
1948-49	-28	-3	11	8	5	3	3	3	1	-26	-52	-58	-11
1949-50	-27	-3	11	8	5	3	3	3	1	-26	-52	-57	-11
1950-51	-27	-3	10	8	5	3	3	3	1	-26	-52	-57	-11
1951-52	-27	-3	10	8	5	3	3	3	1	-26	-52	-57	-11
1952-53	-27	-3	11	8	5	3	3	3	1	-26	-52	-57	-11
1953-54	-27	-3	11	8	5	3	3	3	1	-26	-52	-57	-11
1954-55	-27	-3	11	8	5	3	3	3	1	-26	-52	-58	-11
1955-56	-27	-3	11	8	5	3	3	3	1	-26	-52	-58	-11
1956-57	-27	-3	11	8	5	3	3	3	1	-26	-53	-58	-11
1957-58	-28	-3	11	8	5	3	3	3	1	-26	-53	-58	-11
1958-59	-28	-3	11	8	5	3	3	3	1	-26	-53	-58	-11
1959-60	-28	-3	11	8	5	3	3	3	1	-26	-53	-59	-11
1960-61	-28	-3	11	8	5	3	3	3	1	-26	-53	-58	-11
1961-62	-28	-3	11	8	5	3	3	3	1	-26	-53	-58	-11
1962-63	-28	-3	11	8	5	3	3	3	1	-26	-53	-58	-11
1963-64	-28	-3	11	8	5	3	3	3	1	-26	-53	-58	-11
1964-65	-28	-3	11	8	5	3	3	3	1	-26	-53	-58	-11
1965-66	-28	-3	11	8	5	3	3	3	1	-26	-53	-59	-11
1966-67	-28	-3	11	8	5	3	3	3	1	-26	-52	-57	-11
1967-68	-27	-3	10	8	5	3	3	3	1	-25	-50	-55	-11
1968-69	-26	-3	10	8	5	3	3	3	1	-24	-49	-54	-10
1969-70	-26	-3	10	8	5	2	3	2	1	-23	-48	-52	-10
1970-71	-25	-3	10	7	5	2	3	2	1	-23	-46	-51	-10
1971-72	-24	-3	9	7	5	2	3	2	1	-22	-45	-49	-10
1972-73	-23	-3	9	7	5	2	2	2	1	-21	-43	-48	-9
1973-74	-23	-3	9	7	4	2	2	2	1	-21	-42	-46	-9
1974-75	-22	-2	8	7	4	2	2	2	1	-20	-40	-44	-9
1975-76	-21	-2	8	6	4	2	2	2	1	-19	-39	-43	-8
1976-77	-20	-2	8	6	4	2	2	2	1	-19	-38	-41	-8
1977-78	-20	-2	8	6	4	2	2	2	1	-18	-36	-40	-8
1978-79	-19	-2	7	6	4	2	2	2	1	-17	-35	-38	-7
1979-80	-18	-2	7	5	4	2	2	2	1	-16	-33	-37	-7
1980-81	-17	-2	7	5	3	2	2	2	1	-15	-30	-33	-8
1981-82	-16	-2	6	5	3	1	2	1	1	-13	-26	-29	-6
1982-83	-14	-2	5	4	3	1	1	1	0	-11	-22	-24	-5
1983-84	-12	-1	4	3	2	1	1	1	0	-9	-19	-20	-4
1984-85	-10	-1	4	3	2	1	1	1	0	-7	-15	-16	-3
1985-86	-8	-1	3	2	1	1	1	1	0	-5	-11	-12	-2
1986-87	-6	-1	2	2	1	1	1	1	0	-4	-7	-8	-2
1987-88	-4	0	1	1	1	0	0	0	0	-2	-4	-4	-1
1988-89	-2	0	1	1	0	0	0	0	0	0	0	0	0
1989-90	0	0											
MEAN	-24	-3	9	7	5	2	3	2	1	-23	-46	-51	-10

KLC3D9

FERN RIDGE

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												-13	
1928-29	-3	0	0	0	0	0	0	0	0	-2	-9	-13	-2
1929-30	-3	0	0	0	0	0	0	0	0	-1	-9	-13	-2
1930-31	-3	0	0	0	0	0	0	0	0	-1	-8	-12	-2
1931-32	-3	0	0	0	0	0	0	0	0	-1	-8	-12	-2
1932-33	-3	0	0	0	0	0	0	0	0	-1	-8	-11	-2
1933-34	-2	0	0	0	0	0	0	0	0	-1	-7	-11	-2
1934-35	-2	0	0	0	0	0	0	0	0	-1	-7	-10	-2
1935-36	-2	0	0	0	0	0	0	0	0	-1	-7	-10	-2
1936-37	-2	0	0	0	0	0	0	0	0	-1	-7	-10	-2
1937-38	-2	0	0	0	0	0	0	0	0	-1	-6	-9	-1
1938-39	-2	0	0	0	0	0	0	0	0	-1	-6	-9	-1
1939-40	-2	0	0	0	0	0	0	0	0	-1	-6	-8	-1
1940-41	-2	0	0	0	0	0	0	0	0	-1	-6	-8	-1
1941-42	-2	0	0	0	0	0	0	0	0	-1	-5	-7	-1
1942-43	-2	0	0	0	0	0	0	0	0	-1	-5	-7	-1
1943-44	-1	0	0	0	0	0	0	0	0	-1	-4	-6	-1
1944-45	-1	0	0	0	0	0	0	0	0	-1	-4	-6	-1
1945-46	-1	0	0	0	0	0	0	0	0	-1	-4	-6	-1
1946-47	-1	0	0	0	0	0	0	0	0	-1	-4	-5	-1
1947-48	-1	0	0	0	0	0	0	0	0	-1	-3	-5	-1
1948-49	-1	0	0	0	0	0	0	0	0	-1	-3	-4	-1
1949-50	-1	0	0	0	0	0	0	0	0	0	-3	-4	-1
1950-51	-1	0	0	0	0	0	0	0	0	0	-2	-4	-1
1951-52	-1	0	0	0	0	0	0	0	0	0	-2	-3	-1
1952-53	-1	0	0	0	0	0	0	0	0	0	-2	-3	0
1953-54	-1	0	0	0	0	0	0	0	0	0	-2	-3	0
1954-55	-1	0	0	0	0	0	0	0	0	0	-2	-2	0
1955-56	-1	0	0	0	0	0	0	0	0	0	-2	-2	0
1956-57	0	0	0	0	0	0	0	0	0	0	-1	-2	0
1957-58	0	0	0	0	0	0	0	0	0	0	-1	-2	0
1958-59	0	0	0	0	0	0	0	0	0	0	-1	-1	0
1959-60	0	0	0	0	0	0	0	0	0	0	-1	-1	0
1960-61	0	0	0	0	0	0	0	0	0	0	-1	-1	0
1961-62	0	0	0	0	0	0	0	0	0	0	0	-1	0
1962-63	0	0	0	0	0	0	0	0	0	0	0	0	0
1963-64	0	0	0	0	0	0	0	0	0	0	0	0	0
1964-65	0	0	0	0	0	0	0	0	0	0	0	0	0
1965-66	0	0	0	0	0	0	0	0	0	0	0	0	0
1966-67	0	0	0	0	0	0	0	0	0	0	0	1	0
1967-68	0	0	0	0	0	0	0	0	0	0	0	1	0
1968-69	0	0	0	0	0	0	0	0	0	0	0	1	0
1969-70	0	0	0	0	0	0	0	0	0	0	0	1	0
1970-71	0	0	0	0	0	0	0	0	0	0	0	1	0
1971-72	0	0	0	0	0	0	0	0	0	0	0	1	0
1972-73	0	0	0	0	0	0	0	0	0	0	0	1	0
1973-74	0	0	0	0	0	0	0	0	0	0	1	1	0
1974-75	0	0	0	0	0	0	0	0	0	0	1	1	0
1975-76	0	0	0	0	0	0	0	0	0	0	1	1	0
1976-77	0	0	0	0	0	0	0	0	0	0	1	1	0
1977-78	0	0	0	0	0	0	0	0	0	0	1	1	0
1978-79	0	0	0	0	0	0	0	0	0	0	1	1	0
1979-80	0	0	0	0	0	0	0	0	0	0	1	1	0
1980-81	0	0	0	0	0	0	0	0	0	0	1	1	0
1981-82	0	0	0	0	0	0	0	0	0	0	1	1	0
1982-83	0	0	0	0	0	0	0	0	0	0	0	1	0
1983-84	0	0	0	0	0	0	0	0	0	0	0	1	0
1984-85	0	0	0	0	0	0	0	0	0	0	0	0	0
1985-86	0	0	0	0	0	0	0	0	0	0	0	0	0
1986-87	0	0	0	0	0	0	0	0	0	0	0	0	0
1987-88	0	0	0	0	0	0	0	0	0	0	0	0	0
1988-89	0	0	0	0	0	0	0	0	0	0	0	0	0
1989-90	0	0											
MEAN	-1	0	0	0	0	0	0	0	0	0	-2	-3	-1

FRN3D9

WILLAMETTE

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												-1971	
1928-29	-429	-16	57	55	36	36	40	36	4	-229	-1337	-1948	-311
1929-30	-424	-16	56	55	35	35	39	35	4	-226	-1321	-1926	-307
1930-31	-419	-16	56	54	35	35	39	35	4	-224	-1306	-1903	-304
1931-32	-414	-16	55	53	34	34	38	34	3	-221	-1291	-1881	-299
1932-33	-410	-16	54	53	34	34	38	34	3	-218	-1275	-1858	-297
1933-34	-405	-16	53	52	33	33	37	33	3	-216	-1260	-1836	-293
1934-35	-400	-16	53	51	33	33	37	33	3	-213	-1244	-1813	-290
1935-36	-395	-16	52	51	33	33	36	33	3	-211	-1229	-1791	-285
1936-37	-391	-16	51	50	32	32	36	32	3	-208	-1214	-1768	-282
1937-38	-386	-16	50	49	32	32	35	32	3	-205	-1198	-1746	-279
1938-39	-381	-16	50	48	31	31	35	31	3	-203	-1183	-1724	-275
1939-40	-376	-16	49	48	31	31	34	31	3	-200	-1167	-1701	-271
1940-41	-372	-16	48	47	30	30	34	30	3	-197	-1152	-1679	-268
1941-42	-367	-15	47	46	30	30	33	30	3	-195	-1137	-1656	-265
1942-43	-362	-15	47	46	29	29	33	29	3	-192	-1121	-1634	-261
1943-44	-358	-15	46	45	29	29	32	29	2	-190	-1106	-1611	-257
1944-45	-353	-15	45	44	29	29	32	29	2	-187	-1090	-1589	-254
1945-46	-348	-15	44	44	28	28	31	28	2	-184	-1075	-1566	-251
1946-47	-343	-15	44	43	28	28	31	28	2	-182	-1060	-1544	-247
1947-48	-339	-15	43	42	27	27	30	27	2	-179	-1044	-1521	-243
1948-49	-334	-15	42	41	27	27	30	27	2	-177	-1029	-1499	-240
1949-50	-329	-15	42	41	26	26	29	26	2	-174	-1013	-1477	-237
1950-51	-324	-15	41	40	26	26	29	26	2	-168	-977	-1424	-229
1951-52	-313	-15	39	39	25	25	28	25	2	-162	-941	-1371	-220
1952-53	-301	-14	38	37	24	24	26	24	2	-155	-905	-1318	-212
1953-54	-290	-14	36	35	23	23	25	23	1	-149	-868	-1265	-203
1954-55	-279	-14	34	34	22	22	24	22	1	-143	-832	-1212	-195
1955-56	-267	-13	33	32	21	21	23	21	1	-137	-796	-1160	-186
1956-57	-256	-13	31	31	20	20	22	20	1	-131	-760	-1107	-178
1957-58	-244	-12	30	29	19	19	21	19	1	-124	-723	-1054	-170
1958-59	-233	-12	28	28	18	18	20	18	1	-118	-687	-1001	-161
1959-60	-221	-12	27	26	17	17	19	17	1	-112	-651	-948	-153
1960-61	-210	-11	25	25	16	16	18	16	1	-106	-615	-895	-145
1961-62	-199	-11	23	23	15	15	17	15	0	-100	-578	-842	-136
1962-63	-187	-11	22	22	14	14	16	14	0	-94	-542	-790	-128
1963-64	-176	-10	20	20	13	13	15	13	0	-87	-506	-737	-119
1964-65	-164	-10	19	19	12	12	13	12	0	-81	-469	-684	-111
1965-66	-153	-9	17	17	11	11	12	11	0	-75	-433	-631	-103
1966-67	-141	-9	16	16	10	10	11	10	0	-69	-397	-578	-94
1967-68	-130	-9	14	14	9	9	10	9	0	-63	-361	-525	-86
1968-69	-119	-8	12	13	8	8	9	8	0	-56	-324	-472	-77
1969-70	-107	-8	11	11	7	7	8	7	0	-50	-288	-419	-69
1970-71	-96	-8	9	10	6	6	7	6	-1	-44	-252	-366	-61
1971-72	-84	-7	8	8	5	5	6	5	-1	-38	-215	-314	-52
1972-73	-73	-7	6	7	4	4	5	4	-1	-32	-179	-261	-44
1973-74	-61	-6	4	5	3	3	4	3	-1	-25	-143	-208	-35
1974-75	-50	-6	3	4	2	2	3	2	-1	-19	-106	-155	-27
1975-76	-38	-6	1	2	1	1	2	1	-1	-13	-70	-102	-19
1976-77	-27	-5	0	1	0	0	0	0	-1	-7	-34	-49	-10
1977-78	-16	-5	-2	-1	-1	-1	-1	-1	-1	-1	2	4	-2
1978-79	-4	-5	-3	-2	-2	-2	-2	-2	-2	6	39	57	7
1979-80	7	-4	-5	-4	-3	-3	-3	-3	-2	12	75	110	15
1980-81	19	-4	-7	-5	-4	-4	-4	-4	0	5	31	44	6
1981-82	10	1	-1	-1	-1	-1	-1	-1	0	5	26	38	6
1982-83	9	1	-1	-1	-1	-1	-1	-1	0	4	22	32	5
1983-84	7	1	-1	-1	0	0	0	0	0	3	18	26	4
1984-85	6	1	0	0	0	0	0	0	0	2	13	19	3
1985-86	5	1	0	0	0	0	0	0	0	2	9	13	2
1986-87	3	1	0	0	0	0	0	0	0	1	5	7	1
1987-88	2	1	0	0	0	0	0	0	0	0	0	0	0
1988-89	1	1	0	0	0	0	0	0	0	0	0	0	0
1989-90	0	0											
MEAN	-210	-10	26	26	17	17	19	17	1	-111	-644	-955	-151

WMT3D9

A CANAL DIVERSION

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												-589	
1928-29	-461	-175	0	0	0	0	0	0	-5	-597	-522	-632	-201
1929-30	-533	-257	0	0	0	0	0	0	-48	-485	-775	-688	-232
1930-31	-508	-177	0	0	0	0	0	0	-312	-853	-734	-823	-286
1931-32	-675	-207	0	0	0	0	0	0	-7	-510	-600	-772	-232
1932-33	-602	-374	0	0	0	0	0	0	-105	-260	-795	-742	-241
1933-34	-647	-338	-14	0	0	0	0	0	-391	-559	-605	-766	-278
1934-35	-654	-351	0	0	0	0	0	0	0	-414	-798	-691	-244
1935-36	-655	-390	-5	0	0	0	0	0	-8	-501	-567	-850	-250
1936-37	-655	-326	0	0	0	0	0	0	-34	-541	-423	-869	-240
1937-38	-716	-383	-4	0	0	0	0	0	-8	-442	-752	-829	-263
1938-39	-646	-425	-20	0	0	0	0	0	-427	-588	-777	-824	-310
1939-40	-742	-341	-17	0	0	0	0	0	-4	-592	-844	-839	-283
1940-41	-648	-240	0	0	0	0	0	0	-343	-499	-592	-783	-261
1941-42	-525	-273	0	0	0	0	0	0	-245	-339	-728	-865	-249
1942-43	-724	-382	-2	0	0	0	0	0	-4	-409	-606	-899	-254
1943-44	-805	-401	-80	0	0	0	0	0	-156	-528	-480	-960	-284
1944-45	-876	-448	-61	0	0	0	0	0	-62	-382	-486	-934	-272
1945-46	-855	-443	-71	0	0	0	0	0	-106	-586	-769	-970	-319
1946-47	-813	-429	-79	0	0	0	0	0	-258	-797	-368	-967	-312
1947-48	-686	-423	-90	0	0	0	0	0	-27	-265	-537	-900	-245
1948-49	-650	-368	0	0	0	0	0	0	-102	-555	-827	-892	-285
1949-50	-695	-491	0	0	0	0	0	0	-88	-643	-800	-976	-310
1950-51	-758	-406	0	0	0	0	0	0	-404	-514	-982	-983	-339
1951-52	-712	-574	-18	0	0	0	0	0	-67	-666	-706	-885	-304
1952-53	-810	-559	-121	0	0	0	0	0	-160	-357	-654	-1004	-308
1953-54	-807	-483	-96	0	0	0	0	0	-119	-897	-753	-1053	-354
1954-55	-795	-617	-75	0	0	0	0	0	-166	-730	-1001	-921	-353
1955-56	-914	-575	-99	0	0	0	0	0	-101	-589	-825	-954	-339
1956-57	-802	-576	-108	0	0	0	0	0	-37	-554	-974	-966	-337
1957-58	-771	-578	-1	0	0	0	0	0	-83	-732	-598	-844	-303
1958-59	-802	-485	-83	0	0	0	0	0	-608	-696	-1047	-1042	-399
1959-60	-797	-480	-107	0	0	0	0	0	-195	-574	-1094	-1086	-362
1960-61	-816	-600	-152	0	0	0	0	0	-292	-785	-858	-1045	-381
1961-62	-825	-579	-161	0	0	0	0	0	-242	-677	-995	-1020	-377
1962-63	-807	-625	-64	0	0	0	0	0	-75	-555	-884	-859	-324
1963-64	-736	-470	-226	0	0	0	0	0	-156	-754	-521	-893	-315
1964-65	-847	-613	-170	0	0	0	0	0	-214	-789	-755	-973	-366
1965-66	-716	-610	-158	0	0	0	0	0	-513	-896	-845	-941	-392
1966-67	-896	-593	-269	0	0	0	0	0	-63	-403	-882	-942	-340
1967-68	-863	-625	-205	0	0	0	0	0	-583	-776	-958	-1009	-419
1968-69	-674	-631	-224	0	0	0	0	0	-209	-744	-827	-981	-360
1969-70	-901	-660	-137	0	0	0	0	0	-255	-689	-938	-984	-383
1970-71	-873	-598	-273	0	0	0	0	0	-91	-482	-747	-966	-338
1971-72	-921	-686	-174	0	0	0	0	0	-144	-772	-940	-996	-388
1972-73	-863	-655	-167	0	0	0	0	0	-380	-903	-983	-1010	-416
1973-74	-904	-595	-110	0	0	0	0	0	-147	-855	-996	-984	-385
1974-75	-919	-763	-315	0	0	0	0	0	-79	-753	-981	-932	-398
1975-76	-905	-710	-221	0	0	0	0	0	-270	-957	-938	-989	-418
1976-77	-489	-646	-247	0	0	0	0	0	-610	-516	-868	-965	-363
1977-78	-835	-574	-58	0	0	0	0	0	-101	-490	-938	-952	-331
1978-79	-851	-549	-198	0	0	0	0	0	-339	-732	-977	-975	-388
1979-80	-784	-510	-281	0	0	0	0	0	-269	-755	-770	-942	-359
1980-81	-857	-652	-250	0	0	0	0	0	-261	-656	-879	-971	-379
1981-82	-863	-601	-99	0	0	0	0	0	-56	-726	-887	-843	-342
1982-83	-881	-583	-141	0	0	0	0	0	-103	-502	-880	-940	-338
1983-84	-781	-630	-179	0	0	0	0	0	-187	-685	-866	-989	-361
1984-85	-1172	-524	-200	0	0	0	0	0	-388	-871	-917	-995	-425
1985-86	-842	-470	-200	0	0	0	0	0	-362	-696	-942	-980	-377
1986-87	-907	-561	-104	0	0	0	0	0	-463	-859	-869	-815	-384
1987-88	-870	-665	-222	0	0	0	0	0	-412	-652	-770	-1011	-385
1988-89	-883	-734	-232	0	0	0	0	0	-239	-659	-898	-996	-389
1989-90	-880	-626											
MEAN	-776	-503	-108	0	0	0	0	0	-200	-627	-795	-914	-329

ACL3D9

A* CANAL INCR. DEPL.

Accumulated depletions at site (1990 level of development).

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AVE.
1927-28												-355	
1928-29	-354	-355	0	0	0	0	0	0	-419	-412	-410	-418	-198
1929-30	-414	-413	0	0	0	0	0	0	-355	-360	662	-356	-105
1930-31	-354	-354	0	0	0	0	0	0	-236	-252	-233	-234	-139
1931-32	-234	-235	0	0	0	0	0	0	-328	-327	-327	-326	-148
1932-33	-327	-327	0	0	0	0	0	0	-328	-328	-326	-327	-164
1933-34	-327	-327	0	0	0	0	0	0	-278	-278	-278	-278	-148
1934-35	-278	-274	0	0	0	0	0	0	-306	-304	-304	-305	-148
1935-36	-305	-306	0	0	0	0	0	0	-290	-290	-290	-290	-147
1936-37	-290	-289	0	0	0	0	0	0	-300	-300	-299	-300	-149
1937-38	-299	-300	0	0	0	0	0	0	-208	-209	-208	-188	-118
1938-39	-202	-208	0	0	0	0	0	0	-181	-181	-181	-180	-95
1939-40	-181	-181	0	0	0	0	0	0	-236	-234	-234	-235	-108
1940-41	-235	-235	0	0	0	0	0	0	-284	-284	-284	-284	-134
1941-42	-284	-284	0	0	0	0	0	0	-224	-224	-224	-224	-122
1942-43	-224	-224	0	0	0	0	0	0	-149	-148	-148	-148	-87
1943-44	-147	-148	0	0	0	0	0	0	-197	-197	-197	-197	-90
1944-45	-196	-198	0	0	0	0	0	0	-235	-235	-235	-235	-111
1945-46	-235	-235	0	0	0	0	0	0	-115	-115	-115	-114	-78
1946-47	-115	-115	0	0	0	0	0	0	-181	-181	-182	-181	-80
1947-48	-181	-181	0	0	0	0	0	0	-317	-316	-317	-317	-136
1948-49	-317	-317	0	0	0	0	0	0	-182	-181	-181	-181	-114
1949-50	-181	-181	0	0	0	0	0	0	-153	-153	-153	-152	-81
1950-51	-153	-153	0	0	0	0	0	0	0	0	0	0	-26
1951-52	0	0	0	0	0	0	0	0	0	0	0	0	0
1952-53	0	0	0	0	0	0	0	0	0	0	0	0	0
1953-54	0	0	0	0	0	0	0	0	0	0	0	0	0
1954-55	0	0	0	0	0	0	0	0	0	0	0	0	0
1955-56	0	0	0	0	0	0	0	0	0	0	0	0	0
1956-57	0	0	0	0	0	0	0	0	0	0	0	0	0
1957-58	0	0	0	0	0	0	0	0	0	0	0	0	0
1958-59	0	0	0	0	0	0	0	0	0	0	0	0	0
1959-60	0	0	0	0	0	0	0	0	0	0	0	0	0
1960-61	0	0	0	0	0	0	0	0	0	0	0	0	0
1961-62	0	0	0	0	0	0	0	0	0	0	0	0	0
1962-63	0	0	0	0	0	0	0	0	0	0	0	0	0
1963-64	0	0	0	0	0	0	0	0	0	0	0	0	0
1964-65	0	0	0	0	0	0	0	0	0	0	0	0	0
1965-66	0	0	0	0	0	0	0	0	0	0	0	0	0
1966-67	0	0	0	0	0	0	0	0	0	0	0	0	0
1967-68	0	0	0	0	0	0	0	0	0	0	0	0	0
1968-69	0	0	0	0	0	0	0	0	0	0	0	0	0
1969-70	0	0	0	0	0	0	0	0	0	0	0	0	0
1970-71	0	0	0	0	0	0	0	0	0	0	0	0	0
1971-72	0	0	0	0	0	0	0	0	0	0	0	0	0
1972-73	0	0	0	0	0	0	0	0	0	0	0	0	0
1973-74	0	0	0	0	0	0	0	0	0	0	0	0	0
1974-75	0	0	0	0	0	0	0	0	0	0	0	0	0
1975-76	0	0	0	0	0	0	0	0	0	0	0	0	0
1976-77	0	0	0	0	0	0	0	0	0	0	0	0	0
1977-78	0	0	0	0	0	0	0	0	0	0	0	0	0
1978-79	0	0	0	0	0	0	0	0	0	0	0	0	0
1979-80	0	0	0	0	0	0	0	0	0	0	0	0	0
1980-81	0	0	0	0	0	0	0	0	0	0	0	0	0
1981-82	0	0	0	0	0	0	0	0	0	0	0	0	0
1982-83	0	0	0	0	0	0	0	0	0	0	0	0	0
1983-84	0	0	0	0	0	0	0	0	0	0	0	0	0
1984-85	0	0	0	0	0	0	0	0	0	0	0	0	0
1985-86	0	0	0	0	0	0	0	0	0	0	0	0	0
1986-87	0	0	0	0	0	0	0	0	0	0	0	0	0
1987-88	0	0	0	0	0	0	0	0	0	0	0	0	0
1988-89	0	0	0	0	0	0	0	0	0	0	0	0	0
1989-90	0	0											
MEAN	-94	-94	0	0	0	0	0	0	-90	-90	-73	-94	-114

PPL3D9

SECTION E

COLUMBIA BASIN PROJECT

RETURN FLOW STUDY

1990 LEVEL IRRIGATION DEPLETION

1990 LEVEL IRRIGATION DEMANDS, RETURN FLOWS, AND DEPLETION AMOUNTS FOR THE COLUMBIA BASIN PROJECT

Introduction

The Columbia Basin Project is a multipurpose development located in the central part of the State of Washington. The project contains extensive irrigation works which extend southward from the Grand Coulee Dam across the Columbia Plateau 125 miles to the vicinity of Pasco, Washington, where the Snake and Columbia Rivers join.

Principal project features include Grand Coulee Dam, Franklin D. Roosevelt Lake, Grand Coulee Powerplant Complex, switchyards, and a pump-generating plant. Primary irrigation facilities are the Feeder Canal, Banks Lake, the Main, West, East High, and East Low Canals, O'Sullivan Dam, Potholes Reservoir, and Potholes Canal. There are 333 miles of main canals, 1,993 miles of laterals, and 3,498 miles of drains and wasteways on the project.

All of the principal features have been constructed, except the East High Canal and the extension of the East Low Canal, on which construction has been deferred.

The widely distributed irrigation works that extend southward from the Grand Coulee Pump-Generating Plant begin with the short feeder canal which carries water to Banks Lake, the equalizing reservoir. This 27-mile-long reservoir occupies the floor of the upper Grand Coulee between North Dam near the town of Coulee Dam, Washington, and Dry Falls Dam near Coulee City. The Main Canal flows southward from the outlet works at Dry Falls Dam into the northern end of the irrigable area. The West, East High, and East Low Canals are fed by the Main Canal and carry water over a large portion of the project area. O'Sullivan Dam, in the central part of the project area, created the Potholes Reservoir where return flows from the northern part of the project are recaptured. The Potholes Canal extends into and serves the southern part of the project area.

MAIN CANAL

The Main Canal begins at the headworks of Dry Falls Dam and consists of unlined and concrete-lined sections. Total length of the canal, including siphons, tunnels, and Billy Clapp Lake, is 18.4 miles. The first 1.8 miles from Dry Falls Dam to the Bacon Siphon and Tunnel structures has been increased in capacity from 13,200 to 19,300 cubic feet per second. Bacon Siphon and Tunnel structures consist of two siphons, each about 1,000 feet long, and two tunnels, each about 2 miles long, that carry the water to Billy Clapp Lake. This lake, some 6 miles long and formed by the construction of the earthfill Pinto Dam, is a segment of the canal system. Construction of an equal length of very difficult and expensive canal was thus avoided. At present, 1,300 acres are served directly from the Main Canal; this will increase to about 5,000 acres.

WEST CANAL

The West Canal has an initial capacity of 5,100 cubic feet per second and a length of 82.2 miles. It is one of two canals formed by the bifurcation of the Main Canal. The West Canal skirts the northwest periphery of the project and enroute is carried across the lower Grand Coulee end of Soap Lake. The canal continues around the upper margin of Quincy Basin to the northern base of Frenchman Hills, which it penetrates by a 9,000-foot tunnel, ending in an easterly branch across the Royal Slope. The West Canal will serve some 274,000 acres. The capacity of the canal is reduced progressively as water is diverted into lateral distribution systems built to serve the entire northwestern portion of the project.

EAST LOW CANAL

The East Low Canal, having an initial capacity of 4,500 cubic feet per second, also begins at the bifurcation of the Main Canal. The East Low Canal extends southerly in a contour course through the rolling eastern uplands, passes through or near the towns of Moses Lake and Warden, and terminates just east of the Scootenev Reservoir. An extension of the canal, on which construction has been deferred, would carry water southward and to the east of the towns of Connell, Mesa, and Eltopia. When complete, the East Low Canal will be about 130 miles long and will carry irrigation water for about 220,000 acres.

O'SULLIVAN DAM

O'Sullivan Dam, one of the larger zoned earthfill dams in the United States, is on Crab Creek about 15 miles south of Moses Lake. The 27,800-acre Potholes Reservoir formed by the dam collects return flows from all irrigation in the upper portion of the project for reuse in the southern portion. Active storage capacity of the reservoir is 332,200 acre-feet. A system of wasteways has been built on both the West and East Low Canals to provide additional safety for the canals and a means of delivering water into Potholes Reservoir to supplement the natural and return flows.

POTHOLES CANAL

The Potholes Canal has a capacity of 3,900 cubic feet per second, begins at the headworks of O'Sullivan Dam, and extends 62.4 miles in a southerly direction to irrigate lands that eventually will total about 234,000 acres in the southwestern and south-central portions of the project. Irrigation Blocks 2 and 3, about 5,000 acres located in the southernmost tip of the South District, receive irrigation water pumped directly from the rivers: Block 2 from the Snake River and Block 3 from the Columbia River.

EAST HIGH CANAL

This proposed 88-mile long canal, designed for an initial capacity of about 7,500 cubic feet per second, will divert water from the Main Canal immediately above Summer Falls and Billy Clapp Lake, and will serve lands east of the East Low Canal extending from the northernmost point of the project area south to Washtucna Coulee. Some 357,000 acres are proposed for service from the East High Canal.

RELIFT PUMPING PLANTS

About 360,000 acres of the irrigable lands within the project are located at elevations higher than the gravity canals and laterals. Some of these high lands are now being served by relift pumping plants at various points within the projects. In 1982, there were 241 pumping plants with 478 individual pumps varving in size from 3 to 2,500 horsepower in those pumps delivering water to the irrigated area, including a few pumps required for drainage of low lying areas.

PROJECT ACREAGE

The irrigable area within the Columbia Basin Project, both existing and proposed, has been subdivided into separate numbered and lettered area called blocks. The blocks are of various sizes and have been developed gradually since 1948. The total acreage irrigated in the Columbia Basin Project in 1990 was 581,388 acres which includes 3,633 acres in Blocks 2 and 3 (served by pumping from McNary Pool) and 51,703 acres served by water service contracts.

PROJECT DIVERSIONS

The 1990 level diversion from Banks Lake through the Main Canal to the bifurcation was 2,731,090 acre-feet. The diversion from the Potholes Reservoir was 988,520 acre-feet.

RETURN FLOW

The Columbia Basin Project contains three distinct return flow units (or areas). They are: (1) Potholes Unit, (2) Lower Crab Creek Unit, and (3) South Unit.

The return flow unit boundaries do not coincide with irrigation district boundaries. Certain blocks in the East and Quincy Irrigation districts, for instance, have return flow which drains into Potholes Reservoir and are part of the Potholes Return-Flow Unit.

1. **Potholes Unit.** The Potholes Unit as of 1990 included 206,207 acres of land with return flow to Potholes Reservoir. These lands include Block 70, 701, 71, 89, 72, 73, 74, 741, 75, 76, 77, 78, 79, 40, 401, 41, 42, 43, one-half of 44, one-half of 80, and 421. The return flow from this acreage enters Potholes Reservoir where it is stored and is available for reuse for irrigation via the Potholes Canal. Excess water in Potholes Reservoir may be spilled down Crab Creek or Potholes Canal. Return flow to the Columbia River from the western portions of Block 74, 741, 77, and 79 and return flows via the Columbia River Wasteway were considered negligible.

2. **Lower Crab Creek Unit.** Return flow from this unit enters the Columbia River through two drainages: the RB4C Wasteway and Crab Creek. The return flows from Block 82, three-fourths of Block 81, (total area = 19,286 acres) and the groundwater seepage from one-fourth of Block 83 enter the Wanapum Pool via the RB4C Wasteway. The return flow was divided as follows: (1) groundwater--2.2 acre-feet/acre, (2) operational waste--0.5 acre-feet/acre, (3) farm runoff--0.25 acre-feet/acre. The monthly percentage distributions for groundwater, operational waste, and farm runoff are shown in Table 1. The latter two return-flow components are surface returns. The monthly percentage distributions by which these three components return are all different. The groundwater return flow is lagged; and the percentage

distribution used for this component was taken from a report entitled "Return Flow Study -- Columbia Basin Project Area," by M. J. Mundorff dated May 9, 1952. The operational waste component returns and the farm runoff component returns have no lag. The return-flow values for acreage draining into the RB4C Wasteway were computed and are shown on Table 2.

The remainder of the return flow from the Lower Crab Creek Unit enters Crab Creek and is equal to the observed flows of the USGS gage "Crab Creek near Beverly," 12472600. Discharges from Crab Creek enter Priest Rapids pool. The following blocks contribute to Crab Creek: one-half of 80, one-fourth of 81, 83 (except for groundwater seepage from one-fourth of the block), 85, 86, 87, 88, 881, and one-third of 49. Total area contained in these blocks is 56,451 acres. There is some re-use of return flow from the Lower Crab Creek Unit. Returns from Blocks 85, 86, and 87 are collected in a lateral and used to supplement Project water deliveries to irrigate Blocks 88 and 881.

There are two additional water sources which contribute to the "Crab Creek near Beverly" discharges: (1) seepage through the O'Sullivan Dam foundation on Potholes Reservoir and (2) spill from Potholes Reservoir and groundwater migration from irrigated lands east of the Potholes Canal. During the pre-project period (prior to 1948), the Potholes Reservoir area was just a series of springs; and Crab Creek in its lower reaches had little flow in comparison to 1990 conditions. For instance, during water year 1948, the USGS gage "Crab Creek near Smyrna" had a monthly mean flow of only 0.26 cfs in September and 18 cfs in February. These figures represented the high and low monthly means for that water year. The recorded flows of "Crab Creek near Beverly" (just downstream from Smyrna) for the calendar year 1990 show a low monthly mean discharge of 156 cfs for March and a maximum mean discharge of 305 cfs for October. This is a substantial increase in the discharge of Crab Creek since irrigation was initiated. Mean monthly discharges for USGS Gage No. 12472600 "Crab Creek near Beverly" are tabulated on Table 3 for calendar year 1990.

3. South Unit. The South Unit as of 1990 included 157,561 acres. The following blocks are included in the South Unit: two-thirds of 49, 19, 48, 21, 201, 24, 23, 20, 18, 1, 2, 3, 11, 12, one half of 44, 45, 46, 47, 13, 14, 15, 16, 161, and 17. Return flow from the South Unit enters the Columbia and Snake Rivers via: WB5 Wasteway no. 1, which enters the Columbia a few mile upstream from Ringold; PE16.4 Wasteway, which enters the Columbia near Ringold; PE46A Wasteway, which merges with the PE16.4 Wasteway below the measuring point; the Esquatzel Diversion Canal; the springs at Ringold; pumping west of Pasco; springs below Ice Harbor Dam; Block 1 returns (computed); and Blocks 2 and 3 returns (computed). Brief descriptions of these return-flow components follow in items (a) through (d).

- (a) Measured Wasteways. Part of the return flow from the South Return Flow Unit enters the Columbia River via the WB5 Wasteway No. 1, the PE16.4 Wasteway, the PE46A Wasteway, and the Esquatzel Canal. The operation of the supply system serving much of the land has been taken over by the irrigation district personnel. Discharge estimates were obtained from the SCBID Wahluke Watermaster's office, the SCBID Mesa Watermaster's office and GCPHA

measurements and estimates. They are shown on Table 4 for the WB5 Wasteway No. 1, the PE16.4 Wasteway, PE46A Wasteway, Springs at Ringold, and the Esquatzel Diversion Canal.

- (b) Pumping West of Pasco. Return flow to the Columbia River West of Pasco collects behind the dikes at Pasco and is pumped into McNary Pool by the Corps of Engineers. This discharge is estimated to be 100cfs. See Table 4.
- (c) Block 1. This block, containing 5,817 acres irrigated in 1990, was the first block developed in the project. The water supply in 1948 was provided by pumping from the Columbia River. Following the construction of Potholes Canal, pumping was discontinued; and the canal has provided the necessary water. The return flow from Block 1 enters McNary pool, and was calculated in the same manner as the RB4C Wasteway. Table 5 presents the results of these calculations.
- (d) Blocks 2 and 3. Records of diversions, losses and wastes have been maintained on the "Monthly Water Distribution" forms. Table 6 lists the data for Blocks 2 and 3 for 1990. The farm delivery rate of 4.09 acre-feet per acre is supplied by diverting a total of 5.62 acre-feet per acre. Table 7 shows the diversion of various return flow components. The monthly return flow is shown on Table 8.

4. Wahluke Branch Canal Return Flow Unit. This return flow is to McNary reservoir and the monthly values are tabulated in Table 9 and also entered in Table 4.

TABLE 1

1990 LEVEL

MONTHLY DISTRIBUTION PERCENTAGES

COLUMBIA BASIN PROJECT

		J	F	M	A	M	J	J	A	S	O	N	D	ANNUAL
1990 DISTRIBUTION: MAIN CANAL TO BIFURCATION	AC-FT	0	0	99670	442440	460570	425600	496570	396920	263790	145530	0	0	2731090
	%	0	0	3.65	16.2	16.87	15.58	18.18	14.33	9.66	5.33			100
GROUNDWATER RETURN FLOW PERCENTAGE DISTRIBUTION (FIG.9, MUNDORFF REPORT)	%	8.5	7.5	6.7	6.2	7.7	9.7	10.7	10.8	10.5	9.7			100
LATERAL WASTE: WEST CANAL EAST LOW CANAL TOTAL	AC-FT	0	0	40220	15680	19010	15600	18340	20290	18660	14680	0	0	126280
	AC-FT	0	0	2010	12740	13260	10840	12020	13510	12560	9860	0	0	86800
	AC-FT	0	0	6030	28420	32270	26440	30360	33800	31220	24540	0	0	213080
	%	0	0	2.83	13.34	15.14	12.40	14.25	15.86	14.65	11.53	0	0	100
FARM RUNOFF-LATERAL LOSSES (WEST + EAST LOW CANAL)	AC-FT	0	0	16630	55110	60320	60250	65260	60460	53030	32460	0	0	403520
	%	0	0	4.12	13.66	14.95	14.93	16.17	14.98	13.14	8.05	0	0	100
W645DRAIN	%	4.6	4.1	4.9	7	10	11.2	12.6	13.6	12.1	9.1	5.9	4.9	100
BLOCKS 2 & 3 DIVERSION MONTHLY DISTRIBUTION-DIVERSION & RETURN FLOW	AC-FT	0	0	310	2970	2690	3210	3450	3350	2870	1560	0	0	20410
	%	0.0	0.0	1.52	14.55	13.18	15.73	16.90	16.41	14.06	7.64	0.0	0.0	100.00

TABLE 2
RETURN FLOW TO WANAPUM POOL
RB4C WASTEWAY
ACRE FEET

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
GROUNDWATER 20,904 ACRES @ 2.2 AF/ACRE 1/	3909 8.5	3449 7.5	3081 6.7	2851 6.2	2667 5.8	2851 6.2	3541 7.7	4461 9.7	4921 10.7	4967 10.8	4829 10.5	4461 9.7	45988 100
WASTE 19,286 ACRES @ 0.5 AF/ACRE	0 0	0 0	273 2.83	1286 13.34	1460 15.14	1196 12.4	1374 14.25	1529 15.86	1413 14.65	1112 11.53	0 0	0 0	9643 100
FARM RUNOFF 19,286 ACRES @ .25 AF/ACRE	0 0	0 0	199 4.12	659 13.66	721 14.95	720 14.93	780 16.17	722 14.98	634 13.14	388 8.05	0 0	0 0	4823 100
RETURN TO WANAPUM AC.FT. CFS	3909 64	3449 62	3553 58	4796 80	4848 79	4767 80	5695 93	6712 109	6968 117	6467 105	4829 81	4461 73	60454

1/ Lower Crab Creek area consists of Block 82 and 75% of Block 81 which totals 19,286 acres. The groundwater component also includes 25% of Block 83 or an additional 1,618 acres for a grand total of 20,904 acres.

TABLE 3
CRAB CREEK NEAR BEVERLY
DISCHARGE IN CFS
1990

JAN	182	APR	227	JUL	234	OCT	305
FEB	158	MAY	251	AUG	295	NOV	197
MAR	156	JUN	215	SEP	278	DEC	168

TABLE 4
RETURN FLOW TO McNARY POOL
FROM COLUMBIA BASIN PROJECT (CFS)
1990

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
SOUTH UNIT												
WBS #1	15	12	12	25	25	30	33	25	25	20	20	12
PE 16.4 WASTEWAY PE46A WASTEWAY SPRINGS AT RINGOLD	66	60	67	95	115	125	200	200	200	115	115	74
ESQUATZEL DIVERSION CANAL	50	50	150	190	160	185	190	190	215	200	50	50
WAHLUKE BRANCH CANAL	86	84	79	112	110	112	129	151	162	144	0	0
PUMPING WEST OF PASCO	100	100	100	100	100	100	100	100	100	100	100	100
SPRINGS BELOW ICE HARBOR	0	0	0	0	0	0	0	0	0	0	0	0
BLOCK 1	18	17	16	23	23	23	26	31	33	30	23	20
BLOCKS 2 & 3	9	9	10	18	18	17	20	23	23	20	12	11
TOTAL	344	332	434	563	551	592	698	720	758	629	320	267

TABLE 5
BLOCK 1 RETURN FLOW
5,812 ACRES
1990

		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
GROUNDWATER COMPONENT (5.812)(2.25AF/A) = 12,786AF		1087	959	857	793	742	793	985	1240	1368	1381	1343	1240	12788
	PERCENT	8.5	7.5	6.7	6.2	5.8	6.2	7.7	9.7	10.7	10.8	10.5	9.7	100
WASTE (5.812)(0.5AF/A) = 2,906AF		0	0	82	388	440	360	414	461	426	335	0	0	2906
	PERCENT	0	0	2.83	13.34	15.14	12.4	14.25	15.86	14.65	11.53	0	0	100
FARM RUNOFF (5.812)(.25AF/A) = 1453AF		0	0	60	198	217	217	235	218	191	117	0	0	1453
	PERCENT	0	0	4.12	13.66	14.95	14.93	16.17	14.98	13.14	8.05	0	0	100
TOTAL RETURN FROM BLOCK 1 TO McNARY POOL	AC.FT.	1087	959	999	1379	1399	1370	1634	1919	1985	1833	1343	1240	17147
	CFS	18	17	16	23	23	23	26	31	33	30	23	20	

TABLE 6
1990 DIVERSIONS TO BLOCKS 2 & 3 IN AC. FT.
IRRIGATED ACRES = 3633

	FARM DELIVERY	LATERAL LOSSES	LATERAL WASTE	TOTAL DIVERSION	MONTHLY DISTRIB.
JAN	0	0	0	0	0
FEB	0	0	0	0	0
MAR	170	10	130	310	1.52
APR	2010	410	550	2970	14.55
MAY	2140	110	440	2690	13.18
JUN	2560	310	340	3210	15.73
JUL	2660	390	400	3450	16.9
AUG	2340	340	670	3350	16.41
SEP	2060	390	420	2870	14.06
OCT	920	210	430	1560	7.65
NOV	0	0	0	0	0
DEC	0	0	0	0	0
TOTAL	14860	2170	3380	20410	100
AC.FT. PER ACRE	4.09	0.6	0.93	5.62	

TABLE 7
1990 PER ACRE RETURN FLOW ESTIMATES
BLOCKS 2 AND 3

DIVERSION REQUIREMENT		5.62	AC. FT.
LATERAL LOSSES		-0.6	
	SUBTOTAL	5.02	
LATERAL WASTES		-0.93	
FARM DELIVERY REQUIREMENT		4.09	
CONSUMPTIVE USE (est)		-2.25	
FARM RUNOFF & GROUNDWATER RETURN		1.84	AC.FT.
GROUNDWATER COMPONENT ESTIMATED TO BE 80% EQUALS 1.5 AF/A			
GROUNDWATER COMPONENT OF RETURN FLOW:			
FROM APPLICATION AT FARM		1.5	AF/A
FROM LOSSES		0.6	
TOTAL RETURN TO GROUNDWATER		2.1	
10% LOSS FROM RE-USE WITHIN PROJECT		-0.21	
NET RETURN FLOW TO GROUNDWATER		1.89	AF/A
FARM RUNOFF AND GROUNDWATER RETURN		1.84	AF/A
GROUNDWATER COMPONENT		1.5	
NET RETURN FLOW TO SURFACE FROM WATER APPLICATION		0.34	AF/A
MEASURED LATERAL WASTES		0.93	AF/A

TABLE 8
1990 RETURN FLOW
BLOCKS 2 AND 3 (3633 ACRES)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
GROUNDWATER COMPONENT 3633 AF X 1.89 AF/ = 6866 AF	584	515	460	426	398	426	529	666	735	742	721	666	6868
%	8.5	7.5	6.7	6.2	5.8	6.2	7.7	9.7	10.7	10.8	10.5	9.7	100
WASTE (3633)(.93) = 3379 AF	0	0	96	451	512	419	482	536	495	390	0	0	3381
%	0	0	2.83	13.34	15.14	12.4	14.25	15.86	14.65	11.53	0	0	100
FARM RUNOFF (3633)(.34) = 1235 AF	0	0	51	165	185	184	200	185	162	99	0	0	1231
%	0	0	4.12	13.36	14.95	14.93	16.17	14.98	13.14	8.05	0	0	99.7
RETURN TO McNARY AC.FT	584	515	607	1042	1095	1029	1211	1387	1392	1231	721	666	11480
CFS	9	9	10	18	18	17	20	23	23	20	12	11	

TABLE 9
1990 RETURN FLOW FROM WAHILUKE BRANCH CANAL
RETURN FLOW UNIT

BLOCK 25, 251, 253 = 28,160 ACRES

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
GROUNDWATER 28,160 ACRES @ 2.2 AF/A = 61,952	5266	4646	4151	3841	3593	3841	4770	6009	6629	6691	6505	6009	61951
%	8.5	7.5	6.7	6.2	5.8	6.2	7.7	9.7	10.7	10.8	10.5	9.7	100
WASTE 28,160 ACRES @ 0.5 AF/A = 14,080 AF	0	0	398	1878	2132	1746	2006	2233	2063	1623	0	0	14079
%	0	0	2.83	13.34	15.14	12.4	14.25	15.86	14.65	11.53	0	0	100
FARM RUNOFF 28,160 ACRES @ 0.25 = 7040 AF	0	0	290	962	1052	1050	1138	1055	925	567	0	0	7039
%	0	0	4.12	13.66	14.95	14.93	16.17	14.98	13.14	8.05	0	0	100
RETURN TO McNARY - AC. FT.	5266	4646	4839	6681	6777	6637	7914	9297	9617	8881	6505	6009	83069
CFS	86	84	79	112	110	112	129	151	162	144	109	98	

Section F

EXCEL PROGRAMS

AND

ANNUAL UPDATE

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I. INTRODUCTION

The programs which have been written to automatically update the modified flows have been written in Microsoft Excel Version 4. While we will refer to the programs as "macros" throughout this report, these macros are not macros in the Lotus 1-2-3 sense. Nothing could be further from the truth. In reality, Excel offers its own programming language capable of nearly anything that such mainframe languages as Pascal or Fortran are capable of with the big difference being Excel is easy to understand. You will notice, if you view the programs or "macros", that all commands in the Excel language are one word long with some parameters in parentheses. For example, the Excel command to ask the user for input (the equivalent of `WriteLn("text")` in Pascal) is `=input(message,type,title)`. The individual commands and parameters are explained in detail in easy to understand English in the Excel Function Reference. Since it is not the purpose of this report to teach the Excel programming language, the reader is referred to the Function Reference for more information.

You will notice some repetition as you read the following report. This was purposely done in the hopes that if the reader failed to grasp the idea the first time it is explained, a second explanation will do the trick.

HARDWARE

In order for the programs discussed below to run properly, the hard drive on which they are run will need to be set up in the following way. Within the c: drive, there must be a subdirectory "bpa". Within the subdirectory "bpa" must be found the following subdirectories: "3-all", which will contain all of the Hforms (to be discussed later), "sf", which will contain all of the PreHforms relating to historic flows, "elev", which will contain all of the PreHforms related to reservoir storage (elevation, storage or change in storage), "macros", which will contain the three macros and four templates, and "stat", which will contain the statistical analyses that can be performed on the modified flows. If the hard drive on the user's computer is other than c: or the subdirectories are named differently than described above, the macros will need to be changed accordingly. This is accomplished quickly by opening the macro files and using the REPLACE command from the Formula menu in Excel.

DEFINITIONS

- Hform - the name of a template that contains the the final format of all data;
- PreHform - the name of a template in which the data is stored prior to its final move to an Hform;
- Site code - the three letter abbreviation for each project or depletion point;
- Datatype - the two, three or four letter abbreviation for the type of data contained therein;
- ProjList - one of several lists used by the macros to provide standardized

notations and procedures; other lists are UpdateHistoricProjList, UpdateContentsProjList, FormulaList, and IncDepl;

- Macros - CDOOutputToPreHform, Headings, MoveToHform, PrintWY_Power, DoWhateverToAllFilesInTemp, UpdateChangeContents, UpdateHistoric, UpdateDepletions, AccumulateAll, Accumulate_Update, RankData and DBFilesToDB;
- Sform - the name of a template that converts data from acre-ft to cfs;
- Modform - the name of a template that provides the format for the statistical information.

CONVENTIONS

Before reading any of the following manual, you will want to familiarize yourself with some terms which will be used quite frequently. In the following discussion, whenever macro files are mentioned, they will be in *italics*, the names of individual macros will be underlined, Excel menu commands or buttons to be clicked will be in all CAPITALS, and text found in dialog boxes will be enclosed in "quotes". In addition, unless otherwise noted, all reference to years are water years, not calendar years.

PreHform: Because the data for these flows came from a variety of sources in a variety of formats, we established a standardized format from which the macros can read.

IMPORTANT:

If the source of data is EarthInfo, there is a macro, to be discussed later, which will automatically put the data in this format for you. If the source of the data is other than EarthInfo, you must put the data in PreHform format. A blank PreHform template is available for your use in c:\bpa\macros\.

A copy of a PreHform template can be found in the appendix of this report. There are two parts of a PreHform, the top portion which contains the monthly data and the lower portion which contains the data for the first fifteen days of the month. The essential features of a PreHform include the following: 1) In cells B4 through M4 and B104 through M104 are the months, Oct-Sep, written as three letter abbreviations of the months. Beginning at cells A5 and A105 are the years of the data such as 1965 or 1989 (not 65 or 89). There is no required beginning year. However, the years entered in cell A5 must be the same as that in A105, the year in cell A6 must equal A106, etc. The data is then entered at the junction between the appropriate month and year. You can either make up your own PreHform or use the template found in c:\bpa\macros\.

Hform: Hform is a template located in c:\bpa\macros\ and can be seen in the appendix of this report. Ultimately, it is the goal of most of the macros described below to get all data into an Hform. There are four portions of an Hform: beginning at about cell A5 you will find the monthly averages, beginning at about cell A105 you will find the first fifteen day averages, beginning at about cell A200 you will find a table containing percentages which are calculated as the fifteen day

ave./ monthly ave, and finally, at about cell AA5, you will find the split month averages. That is, each month is divided into; the average for the first 15 days and next to it is the average for the remaining portion of the month. These split month values are only used by the System 1032 (that is, they are exported to S1032) and are never used by the various macros described below. The macros below only use the monthly and fifteen day averages in their calculations.

Throughout this report, data that is contained within an Hform will have a name with this format: "three letter abbreviation & datatype.xls". For example, the historic flows at Mica Dam would be stored in an Hform as MCD3H.xls, the change in contents at Green Peter would be stored in an Hform as GPR3S.xls, the adjusted flows at Bonneville dam would be stored in an Hform as BON3A.xls, etc.

Three letter abbreviations: All projects as well as points where depletions are taken are referred to by three letter abbreviations. For a complete list of these abbreviations, see ProjList discussed below.

Datatype: The various types of data are referred to by two to four letter abbreviations as follows:

<u>Abbreviation</u>	<u>Datatype</u>
3H	historic flows
3S	change in contents or storage
3SS	accumulated change in contents
3A	adjusted flows
3D9	1990 level depletions
3DD9	accumulated depletions
3E	evaporation
3EE	accumulated evaporation
3M9	modified flows to a 1990 level
3AP2	Assured Operating Plan step 2 1990 level modified flows
3AP3	Assured Operating Plan step 3 1990 level modified flows
3NP9	modified flows, 1990 level, without pumping to Columbia Basin Project
DX	incremental depletions
DDX	accumulated incremental depletions
MX	modified flows beyond 1990

Datatypes 3AP2 and 3AP3 are required input for AOP studies. Step 2 represents the 33 projects which existed in 1961 plus the three Canadian projects, Mica Arrow and Duncan. Libby is excluded from the list of projects but Libby evaporation is included in 3M9 and 3NP9 flows. To reflect the "no Libby" streamflows, all 3M9 and 3NP9 flows from Libby downstream have the Libby evaporation added back. These 17 sites then have the modified 1990 level

streamflows stored as datatype 3AP2. Step 3 represents the 33 projects which existed in 1961 (no Canadian projects). Arrow and Duncan projects are sites where natural lakes existed prior to project construction. The historic change of contents for these projects have been included in the calculation for adjusted flows at site and downstream. To reflect the "no Arrow" and "no Duncan" streamflows, all Step 2 flows from Arrow and Duncan downstream have the historic changes and evaporations added back. These 17 sites have modified 1990 level streamflows stored as datatype 3AP3. All studies have the 1990 level of pumping to Columbia Basin Project included in the calculations of 3M9 streamflows. When files are created for input to hydro-regulation studies, the Columbia Basin Project has a different estimate for pumping based on what year is being studied. That estimate (referred to as Actual Coulee Pumping) is taken into account at the time that the streamflow file is constructed. The database streamflow, therefore, has values for the eleven sites from Grand Coulee downstream as if there were "no pumping". The estimate for 1990 level pumping to the Columbia Basin Project is added back into the streamflows and stored as datatype 3NP9.

ProjList: ProjList is one of several "lists" from which the macros discussed below read. ProjList is ten columns wide and approximately 275 rows tall. You will notice many blanks in ProjList. The blank spaces on ProjList are there for a variety of reasons discussed below and do not indicate something is missing. Columns one, three, and four contain several numbering schemes by which we sorted ProjList at various times. They are not of interest in this discussion. Column two contains the three letter project abbreviations or the three letter abbreviations for where depletions are applied. These three letter abbreviations are used extensively through this discussion and the macros. To run these macros, you must either know the three letter project abbreviations or have ready access to ProjList because, without exception, the macros ask for input about a project by means of its three letter abbreviation. Column five of ProjList contains the names of the project owners. Since depletions are not necessarily applied at a particular dam, you will notice many blanks in column five. Column six contains a number which is not of interest. Column seven contains the name of the project or the name where the depletions are applied. Use this column for a full name description of the three letter abbreviations in column two. Column eight contains the river name, column nine contains the river mile, and column ten contains the drainage area upstream of the project. Again, since depletions are not necessarily applied at a project, you will notice many blanks. ProjList is contained within the macro files *Utility.xlm* and *M_accum.xlm* beginning at cell DA1.

UpdateHistoricProjList: UpdateHistoricProjList, which can also be found in the appendix of this report, is located within the macro file *m_update.xlm*. It is another list used by a macro. You will notice it is similar to ProjList discussed above except that it is shorter and has more columns. UpdateHistoricProjList is used by the macro UpdateHistoric to update the historic flows (3H). The first ten columns are the same as in ProjList discussed above. There are two main differences: 1) UpdateHistoricProjList contains only actual projects for which historic flows are

calculated (i.e. no depletion abbreviations are contained here) and 2) it contains seven additional columns. Column 11 is intentionally blank. Columns 12, 14, and 16 are titled StmflwSite 1, StmflwSite 2, and StmflwSite 3, respectively, while columns 13, 15, and 17 are titled MultFactor 1, MultFactor 2, and MultFactor 3, respectively. To illustrate the purpose of these columns, locate Dworshak (DWR) about 40 lines down on UpdateHistoricProjList. Notice that columns 12, 13, 14, and 15 contain the following: 13341050, 1, 13340000, and -1, respectively. What happens is the macro opens the file 13341050.xls which contains part of the flows necessary to construct the historic flows at DWR. (The eight digit name of the file is a USGS gaging station as well as the name of the PreHform file containing the flows measured at that gaging station). The macro then reads the "1" and understands that those flows contained in 13341050.xls are to be multiplied by one (since a number multiplied by one is, of course, itself, the macro understands not to do anything; however, the "1" must be there). It then exports the numbers (flows) from 13341050.xls into DWR3H.xls. Upon completion, the macro looks two columns to the right of 13341050 and discovers the number 13340000. It then opens 13340000.xls and, because there is a -1 to the right of 13340000, multiplies the numbers (flows) contained in 13340000.xls by -1 and adds them to the numbers in DWR3H.xls. (As you can see, the flows at 13340000 are being subtracted from the flows recorded at 13341050). This procedure will be discussed more fully later.

UpdateContentsProjList: UpdateContentsProjList, which can also be found in the appendix to this report, is located within the macro file *m_update.xlm*. It is another list used by a macro. You will notice it is similar to ProjList discussed above except that it is shorter and uses fewer columns. UpdateContentsProjList is used by the macro UpdateChangeContents to update the 3S files. Column one contains the projects that have significant storage changes which must be accounted for (i.e. those projects that are not run-of-river). The next eight columns contain a "*" and column ten contains the name of a PreHform file that contains one of the following four types of information used to update the 3S file: elevation above mean sea level (MSL), elevation above a datum, storage in a reservoir, or change in storage in a reservoir. Column eleven tells the computer which of the four possible data types are contained in column ten. A "1" means the PreHform file contains elevations above mean sea level, a "1g" means the PreHform file contains elevation above a datum (gage elevation), a "2" means the PreHform file contains contents in acre-ft, and a "3" means the PreHform file contains change in contents.

FormulaList: FormulaList, which can be seen in the appendix and is found in the macro file *M_accum.xlm*, is the list which tells the macros AccumulateAll and Accumulate_Update what to do. FormulaList contains seventeen columns, eleven for accumulation formulas and six for multiplication factors. FormulaList is divided into blocks of data. To illustrate how formula list works consider the following example. Under the column 3NP9 on FormulaList about 20 lines down, locate the following three entries written one under the other, RIS3NP9, RIS3M9, and GCL3D9. Notice there is a blank line above RIS3NP9 and a blank line below

GCL3D9. A group of entries separated from other entries by blank lines above and below such as this will henceforth be referred to as a block. Notice immediately to the right of GCL3D9 there is a "-1". Here is how FormulaList is used by the two aforementioned macros. The first site in the block, in this case RIS3NP9, tells the macro under what name to save the file that is about to be created or, if running the update, which file is to be updated. The second, third, and in some cases even fourth or fifth files are added together to create (or update) the first site in the block. Now, what is the -1 doing next to GCL3D9? The macro looks to the right of each site in a block found under the columns 3DD9, DDX, 3AP2, 3AP3, 3NP9, and Whatever to determine whether the cell to the right contains a number, a MultiFactor. (Notice there are no MultiFactor columns next to 3SS, 3A, 3M9, MX, and 3EE). If it finds a number there in the MultiFactor column, the macro multiplies all the numbers (flows) in the file to MultiFactor's left by the MultiFactor. In our example, every flow in GCL3D9 is multiplied by -1 before it is added to RIS3M9 (this, of course, is equivalent to subtracting every number (flow) in GCL3D9 from every number (flow) in RIS3M9).

IMPORTANT:

Because of the way FormulaList has been set up, it is easy for the user to add sites at some future time. All that is required is the following: 1) the first site in the block must be the name under which the other sites when added together will be saved and 2) there must be one and not more than one blank line above and below a block. Finally, in row two of FormulaList notice it says ???3SS, ???3A, ???3EE, etc. This row gives the exact form that the first site in the block must take (where ? stands for a character).

II. MACROS

This section discusses the various macros available, what is necessary to operate them and how they operate. There are three macro files, *Utility.xlm*, *M_accum.xlm*, and *M_update.xlm*. The macro file *Utility.xlm* contains a variety of macros which will convert data from EarthInfo format to PreHform format, move data from PreHform to Hform format, print, etc. The macro file *M_update.xlm* contains two macros, one to update 3S files and the other to update 3H files. The macro file *M_accum.xlm* contains four macros, one which creates 3SS, 3A, 3DD9, 3EE, 3M9, 3AP2, 3AP3, and 3NP9 files, one which updates 3SS, 3A, MX, DDX, 3AP2, 3AP3, and 3NP9 files, one to export data to the 1032 format, and one which analyzes various statistical elements of 3M9 files. All macros will be discussed in detail below.

Utility.xlm

The macro file *Utility.xlm* found in c:\bpa\macros contains the following macros: CDOutputToPreHform, Headings, MoveToHform, PrintWY_Power, and DoWhateverToAllFilesInTemp.

CDOOutputToPreHform converts daily values of streamflow, storage, or elevation data exported from EarthInfo in the Lotus format to the PreHform format.

IMPORTANT:

At least two years worth of data, and preferably more, must be contained in the file which is to be converted to PreHform by the macro in question. In other words, even though you may plan to add just one year to the current data, you must export at least two years worth of data from EarthInfo for the macro CDOOutputToPreHform to work properly.

To run this macro, *Utility.xlm* must be open as well as one or more files that have been exported from EarthInfo. Although not absolutely necessary, the EarthInfo file should be on top before running CdOutputToPreHform. CdOutputToPreHform is run by choosing RUN from the MACRO menu, selecting CDOOutputToPreHform, then pressing OK. A dialog box then appears with all options dimmed except the box asking for "Country of data:" with two options available, US or Canada. Select the appropriate choice and the other items in the dialog box become undimmed, asking for several more pieces of information. Because EarthInfo changed their export format numerous times in the nine months that we worked on this project, the user must input the following information to account for future EarthInfo changes. There are five pieces of information the dialog box "Initialize" requires: 1) row number of first data point (i.e. the row which contains the first daily value), 2) row number of year (i.e. one of the rows will contain the year of the daily data), 3) row number of statistic (consult EarthInfo manual if unsure - this is the number which tells CDOOutputToPreHform whether the daily values are for streamflow, contents or elevation), 4) row number of station gage (for US stations this will be an eight digit number such as 12463500, for Canadian stations this will be a number such as 08NJ106), and 5) row number of station name. Enter the appropriate row numbers and click OK (or just click OK if the default numbers are alright). The macro does its work and displays another dialog box "Save Name" asking for the path and name to save the just converted file. If the default value is alright click OK or make the appropriate changes to the name or path then click OK, otherwise select CANCEL. The macro has now finished its run. This macro must be run once for each file which was exported from EarthInfo.

MoveToHform, as its name implies, moves any portion of a PreHform file to Hform format. This macro will only be used if you are creating a new site or are updating manually one of the sites which does not have an automatic update procedure (see discussion under UpdateHistoric and UpdateChangeContents). Moving only a portion at a time is useful when a streamflow site is to be created which uses more than one gage, as most do. To run this macro the macro file *Utility.xlm* should be open as well as the PreHform file (typically something with a name like 12364500.xls or 08NJ001.xls) which is to be moved to Hform with the PreHform file on top. The macro is run by choosing RUN from the MACRO menu, selecting MoveToHform, and pressing OK or by the shortcut Ctrl-h. Let's illustrate the use of this macro with an example. Suppose you are constructing the historic flows (3H) for Corra Linn. The flows for July 1928 through September 1937 are

taken from the PreHform file 08NJ009.xls. (This example assumes that the flows at 08NJ009 have already been exported from EarthInfo and are in a PreHform format). The flows for October 1937 through September 1989 are taken from the PreHform file 08NJ158. The three letter abbreviation for Corra Linn is COR and you are constructing historic flows, thus the Hform for this site will be named COR3H.xls. Now suppose that COR3H does not exist; you are starting from scratch. The macro file *Utility.xlm* and the file 08NJ009.xls (which should be located in c:\bpa\sfl) should be open with 08NJ009.xls on top and the macro is run as discussed above. A dialog box appears telling the macro's purpose. Click OK and another dialog box appears asking whether to move the data from the PreHform to an existing Hform or a new Hform. Since in our example COR3H.xls does not exist, you click CANCEL and, unseen to the user, a new Hform is opened. Another dialog box "Begin Month" appears asking for the beginning month of the data that is to be moved from the PreHform file (08NJ009 in our example) to Hform.

IMPORTANT:

The macro understands only three letter abbreviations, the first three letters in the month.

Therefore, you should enter JUL (not necessarily in capital letters) and then click OK. Another dialog box "Begin Year" appears asking for the beginning year.

IMPORTANT:

The macro understands only water years although the technical appendix is written in terms of calendars years.

Therefore, the year entered must be the water year. That is, Oct, Nov, and Dec of calendar year X are actually in water year X + 1 since a water year is from Oct-Sep. All other months, Jan-Sep, are the same in both calendar and water year. For example, Oct of 1968 is actually in water year 1969 but Sep of 1968 is in water year 1968. For this part of our example the water year/calendar year issue is of no concern since the beginning month is July. Therefore 1928 is entered in the dialog box and OK is selected. Another dialog box "End Month" appears asking for the end month (SEP for this example) and, finally, a dialog box "End Year" appears and you enter 1937 and click OK. The macro then does its work and another dialog box "Site Code?" appears asking for the three letter site code, COR in this example, which is entered and OK selected. Another dialog box "Data Type?" follows asking for the two, three or four letter data type, 3H in this example, which is entered and OK selected. One final dialog box "Save Name" appears asking for the name and path to save the Hform. Click OK if the default value suits you. This is the end of the macro run but let's finish our example since you have constructed the historic flows for Corra Linn only through Sep 1937. Before proceeding, the just created COR3H.xls should be closed and 08NJ158.xls should be opened on top of the macro. Run the macro MoveToHform in the same way described above. This time when the dialog box appears asking whether to move

data to an existing Hform, you would type "c:\bpa\3-all\cor3h.xls" and the macro would open COR3H.xls. For begin month you would type OCT, for begin year you would type 1938 (not 1937 since Oct 1937 is in water year 1938), for end month you would type SEP, and for end year you would type 1989. A final dialog box appears asking how you would like it saved. Click OK if the default value is alright. Note: Excel will then bring up a dialog box asking whether to replace the existing file to which you should click OK.

PrintWY_Power is a macro which will print the whole month values of any Hform file in either the water year (Oct-Sep) or power year (Aug-Jul) format in a way suitable for publishing. In addition, depending whether the Hform is a 3H, 3S or SS, 3A, 3D9 or DD9, 3M9, etc., the macro will automatically do some or all of the following: underline the maximum value for each month, underline the minimum values for each month, calculate the mean, and/or calculate the median (the macro decides which - you have no control over this). If any other portion of the Hform is to be printed other than the whole month averages, such as the half month, percentages, or split month value, there is no macro to do it; you will need to follow Excel instructions. The mean is calculated for all of the datatypes, and the median, maximum and minimum values are calculated only for 3H, 3A, MX, and 3M9. To run this macro, the Hform that is to be printed should be open and be the active file. The macro can be run in one of two ways: 1) From the MACRO menu choose RUN, select PrintWY_Power and click OK or 2) Ctrl-p. A dialog box then appears asking whether to print water year or power year or both. Make the appropriate selection and click OK. The macro then does its work. This macro is actually made up of two submacros (submacros which cannot be run from the macro menu): PrintPowerYear and PrintWaterYear. These two submacros will be discussed in the next section.

DoWhateverToAllFilesInTemp is a nifty little shell of a macro that requires you to know a bit about the Excel programming language (which will not be discussed here). What this macro does is up to you. Here's how it works. Let's suppose you want to print every 3H file in the power year format. Using your knowledge of Windows or DOS, you would move all Hform files ending in 3H (i.e. ???3H.xls) into c:\bpa\3-all\temp\. All the macro knows is that it is to do something to every file in the directory c:\bpa\all\temp\. You must then go into the macro file *Utility.xlm*, find the macro DoWhateverToAllFilesInTemp, and in the blank lines you find there, type the appropriate Excel commands. In this case, since there is a submacro PrintPowerYear, you would type =PrintPowerYear() in one of the blank lines. Then run DoWhateverToAllFilesInTemp and all the Hforms are printed in power year format. If you wanted to print them all in water year format, you would have typed =PrintWaterYear() instead of =PrintPowerYear(). As you can see, this is quite a convenient way to print many files with minimal user interaction. It is made simpler because the two submacros PrintWaterYear and PrintPowerYear have been written for you. Now suppose you wanted to do something for which there is no prewritten submacro. Suppose, for whatever reason, you wanted to type "Rush Limbaugh for Prez. '96" in cell A500 of every 3A file. Using your knowledge of Windows or DOS, you would move every file ending with 3A (that is, all files of the form ???3A.xls) into the subdirectory

c:\bpa\3-all\temp\. Then find the macro DoWhateverToAllFilesInTemp in the macro file *Utility.xlm*. In the blank lines in the macro you would simply type the following line " =formula("Rush Limbaugh for Prez. '96",!A500)". As already noted, this requires some knowledge of the Excel programming language, but with this little program it is possible to do something to a whole bunch of Hforms in a very short time, performing tasks that if done one at a time could take days. **Warning:** Make sure you know what you are doing or have backed up the files before running DoWhateverToallFilesInTemp because whatever you do, the changes you make will be saved automatically without asking for confirmation.

Headings is a macro which is used in other macros but we decided to make it a stand alone macro as well. What it does is to ask the user for the three letter site code and the two, three or four letter datatype. The macro then reads ProjList and types relevant information about a site including its full name, river, river mile, drainage area, USGS # and full description of its data type beginning in cell Q1. Like most of these macros, Headings can only be run on an Hform. It is useful for quickly changing the headings information that already exists on an Hform. It can be run by choosing RUN from the MACRO menu, selecting Headings, and clicking OK (be sure the Hform to be changed is the active sheet). A dialog box appears asking for the three letter site code followed by another dialog box asking for the two, three or four letter data type followed by a final dialog box asking if you wish to save the changes you just made and, if so, under what name.

M_update.xlm

The macro file *M_update.xlm* found in c:\bpa\macros\ contains the following two macros: UpdateChangeContents and UpdateHistoric as well as UpdateHistoricProjList and UpdateContentsProjList all of which are necessary to update all 3H and 3S files, a first step in the update process.

UpdateHistoric is the macro which update the 3H Hforms. It is a simple macro to execute. Only the macro file *M_update.xlm* should be open. From the MACRO menu choose RUN, select UpdateHistoric and click OK or the shortcut Ctrl-H. A dialog box "Update Which 3H?" appears with a scroll box with all the 3H sites and two edit boxes asking for the year from which to update and to which to update. If, for example, you wish to update CAB3H and PSL3H through 1992 and they currently contain data through water year 1989, you would type 1990 in the "From" box and 1992 in the "To" box and select CAB and PSL from the scroll box. Note: More than one site can be selected at once by selecting the first site then holding down Ctrl as you click on a second, third, etc. site with the mouse. You would then click OK and the macro does its work. At the end of the update procedure you will be given the choice of whether to save or not save the file that was just updated. If you choose CANCEL, the updated file will not be saved, it will be left open for your later inspection and the macro will update the next site you selected in the dialog box, if any.

As you can imagine, the workings behind this macro are quite complicated but the user ought to understand the basics of it. The formulas used to update

each site are shown in the UpdateHistoricProjList located in the appendix. Note that columns 12, 14, and 16 are titled StmflwSite # and columns 13, 15, and 17 are titled MultFactor #. Since our example involves Cabinet Gorge, find it on UpdateHistoricProjList and notice under StmflwSite 1 you find 12392000, under MultFactor 1 you find 1, and nothing is found under StmflwSite 2 or 3, or MultFactor 2 or 3. What this says is that Cabinet Gorge (CAB) will be updated by reading the PreHform file 12392000.xls, multiplying it by 1, and appending the existing CAB3H.xls. Now locate PSL, Priest Lake, on UpdateHistoricProjList and notice under StmflwSite 1, MultFactor1, StmflwSite 2, MultFactor 2 are 12394000, 0.8, 12395000, 0.134, respectively. These four entries tell the computer to open 12394000.xls, multiply the data there by 0.8, put it into PSL3H, then open 12395000, multiply the data there by 0.134 and add it to the data from 12394000.xls which was multiplied by 0.8. It is rather obvious then that in order for this macro to update any 3H file, the PreHform files used to create that site must exist in c:\bpa\sfl. That the relevant PreHform file(s) does (do) exist in the appropriate directory and through the desired update year is up to the user to ensure. Once the necessary PreHform files do exist, this macro makes life easy.

Several things should be noted here.

- 1) If you look carefully at UpdateHistoricProjList, you will notice that under StmflwSite 1 there are several columns which read DNE which is short for Does Not Exist; that is, the procedure used to construct the historic flows at this site are so complicated (including those that involve regression) that this program cannot handle it. In particular, notice Green Peter, Foster, Detroit, and Big Cliff. You, the user, must manually update these files by the procedure outlined in the technical appendix; there is no automatic procedure.
- 2) **It is possible for the user to change the formula** at some future time. All that needs to be done is enter the correct USGS number under StmflwSite # and the correct number by which to multiply under MultFactor # (enter 1 if it does not need to be multiplied at all - **do not leave MultFactor blank**).
- 3) Subtraction can be done by multiplying by a negative.
- 4) It is possible that the update of a 3H file can use another Hform (the standard method is to use PreHforms but notice Thompson Falls which uses the accumulated change in contents at Kerr (KER3SS) in its update procedure).

IMPORTANT:

In most cases, the number (actually the name of a PreHform file) in the StmflwSite # columns is the number the USGS has given a gage and the number under which data can be found in EarthInfo. In some cases, however, where the data comes from the project owner, we have simply picked a number for the site. Whatever the source of data, for UpdateHistoric to run, the name (actually a number) of the PreHform file containing the relevant data must match that on UpdateHistoricProjList.

UpdateChangeContents operates in much the same way as UpdateHistoric

at first glance but the programming behind it is actually much more complicated. To run UpdateChangeContents choose RUN from the MACROS menu, select UpdateChangeContents and click OK or the shortcut Ctrl-S. A dialog box appears asking for the year from which and to which to update as well as a scroll box with all the 3S sites. As mentioned above, if the 3S files currently exist through a certain water year, you would enter the next water year in the "From" box. Also, to select more than one site, select the first site then hold down Ctrl as you click on additional sites with the mouse.

UpdateChangeContents is a rather complicated macro. Change in contents for reservoirs are computed by subtracting the previous month's contents from the current month's contents.

IMPORTANT:

Therefore, to update Oct of water year X, Sep of water year X-1 must be available.

Recall that in UpdateHistoric, if a 3H file was to be updated through water year X, it was necessary to ensure the relevant PreHform files existed through water year X. For UpdateChangeContents, you must ensure not only that the relevant PreHform exists through the appropriate water year but that it also contains data for Sep of the appropriate water year - 1. For example, if you wished to update a 3S file through 1990, the relevant PreHform file must contain data for 1990 as well as Sep of 1989.

Reservoir storage data has been stored in a variety of ways over the years including elevation of the water surface above mean sea level, elevation of water surface above a datum, reservoir contents, and change in contents. UpdateChangeContents is equipped to handle all the above cases. On UpdateContentsProjList, you will notice four columns containing information. The first is the project name, the second is the PreHform file used to update the 3S site, the third contains the codes which tell the macro whether the PreHform is elevation above MSL (signified by a 1), elevation above a datum (signified by a 1g), contents (signified by a 2), or change in contents (signified by a 3), and the fourth column contains the height of the datum above MSL (relevant only for those PreHform files which contain elevation above a datum). As you can see, most 3S sites are computed by elevations. Elevations above a datum are converted to elevations above MSL by adding the value in column four to every elevation value in the PreHform file. Elevations above MSL are converted to contents by means of capacity tables and a long logarithmic formula. These contents are then subtracted to get change in contents. The capacity tables contained within UpdateChangeContents are only applicable to elevations above MSL. The procedure to convert elevations to contents reads the elevation from the PreHform file, finds the appropriate capacity table titled ???cap (where a ? represents a letter) then searches the table to find which two numbers the elevation from PreHform lies between. It then interpolates by some log function, calculates the contents and pastes the contents into PreHform, back over the elevation. This procedure is done for every elevation selected. Let's illustrate this with an example. Suppose you wish to update ALD3S and ALF3S, from 1990 to 1992

(recall that those are water years). Close all files except *m_update.xlm*, run the macro UpdateChangeContents in either of the two ways mentioned above and a dialog box appears. In the "From" box you would type 1990, in the "To" box you would type 1992, and you would select ALD3S and ALF3S from the scroll box and press OK. The macro then opens ALD3S.xls and 12085000.xls and, since the code in the third column is a "1", the macro knows this is elevation above MSL. Since the ultimate goal is to get the change in contents for each month of water years Oct 1990 through Sep 1992, the macro first calculates the contents for every month from **Sep 1989** through Sep 1992 since the Sep 1989 contents must be subtracted from Oct 1990 to get change in contents. Therefore, before running the macro you must ensure that elevation data exists in 12085000.xls for the period Sep 1989 through Sep 1992. After converting the elevations to storage, the macro then subtracts to get change in storage. However, since the capacity tables are in acre-ft and you want cfs, one final conversion is necessary. The macro opens a template called "sform" found in c:\bpa\macros\ which has the formulas to do the conversion. The change in contents are pasted into this template which converts them to cfs and, finally, the data is copied out of sform and pasted into the appropriate 3S file. If a site uses contents data (i.e. the third column of UpdateContentsProjList contains a 2) the macro skips the portion of the macro which uses the capacity tables and simply carries out the appropriate subtraction and conversion from acre-ft to cfs. If a macro uses change in contents data (i.e. the third column contains a 3) the macro simply pastes the data from the PreHform directly into the 3S file. With this knowledge, it is possible for you to make changes to UpdateContentsProjList should the form of the data change in future years. All that is necessary is to put the appropriate number in the third column and, if elevation above a datum is used, put the correct datum elevation in the fourth column.

IMPORTANT:

1) In most cases, the number (actually the name of a PreHform file) in the second column is the number the USGS has given a gage and the number under which data can be found in EarthInfo. In some cases, however, such as Packwood Lake where the data comes from the project owner, we have simply picked a number for the site. Whatever the source of data, for UpdateChangeContents to run, the name (actually its name is a number) of the PreHform file containing the relevant data must match that on UpdateContentsProjList.

M_accum.xlm

The macro file *M_accum.xlm* found in c:\bpa\macros\ contains the macros UpdateDepletions, AccumulateAll, Accumulate_Update, DBDateaToDB, and RankData. These are the macros necessary to create and/or update 3A, 3EE, 3DD9, 3SS, 3AP2, 3AP3, 3NP9, 3M9, MX, and DDX files, export them to the 1032 format as well as do a predefined statistical analysis.

AccumulateAll and Accumulate Update do essentially the same thing except that the former is to create and the latter is to update. To run either you can do the same procedure mentioned above by choosing RUN from the MACRO menu or a shortcut for AccumulateAll is Ctrl-a and for Accumulate Update is Ctrl-A. As you can see, the case of the "a" matters. (Note: AccumulateAll will not be used unless you are creating a new site; in general you will use Accumulate Update). Before describing how to run these two similar macros, it is necessary to have an understanding of how they work. AccumulateAll gives you a choice of what to accumulate (add). These are the choices: 3SS, 3A, 3DD9, 3EE, 3M9, 3AP2, 3AP3, 3NP9, and Whatever. Accumulate Update gives you the following choices of what to accumulate (accumulate = calculate): 3SS, 3A, DDX, MX, 3AP2, 3AP3, and 3NP9. So what does it mean to "accumulate?" Take a look at FormulaList in the appendix. You will notice there are "blocks" of data. That is, three or four entries separated by a blank line above and below followed by more blocks of three or four sites. For example, take a look under the 3A column and find RVC3A in the second block. Notice that underneath RVC3A is RVC3H and under it is RVC3SS. AccumulateAll and Accumulate Update work like this: The first site in the block is the name of the final product, RVC3A in our little example (that is, the file which will be created if you are running AccumulateAll or the file which will be updated if you are running Accumulate Update). The other two sites are what are added together to create (or update) the first site in the block. That is, RVC3H is added to RVC3SS to create (or update) RVC3A. For Accumulate Update, since RVC3A already exists (that is, does not need to be created), RVC3H and RVC3SS are added together to update RVC3A. This is where a potentially large problem lies. In order to create or update RVC3A, RVC3H and RVC3SS must exist and contain data through the appropriate year. But RVC3SS is itself created or updated using one of the other accumulate macros. Find RVC3SS in the first block under 3SS in FormulaList and notice RVC3SS is created by adding RVC3S and MCD3S. Therefore, it would be necessary to run one of the accumulate macros to create (or update) RVC3SS before creating (or updating) RVC3A. There are several more dangers here. A change in a 3S file propagates all the way downstream. Look at the 3SS column on FormulaList. Notice how RVC3SS and ARD3SS are created. In particular, notice that ARD3SS is created (or updated) using RVC3SS. Now look down several more blocks and notice that MUC3SS is created using ARD3SS. Therefore, it would be logical to assume that a change to RVC3S would require RVC3SS to be changed which would require ARD3SS to be changed which would require MUC3SS to be changed and so on downstream. That is, if a ???3S file is changed, all the sites downstream of it to be changed or, conversely, no 3SS site can be created, changed or updated without first doing the upstream sites. One other potential pitfall should be noted. Unless you do the whole list at one time, you must have some knowledge of which sites are upstream of which sites and which tributaries are upstream of which sites. For example, to get GCL3SS, not only would you need to accumulate every site upstream of Grand Coulee on the Columbia River but also every site on the Spokane River since the Spokane River drains into the Columbia River upstream of Grand Coulee. The best remedy to this

pitfall, while not always possible, is to accumulate the entire list ("Whole List" in the accumulate macro dialog boxes) but this requires that all the necessary data be available for the entire river system before you start. For example, to accumulate all the 3SS sites ("Whole List" in the accumulate macro dialog box) you must ensure that every 3S file in the entire Columbia River system is available and up to date. If this is not possible, a thorough knowledge of the river system is required.

IMPORTANT:

For the update process, the 3SS files are accumulated first, followed by the 3A files, followed by the DX files, followed by the DDX files, followed by the MX files, then, if desired, 3NP9, 3AP2, and 3AP3.

Now let's go back to FormulaList and explore it further. You will notice the column to the right of 3DD9 is titled MultiFactor for Depl and under that column heading, somewhat sporadically, are various numbers, all less than one. Also, in the columns to the right of DDX, 3AP2, 3AP3, 3NP9, and Whatever are also MultiFactors. What these numbers do is multiply the site next to it. For example, in the 3DD9 column on FormulaList locate the LIB3DD9 block. Next to KMT3D9 (just under LIB3DD9) you will find the number 0.3. This means that every number in the file KMT3D9 is multiplied by 0.3 before it is added to EKO3D9 to create LIB3DD9. A MultiFactor of -1 simply means that the flows at that site are subtracted from the others. Continuing our discussion of FormulaList, you will notice in the second row of the 3SS column this "word": ???3SS; in the second row of the 3EE column can be found this "word", ???3EE; etc. where, as before, a ? signifies a letter. What this means is that the first site in every block must be in that format (i.e., it must contain the three letter abbreviation followed by that particular two, three, or four letter datatype abbreviation). Now locate the column Whatever on FormulaList and notice not much is there. This column was created so that the user could, at some point in the future, fill in anything he desires to be accumulated along with any MultiFactor he wants and the computer will perform the accumulation. Notice the second row of Whatever contains the "word" ???TMP. This means, as before, that the first site must be in this form. For example, suppose, for whatever reason, you decide you'd like to see the numbers that result from subtracting the evaporation at Libby, LIB3E, from the modified flows at Grand Coulee. (This is only an example of the macro's capabilities, not an example of the physical processes that may or may not be of interest). To do this, in row three of the Whatever column you would type GCLTMP, in the line below that you would type GCL3M9, and in the line below that you would type LIB3E. In the cell to the right of LIB3S (under MultiFactor for Whatever) you would type -1 so that subtraction would be performed rather than addition. Then run the macro AccumulateAll, selecting "Whatever" in the dialog box under "Accumulate What?" and for "Start site" and "End site" enter GCLTMP. The macro then does its work.

Now let's see how to use both of the accumulate macros. As mentioned above, AccumulateAll will be used only if you decide to add a site which is not currently on FormulaList. This is not too likely, but for completeness, AccumulateAll will be discussed here. As already mentioned, AccumulateAll is run

by closing all files except the macro file *M_accum.xlm* and pressing Ctrl-a (it does matter whether a is capitalized or not). A dialog box appears asking for several types of information. "Accumulate What?" asks whether it is 3SS, 3A, 3DD9, 3M9, 3AP2, 3AP3, 3NP9, or Whatever. Make the appropriate selection. It also asks "What Portion of List?" As already mentioned, the safest option if you don't know much about the river system and you have the appropriate information is to choose Whole List. If you want to do only a portion of the list, you must type the three letter abbreviation for the "start" and "end" sites. This information is obtained from FormulaList contained in the appendix. If you want to accumulate only one site, enter that site in both the start and end site boxes.

IMPORTANT:

The macro will accumulate every site between start and end site so if your sites are not continuous and you do not want to calculate the intermediate sites, you must run the macro twice.

For example, suppose you wanted to accumulate RVC3M9, ARD3M9, and COR3M9. Locate these three sites on FormulaList and notice that while RVC3M9 and ARD3M9 are continuous (i.e. the RVC3M9 block is followed immediately by ARD3M9 block), COR3M9 is separated from ARD3M9 by LIB3M9, BFE3M9, and DCD3M9 blocks. Therefore, if in the "start site" box you entered RVC3M9 and in the "end site" box you entered COR3M9, all sites between those two would be accumulated. If for some reason you specifically did not want to calculate DCD3M9, LIB3M9, and BFE3M9, and only wanted to calculate RVC3M9, ARD3M9, and COR3M9, you must run the macro twice. For the first run you would enter RVC in the "start site" box and ARD in the "end site" box. On the second run you would enter COR in both the "start" and "end" site dialog boxes.

Accumulate_Update is run using the MACRO menu as discussed above or by using the short cut Ctrl-A (capital A). Make sure that Accumulate_Update is the only file open before you run the macro. The same procedures and dangers apply to this macro as were discussed for AccumulateAll. Again, the safest route is to do the Whole List at one time unless you are familiar with the river system. In the dialog box, the "From" box is the first water year in which the existing Hforms do not have data. As already noted, **make sure the files used by Accumulate_Update have themselves been updated.** Also, if you choose "Partial List", use FormulaList to fill in "Start" and "End" sites.

Before discussing the macro UpdateDepletions it would be appropriate to discuss how we have provided for the update of the modified flows. Several assumptions have been made including the main assumption that the depletion rates for the various months will remain the same into the near future. There are two possibilities available to update the modified flows. The first is to simply extend the 90 level modified flows for additional years. This assumes that the irrigated acres do not change nor do the depletion rates. In this case, the adjusted flows are simply tacked onto the end of the existing modified flows. For example, suppose it is desired to extend the modified flows at Mica Dam through 1993. That is, we'd like the 90 level modified flows through 1993. To accomplish this,

the adjusted flows at Mica Dam (MCD3A.xls) for the period 1990 through 1993 are tacked on to the end of the existing modified flows at Mica Dam (MCD3M9.xls) which exist through 1989. The second possibility is we'd like to obtain the modified flows at some future level through 1993. For example, we might like the flows modified to a 1999 level through 1993. As you might suspect, this requires that an estimate of the irrigated acres in 1999 be available. Let's look at an example. Suppose the 1999 level modified flows at Mica Dam are desired through 1993. The way we've set this up to work is as follows. The 1990 level modified flows at Mica Dam have already been calculated as the adjusted flows plus the depletions. In the appendix, locate IncDepl.xls. This is the primary file used to update depletions. It is a list much like those discussed previously such as FormulaList except that IncDepl is its own file, IncDepl.xls which can be found in c:\bpa\macros. Now from FormulaList under the DDX column notice that the depletions upstream of Mica Dam are known by the abbreviation UPC which stands for Upper Columbia. Now locate UPC in column 2 of IncDepl.xls. Notice that the irrigation above Mica Dam is separated into sprinkler and gravity. Also notice the 1989 irrigated acres (in thousands) are given as 10 for sprinkler and 4 for gravity. To get the 1999 level flows it is necessary to obtain an estimate for the number of acres that will be under irrigation by sprinkler and gravity in that year and, by means of the macro UpdateDepletions, enter them in the appropriate place on IncDepl.xls. The line next to "UPC total" is the total irrigation due to sprinkler and gravity above or below the 1989 level, the incremental irrigation. By incremental we mean the amount above or below the 1989 level. Accumulate Update then operates as follows: it takes the 1990 level modified flows through 1989 and tacks on to the end the adjusted flows from 1990 to 1993. It then adds the incremental irrigation to the whole period to get the 1999 level flows through 1993.

UpdateDepletions is run by choosing RUN from the MACROS menu or the short cut Ctrl-E. All files other than *m_accum.xlm* should be closed. It would be helpful to have a copy of FormulaList as well as IncDepl in front of you. A dialog box appears complete with directions. You are instructed to type the three letter abbreviation of the depletion point and click the GO button. When you do that, the dialog box then asks for the future acreages. Some sites are separated by sprinkler and gravity, some sites lump it all together. The macro will determine which is which and will permit you to type in only the appropriate boxes. After you fill in the acreages, click UPDATE and the macro puts those acreages in the appropriate place on IncDepl. The dialog box then appears again and you can repeat the procedure for another depletions point or click DONE which will save the changes to IncDepl.xls and close it. Later in this report two complete examples will be given which will more clearly illustrate the use of UpdateDepletions.

DBDataToDB is a macro to export data to the 1032 format. That is, this macro takes the split month values (see columns AA through BA on any Hform), flips them around so they are Jan-Dec, calculated the average and sends them to a floppy on either the a: or b: drive. To run this macro, choose RUN from the MACRO menu, select DBDataToDB and click OK or the shortcut Ctrl-D. A dialog box appears asking whether it is 3H, 3S or 3SS, 3E or 3EE, 3D9 or 3DD9, 3A,

3M9, MX, 3AP2, 3AP3, or 3NP9 data that is to be exported. Make the appropriate selection and the list box on the right side of the dialog box changes accordingly. Select the appropriate sites (multiple sites can be selected by first selecting a site then hold down Ctrl as you use the mouse to select additional sites) and click OK. A second dialog box appears asking to what drive is the data to be exported with b: the default drive. It also asks which calendar years of data are to be exported. Make the appropriate entries and click OK. The data is exported on a floppy under a file called DBFiles.txt, a text file. If you should decide after your first run to export still more data to that same floppy, the macro attempts again to save it to DBFiles.txt which already exists. Excel, therefore, asks you whether to replace the existing DBFiles.txt.

IMPORTANT:

If you wish to append the information which already exists in DBFiles.txt, choose CANCEL when asked by Excel whether to replace the existing DBFiles.txt. If you wish to replace the information that already exists in DBFiles.txt, choose OK. That's all there is to this macro.

RankData is a macro that imports the modified flow data into a template called ModForm.xlt (henceforth referred to as ModForm), formats the modified flows in various ways, ranks it from high to low, prints any portion of the file if you like, and saves the ModForm as a ???3M9S.xls or ???MXS.xls file in the directory c:\bpa\stat\. This macro can also be used to just print (i.e. not print and calculate but only print) any of the 12 tables contained within a ???3M9ST file. The ST in the file name denotes this is a statistical file, the 3M9 or MX denotes that these are modified files and, as before, a ? signifies a letter. This macro can be run in the usual way from the MACRO menu or by the shortcut Ctrl-R. The macro file *M_accum.xlm* should be the only sheet open when this macro is run. When the macro is run, a dialog box appears asking for the year through which the data is to be calculated (this should be the last water year that contains data in the Hform) as well as a list box with the 3M9 and MX files (when choosing the "Print Only" option, it does not matter what year you enter or if you enter a year at all since it will give you a printout through the last year available). As before, to select more than one file at a time, select the first site then hold down Ctrl as you choose others with the mouse. The first dialog box also asks whether to "Calculate", "Print and Calculate" or "Print Only." If one of the latter two options is chosen, a second dialog box appears asking which tables to print. There are twelve tables in a ModForm (actually 6 with the each of the six then ranked which makes twelve) which will now be described.

Table 1 contains the basic Oct-Sep monthly streamflow averages in cfs.

Table 1_Ranked ranks Table 1 from high to low for each month.

Table 2 contains the basic Aug-Jul monthly streamflow averages in cfs.

Table 2_Ranked ranks Table 2 from high to low for each month.

Table 3 contains the following streamflow data in thousands of acre-ft (KAF) in successive columns: Aug Aug-Sep Aug-Oct Aug-Nov Aug-Dec Jan Jan-Feb Jan-Mar Jan-Apr Jan-May Jan-Jun Jan-Jul Oct-Sep.

Table 3_Ranked contains the data from Table 3 ranked from high to low for each month.

Table 4 contains the following streamflow data in KAF in successive columns:
Aug-Dec Sep-Dec Oct-Dec Nov-Dec Dec Jan-Jul Feb-Jul Mar-Jul Apr-Jul May-Jul
Jun-Jul Jul Aug-Jul.

Table 4_Ranked contains the data from Table 4 ranked from high to low for each month.

Table 5 contains the following streamflow data in KAF in successive columns:
Aug-Mar Sep-Mar Oct-Mar Nov-Mar Dec-Mar Jan-Mar Feb-Mar Mar Apr-Aug May-
Aug Jun-Aug Jul-Aug Aug.

Table 5_Ranked contains the data from Table 5 ranked from high to low for each month.

Table 6 contains the following streamflow data in KAF in successive columns:
Sep-Mar Oct-Mar Nov-Mar Dec-Mar Jan-Mar Feb-Mar Mar Apr-Sep May-Sep Jun-
Sep Jul-Sep Aug-Sep Sep.

Table 6_Ranked contains the data from Table 6 ranked from high to low for each month.

III. UPDATING EXAMPLES

LIBBY PROJECT - Example A

For this example, suppose that you wish to update the modified flows at Libby Dam through 1992 and, furthermore, suppose that all necessary Hforms currently exist through 1989. We'll consider two cases: the first case is that you wish to extend the existing 1990 level flows by three years. This case assumes that the irrigation acreages and depletion rates have not changed since 1989. This is equivalent to saying that MCD3M9 will be extended by simply tacking on three years of adjusted flows at Mica Dam to the MCD3M9. The second case is that you wish to get three additional years of flows except that all the flows at Mica are to be modified to some future level, say 1999. This is accomplished, as discussed above, by adding together the following three files: the MCD3M9 up through 1989, the adjusted flows (MCD3A) from 1990 through 1992, and the incremental depletions file MCDDDX for the period 1927 through 1992. Adding flows to the 1990 level modified flows is done using the 3M9 column on FormulaList whereas creating the modified flows for some future level is done by using the MX column on FormulaList.

IMPORTANT:

In either case, the resulting modified flows are saved as ???MX so as to preserve the existing ???3M9 in its original form.

Let's take it from the beginning. The first step in either case is to check FormulaList to see what is necessary to calculate the modified flows. For the first case, locate LIB3M9 in the 3M9 column if you wish to extend the flows but keep them modified to a 1990 level. For the second case, locate LIBMX if you wish to extend the flows but modify them to some future level. Under the LIB3M9 column notice there are the following entrees: LIB3A, LIB3DD9, and LIB3E which means that LIB3M9 (that is, the 90 level flows simply extended a few years) are calculated as LIB3A plus LIB3DD9 plus LIB3E. However, for the 90 level depletions, LIB3DD9, are zero for all years after 1989 as are the evaporations. Therefore, the 90 level modified flows are extended, as already noted, by simply tacking on to the end the adjusted flows. This is case one as discussed above. Well how are the adjusted flows calculated? Under the 3A column note that LIB3A is calculated as LIB3H plus LIB3S. Under the 3A column notice that LIB3A is calculated from LIB3H and LIB3S. Now consider the second case: under the MX column, notice that under LIBMX is LIB3M9, LIB3A, and LIBDDX. This means, as discussed above, that the flows at Mica Dam, modified to some level beyond 1990, are calculated by adding the following three things: MCD3M9 through 1989 plus MCD3A from 1990 through 1992 plus the incremental depletion file DDX for the whole period which will be discussed in a moment.

For either case, then, to update the modified flows at Libby dam you must first update LIB3S, LIB3H, and LIB3A. The files needed to update LIB3S can be found in UpDateContentsProjList and to update LIB3H are found in

UpdateHistoricList in the macro file *m_update.xlm*. They are 12301920 for LIB3S and 12301933 for LIB3H. Our first step then would be to export these two files from EarthInfo on the CD-ROM. If EarthInfo has the data, export to a floppy at least two and preferably more years worth of data in the "Lotus" export format giving the files the export names 12301920.wk1 and 12301933.wk1, respectively. If EarthInfo contains missing data, you must obtain it (the monthly and first fifteen day averages for streamflow or reservoir contents or end of month and fifteenth day elevations for reservoir data) from some other source such as the project owner, water supply papers, etc. Once you obtain it, you must manually put it in the PreHform format.

Recall from the discussion above that for the macro to calculate change in contents, it must do a subtraction and, therefore, when you export 12301920, make sure to also export water year 1989 even though LIB3S already exists through 1989. This is because the macro must have Sep 1989 to calculate change in contents for Oct 1990. If you are lucky, EarthInfo will contain all the data you need. Upon completion of the EarthInfo export, get into Excel, close all files except the macro file *Utility.xlm*, open the two files you just exported from EarthInfo, 12301920.wk1 and 12301933.wk1 and run CDOutputToPreHform as discussed above. You will have to run it once for each file that is to be converted. Save the two PreHforms under the default names in the default directories. You are now ready to update LIB3S and LIB3H. Close all files including the macro file *utility.xlm* and open *M_update.xlm*. Run the macro UpdateChangeContents by one of the two methods mentioned above (shortcut Ctrl-S). In the "From" edit box you will type 1990 since LIB3S currently exists through 1989 in our example and in the "To" edit box you will type 1992. In the scroll box select LIB3S and click OK. The macro does its work and a final dialog box appears asking for a save path and name. Click OK if the default entry is appropriate. LIB3S is now updated. To update LIB3H, close all files except the macro file *M_update.xlm* and run the macro UpdateHistoric in one of the two ways mentioned above (shortcut Ctrl-H). Make the same entries in the "From" and "To" boxes as you did for LIB3S, in the scroll box select LIB and click OK. The macro does its work and a final dialog box appears asking for a save path and name. Click OK if the default entry is appropriate. LIB3H is now updated. Our ultimate goal for case one is to update the modified flows at Libby at the 1990 level through 1992 or case two, to update the modified flows through 1992 at the 1999 level. Therefore, the next step is to update LIB3A which is done by closing all files and macro files and opening *M_accum.xlm*. (Note: If the formula for LIB3M9 or LIBMX had contained a ??3SS, it would now be necessary to calculate it using Accumulate_Update, but for this example, this is not the case). Run the macro Accumulate_Update in one of the two ways discussed above (shortcut Ctrl-A). In the dialog box that appears click "A", enter 1990 in the "From" box, 1992 in the "To" box, LIB in the "Start" and "End" site box and click OK. The macro does its work and saves the updated LIB3A without asking for confirmation. Now consider the first case mentioned above (i.e., extending the flows beyond 1989 but still modified to a 1990 level). The only thing that remains is to update LIB3M9 since LIB3H, LIB3S, and LIB3A all have been updated and LIB3E and LIB3DD9 are okay in their current format (that

is, they are all zeroes beyond 1989). Therefore, run Accumulate_Update and make the same entries in the dialog box as you did when updating LIB3A except you would click the "M9" button instead of "A". The macro does its work and again saves the updated LIB3M9 except that it will be saved as LIBMX. That's all there is to the first case. However, for the second case mentioned above (i.e., extending the flows beyond 1989 but modified to some future level), we aren't quite done. We must obtain the file LIBDDX. This file is the depletion increment above or below the 1989 level that will be added to every flow from 1927 through 1992. The DDX files have their own column in FormulaList. Locate LIBDDX and notice it is obtained by adding together EKODX and KMTDX multiplied by 0.3. EKODX and KMTDX, the incremental depletions at East Kootenay and Kootenay Montana, are stored as one line in the file IncDepl (which stands for incremental depletions) which can be seen in the appendix to this report. You will notice that currently for EKO 20 thousand acres is under sprinkler irrigation and 6.6 thousand acres is under gravity irrigation. At KMT those figures are 4.8 and 4.4. Now let's suppose that in 1999 it is determined that at EKO the sprinkler irrigated acres are 21 thousand and the gravity irrigation is 5 thousand and at KMT those numbers are 5 and 4. The procedure is as follows. Close all files except *m_accum.xlm*. Run the macro UpdateDepletions in one of the two ways discussed above (shortcut Ctrl-E). In the box for the three letter depletion site abbreviation, type EKO and click GO. Now type 21 in the box for sprinkler and 5 in the box for gravity and click UPDATE. The macro puts those acreages in the appropriate place on IncDepl then prompts for another site. Enter KMT and click GO then enter 5 in the box for sprinkler and 4 in the box for gravity and click UPDATE. The macro again does its work. Now click "Done" and the macro saves and closes IncDepl.xls. You are now ready to update LIBDDX. Run the macro Accumulate_Update in one of the two usual ways (shortcut Ctrl-A). Click the DDX box, enter 1990 in the "Update From" box, 1992 in the "Update To" box, LIB in "Start Site" and "End Site" boxes and click OK. The macro does its work and LIBDDX is updated. The final step then is to update modified flows. Run Accumulate_Update but this time click the MX box.

IMPORTANT:

When updating modified flows to the 1990 level, case 1, click M9, when updating modified flows for some future level, case 2, click MX. In either case, the updated modified flows will be saved as ???MX, overwriting any previous ???MX. If you do not want a previous MX file overwritten, save it under a different name before running Accumulate_Update.

Let's now discuss several options which are available for these updated files. Suppose these additional years (water years 1990-1992 for this example) are now needed on the System 1032. That is, you want to export to System 1032 the additional years that have been created in LIB3H, LIB3S, LIB3A, and LIB3M9 or LIBMX as a result of the update process by using the macro DBFilesToDB found in the macro file *m_accum.xlm*. First be sure there is a blank floppy in either your a: or b: drive which will receive the exported data. Close all

files and macro files except *m_accum.xlm* and run DBFilesToDB in one of the two ways mentioned above (shortcut Ctrl-D). A dialog box appears with some buttons and a scroll box. Let's export LIBMX. Check the "MX" button and the scroll box changes to display all the MX files. Select LIBMX and click OK. Another dialog box appears asking for the drive to which to export and the years to export. Note: The dialog box asks for calendar years, not water years. What you have just updated is water years 1990-1992. Recall this period contains the data from Oct of calendar year 1989 through Sep of calendar year 1992. Therefore in the "From" box you would enter 1989 and in the "To" box you would enter 1992 and click OK. The macro saves the information on the floppy in a text file called DBFiles.txt. (Note: there is an option for exporting 3M9 files. If you choose this option, you will get data which only extends through 1989. It is more likely that the MX option will be of use to you).

Suppose you now wish to have the macro RankData do its calculations as discussed above. Close all files and macro files except *M_accum.xlm* and run RankData in one of the two ways discussed above (shortcut Ctrl-R). A dialog box appears asking if you want to "Calculate Only", "Print Only", or "Calculate and Print", through what year, and a scroll box asking which sites. Note: "Print Only" should be chosen only if the appropriate ???3M9S has previously been calculated since, of course, you cannot print what does not exist. Select the appropriate site, LIBMX in this case, then select "Calculate and Print" and a second dialog box appears asking which tables to print (all will be calculated). See the discussion above to determine which table is which, make the desired selections and click OK. The macro then does its calculating and/or printing. (Note: you can select either LIBMX or LIB3M9. However, as before, selecting any ???3M9 will include data only through 1989. It is more likely that the ???MX files will be used in the future, provided, of course, that they have been created).

MULTIPLE SITES - Hungry Horse through Albeni Falls - Example B

This example will be the essentially the same as the example discussed above except this time you would like to update all the flows for all the sites between Hungry Horse and Albeni Falls through water year 1992 (that is, Hungry Horse (HGH), Columbia Falls (CFM), Kerr (KER), Thompson Falls (TOM), Noxon Rapids (NOX), Cabinet Gorge (CAB), Priest Lake (PSL), and Albeni Falls (ALF)). We will consider the two cases mentioned above. Case one is extending the 90 level modified flows by three years and case two is obtaining the 1999 level flows through 1992. Suppose that all of the Hforms exist through 1989, that is, you will update three additional years. The first step is to check FormulaList to see which sites require what type of data (e.g., some sites do not have change in storage and/or depletions). For instance, Columbia Falls (CFM) requires 3H data but not 3S data whereas Hungry Horse (HGH) requires both 3S and 3H data. The next step is to look at UpdateHistoricProjList and UpdateContentsProjList to determine what information is needed to update the historic flows (3H) and change in contents (3S) which are the basis for the rest of the update process. Data from the following gaging stations is needed: for HGH3S, 12362000; for CFM3S, nothing; for KER3S, 12371500; for TOM3S, nothing; for NOX3S, 12391300; for CAB3S, nothing; for PSL3S, 12393000; for ALF3S, 12392500. By "nothing" it is meant that these sites are run-of-river and change in contents is not significant and, therefore, not computed. For HGH3H, 12362500; for CFM3H, 12363000; for KER3H, 12372000; for TOM3H, 12389000 and KER3SS; for NOX3H, 12391400; for CAB3H, 12392000; for PSL3H, 12394000 and 12395000; for ALF3H 12395500. If you are lucky, all of the needed of information will be available on CD-ROM from EarthInfo. (Lucky because there are macros to quickly handle data in this format). Recall that even though you want to update only water years 1990 through 1992, to compute change in contents it is necessary to export water year 1989 since change in contents for Oct of water year 1990 uses Sep of water year 1989 in its calculation. Also recall that even though you want to update only one additional year, the macro which converts the data from the EarthInfo's output to PreHform requires at least two years worth of data to operate properly. Therefore, our first step is to enter EarthInfo and export (in Lotus format) the above files, saving them under the name eight digit USGS#.wk1 (e.g. 12394000.wk1). As you will discover, EarthInfo contains all the needed information except the change in contents information at HGH, 12362000, at KER, 12371500, and at NOX, 12391300. This information (the monthly and first fifteen day averages for streamflow or reservoir contents or end of month and fifteenth day elevation for reservoir data) must be obtained by you, the user, from such sources as the project owner, water supply papers, etc. and manually input into an appropriately named PreHform. For example, since 12391300 is not contained within EarthInfo, one possibility is to get the daily elevation values from the water supply papers and manually input the end of month and fifteenth day elevations into a PreHform then save the PreHform as 12391300.xls in c:\bpa\elev\. For the data that is available on EarthInfo, the procedure is as

follows. After the export process, you will have the daily values in a file called eight digit USGS#.wk1. Open the macro file *Utility.xlm* and these wk1 files. From the MACRO menu choose RUN, select CDOOutputToPreHform and click OK. Follow the dialog box instructions. In particular, the first dialog box "Initialize" appears asking for "Country of data" with all other items in the dialog box except "US" and "Canada" dimmed. For this example, you would select "US" and the other items in the dialog box become undimmed, revealing that the macro requires five pieces of information: 1) row number of first data point, 2) row number of year 3) row number of statistic, 4) row number of station gage number, and 5) row number of station name with default values given. So much input is required because it has been our experience that EarthInfo changes their output format with each new version, three times in the nine months we worked on this project. By requiring the user to enter this information, the macro will not be rendered useless by future EarthInfo changes. If in doubt about the location of any of these five items, consult the EarthInfo manual. If the default values are okay, click OK. The macro then converts these daily values from EarthInfo into the PreHform format and asks for a save path and name with a default entry shown. Click OK and the first wk1 file has been converted to PreHform. This process must be repeated for each file you exported from EarthInfo.

Upon completion of this conversion of data to the PreHform format and obtaining the data missing from EarthInfo from other sources and entering it into PreHform format saved under the appropriate name, you are ready to update the historic flows (3H) and change in contents (3S). Close all files and macro files and open *m_update.xlm* and run the macro UpdateChangeContents in one of the two ways mentioned above (shortcut Ctrl-S). A dialog box appears with edit boxes for the "From" and "To" dates and a scroll box to select the sites you wish to update. In both the "From" and "To" boxes you would enter 1992 since it is through 1992 that you wish to update and water year 1989 already contains data. In the scroll box first select ALF3S then hold down Ctrl and select HGH3S, KER3S, NOX3S, and PSL3S and click OK. The macro then reads UpdateContentsProjList to determine whether the data in the relevant PreHform is elevation above MSL (signified by a 1 in the third column of UpdateContentsProjList), elevation above a datum (signified by a 1g in third column), storage in acre-ft (signified by a 2 in the third column) or change in storage in cfs (signified by a 3 in the third column). If the data in the PreHform is elevation above MSL, the macro uses the appropriate capacity table to convert the elevation data to acre-ft which is then converted to cfs by means of the template *sform.xlt*. If the data in the PreHform is elevation above a datum, the macro reads the fourth column of UpdateContentsProjList and adds that value to every elevation in the PreHform then uses the appropriate capacity table to convert the elevation data to acre-ft which is then converted to cfs by means of the template *sform.xlt*. If the data is already in contents (acre-ft), the macro converts it to cfs by means of the template *sform.xlt*. None of this is of concern to the user since the computer does all of this automatically on the basis of what is contained in UpdateContentsProjList. As the macro updates each ???3S file, it asks the user whether to save the ???3S file and if so, where and under what name. A default entry is displayed. If you would like to view the data before

saving it, click CANCEL and the macro will leave that site open after making the appropriate calculations and proceed to update the next site. At the end of the macro run you can then go back and look at the updated files and decide whether or not to save them. In general, unless you have reason to believe something might be wrong with the update procedure, you will click OK when asked if you want to save. Note: When the macro attempts to save the updated file, it is saving to a file which already exists prompting Excel to send up a dialog box which says "Replace existing ??????" to which you should respond OK. You are now done updating the 3S files. The next step is to update the historic flows (3H). On UpdateHistoricProjList locate TOM and, looking under StmflwSite 2 notice the entry KER3SS. This means that the procedure for updating TOM3H makes use of the accumulated change in contents at Kerr, KER3SS. This implies that KER3SS must exist in its updated form (i.e. must be updated through 1992) in order to update TOM3H. As discussed above, 3SS files are updated using the macro Accumulate_Update found in *M_accum.xlm*. Therefore, close all files and macro files and open *M_accum.xlm* and run Accumulate_Update in one of the two ways mentioned above (shortcut Ctrl-A). (While it is rare for the update procedure for one Hform, TOM3H in this case, to use another Hform, KER3SS in this case, this is a good illustration of the necessity of studying UpdateHistoricProjList and UpdateContentsProjList before running the associated macros so that you will know what the macro will require for a successful run). For the purposes of updating the historic flows (3H), it is only necessary to get the accumulated storage at Kerr (KER3SS). However, at some point you will need to update all the 3SS files which exist from Hungry Horse to Albeni Falls so you may as well do it now. This requires some knowledge of yet another list, FormulaList. Locate FormulaList in the appendix and determine whether there are accumulated change in contents are calculated at any of the sites between Hungry Horse and Albeni Falls. You will notice the following four: KER3SS, NOX3SS, CAB3SS, and ALF3SS. Therefore, in the dialog box which appears when you run the macro Accumulate_Update, enter KER in the "Start" site box, ALF in the "End" site box, 1992 in both the "From" and "To" boxes, click the "SS" button and click OK. The macro updates the four 3SS files and saves them.

Now you are ready to update the historic flows (3H). Close all files and macro files except *M_update.xlm* and run the macro UpdateHistoric by one of the usual methods (shortcut Ctrl-H). In the "From" box enter 1990 and in the "To" box enter 1992, select HGH from the scroll box then hold down Ctrl and select CFM, KER, TOM, NOX, CAB, PSL, and ALF. The computer then reads the information in UpdateHistoricProjList and calculates the flows for water years 1990-1992. For example, at Thompson Falls, the computer gets the flows from 12389000.xls, multiplies them by one (actually the one is a placeholder) then gets the "flows" from KER3SS, multiplies them by 0.0405 and adds these numbers to the numbers from 12389000 then pastes into TOM3H. This procedure is described in more detail in the discussion of UpdateHistoric. As each 3H site is updated the computer asks whether to save the changes and, if so, under what name and in what directory. Answer these questions in the same way that was done in the run of UpdateChangeContents. The historic flows (3H) for Hungry

Horse through Albeni Falls are now updated.

The next step in this update process is to calculate the adjusted flows (3A) at each of the sites. This is accomplished by running the macro Accumulate Update found in the macro file *M_accum.xlm* in one of the usual methods (shortcut Ctrl-A). Prior to running this macro or any macro which uses other files in the update process, it would be wise to look at its associated list, in this case FormulaList. Locate HGH3A, CFM3A, KER3A, TOM3A, NOX3A, CAB3A, PSL3A, and ALF3A on FormulaList and make sure that the files necessary to create these ???3A files have themselves been updated. Since you have already updated the necessary 3H and 3SS files, you can see from FormulaList that nothing else is required so you are ready to update the 3A files. Therefore, run Accumulate Update and in the "Update What" box click "A", in the "From" box enter 1990, in the "To" box enter 1992, in "Begin" site, from FormulaList you know to enter HGH, in the "End" site box enter ALF and click OK. All the ???3A sites between HGH and ALF are updated.

The final step is to update the modified flows. We will consider the two cases mentioned above: case one is extending the 1990 level modified flows three additional years and case two is extending the flows three additional years but modified to a 1999 level. Again, a wise first step is to look at FormulaList under the 3M9 column, for case one, and the MX column, for case two, to see what is necessary to update the modified flows. The additional files for the 3M9, case one, needed are HGH3E, KER3DD9, TOM3DD9, NOX3DD9, CAB3DD9, NOX3EE, and ALF3DD9. Recall that to extend the flows three additional years at the 90 level, all that is needed is the adjusted flows. That is, all the evaporation and depletion files will be blank beyond 1989. Therefore, everything necessary for the case one modified update is in place and you can run Accumulate Update in one of the usual ways. In the dialog box that appears, click "M9", enter 1990 in the "From" box, 1992 in the "To" box, enter HGH in the "Start" site box and ALF in the "End" site box and click OK. The macro then calculates all the modified from Hungry Horse through Albeni Falls and saves them as ???MX, overwriting any previous ???MX file.

Now consider case two: you want the flows through 1992 modified to a 1992 level for all sites from Hungry Horse to Albeni Falls. From FormulaList under the MX column notice that the incremental depletions, ???DDX, are required at Kerr, Thompson, Noxon, Cabinet Gorge, and Albeni Falls. Now look on FormulaList to find out what is required to calculate KERDDX, TOMDDX, NOXDDX, CABDDX, and ALFDDX. For KERDDX, the incremental depletion at Flathead Irrigation District and Upper Flathead are required. For TOMDDX, NOXDDX and CABDDX, the incremental depletion at Flathead Irrigation District, Upper Flathead, Upper Clark Fork, Bitterroot, and Lower Clark Fork are required. Finally, for ALFDDX, the incremental depletion at Pend O'Reille, US is required. What is actually required is the acreage under irrigation by sprinkler and gravity in 1999. You cannot proceed unless you have some estimate of these acreages (or, if the acreages under irrigation are not separated by gravity and sprinkler, you need the total acreage under irrigation). In the appendix find IncDepl. This is a table which, together with the macro UpdateDepletions calculates the incremental depletion.

Locate FID which stands for Flathead Irrigation District and notice that the 1989 acreages under sprinkler and gravity are 71.9 and 44.1 thousand, respectively. Notice the blank box immediately below both the 71.9 and 44.1. In these blank boxes will go the 1999 acreages under irrigation. The incremental depletion is the the diversion rate times the difference between the future acreage (1999 in this example) and the 1990 acreage. This incremental depletion is then added onto the 1990 level modified flows to get the 1999 level modified flows.

Now, for the sake of this example, suppose that the estimate for the acreages under sprinkle and gravity irrigation in 1999 for UCFDX are 40 and 110, for BITDX are 60 and 35, for FLTDX are 22 and 10, for FIDDX are 80 and 45, for LCF are 15 and 5, and for PENDX are 6 and 1. Close all files except *m_accum.xlm* and run the macro UpdateDepletions (shortcut Ctrl-E). Type UCF in the box for the three letter abbreviation and click GO. Enter 40 in the box for sprinkler and 110 in the box for gravity and click UPDATE. The macro enters these values in the appropriate place on IncDepl and then prompts for more data. Next enter BIT in the box for the site abbreviation and click GO. Enter 60 and 35 in the appropriate boxes and click UPDATE. Continue this process until all the necessary acreages have been entered (i.e., for UCF, BIT, LCF, FLT, FID, and PEN) then click DONE. The macro saves these values in IncDepl.xls and closes it. You are now ready to update the DDX files. Run Accumulate_Update (shortcut Ctrl-A). Click DDX, enter 1990 in the "Update From", 1992 in the "Update To" box, KER in the "Start Site" box, ALF in the "End Site" box and click OK. The macro then updates the ???DDX files.

We are now ready to update the MX files. Close all files except *m_accum.xlm* and run Accumulate_Update. Click MX (not M9), enter 1990 in the "Update From", 1992 in the "Update To" box, HGH in the "Start Site" box, ALF in the "End Site" box and click OK. The macro then updates the ???MX files to yield flows through 1992 modified to a 1999 level, saving these ???MX files over any previous MX file. If there is a previous ???MX file you do not wish to have over written, save it under a different name prior to running Accumulate_Update.

Now suppose that you want to export the updated years from the modified flows from Hungry Horse through Albeni Falls to the System 1032. Close all files and macro files except *M_accum.xlm*. Run the macro DBFilesToDB in one of the usual ways (shortcut Ctrl-D). Be sure there is a blank floppy in either your a: or b: drive which will receive the exported data. A dialog box appears with some buttons and a scroll box. Check the MX button and the scroll box changes to display all the MX files. (Note: there is an option for 3M9 files. However, if you choose this option you will only get the 1990 level modified flows through 1989. Therefore, in the future you will probably choose the MX option, provided the appropriate MX files exist). Select HGHEMX then hold down Ctrl and select CFEMMX, KERMX, TOMMX, NOXXMX, CABMX, PSLMX, and ALFMX and click OK. Another dialog box appears asking for the drive to which to export and the years to export. Note: The dialog box asks for calendar years, not water years. What you have just updated is water years 1990 through 1992. Recall this period contains the data from Oct of calendar year 1989 through Sep of calendar year 1992. Therefore, in the "From" box you would enter 1989 and in the "To" box

you would enter 1992 and click OK. The macro saves the information on the floppy in a text file called DBFiles.txt.

Suppose you now wish to have the macro RankData do its calculations as discussed above. Close all files and macro files except *M_accum.xlm* and run RankData in one of the two ways discussed above (shortcut Ctrl-R). A dialog box appears asking if you want to "Calculate Only", "Print Only", or "Calculate and Print", through what year, and a scroll box asking which sites. Note: "Print Only" should be chosen only if the appropriate ???3M9S has previously been calculated since, of course, you cannot print what does not exist. Select the appropriate sites, HGHMX, CFMMX, KERMX, TOMMX, NOXMX, CABMX, PSLMX, and ALFMX in this example, then select "Calculate and Print" and a second dialog box appears asking which tables to print (all will be calculated). See the discussion above to determine which table is which, make the desired selections and click OK. The macro then does its calculating and/or printing. (Note: you can select either ???MX or ???3M9. However, as before, selecting any ???3M9 will include data only through 1989. It is more likely that the ???MX files will be used in the future, provided, of course, that they have been created).

A FEW LAST THINGS

1. A macro called ClearIncDeplAcreages has been added to *m_accum.xlm*. This macro will clear all future depletion acreages that you have entered as a part of the IncDepl.xls table using the macro UpdateDepletions. Use this macro carefully since it will permanently erase any and all future depletion acreages that you have entered.
2. If a historic streamflow site does not have an automatic update procedure (and there about seven that do not) you must manually follow the procedure outlined in the technical appendix. For example, because the calculation for the historic streamflows at Lower Granite involves regression, there is no automatic procedure. Find Lower Granite in the technical appendix and note the procedure for updating Jan 1973 through Sep 1989. To update, all you are interested in is the procedure that was used to calculate the most recent year, 1989. This assumes that the stream gages that were available in 1989 will be available in the near future. Therefore, the historic flows at Lower Granite are calculated as the sum of (13342500) observed flow of Clearwater R. at Spalding plus observed flow (13334300) Snake R. near Anatone plus the extended flow of (13334700) Asotin Cr. below Kearney Gulch. The flow of (13334700) Asotin Cr. is extended by linear correlation with (13345000) Palouse R. near Potlatch. The regression constants we calculated (shown in the technical appendix) can be used or the regression can be done again using any additional years available. The point is, you, the user, must do the addition, regression and any other operations necessary on both the whole and half month portions of Hform following the steps outlined in the technical appendix for those sites with no automatic update (see UpdateHistoricProjList).
3. Occasionally, a depletions point may be labeled 3DD9 or DDX even though it is not an accumulated depletions site; RAT3DD9 is an example (see below). This was done to facilitate the running of certain macros.
4. "A" Canal is a depletion that is measured with a streamgage. This information is obtained from the USBR. This data is stored in two ways: as ACL3H and as ACL3D9 after being multiplied by -1. ACL3H is used to calculate the adjusted flows at LNK, KLA, JCB, CPC, and IRG. ACL3D9, which is the negative of ACL3H, is then used to calculate the modified flows at these same sites. The net effect, then, is that the flows through "A" Canal is added in then subtracted out.
5. Rathdrum Prairie Canal is another depletion that is measured with a streamgage which has USGS # 12418000. This data is stored as RAT3DD9.

IMPORTANT:

Because these two depletion points are measured by a gage, they are handled in the following manner: for the update process, ACL3H, ACL3D9, and RAT3DD9

MUST contain either blanks or zeroes for every date through Sep 1989 and contain the streamgage measured data for dates after that.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Type gage number (e.g. 12345678), if desired, here												
2	Type river name and location, if desired, here												
3	Type datatype (i.e. Monthly Averages for SF, End of Month Elevations, etc.), if desired, here												
4		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
5	1927												
6	1928												
7	1929												
8	1930												
9	1931												
10	1932												
11	1933												
12	1934												
13	1935												
14	1936												
15	1937												
16	1938												
17	1939												
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19	1941												
20	1942												
21	1943												
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68	1990												
69	1991												
70	1992												
71	1993												
72	1994												
73	1995												
74	1996												
75	1997												
76	1998												
77	1999												

	A	B	C	D	E	F	G	H	I	J	K	L	M
101	Type gage number (e.g. 12345678), if desired, here												
102	Type river name and location, if desired, here												
103	Type datatype (i.e. Monthly Averages for SF, End of Month Elevations, etc.), if desired, here												
104		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
105	1927												
106	1928												
107	1929												
108	1930												
109	1931												
110	1932												
111	1933												
112	1934												
113	1935												
114	1936												
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137	1959												
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161	1983												
162	1984												
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164	1986												
165	1987												
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168	1990												
169	1991												
170	1992												
171	1993												
172	1994												
173	1995												
174	1996												
175	1997												
176	1998												
177	1999												

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	
1	3 DIGIT CODE	=	TST	DATA	=	3H											TS13H	
2			*****	*****													TEST SITE	
3																	12345678	
4																	Monthly m	
5			OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVE		COLUMBIA	
6	1927-28															0	100	
7	1928-29															0	197000	
8	1929-30															0		
9	1930-31															0		
10	1931-32															0		
11	1932-33															0		
12	1933-34															0		
13	1934-35															0		
14	1935-36															0		
15	1936-37															0		
16	1937-38															0		
17	1938-39															0		
18	1939-40															0		
19	1940-41															0		
20	1941-42															0		
21	1942-43															0		
22	1943-44															0		
23	1944-45															0		
24	1945-46															0		
25	1946-47															0		
26	1947-48															0		
27	1948-49															0		
28	1949-50															0		
29	1950-51															0		
30	1951-52															0		
31	1952-53															0		
32	1953-54															0		
33	1954-55															0		
34	1955-56															0		
35	1956-57															0		
36	1957-58															0		
37	1958-59															0		
38	1959-60															0		
39	1960-61															0		
40	1961-62															0		
41	1962-63															0		
42	1963-64															0		
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44	1965-66															0		
45	1966-67															0		
46	1967-68															0		
47	1968-69															0		
48	1969-70															0		
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50	1971-72															0		
51	1972-73															0		
52	1973-74															0		
53	1974-75															0		
54	1975-76															0		
55	1976-77															0		
56	1977-78															0		
57	1978-79															0		
58	1979-80															0		
59	1980-81															0		
60	1981-82															0		
61	1982-83															0		
62	1983-84															0		
63	1984-85															0		
64	1985-86															0		
65	1986-87															0		
66	1987-88															0		
67	1988-89															0		
68	1989-90															0		
69	1990-91															0		
70	1991-92															0		
71	1992-93															0		
72	1993-94															0		
73	1994-95															0		
74	1995-96															0		
75	1996-97															0		
76	1997-98															0		
77	1998-99															0		
78	1999-00															0		
79	2000-01															0		
80	2001-02															0		
81	2002-03															0		
82	2003-04															0		
83																		
84																		
85																		
86			WHOLE MONTH AVERAGES IN CFS															

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
100	FIRST 15 DAY AVERAGE IN CFS													
101														
102														
103		OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVE.
104	1927-28													0
105	1928-29													0
106	1929-30													0
107	1930-31													0
108	1931-32													0
109	1932-33													0
110	1933-34													0
111	1934-35													0
112	1935-36													0
113	1936-37													0
114	1937-38													0
115	1938-39													0
116	1939-40													0
117	1940-41													0
118	1941-42													0
119	1942-43													0
120	1943-44													0
121	1944-45													0
122	1945-46													0
123	1946-47													0
124	1947-48													0
125	1948-49													0
126	1949-50													0
127	1950-51													0
128	1951-52													0
129	1952-53													0
130	1953-54													0
131	1954-55													0
132	1955-56													0
133	1956-57													0
134	1957-58													0
135	1958-59													0
136	1959-60													0
137	1960-61													0
138	1961-62													0
139	1962-63													0
140	1963-64													0
141	1964-65													0
142	1965-66													0
143	1966-67													0
144	1967-68													0
145	1968-69													0
146	1969-70													0
147	1970-71													0
148	1971-72													0
149	1972-73													0
150	1973-74													0
151	1974-75													0
152	1975-76													0
153	1976-77													0
154	1977-78													0
155	1978-79													0
156	1979-80													0
157	1980-81													0
158	1981-82													0
159	1982-83													0
160	1983-84													0
161	1984-85													0
162	1985-86													0
163	1986-87													0
164	1987-88													0
165	1988-89													0
166	1989-90													0
167	1990-91													0
168	1991-92													0
169	1992-93													0
170	1993-94													0
171	1994-95													0
172	1995-96													0
173	1996-97													0
174	1997-98													0
175	1998-99													0
176	1999-00													0
177	2000-01													0
178	2001-02													0
179	2002-03													0
180	2003-04													0

	A	B	C	D	E	F	G	H	I	J	K	L	M
200	FIRST 15 DAYS EACH MONTH AS PERCENT OF WHOLE MONTH												
201													
202													
203		OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
204	1927-28	1	1	1	1	1	1	1	1	1	1	1	1
205	1928-29	1	1	1	1	1	1	1	1	1	1	1	1
206	1929-30	1	1	1	1	1	1	1	1	1	1	1	1
207	1930-31	1	1	1	1	1	1	1	1	1	1	1	1
208	1931-32	1	1	1	1	1	1	1	1	1	1	1	1
209	1932-33	1	1	1	1	1	1	1	1	1	1	1	1
210	1933-34	1	1	1	1	1	1	1	1	1	1	1	1
211	1934-35	1	1	1	1	1	1	1	1	1	1	1	1
212	1935-36	1	1	1	1	1	1	1	1	1	1	1	1
213	1936-37	1	1	1	1	1	1	1	1	1	1	1	1
214	1937-38	1	1	1	1	1	1	1	1	1	1	1	1
215	1938-39	1	1	1	1	1	1	1	1	1	1	1	1
216	1939-40	1	1	1	1	1	1	1	1	1	1	1	1
217	1940-41	1	1	1	1	1	1	1	1	1	1	1	1
218	1941-42	1	1	1	1	1	1	1	1	1	1	1	1
219	1942-43	1	1	1	1	1	1	1	1	1	1	1	1
220	1943-44	1	1	1	1	1	1	1	1	1	1	1	1
221	1944-45	1	1	1	1	1	1	1	1	1	1	1	1
222	1945-46	1	1	1	1	1	1	1	1	1	1	1	1
223	1946-47	1	1	1	1	1	1	1	1	1	1	1	1
224	1947-48	1	1	1	1	1	1	1	1	1	1	1	1
225	1948-49	1	1	1	1	1	1	1	1	1	1	1	1
226	1949-50	1	1	1	1	1	1	1	1	1	1	1	1
227	1950-51	1	1	1	1	1	1	1	1	1	1	1	1
228	1951-52	1	1	1	1	1	1	1	1	1	1	1	1
229	1952-53	1	1	1	1	1	1	1	1	1	1	1	1
230	1953-54	1	1	1	1	1	1	1	1	1	1	1	1
231	1954-55	1	1	1	1	1	1	1	1	1	1	1	1
232	1955-56	1	1	1	1	1	1	1	1	1	1	1	1
233	1956-57	1	1	1	1	1	1	1	1	1	1	1	1
234	1957-58	1	1	1	1	1	1	1	1	1	1	1	1
235	1958-59	1	1	1	1	1	1	1	1	1	1	1	1
236	1959-60	1	1	1	1	1	1	1	1	1	1	1	1
237	1960-61	1	1	1	1	1	1	1	1	1	1	1	1
238	1961-62	1	1	1	1	1	1	1	1	1	1	1	1
239	1962-63	1	1	1	1	1	1	1	1	1	1	1	1
240	1963-64	1	1	1	1	1	1	1	1	1	1	1	1
241	1964-65	1	1	1	1	1	1	1	1	1	1	1	1
242	1965-66	1	1	1	1	1	1	1	1	1	1	1	1
243	1966-67	1	1	1	1	1	1	1	1	1	1	1	1
244	1967-68	1	1	1	1	1	1	1	1	1	1	1	1
245	1968-69	1	1	1	1	1	1	1	1	1	1	1	1
246	1969-70	1	1	1	1	1	1	1	1	1	1	1	1
247	1970-71	1	1	1	1	1	1	1	1	1	1	1	1
248	1971-72	1	1	1	1	1	1	1	1	1	1	1	1
249	1972-73	1	1	1	1	1	1	1	1	1	1	1	1
250	1973-74	1	1	1	1	1	1	1	1	1	1	1	1
251	1974-75	1	1	1	1	1	1	1	1	1	1	1	1
252	1975-76	1	1	1	1	1	1	1	1	1	1	1	1
253	1976-77	1	1	1	1	1	1	1	1	1	1	1	1
254	1977-78	1	1	1	1	1	1	1	1	1	1	1	1
255	1978-79	1	1	1	1	1	1	1	1	1	1	1	1
256	1979-80	1	1	1	1	1	1	1	1	1	1	1	1
257	1980-81	1	1	1	1	1	1	1	1	1	1	1	1
258	1981-82	1	1	1	1	1	1	1	1	1	1	1	1
259	1982-83	1	1	1	1	1	1	1	1	1	1	1	1
260	1983-84	1	1	1	1	1	1	1	1	1	1	1	1
261	1984-85	1	1	1	1	1	1	1	1	1	1	1	1
262	1985-86	1	1	1	1	1	1	1	1	1	1	1	1
263	1986-87	1	1	1	1	1	1	1	1	1	1	1	1
264	1987-88	1	1	1	1	1	1	1	1	1	1	1	1
265	1988-89	1	1	1	1	1	1	1	1	1	1	1	1
266	1989-90	1	1	1	1	1	1	1	1	1	1	1	1
267	1990-91	1	1	1	1	1	1	1	1	1	1	1	1
268	1991-92	1	1	1	1	1	1	1	1	1	1	1	1
269	1992-93	1	1	1	1	1	1	1	1	1	1	1	1
270	1993-94	1	1	1	1	1	1	1	1	1	1	1	1
271	1994-95	1	1	1	1	1	1	1	1	1	1	1	1
272	1995-96	1	1	1	1	1	1	1	1	1	1	1	1
273	1996-97	1	1	1	1	1	1	1	1	1	1	1	1
274	1997-98	1	1	1	1	1	1	1	1	1	1	1	1
275	1998-99	1	1	1	1	1	1	1	1	1	1	1	1
276	1999-00	1	1	1	1	1	1	1	1	1	1	1	1
277	2000-01	1	1	1	1	1	1	1	1	1	1	1	1
278	2001-02	1	1	1	1	1	1	1	1	1	1	1	1
279	2002-03	1	1	1	1	1	1	1	1	1	1	1	1
280	2003-04	1	1	1	1	1	1	1	1	1	1	1	1

PROJLIST	3 digit code		Owner	page #	Proj name	River	River mile	DA
1	MCD	11	70	BCHYDRO	12227100	COLUMBIA	1018.1	8280
2	RVC	8	88	BCHYDRO	12229800	COLUMBIA	934	10200
3	ARD	7	88	BCHYDRO	12239500	COLUMBIA	780.6	14100
3	LOA	7		BCHYDRO	12239500	COLUMBIA	780.6	14100
3	UPA	7		BCHYDRO	12239500	COLUMBIA	780.6	14100
4	LUB	101	67	USCE	12301821	KOOTENAI	221.7	8985
5	DCD	8	88	BCHYDRO	12322405	DUNCAN	8.3	942
6	KOO	118		W KOOT	12322745	KOOTENAY	16.1	17700
7	COR	118	65	W KOOT	12322730	KOOTENAY	16.1	17700
8	UBN	118	63	W KOOT	12322750	KOOTENAY	14.8	17700
9	LBN	118	62	W KOOT	12322785	KOOTENAY	14.3	17700
10	SLO	118	61	W KOOT	12322770	KOOTENAY	13.4	17700
11	CAN	118	64	BCHYDRO	12322745	KOOTENAI CANAL	16.1	17700
12	BRI	117	60	W KOOT	12322970	KOOTENAY	1.9	19300
13	MUC	5		BCHYDRO	12323040	COLUMBIA	759	34000
14	HGH	88	59	USBR	12362001	MURPHY CREEK	5.2	1654
15	CFM	89	58	USBR	12363000	HUNGRY HORSE	143	4484
16	KER	30	57	MONTANA	12371800	COLUMBIA FALLS	72	7086
17	TOM	31	56	MONTANA	12380001	KERR (FLATHEAD LAKE)	208	20968
18	NOX	125	55	WASH	12381301	THOMPSON FALLS	169.7	21833
19	CAB	126	54	WASH	12381800	NOXON RAPIDS	149.9	22067
20	PSL	127	53	WASH	12383580	CABINET GORGE	43.2	572
21	ALF	100	52	USCE	12386400	PRIEST LAKE	90.1	24200
22	BOX	33	51	PEND O	12386485	ALBENI FALLS	34.5	24800
23	BOY	61	50	SEATTLE	12386555	BOX CANYON	17	25200
24	SEV	10	49	BCHYDRO	12388100	BOUNDARY	8	25700
25	WAT	115	48	W KOOT	12388350	SEVEN MILE	0.5	25800
26	COE	119	47	WASH	12418900	WANETA	102.1	3840
26	PFL	119	46			COEUR D'ALENE		
27	UPF	121	45	WASH	12422150	POST FALLS		
28	MON	122	44	WASH	12422280	UPPER FALLS	78.2	4290
29	NN	123	43	WASH	12425950	MONROE STREET	74.2	4280
30	LLK	120	42	WASH	12432510	NINE MILE	58.1	5204
31	LFL	124	41	WASH	12433475	LONG LAKE	33.9	6020
32	FDR	70		USBR	12436100	LITTLE FALLS	29.3	6283
32	GCL	70	40	USBR	12436100	COULEE PUMP	596.6	74700
33	CHJ	102	39	USCE	12437880	GRAND COULEE	596.6	74700
34	WEL	17	38	DOUGLAS	12450652	CHEF JOSEPH	545.1	75400
35	CHL	14	37	CHELAN	12452400	WELLS	515.9	86100
36	RRH	15	36	CHELAN	12453682	CHELAN	4.3	824
37	RIS	16	35	CHELAN	12462552	ROCKY REACH	473.9	87800
38	WAN	22	34	GRANT	12464612	ROCK ISLAND	453.4	89400
39	PRD	23	33	GRANT	12472710	WANAPUM	415.8	90700
40	BRN	27	32	IDAHO	13288710	PRIEST RAPIDS	397.1	95500
41	OXB	25	31	IDAHO	13290049	BROWNLEE	285	72580
42	HCD	28	30	IDAHO	13290440	OXBOW	273	72800
43	DWR	103	29	USCE	13340980	HELLS CANYON	247.6	73300
44	LWG	104	28	USCE	13343598	DWORSHAK	1.9	2440
45	LGS	105	27	USCE	13343830	LOWER GRANITE	107.5	103500
46	LMN	106	26	USCE	13352585	LITTLE GOOSE	70.3	103900
47	IHR	107	25	USCE	13352880	LOWER MONUMENTAL	41.6	108500
48	MCN	108	24	USCE	14019188	ICE HARBOR	9.7	109500
49	JDA	109	23	USCE	14048006	MC NARY	292	213500
50	ROU	38	22	PGE	14082150	JOHN DAY	215.6	228000
51	PEL	35	21	PGE	14082455	ROUND BUTTE	110.6	7490
52	RER	41	20	PGE	14082495	PELTON	102.8	7800
53	TDA	110	19	USCE	14103950	PELTON REREG	100.1	7820
54	BON	111	18	USCE	14128880	THE DALLS	191.5	237000
55	LOP	94		USCE	14149050	BONNEVILLE	146.1	240000
56	DEX	99		USCE	14149150	LOOKOUT POINT	206.9	991
57	CAR	18	17	EUGENE	14158890	DEXTER	203.8	1001
57	SMH	18			14158795	CARMEN DIVERSION INFLOW	87.6	146
58	TRB	19	16	EUGENE	14158840	SMITH R. INFLOW TO RESERVOIR	2.1	18
59	CGR	95		USCE	14159450	TRAIL BRIDGE	81.9	184
60	BLU	4		USCE	14162150	COUGAR	4.5	208
60	LEA	20	15	EUGENE	14163100	BLUE RIVER	1.7	88
61	WAV	21	14	EUGENE	14163505	LEABURG	38.8	1000
62	DET	93		USCE	14180550	WALTERVILLE	28.5	1050
63	BCL	98		USCE	14180700	DETROIT	60.9	438
64	GPR	96		USCE	14186200	BIG CLIFF	58.1	453
65	FOS	97		USCE	14186650	GREEN PETER	5.7	277
66	SVN	40		PGE	14207750	FOSTER	37.7	493
67	TMY	34	13	PGE	14208895	T.W. SULLIVAN	26.6	10100
68	OAK	37	12	PGE	14208995	TIMOTHY MEADOWS	15.8	53
69	NFK	42	11	PGE	14209805	OAK GROVE	5.1	126
70	FAR	38	10	PGE	14209850	OAK GROVE FK	31.1	665
71	RML	39	9	PGE	14209985	NORTH FORK	26.2	667
72	SWF	48	8	COWLITZ	14217610	FARADAY	23.3	671
73	SW2	32	7	PP&L	14217814	RIVER MILL	47.9	480
74	YAL	46	6	PP&L	14218510	SWIFT 1	47.9	480
75	MER	47	5	PP&L	14220010	SWIFT 2	34.2	596
76	PAK	131	3	WPPSS	14225420	YALE	19.5	730
77	PKL		4	WPPSS	14225420	AERIAL (MERWIN)	5.3	19
78	MOS	64	2	TACOMA	14234802	PACKWOOD LAKE	5.3	19
79	MAY	66	1	TACOMA	14237810	PACKWOOD LAKE	65.5	1170
80	CS1	62	80	TACOMA	12057100	MOSSY ROCK	52	1400
81	CS2	65	79	TACOMA	12058610	MAYFELD	18.6	94
82	ALD	63	78	TACOMA	12085010	CUSHMAN 1	17.3	98
83	LAG	67	77	TACOMA	12085510	CUSHMAN 2	44.2	286
84	WHI	55	76	PUGET	12099080	ALDER	42.5	289
85	ROS	58	75	SEATTLE	12175010	LAGRANDE	24.3	407
86	DIA	59	74	SEATTLE	12177710	WHITE RIVER	105.2	999
87	GOR	60	73	SEATTLE	12181610	ROSS	101	1125
88	USK	56	72	PUGET	12183010	DIABLO	96.6	1159
89	SHA	54	71	PUGET	14312950	GORGE	8.3	215
90	LM1			PP&L	14313700	UPPER BAKER	1.2	287
90	LM2			PP&L	11507400	LOWER BAKER	93	170
91	KLA	49		PP&L	11510800	LEMOLO 1	88.4	258
92	JCS	51		PP&L		LEMOLO 2	254.3	3810
						KLAMATH LAKE	224.7	4080
						JOHN C BOYLE		

PROJLIST	3 digit code		Owner	Page #	Proj name	River	River mile	DA
83	CPC	52	PP&L	11511450	COPCO NO.1	KLAMATH	198.6	4300
84	IRG	53	PP&L	11510515	IRON GATE	KLAMATH	190.7	4630
85	SLA	1	ALBERTA		SLAVE	SLAVE		
86	PCC	2	BCHYDRO		PEACE SITE C	PEACE		
87	GMS	3	BCHYDRO		G M SHRUM	PEACE		
88	HMT							
89	HVA	12	CA DWR					
100	BER	13	CA DWR					
101	UPS	24	IDAHO		UPPER SALMON R. BASIN	SALMON		
102	SMP	26	IDAHO					
103	CNF	71	USBR		CANYON FERRY	MISSOURI		
104	YEL	72	USBR		YELLOW TAIL	BIG HORN		
105	PEK	73	USCE		FORT PECK	MISSOURI		
106	GAR	74	USCE		GARRISON	MISSOURI		
107	OME	75	USCE		QAHE	MISSOURI		
108	BND	76	USCE		BIG BEND	MISSOURI		
109	RAN	77	USCE		FORT RANDALL	MISSOURI		
110	GAV	78	USCE		GAVINS POINT	MISSOURI		
111	HVR	89	USBR		HOOVER	COLORADO		
112	GLN	90	USBR		GLEN CANYON	COLORADO		
113	GAL	91	USCE	13296001	GALLOWAY	WEISER	13.5	1460
114	UPR	92	USBR					
115	HCR	133	USCE	14145200	HILLS CREEK	MF WILLAMETTE	232.5	392
116	FAL	134	USCE	14150960	FALL CREEK	FALL CR.	7.1	186
117	COT	135	USCE	14153100	COTTAGE GROVE	COAST FK WILL	29.7	104
118	DOR	136	USCE	14155100	DORNA	ROW	7.6	270
119	FRN	137	USCE	14168100	FERN RIDGE	LONG TOM	25.7	252
120	UPC				UPPER COLUMBIA ABOVE MICA	CLARK FORK		
121	EKO				EAST KOOTENAY ABOVE NEWGATE			
122	KMT				KOOTENAI BASIN IN MONTANA			
123	KID				KOOTENAI BASIN IN IDAHO			
124	WKO				WEST KOOTENAY - INT'L BORDER TO CORRA			
125	CTR				KEENLEYSIDE TO PEND OREILLE			
126	LUX				LUXOR			
127	BUL				BULL RIVER			
128	LIR				LIBBY RENEG			
129	KOF				KOOTENAI FALLS			
130	KAT				KATKA			
131	UCF				UPPER CLARK FORK			
132	BIT				BITTERROOT			
133	LCF				LOWER CLARK FORK			
134	FLT				UPPER FLATHEAD			
135	FID				FLATHEAD IRRIGATION DISTRICT			
136	PEN				PEND O'REILLE			
137	POC				PEND O'REILLE IN CANADA			
138	NM				NINE MILE PRAIRIE			
139	ORC				QUARTZ CREEK			
140	BF2				BUFFALO #2			
141	BF4				BUFFALO #4			
142	KET				KETTLE IN CANADA			
143	FER				FERRY - STEVENS, WASHINGTON			
144	OKA				OKANAGAN IN CANADA			
145	OKM				OKANAGAN METHOW (U.S.)			
146	WSB				WEST OF BANKS LAKE			
147	CHN				CHELAN - ENTIAT			
148	WNA				WENATCHEE			
149	BEN				BENFRANKLIN			
150	YAK		USBR	12510500	YAKIMA	YAKIMA	29.9	5616
151	MCR				MONARY COLUMBIA RIVER DEPLETIONS			
152	LWS				LOWER SALMON R. BASIN			
153	TRY	143	USCE	13333000	TROY	SALMON	45.2	3412
154	CLR				CLEARWATER	GRAND RONDE		
155	PLS				PALOUSE-LOWER SNAKE	CLEARWATER		
156	CHA				CHALLIS	SNAKE		
157	IND				INDIANOLA			
158	FRE				FREEDOM			
159	NEZ				NEZ PERCE			
160	LIM	142	USCE	13317880	LIME POINT	SNAKE	172	88000
161	ANA	144	USCE	13334300	ANATONE	SNAKE	167.2	92960
162	APP				APPALOOSA			
163	PAH				PAHSIMEROI			
164	SHO				SHOSHONE			
165	PIN				PINACLE PEAK			
166	BLC				BLACK CANYON			
167	GRR				GROWLER RAPIDS			
168	CRE				CREVICE			
169	WHB	141	USCE	13317000	WHITE BIRD	SALMON	53.7	13550
170	SPD	140	USCE	13342500	SPALDING	CLEARWATER	11.6	9570
171	WWA				WALLA WALLA RIVER			
172	UMW				UMATILLA RIVER AND WILLOW CREEK			
173	HOD				HOOD RIVER BASIN			
174	DES				DESCHUTES			
175	UND				UNDERWOOD			
176	WMT				WILLAMETTE			
177	SLM			14191000	SALEM	WILLAMETTE	84.16	7280
178	MDU				MEADOWS UPPER DROP			
179	MLD				MEADOWS LOWER DROP			
180	ELC				ELECTRON			
181	SNQ				SNOQUALMIE			
182	SN7				SNOQUALMIE #2			
183	SPA				SPADA			
184	THU				THUNDER CREEK			
185	COP				COPPER CREEK			
186	WYN				WYNOOCHEE			
187	TRB				TRASK	TRASK		
188	CW1				CLEARWATER 1			
189	CW2				CLEARWATER 2			
190	TOK				TOKETEE			
191	FSH				FISH CREEK			

PROJLIST	3 digit code	Owner	gage #	Proj name	River	River miles	DA
192	SLI			SLIDE CREEK			
193	SDA			SOOA SPRINGS			
194	LOS	138	14335050	LOST CREEK	ROGUE	157.2	674
195	ELK			ELK RIVER	ROGUE		
196	APL			APPLEGATE	ROGUE		
197	ACL		11507200	A CANAL DIVERSION	A CANAL		
198	LAK		11507500	LINK R.	KLAMATH	254.3	3810
199	KNO			KENO	KLAMATH		
200	BRS			BEAR SPRINGS	KLAMATH		
201	WRS			WARM SPRINGS	DESCHUTES		
202	TST	AN EVANS	1210001	TEST SITE	GREAT AMER.	100	20000
203	ORO	USCE	13340000	OROFINO	CLEARWATER	44.6	5580
204	BFE	112		BONNERS FERRY	KOOTENAI		
205	LNR	USCE	13341143	LENORE	CLEARWATER	31.1	6300
206	LCC			LOWER CANYON	SNAKE		
207	ASO			ASOTIN	SNAKE		
208	WEN			GRANDE RONDE	GRAND RONDE		
209	SNK			SNAKE RIVER ACCUMULATED DEPLETIONS	SNAKE		
210	1TM						
211	2TM						
212	3TM						
213	4TM						
214	5TM						
215	EUG			EUGENE	WILLAMETTE		
216	ALB		14174000	ALBANY	WILLAMETTE	119.3	4840
217	C-S			CARMEN-SMITH PP INFLOW	MCKENZIE	82	164
218	PRF			RETURN FLOW TO PRIEST RAPIDS	PRIEST		
219	WRF			RETURN FLOW TO WANAPUM POOL	COLUMBIA		
220	MRF			RETURN FLOW TO McNARY POOL	COLUMBIA		
221	WHT			WHITE R.- WAPINITIA PROJECT	DESCHUTE		
222	JOP			PUMPING JOHN DAY TO MORROW & GILLIAM	COLUMBIA		
224	RAT		12418000	RATHDRUM PRAIRIE CANAL	SPOKANE		
225	RPR			RATHDRUM PRAIRIE CANAL	SPOKANE		
226	SVF			SPOKANE VALLEY FARMS	SPOKANE		
227	UPS			UPPER SALMON RIVER	SALMON		
228	MPU			MCNARY PUMPING	COLUMBIA		
229	KEN			KENNEWICK PROJECT RETURN FLOW	COLUMBIA		
230	NSR			McNARY NORTHSIDE RETURN FLOW	COLUMBIA		
231	UMR			UMATILLA RETURN FLOW	COLUMBIA		
232	UMP			PUMPING FROM McNARY TO UMATILLA SUB	COLUMBIA		
233	WHS			WHITE SALMON RIVER BASIN	WHITE SALMON		
234	KWS			KLUCKITAT-WHITE SALMON	COLUMBIA		
235	NEJ			PUMPING FROM JOHN DAY TO NORTH SIDE	COLUMBIA		
236	NSM			PUMPING FROM McNARY TO NORTH SIDE	COLUMBIA		
237	SPO			SPOKANE VALLEY FARMS DIVERSIONS	SPOKANE		
238	PPL			A* CANAL INCR. DEPL.	KLAMATH		
239	KLC			KLUCKITAT BASIN	KLUCKITAT		
240	HYD			CARMEN DIV. MAX 630CFS	MCKENZIE	97.8	146
241	LST		11508500	LOST RIVER DIV. CANAL	LOST		
242	KNC			WESTSIDE CANAL	KLAMATH		
243	RPR			RATHDRUM PRAIRIE			
244	SVF			SPOKANE VALLEY FARMS			
245	UPS			UPPER SALMON RIVER BASIN			
246	MPU			MCNARY PUMP			

Abbr.	Owner	Proj Name	River	DA	Blank Col Do Not Delete	StmflowSite 1	MultFactor 1	StmflowSite 2	MultFactor 2	StmflowSite 3	MultFactor 3
MCD	11	70	BYHYDRO 1222710	MICA	COLUMBIA	1018.1	9290	12227100			
RVC	8	69	BYHYDRO 1222980	REVELSTOKE CANYON	COLUMBIA	934	10200	12229800			
ARD	7	68	BYHYDRO 1223950	HUGH KEENLYSIDE (ARROW LAKES)	COLUMBIA	780.6	14100	12239500			
LBB	101	67	USCE 1230182	LIBBY	KOOTENAI	221.7	8995	12301833	1		
DCD	6	66	BYHYDRO 1232240	DUNCAN	DUNCAN	8.3	942	08ch128	1		
KOO	118	65	W KOOT 1232274	KOOTENAY LAKE	KOOTENAY	16.1	17700	08ch158	1		
COR	116	65	W KOOT 1232273	CORRA INN	KOOTENAY	16.1	17700	08ch158	1		
UBN	118	63	W KOOT 1232275	UP. BONNINGTON	KOOTENAY	14.8	17700	08ch158	1		
LBN	118	62	W KOOT 1232276	LO. BONNINGTON	KOOTENAY	14.3	17700	08ch158	1		
SLO	118	61	W KOOT 1232277	SLOCAN	KOOTENAY	13.4	17700	08ch158	1		
CAN	118	64	BYHYDRO 1232274	KOOTENAI CANAL	KOOTENAY	16.1	17700	08ch158	1		
BRI	117	60	W KOOT 1232287	BRIILLANT	KOOTENAY	1.9	18300	08ch158	1	08ch013	1
MUC	5		BYHYDRO 1232304	MURPHY CREEK	COLUMBIA	759	34000	08ch049	1		
HGH	68	59	USBR 1238200	HUNGRY HORSE	SF FLATHEAD	5.2	1654	12382500	1		
CFM	69	58	USBR 1238300	COLUMBIA FALLS	FLATHEAD	143	4464	12383000	1		
KER	30	57	MONTAN 1237180	KERR FLATHEAD LAKE	FLATHEAD	72	7086	12372000	1		
TOM	31	56	MONTAN 1239000	THOMPSON FALLS	CLARK FORK	208	20988	12389000	1.0405	KER3SS	0.0405
NOX	175	55	WASH 1239130	NOXON RAPIDS	CLARK FORK	189.7	21833	12391400	1		
CAB	128	54	WASH 1239180	CABINET GORGE	CLARK FORK	149.9	22067	12392000	1		
PBL	127	53	WASH 1239358	PRIEST LAKE	PRIEST	43.2	572	12394000	1.134	12395000	-0.134
ALF	100	52	USCE 1239540	ALBEM FALLS (LAKE PEND O'REILLE)	PEND O'REILLE	90.1	24200	12395500	1		
BOX	33	51	PEND O 1239648	BOX CANYON	PEND O'REILLE	34.5	24900	12396500	1		
BDY	61	50	SEATTLE 1239855	BOUNDARY	PEND O'REILLE	17	25200	12398600	1		
SEV	10	49	BYHYDRO 1239810	SEVEN MILE	PEND O'REILLE	6	25700	12398800	1	08ch074	1
WAT	115	48	W KOOT 1239835	WANETA	PEND O'REILLE	0.5	25900	12398900	1	08ch074	1
COE	119	47	WASH 1241890	COEUR D'ALENE	SPOKANE	102.1	3840	12418000	1		
PFL	119	46	WASH 1242215	POST FALLS	SPOKANE	102.1	3840	12418000	1		
UPF	121	45	WASH 1242215	UPPER FALLS	SPOKANE	78.2	4290	12422500	1		
MON	122	44	WASH 1242228	MONROE STREET	SPOKANE	74.2	4290	12422500	1		
NN	123	43	WASH 1242595	NINE MILE	SPOKANE	58.1	5204	12424500	1		
LLK	120	42	WASH 1243251	LONG LAKE	SPOKANE	35.9	6020	12433000	1		
LFL	124	41	WASH 1243347	LITTLE FALLS	SPOKANE	28.3	6293	12433000	1		
GCL	70	40	USBR 1243610	GRAND COURSE	COLUMBIA	588.6	74700	12438500	1		
CHJ	102	39	USCE 1243788	CHEF JOSEPH	COLUMBIA	545.1	75400	12438000	1		
WEL	17	38	DOUGLAS 1245095	WELLS	COLUMBIA	515.8	86100	12450700	1		
CHL	14	37	CHELAN 1245240	CHELAN	CHELAN	4.3	824	12452500	1		
RRH	15	36	CHELAN 1245389	ROCKY REACH	COLUMBIA	473.9	87800	12453700	1		
RIS	16	35	CHELAN 1248255	ROCK ISLAND	COLUMBIA	453.4	89400	12482600	1		
WAM	22	34	GRANT 1248481	WANAPUM	COLUMBIA	415.8	90700	12482600	1		
PRD	27	32	GRANT 1247271	PRIEST RAPIDS	COLUMBIA	397.1	85500	12472800	1		
BBN	27	32	IDAHO 1239871	BROWNLEE	SNAKE	285	72580	13280450	-2.17	13280180	-2.17
OXB	25	31	IDAHO 1239804	OSBOW	SNAKE	273	72800	13280450	-2.17	13280180	-2.17
HCD	28	30	IDAHO 1239044	HELLS CANYON	SNAKE	247.6	73300	13280450	-1	13340000	-1
DWR	103	29	USCE 1334088	DWORSIAK	NF CLEARWTR	1.9	2440	13341050	1		
LWG	104	28	USCE 1334358	LOWER GRANITE	SNAKE	107.5	103500	DNE			
LGS	105	27	USCE 1334383	LITTLE GOOSE	SNAKE	70.3	103500	DNE			
LMN	106	26	USCE 1335258	ICE HARBOR	SNAKE	41.6	108500	13353000	1		
NR	107	25	USCE 1335298	MC HARBOR	SNAKE	9.7	108500	13353000	1		
MCN	108	24	USCE 1401800	JOHN DAY	COLUMBIA	282	213500	14018195	1		
JDA	108	23	USCE 1402115	N. JORD BUTTE	COLUMBIA	215.6	228000	14105700	-1	14103000	-1
ROU	38	22	PGE 1408245	FELTON	DESCHUTES	110.6	7490	14092500	1		
PEL	35	21	PGE 1408245	PELTON	DESCHUTES	7808	7808	14092500	1		
PER	41	20	PGE 1408249	FELTON BELEG	DESCHUTES	102.8	7808	14092500	1		
TDA	110	19	USCE 1410395	THE DALLIES	COLUMBIA	100.1	7820	14105700	1		
BON	111	18	USCE 1412888	BONNEVILLE	COLUMBIA	181.5	237000	14128800	1		
LOP	94		USCE 1414805	LOOKOUT POINT	MF WILL.	146.1	240000	14150000	1		
DEX	89		USCE 1414815	DEXTER	MF WILL.	208.9	991	14150000	1		
SMH	18		USCE 1415879	SMITH R. INFLOW TO RESERVOIR	MF WILL.	203.8	1001	14150000	1		
CAR	18	17	EUGENE 1415868	CARMEN DIVERSION INFLOW	SMITH	2.1	18	14158780	1		
TRB	18	16	EUI 2ME 1415884	TRAIL BRIDGE	MC KENZIE	87.9	146	DNE	1		
COG	95		USCE 1415845	COUGAR	MC KENZIE	81.9	184	14158850	1		
BLU	4		USCE 1418215	BLUE RIVER	SF MC KENZIE	4.5	208	14158500	1		
LEA	20	15	EUGENE 1418310	LEABURG	BLUE	1.7	88	14182200	1		
WAV	21	14	EUGENE 1418350	WALTERVILLE	MC KENZIE	38.6	1000	14182500	1	14183000	1.47
DET	83		USCE 1418055	DETROIT	MC KENZIE	28.5	1050	14182500	1.05	14183000	1.5435
BCL	88		USCE 1418070	BIG CLIFF	N. SANTIAM	60.9	439	DNE			
GPR	86		USCE 1418020	GREEN PETER	M. SANTIAM	58.1	453	DNE			
FOS	97		USCE 1418065	FOSTER	M. SANTIAM	5.7	277	DNE			
					S. SANTIAM	37.7	483	14187200	1	14187100	-1

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SVN	Owner	Proj Name	RM	DA	Blank Col	Simflow Site 1	Multifactor 1	Simflow Site 2	Multifactor 2	Simflow Site 3	Multifactor 3
40	PGE	1420775 T.W. SULLIVAN	28.6	10100		DNE					
34	PGE	1420869 TIMOTHY MEADOWS	15.6	53		14208700	1				
37	PGE	1420809 OAK GROVE	5.1	126		14208000	1				
42	PGE	1420809 OAK GROVE	31.1	665		14210000	1				
11	PGE	1420980 NORTH FORK	26.2	697		14210000	1				
38	PGE	1420985 FARMADAY	23.3	671		14210000	1				
9	PGE	1420989 RIVER MALL	47.9	480		14217810	1				
48	COMLITZ	1421781 SWFT 1	47.9	480		14217814	1				
32	PPAL	1421781 SWFT 2	34.2	596		14218510	1				
7	PPAL	1421851 YALE	16.5	720		14220110	1				
5	PPAL	1422001 AERIAL (MERWIN)	18	19		14221120	1				
131	PAK	1422542 PACKWOOD LAKE	95.5	1170		14225420	1				
4	TACOMA	1423480 MOSSVROCK	52	1400		14234802	1				
64	TACOMA	1423781 MAYFIELD	18.6	84		12057100	1				
1	TACOMA	1205710 CUSHMAN 1	44.2	286		12058610	1				
82	CS1	1205861 CUSHMAN 2	42.5	289		12066500	1				
79	TACOMA	1206501 ALDER	24.3	407		12066500	1				
65	TACOMA	1206551 LAGRANDE	105.2	999		12068080	1				
78	PUGET	1206908 WHITE RIVER	101	1125		12175010	1				
59	SEATTLE	1217501 ROSS	96.6	1159		12176510	1				
75	SEATTLE	1217651 DIABLO	9.3	215		12177710	1				
74	SEATTLE	1217771 GORGE	1.2	287		12181610	1				
73	PUGET	1218161 UPPER BAKER	254.3	3810		12183010	1				
72	PPAL	1219301 LOWER BAKER	224.7	4080		11507500	1				
54	PPAL	1151090 KIAMATH LAKE	196.7	4300		11510700	1				
71	PPAL	1151145 COPCO NO.1	232.5	392		DNE		1KenoCen	1		
49	PPAL	1151651 RION GATE	7.1	186		11516530	1				
51	USCE	1414520 HILLS CREEK	26.7	104		14145500	1				
52	USCE	1415085 FALL CREEK	7.6	270		14151000	1				
133	USCE	1415310 COTTAGE GROVE	25.7	252		14153500	1				
134	USCE	1415510 DORENA	0	6155		14155500	1				
135	USCE	1415510 FERN RIDGE	45.2	3412		12510500	1				
136	USCE	1416810 YAKIMA	172	88000		13333000	1				
137	USCE	1333300 TROY	187.2	32980		13317000	1				
143	USCE	1331768 LIME POINT	53.7	13550		13334300	1				
142	USCE	1333430 ANATONE	11.6	9570		13317000	1				
144	USCE	1331700 WHITE BIRD	157.2	674		13342500	1				
141	USCE	1334250 SPALDING	254.3	3810		DNE					
140	USCE	1433505 LOST CREEK				11507500	1				
138	USCE	1433505 LINK RIVER				13340000	1				
139	USCE	OROFINO									

3SS 777SS	3EE 777EE	3A 777A	3M9 777M9	3D9 777D9	MultiFactor for 3D9	3AP2 777AP2	MultiFactor for 3AP2
RVC3SS	RVC3EE	MCD3A	MCD3M9	MCD3D9		COR3AP2	
RVC3S	RVC3E	MCD3H	MCD3A	UPC3D9		COR3M9	
MCD3S	MCD3E	MCD3S	MCD3D9			LIB3E	-1
			MCD3E	RVC3D9			
LOA3SS	ARD3EE	RVC3H	RVC3M9	UPC3D9	0.35	CAN3AP2	
UPA3S	RVC3EE	RVC3H	RVC3A	ARD3D9		CAN3M9	
LOA3S	ARD3E	RVC3SS	RVC3A			LIB3E	-1
ARD3S			RVC3D9	ARD3D9			
	COR3EE	ARD3A	RVC3EE	UPC3D9		UBN3AP2	
ARD3SS	LIB3E	ARD3H		ARD3D9		UBN3M9	
LOA3SS	DCD3E	ARD3SS	ARD3M9			LIB3E	-1
RVC3SS			ARD3A	LIB3D9			
	MUC3EE	LIB3A	ARD3D9	EKO3D9		LBN3AP2	
KOO3SS	ARD3EE	LIB3H	ARD3EE	KMT3D9	0.3	LBN3M9	
KOO3S	COR3EE	LIB3S				LIB3E	-1
DCD3S			LIB3M9	BFE3D9			
LIB3S	NOX3EE	BFE3A	LIB3A	EKO3D9		SLO3AP2	
	HGH3E	BFE3H	LIB3D9	KMT3D9		SLO3M9	
MUC3SS	NOX3E	LIB3S	LIB3E			LIB3E	-1
KOO3SS				COR3D9			
ARD3SS	GCL3EE	DCD3A	BFE3M9	EKO3D9		BRI3AP2	
	MUC3EE	DCD3H	BFE3A	KMT3D9		BRI3M9	
KER3SS	NOX3EE	DCD3S	LIB3E	KID3D9		LIB3E	-1
HGH3S	GCL3E		KMT3D9	WKO3D9			
KER3S		COR3A	EKO3D9			GCL3AP2	
	CHJ3EE	COR3H		BRI3D9		GCL3M9	
NOX3SS	GCL3EE	KOO3SS	DCD3M9	COR3D9		LIB3E	-1
KER3SS	CHJ3E		DCD3A	BRI3D9			
NOX3S		BRI3A	DCD3E			CHJ3AP2	
	WEL3EE	BRI3H		MUC3D9		CHJ3M9	
CAB3SS	CHJ3EE	KOO3SS	COR3M9	ARD3D9		LIB3E	-1
NOX3SS	WEL3E		COR3A	BRI3D9			
CAB3F		MUC3A	COR3D9	CTR3D9	0.45	WEL3AP2	
	RRH3EE	MUC3H	COR3EE			WEL3M9	
ALF3SS	WEL3EE	MUC3SS		CTR3D9		LIB3E	-1
CAB3SS	RRH3E		CAN3M9	ARD3D9			
ALF3S		HGH3A	COR3M9	BRI3D9		RRH3AP2	
PSL3S	WANG3EE	HGH3H		CTR3D9		RRH3M9	
	RRH3EE	HGH3S	UBN3M9			LIB3E	-1
BOX3SS	WANG3E		COR3M9	KER3D9			
ALF3SS		CFM3A		FID3D9	0.1	RIS3AP2	
BOX3F	PRD3EE	CFM3H	LBN3M9	FLT3D9		RIS3M9	
	WANG3E	HGH3S	COR3M9			LIB3E	-1
BOY3SS	PRD3E			TOM3D9			
BOX3SS		KER3A	SLO3M9	FLT3D9		WANG3AP2	
BOY3F	HCD3EE	KER3H	COR3M9	FID3D9		WANG3M9	
	BRN3E	KER3SS		UCF3D9		LIB3E	-1
SEV3SS	HCD3E		BRI3M9	BIT3D9			
BOY3SS		TOM3A	BRI3A	LCF3D9	0.85	PRD3AP2	
SEV3F	LWG3EE	TOM3H	BRI3D9			PRD3M9	
	HCD3EE	KER3SS	COR3EE	NOX3D9		LIB3E	-1
WAT3SS	LWG3E			FLT3D9			
BOY3SS	DWR3E	NOX3A	MUC3M9	FID3D9		IHR3AP2	
WAT3F		NOX3H	MUC3A	UCF3D9		IHR3M9	
	LGS3EE	NOX3SS	MUC3D9	BIT3D9		LMN3EE	-1
LLK3SS	LWG3EE		MUC3EE	LCF3D9	0.85	BRN3E	
LLK3S	LGS3E	CAB3A					
COE3S		CAB3H	HGH3M9	CAB3D9		MCH3AP2	
	LMN3EE	CAB3SS	HGH3A	FLT3D9		MCH3M9	
GCL3SS	LGS3EE		HGH3E	FID3D9		LIB3E	-1
LLK3SS	LMN3E	PSL3A		UCF3D9		LMN3EE	-1
WAT3SS		PSL3H	CFM3M9	BIT3D9		BRN3E	
MUC3SS	IHR3EE	PSL3S	CFM3A	LCF3D9			
GCL3S	LMN3EE		HGH3E			JDA3AP2	
FDR3P	IHR3E	ALF3A		ALF3D9		JDA3M9	
FDR3G		ALF3H	KER3M9	CAB3D9		LIB3E	-1
	MCN3EE	ALF3SS	KER3A	PEN3D9	0.5	LMN3EE	-1
			KER3D9			BRN3E	
CHJ3SS	IHR3EE		HGH3E	BOX3D9			
GCL3SS	PRD3EE	BOX3A		CAB3D9			
CHJ3S	MCN3E	BOX3H	TOM3M9	PEN3D9	0.75	TDA3AP2	
		BOX3SS	TOM3A			LIB3E	-1
WEL3SS	JDA3EE		TOM3A			LMN3EE	-1
CHJ3SS	MCN3EE	BOY3A	TOM3D9	BOY3D9		BRN3E	
WEL3F	JDA3E	BOY3H	HGH3E	CAB3D9		ROU3E	-1
		BOY3SS		PEN3D9	0.9		
RRH3SS	TDA3EE		NOX3M9				
WEL3SS	JDA3EE	SEV3A	NOX3A	SEV3D9		BON3AP2	
RRH3F	ROU3E	SEV3H	NOX3D9	CAB3D9		BON3M9	
CHL3S	TDA3E	SEV3SS	NOX3EE	PEN3D9		LIB3E	-1
				POC3D9		LMN3EE	-1
WANGSS	SVN3EE	WAT3A	CAB3M9			BRN3E	
RRH3SS	LOP3E	WAT3H	CAB3A	COE3D9		ROU3E	-1
WANGF	FRN3E	WAT3SS	CAB3D9	RAT3D9			
			NOX3EE	SPO3D9			
PRD3SS		COE3A		RPR3D9			
WANGSS		COE3H	PSL3M9				
PRD3F		COE3S	PSL3A	UPF3D9			
				COE3D9			
HCD3SS	UPF3A		ALF3M9	SVF3D9			
BRN3S	UPF3H		ALF3A				
HCD3F	COE3S		ALF3D9	1TM3D9			
		NN3A	NOX3EE	CTR3D9			
LWG3SS		NN3H	BOX3M9	SEV3D9			
HCD3SS		COE3S	BOX3A	UPF3D9			
DWR3S							

388 777388	3EE 7773EE	3A 7773A	3M9 7773M9	3009 7773009	MultiFactor for 3009	3AP2 7773AP2	MultiFactor for 3AP2
LWG3F		LLK3A	NOX3EE	GCL3009			
LGS388		LLK3H		1TM3009			
LWG388		LLK388	BOY3M9	KET309			
LGS3F			BOY3A	FER309			
LMN388		GCL3A	BOY3009	GCL309			
LGS388		GCL3H	NOX3EE	2TM3009			
LMN3F		GCL388		GCL3009			
			SEV3M9	OKA309			
		CHJ3A	SEV3A	OKM309			
		CHJ3H	SEV3009				
		CHJ388	NOX3EE	WEL3009			
				2TM3009			
		WEL3A	WAT3M9	W88309	0.1		
		WEL3H	WAT3A				
		WEL388	SEV3C79	RRH3009			
			NOX3EE	2TM3009			
		CHL3A		W88309	0.3		
		CHL3H	COE3M9	CHC309			
		CHL38	COE3A				
			COE3009	RIS3009			
				2TM3009			
		RRH3A	PFL3M9	W88309			
		RRH3H		CHC309			
		RRH388	COE3M9	WNA309			
		RIS3A	UPF3M9				
		RIS3H	UPF3A	WAN3009			
		RRH388	UPF3009	2TM3009			
				W88309			
		PRO3A	MON3M9	CHC309			
		PRO3H	UPF3M9	WNA309			
		PRO388		WRF309			
			NRN3M9				
		BRN3A	NRN3A	PRO3009			
		BRN3H	UPF3009	WAN3009			
		BRN38		PRF309			
			LLK3M9				
		HCD3A	LLK3A	YAK3009			
		HCD3H	UPF3009	YAK3R9			
		HCD388		YAK3H	-1		
			LFL3M9				
		WHB3A	LLK3M9	MCR3009			
		WHB3H		MRF309			
			GCL3M9	YAK3009			
		LM3A	GCL3A	MPU309			
		LM3H	GCL3009	PRO3009			
		HCD388	GCL3EE				
				BRN3009			
		TRY3A	CHJ3M9	BRN3R9			
		TRY3H	CHJ3A	BRN3A	-1		
			GCL3009				
		ANA3A	CHJ3EE	ANA3009			
		ANA3H		UP8309			
		HCD388	WEL3M9	LW8309			
			WEL3A	WEN309			
		ORO3A	WEL3009	BRN3009			
		ORO3H	WEL3EE				
				LWG3009			
		DWR3A	CHL3M9	ANA3009			
		DWR3H	CHL3A	CLR309			
		DWR38					
			RRH3M9	LMN3009			
		SPD3A	RRH3A	LWG3009			
		SPD3H	RRH3009	PLS309			
		DWR38	RRH3EE				
				3TM3009			
		LWG3A	RIS3M9	MCR3009			
		LWG3H	RIS3A	LMN3009			
		LWG388	RIS3009	NSM309			
			RRH3EE	KEN309			
		LGS3A					
		LWG3H	WAN3M9	MCN3009			
		LGS388	RIS3A	3TM3009			
			WAN3009	NBR309	0.35		
			WAN3EE	UMP309			
		LMN3A		WWA309			
		LMN3H					
		LMN388	PRO3M9				
			PRO3A	4TM3009			
		HR3A	PRO3009	MCN3009			
		LMN3H	PRO3EE	NEL309			
		HR388		UMW309			
			GAL3M9	UMR309			
			GAL3A				
		MCN3A		JDA3009			
		MCN3H		4TM3009			
		MCN388	BRN3M9	NBR309	0.65		
			BRN3A				
		JDA3A	BRN3009	JDP309			
		JDA3H	BRN3EE	JDA309			
		JDA388					
			QXB3M9	TDA3009			
			BRN3M9	JDA3009			
		ROU3A		PEL3009			
		PEL3H		WHT309			
		PEL388	HCD3M9				
			HCD3A				
		TDA3A	BRN3009	5TM3009			
CPC388							

3SS 7773SS	3EE 7773EE	3A 7773A	3M9 7773M9	3009 7773009	MultiFactor for 3009	3AP2 7773AP2	MultiFactor for 3AP2
JCB3SS		TDA3M	HCD3EE	TDA3009			
CPC3S		TDA3SS		HCD309			
RG3SS		BON3A	WHB3M9	WHS309			
CPC3SS		BON3H	WHB3A	KWS309			
RG3S		TDA3SS	UPS309	BON3009			
			LWS309	STM3009			
		DEX3A	LM3M9	KLC309			
		DEX3H	LM3A				
		DEX3SS	UPS309	SLM3009	0.468		
			LWS309	WMT309			
		LOP3A	BRN3009				
		DEX3A	HCD3EE	SVN3009	0.90		
				WMT309			
		DOR3A	TRY3M9				
		DOR3H	TRY3A	ACL309			
		DOR3S	WEN309	ACL3H	.1		
		FRN3A	ANA3M9				
		FRN3H	ANA3A				
		FRN3S	ANA3009				
			HCD3EE				
		COT3A					
		COT3H	ORO3M9				
		COT3S	ORO3A				
		FAL3A	DWR3M9				
		FAL3H	DWR3A				
		FAL3S	DWR3E				
		HCR3A	SPD3M9				
		HCR3H	SPD3A				
		HCR3S	DWR3E				
		CAR3A	LWG3M9				
		CAR3H	LWG3A				
			LWG3009				
		C-33A	LWG3EE				
		HYD3A					
		SMH3A	LGS3M9				
			LWG3A				
		TRB3A	LWG3009				
		TRB3H	LGS3EE				
		SMH3S					
			LMN3M9				
		CGR3A	LMN3A				
		CGR3H	LMN3009				
		CGR3S	LMN3EE				
		BLU3A	IHR3M9				
		BLU3H	LMN3A				
		BLU3S	LMN3009				
			IHR3EE				
		LEA3A					
		LEA3H	MCN3M9				
		LEA3SS	MCN3A				
			MCN3009				
		WAV3A	MCN3EE				
		WAV3H					
		LEA3SS	JDA3M9				
			JDA3A				
		DET3A	JDA3009				
		BCL3H	JDA3EE				
		BCL3SS					
			ROU3M9				
		BCL3A	ROU3A				
		DET3A	ROU3009				
			ROU3E				
		GPR3A					
		GPR3H	PEL3M9				
		GPR3S	ROU3A				
			PEL3009				
		FOS3A	ROU3E				
		FOS3H					
		FOS3SS	RER3M9				
			PEL3M9				
		SVN3A					
		SVN3H	TDA3M9				
		SLM3SS	TDA3A				
			TDA3009				
		TMY3A	TDA3EE				
		TMY3H					
		TMY3S	BON3M9				
			BON3A				
		OAK3A	BON3009				
		OAK3H	TDA3EE				
		TMY3S					
			HCR3M9				
		NFK3A	HCR3A				
		NFK3H					
		NFK3SS	LOP3M9				
			DEX3A				
		MAY3A	LOP3E				
		MAY3H					
		MAY3SS	DEX3M9				

3SS ??73SS	3EE ??73EE	3A ??73A	3M9 ??73M9	3DD9 ??73DD9	MultiFactor for 3DD9	3AP2 ??73AP2	MultiFactor for 3AP2
			LOP3M9				
		GOR3A	FAL3M9				
		GOR3H	FAL3A				
		GOR3SS					
		SHA3A	DOR3M9				
		SHA3H	DOR3A				
		SHA3SS					
			COT3M9				
		LAG3A	COT3A				
		LAG3H					
		ALD3S	CAR3M9				
			CAR3A				
		ALD3A					
		LAG3A	C-53M9				
			C-53A				
		LM13A					
		LM13H	SMH3M9				
		LM13S	SMH3A				
		LOS3A	TR83M9				
		LOS3H	TR83A				
		LOS3S					
			CGR3M9				
		LNK3A	CGR3A				
		LNK3H					
		KLA3S	BLU3M9				
		ACL3H	BLU3A				
		KLA3A	LEA3M9				
		LNK3A	LEA3A				
		JCS3A	WAV3M9				
		JCS3H	WAV3A				
		JCS3SS					
		ACL3H	FRN3M9				
			FRN3A				
		CPC3A	FRN3D9				
		CPC3H	FRN3E				
		CPC3SS					
		ACL3H	DET3M9				
			DET3A				
		IRG3A					
		IRG3H	BCL3M9				
		IRG3SS	BCL3A				
		ACL3H					
			GPR3M9				
			GPR3A				
			FOS3M9				
			FOS3A				
			SVN3M9				
			SVN3A				
			SVN3DD9				
			SVN3EE				
			TMY3M9				
			TMY3A				
			OAK3M9				
			OAK3A				
			NFK3M9				
			NFK3A				
			RML3M9				
			NFK3A				
			FAR3M9				
			NFK3A				
			SWF3M9				
			SWF3A				
			SW23M9				
			SWF3M9				
			YAL3M9				
			YAL3A				
			MER3M9				
			MER3A				
			PAK3M9				
			PAK3A				
			PKL3M9				
			PAK3M9				
			MOS3M9				
			MOS3A				
			MOS3E				
			MAY3M9				

388	3EE	3A	3M9	3009	MultiFactor	3AP2	MultiFactor
7773SS	7773EE	7773A	7773M9	7773009	for 3009	7773AP2	for 3AP2
			MAY3A				
			MOS3E				
			CS13M9				
			CS13A				
			CS23M9				
			CS23A				
			ALD3M9				
			LAG3M9				
			LAG3M9				
			LAG3A				
			ROS3M9				
			ROS3A				
			ROS3E				
			DIA3M9				
			DIA3A				
			ROS3E				
			GOR3M9				
			GOR3A				
			ROS3E				
			USK3M9				
			USK3A				
			SHA3M9				
			SHA3A				
			LOS3M9				
			LOS3A				
			KLA3M9				
			KLA3A				
			ACL309				
			PPL309				
			LNK3M9				
			LNK3A				
			ACL309				
			PPL309				
			JCS3M9				
			JCS3A				
			ACL309				
			PPL309				
			CPC3M9				
			CPC3A				
			ACL309				
			PPL309				
			RG3M9				
			RG3A				
			ACL309				
			PPL309				

3AP3 ???3AP3	MultiFactor for 3AP3	3NP9 ???3NP9	MultiFactor for 3NP9	WHATEVER ???wmp	MultiFactor for Whatever	DOX ???DOX	MultiFactor for DOX	MX ???MX
COR3AP3		GCL3NP9		mod3mp		MCDDOX		MCDMX
COR3AP2		GCL3M9		mod3m9		UPCDX		MCD3M9
DCD3S	-1	GCL3D9	-1	mod3e		RVCDOX		MCD3A
DCD3E	-1					UPCDX		MCDDOX
CAN3AP3		CHJ3NP9				ARDOX	0.35	RVCMX
CAN3AP2		CHJ3M9				ARDOX		RVC3M9
DCD3S	-1	GCL3D9	-1			ARDOX		RVC3A
DCD3E	-1					UPCDX		RVCDOX
UBN3AP3		WEL3NP9				ARDOX		ARDMX
UBN3AP2		WEL3M9						ARD3M9
DCD3S	-1	GCL3D9	-1			LIBOX		ARD3A
DCD3E	-1					EKODX	0.3	ARDDOX
LBH3AP3		RIS3NP9				KMTDX		LIBMX
LBH3AP2		RIS3M9						LIB3M9
DCD3S	-1	GCL3D9	-1					LIB3A
DCD3E	-1					BFEDOX		LIBDOX
SLQ3AP3		RRH3NP9				EKODX		BFEMX
SLQ3AP2		RRH3M9				KMTDX		BF3M9
DCD3S	-1	GCL3D9	-1			KIDOX		BF3A
DCD3E	-1					WKODX		BFEDOX
BRJ3AP3		PRD3NP9				BRIDOX		DCOMX
BRJ3AP2		PRD3M9				CORDOX		DCD3M9
DCD3S	-1	GCL3D9	-1			BRIDOX		DCD3A
DCD3E	-1							
GCL3AP3		MCN3NP9				MUCDOX		CORMX
GCL3AP2		MCN3M9				ARDOX		COR3M9
DCD3S	-1	GCL3D9	-1			BRIDOX	0.45	COR3A
DCD3E	-1					CTROX		CORDOX
ARD3S	-1	JDA3NP9						BRIMX
ARD3E	-1	JDA3M9				CTROX		BR3M9
ARD3E	-1	GCL3D9	-1			ARDDOX		BR3A
MCD3E	-1					BRIDOX		BRIDOX
CHJ3AP3		TDA3NP9				CTROX		
CHJ3AP2		TDA3M9						
DCD3S	-1	GCL3D9	-1			KERDOX	0.1	MUCMX
DCD3E	-1					FIDOX		MUC3M9
ARD3S	-1	BON3NP9				FLTDX		MUC3A
ARD3E	-1	BON3M9						MUCDOX
ARD3E	-1	GCL3D9	-1					
MCD3E	-1					TOMDOX		HGHMX
						FLTDX		HGH3M9
WEL3AP3						FIDOX		HGH3A
WEL3AP2						UCFDX		
DCD3S	-1					BITDX	0.85	CFMMX
DCD3E	-1					LCFDX		CFM3M9
ARD3S	-1							CFM3A
ARD3E	-1					NOXDOX		
ARD3E	-1					FLTDX		KERMX
MCD3E	-1					FIDOX		KER3M9
						UCFDX		KER3A
RRH3AP3						BITDX	0.95	KERDOX
RRH3AP2						LCFDX		
DCD3S	-1							
DCD3E	-1					CABDOX		TOMMX
ARD3S	-1					FLTDX		TOM3M9
ARD3E	-1					FIDOX		TOM3A
MCD3E	-1					UCFDX		TOMDOX
						BITDX		
RIS3AP3						LCFDX		NOXMX
RIS3AP2								NOX3M9
DCD3S	-1					ALFDOX		NOX3A
DCD3E	-1					CABDOX	0.5	NOXDOX
ARD3S	-1					PENDX		
ARD3E	-1							CABMX
MCD3E	-1					BOXDOX		CAB3M9
						CABDOX	0.75	CAB3A
WANGAP3						PENDX		CABDOX
WANGAP2								
DCD3S	-1					BOYDOX		PBLMX
DCD3E	-1					CABDOX	0.9	PBL3M9
ARD3S	-1					PENDX		PBL3A
ARD3E	-1							
MCD3E	-1					SEVDOX		ALFMX
						CABDOX		ALF3M9
PRD3AP3						PENDX		ALF3A
PRD3AP2						POCDOX		ALFDOX
DCD3S	-1							
DCD3E	-1					COEDOX		BOXMX
ARD3S	-1					RATDOX		BOX3M9
ARD3E	-1					RPRDX		BOX3A
MCD3E	-1							BOXDOX
						UPFDOX		
HR3AP3						COEDOX		BOYMX
HR3AP2								BOY3M9
						1TMDOX		BOY3A
MCN3AP3						CTROX		BOYDOX
MCN3AP2						SEVDOX		
DCD3S	-1					UPFDOX		SEVMX
DCD3E	-1							SEV3M9
ARD3S	-1					GCLDOX		SEV3A
ARD3E	-1					1TMDOX		SEVDOX
MCD3E	-1					KETDX		

3AP3	MultFactor	3NP9	MultFactor	WHATEVER	MultFactor	DOX	MultFactor	MX
???3AP3	for 3AP3	???3NP9	for 3NP9	???wmp	for Whatever	???DOX	for DOX	???MX
JOA3AP3						FERDX		WATMX
JOA3AP2						GCLDX		WAT3M9
DCD3S	-1					2TMDXX		WAT3A
DCD3E	-1					GCLDOX		SEVDOX
ARD3S	-1					OKADX		COEMX
ARD3E	-1					OKMDX		COE3M9
MCD3E	-1							COE3A
						WELDOX		COEDOX
TDA3AP3						2TMDXX	0.1	
TDA3AP2						WSBOX		PFLMX
DCD3S	-1							PFL3M9
DCD3E	-1					RRHDOX		COE3A
ARD3S	-1					2TMDXX	0.3	
ARD3E	-1					WSBOX		UPFMX
MCD3E	-1					CHEDX		UPF3M9
								UPF3A
BON3AP3						RISDOX		UPFDOX
BON3AP2						2TMDXX		
DCD3S	-1					WSBOX		MONMX
DCD3E	-1					CHEDX		MON3M9
ARD3S	-1					WNAOX		UPF3A
ARD3E	-1							
MCD3E	-1					WANDOX		NNMX
						2TMDXX		NN3M9
						WSBOX		NN3A
						CHEDX		UPFDOX
						WNAOX		
								LLKMx
						PRODOX		LLK3M9
						WANDOX		LLK3A
								UPFDOX
						YAKDOX		
						YAK3R9		LFLMX
						YAK3H	-1	LFL3M9
								LLK3A
						MCRDOX		
						YAKDOX		GCLMX
						MPUDX		GCL3M9
						PRODOX		GCL3A
								GCLDOX
						BRNDOX		
						BRN3R9		CHJMX
						BRN3A	-1	CHJ3M9
								CHJ3A
						ANADOX		GCLDOX
						UPSOX		
						LWSDX		WELMX
						WENDX		WEL3M9
						BRNDOX		WEL3A
								WELDOX
						LWGDOX		
						ANADOX		CHLMX
						CLROX		CHL3M9
								CHL3A
						LMNDOX		
						LWGDOX		RRHMX
						PLSDX		RRH3M9
								RRH3A
						3TMDXX		RRHDOX
						MCRDOX		
						LMNDOX		RISMx
						NBMDX		RIS3M9
						KENDX		RIS3A
								RISDOX
						MCNDOX		
						3TMDXX		WANMX
						NSROX		WAK3M9
						UMPOX		RIS3A
						WWADX		WANDOX
						4TMDXX		PRDMX
						MCNDOX		PRO3M9
						NEJDX	0.35	PRO3A
						UMWDX		PRODOX
						UMROX		
								GALMX
						JOADOX		GAL3M9
						4TMDXX		GAL3A
						NSROX	0.65	
						JDPOX		BRNMX
						JDADX		BRN3M9
								BRN3A
						TDADOX		BRNDOX
						JDADOX		
						PELDOX		
						WHTDX		OXBMX
								OXB3M9
								BRN3A
						5TMDXX		
						TDADOX		HCDMX
						HODDX		HCD3M9
						WHSOX		HCD3A
						KWSDX		BRNDOX
						BONDOX		WHBMX
						5TMDXX		WHB3M9

3AP3	MultiFactor	3NP8	MultiFactor	WHATEVER	MultiFactor	DOX	MultiFactor	MX
???3AP3	for 3AP3	???3NP8	for 3NP8	???tmp	for Whatever	???DOX	for DOX	???MX
						KLCOX		WH83A
						SLMDOX		UP8DX
						WMTDX	0.488	LW8DX
						SVNDOX		LIMMX
						WMTDX	0.98	LIM3M9
								LIM3A
								UP8DX
								LW8DX
								BRNDOX
								TRYMX
								TRY3M9
								TRY3A
								WENDX
								ANAMX
								ANA3M9
								ANA3A
								ANADOX
								OROMX
								ORO3M9
								ORO3A
								DWRMX
								DWR3M9
								DWR3A
								SPOMX
								SPD3M9
								SPD3A
								LWGMX
								LWG3M9
								LWG3A
								LWGDOX
								LGSIX
								LGS3M9
								LWG3A
								LWGDOX
								LMNMX
								LMN3M9
								LMN3A
								LMNDOX
								HRMX
								HR3M9
								LMN3A
								LMNDOX
								MCMIX
								MCM3M9
								MCM3A
								MCMDOX
								JDAMX
								JDA3M9
								JDA3A
								JDAOX
								ROUMX
								ROU3M9
								ROU3A
								ROUDOX
								PELMX
								PEL3M9
								ROU3A
								PELDOX
								RERMX
								PEL3M9
								ROU3A
								PELDOX
								TDAMX
								TDA3M9
								TDA3A
								TDADOX
								BONMX
								BON3M9
								BON3A
								BONDOX
								HCRMX
								HCR3M9
								HCR3A
								LOPMX
								LOP3M9
								DEX3A

3AP3	MultiFactor	3NP9	MultiFactor	WHATEVER	MultiFactor	DOX	MultiFactor	MX
7773AP3	for 3AP3	7773NP9	for 3NP9	777tmp	for Whatever	777DOX	for DOX	777MX
								DEXXM
								LOP3M9
								DEX3A
								FALMX
								FAL3M9
								FAL3A
								DORMX
								DOR3M9
								DOR3A
								COTMX
								COT3M9
								COT3A
								CARMX
								CAR3M9
								CAR3A
								C-SMX
								C-S3M9
								C-S3A
								SMHMX
								SMH3M9
								SMH3A
								TRBMX
								TRB3M9
								TRB3A
								CGRMX
								CGR3M9
								CGR3A
								BLUMX
								BLU3M9
								BLU3A
								LEAMX
								LEA3M9
								LEA3A
								WAVMX
								WAV3M9
								WAV3A
								FRNMX
								FRN3M9
								FRN3A
								FRNDX
								DETMX
								DET3M9
								DET3A
								BCLMX
								BCL3M9
								BCL3A
								GPRMX
								GPR3M9
								GPR3A
								FOSMX
								FOS3M9
								FOS3A
								SVNMX
								SVN3M9
								SVN3A
								SVNDDX
								TMVMX
								TMY3M9
								TMY3A
								OAKMX
								OAK3M9
								OAK3A
								NFKMX
								NFK3M9
								NFK3A
								RMLMX
								RML3M9
								NFK3A
								FARMX
								FAR3M9
								NFK3A
								SWFMX
								SWF3M9

3AP3	Multi-Factor	3NF3	Multi-Factor	WHATEVER	Multi-Factor	DOX	Multi-Factor	MX
???3AP3	for 3AP3	??/3NF3	for 3NF3	???ing	for Whatever	???DOX	for DOX	???MX
								SWF3A
								SW2MX
								SWF3M9
								SWF3A
								YALMX
								YAL3M9
								YAL3A
								MERMX
								MER3M9
								MER3A
								PAKMX
								PAK3M9
								PAK3A
								PKLMX
								PAK3M9
								PAK3A
								MOSMX
								MOS3M9
								MOS3A
								MAYMX
								MAY3M9
								MAY3A
								CS1MX
								CS13M9
								CS13A
								CS2MX
								CS23M9
								CS23A
								LAGMX
								LAG3M9
								LAG3A
								ALDMX
								LAG3M9
								LAG3A
								ROBMX
								ROB3M9
								ROB3A
								DIAMX
								DIA3M9
								DIA3A
								GORMX
								GOR3M9
								GOR3A
								USKMX
								USK3M9
								USK3A
								SHAMX
								SHA3M9
								SHA3A
								LOBMX
								LOS3M9
								LOS3A
								KLAMX
								KL3M9
								KL3A
								ACLDOX
								LNKMX
								LNK3M9
								LNK3A
								ACLDOX
								JCBMX
								JCB3M9
								JCB3A
								ACLDOX
								CPCMX
								CPC3M9
								CPC3A
								ACLDOX
								IRGMX
								IRG3M9
								IRG3A
								ACLDOX

	Acreage (x10)	Sprinkler (cfs/1000 ac)											
	UPC	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	10.0	1.15	1.05	0.79	0.68	0.63	0.45	0.25	-4.87	-8.10	-9.31	-6.10	0.05
future acreage sprinkler		-11.51	-10.52	-7.92	-6.79	-6.26	-4.53	-2.50	46.66	81.00	93.09	60.99	-0.47
		Gravity (cfs/1000 ac)											
	UPC	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	4.0	2.02	1.81	1.36	1.17	1.08	0.78	0.53	-5.52	-9.72	-11.16	-7.01	0.81
future acreage gravity		-8.08	-7.23	-6.44	-4.66	-4.30	-3.11	-2.12	22.06	38.90	44.64	28.04	-3.24
2 UPC total		-19.59	-17.75	-13.36	-11.45	-10.56	-7.64	-4.62	68.72	119.90	137.73	89.03	-3.71
		Sprinkler (cfs/1000 ac)											
	ARD	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	4.1	1.38	1.40	1.08	0.95	0.90	0.68	0.30	-5.85	-9.83	-11.27	-7.16	-0.23
future acreage sprinkler		-5.65	-5.74	-4.44	-3.88	-3.69	-2.78	-1.23	24.00	40.30	46.22	29.36	0.96
		Gravity (cfs/1000 ac)											
	ARD	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	0.5	2.42	2.40	1.86	1.63	1.55	1.16	0.63	-7.07	-11.87	-13.58	-8.16	0.49
future acreage gravity		-1.21	-1.20	-0.93	-0.81	-0.77	-0.58	-0.32	3.53	5.94	6.79	4.08	-0.24
2 ARD total		-6.85	-6.94	-6.37	-4.70	-4.46	-3.36	-1.54	27.53	46.24	53.01	33.44	0.71
		Sprinkler (cfs/1000 ac)											
	CTR	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	1.6	1.26	1.18	0.89	0.76	0.70	0.51	0.37	-4.50	-8.06	-11.05	-7.77	-0.15
future acreage sprinkler		-2.01	-1.89	-1.42	-1.22	-1.12	-0.81	-0.60	7.19	12.90	17.67	12.43	0.23
		Gravity (cfs/1000 ac)											
	CTR	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	0.2	2.22	2.02	1.52	1.31	1.21	0.87	0.71	-5.26	-9.62	-13.28	-9.04	0.66
future acreage gravity		-0.44	-0.40	-0.30	-0.26	-0.24	-0.17	-0.14	1.05	1.92	2.66	1.81	-0.13
2 CTR total		-2.46	-2.29	-1.72	-1.48	-1.36	-0.99	-0.74	8.25	14.82	20.33	14.24	0.10
		Sprinkler (cfs/1000 ac)											
	EKO	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	20.0	1.23	1.16	0.90	0.78	0.74	0.56	0.20	-4.58	-10.01	-10.70	-3.72	0.48
future acreage sprinkler		-24.65	-23.16	-17.93	-15.69	-14.89	-11.21	-3.91	91.61	200.17	213.98	74.50	-9.53
		Gravity (cfs/1000 ac)											
	EKO	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	6.6	2.12	1.99	1.54	1.35	1.28	0.96	0.46	-5.51	-12.19	-12.97	-3.97	1.24
future acreage gravity		-13.98	-13.13	-10.17	-8.90	-8.44	-6.35	-3.03	36.40	80.43	85.59	26.23	-8.17
2 EKO total		-36.63	-36.29	-28.10	-24.58	-23.33	-17.56	-6.94	128.00	280.60	299.58	100.73	-17.70
		Sprinkler (cfs/1000 ac)											
	KID	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	2.3	1.23	1.16	0.90	0.78	0.74	0.56	0.20	-4.58	-10.01	-10.70	-3.72	0.48
future acreage sprinkler		-2.84	-2.66	-2.06	-1.80	-1.71	-1.29	-0.45	10.53	23.02	24.61	8.57	-1.10
		Gravity (cfs/1000 ac)											
	KID	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	0.0	2.12	1.99	1.54	1.35	1.28	0.96	0.46	-5.51	-12.19	-12.97	-3.97	1.24
future acreage gravity		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2 KID total		-2.84	-2.66	-2.06	-1.80	-1.71	-1.29	-0.45	10.53	23.02	24.61	8.57	-1.10
		Sprinkler (cfs/1000 ac)											
	KMT	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	4.8	1.23	1.16	0.90	0.78	0.74	0.56	0.20	-4.58	-10.01	-10.70	-3.72	0.48
future acreage sprinkler		-5.92	-5.56	-4.30	-3.77	-3.57	-2.69	-0.94	21.99	48.04	51.36	17.88	-2.29
		Gravity (cfs/1000 ac)											
	KMT	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	4.4	2.12	1.99	1.54	1.35	1.28	0.96	0.46	-5.51	-12.19	-12.97	-3.97	1.24
future acreage gravity		-9.32	-8.75	-6.78	-6.93	-5.63	-4.24	-2.02	24.26	53.62	57.06	17.48	-5.44
2 KMT total		-15.24	-14.31	-11.08	-9.70	-8.20	-6.93	-2.96	46.25	101.66	108.42	35.37	-7.73
		Sprinkler (cfs/1000 ac)											

	WKO	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	10.5	1.18	1.28	0.99	0.87	0.82	0.62	0.12	-4.56	-9.61	-11.57	-5.34	-0.04
future acreage sprinkler		-12.37	-13.40	-10.37	-9.08	-8.61	-6.49	-1.21	47.92	100.94	121.49	56.02	0.45
		Gravity (cfs/1000 ac)											
	WKO	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	4.0	2.11	2.19	1.70	1.49	1.41	1.06	0.38	-6.47	-11.64	-14.01	-5.93	0.65
future acreage gravity		-8.43	-8.77	-6.79	-5.94	-5.64	-4.24	-1.52	21.87	46.58	56.05	23.72	-2.59
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2 WKO total		-20.80	-22.17	-17.17	-15.02	-14.25	-10.73	-2.72	69.79	147.51	177.53	79.73	-2.14
		Sprinkler (cfs/1000 ac)											
	BRI	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	3.7	1.18	1.28	0.99	0.87	0.82	0.62	0.12	-4.56	-9.61	-11.57	-5.34	-0.04
future acreage sprinkler		-4.36	-4.72	-3.66	-3.20	-3.03	-2.29	-0.43	16.89	35.57	42.81	19.74	0.16
		Gravity (cfs/1000 ac)											
	BRI	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	0.5	2.11	2.19	1.70	1.49	1.41	1.06	0.38	-6.47	-11.64	-14.01	-5.93	0.65
future acreage gravity		-1.05	-1.10	-0.85	-0.74	-0.71	-0.53	-0.19	2.73	5.82	7.01	2.96	-0.32
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2 BRI total		-5.41	-5.82	-4.50	-3.94	-3.74	-2.82	-0.62	19.62	41.39	49.82	22.70	-0.16
		Sprinkler (cfs/1000 ac)											
	UCF	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	36.6	1.18	0.85	0.71	0.59	0.52	0.47	0.44	-1.11	-9.43	-18.18	-6.72	1.59
future acreage sprinkler		-43.26	-31.29	-25.95	-21.63	-19.16	-17.30	-15.96	40.59	345.04	665.36	246.12	-58.11
		Gravity (cfs/1000 ac)											
	UCF	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	107.4	2.46	1.78	1.47	1.23	1.09	0.98	0.95	-0.70	-11.73	-23.22	-7.70	3.30
future acreage gravity		####	####	####	####	####	####	####	75.16	####	####	827.03	####
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2 UCF total		####	####	####	####	####	####	####	115.75	####	####	####	####
		Sprinkler (cfs/1000 ac)											
	BIT	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	55.3	1.18	0.85	0.71	0.59	0.52	0.47	0.44	-1.11	-9.43	-18.18	-6.72	1.59
future acreage sprinkler		-65.36	-47.27	-39.21	-32.68	-28.94	-26.14	-24.12	61.33	521.33	####	371.87	-87.79
		Gravity (cfs/1000 ac)											
	BIT	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	39.0	2.46	1.78	1.47	1.23	1.09	0.98	0.95	-0.70	-11.73	-23.22	-7.70	3.30
future acreage gravity		-95.84	-69.32	-57.50	-47.92	-42.44	-38.34	-36.88	27.29	457.46	905.75	300.32	####
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2 BIT total		####	####	-96.72	-80.60	-71.39	-64.48	-61.00	88.63	978.79	####	672.19	####
		Sprinkler (cfs/1000 ac)											
	FLT	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	21.6	1.30	1.21	0.91	0.78	0.72	0.65	0.57	-3.28	-8.16	-13.09	-7.64	-5.98
future acreage sprinkler		-28.17	-26.20	-19.72	-16.89	-15.60	-14.08	-12.25	70.91	176.26	282.79	165.02	129.17
		Gravity (cfs/1000 ac)											
	FLT	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	13.2	2.24	2.08	1.57	1.34	1.24	1.12	1.02	-3.60	-9.66	-15.84	-8.91	-0.07
future acreage gravity		-29.57	-27.50	-20.70	-17.74	-16.37	-14.78	-13.50	47.49	127.56	209.07	117.60	0.98
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2 FLT total		-57.73	-53.70	-40.42	-34.63	-31.96	-28.87	-25.75	118.41	303.82	491.86	282.62	130.14
		Sprinkler (cfs/1000 ac)											
	FID	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	71.9	1.30	1.21	0.91	0.78	0.72	0.65	0.57	-3.28	-8.16	-13.09	-7.64	-5.98
future acreage sprinkler		-93.76	-87.21	-65.64	-56.23	-51.91	-46.88	-40.77	236.05	586.70	941.31	549.32	429.96
		Gravity (cfs/1000 ac)											
	FID	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	44.1	2.24	2.08	1.57	1.34	1.24	1.12	1.02	-3.60	-9.66	-15.84	-8.91	-0.07
future acreage gravity		-98.78	-91.88	-69.15	-59.27	-54.68	-49.39	-45.11	158.67	426.18	698.50	392.89	3.26
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2 FID total		####	####	####	####	####	-96.27	-85.88	394.72	####	####	942.20	433.23
		Sprinkler (cfs/1000 ac)											
	PEN	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep

1989 acreage	4.7	0.77	0.72	0.56	0.56	0.46	0.42	0.38	-3.76	-7.30	-10.44	-7.22	0.06
future acreage sprinkler		-3.60	-3.37	-2.61	-2.61	-2.17	-1.96	-1.79	17.66	34.29	49.04	33.92	-0.28
		Gravity (cfs/1000 ac)											
	PEN	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	2.5	2.32	2.18	1.68	1.68	1.40	1.26	1.23	-4.92	-10.02	-14.37	-9.50	1.31
future acreage gravity		-5.79	-5.44	-4.21	-4.21	-3.50	-3.16	-3.08	12.29	25.05	35.92	23.75	-3.28
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2 PEN total		-9.38	-8.81	-6.82	-6.82	-5.67	-5.12	-4.87	29.95	59.34	84.97	57.67	-3.56
		Sprinkler (cfs/1000 ac)											
	POC	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	0.6	0.77	0.72	0.56	0.56	0.46	0.42	0.38	-3.76	-7.30	-10.44	-7.22	0.06
future acreage sprinkler		-0.46	-0.43	-0.33	-0.33	-0.28	-0.25	-0.23	2.26	4.38	6.26	4.33	-0.04
		Gravity (cfs/1000 ac)											
	POC	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	0.3	2.32	2.18	1.68	1.68	1.40	1.26	1.23	-4.92	-10.02	-14.37	-9.50	1.31
future acreage gravity		-0.69	-0.65	-0.51	-0.51	-0.42	-0.38	-0.37	1.47	3.01	4.31	2.85	-0.39
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2 POC total		-1.15	-1.08	-0.84	-0.84	-0.70	-0.63	-0.60	3.73	7.38	10.57	7.18	-0.43
		Sprinkler (cfs/1000 ac)											
	LCF	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	13.5	0.75	0.79	0.44	0.22	0.12	0.00	-0.56	-3.76	-6.89	-10.16	-6.71	-2.54
future acreage sprinkler		-10.16	-10.64	-5.88	-2.94	-1.63	0.00	7.52	50.77	92.98	137.16	80.53	34.27
		Gravity (cfs/1000 ac)											
	LCF	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	5.6	2.01	1.72	0.95	0.48	0.26	0.00	-0.76	-4.58	-7.97	-12.20	-7.32	-1.97
future acreage gravity		-11.27	-9.64	-6.33	-2.67	-1.48	0.00	4.24	25.62	44.65	66.31	41.00	11.01
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2 LCF total		-21.41	-20.28	-11.21	-6.61	-3.10	0.00	11.77	76.39	137.63	205.47	131.53	45.28
		Sprinkler (cfs/1000 ac)											
	KET	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	20.6	1.28	1.08	0.81	0.70	0.64	0.47	0.18	-4.05	-10.05	-11.66	-3.99	0.78
future acreage sprinkler		-26.36	-22.28	-16.77	-14.38	-13.26	-9.58	-3.76	83.52	207.11	240.12	82.22	-16.03
		Gravity (cfs/1000 ac)											
	KET	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	6.5	2.20	1.86	1.40	1.20	1.11	0.80	0.45	-4.74	-12.17	-14.10	-4.34	1.75
future acreage gravity		-14.29	-12.08	-9.09	-7.79	-7.19	-5.20	-2.93	30.78	79.12	91.65	28.18	-11.39
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2 KET total		-40.65	-34.37	-25.87	-22.17	-20.46	-14.78	-6.68	114.30	286.22	331.77	110.40	-27.42
		Sprinkler (cfs/1000 ac)											
	OKM	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	42.9	2.31	1.33	1.29	1.03	1.14	0.77	-0.77	-7.17	-10.90	-15.04	-11.69	-2.81
future acreage sprinkler		-99.18	-56.97	-55.13	-44.10	-48.82	-33.08	32.86	307.68	467.52	645.04	501.54	120.46
		Gravity (cfs/1000 ac)											
	OKM	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	0.9	3.04	1.75	1.69	1.35	1.50	1.01	-0.69	-7.68	-11.77	-16.47	-12.70	-2.64
future acreage gravity		-2.74	-1.57	-1.52	-1.22	-1.35	-0.91	0.62	6.91	10.59	14.82	11.43	2.38
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2 OKM total		####	-58.54	-56.65	-45.32	-50.17	-33.99	33.48	314.59	478.12	659.86	512.97	122.84
		Sprinkler (cfs/1000 ac)											
	FER	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	22.2	0.49	0.28	0.27	0.22	0.24	0.16	0.17	-4.39	-7.96	-10.45	-7.21	-0.94
future acreage sprinkler		-10.97	-6.30	-6.10	-4.88	-6.40	-3.66	-3.85	97.53	176.70	231.96	160.03	20.95
		Gravity (cfs/1000 ac)											
	FER	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	0.5	2.78	1.60	1.54	1.24	1.37	0.93	1.18	-5.60	-11.29	-15.66	-10.03	0.91
future acreage gravity		-1.39	-0.80	-0.77	-0.62	-0.68	-0.46	-0.59	2.80	5.64	7.83	5.02	-0.45
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2 FER total		-12.36	-7.10	-6.87	-5.50	-6.08	-4.12	-4.44	100.33	182.34	239.79	165.04	20.49
		Sprinkler (cfs/1000 ac)											
	OKA	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	77.3	1.46	1.31	0.99	0.85	0.78	0.57	0.41	-5.37	-9.17	-12.03	-8.43	-0.19

future acreage sprinkler		####	####	-76.37	-65.47	-60.37	-43.67	-31.46	415.26	708.84	929.84	651.72	14.92
		Gravity (cfs/1000 ac)											
	OKA	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	25.8	2.55	2.28	1.70	1.46	1.34	0.97	0.78	-6.32	-10.95	-14.45	-9.78	0.69
future acreage gravity		-65.79	-68.20	-43.81	-37.54	-34.05	-25.03	-20.15	162.95	282.56	372.68	252.38	-17.88
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2 OKA total	####	####	####	####	####	-95.02	-68.70	-51.61	578.21	991.40	####	904.09	-2.96
		Sprinkler (cfs/1000 ac)											
	CHE	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	6.8	-0.21	1.72	1.66	1.33	1.47	1.00	-1.38	-7.71	-12.29	-15.73	-12.80	-6.37
future acreage sprinkler		1.45	-11.70	-11.32	-8.06	-10.03	-6.79	9.41	52.44	83.56	106.95	87.07	36.55
		Gravity (cfs/1000 ac)											
	CHE	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	0.0	0.09	2.08	2.01	1.81	1.78	1.21	-1.37	-8.09	-13.00	-16.76	-13.58	-5.47
future acreage gravity		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2 CHE total		1.45	-11.70	-11.32	-8.06	-10.03	-6.79	9.41	52.44	83.56	106.95	87.07	36.55
		Sprinkler (cfs/1000 ac)											
	WNA	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	27.2	-0.21	1.72	1.66	1.33	1.47	1.00	-1.38	-7.71	-12.29	-15.73	-12.80	-6.37
future acreage sprinkler		5.80	-46.80	-45.29	-36.23	-40.11	-27.17	37.64	209.77	334.23	427.79	348.27	146.18
		Gravity (cfs/1000 ac)											
	WNA	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	0.0	0.09	2.08	2.01	1.81	1.78	1.21	-1.37	-8.09	-13.00	-16.76	-13.58	-5.47
future acreage gravity		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2 WNA total		5.80	-46.80	-45.29	-36.23	-40.11	-27.17	37.64	209.77	334.23	427.79	348.27	146.18
		Sprinkler (cfs/1000 ac)											
	WSB	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	28.3	0.18	0.34	0.32	0.26	0.29	0.19	-0.60	-6.64	-11.47	-12.43	-6.57	-1.07
future acreage sprinkler		-5.06	-9.50	-9.19	-7.35	-8.14	-5.51	16.92	187.84	324.63	351.89	185.80	30.30
		Gravity (cfs/1000 ac)											
	WSB	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	0.0	2.78	2.01	1.95	1.56	1.73	1.17	0.05	-8.95	-16.70	-18.29	-8.00	1.46
future acreage gravity		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2 WSB total		-5.06	-9.50	-9.19	-7.35	-8.14	-5.51	16.92	187.84	324.63	351.89	185.80	30.30
		Sprinkler (cfs/1000 ac)											
	UPS	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	22.7	1.14	0.78	0.78	0.63	0.70	0.51	0.80	-5.42	-10.13	-12.76	-9.12	1.03
future acreage sprinkler		-25.80	-17.77	-17.20	-14.33	-15.87	-11.47	-18.12	122.98	229.92	289.74	207.11	-23.49
		Gravity (cfs/1000 ac)											
	UPS	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	82.1	2.36	1.63	1.58	1.31	1.45	1.05	1.84	-6.42	-12.51	-15.98	-11.01	2.54
future acreage gravity		####	####	####	####	####	-86.22	####	527.05	####	####	904.11	####
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2 UPS total	####	####	####	####	####	####	-87.69	####	650.03	####	####	####	####
		Sprinkler (cfs/1000 ac)											
	LWS	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	2.4	0.98	1.20	1.16	0.97	1.07	0.77	-2.55	-7.03	-10.86	-14.49	-10.94	-5.05
future acreage sprinkler		-2.36	-2.86	-2.79	-2.32	-2.57	-1.86	6.13	16.88	26.08	34.78	26.25	12.13
		Gravity (cfs/1000 ac)											
	LWS	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	10.3	2.45	2.38	2.30	1.92	2.12	1.53	-2.31	-8.13	-12.89	-17.59	-12.78	-5.09
future acreage gravity		-25.18	-24.47	-23.69	-19.74	-21.85	-15.79	23.84	83.78	132.76	181.22	131.62	52.40
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2 LWS total		-27.55	-27.36	-26.47	-22.08	-24.42	-17.65	29.97	100.66	158.84	216.00	157.97	64.53
		Sprinkler (cfs/1000 ac)											
	WEN	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	43.8	0.39	0.41	0.36	0.29	0.32	0.21	-0.34	-4.68	-9.13	-11.11	-6.48	-2.69
future acreage sprinkler		-17.20	-17.77	-15.64	-12.51	-13.85	-8.38	14.93	205.10	399.77	486.63	284.18	17.99

		Gravity (cfs/1000 ac)											
	WEN	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	36.0	3.38	3.49	3.07	2.46	2.72	1.84	0.94	-6.58	-14.18	-17.39	-8.70	-1.84
future acreage gravity		####	####	####	-88.42	-87.89	-66.31	-33.72	236.90	510.34	626.06	313.33	66.31
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2 WEN total		####	####	####	####	####	-75.69	-18.79	442.00	910.11	####	597.51	184.30
		Sprinkler (cfs/1000 ac)											
	CLR	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	5.0	0.22	0.92	0.81	0.65	0.72	0.48	-0.33	-4.33	-10.73	-14.13	-5.37	-1.61
future acreage sprinkler		-1.09	-4.60	-4.05	-3.24	-3.58	-2.43	1.63	21.64	53.67	70.64	26.83	8.04
		Gravity (cfs/1000 ac)											
	CLR	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	0.0	2.02	3.15	2.77	2.21	2.45	1.66	0.46	-5.66	-15.36	-20.40	-6.62	-0.70
future acreage gravity		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2 CLR total		-1.09	-4.60	-4.05	-3.24	-3.58	-2.43	1.63	21.64	53.67	70.64	26.83	8.04
		Sprinkler (cfs/1000 ac)											
	PLS	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	63.8	0.31	0.68	0.66	0.66	0.63	0.47	-2.24	-7.87	-11.61	-10.28	-6.47	-3.28
future acreage sprinkler		-20.08	-43.70	-42.29	-42.29	-40.13	-30.20	142.76	502.11	740.62	655.59	412.55	209.45
		Gravity (cfs/1000 ac)											
	PLS	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	0.0	1.92	2.34	2.27	2.27	2.15	1.62	-2.10	-10.34	-15.60	-13.64	-7.85	-2.95
future acreage gravity		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2 PLS total		-20.08	-43.70	-42.29	-42.29	-40.13	-30.20	142.76	502.11	740.62	655.59	412.55	209.45
		Sprinkler (cfs/1000 ac)											
	WWA	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	88.6	-0.39	0.42	0.45	0.45	0.43	0.32	-4.10	-10.56	-11.11	-5.34	-3.26	-1.57
future acreage sprinkler		34.37	-37.00	-40.04	-40.04	-37.99	-28.60	363.49	935.45	984.68	472.90	289.23	139.08
		Gravity (cfs/1000 ac)											
	WWA	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	3.1	0.88	2.02	2.03	2.03	1.93	1.45	-6.21	-15.21	-15.65	-6.48	-3.16	-0.38
future acreage gravity		-2.72	-6.27	-6.30	-6.30	-5.98	-4.50	16.15	47.15	48.53	20.09	9.81	1.19
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2 WWA total		31.65	-43.27	-46.34	-46.34	-43.98	-33.10	379.64	982.60	####	492.99	299.04	140.24
		Sprinkler (cfs/1000 ac)											
	UMW	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	25.1	0.30	0.26	0.15	0.10	0.08	0.05	0.08	-6.46	-9.80	-12.38	-9.07	-2.95
future acreage sprinkler		-7.54	-6.49	-3.77	-2.51	-2.09	-1.26	-1.95	162.05	245.96	310.77	227.60	74.16
		Gravity (cfs/1000 ac)											
	UMW	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	19.5	5.01	4.31	2.50	1.67	1.39	0.83	1.29	-9.97	-15.04	-19.99	-12.99	-0.98
future acreage gravity		-97.66	-64.09	-48.83	-32.55	-27.03	-16.28	-25.23	194.49	293.36	389.78	253.38	19.02
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2 UMW total		####	-90.59	-52.60	-35.07	-29.12	-17.53	-27.18	356.54	539.32	700.55	480.97	93.18
		Sprinkler (cfs/1000 ac)											
	JDA	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	18.1	0.80	0.69	0.40	0.27	0.22	0.13	0.21	-4.54	-8.19	-11.10	-8.99	-0.56
future acreage sprinkler		-14.50	-12.49	-7.25	-4.83	-4.01	-2.42	-3.75	82.16	148.15	200.97	162.65	10.09
		Gravity (cfs/1000 ac)											
	JDA	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	23.8	3.12	2.69	1.56	1.04	0.86	0.52	0.81	-5.83	-10.83	-15.29	-11.83	1.23
future acreage gravity		-74.37	-64.04	-37.19	-24.79	-20.59	-12.40	-18.21	138.79	257.79	363.91	281.59	-29.26
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2 JDA total		-88.88	-76.53	-44.44	-29.63	-24.60	-14.81	-22.96	220.95	405.94	564.88	444.24	-19.18
		Ret flow											
	1 KEN total	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989 acreage	24.5	4.29	3.23	2.73	2.73	3.02	2.34	2.02	2.73	3.63	4.29	4.29	4.44
future acreage		####	-79.05	-66.94	-66.94	-74.11	-57.38	-49.41	-66.94	-88.93	####	####	####
		Pumping											

	1 NSM total	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
	1989 acreage	41.5	-1.78	0.00	0.00	0.00	0.00	0.00	-4.53	-9.56	-13.12	-14.66	-11.73	-6.93
	future acreage		73.85	0.00	0.00	0.00	0.00	0.00	187.82	396.65	544.45	608.34	486.67	287.67
		Pumping												
	1 NSJ total	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
	1989 acreage	18.1	-1.78	0.00	0.00	0.00	0.00	0.00	-4.53	-9.56	-13.12	-14.66	-11.73	-6.93
	future acreage		32.21	0.00	0.00	0.00	0.00	0.00	81.92	173.00	237.46	265.32	212.26	125.46
		Pumping												
	1 UMP total	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
	1989 acreage	44.6	-1.78	0.00	0.00	0.00	0.00	0.00	-4.53	-9.56	-13.12	-14.66	-11.73	-6.93
	future acreage		79.37	0.00	0.00	0.00	0.00	0.00	201.85	426.28	585.12	653.78	523.03	309.15
		Return flow												
	1 NSR total	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
	1989 acreage	59.6	1.21	0.94	0.60	0.30	0.33	0.30	0.31	0.91	1.25	1.21	1.51	1.35
	future acreage		-72.11	-55.89	-36.06	-18.03	-19.96	-18.03	-18.63	-54.08	-74.52	-72.11	-80.14	-80.73
		Return flow												
	1 UMR total	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
	1989 acreage	44.6	1.21	0.94	0.60	0.30	0.33	0.30	0.31	0.91	1.25	1.21	1.51	1.35
	future acreage		-53.97	-41.82	-26.98	-13.49	-14.94	-13.49	-13.94	-40.47	-65.76	-63.97	-67.46	-60.41
		Pumping												
	1 JDP total	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
	1989 acreage	89.2	-0.25	0.93	0.60	0.30	0.33	0.30	-3.37	-6.87	-9.43	-10.72	-8.04	-4.29
	future acreage		21.90	-83.09	-63.61	-26.60	-29.68	-26.60	300.65	613.02	841.04	956.30	716.80	382.89
		Combined S&G												
	1 WHT total	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
	1989 acreage	13.8	1.98	1.52	0.98	0.49	0.54	0.49	0.50	-3.43	-9.91	-14.36	-5.67	2.20
	future acreage		-27.10	-21.01	-13.55	-6.78	-7.50	-6.78	-6.86	47.37	136.80	198.18	78.19	-30.34
		Combined S&G												
	1 KLC total	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
	1989 acreage	11.7	2.68	2.08	1.34	0.67	0.74	0.67	0.26	-6.54	-13.29	-14.61	-6.97	-0.78
	future acreage		-31.33	-24.28	-15.66	-7.83	-8.67	-7.83	-3.05	76.51	155.54	170.91	81.49	9.16
		Combined S&G												
	1 WHS total	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
	1989 acreage	6.4	2.68	2.08	1.34	0.67	0.74	0.67	0.26	-6.54	-13.29	-14.61	-6.97	-0.78
	future acreage		-17.14	-13.28	-8.57	-4.28	-4.74	-4.28	-1.67	41.85	85.08	93.49	44.58	5.01
		Combined S&G												
	1 KWS total	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
	1989 acreage	4.3	2.68	2.08	1.34	0.67	0.74	0.67	0.26	-6.54	-13.29	-14.61	-6.97	-0.78
	future acreage		-11.51	-8.92	-5.76	-2.88	-3.19	-2.88	-1.12	28.12	57.17	62.81	29.95	3.37
		Sprinkler												
	HOD	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
	1989 acreage	32.2	-0.37	0.48	0.31	0.16	0.17	0.16	-1.54	-5.87	-8.45	-10.49	-8.36	-4.68
	future acreage sprinkler		11.89	-15.55	-10.03	-5.01	-5.55	-5.01	49.69	189.01	272.23	337.70	269.28	150.60
	HOD	Gravity												
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
	1989 acreage	0.7	2.99	3.75	2.42	1.21	1.34	1.21	-1.93	-8.20	-11.98	-15.89	-11.01	-4.61
	future acreage gravity		-2.10	-2.63	-1.70	-0.85	-0.94	-0.85	1.35	5.74	8.38	11.13	7.71	3.23
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
	2 HOD total		9.80	-18.17	-11.73	-5.66	-6.49	-5.66	51.04	194.75	280.62	348.83	276.98	153.83
		Sprinkler (cfs/1000 ac)												
	WMT	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
	1989 acreage	208.5	0.29	0.28	0.18	0.18	0.20	0.18	0.02	-1.13	-6.61	-9.64	-2.08	-0.06
	future acreage sprinkler		-60.71	-58.17	-37.53	-37.53	-41.55	-37.53	-4.96	235.13	####	####	433.39	13.07
		Gravity (cfs/1000 ac)												
	WMT	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
	1989 acreage	1.1	1.21	0.95	0.62	0.62	0.68	0.62	0.39	-1.29	-8.99	-13.19	-1.62	1.05
	future acreage gravity		-1.30	-1.02	-0.66	-0.66	-0.73	-0.66	-0.42	1.38	9.62	14.12	1.73	-1.13
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
	2 WMT total		-62.01	-59.19	-38.19	-38.19	-42.28	-38.19	-5.37	236.50	####	####	435.12	11.95
		Sprinkler (cfs/1000 ac)												
	FRN	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
	1989 acreage	1.4	0.29	0.28	0.18	0.18	0.20	0.18	0.02	-1.13	-6.61	-9.64	-2.08	-0.06
	future acreage sprinkler		-0.41	-0.39	-0.25	-0.25	-0.28	-0.25	-0.03	1.58	9.25	13.49	2.91	0.09
		Gravity (cfs/1000 ac)												
	FRN	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
	1989 acreage	0.0	1.21	0.95	0.62	0.62	0.68	0.62	0.39	-1.29	-8.99	-13.19	-1.62	1.05
	future acreage gravity		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	

	2 FRN total	-0.41	-0.39	-0.25	-0.25	-0.28	-0.25	-0.03	1.58	9.25	13.49	2.91	0.09
constant	RPR total	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
This is a constant depl	*****												
so no acreages req'd	*****	0	0	0	0	0	0	0	-30	-50	-50	-50	-30
constant	GCL total	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
This is a constant depl	*****												
so no acreages req'd	*****	-2080	0	0	0	0	-540	-5850	-7400	-7920	-7850	-6900	-4140

	D	E	F
84		= SELECT("R11C")	*
85		= IF(ROW(ACTIVE.CELL()) > 500, NotInFormulaList(),)	if not on Formula list, runs this macro defined below
86		= NEXT()	*
87		= FORMULA(GET.CELL(1), \$E\$2)	puts ref of start site above
88		= WHILE(NOT(ACTIVE.CELL() = \$M\$21 & "3AP2"))	finds end site
89		= SELECT("R11C")	*
90		= IF(ROW(ACTIVE.CELL()) > 500, NotInFormulaList(),)	if not on Formula list, runs this macro defined below
91		= NEXT()	*
92		= GOTO(\$E\$125)	skips down below
93	AP3	= SELECT(\$X\$3)	selects top of AP3
94		= WHILE(NOT(ACTIVE.CELL() = \$M\$20 & "3AP3"))	finds start site
95		= SELECT("R11C")	*
96		= IF(ROW(ACTIVE.CELL()) > 500, NotInFormulaList(),)	if not on Formula list, runs this macro defined below
97		= NEXT()	*
98		= FORMULA(GET.CELL(1), \$E\$2)	puts ref of start site above
99		= WHILE(NOT(ACTIVE.CELL() = \$M\$21 & "3AP3"))	finds end site
100		= SELECT("R11C")	*
101		= IF(ROW(ACTIVE.CELL()) > 500, NotInFormulaList(),)	if not on Formula list, runs this macro defined below
102		= NEXT()	*
103		= GOTO(\$E\$125)	skips down below
104	NP	= SELECT(\$Z\$3)	selects top of NP
105		= WHILE(NOT(ACTIVE.CELL() = \$M\$20 & "3NP9"))	finds start site
106		= SELECT("R11C")	*
107		= IF(ROW(ACTIVE.CELL()) > 500, NotInFormulaList(),)	if not on Formula list, runs this macro defined below
108		= NEXT()	*
109		= FORMULA(GET.CELL(1), \$E\$2)	puts ref of start site above
110		= WHILE(NOT(ACTIVE.CELL() = \$M\$21 & "3NP9"))	finds end site
111		= SELECT("R11C")	*
112		= IF(ROW(ACTIVE.CELL()) > 500, NotInFormulaList(),)	if not on Formula list, runs this macro defined below
113		= NEXT()	*
114		= GOTO(\$E\$125)	skips down below
115	Whatever	= SELECT(\$AB\$3)	selects top of Whatever
116		= WHILE(NOT(ACTIVE.CELL() = \$M\$20 & "TMP"))	finds start site
117		= SELECT("R11C")	*
118		= IF(ROW(ACTIVE.CELL()) > 500, NotInFormulaList(),)	if not on Formula list, runs this macro defined below
119		= NEXT()	*
120		= FORMULA(GET.CELL(1), \$E\$2)	puts ref of start site above
121		= WHILE(NOT(ACTIVE.CELL() = \$M\$21 & "TMP"))	finds end site
122		= SELECT("R11C")	*
123		= IF(ROW(ACTIVE.CELL()) > 500, NotInFormulaList(),)	if not on Formula list, runs this macro defined below
124		= NEXT()	*
125		= SELECT.END(4)	finds end of end site block
126		= SELECT("R11C")	selects the blank below it
127		= DEFINE.NAME("InsertCell")	defines it InsertCell
128		= INSERT(2)	inserts a cell
129		= IF(\$M\$4 = 1, AccummSS(), IF(\$M\$4 = 2, AccummEE(), IF(\$	runs appropriate Accum macro
130		= IF(\$M\$4 = 6, AccummAP2(), IF(\$M\$4 = 7, AccummAP3(), IF	*
131		= IF(B249 = FALSE, RETURN(),)	
132		= SELECT(InsertCell)	when run is finished, deletes InsertCell
133		= EDIT.DELETE(2)	*
134		= RETURN()	done
135			
136			
137			< this is error macro
138		Woops	
139		= ERROR(2, WoopsForWoops)	if error in error macro, runs macro defined below
140		= ACTIVATE("m_accum.xml")	
141		= SELECT(InsertCell)	finds InsertCell,
142		= EDIT.DELETE(2)	deletes it
143		= HALT()	
144			< this macro is if there is an error in Woops
145			it does the same thing, alerts user if sites
146		WoopsForWoops	in block do not exist
147		= HALT()	
148			
149			
150			< if start or end site is not on ProjList
151			this macro is run to alert user
152		NotInProjList	
153		= ERROR(2, WoopsForWoops)	if error in this macro, runs error macro
154		= ALERT("A site in the formula list is not on the ProjList; che	alert user that a site on FormulaList cannot be found on
155		= ACTIVATE.NEXT()	halts macro run but first
156		= CLOSE(FALSE)	deletes InsertCell
157		= ACTIVATE.PREV()	
158		= SELECT(InsertCell)	
159		= EDIT.DELETE(2)	
160		= HALT()	
161			
162		NotInFormulaList	< if start or end site not on FormulaList
163		= ERROR(2, WoopsForWoops)	alerts user and halts macro
164		= ALERT("Either the start or end site you entered in not on F	
165		= HALT()	
166			

	A	B	C
1	a:\bps\3-ALL\		
2			
3	AccummSS	=ECHO(TRUE)	turns screen updating off
4		=FORMULA("3SS",B227)	puts kind of data in B136 for use in headings
5		=COPY(\$CZ\$2,\$B\$234)	copies stuff for heading to B143
6		=COPY(\$CZ\$12,\$B\$235)	
7		=First()	begin macro by calling First subroutine
8		=FORMULA.GOTO(TEXTREF(GET.CELL(5,\$E\$2),TRUE))	goes to top of site list
9		=DEFINE.NAME("createname")	defines initial createname-first name in site list
10		=FORMULA.GOTO(\$DB\$1)	goes to top of ProjList
11		=DEFINE.NAME("headings")	defines initial headings-first name in proj list
12		=CreateSite()	runs subroutine defined below
13		=RETURN()	
14			
15			
16	AccummEE	=ECHO(TRUE)	turns screen updating off
17		=FORMULA("3EE",B227)	puts kind of data in B136 for use in headings
18		=COPY(\$CZ\$3,\$B\$234)	copies stuff for heading to B143
19		=COPY(\$CZ\$39,\$B\$235)	
20		=First()	begin macro by calling First subroutine
21		=FORMULA.GOTO(TEXTREF(GET.CELL(5,\$E\$2),TRUE))	goes to top of site list
22		=DEFINE.NAME("createname")	defines initial createname-first name in site list
23		=FORMULA.GOTO(\$DB\$1)	goes to top of ProjList
24		=DEFINE.NAME("headings")	defines initial headings-first name in proj list
25		=CreateSite()	runs subroutine defined below
26		=RETURN()	
27			
28	AccummDD	=ECHO(TRUE)	turns screen updating off
29		=FORMULA("3DD",B227)	puts kind of data in B136 for use in headings
30		=COPY(\$CZ\$6,\$B\$234)	copies stuff for heading to B143
31		=COPY(\$CZ\$16,\$B\$235)	
32		=First()	begin macro by calling First subroutine
33		=FORMULA.GOTO(TEXTREF(GET.CELL(5,\$E\$2),TRUE))	goes to top of site list
34		=DEFINE.NAME("createname")	defines initial createname-first name in site list
35		=FORMULA.GOTO(\$DB\$1)	goes to top of ProjList
36		=DEFINE.NAME("headings")	defines initial headings-first name in proj list
37		=CreateSite()	runs subroutine defined below
38		=RETURN()	
39			
40	AccummA	=ECHO(TRUE)	turns screen updating off
41		=FORMULA("3A",B227)	puts kind of data in B136 for use in headings
42		=COPY(\$CZ\$4,\$B\$234)	copies stuff for heading to B143
43		=COPY(\$CZ\$14,\$B\$235)	
44		=First()	begin macro by calling First subroutine
45		=FORMULA.GOTO(TEXTREF(GET.CELL(5,\$E\$2),TRUE))	goes to top of site list
46		=DEFINE.NAME("createname")	defines initial createname-first name in site list
47		=FORMULA.GOTO(\$DB\$1)	goes to top of ProjList
48		=DEFINE.NAME("headings")	defines initial headings-first name in proj list
49		=CreateSite()	runs subroutine defined below
50		=RETURN()	
51			
52	AccummM	=ECHO(TRUE)	turns screen updating off
53		=FORMULA("3M",B227)	puts kind of data in B136 for use in headings
54		=COPY(\$CZ\$5,\$B\$234)	copies stuff for heading to B143
55		=COPY(\$CZ\$15,\$B\$235)	
56		=First()	begin macro by calling First subroutine
57		=FORMULA.GOTO(TEXTREF(GET.CELL(5,\$E\$2),TRUE))	goes to top of site list
58		=DEFINE.NAME("createname")	defines initial createname-first name in site list
59		=FORMULA.GOTO(\$DB\$1)	goes to top of ProjList
60		=DEFINE.NAME("headings")	defines initial headings-first name in proj list
61		=CreateSite()	runs subroutine defined below
62		=RETURN()	
63			
64			
65	AccumMAP2	=ECHO(TRUE)	turns screen updating off
66		=FORMULA("3AP2",B227)	puts kind of data in B136 for use in headings
67		=COPY(\$CZ\$7,\$B\$234)	copies stuff for heading to B143
68		=COPY(\$CZ\$17,\$B\$235)	
69		=First()	begin macro by calling First subroutine
70		=FORMULA.GOTO(TEXTREF(GET.CELL(5,\$E\$2),TRUE))	goes to top of site list
71		=DEFINE.NAME("createname")	defines initial createname-first name in site list
72		=FORMULA.GOTO(\$DB\$1)	goes to top of ProjList
73		=DEFINE.NAME("headings")	defines initial headings-first name in proj list
74		=CreateSite()	runs subroutine defined below
75		=RETURN()	
76			
77			
78	AccumMAP3	=ECHO(TRUE)	turns screen updating off
79		=FORMULA("3AP3",B227)	puts kind of data in B136 for use in headings
80		=COPY(\$CZ\$8,\$B\$234)	copies stuff for heading to B143
81		=COPY(\$CZ\$18,\$B\$235)	
82		=First()	begin macro by calling First subroutine
83		=FORMULA.GOTO(TEXTREF(GET.CELL(5,\$E\$2),TRUE))	goes to top of site list
84		=DEFINE.NAME("createname")	defines initial createname-first name in site list
85		=FORMULA.GOTO(\$DB\$1)	goes to top of ProjList

	A	B	C
86		=DEFINE.NAME("headings")	defines initial headings-first name in proj list
87		=CreateSite()	runs subroutine defined below
88		=RETURN()	
89			
90			
91	AccummNP9	=ECHO(TRUE)	turns screen updating off
92		=FORMULA("3NP9",B9227)	puts kind of data in B136 for use in headings
93		=COPY(\$CZ\$9,\$B\$234)	copies stuff for heading tp B143
94		=COPY(\$CZ\$20,\$B\$235)	
95		=First()	begin macro by calling First subroutine
96		=FORMULA.GOTO(TEXTREF(GET.CELL(5,\$E\$2),TRUE))	goes to top of site list
97		=DEFINE.NAME("createname")	defines initial createname-first name in site list
98		=FORMULA.GOTO(\$D8\$1)	goes to top of ProjList
99		=DEFINE.NAME("headings")	defines initial headings-first name in proj list
100		=CreateSite()	runs subroutine defined below
101		=RETURN()	
102			
103			
104	AccummWhatever	=ECHO(TRUE)	turns screen updating off
105		=FORMULA("TMP",B9227)	puts kind of data in B136 for use in headings
106		=COPY(\$CZ\$10,\$B\$234)	copies stuff for heading tp B143
107		=COPY(\$CZ\$20,\$B\$235)	
108		=First()	begin macro by calling First subroutine
109		=FORMULA.GOTO(TEXTREF(GET.CELL(5,\$E\$2),TRUE))	goes to top of site list
110		=DEFINE.NAME("createname")	defines initial createname-first name in site list
111		=FORMULA.GOTO(\$D8\$1)	goes to top of ProjList
112		=DEFINE.NAME("headings")	defines initial headings-first name in proj list
113		=CreateSite()	runs subroutine defined below
114		=RETURN()	
115			
116			
117			
118			
119			
120			
121			
122			
123	First	=OPEN("c:\bpa\macros\hform.xls")	opens new hform
124		=RETURN()	
125			
126			
127			
128			
129			
130	CreateSite	=FORMULA.GOTO("createname")	goes to "createname" defined elsewhere in mac.
131		=DEFINE.NAME("markname")	defines it as "markname"
132		=HEADINGS ACCUM()	runs headings subroutine on new hform
133		=IF(B249=FALSE,RETURN(),)	
134		=ACTIVATE.PREV()	activates macro sheet
135		=WHILE(NOT(ISBLANK(ACTIVE.CELL())))	finds beginning of next block of names
136		=SELECT("R11C")	.
137		=NEXT()	.
138		=SELECT("R11C")	.
139		=DEFINE.NAME("createname")	defines beginning of next block: "createname"
140		=AddSite()	runs AddSite subroutine defined below
141		=RETURN()	
142			
143	AddSite	=FORMULA.GOTO("markname")	goes to "markname" (first site in block)
144		=WHILE(NOT(ISBLANK(ACTIVE.CELL())))	begin loop*****
145		=SELECT("R11C")	select next site in block
146		=IF(ISBLANK(ACTIVE.CELL()),GOTO(B182),)	if site space is blank (end of block) end loop
147		=ACTIVE.CELL()&"&.xls"	returns site name.xls (1 below first site in block)
148		=IF(OR(\$M\$4=5,\$M\$4=6,\$M\$4=7,\$M\$4=8,\$M\$4=9))	if Depl defines a mult factor, else skip to 3 lines
149		=SELECT("RC11")	selects one cell to right of current cell in block
150		=DEFINE.NAME("MultFactor")	defines it "Mult..." (for Depl. mult. is required)
151		=SELECT("RC(-1)")	selects one cell to left
152		=FORMULA(markname&"&.xls",B153)	first site in block.xls to B32
153		GCL3NP8.xls	
154		=ACTIVATE(B153)	activate first site in block.xls
155		=SELECT("R6C2")	select location to be pasted to (whole month)
156		=OPEN(\$A\$1&B147)	open next site in block
157		=SELECT("R7C13")	select appropriate area to be copied
158		=SELECT.END(4)	.
159		=SELECT(1B6:ACTIVE.CELL())	.
160		=IF(OR(\$M\$4=5,\$M\$4=6,\$M\$4=7,\$M\$4=8,\$M\$4=9))	if running Depl mac. checks to see if mult. is nec. if not skip 2
161		=COPY(MultFactor)	copies # in MultFactor
162		=PASTE.SPECIAL(3,4,TRUE,FALSE)	multiplies if Depl
163		=COPY()	copy it
164		=ACTIVATE(B153)	activate first site in block
165		=PASTE.SPECIAL(3,2,FALSE,FALSE)	add to whatever is already there
166		=SELECT("R10C2")	select location to be pasted to (half month)
167		=ACTIVATE(B147)	activate next site in block
168		=SELECT("R10C13")	select appropriate area to be copied
169		=SELECT.END(4)	.
170		=SELECT(1B104:ACTIVE.CELL())	.

A	B	C
171	=IF(OR(\$M\$4=5,\$M\$4=6,\$M\$4=7,\$M\$4=8,\$M\$4=9)	if running Dept. macro, checks to see if mult. is nec. if not skip 2
172	=COPY(MultFactor)	copies # in MultFactor
173	=PASTE.SPECIAL(3,4,TRUE,FALSE)	multiplies if Dept
174	=COPY()	copy 1
175	=ACTIVATE(B153)	activate first site in block
176	=PASTE.SPECIAL(3,2,FALSE,FALSE)	add to whatever is already there
177	=ACTIVATE(B147)	activate site name.xls (1 below first site in block)
178	=CANCEL.COPY()	
179	=CLOSE(FALSE)	close it
180	=ACTIVATE("m_accum.xlm")	activate macro
181	=NEXT()	end loop*****
182	=ACTIVATE(B153)	after loop is done,
183	=SELECT("R104C2:R104C10,R6C2:R6C10","R6C2")	deletes any data in Oct-Jun 1927
184	=CLEAR()	
185	=SELECT(A1)	
186	=SAVE()	saves file
187	=IF(AND(\$M\$29=TRUE,\$M\$30=TRUE))	if printing both water and power year is selected in dialog box
188	=FORMULA(1,\$A\$5)	puts 1 in appropriate place signifying water year print
189	=PRNTWY PowerPublish()	prints water year format
190	=FORMULA(2,\$A\$5)	puts 2 in appropriate place signifying power year print
191	=PRNTWY PowerPublish()	prints power year format
192	=ELSE.IF(\$M\$29=TRUE)	if only water year
193	=FORMULA(1,\$A\$5)	puts 1 in appropriate place signifying water year print
194	=PRNTWY PowerPublish()	prints water year format
195	=ELSE.IF(\$M\$30=TRUE)	if only power year
196	=FORMULA(2,\$A\$5)	puts 2 in appropriate place signifying power year print
197	=PRNTWY PowerPublish()	prints power year format
198	=ELSE()	otherwise no print
199	=END.IF()	
200	=CLOSE(FALSE)	closes it
201	=FORMULA.GOTO("createname")	goto createname-first site in next block
202	=IF(ISBLANK(ACTIVE.CELL()),GOTO(B206),)	if "createname" is blank, done, if not
203	=First()	repeat all of the above
204	=ACTIVATE("m_accum.xlm")	activates macro sheet
205	=CreateSite()	
206	=RETURN()	
207		
208		
209		
210	HEADINGS ACCUM	
211	=FORMULA.GOTO("headings")	go to headings
212	=WHILE(NOT(ACTIVE.CELL()=LEFT(markname,3)))	begins loop to find proper name from ProjList
213	=SELECT("R1C")	selects next name in ProjList
214	=IF(ROW(ACTIVE.CELL())>500,NotInProjList(),)	catches an entry not on ProjList
215	=NEXT()	end loop
216	=COPY(ACTIVE.CELL(),B228)	copies 3 char code below
217	=SELECT("RC(4)")	
218	=COPY(ACTIVE.CELL(),B229)	copies USGS # below
219	=SELECT("RC(1)")	
220	=COPY(ACTIVE.CELL(),B230)	copies site name below
221	=SELECT("RC(1)")	
222	=COPY(ACTIVE.CELL(),B231)	copies river below
223	=SELECT("RC(1)")	
224	=COPY(ACTIVE.CELL(),B232)	copies river mile below
225	=SELECT("RC(1)")	
226	=COPY(ACTIVE.CELL(),B233)	copies drainage area below
227	=FORMULA.GOTO("createname")	
228	3NP9	data type
229	GCL	3 letter abbr.
230	12436100	USGS #
231	GRAND COULEE	project name
232	COLUMBIA	river
233	586.6	river mile
234	74700	drainage area
235		datatype description
236		split moth datatype description if desired
237	=ACTIVATE.NEXT()	activates new site hform
238	=COPY(B227,I\$Q\$1)	copies type of record code to e1
239	=COPY(B228,I\$Q\$1)	copies 3 char site code to c1
240	=FORMULA(B228&B227,B240)	
241	GCL3NP9	
242	=COPY(\$B\$240,I\$Q\$1)	
243	=COPY(B229,I\$Q\$3)	copies USGS # to b3
244	=COPY(B230,I\$Q\$2)	copies site name
245	=COPY(B231,I\$Q\$5)	copies river name
246	=COPY(B232,I\$Q\$6)	copies river mile
247	=COPY(B233,I\$Q\$7)	copies drainage area
248	=COPY(B234,I\$Q\$4)	copies file description
249	=A1&B228&B227&"_de"	returns name and path to save as
250	=SAVE.AS(B248,1,"",FALSE,"",FALSE)	saves it
251	=IF(B249=FALSE,CLOSE(FALSE),RETURN())	if file already exists and user doesn't want to save
252	=SELECT(InsertCell)	over it, halts macro run and alerts user he must
253	=EDIT.DELETE(2)	save over it
254	=ALERT("The only way to proceed wrth 'Accum' is to re	
	=HALT()	

	D	E	F
336	NP	=SELECT(\$Z\$3)	selects top of NP
336		=WHILE(NOT(ACTIVE.CELL()=\$M\$276&"3NP9"))	finds start site
337		=SELECT("R(1)C")	.
338		=IF(ROW(ACTIVE.CELL())>500,NotInFormulaList(),)	if not on Formula list, runs this macro defined below
339		=NEXT()	.
340		=FORMULA(GET.CELL(1),\$E\$264)	puts ref of start site above
341		=WHILE(NOT(ACTIVE.CELL()=\$M\$277&"3NP9"))	finds end site
342		=SELECT("R(1)C")	.
343		=IF(ROW(ACTIVE.CELL())>500,NotInFormulaList(),)	if not on Formula list, runs this macro defined below
344		=NEXT()	.
345		=GOTO(\$E\$377)	skips down below
346	DDX	=SELECT(\$AD\$3)	selects top of NP
347		=WHILE(NOT(ACTIVE.CELL()=\$M\$276&"DDX"))	finds start site
348		=SELECT("R(1)C")	.
349		=IF(ROW(ACTIVE.CELL())>500,NotInFormulaList(),)	if not on Formula list, runs this macro defined below
350		=NEXT()	.
351		=FORMULA(GET.CELL(1),\$E\$264)	puts ref of start site above
352		=WHILE(NOT(ACTIVE.CELL()=\$M\$277&"DDX"))	finds end site
353		=SELECT("R(1)C")	.
354		=IF(ROW(ACTIVE.CELL())>500,NotInFormulaList(),)	if not on Formula list, runs this macro defined below
355		=NEXT()	.
356		=GOTO(\$E\$377)	skips down below
357	MX	=SELECT(\$AF\$3)	selects top of MX
358		=WHILE(NOT(ACTIVE.CELL()=\$M\$276&"MX"))	finds start site
359		=SELECT("R(1)C")	.
360		=IF(ROW(ACTIVE.CELL())>500,NotInFormulaList(),)	if not on Formula list, runs this macro defined below
361		=NEXT()	.
362		=FORMULA(GET.CELL(1),\$E\$264)	puts ref of start site above
363		=WHILE(NOT(ACTIVE.CELL()=\$M\$277&"MX"))	finds end site
364		=SELECT("R(1)C")	.
365		=IF(ROW(ACTIVE.CELL())>500,NotInFormulaList(),)	if not on Formula list, runs this macro defined below
366		=NEXT()	.
367	3M9	=SELECT(\$S\$3)	selects top of 3m9
368		=WHILE(NOT(ACTIVE.CELL()=\$M\$276&"3M9"))	finds start site
369		=SELECT("R(1)C")	.
370		=IF(ROW(ACTIVE.CELL())>500,NotInFormulaList(),)	if not on Formula list, runs this macro defined below
371		=NEXT()	.
372		=FORMULA(GET.CELL(1),\$E\$264)	puts ref of start site above
373		=WHILE(NOT(ACTIVE.CELL()=\$M\$277&"3M9"))	finds end site
374		=SELECT("R(1)C")	.
375		=IF(ROW(ACTIVE.CELL())>500,NotInFormulaList(),)	if not on Formula list, runs this macro defined below
376		=NEXT()	.
377		=SELECT.END(4)	finds end of end site block
378		=SELECT("R(1)C")	selects the blank below it
379		=DEFINE.NAME("InsertCell")	defines it InsertCell
380		=INSERT(2)	inserts a cell
381		=IF(\$M\$261=1,AccummSS Update(),IF(\$M\$261=2,Acc	runs appropriate Accum macro
382		=IF(\$M\$261=6,AccummDDX Update(),IF(\$M\$261=7,Ac	runs appropriate Accum macro
383		=IF(\$B\$376=FALSE,RETURN(),)	
384		=SELECT(InsertCell)	when run is finished, deletes InsertCell
385		=EDIT.DELETE(2)	.
386		=RETURN()	done
387			
388			
389			
390			
391		Woops Update	if error in error macro, runs macro defined below
392		=ERROR(2,WoopsForWoops Update)	finds InsertCell,
393		=ACTIVATE("m accum.xml")	deletes it
394		=SELECT(InsertCell)	sites in block do not exist.
395		=EDIT.DELETE(2)	
396		=HALT()	
397			<this macro is if there is an error in Woops
398		WoopsForWoops Update	it does the same thing, alerts user if sites
399		=HALT()	
400			

	A	B	C
259			
260	UPDATE Accumm		
261			
262			
263			
264			
265	AccummSS Update	=ECHO(TRUE)	turns screen updating off
266		=FORMULA.GOTO(TEXTREF(GET.CELL(5,\$E\$264),TRUE	goes to top of site list
267		=DEFINE.NAME("createname")	defines initial createname-first name in site list
268		=FirstUpdate()	begin macro by calling FirstUpdate subroutine
269		=ACTIVATE("m_accum.xdm")	
270		=CreateSiteUpdate()	runs subroutine defined below
271		=RETURN()	
272			
273			
274			
275			
276	AccummA Update	=ECHO(TRUE)	turns screen updating off
277		=FORMULA.GOTO(TEXTREF(GET.CELL(5,\$E\$264),TRUE	goes to top of site list
278		=DEFINE.NAME("createname")	defines initial createname-first name in site list
279		=FirstUpdate()	begin macro by calling FirstUpdate subroutine
280		=ACTIVATE("m_accum.xdm")	
281		=CreateSiteUpdate()	runs subroutine defined below
282		=RETURN()	
283			
284			
285			
286			
287	AccummAP2 Update	=ECHO(TRUE)	turns screen updating off
288		=FORMULA.GOTO(TEXTREF(GET.CELL(5,\$E\$264),TRUE	goes to top of site list
289		=DEFINE.NAME("createname")	defines initial createname-first name in site list
290		=FirstUpdate()	begin macro by calling FirstUpdate subroutine
291		=ACTIVATE("m_accum.xdm")	
292		=CreateSiteUpdate()	runs subroutine defined below
293		=RETURN()	
294			
295			
296	AccummAP3 Update	=ECHO(TRUE)	turns screen updating off
297		=FORMULA.GOTO(TEXTREF(GET.CELL(5,\$E\$264),TRUE	goes to top of site list
298		=DEFINE.NAME("createname")	defines initial createname-first name in site list
299		=FirstUpdate()	begin macro by calling FirstUpdate subroutine
300		=ACTIVATE("m_accum.xdm")	
301		=CreateSiteUpdate()	runs subroutine defined below
302		=RETURN()	
303			
304			
305	AccummNP Update	=ECHO(TRUE)	turns screen updating off
306		=FORMULA.GOTO(TEXTREF(GET.CELL(5,\$E\$264),TRUE	goes to top of site list
307		=DEFINE.NAME("createname")	defines initial createname-first name in site list
308		=FirstUpdate()	begin macro by calling FirstUpdate subroutine
309		=ACTIVATE("m_accum.xdm")	
310		=CreateSiteUpdate()	runs subroutine defined below
311		=RETURN()	
312			
313			
314	AccummJMS Update	=ECHO(TRUE)	turns screen updating off
315		=FORMULA.GOTO(TEXTREF(GET.CELL(5,\$E\$264),TRUE	goes to top of site list
316		=DEFINE.NAME("createname")	defines initial createname-first name in site list
317		=FirstUpdate()	begin macro by calling FirstUpdate subroutine
318		=ACTIVATE("m_accum.xdm")	
319		=CreateSiteUpdate()	runs subroutine defined below
320		=RETURN()	
321			
322			
323			
324			
325	AccummDOX Update	=ECHO(TRUE)	turns screen updating off
326		=FORMULA.GOTO(TEXTREF(GET.CELL(5,\$E\$264),TRUE	goes to top of site list
327		=DEFINE.NAME("createname")	defines initial createname-first name in site list
328		=OPEN("c:\bp\m\macro\incdepl.xls")	
329		=ACTIVATE("m_accum.xdm")	
330		=CreateSiteUpdate()	runs subroutine defined below
331		=RETURN()	
332			
333			
334	AccummMX Update	=ECHO(TRUE)	turns screen updating off
335		=FORMULA("MX", \$B\$227)	
336		=COPY(\$CZ\$11, \$B\$234)	
337		=FORMULA.GOTO(TEXTREF(GET.CELL(5,\$E\$264),TRUE	goes to top of site list
338		=DEFINE.NAME("createname")	defines initial createname-first name in site list
339		=FORMULA.GOTO(\$DB\$1)	
340		=DEFINE.NAME("headings")	
341		=OPEN("c:\bp\m\macro\incdepl.xls")	
342		=ACTIVATE("m_accum.xdm")	activate this macro sheet
343		=CreateSiteUpdate()	runs subroutine defined below

	A	B	C
344		= RETURN()	
345			
346			
347			
348			
349	FirstUpdate	= OPEN(A1&createname)	opens first name in block
350		= RETURN()	
351			
352	CreateSiteUpdate	= FORMULA.GOTO("createname")	goes to "createname" defined elsewhere in mac.
353		= DEFINE.NAME("markname")	defines it as "markname"
354		= WHILE[NOT(ISBLANK(ACTIVE.CELL()))]	finds beginning of next block of names
355		= SELECT("R11C")	*
356		= NEXT()	*
357		= SELECT("R11C")	*
358		= DEFINE.NAME("createname")	defines beginning of next block: "createname"
359		= IF(NOT(OR(\$M\$261 = 6, \$M\$261 = 7)))	runs AddSite subroutine defined below
360		= AddSiteUpdate()	
361		= ELSE.IF(\$M\$261 = 6)	if DDX chosen runs AddSiteUpdateDDX
362		= AddSiteUpdateDDX()	
363		= ELSE()	if MX chosen runs the submacros below
364		= First()	opens new hform
365		= ACTIVATE("m accum.xdm")	activates this macro sheet
366		= HEADINGS ACCUM()	runs submacro HEADINGS ACCUM
367		= ACTIVATE("m accum.xdm")	activates this macro sheet
368		= AddSiteUpdateMX()	runs submacro defined below
369		= END.IF()	
370		= RETURN()	
371			
372			
373			
374	AddSiteUpdate	= FORMULA.GOTO("markname")	goes to "markname" (first site in block)
375		= FORMULA(1,B402)	puts "paste over" code in Mon
376		= FORMULA(1,B416)	puts "paste over" code in Half Mon
377		= WHILE[NOT(ISBLANK(ACTIVE.CELL()))]	begin loop *****
378		= SELECT("R11C")	select next site in block
379		= IF(ISBLANK(ACTIVE.CELL()),GOTO(B423),)	if site space is blank (end of block) get out of loop
380		= ACTIVE.CELL()&"<.xls">	returns site name.xls (1 below first site in block)
381		= IF(OR(\$M\$261 = 4, \$M\$261 = 5, \$M\$261 = 3), GOTO(B3)	if no mult factor skip down 4 lines
382		= SELECT("RC11")	find mult factor over 1 column
383		= DEFINE.NAME("MultFactor")	name it
384		= SELECT("RC-1")	
385		= FORMULA(markname&"<.xls">,B386)	first site in block.xls to next cell
386		MCD3M9.xls	
387		= ACTIVATE(B386)	activate first site in block.xls
388		= FORMULA.GOTO(INDEX((1#A#1:1#DW#300, \$M\$290-19	select location to be pasted to (whole mon)
389		= OPEN(1#A#1&B390)	open next site in block
390		= FORMULA.GOTO(INDEX((1#A#1:1#DW#300, \$M\$291-19	checks to ensure data not missing
391		= IF(ISBLANK(ACTIVE.CELL()),ALERT("There is missing d	*
392		= IF(B381 = TRUE,,Woops Update())	if data missing, halts macro
393		= FORMULA.GOTO(INDEX((1#A#1:1#DW#300, \$M\$290-19	select appropriate area to be copied
394		= DEFINE.NAME("begin")	*
395		= FORMULA.GOTO(INDEX((1#A#1:1#DW#300, \$M\$291-19	*
396		= SELECT(lbegin:ACTIVE.CELL())	*
397		= IF(OR(\$M\$261 = 4, \$M\$261 = 5, \$M\$261 = 3),IFNOT(IS	checks to see if mult. is nec, if not skip 2 lines
398		= COPY(MultFactor)	copies # in MultFactor
399		= PASTE.SPECIAL(3,4,TRUE,FALSE)	multiplies if Depl
400		= COPY()	copy it
401		= ACTIVATE(B386)	activate first site in block
402		2	code to tell whether to paste over or add
403		= PASTE.SPECIAL(1,B402,FALSE,FALSE)	paste over or add to whatever is already there
404		= FORMULA(2,B402)	on next run thru loop tells it to add to data there
405		= FORMULA.GOTO(INDEX((1#A#1:1#DW#300, \$M\$290-19	select location to be pasted to (half month)
406		= ACTIVATE(B390)	activates next site in block
407		= FORMULA.GOTO(INDEX((1#A#1:1#DW#300, \$M\$290-19	select appropriate area to be copied
408		= DEFINE.NAME("begin")	*
409		= FORMULA.GOTO(INDEX((1#A#1:1#DW#300, \$M\$291-19	*
410		= SELECT(lbegin:ACTIVE.CELL())	*
411		= IF(OR(\$M\$261 = 4, \$M\$261 = 5, \$M\$261 = 3),IFNOT(IS	checks to see if mult. is nec, if not skip 2 lines
412		= COPY(MultFactor)	copies # in MultFactor
413		= PASTE.SPECIAL(3,4,TRUE,FALSE)	multiplies if Depl
414		= COPY()	copy it
415		= ACTIVATE(B386)	activate first site in block
416		2	code to tell whether to paste over or add
417		= PASTE.SPECIAL(1,B416,FALSE,FALSE)	paste over or add to whatever is already there
418		= FORMULA(2,B416)	on next run thru loop tells it to add to data there
419		= ACTIVATE(B380)	activate site name.xls (1 below first site in block)
420		= CLOSE(FALSE)	close it
421		= ACTIVATE("m accum.xdm")	activate macro
422		= NEXT()	end loop *****
423		= ACTIVATE(B386)	after loop is done close and save-
424		= SELECT(lA1)	
425		= IF(\$M\$261 = 0,SAVE.ASI("c:\bpa\3-ell"&"<IC1">"<MX">"),S	saves file
426		= IF(AND(\$M\$266 = TRUE, \$M\$268 = TRUE))	if printing both water and power year is selected in dialog box
427		= FORMULA(1,1AR95)	puts 1 in appropriate place signifying water year print
428		= PRINTWY PowerPublish()	prints water year format

	A	B	C
429		=FORMULA(2, \$A\$6)	puts 2 in appropriate place signifying power year print
430		=PRNTWY PowerPublish()	prints power year format
431		=ELSE.IF(\$M\$286=TRUE)	if only water year
432		=FORMULA(1, \$A\$6)	puts 1 in appropriate place signifying water year print
433		=PRNTWY PowerPublish()	prints water year format
434		=ELSE.IF(\$M\$286=TRUE)	if only power year
435		=FORMULA(2, \$A\$6)	puts 2 in appropriate place signifying power year print
436		=PRNTWY PowerPublish()	prints power year format
437		=ELSE()	otherwise no print
438		=END.IF()	
439		=CLOSE(FALSE)	closes it
440		=FORMULA.GOTO("createname")	gets createname-first site in next block
441		=IF(ISBLANK(ACTIVE.CELL()), GOTO(B445),)	if "createname" is blank, done, if not
442		=FirstUpdate()	repeat all of the above
443		=ACTIVATE("m accum.xdm")	activates macro sheet
444		=CreateSiteUpdate()	
445		=RETURN()	
446			
447			
448			
449	AddSiteUpdateDDX	=FORMULA.GOTO("markname")	goes to "markname" (first site in block)
450		=FORMULA(1, B548)	puts "paste over" code in Mon
451		=FORMULA(1, B555)	puts "paste over" code in Half Mon
452		=FORMULA(1, B491)	puts "paste over" code in Mon
453		=FORMULA(1, B506)	puts "paste over" code in Half Mon
454		=OPEN(A1&markname&".xls")	opens first site in block
455			
456		=ACTIVATE("m accum.xdm")	activates this sheet
457		=WHILE(NOT(ISBLANK(ACTIVE.CELL())))	begin loop*****
458		=SELECT("R(1)C")	select next site in block
459		=IF(ISBLANK(ACTIVE.CELL()), GOTO(B562), DEFINE.NAM	if site space is blank (end of block) get out of loop
460		=ACTIVE.CELL()&".xls"	returns site name.xls (1 below first site in block)
461		=SELECT("RC(1)")	select 1 column over
462		=DEFINE.NAME("MultFactor")	define is MultFactor
463		=SELECT("RC(-1)")	
464		=FORMULA(markname&".xls", B465)	first site in block.xls to next cell down
465		YAKDDX.xls	
466		=ACTIVATE(B465)	activate first site in block.xls
467		=IF(NOT(OR(\$B\$491=2, \$B\$548=2)))	clears previous data if necessary
468		=SELECT(\$B:\$M\$2)	.
469		=CLEAR()	.
470		=SELECT(\$B104:\$M180)	.
471		=CLEAR()	.
472		=END.IF()	
473		=FORMULA.GOTO(INDEX(\$A\$1:\$D\$300, 1928-1922,	select location to be pasted to (whole mon)
474		=DEFINE.NAME("begin")	.
475		=FORMULA.GOTO(INDEX(\$A\$1:\$D\$300, \$M\$291-19	.
476		=SELECT(\$begin:ACTIVE.CELL())	.
477		=ACTIVATE("m accum.xdm")	activate this sheet
478		=IF(NOT(MID(B460, 5, 1) = "X"))	if current site is other than DX, do the following
479		=OPEN(A, &ACTIVE.CELL())	open the DDX
480		=FORMULA.GOTO(INDEX(\$A\$1:\$D\$300, \$M\$291-19	checks to ensure data not missing
481		=IF(ISBLANK(ACTIVE.CELL()), ALERT("There is missing d	.
482		=IF(B481=TRUE, Woops Update())	if data missing, halts macro
483		=FORMULA.GOTO(INDEX(\$A\$1:\$D\$300, 1928-1922,	select appropriate area to be copied
484		=DEFINE.NAME("begin")	.
485		=FORMULA.GOTO(INDEX(\$A\$1:\$D\$300, \$M\$291-19	.
486		=SELECT(\$begin:ACTIVE.CELL())	.
487		=IF(ISBLANK(MultFactor), GOTO(B489), COPY(MultFactor	copies # in MultFactor
488		=PASTE.SPECIAL(3, 4, TRUE, FALSE)	multiplies data by MultFactor
489		=COPY()	copy data
490		=ACTIVATE(B465)	activate first site in block
491		2	code to tell whether to paste over or add
492		=PASTE.SPECIAL(1, B491, FALSE, FALSE)	paste over or add to whatever is already there
493		=FORMULA(2, B491)	on next run thru loop tells it to add to data there
494		=FORMULA(2, B548)	on next run thru loop tells it to add to data there
495		=FORMULA.GOTO(INDEX(\$A\$1:\$D\$300, 1928-1922	select location to be pasted to (half month)
496		=ACTIVATE(B460)	activates next site in block
497		=FORMULA.GOTO(INDEX(\$A\$1:\$D\$300, 1928-1922	select appropriate area to be copied
498		=DEFINE.NAME("begin")	.
499		=FORMULA.GOTO(INDEX(\$A\$1:\$D\$300, \$M\$291-19	.
500		=SELECT(\$begin:ACTIVE.CELL())	.
501		=IF(ISBLANK(MultFactor), GOTO(B503), COPY(MultFactor	copies # in MultFactor
502		=PASTE.SPECIAL(3, 4, TRUE, FALSE)	multiplies data
503		=COPY()	copy data
504		=ACTIVATE(B465)	activate first site in block
505		2	code to tell whether to paste over or add
506		=PASTE.SPECIAL(1, B506, FALSE, FALSE)	paste over or add to whatever is already there
507		=FORMULA(2, B506)	on next run thru loop tells it to add to data there
508		=FORMULA(2, B555)	on next run thru loop tells it to add to data there
509		=ACTIVATE(B460)	activate site name.xls (1 below first site in block)
510		=CLOSE(FALSE)	closes it
511		=ACTIVATE("m accum.xdm")	activate macro
512		=SELECT(CurrentSite)	select CurrentSite defined above
513		=ELSE()	else

	A	B	C
514		=ACTIVATE("incdepl.xls")	
515		=SELECT(I10B91)	select top of incremental depletions
516		=WHILE(NOT(ACTIVE.CELL()=LEFT(B460,3)&" total"))	finds appropriate incremental depletion
517		=SELECT("R(1)C")	.
518		=IF(ROW(ACTIVE.CELL())>500)	.
519		=ALERT("That depletion site is not in the table on the	.
520		=HALT()	.
521		=END.IF()	.
522		=NEXT()	.
523		=SELECT("RC(1)")	these next lines 16 or so lines ensure that the inc.
524		=FORMULA(ACTIVE.CELL(),B525)	depletion acreages have been filled in by user
525		2	.
526		=SELECT("RC(1)")	.
527		=IF(M ACCUM.XLM!B525=1)	.
528		=SELECT("R(2)C")	.
529		=IF(ISBLANK(ACTIVE.CELL()),ALERT("A future irrigation	.
530		=Woops Update()	.
531		=ELSE.IF(M ACCUM.XLM!B525=2)	.
532		=SELECT("R(3)C")	.
533		=IF(ISBLANK(ACTIVE.CELL()),ALERT("A future irrigation	.
534		=Woops Update()	.
535		=SELECT("R(4)C")	.
536		=IF(ISBLANK(ACTIVE.CELL()),ALERT("A future irrigation	.
537		=Woops Update()	.
538		=SELECT("R(7)C")	.
539		=END.IF()	.
540		=COPY("RC(1):RC(12)")	copies incremental data
541		=ACTIVATE("m accum.xlm")	activates this macro sheet
542		=SELECT(I1A900)	goes to blank area of this macro sheet
543		=PASTE.SPECIAL(3,1,TRUE,FALSE)	pastes incremental data there
544		=COPY(MultFactor)	copies # in MultFactor
545		=PASTE.SPECIAL(3,4,TRUE,FALSE)	multiplies data by MultFactor
546		=COPY()	copy incremental data
547		=ACTIVATE(B465)	activate first site in block
548		2	code to tell whether to paste over (1) or add (2)
549		=PASTE.SPECIAL(1,B548,FALSE,FALSE)	paste over or add to whatever is already there
550		=FORMULA(2,B549)	on next run thru loop tells it to add to data there
551		=SELECT(INDEX(I1A91:I1DW300,104,2):INDEX(I1A91	select half month data
552		=ACTIVATE("m accum.xlm")	activate this sheet
553		=COPY()	copy incremental depletions stuff
554		=ACTIVATE(markname&".xls")	activate previous sheet
555		2	code to tell whether to paste over or add
556		=PASTE.SPECIAL(1,B555,FALSE,FALSE)	paste over or add to whatever is already there
557		=FORMULA(2,B556)	on next run thru loop tells it to add to data there
558		=ACTIVATE("m accum.xlm")	activate macro
559		=SELECT(CurrentSite)	
560		=END.IF()	
561		=NEXT()	end loop *****
562		=ACTIVATE(B465)	activate first site in block
563		=SELECT("R6C2:R6C10,R104C2:R104C10")	select Oct 27-Jun 28
564		=CLEAR()	clears that unnecessary data
565		=SELECT(I1A1)	select A1
566		=SAVE()	saves file
567		=CLOSE(FALSE)	closes it
568		=FORMULA.GOTO("createname")	goto createname-first site in next block
569		=IF(ISBLANK(ACTIVE.CELL()))	if "createname" is blank, done
570		=ACTIVATE("incdepl.xls")	but first close IncDepl.xls
571		=CLOSE()	.
572		=RETURN()	.
573		=END.IF()	.
574		=ACTIVATE("m accum.xlm")	if "createname" isn't blank, activates macro sheet
575		=CreateSiteUpdate()	begin loop again
576		=RETURN()	
577			
578			
579			
580	AddSitesUpdateMX	=FORMULA.GOTO("markname")	goes to "markname" (first site in block)
581		=FORMULA(1,B580)	puts "paste over" code in Mon
582		=FORMULA(1,B585)	puts "paste over" code in Half Mon
583		=FORMULA(0,B586)	puts a counter number in cell 3 rows down
584		=WHILE(NOT(ISBLANK(ACTIVE.CELL())))	begin loop *****
585		=FORMULA(B586+1,B586)	increments counter in next cell
586		5	
587		=SELECT("R(1)C")	select next site in block
588		=DEFINE.NAME("CurrentSite")	
589		=IF(ISBLANK(ACTIVE.CELL()),GOTO(B596),)	if site space is blank (end of block) get out of loop
590		=ACTIVE.CELL()&".xls"	returns site name.xls (1 below first site in block)
591		=FORMULA(markname&".xls",B592)	first site in block.xls to next cell
592		WHBMX.xls	
593		=ACTIVATE(B592)	activate first site in block.xls
594		=IF(B596=2)	counter = 2 signifies an A file which will begin in 1990
595		=SELECT("R6C2")	select Oct 1990
596		=ELSE()	otherwise select Oct of 27-28
597		=SELECT("R6C2")	.
598		=END.IF()	.

A	B	C
899	=ACTIVATE("m_accum.xdm")	activate this sheet
900	=IF(MID(M_ACCUM.XLMICurrentSite,5,1)="X")	if current site is a DX, do the following
901	=ACTIVATE("IncDepl.de")	
902	=SELECT(I9891)	select top of incremental depletions
903	=WHILE(NOT(ACTIVE.CELL()=LEFT(989590,3)&"total")	finds appropriate incremental depletion
904	=SELECT("R11C")	.
905	=IF(ROW(ACTIVE.CELL())>500)	.
906	=ALERT("That depletion site is not in the table on the	.
907	=HALT()	.
908	=END.IF()	.
909	=NEXT()	.
910	=SELECT("RC(-1)")	these next lines 15 or so lines ensure that the inc.
911	=FORMULA(ACTIVE.CELL(),B612)	depletion acreages have been filled in by user
912	2	.
913	=SELECT("RC(1)")	.
914	=IF(M_ACCUM.XLM1989525=1)	.
915	=SELECT("R21C")	.
916	=IF(ISBLANK(ACTIVE.CELL()),ALERT("A future irrigation	.
917	=Woope Update()	.
918	=ELSE.IF(M_ACCUM.XLM1989525=2)	.
919	=SELECT("R(-3)C")	.
920	=IF(ISBLANK(ACTIVE.CELL()),ALERT("A future irrigation	.
921	=Woope Update()	.
922	=SELECT("R(-4)C")	.
923	=IF(ISBLANK(ACTIVE.CELL()),ALERT("A future irrigation	.
924	=Woope Update()	.
925	=SELECT("R(7)C")	.
926	=END.IF()	.
927	=COPY("RC(1):RC(12)")	copies incremental data
928	=ACTIVATE("m_accum.xdm")	activates this macro sheet
929	=SELECT(I9A9800)	goes to blank area of this macro sheet
930	=PASTE.SPECIAL(3,1,TRUE,FALSE)	pastes incremental data there
931	=COPY(MultFactor)	copies # in MultFactor
932	=PASTE.SPECIAL(3,4,TRUE,FALSE)	multiplies data by MultFactor
933	=COPY()	copy incremental data
934	=ACTIVATE(989592)	activate first site in block
935	=SELECT(1B6:INDEX(1A1:1DW300,M9291-1922,13))	
936	=ELSE()	otherwise
937	=OPEN(9A91B590)	open next site in block
938	=FORMULA.GOTO(INDEX(19A91:19DW9300,M9291-19	checks to ensure data not missing
939	=IF(AND(ISBLANK(ACTIVE.CELL()),M_ACCUM.XLM1989	.
940	=IF(B939=TRUE,Woope Update())	if data missing, halts macro
941	=IF(989595=2)	counter = 2 signifies an A file which will begin in 1990
942	=SELECT("R66C2")	select Oct 1990
943	=ELSE()	otherwise select Oct of 27-28
944	=SELECT("R6C2")	.
945	=END.IF()	.
946	=DEFINE.NAME("begin")	define upper left corner of block as begin
947	=IF(989595=1)	counter = 1 signifies a 3M9 file which ends in 1989
948	=SELECT("R67C13")	if counter = 1 select Sep 1989
949	=ELSE()	otherwise select Sep of last year to be updated
950	=FORMULA.GOTO(INDEX(19A91:19DW9300,M9291-19	.
951	=END.IF()	.
952	=SELECT(1begin:ACTIVE.CELL())	select block to be copied
953	=COPY()	copy it
954	=ACTIVATE(B692)	activate first site in block
955	=END.IF()	end if statement
956	2	code to tell whether to paste over or add
957	=PASTE.SPECIAL(3,B656,FALSE,FALSE)	paste over or add to whatever is already there
958	=IF(989595>1,FORMULA(2,B656),)	on next run thru loop tells it to add to data there
959	=IF(989595=2)	
960	=SELECT("R166C2")	if adjusted file select 1990
961	=ELSE()	
962	=SELECT("R104C2")	otherwise select 1927
963	=END.IF()	
964	=IF(MID(M_ACCUM.XLMICurrentSite,5,1)="X")	if current site is a DX, do the following
965	=SELECT(1B104:INDEX(1A1:1DW300,M291-1922+98,13	
966	=ACTIVATE("m_accum.xdm")	
967	=COPY()	copy incremental data
968	=ELSE()	otherwise
969	=ACTIVATE(989590)	activate next site in block
970	=IF(989595=2)	counter = 2 signifies an A file which will begin in 1990
971	=SELECT("R166C2")	select Oct 1990
972	=ELSE()	otherwise select Oct of 27-28 for half month
973	=SELECT("R104C2")	.
974	=END.IF()	.
975	=DEFINE.NAME("begin")	define it begin
976	=IF(989595=1)	counter = 1 signifies a 3M9 file which ends in 1989
977	=SELECT("R166C13")	if counter = 1 select Sep 1989
978	=ELSE()	otherwise select Sep of last year to be updated
979	=FORMULA.GOTO(INDEX(19A91:19DW9300,M9291-19	.
980	=END.IF()	.
981	=SELECT(1begin:ACTIVE.CELL())	select block to be copied
982	=COPY()	copy it
983	=END.IF()	end if

	A	B	C
684		=ACTIVATE(189582)	activate first site in block
685		2	code to tell whether to paste over or add
686		=PASTE.SPECIAL(3,8686,FALSE,FALSE)	paste over or add to whatever is already there
687		=IF(489586>1,FORMULA(2,8686),)	on next run thru loop tells it to add to data there
688		=IF(NOT(MID(M ACCUM.XLM!CurrentSite,5,1)="X"))	if current site is a DX, do the following
689		=ACTIVATE(8590)	activate site name.xls (1 below first site in block)
690		=CANCEL.COPY()	
691		=CLOSE(FALSE)	close it
692		=END.IF()	
693		=ACTIVATE("m accum.xdm")	activate macro
694		=SELECT(CurrentSite)	
695		=NEXT()	end loop*****
696		=ACTIVATE(8592)	after loop is done close and save-
697		=SELECT("R104C2:R104C10,R6C2:R6C10","R6C2")	deletes any data in Oct-Jun 1927
698		=CLEAR(1)	
699		=SELECT(1A1)	
700		=SAVE()	saves file
701		=IF(AND(\$M\$285=TRUE,\$M\$286=TRUE))	if printing both water and power year is selected in dialog box
702		=FORMULA(1,\$AR\$6)	puts 1 in appropriate place signifying water year print
703		=PRNTWY PowerPublish()	prints water year format
704		=FORMULA(2,\$AR\$6)	puts 2 in appropriate place signifying power year print
705		=PRNTWY PowerPublish()	prints power year format
706		=ELSE.IF(\$M\$286=TRUE)	if only water year
707		=FORMULA(1,\$AR\$6)	puts 1 in appropriate place signifying water year print
708		=PRNTWY PowerPublish()	prints water year format
709		=ELSE.IF(\$M\$286=TRUE)	if only power year
710		=FORMULA(2,\$AR\$6)	puts 2 in appropriate place signifying power year print
711		=PRNTWY PowerPublish()	prints power year format
712		=ELSE()	otherwise no print
713		=END.IF()	
714		=CLOSE(FALSE)	closes it
715		=FORMULA.GOTO("createname")	goto createname-first site in next block
716		=IF(ISBLANK(ACTIVE.CELL()))	if "createname" is blank, done, if not
717		=ACTIVATE("incdepl.xls")	but first close incDepl.xls
718		=CLOSE()	
719		=RETURN()	
720		=END.IF()	
721		=First()	repeat all of the above
722		=ACTIVATE("m accum.xdm")	activates macro sheet
723		=CreateSiteUpdate()	begin loop again
724		=RETURN()	

	AM	AI
3	UpdateDepletion	
4	=ECHO(TRUE)	
5	=OPEN("c:\bp\macros\inodepl.xls")	opens depl table
6	=UpDeplDistSetup()	runs submacro defined below
7	=FillInAcresges()	runs submacro defined below
8	=GOTO(AH8)	
9	=RETURN()	
10		
11		
12		
13	UpDeplDistSetup	
14	=ACTIVATE("m_accum.xlm")	activate this sheet
15	=SELECT(AP17:AP26)	sets up the various dialog box
16	=CLEAR()	features
17	=SET.VALUE(AP20,0/A)	.
18	=SET.VALUE(AJ16,206)	.
19	=SET.VALUE(AJ14,206)	.
20	=SET.VALUE(AJ15,206)	.
21	=SET.VALUE(AJ17,206)	.
22	=SET.VALUE(AJ18,206)	.
23	=SET.VALUE(AJ19,206)	.
24	=SET.VALUE(AJ22,203)	.
25	=SET.VALUE(AJ21,112)	.
26	=SET.VALUE(AJ26,0)	.
27	=DIALOG.BOX(Update Depletions)	runs dialog box
28	=IF(AH27=FALSE)	If 'Done' chosen, halts macro
29	=ACTIVATE("inodepl.xls")	after saving changes inodepl
30	=CLOSE(TRUE)	table
31	=HALT()	.
32	=END.IF()	.
33	=IF(AND(AP20=1,ISBLANK(AP26)))	If no 3 char code entered,
34	=ALERT("You must enter a three letter abbreviation before clicking")	alerts user and reruns dialog box
35	=GOTO(AH15)	
36	=END.IF()	
37	=ACTIVATE("inodepl.xls")	
38	=SELECT(I81)	finis 3 char code
39	=WHILE(NOT(ACTIVE.CELL()=LEFT(AP26,3)&" total"))	.
40	=SELECT("R11C")	.
41	=IF(ROW(ACTIVE.CELL())>600)	catches it if user enters site
42	=ALERT("That site is not on the list.")	not on list and alerts him
43	=GOTO(AH14)	
44	=END.IF()	
45	=NEXT()	
46	=SELECT("RC(-1)")	selects cell which contains whether
47	=FORMULATEXT(ACTIVE.CELL(),AH48)	spreadages are separated by gravity
48	=constant	and sprinkler or whether it all in one
49	=IF(ACTIVE.CELL()=1)	If all in one, reformats dialog box
50	=SET.VALUE(AJ16,5)	.
51	=SET.VALUE(AJ19,0)	.
52	=SET.VALUE(AJ22,3)	.
53	=SET.VALUE(AJ21,212)	.
54	=SET.VALUE(AJ26,206)	.
55	=ELSE.IF(ACTIVE.CELL()=2)	If separate gravity and sprinkler,
56	=SET.VALUE(AJ14,5)	reformats dialog box
57	=SET.VALUE(AJ16,5)	.
58	=SET.VALUE(AJ17,0)	.
59	=SET.VALUE(AJ18,0)	.
60	=SET.VALUE(AJ22,3)	.
61	=SET.VALUE(AJ21,212)	.
62	=SET.VALUE(AJ26,206)	.
63	=ELSE.IF(ACTIVE.CELL()="constant")	If constant depl rate
64	=ALERT("The depletion rate '&UPPER(AP26)&' is assumed constant")	
65	=GOTO(AH14)	
66	=END.IF()	
67	=DIALOG.BOX(Update Depletions)	reruns dialog box
68	=IF(AH67=FALSE)	If 'Done' chosen, halts macro
69	=ACTIVATE("inodepl.xls")	after saving changes inodepl
70	=CLOSE(TRUE)	table
71	=HALT()	.
72	=END.IF()	.
73	=IF(OR(AND(AH48=1,ISBLANK(AP19)),AND(AH48=2,OR(ISBLANK	ensures proper stuff is entered
74	=RETURN()	in dialog box
75		
76		
77		
78		
79		
80		
81	FillInAcresges	
82	=IF(AH48=1)	If intg. not separated by sprinkler/gravity
83	=SELECT("R21C(1)")	
84	=COPY(AP18)	
85	=PASTE.SPECIAL(3,1,TRUE,FALSE)	
86	=ELSE.IF(AH48=2)	If intg. separated by sprnklr/gravity
87	=SELECT("R31C(1)")	
88	=COPY(AP18)	
89	=PASTE.SPECIAL(3,1,TRUE,FALSE)	
90	=SELECT("R41C")	
91	=COPY(AP17)	
92	=PASTE.SPECIAL(3,1,TRUE,FALSE)	
93	=END.IF()	
94	=RETURN()	
95		
96		
97	ClearingDeplAcresges	
98	=ECHO(FALSE)	
99	=ALERT("This macro will permanently erase all future incremental de	
100	=IF(AH99=FALSE,HALT(),)	
101	=OPEN("c:\bp\macros\inodepl.xls")	
102	=SELECT(I81)	
103	=WHILE(ROW(ACTIVE.CELL())<475)	
104	=IF(AND(GET.CELL(0)=2,NOT(ISBLANK(ACTIVE.CELL(0))))	
105	=SELECT("R11C")	
106	=NEXT()	
107	=CLOSE(TRUE)	
108	=RETURN()	
109		

	BC	BD
1		< This macro exports
2		files to a floppy in
3		1032 format (Split
4		month Jan-Dec)
5	DBDataToDB	
6	=IF(NOT(GET.WINDOW(1)="m accum.xlm"),ACTIVAT	
7	=ECHO(TRUE)	turns screen updating off
8	=DBDialogSetup()	run submacro defined below
9	=DIALOG.BOX(SaveToDB)	run submacro defined below
10	=ECHO(TRUE)	turns screen updating off
11	=DBDialogConditions()	run submacro defined below
12	=DBFindFilesToDB()	run submacro defined below
13	=HALT()	
14		
15		
16	SUBMACROS	
17		
18		< This macro initializes
19		the 2 dialog boxes used
20	DBDialogSetup	by DBDataToDB
21	=SELECT(BA35:BA36)	clears start/end years
22	=CLEAR(1)	.
23	=SET.VALUE(BA27,2)	default place to save is "b:"
24	=SET.NAME("SiteNo",{1})	default is first site in array
25	=SET.VALUE(BA8,1)	default datatype is "H"
26	=SELECT(BF2)	selects cells displayed in list box
27	=SELECT.END(4)	.
28	=SELECT(BF2:ACTIVE.CELL())	.
29	=DEFINE.NAME("list")	.
30	=RETURN()	end this submacro
31		
32		
33		
34		< This submacro uses
35		the results of the
36	DBDialogConditions	dialog box
37	=IF(BC9=FALSE,HALT(),)	if 'Cancel', halts macro
38	=IF(BC9=1,GOTO(BC84),)	if 'OK', skips down 26 lines
39	=IF(BA8=1)	if "H" chosen, displays
40	=SET.NAME("SiteNo",{1})	???73H in list box with
41	=SELECT(BF2)	first ???73H the default
42	=DEFINE.NAME("top")	.
43	=ELSE.IF(BA8=2)	if "S or SS" chosen, displays
44	=SET.NAME("SiteNo",{1})	???73S in list box with
45	=SELECT(BG2)	first ???73S the default
46	=DEFINE.NAME("top")	.
47	=ELSE.IF(BA8=3)	if "A" chosen, displays
48	=SET.NAME("SiteNo",{1})	???73A in list box with
49	=SELECT(BH2)	first ???73A the default
50	=DEFINE.NAME("top")	.
51	=ELSE.IF(BA8=4)	if "D or DD" chosen, displays
52	=SET.NAME("SiteNo",{1})	???73D in list box with
53	=SELECT(BI2)	first ???73D the default
54	=DEFINE.NAME("top")	.
55	=ELSE.IF(BA8=5)	if "M" chosen, displays
56	=SET.NAME("SiteNo",{1})	???73M in list box with
57	=SELECT(BJ2)	first ???73M the default
58	=DEFINE.NAME("top")	.
59	=ELSE.IF(BA8=6)	if "AP2" chosen, displays
60	=SET.NAME("SiteNo",{1})	???73AP2 in list box with
61	=SELECT(BK2)	first ???73AP2 the default
62	=DEFINE.NAME("top")	.
63	=ELSE.IF(BA8=7)	if "AP3" chosen, displays
64	=SET.NAME("SiteNo",{1})	???73AP3 in list box with
65	=SELECT(BL2)	first ???73AP3 the default
66	=DEFINE.NAME("top")	.
67	=ELSE.IF(BA8=8)	if "NP9" chosen, displays
68	=SET.NAME("SiteNo",{1})	???73NP9 in list box with
69	=SELECT(BM2)	first ???73NP9 the default
70	=DEFINE.NAME("top")	.

	BC	BD
71	=ELSE.IF(BA8=9)	if "NP9" chosen, displays
72	=SET.NAME("SiteNo",{1})	7773NP9 in list box with
73	=SELECT(BN2)	first 7773NP9 the default
74	=DEFINE.NAME("top")	.
75	=ELSE.IF(BA8=10)	if "MX" chosen, displays
76	=SET.NAME("SiteNo",{1})	7773NP9 in list box with
77	=SELECT(BO2)	first 7773NP9 the default
78	=DEFINE.NAME("top")	.
79	=END.IF()	these 4 line involved in
80	=SELECT.END(4)	displaying proper sites
81	=SELECT(top:ACTIVE.CELL())	in list box
82	=DEFINE.NAME("list")	.
83	=GOTO(BC9)	back up to run dialog box
84	=DIALOG.BOX(SaveWhere)	runs dia.box(SaveWhere)
85	=IF(BC84=FALSE,HALT())	if 'Cancel', halts macro
86	=IF(OR(ISBLANK(BA27),ISBLANK(BA35),ISBLANK(BA3	ensures years were entered
87	=IF(BA35-BA36>0)	ensures end year is later than begin year
88	=ALERT("The start year is later than the end year! Try	.
89	=GOTO(BC84)	reruns dia.box(SaveWhere)
90	=ELSE.IF(OR(BA35<1928,BA36<1928))	ensures years entered in
91	=ALERT("One of two errors has occurred: 1) the year w	proper format
92	=GOTO(BC84)	reruns dia.box(SaveWhere)
93	=END.IF()	.
94	=IF(BA27=1,FORMULA("a:\",BC95),FORMULA("b:\",B	puts where to save DBFiles
95	b:\	in this cell
96	=RETURN()	end of submacro
97		
98		
99		
100		< This macro extracts the
101		sites to be moved to DB
102		from the array created by
103	DBFindFilesToDB	dia. box
104	=NEW(1)	opens new worksheet
105	=SAVE.AS(BC95&"DBFiles",3,"",FALSE,"",FALSE)	saves is as DBFiles on drive chosen in dia.box
106	=IF(BC105=FALSE)	if DBFiles exists, can append it or save over it
107	=CLOSE(FALSE)	if append is desired,
108	=OPEN(BC95&"DBFiles"&".txt")	opens existing DBFiles
109	=ELSE()	
110	=END.IF()	
111	=ACTIVATE.NEXT()	activates macro sheet
112	=COUNTA(SiteNo)	counts # of sites selected in dia. box & stored
113	=SET.VALUE(CounterDB,1)	initializes CounterDB to 1
114	=WHILE(CounterDB<=BC112)	start loop, when CounterDB < # sites selecte
115	=FORMULA(INDEX(SiteNo,1,CounterDB),BC116)	puts position # of first
116	5	site chosen in this cell
117	=FORMULA.GOTO(list)	selects list chosen in dia. box (e.g. entire list o
118	=SET.VALUE(PositionNumber,1)	calls first site in list PositionNum 1
119	=WHILE(PositionNumber<BC116)	finds position # of site
120	=SELECT("R(1)C")	entered in cell 4 lines above
121	=PositionNumber+1	.
122	=NEXT()	.
123	=ACTIVE.CELL()	.
124	=OPEN("c:\bps\3-all\ "&ACTIVE.CELL()&".xls")	opens Hform from which data is to be extract
125	=ExcelTo1032()	runs submacro defined below
126	=ACTIVATE(BC123&".xls")	activates Hform from which data was extracte
127	=CLOSE(FALSE)	closes Hform from which data was extracted
128	=CounterDB+1	increments CounterDB
129	=ACTIVATE.PREV()	activates macro sheet
130	=NEXT()	end loop
131	=ACTIVATE("DBFiles"&".txt")	activates DBFiles
132	=SELECT("R1C37:R76C64")	clears work area
133	=CLEAR(1)	.
134	=SELECT(IA1)	formats whole spreadsheet
135	=SELECT.END(4)	.
136	=IF(ISBLANK(ACTIVE.CELL()),SELECT.END(3),)	.
137	=SELECT.END(2)	.
138	=SELECT(IA1:ACTIVE.CELL())	.
139	=FORMAT.NUMBER("0")	.
140	=SELECT(IA1)	selects a1

	8C	8D
141	=SAVE()	saves DBFiles
142	=RETURN()	end of this submacro
143		
144		
145		
146		< This submacro moves
147		data from Hform, rearranges it,
148	ExcelTo1032	to DBFiles
149	=ECHO(TRUE)	turn screen updating off
150	=DBPasteFromHform()	run submacro defined below
151	=DBHeadings()	run submacro defined below
152	=DBAve()	run submacro defined below
153	=DBAppendList()	run submacro defined below
154	=RETURN()	
155		
156		
157		
158		
159	DBPasteFromHform	
160	=SELECT("R4C40:R78C51")	selects Jan-Jun of Split Month
161	=COPY()	copies it
162	=ACTIVATE("DBFiles"&".txt")	activates DBFiles
163	=SELECT("R2C40")	selects appropriate place on DBFiles
164	=PASTE.SPECIAL(3,1,FALSE,FALSE)	pastes values
165	=ZOOM(75)	decreases screen size
166	=SELECT("R[-1]C[12]")	selects place to paste Jul-Dec
167	=ACTIVATE.NEXT()	activates Hform
168	=SELECT("R4C28:R79C39")	selects Jul-Dec of Split Month
169	=COPY()	copies it
170	=ACTIVATE.PREV()	activates DBFiles
171	=PASTE.SPECIAL(3,1,FALSE,FALSE)	pastes values
172	=RETURN()	end of submacro
173		
174		
175		< This submacro puts
176		site abbr and code and
177		year and puts is to left
178	DBHeadings	of each record
179	=SELECT("R[0]C39")	selects place to paste years
180	=CANCEL.COPY()	pastes years 1928-2003
181	=IF(CounterDB = 1)	.
182	=FORMULA("1928")	.
183	=SELECT("R[1]C")	.
184	=FORMULA("=R[-1]C + 1")	.
185	=COPY()	.
186	=SELECT("R[0]C:R[74]C")	.
187	=PASTE()	.
188	=COPY()	.
189	=PASTE.SPECIAL(3,1,FALSE,FALSE)	.
190	=SELECT("R[-1]C[-2]")	.
191	=ELSE()	.
192	=SELECT("R1C37")	.
193	=END.IF()	.
194	=ACTIVATE.NEXT()	activates macro sheet
195	=SELECT("R1C3")	selects 3 letter site code
196	=COPY()	copies it
197	=ACTIVATE.PREV()	activates DBFiles
198	=PASTE()	pastes it
199	=ACTIVATE.NEXT()	activates macro sheet
200	=SELECT("R1C5")	selects 2 or 3 letter data code
201	=COPY()	copies it
202	=ACTIVATE.PREV()	activates DBFiles
203	=SELECT("RC[1]")	selects appropriate place
204	=PASTE()	pastes it
205	=SELECT("RC:RC[-1]")	copies site code and
206	=COPY()	datacode down for
207	=SELECT("RC:R[75]C[1]")	to 2003
208	=PASTE()	.
209	=RETURN()	end of submacro
210		

	BC	BD
211		
212		
213		< This submacro does
214		the ave's for the calendar
215		year accounting for leap
216	DBAve	years
217	= SELECT("RC[27]")	selects appropriate place
218	= IF(CounterDB = 1,,RETURN())	if this is second or more site selected, no need
219	= FORMULA(" = ((RC[-24] + RC[-22] + RC[-20] + RC[-18]	ave formula
220	= COPY()	copies it down through year 2003
221	= SELECT("RC:R[75]C")	.
222	= PASTE()	.
223	= CANCEL.COPY()	.
224	= SELECT("RC")	puts in different ave formula
225	= DEFINE.NAME("top")	for leap year
226	= FORMULA(" = ((RC[-24] + RC[-22] + RC[-20] + RC[-18]	.
227	= COPY()	.
228	= WHILE(NOT(ISBLANK(ACTIVE.CELL())))	.
229	= SELECT("R[4]C")	.
230	= IF(ISBLANK(ACTIVE.CELL()),GOTO(BC233),)	.
231	= PASTE()	.
232	= NEXT()	.
233	= RETURN()	end of this submacro
234		
235		
236		< This submacro takes
237		data from work area
238		in the right side of DBFiles
239	DBAppendList	and pastes it starting at A1
240	= SELECT("R1C40")	
241	= FORMULA("0",ACTIVE.CELL())	puts 0's in Jan-Jul 1928
242	= COPY()	.
243	= SELECT("RC:RC[11]")	.
244	= PASTE()	.
245	= SELECT("RC[-1]")	selects columns with years
246	= IF(BA35 = 1928,GOTO(BC248),)	if first year is 1928, skip 2 lines
247	= FORMULA.FIND(BA35,1,2,2)	else find first year
248	= SELECT("RC[-2]")	selects 2 col. to left to include site code and d
249	= DEFINE.NAME("FirstLine")	define it as FirstLine
250	= SELECT("RC[2]")	selects 2 col. to right
251	= WHILE(NOT(ACTIVE.CELL() = BA36))	finds end year
252	= SELECT("R[1]C")	.
253	= NEXT()	.
254	= SELECT("RC[25]")	
255	= SELECT(!FirstLine:ACTIVE.CELL())	selects years to be copied
256	= COPY()	copies them
257	= SELECT(!A1)	puts years at end of current
258	= IF(ISBLANK(!A1))	data beginning in A1
259	= PASTE.SPECIAL(3,1,FALSE,FALSE)	.
260	= ELSE()	.
261	= SELECT("R[1]C")	.
262	= END.IF()	.
263	= IF(ISBLANK(!A2))	.
264	= PASTE.SPECIAL(3,1,FALSE,FALSE)	.
265	= ELSE()	.
266	= SELECT("R[-1]C")	.
267	= SELECT.END(4)	.
268	= SELECT("R[1]C")	.
269	= PASTE.SPECIAL(3,1,FALSE,FALSE)	.
270	= END.IF()	.
271	= RETURN()	
272		

	BA	BB
1		
2		
3		
4		
5		
6		
7	RankData	
8	=IF(NDGET.WINDOW(1) = "m_accum.xlm"),ACTIVATE("m_accum.xlm"),	This macro takes data from
9	=ECHO(TRUE)	3MB, rearranges it in various
10	=DialogSetup()	ways and ranks it.
11	=DIALOG.BOX(Statstions)	
12	=IF(BR10 = FALSE,HALT())	makes this sheet the active window
13	=IF(AND(NOT(CA14 = 2),OR(CA95 < 1928,CA95 > 2004)))	turns off screen updating
14	=ALERT("An improper date has been entered.")	runs macro defined below
15	=GOTO(BR610)	runs dialog box
16	=ELSE()	
17	=END IF()	
18	=IF(OR(CA914 = 3,CA914 = 2))	if either print option chosen,
19	=SELECT(CA932:CA93)	sets up print dialog box
20	=CLEAR()	
21	=DIALOG.BOX(PrintWhichStatstions)	runs print dialog box
22	=IF(BR120 = FALSE,HALT())	if 'Cancel', halts macro
23	=ELSE()	
24	=END IF()	
25	=IF(CA914 = 2)	if 'Print Only' chosen,
26	=FOR("CountPrintOnly",1,COUNTA(StatstionsFiles))	start loop
27	=SELECT(CB91)	selects top of site list
28	=SET.VALUE(PrintPostNum,0)	
29	=WHILE(PrintPostNum < INDEX(StatstionsFiles,Count(PrintOnly)))	finds first site selected
30	=SELECT("N1JC")	
31	=PrintPostNum + 1	
32	=NEXT()	
33	=FORMULA(ACTIVE.CELL(),BR33)	puts name of file to be operated on
34	=MCDMX	here
35	=OPEN("c:\batman"&BR33&"s.xls")	open the 773mb file to be worked on
36	=WhichBruttToPrint()	runs macro defined below
37	=CLOSE(FALSE)	closes w/o saving
38	=NEXT()	end of loop
39	=ELSE()	if 'Print Only' option NOT chosen,
40	=MainBody()	runs macro defined below
41	=END IF()	
42	=RETURN()	done
43		
44		
45		
46		
47	DialogSetup	< this macro initializes dialog box
48	=FORMULA.GOTO(CB2)	defines list to be shown
49	=DEFINE.NAME("top")	in dialog list box
50	=SELECT.END()	
51	=SELECT(top:ACTIVE.CELL())	
52	=DEFINE.NAME("bot")	
53	=SET.NAME("StatstionsFiles",1)	
54	=FORMULA.GOTO(CA5)	clears year
55	=CLEAR()	
56	=SET.VALUE(CA914,1)	
57	=RETURN()	
58		
59		
60		
61	MainBody	
62	=FOR("CounterMainBody",1,COUNTA(StatstionsFiles))	begin main loop
63	=SELECT(CB91)	selects top of site list
64	=SET.VALUE(PostNum,0)	
65	=WHILE(PostNum < INDEX(StatstionsFiles,CounterMainBody))	finds first site selected
66	=SELECT("N1JC")	
67	=PostNum + 1	
68	=NEXT()	
69	=FORMULA(ACTIVE.CELL(),BR70)	puts name of file to be operated on
70	=MCDMX	here
71	=IF(AND(BR70,5,1) = "X",FORMULA("Mean streamflow, in cfs, modified to a cume	
72	=OPEN("c:\batman3"&"&BR70&"s.xls")	open the 773mb file to be worked on
73	=FORMULA.GOTO(INDEX(19A91:19DW9300,CA95-1922,13))	go Sep of last water yr.
74	=DEFINE.NAME("end")	define that cell as 'end'
75	=OPEN("c:\batmanmacromodform.xls")	open template
76	=SELECT(BB99)	select cell B6 in template
77	=ACTIVATE.NEXT()	
78	=COPY(19B98:1end,)	copies all monthly data
79	=ACTIVATE.PREV()	
80	=PASTE.SPECIAL(3,1,TRUE,FALSE)	pastes it in template
81	=SELECT(19N98)	These next 24 lines delete unneeded years
82	=DeletePartialYears()	at end of period of record
83	=SELECT(19AQ98)	
84	=DeletePartialYears()	
85	=SELECT(19BN98)	
86	=DeletePartialYears()	
87	=SELECT(19CQ98)	
88	=DeletePartialYears()	
89	=SELECT(19N91)	
90	=DeletePartialYears()	
91	=SELECT(19AQ91)	
92	=DeletePartialYears()	
93	=SELECT(19BN91)	
94	=DeletePartialYears()	
95	=SELECT(19CQ91)	
96	=DeletePartialYears()	
97	=SELECT(19N92)	
98	=DeletePartialYears()	
99	=SELECT(19AQ92)	
100	=DeletePartialYears()	
101	=SELECT(19BN92)	
102	=DeletePartialYears()	
103	=SELECT(19CQ92)	
104	=DeletePartialYears()	
105	=SELECT(19R98)	select R6 on template
106	=RankTables()	run subroutine RankTable
107	=SELECT(19R107)	select R107
108	=RankTables()	run subroutine

	BR	BS
108	=SELECT(I18R9207)	etc.
110	=RankTables()	.
111	=SELECT(I18R97)	.
112	=RankTables()	.
113	=SELECT(I18R9107)	.
114	=RankTables()	.
115	=SELECT(I18R9207)	.
116	=RankTables()	.
117	=SELECT(I18A91:I18N9300)	selects stuff from template
118	=COPY()	and pastes values over the formulas
119	=PASTE.SPECIAL(0,1,TRUE,FALSE)	.
120	=SELECT(I18A91:I18N9300)	selects stuff from template
121	=COPY()	and pastes values over the formulas
122	=PASTE.SPECIAL(0,1,TRUE,FALSE)	.
123	=SELECT(I18A97:I18N982)	gets rid of Jul-Aug 1928
124	=CUT()	.
125	=SELECT(I18A98)	.
126	=PASTE()	.
127	=Heading_Med()	runs Heading_Med macro defined below
128	=SAVE.AS("c:\basestem\BR191a.xls",1,"FALSE","FALSE")	saves file under name ???3M9BT.xls
129	=IF(BR9128=FALSE,)	.
130	=IF(CA14=3,WhichStuffToPrint(),)	if "Calculate and Print" chosen, runs print macro
131	=CLOSE()	.
132	=ACTIVATE(BR179&BR180&".xls")	closes 3M9 file
133	=CLOSE(FALSE)	.
134	=NEXT()	.
135	=RETURN()	done
136		.
137		< this macro deletes years beyond
138		current year
139	DeletePartialYears	
140	=WHILE(ACTIVE.CELL()=0)	
141	=SELECT("R-1C")	
142	=NEXT()	
143	=SELECT("RC-2")	
144	=IF(ACTIVE.CELL()=0,SELECT("RC(2)",SELECT("R(1)C(2)"))	
145	=DEFINE.NAME("UpperRightDelete")	
146	=SELECT.END(1)	
147	=SELECT.END(4)	
148	=SELECT(ACTIVE.CELL():UpperRightDelete)	
149	=CLEAN()	
150	=RETURN()	
151		
152		
153		
154		
155		
156		
157		Heading_Med is submacro
158	Heading_Med	of RankData
159	=FORMULA.UPPERLEFT(BR970,3),BR9179)	capitalize 3 letter abbrev and put it below
160	=FORMULA.UPPERBMD(BR970,4,4),BR9180)	
161	=FORMULA.GOTO(9D891)	goes top of 3 ProList
162	=WHILENOT(BR9179=ACTIVE.CELL())	advances thru list till 3 char site
163	=SELECT("R(1)C")	is found
164	=IF(ROW(ACTIVE.CELL())>400)	
165	=ALERT("The site you selected in the dialog box is not on ProList")	
166	=HALT()	
167	=END.IF()	
168	=NEXT()	
169	=SELECT("RC(4)")	
170	=COPY(ACTIVE.CELL,BR182)	copies station # below
171	=SELECT("RC(1)")	
172	=COPY(ACTIVE.CELL,BR181)	copies station name below
173	=SELECT("RC(1)")	
174	=COPY(ACTIVE.CELL,BR184)	copies river name below
175	=SELECT("RC(1)")	
176	=COPY(ACTIVE.CELL,BR186)	copies river mile below
177	=SELECT("RC(1)")	
178	=COPY(ACTIVE.CELL,BR188)	copies DA below
179	MCD	3 char code
180	MX	data type
181	MICA	site name
182	12227100	USGS#
183	Mean streamflow, in cfs, modified to a current (1990) level	data description
184	COLUMBIA	river
185	1018.1	river mile
186	8290	drainage area
187	=ACTIVATE.NEXT()	
188	=COPY(BR179,18C91)	copies 3 char code to c1 on templ.
189	=COPY(BR180,18E91)	copies 3M9 to e1 on templ.
190	=FORMULA(BR179&BR180&"S",BR181)	
191	MCDMXS	
192	=COPY(BR181,18O91)	copies ???&data type to O1
193	=COPY(BR182,18O92)	copies station # to o2 on templ.
194	=COPY(BR183,18O93)	copies station name to o3 on templ.
195	=COPY(BR184,18O94)	copies data description to o4
196	=COPY(BR185,18O95)	copies river to o5 on templ.
197	=COPY(BR186,18O96)	copies river mile to o6 on templ.
198	=COPY(BR188,18O97)	copies DA to o7 on templ.
199	=RETURN()	
200		
201		
202		
203		
204		
205		
206		
207		< this macro ranks the various tables
208		
209	RankTables	
210	=SELECT("RC:"R76C(26)")	select table to be ranked
211	=COPY()	pastes values over the
212	=PASTE.SPECIAL(0,1,TRUE,FALSE)	formulas that are orig. there
213	=CANCEL.COPY()	
214	=SELECT("RC(1)")	
215	=FORM.COUNTER",1,13)	start of loop to rank table
216	=DEFINE.NAME("top")	column by column

	B8	B9
217	=SELECT (END4)	
218	=SELECT ("PC1")	
219	=SELECT (ACTIVE CELL0:R9N)	
220	=SORT (1, R9N, 2)	the actual sort rank, hence
221	=SELECT ("PC3")	
222	=TEXT0	
223	=RETURN0	
224		< this macro reads the dialog box
225		to determine what to print
226		
227	WhichSheetToPrint	
228	=IF (C6A32 = TRUE, SELECT (10A95:10N951), GOTO (B2301))	If print Table 1
229	=FORMULA ("c6", B8B322)	
230	=PrintTable0	
231	=IF (C6A33 = TRUE, SELECT (10Q94:10AQ951), GOTO (B2331))	If print Table 1 Ranked
232	=FORMULA ("c6", B8B322)	
233	=PrintTable Ranked0	
234	=IF (C6A34 = TRUE, SELECT (10A106:10N102), GOTO (B2361))	If print Table 2
235	=FORMULA ("c6", B8B322)	
236	=PrintTable0	
237	=IF (C6A35 = TRUE, SELECT (10Q107:10AQ102), GOTO (B2381))	If print Table 2 Ranked
238	=FORMULA ("c6", B8B322)	
239	=PrintTable Ranked0	
240	=IF (C6A36 = TRUE, SELECT (10A1206:10N1202), GOTO (B2421))	If print Table 3
241	=FORMULA ("c6", B8B322)	
242	=PrintTable0	
243	=IF (C6A37 = TRUE, SELECT (10Q1207:10AQ1202), GOTO (B2451))	If print Table 3 Ranked
244	=FORMULA ("c6", B8B322)	
245	=PrintTable Ranked0	
246	=IF (C6A38 = TRUE, SELECT (10A1406:10N1402), GOTO (B2481))	If print Table 4
247	=FORMULA ("c6", B8B322)	
248	=PrintTable0	
249	=IF (C6A39 = TRUE, SELECT (10Q1407:10AQ1402), GOTO (B2511))	If print Table 4 Ranked
250	=FORMULA ("c6", B8B322)	
251	=PrintTable Ranked0	
252	=IF (C6A40 = TRUE, SELECT (10A1606:10N1602), GOTO (B2541))	If print Table 5
253	=FORMULA ("c6", B8B322)	
254	=PrintTable0	
255	=IF (C6A41 = TRUE, SELECT (10Q1607:10AQ1602), GOTO (B2571))	If print Table 5 Ranked
256	=FORMULA ("c6", B8B322)	
257	=PrintTable Ranked0	
258	=IF (C6A42 = TRUE, SELECT (10A1806:10N1802), GOTO (B2601))	If print Table 6
259	=FORMULA ("c6", B8B322)	
260	=PrintTable0	
261	=IF (C6A43 = TRUE, SELECT (10Q1807:10AQ1802), RETURN0)	If print Table 6 Ranked
262	=FORMULA ("c6", B8B322)	
263	=PrintTable Ranked0	
264	=RETURN0	
265		
266		
267		
268		
269		< This macro prints the unranked stuff
270		
271	PrintTable	
272	=PrintTableUnranked_Start0	runs macro defined below
273	=PrintHeadings_Start0	runs macro defined below
274	=AveragePrint_Start0	runs macro defined below
275	=InsertLines_Start0	runs macro defined below
276	=PrintSetup_Start0	runs macro defined below
277	=RETURN0	
278		
279		
280		
281		
282		
283		
284		< this macro prints the ranked tables
285	PrintTable Ranked	
286	=PrintTableRanked_Start0	runs macro defined below
287	=PrintHeadings_Start0	runs macro defined below
288	=AveragePrint_Start0	runs macro defined below
289	=InsertLines_Start0	runs macro defined below
290	=AdjustmentAdjustment0	runs macro defined below
291	=PrintSetup_Start0	runs macro defined below
292	=RETURN0	
293		
294		
295		
296	PrintTableUnranked_Start	copies it
297	=COPY0	copies new worksheet
298	=NEW0	shrinks screen
299	=ZOOM0(50)	selects copy to place
300	=SELECT (10A94)	pastes only vs val
301	=PASTE_SPECIAL0 (1, TRUE, FALSE)	
302	=ACTIVATE_NEXT0	copies formulas
303	=COPY0	
304	=ACTIVATE_PREV0	pastes formulas to new sheet
305	=PASTE_SPECIAL0 (4, TRUE, FALSE)	
306	=ACTIVATE_NEXT0	
307	=COPY (10Q91:10Q97)	copy headings stuff from h10m
308	=ACTIVATE_PREV0	
309	=SELECT (10AC91)	paste it to a1
310	=PASTE0	
311	=RETURN0	
312		
313	PrintHeadings_Start	find bottom left corner of sheet to be printed
314	=SELECT (10A910)	
315	=SELECT (END4)	
316	=DEFINE_NAME ("BottomLeft", "c6")	
317	=SELECT ("B9C")	
318	=DEFINE_NAME ("BottomLeft", "c6")	
319	=COPY (10AC91, ACTIVE CELL0)	copy 7777 to bottom left
320	=SELECT (10Q91)	copy site name to d1
321	=COPY (10AC92, ACTIVE CELL0)	
322		
323	=IF (B9Q22 = "c6")	depending on which table, type
324	=FORMULA ("c6", "Copy Macro Mod (End Sheet) (new in c6)", (10AC94)	one of the two following headings

	SR	SS
325	=ELSE()	
326	=FORMULA("ModRed Streamflow Volume in Thousands of acre-ft (KAF)",(I8AC84	
327	=END.IF()	
328	=COPY(I8AC84,I8A82)	copy description to a2
329	=FORMULA("USGS #",I8A81)	type 'USGS #' to a1
330	=FORMULA("B",I8AC83,I8B81)	copy USGS # to b1
331	=COPY(I8AC85,I8B81)	copy river to i1
332	=COPY(I8AC86,I8M82)	copy river mile to m2
333	=COPY(I8AC87,I8M81)	copy drainage area to m1
334	=FORMULA("River",I8H81)	type river in h1
335	=SELECT(I8H81)	formats 'river'
336	=ALIGNMENT(3)	
337	=FORMULA("River Mile",I8L82)	types 'River Mile' in i2
338	=SELECT(I8L82)	formats 'River Mile'
339	=ALIGNMENT(4)	
340	=FORMULA("Drainage Area",I8L81)	types 'Drainage Area' in L1
341	=SELECT(I8L81)	formats Drainage Area
342	=ALIGNMENT(4)	
343	=FORMULA("Sq. Mi.",I8M11)	types "Sq Mi" in n1
344	=IF(ISBLANK(I8O87),SELECT(I8B81),SELECT(I8B81,I8AA81))	
345	=FORMAT.FONT("MS Sans Serif",12,FALSE,FALSE,FALSE,FALSE,0)	
346	=SELECT(I8O81)	formats station name big, bold
347	=FORMAT.FONT("MS Sans Serif",14,TRUE,FALSE,FALSE,FALSE,0)	
348	=SELECT(I8B81)	
349	=FORMAT.FONT("MS Sans Serif",14,TRUE,FALSE,FALSE,FALSE,0)	
350	=IF(ISBLANK(I8O87),SELECT(I8B84,I8N84),SELECT(I8AA81,I8AA86))	selects months
351	=ALIGNMENT(4)	formats them
352	=FORMAT.FONT("MS Sans Serif",10,FALSE,FALSE,FALSE,FALSE,0)	
353	=RETURN()	
354		
355		
356		
357		
358		
359		
360		
361		
362		
363		
364	AutoFormat Size	
365	=SELECT(I8B81,I8B81)	goes to bottom of sheet and types,
366	=SELECT.END()	
367	=SELECT("N2IC")	'mean' and 'median'
368	=FORMULA("MEAN")	
369	=DEFINE.NAME("PlaceForFormula")	
370	=SELECT("N1IC")	
371	=FORMULA("MEDIAN")	
372	=SELECT("N1IC")	
373	=FORMULA("STD DEV")	
374	=IF(ISBLANK(I8O87),SELECT(I8A86),SELECT(I8A86))	
375	=FOR("Current",1,13)	begin loop
376	=IF(ISBLANK(I8O87),SELECT("N1IC"),SELECT("N2IC"))	finds top of data (first nonzero or nonblank value)
377		
378	=DEFINE.NAME("Top")	
379	=SELECT.END()	goes to bottom
380	=SELECT(REF. ACTIVE CELL)	selects top to bottom
381	=DEFINE.NAME("MonAve")	defines it MonAve
382	=SELECT(I8B81,I8B81)	goes to bottom
383	=IF(ISBLANK(I8O87),SELECT("N1IC"),SELECT("N2IC"))	
384	=DEFINE.NAME("PlaceForFormula")	
385	=FORMULA("=average(MonAve)")	pastes average formula
386	=SELECT("N1IC")	selects down 1 row
387	=FORMULA("=median(MonAve)")	pastes median formula
388	=SELECT("N1IC")	selects down 1 row
389	=FORMULA("=stdevp(MonAve)")	pastes stdev formula
390	=SELECT("N2IC:NC")	selects over stdev
391	=FOR.CELL("Current Cell",TRUE)	formats them as follows:
392	=IF(CurrentCell<1000)	If < 10,000 rounds to nearest integer
393	=FORMULA(ROUND(CurrentCell,0),CurrentCell)	
394	=ELSE.IF(AND(1000<CurrentCell,CurrentCell<100000))	If between 10^4 and 10^5 rounds to tens place
395	=FORMULA(ROUND(CurrentCell,-1),CurrentCell)	
396	=ELSE()	If > 10^5 rounds to hundreds
397	=FORMULA(ROUND(CurrentCell,-2),CurrentCell)	
398	=END.IF()	
399	=NEXT()	
400	=COPY()	copies mean:std
401	=PASTE.SPECIAL(1,TRUE,FALSE)	pastes values over formulas
402	=SELECT(MonAve)	selects data
403	=FOR.CELL("Current Cell",TRUE)	formats them as follows:
404	=IF(CurrentCell<10000)	If < 10,000 rounds to nearest integer
405	=FORMULA(ROUND(CurrentCell,0),CurrentCell)	
406	=ELSE.IF(AND(10000<CurrentCell,CurrentCell<100000))	If between 10^4 and 10^5 rounds to tens place
407	=FORMULA(ROUND(CurrentCell,-1),CurrentCell)	
408	=ELSE()	If > 10^5 rounds to hundreds
409	=FORMULA(ROUND(CurrentCell,-2),CurrentCell)	
410	=END.IF()	
411	=NEXT()	
412	=SELECT(I8B81,I8B81)	
413	=SELECT.END()	back up to top of column
414	=SELECT.END()	
415	=SELECT("N1IC")	
416	=NEXT()	end of loop
417	=DELETE.NAME("MonAve")	delete the various names defined
418	=DELETE.NAME("Top")	
419	=DELETE.NAME("PlaceForFormula")	
420	=RETURN()	
421		
422		
423		
424		
425		
426		< this macro inserts blank lines of height 6
427		every 5 lines & s. under every year that
428		is a multiple of 5)
429	InsertLines Size	
430	=IF(ISBLANK(I8O87))	
431	=SELECT("R6")	
432	=INSERT(2)	

	88	89
435	=ROW.HEIGHT(8)	
436	=SELECT("R8")	
437	=INSERT(2)	
438	=ROW.HEIGHT(8)	
439	=SELECT("R8")	
440	=INSERT(2)	
441	=ROW.HEIGHT(8)	
442	=SELECT("R8")	
443	=INSERT(2)	
444	=ROW.HEIGHT(8)	
445	=END IF	
446	=FOR "Counter",1,14	
447	=SELECT("R8")	
448	=INSERT(2)	
449	=ROW.HEIGHT(8)	
450	=NEXT	
451	=SELECT(18bottomLeft)	
452	=SELECT("R-2C")	
453	=FOR "OutCounter",1,3	
454	=IF ISBLANK(ACTIVE.CELL)	
455	=SELECT("R")	
456	=END DELETE(2)	
457	=END IF	
458	=SELECT("R-1C")	
459	=NEXT	
460	=SELECT(18bottomLeft)	
461	=SELECT("R0:R-8")	
462	=ROW.HEIGHT(12.75)	
463	=RETURN	
464		
465		
466		
467		< this macro makes some alignment
468	AlignmentAdjustment	adjustments so printed looks better
469	=SELECT(18A84)	
470	=FOR "CounterAlign",1,13	
471	=SELECT("RC1")	
472	=DEFINE.NAME("top")	
473	=SELECT("R97C")	
474	=SELECT(18top:ACTIVE.CELL)	
475	=ALIGNMENT(4)	
476	=SELECT("RC1")	
477	=DEFINE.NAME("top")	
478	=SELECT("R97C")	
479	=SELECT(18top:ACTIVE.CELL)	
480	=ALIGNMENT(2)	
481	=NEXT	
482	=RETURN	
483		
484		
485		
486		
487		
488		
489	PrintSetup_Exit	
490	=IF ISBLANK(18O97,SELECT(18bottomLeft:18N97),SELECT(18bottomLeft:18AA97))	adjust whole sheet
491	=SET.PRINT AREA	copy print area
492	=IF ISBLANK(18O97,PAGE.SETUP,"",1,0,25,0,5,0,5,FALSE,FALSE,FALSE,FAL	page setup
493	=PRINT(1,1,FALSE,FALSE,1,FALSE,1,-4)	print
494	=CLOSE(FALSE)	
495	=RETURN	
496		

A	B
1	
5 UpDateChangeContents	
6 =ERROR(2,Whoops 5)	if an error occurs, run Whoops 5 below
7 =IF(NDOT(GET.WINDOW(1) = "m update.xlm"),ACTIVATE("m update.xlm"),)	makes this macro the active work sheet
8 =CCDialogSetup()	runs macro defined below
9 =IF(J6 = FALSE,HALT())	if cancel, halts run
10 =RunDialog()	runs macro defined below
11 =RETURN()	end
12	
13	
14	
15 CCDialogSetup	
16 =ECHO(FALSE)	turns off screen updating off
17 =SELECT(Y257)	defines stuff to display in dialog box
18 =SELECT.END(4)	.
19 =SELECT(Y257:ACTIVE.CELL())	.
20 =DEFINE.NAME("ChangeInContentsList")	.
21 =SET.NAME("UpdateChangeInContentsSiteArray",(1))	.
22 =RETURN()	
23	
24	
25 RunDialog	
26 =DIALOG.BOX(UpdateWhich3S)	runs dialog box
27 =IF(A26 = FALSE)	if cancel,halts macro
28 =HALT()	
29 =ELSE,IF(OR(J9 < 1929,J11 < 1929,J11 < J9,ISBLANK(J9),ISBLANK(J11)))	if improper date entered,
30 =ALERT("There is an error in the dates you have entered.",2)	alerts user
31 =GOTO(A26)	returns dialog box
32 =END.IF()	
33 =FOR("Counter",1,COUNTA(UpdateChangeInContentsSiteArray))	begin main loop
34 =FORMULA.GOTO(Y258)	finds first site selected in dialog box
35 =SET.VALUE(CCPositionNum,0)	.
36 =WHILE(CCPositionNum < INDEX(UpdateChangeInContentsSiteArray,,Counter))	.
37 =SELECT("R11C")	.
38 =CCPositionNum + 1	.
39 =NEXT()	.
40 =FORMULA(LEFT(ACTIVE.CELL(),3),A41)	puts 3 letter code of file to be
41 NOX	updated here
42 =SELECT("RC10")	select data codes: elev or elev
43 =COPY(ACTIVE.CELL(),A44)	gets code for data type and copies
44 3	here, 1 = elevMSL, 1g = elevage, 2 = storage, 3 = chan
45 =SELECT("RC11")	select USGS elev gage
46 =COPY(ACTIVE.CELL(),A47)	copy it to
47 123913ch	this cell
48 =IF(A44 = "1g")	if it is gage date, copies gage height,
49 =SELECT("RC12")	to cell 2 rows down
50 =COPY(ACTIVE.CELL(),A48)	.
51 2434.64	.
52 =END.IF()	.
53 =IF(A44 = "ONE")	if update procedure ONE,
54 =ALERT("An automatic update procedure does not exist for "A41&" 3S")	alerts user and does next step
55 =ELSE,IF(OR(A44 = 1,A44 = "1g",A44 = 2))	if storage or elevation,
56 =FindDates()	runs macro defined below
57 =MonChangeContents()	runs macro defined below
58 =ACTIVATE(A47&"&"&.xls")	activate USGS elev station file
59 =HalfMonChangeContents()	runs macro defined below
60 =ELSE,IF(A44 = 3)	if already change in contents,
61 =FindDates()	runs macro defined below
62 =AlreadyChangeInContents PreHformToHform()	runs macro defined below
63 =ACTIVATE(A47&"&"&.xls")	activate USGS elev station file
64 =AlreadyChangeInContents PreHformToHform Half()	runs macro defined below
65 =ELSE()	if no parameter,
66 =ALERT("There is a parameter problem on PreList. The code should be 1, 1g,	alerts user of problem
67 =END.IF()	end loop
68 =NEXT()	
69 =RETURN()	
70	
71	
72	
73	
74 FindDates	
75 =OPEN("c:\bpe13-9"&"A41&"3s.xls")	open ????.xls selected in dial box
76 =OPEN("c:\bpe13-9"&"A47&"&.xls")	open USGS elev station file
77 =FORMULA(VALUE(J9),A79)	gets end year from dialog box
78 Oct	update from this month
79 1929	update from this year
80 Sep	update to this month
81 =SELECT(A1)	next few lines find begin/end month & year
82 =FORMULA.FIND(A78,2,1,1)	find begin month
83 =IF(A82 = FALSE,GOTO(A89),)	if begin mon doesn't exist skips 12 lines
84 =COLUMN(ACTIVE.CELL())	begin month column
85 =FORMULA.FIND(A79,1,1,1)	find begin year
86 =IF(A85 = FALSE,GOTO(A89),)	if begin year doesn't exist skips 9 lines
87 =ROW(ACTIVE.CELL())	begin year row
88 =FORMULA.FIND(A80,2,1,2)	find end month
89 =IF(A88 = FALSE,GOTO(A89),)	if end mon doesn't exist skips 8 lines
90 =COLUMN(ACTIVE.CELL())	end month column
91 =FORMULA.FIND(J11,1,1,1)	find end year (found in dialog box)
92 =IF(A91 = FALSE,GOTO(A89),)	if end year doesn't exist skips 3 lines
93 =ROW(ACTIVE.CELL())	end year row
94 =GOTO(A97)	
95 =ALERT("That date is invalid")	if cannot find end year alerts user and
96 =HALT()	halts macro
97 =RETURN()	

1	A	B	C
106	MONTHLY SUBROUTINES	HALF MONTHLY SUBROUTINES	
107	.	.	
108	.	.	
109	.	.	
110	MonChangeContents	HalfMonChangeContents	
111	=FORMULA.GOTO(INDEX((10A01:10DW\$300,0A007-1,13))	=FORMULA.GOTO(INDEX((10A01:10DW\$300,0A007-1+100,13))	selects the Sep prior to begin Oct
112	=DEFINE.NAME("tagalong")	=DEFINE.NAME("tagalong")	defines it as "tagalong"
113	=FORMULA.GOTO(INDEX((10A01:10DW\$300,0A007,0A004))	=FORMULA.GOTO(INDEX((10A01:10DW\$300,0A007+100,0A004))	selects begin Oct (i.e. first cell from which to update)
114	=DEFINE.NAME("begin")	=DEFINE.NAME("begin")	defines it as "begin"
115	=FORMULA.GOTO(INDEX((10A01:10DW\$300,0A003,0A000))	=FORMULA.GOTO(INDEX((10A01:10DW\$300,0A003+100,0A000))	selects end Sep (i.e. last cell to which to update)
116	=DEFINE.NAME("end")	=DEFINE.NAME("end")	defines it as "end"
117	=IF(0A044=1)	=IF(0A044=1)	if elev data, runs macro to convert to acre-ft
118	=Volume0	=Volume0	
119	=ELSE.IF(0A044="1g")	=ELSE.IF(0A044="1g")	if elev above page,
120	=SELECT("begin:end,tagalong","begin")	=SELECT("begin:end,tagalong","begin")	select all cells from "tagalong" to "end"
121	=COPY(0A001)	=COPY(0A001)	adds page height
122	=PASTE.SPECIAL(2,2,TRUE,FALSE)	=PASTE.SPECIAL(2,2,TRUE,FALSE)	
123	=Volume0	=Volume0	runs macro to convert elev to acre-ft
124	=END.IF()	=END.IF()	
125	=E2.E1	=E2.E1.Half0	runs macro defined below
126	=MoveToSForm0	=MoveToSForm.Half0	runs macro defined below
127	=StormToHForm0	=StormToHForm.Half0	runs macro defined below
128	=RETURN()	=ACTIVATE(0A047&".xls")	activates USGS elev station
129		=CLOSE(FALSE)	closes w/o saving it
130		=INPUT("Type name (including path) to save as (e.g. c:\bepnJ-af	asks whether to save name & path
131		=FORMULA(B130,B132)	puts name and path,
132		FALSE	here
133		=IF(B132=FALSE)	if user chooses "Cancel", leaves updated
134		=ACTIVATE.NEXT()	file open w/o saving it
135		=CLOSE(FALSE)	closes storm (a temp. file to convert to cfm)
136		=ELSE()	otherwise
137		=SAVE.A0(B132,1,"FALSE",FALSE)	saves updated Hform
138		=CLOSE(FALSE)	closes just saved updated 7773S
139		=CLOSE(FALSE)	closes storm (a temporary file) w/o saving it
140		=END.IF()	
141		=RETURN()	done
142			
143			
144			
145			
146			< these macros subtracts prev man volume from
147			current man volume (E2.E1 stands for Elev of
148			month 2 - Elev of month 1)
149	E2.E1	E2.E1.Half	
150	=SELECT(begin)	=SELECT(begin)	selects begin Oct on USGS elev file
151	=SELECT("RC(12)")	=SELECT("RC(12)")	selects 12 to right of that
152	=DEFINE.NAME("begin")	=DEFINE.NAME("begin")	define it as "begin"
153	=FORMULA("=(RC(12)-RC(11))")	=FORMULA("=(RC(12)-RC(11))")	Oct formula subtracts prev man from current man
154	=COPY()	=COPY()	copy formula to all Oct's
155	=FORMULA.GOTO(INDEX((10A01:10DW\$300,0A003,14))	=FORMULA.GOTO(INDEX((10A01:10DW\$300,0A003+100,14))	
156	=SELECT(begin:ACTIVE.CELL)	=SELECT(begin:ACTIVE.CELL)	
157	=PASTE.SPECIAL(2,1,TRUE,FALSE)	=PASTE.SPECIAL(2,1,TRUE,FALSE)	
158	=SELECT(begin)	=SELECT(begin)	select begin
159	=SELECT("RC(11)")	=SELECT("RC(11)")	selects one cell to the right - cell corresp. to Nov
160	=DEFINE.NAME("beginNov")	=DEFINE.NAME("beginNov")	define it "beginNov"
161	=FORMULA("=(RC(12)-RC(11))")	=FORMULA("=(RC(12)-RC(11))")	Nov-Sep formula: sub prev man from current man
162	=FORMULA.GOTO(INDEX((10A01:10DW\$300,0A003,25))	=FORMULA.GOTO(INDEX((10A01:10DW\$300,0A003+100,25))	copies formula to all other cells
163	=DEFINE.NAME("end")	=DEFINE.NAME("end")	
164	=SELECT(beginNov)	=SELECT(beginNov)	
165	=COPY()	=COPY()	
166	=SELECT(beginNov:end)	=SELECT(beginNov:end)	
167	=PASTE.SPECIAL(2,1,TRUE,FALSE)	=PASTE.SPECIAL(2,1,TRUE,FALSE)	
168	=RETURN()	=RETURN()	
169			
170			
171	MoveToSForm	MoveToSForm.Half	
172	=OPEN("c:\bepnstormform.xls")		temp Storm template which converts it to cfm
173	=ACTIVATE(A047&".xls")	=SELECT(begin:end)	open template Storm
174	=SELECT(begin:end)	=ACTIVATE.NEXT()	activates USGS elev station file
175	=ACTIVATE.NEXT()	=ACTIVATE.NEXT()	selects appropriate data
176	=FORMULA.GOTO(INDEX((10A01:10DW\$300,0A070-1023,20))	=FORMULA.GOTO(INDEX((10A01:10DW\$300,0A070-1023+100,20))	go to appropriate place
177	=ACTIVATE(A047&".xls")	=ACTIVATE(A047&".xls")	activates USGS elev station file
178	=COPY()	=COPY()	copies appropriate data and pastes it on storm
179	=ACTIVATE.NEXT()	=ACTIVATE.NEXT()	
180	=PASTE.SPECIAL(2,1,TRUE,FALSE)	=PASTE.SPECIAL(2,1,TRUE,FALSE)	
181	=RETURN()	=RETURN()	
182			
183			
184			
185			
186			< these macros move data which has been converted
187	StormToHform	StormToHform.Half	from acre-ft to cfm on storm to its final destination
188	=FORMULA.GOTO(INDEX((10A01:10DW\$300,0A070-1023,2))	=FORMULA.GOTO(INDEX((10A01:10DW\$300,0A070-1023+100,2))	on Hform
189	=DEFINE.NAME("begin")	=DEFINE.NAME("begin")	selects beginning of data on Storm
190	=FORMULA.GOTO(INDEX((10A01:10DW\$300,0A011-1023,13))	=FORMULA.GOTO(INDEX((10A01:10DW\$300,0A011-1023+100,13))	define it as "begin"
191	=SELECT(begin:ACTIVE.CELL)	=SELECT(begin:ACTIVE.CELL)	selects end of data on Storm
192	=ACTIVATE(0A041&"3s.xls")	=ACTIVATE(0A041&"3s.xls")	select begin to end
193	=FORMULA.GOTO(INDEX((10A01:10DW\$300,0A070-1022,2))	=FORMULA.GOTO(INDEX((10A01:10DW\$300,0A070-1022+00,2))	activate the existing 7773s which is being updated
194	=ACTIVATE.NEXT()	=ACTIVATE.NEXT()	go to appropriate place in 7773s
195	=COPY()	=COPY()	copy from Storm to Hform
196	=ACTIVATE.PREV()	=ACTIVATE.PREV()	
197	=PASTE.SPECIAL(2,1,TRUE,FALSE)	=PASTE.SPECIAL(2,1,TRUE,FALSE)	
198	=RETURN()	=RETURN()	
199			
200			
201			
202			< this macro converts USGS elevation data to
203			volume (which is a different relationship for each

	A	B	C
1			
204			reservoir) by means of cap tables located elsewhere
205			in this sheet and pastes the volume back on top
206	Volume		of the corresponding elev
207	=SELECT("begin:end,tagalong","begin")		select all cells from "tagalong" to "end"
208	=FOR.CELL("CurrentCell",,TRUE)		
209	=COPY(CURRENTCELL,A210)		copy current cell onto this macro sheet
210	2892.94262896312		
211	=ACTIVATE("m update.xm")		activate this macro
212	=AA1&"cap"		table which capacity table to go to
213	=FORMULA.GOTO(GET.CELL(6,A212))	If Can data do the following...	go to capacity table
214	=SELECT("M-1")C)		
215	=IF(RIGHT(ACTIVE.CELL(0,3))="CAN",GOTO(B216),)		If it is Canadian data do column B, else do col A
216	=SELECT("M-1")C)	=SELECT("M-1")C)	
217	=SELECT("M-1")C)	=SELECT("M-1")C)	
218	=WHILE(A210>=ACTIVE.CELL(0))	=WHILE(A210>=ACTIVE.CELL(0))	find approp elev in cap table
219	=SELECT("M-1")C)	=SELECT("M-1")C)	
220	=IF(ISBLANK(ACTIVE.CELL(0)))	=IF(ISBLANK(ACTIVE.CELL(0)))	If an inappropriate elevation exists that capacity
221	=ALERT("Something is wrong with an elevation value. The capacity t	=ALERT("Something is wrong with an elevation value. The cap	table cannot handle, alerts user and harts macro
222	=HALT()	=HALT()	
223	=ELSE()	=ELSE()	
224	=END.IF()	=END.IF()	
225	=NEXT()	=NEXT()	
226	=DEFINE.NAME("elev3")	=SELECT("M-1")C(1))	
227	=SELECT("M-1")C)	=DEFINE.NAME("area0")	define various constants to plug into vol formula
228	=DEFINE.NAME("elev1")	=SELECT("RC(1))	
229	=SELECT("RC(1))")	=DEFINE.NAME("area1")	
230	=DEFINE.NAME("vol1")	=SELECT("RC(1))")	
231	=SELECT("RC(1))")	=DEFINE.NAME("area2")	
232	=DEFINE.NAME("area1")	=SELECT("RC(1))")	
233	=SELECT("RC(1))")	=DEFINE.NAME("area3")	
234	=DEFINE.NAME("area3")	=SELECT("RC(1))")	
235	=SELECT("M-1")C(2))	=DEFINE.NAME("area4")	
236	=DEFINE.NAME("vol3")	=SELECT(A210)	
237	=SELECT(A210)	=DEFINE.NAME("elev")	
238	=DEFINE.NAME("elev2")	=FORMULA(Area0*(Elev+area1)*area2+area3*Elev+area4,A2	this is formula to convert elev to volume
239	=FORMULA(LN(vol1-area3)+(LN(elev2+area1)-LN(elev1+area1))*(LN	=GOTO(A242)	this is formula to convert elev to volume
240	=FORMULA(EXP(A241)+area3,A241)		this is formula to convert elev to volume
241	1783772.33676397		
242	=ACTIVATE.NEXT()		
243	=COPY(A241,CURRENTCELL)		copies just calculated volume over elev
244	=NEXT()		end loop *****
245	=RETURN()		
246			
247			
248			
249			
250			
251			
252			
253			
254			<these macros move data which is already in
255	AlreadyChangeinContents PreHformToHform	AlreadyChangeinContents PreHformToHform Hal	the form of change in contents to
256	=FORMULA.GOTO(INDEX((B91:18DW\$300,\$A987,2))	=FORMULA.GOTO(INDEX((B91:18DW\$300,\$A987+100,2))	on hform
257	=DEFINE.NAME("begin")	=DEFINE.NAME("begin")	selects beginning of data on change in contents file
258	=FORMULA.GOTO(INDEX((B91:18DW\$300,\$A983,13))	=FORMULA.GOTO(INDEX((B91:18DW\$300,\$A983+100,13))	define it as "begin"
259	=SELECT((begin:ACTIVE.CELL(0))	=SELECT((begin:ACTIVE.CELL(0))	selects end of data on change contents file
260	=ACTIVATE((B941&"3a.xls")	=ACTIVATE((B941&"3a.xls")	selects all appropriate data
261	=FORMULA.GOTO(INDEX((B91:18DW\$300,\$A978-1822,2))	=FORMULA.GOTO(INDEX((B91:18DW\$300,\$A978-1822+98	activate the existing 7773s which is being updated
262	=ACTIVATE.NEXT()	=ACTIVATE.NEXT()	go to appropriate place in 7773s
263	=COPY()	=COPY()	copy from change contents to Hform
264	=ACTIVATE.PREV()	=ACTIVATE.PREV()	
265	=PASTE.SPECIAL(3,1,TRUE,FALSE)	=PASTE.SPECIAL(3,1,TRUE,FALSE)	
266	=RETURN()	=ACTIVATE((B947&"3a.xls")	activates change contents file
267		=CANCEL.COPY()	
268		=CLOSE(FALSE)	closes w/o saving it
269		=INPUT("Type name (including path) to save as (e.g. c:\bpa3-2	asks whether to save & path of 3S
270		=FORMULA(B268,B271)	puts save name and path
271		FALSE	here
272		=IF(B271=FALSE)	If user chooses "Cancel", leaves updated
273		=ELSE()	file open w/o saving it
274		=SAVE.AS(B271,1,"",FALSE,"",FALSE)	otherwise saves updated Hform
275		=CLOSE(FALSE)	and closes it
276		=END.IF()	
277		=RETURN()	
278			
279			
280			
281			
282			
283			
284			
285			
286			
287			
288			
289			
290			
291	Woops 3		
292	=IF(ISERROR(A75))		
293	=ALERT("The file 'AA41&"3S.xls does not exist in c:\bpa3-xm. It mu	If the file existed to be updated ONE,	
294	=HALT()	informs user	
295	=ELSE.IF(ISERROR(A76))		
296	=ALERT("The file 'AA47&"3s does not exist in c:\bpa3-ev. It must	If USGS file ONE, informs user...	
297	=CLOSE(FALSE)		
298	=HALT()		
299	=ELSE()		
300	=END.IF()		
301	=HALT()		

	M	N
1		
5	UpdateHistoric	
6	ERROR(2,Whoops H)	if error occurs runs macro below
7	=IF(NOT(GET.WINDOW(1)="m update.xlm"),ACTIVATE("m update.xlm"))	ensures this is active sheet when running
8	=ECHO(FALSE)	turns off screen updating off
9	=SELECT(Y2)	defines stuff to display in dialog box
10	=SELECT.END(4)	*
11	=SELECT(Y2:ACTIVE.CELL())	*
12	=DEFINE.NAME("HistList")	*
13	=SET.NAME("UpdateHistoricSitesArray",{1})	*
14	=DIALOG.BOX(UpdateWhich3H)	runs dialog box
15	=IF(M14=FALSE)	if cancel, hails macro
16	=HALT()	
17	=ELSE.IF(OR(ISBLANK(U9),ISBLANK(U11),U9<1926,U11<1926,U11<U9))	if improper date entered,
18	=ALERT("There is an error in the dates you have entered.",2)	alerts user
19	=GOTO(M14)	reruns macro
20	=END.IF()	
21	=FOR("Counter",1,COUNTA(UpdateHistoricSitesArray))	begin main loop
22	=SELECT(Y1)	finds first site selected
23	=SET.VALUE(PositionNum,0)	*
24	=WHILE(PositionNum<INDEX(UpdateHistoricSitesArray,,Counter))	*
25	=SELECT("R11C1")	*
26	=PositionNum+1	*
27	=NEXT()	*
28	=FORMULA(ACTIVE.CELL(),M29)	puts name of file to be updated,
29	TOM	have
30	=SELECT("RC1B1")	
31	=OPEN("c:\bpa\3-est\&M29&"3h.xls")	open the 7773h file to be updated
32	=ACTIVATE.NEXT()	activate this macro sheet
33	=SELECT("RC2I")	select 2 cells to the right - the mult factor
34	=DEFINE.NAME("MultFactor")	define it as "MultFactor"
35	=COPY(ACTIVE.CELL(),M38)	copy MultFactor
36	0.0405	have
37	=SELECT("RC1I")	select the USGS of site
38	=DEFINE.NAME("Site")	define it as "Site"
39	=COPY(ACTIVE.CELL(),M40)	copy Site
40	KER388	have
41	=IF(M40="DNE")	if DNE, alerts user no automatic update
42	=ALERT("There is no automatic update procedure for "&M29&"3H")	
43	=ACTIVATE(M29&"3h.xls")	and does next site
44	=CLOSE(FALSE)	*
45	=ELSE()	
46	=IF(OR(LEFT(M40,1)="1",LEFT(M40,1)="0"))	if PreHform file needed for Update ...
47	=USGSUpdateFile)	runs this macro defined below
48	=ELSE()	else if Hform needed for Update ...
49	=HformUpdateFile)	runs this macro defined below
50	=END.IF()	
51	1	Whole month code
52	1	Half month code
53	=CANCEL.COPY()	
54	=CLOSE(FALSE)	close USGS or file
55	=SELECT("MultFactor")	select MultFactor and look to right to see
56	=SELECT("RC2I")	if more files are used for this station
57	=IF(ISBLANK(ACTIVE.CELL()))	if this site needs more work, skip to else
58	=FORMULA(I,M51)	if done tells program to paste over date
59	=FORMULA(I,M52)	*
60	=ACTIVATE(M29&"3h.xls")	activates updated site
61	=INPUT("Type name (including path) to save as (e.g. c:\bpa\3-est\high3h.xls) or press	asks whether to save & path
62	=FORMULA(M61,M63)	
63	FALSE	
64	=IF(M63=FALSE)	if 'Cancel' chosen, doesn't save it
65	=ACTIVATE("m update.xlm")	
66	=ELSE()	leaves it open and moves to next site
67	=SAVE.AS(M61,1,"",FALSE,"",FALSE)	otherwise saves and closes it
68	=CLOSE()	
69	=END.IF()	
70	=ELSE()	if more work needed
71	=SELECT("RC1I")	
72	=FORMULA(2,M51)	tells program to add to current data
73	=FORMULA(2,M52)	*
74	=GOTO(M33)	back up to top
75	=END.IF()	
76	=END.IF()	
77	=NEXT()	and loop
78	=RETURN()	
79		
80		
81		
82		
83	USGSUpdateFile	
84	=OPEN("c:\bpa\3-est\&M40&"xls")	open Site to append
85	=FORMULA(VALUE(0U89),M87)	puts end year down 2 lines
86	Oct	update from this month
87	1970	update from this year
88	Sep	update to this month
89	=SELECT(IA1)	next few lines find begin/end month & year
90	=FORMULA.FIND(M89,2,1,1)	find begin month
91	=IF(M90=FALSE,GOTO(M103),)	
92	=COLUMN(ACTIVE.CELL())	begin month column
93	=FORMULA.FIND(M87,1,1,1)	find begin year
94	=IF(M93=FALSE,GOTO(M103),)	
95	=ROW(ACTIVE.CELL())	begin year row
96	=FORMULA.FIND(M89,2,1,2)	find end month

	M	N
1		
97	=IF(M96=FALSE,GOTO(M9103),)	
98	=COLUMN(ACTIVE.CELL())	and month column
99	=FORMULA.FINDVALUE(U11),1,1,1)	find end year
100	=IF(M99=FALSE,GOTO(M9103),)	
101	=ROW(ACTIVE.CELL())	and year row
102	=GOTO(M105)	
103	=ALERT("That date is invalid!")	if cannot find end year alert user
104	=HALT()	
105	=FORMULA.GOTO(INDEX(10A91:10DW9300,M995,M992))	selects begin cell
106	=DEFINE.NAME("begin")	define it "begin"
107	=FORMULA.GOTO(INDEX(10A91:10DW9300,M9101,M998))	select end cell
108	=DEFINE.NAME("end")	define it "end"
109	=SELECT((begin:1end)	.
110	=IF(NOT(M38=1))	if Multifactor = 1 skip 3 lines else mult
111	=COPY(M38)	selected data by Multifactor
112	=PASTE.SPECIAL(3,4,TRUE,FALSE)	.
113	=ELSE()	
114	=END.IF()	
115	=ACTIVATE(M298"3h.xls")	.
116	=FORMULA.GOTO(INDEX(10A91:10DW9300,U99-1922,M992))	
117	=ACTIVATE.NEXT()	copies over prev
118	=COPY()	values, DOES NOT
119	=ACTIVATE.PREV()	ADD TO CURRENT
120	=PASTE.SPECIAL(3,M51,TRUE,FALSE)	
121	=ACTIVATE.NEXT()	*****
122	=FORMULA.GOTO(INDEX(10A91:10DW9300,M995+100,M992))	do same for half monthly data
123	=DEFINE.NAME("begin")	.
124	=FORMULA.GOTO(INDEX(10A91:10DW9300,M9101+100,M998))	.
125	=DEFINE.NAME("end")	.
126	=SELECT((begin:1end)	.
127	=IF(NOT(M38=1))	if mult factor is 1 skips 3 lines
128	=COPY(M38)	else copy Multifactor
129	=PASTE.SPECIAL(3,4,TRUE,FALSE)	multiplies
130	=ELSE()	
131	=END.IF()	.
132	=ACTIVATE(M298"3h.xls")	.
133	=FORMULA.GOTO(INDEX(10A91:10DW9300,U99-1922+98,M992))	
134	=ACTIVATE.NEXT()	copies over prev
135	=COPY()	values, DOES NOT
136	=ACTIVATE.PREV()	VALUES
137	=PASTE.SPECIAL(3,M52,TRUE,FALSE)	
138	=ACTIVATE.NEXT()	
139	=RETURN()	
140		
141		
142	HformUpdateFile	
143	=OPEN("c:\begin3-ent"&M940&".xls")	open file to append
144	=FORMULA(VALUE(BU99),M146)	puts end year down 2 lines
145	Ost	update from this month
146	1970	update from this year
147	Sep	update to this month
148	=FORMULA.GOTO(INDEX(10A91:10DW9300,M9146-1922,2))	selects begin cell
149	=DEFINE.NAME("begin")	define it "begin"
150	=FORMULA.GOTO(INDEX(10A91:10DW9300,U911-1922,13))	select end cell
151	=DEFINE.NAME("end")	define it "end"
152	=SELECT((begin:1end)	.
153	=IF(NOT(M38=1))	if Multifactor = 1 skip 3 lines else mult
154	=COPY(M38)	selected data by Multifactor
155	=PASTE.SPECIAL(3,4,TRUE,FALSE)	.
156	=ELSE()	
157	=END.IF()	.
158	=ACTIVATE(M298"3h.xls")	
159	=FORMULA.GOTO(INDEX(10A91:10DW9300,U99-1922,2))	copies over prev
160	=ACTIVATE.NEXT()	values, DOES NOT
161	=COPY()	ADD TO CURRENT
162	=ACTIVATE.PREV()	
163	=PASTE.SPECIAL(3,M51,TRUE,FALSE)	*****
164	=ACTIVATE.NEXT()	selects begin cell
165	=FORMULA.GOTO(INDEX(10A91:10DW9300,M9146-1922+98,2))	define it "begin"
166	=DEFINE.NAME("begin")	select end cell
167	=FORMULA.GOTO(INDEX(10A91:10DW9300,U911-1922+98,13))	define it "end"
168	=DEFINE.NAME("end")	.
169	=SELECT((begin:1end)	.
170	=IF(NOT(M38=1))	if mult factor is 1 skips 3 lines
171	=COPY(M38)	else copy Multifactor
172	=PASTE.SPECIAL(3,4,TRUE,FALSE)	multiplies
173	=ELSE()	
174	=END.IF()	.
175	=ACTIVATE(M298"3h.xls")	.
176	=FORMULA.GOTO(INDEX(10A91:10DW9300,U99-1922+98,2))	
177	=ACTIVATE.NEXT()	copies over prev
178	=COPY()	values, DOES NOT
179	=ACTIVATE.PREV()	VALUES
180	=PASTE.SPECIAL(3,M52,TRUE,FALSE)	
181	=ACTIVATE.NEXT()	
182	=RETURN()	
183		

	A	B
1		
2		
3		< this macro moves data from CD to PreHform
4		it will handle, streamflow, elev, and storage
5		data, Canadian or US, metric or US units.
6	CDOutputToPreHform	
7	=IF(RIGHT(GET.WINDOW(1),3) = "wk1",,ACTIVATE.NEXT())	ensures macro operates on wk1 file as opposed
8	=IF(RIGHT(GET.WINDOW(1),3) = "wk1",,ACTIVATE.NEXT())	to this macro sheet
9	=IF(RIGHT(GET.WINDOW(1),3) = "wk1",,ACTIVATE.NEXT())	
10	=IF(GET.WINDOW(1) = "utility.xlm", HALT(),)	if only sheet open is this macro sheet, halts mac.
11	=SELECT(A1)	select a1
12	=ZOOM(B0)	shrink data on screen
13	=ReadInitializeDialog()	run macro defined below
14	=ECHO(FALSE)	turns off screen updating
15	=DeleteBlankRows()	run macro defined below
16	=ElevOrSF()	run macro defined below
17	1	
18	=IF(I17 = 2, CalYrToWY(),)	if Can data, run macro defined below
19	=InsertColumn()	run macro defined below
20	=data()()	run macro defined below
21	=MoveToStandardLocation()	run macro defined below
22	=breaks()	run macro defined below
23	=IF(A17 = 2)	if elev data . . .
24	=Elev()	run macro defined below
25	=ElevToTable()	run macro defined below
26	=ElevServit()	run macro defined below
27	=ELSE()	
28	=Ave()	if sf data . . .
29	=AveToTable()	run macro defined below
30	=Servit()	run macro defined below
31	=END.IF()	
32	=COPY(A1,A33)	copies gage number 1 line below
33	14145100	
34	=FORMULA(LEFT(A33,9),A33)	reformats gage number 1 line above
35	=IF(A17 = 1, INPUT("Type name (including path) to save as (e.g. c:\bpg\12308",	asks for save name and path
36	=FORMULA(A35,A37)	
37	FALSE	
38	=IF(A37 = FALSE, RETURN(), SAVE.AS(A37,1,"",FALSE,"",FALSE))	saves PreHform file just created
39	=RETURN()	
40		
41		< this submacro initializes and reads
42		dialog box
43	ReadInitializeDialog	
44	=SET.VALUE(C03,201)	dim various buttons in dialog box
45	=SET.VALUE(C05,205)	.
46	=SET.VALUE(C06,205)	.
47	=SET.VALUE(C07,205)	.
48	=SET.VALUE(C08,205)	.
49	=SET.VALUE(C09,205)	.
50	=SET.VALUE(C010,205)	.
51	=SET.VALUE(C011,205)	.
52	=SET.VALUE(C012,205)	.
53	=SET.VALUE(C013,205)	.
54	=SET.VALUE(C014,205)	.
55	=SET.VALUE(C015,205)	.
56	=SET.VALUE(C016,14)	.
57	=SET.VALUE(C017,11)	.
58	=SET.VALUE(I17,#N/A)	.
59	=DIALOG.BOX(Initialize)	runs dialog box
60	=IF(A59 = FALSE)	if cancel, halts macro
61	=HALT()	
62	=ELSE.IF(AND(A59 = 1,I17 = 1))	if US button and OK button selected . . .
63	=COPY(I07,A87)	puts various defaults in dialog box
64	=COPY(I09,A89)	.
65	=COPY(I011,A89)	.
66	=COPY(I013,A90)	.
67	=COPY(I015,A91)	.
68	=ELSE.IF(AND(A59 = 1,I17 = 2))	if Can and OK button selected . . .
69	=COPY(I07,A111)	puts various defaults in dialog box
70	=COPY(I09,A112)	.
71	=COPY(I011,A113)	.
72	=COPY(I013,A114)	.
73	=COPY(I015,A115)	.
74	=ELSE.IF(I17 = 1)	if just US button (trigger button) selected
75	=SET.VALUE(C03,1)	puts various defaults in dialog box
76	=SET.VALUE(C05,5)	.
77	=SET.VALUE(C06,5)	.
78	=SET.VALUE(C07,5)	.
79	=SET.VALUE(C08,5)	.
80	=SET.VALUE(C09,5)	.
81	=SET.VALUE(C010,5)	.
82	=SET.VALUE(C011,5)	.
83	=SET.VALUE(C012,5)	.
84	=SET.VALUE(C013,5)	.
85	=SET.VALUE(C014,5)	.

	A	B
96	=SET.VALUE(0C915,0)	.
97	30	.
98	28	.
99	5	.
100	1	.
101	2	.
102	=COPY(A87,0107)	.
103	=COPY(A88,0108)	.
104	=COPY(A89,01011)	.
105	=COPY(A90,01013)	.
106	=COPY(A91,01015)	.
107	=GOTO(A89)	reruns dialog box
108	=ELSE.IF(I17=2)	if just Can button (trigger button) selected
109	=SET.VALUE(0C93,1)	puts various defaults in dialog box
110	=SET.VALUE(0C95,5)	.
111	=SET.VALUE(0C96,5)	.
112	=SET.VALUE(0C97,5)	.
113	=SET.VALUE(0C98,5)	.
114	=SET.VALUE(0C99,5)	.
115	=SET.VALUE(0C10,5)	.
116	=SET.VALUE(0C11,5)	.
117	=SET.VALUE(0C12,5)	.
118	=SET.VALUE(0C13,5)	.
119	=SET.VALUE(0C14,5)	.
120	=SET.VALUE(0C15,0)	.
121	18	.
122	10	.
123	13	.
124		.
125	=COPY(A111,0107)	.
126	=COPY(A112,0108)	.
127	=COPY(A113,01011)	.
128	=COPY(A114,01013)	.
129	=COPY(A115,01015)	.
130	=GOTO(A89)	reruns dialog box
131	=END.IF()	
132	=FORMULA("I"&"A"&M7,A124)	puts location of upper leftmost datapoint
133	A30	here
134	=FORMULA("I"&"A"&J9,A128)	puts location of leftmost year
135	A28	here
136	=RETURN()	
137		
138		< this macro deletes blank rows which may occur
139	DeleteBlankRows	in data exported from Earthinfo
140	=SELECT("R500")	
141	=WHILE(AND(ISBLANK(ACTIVE.CELL()),ROW(ACTIVE.CELL())>30))	finds bottom of data
142	=DEFINE.NAME("CurrentRow")	.
143	=IF(MAX((CurrentRow)=0,SELECT("R-1"),BREAK))	.
144	=NEXT()	.
145	=WHILE(OR(ISBLANK(ACTIVE.CELL()),ROW(ACTIVE.CELL())>30))	finds blank row and deletes them
146	=DEFINE.NAME("CurrentRow")	.
147	=IF(MAX((CurrentRow)=0)	.
148	=EDIT.DELETE(2)	.
149	=ELSE()	.
150	=END.IF()	.
151	=SELECT("R-1")	.
152	=NEXT()	.
153	=RETURN()	
154		
155		< this submacro determines whether data is
156		elev or streamflow (contents data is lumped in
157	ElevOrSF	with streamflow for purposes of this macro
158	=FORMULA("I"&"A"&J11,A150)	puts location of leftmost statistic
159	A15	here
160	=SELECT(TEXTREF(A150,TRUE))	selects statistic
161	=COPY(ACTIVE.CELL(),A153)	copies it
162	5 4	here
163	=FORMULA(VALUE(A153),A153)	ensures it is value and not text
164	=IF(OR(A153=60,A153=1,A153=54))	if it is 60, 1, or 54
165	=FORMULA(1,A17)	puts a 1 in cell above identifying it as SF or contents
166	=ELSE.IF(OR(A153=72020,A153=65,A153=2))	if it is 72020, 65, or 2
167	=FORMULA(2,A17)	puts a 2 in cell above identifying it as elev
168	=ELSE.IF(A153=54)	if it is 54
169	=FORMULA(3,A153)	puts a 3 in cell above identifying it as elev
170	=ELSE()	
171	=ALERT("That is an unrecognized statistic!",2)	otherwise alerts user of unknown stat. and
172	=HALT()	halts macro
173	=END.IF()	
174	=RETURN()	
175		

A	B
168	< this macro converts calendar year data to
169	water year if necessary (Canadians record their
170	data in calendar year)
171	= SELECT (TEXTREF(A124,TRUE))
172	= SELECT ("R:R191")
173	= INSERT (2)
174	= SELECT ("R(386)C:R(457)C(85)")
175	= CUT ()
176	= SELECT (TEXTREF(A124,TRUE))
177	= SELECT ("RC(1)")
178	= PASTE ()
179	= RETURN ()
180	< this macro inserts column for dates
181	InsertColumn
182	= SELECT ("C1")
183	= INSERT (1)
184	= SELECT (TEXTREF(A124,TRUE))
185	= RETURN ()
186	
187	< this macro types dates in column 1
188	Dates
189	= FORMULA ("10/1/91")
190	= FORMAT.NUMBER ("d-mmm")
191	= SELECT ("R(1)C")
192	= FORMULA ("= R(1)C + 1")
193	= COPY ()
194	= SELECT ("RC:R(384)C")
195	= PASTE ()
196	= FORMAT.NUMBER ("d-mmm")
197	= CANCEL.COPY ()
198	= SELECT. END (3)
199	= RETURN ()
200	
201	< this macro recognizes different Earthinfo
202	export formats and moves data so that
203	Oct 1 of first year is in row 30 - an arbitrary standard
204	MoveToStandardLocation
205	= SELECT (IB1)
206	= SELECT. END (2)
207	= SELECT ("R(400)C")
208	= DEFINE.NAME ("LastCell")
209	= SELECT (TEXTREF(A124,TRUE))
210	= SELECT (ACTIVE.CELL ());LastCell
211	= CUT ()
212	= SELECT (IA30)
213	= PASTE ()
214	= RETURN ()
215	
216	
217	< this macro inserts two row blanks after 15th and
218	end of every month
219	breaks
220	= SELECT ("R386:R387")
221	= INSERT (2)
222	= SELECT ("R381:R382")
223	= INSERT (2)
224	= SELECT ("R386:R387")
225	= INSERT (2)
226	= SELECT ("R350:R351")
227	= INSERT (2)
228	= SELECT ("R335:R336")
229	= INSERT (2)
230	= SELECT ("R319:R320")
231	= INSERT (2)
232	= SELECT ("R304:R305")
233	= INSERT (2)
234	= SELECT ("R289:R290")
235	= INSERT (2)
236	= SELECT ("R274:R275")
237	= INSERT (2)
238	= SELECT ("R258:R259")
239	= INSERT (2)
240	= SELECT ("R243:R244")
241	= INSERT (2)
242	= SELECT ("R228:R229")
243	= INSERT (2)
244	= SELECT ("R213:R214")
245	= INSERT (2)
246	= SELECT ("R197:R198")
247	= INSERT (2)
248	= SELECT ("R182:R183")
249	= INSERT (2)
250	= SELECT ("R168:R169")
251	= INSERT (2)
252	= SELECT ("R153:R154")
253	= INSERT (2)
254	= SELECT ("R137:R138")
255	= INSERT (2)
256	= SELECT ("R122:R123")

	A	B
256	=INSERT(2)	
257	=SELECT("R106:R107")	
258	=INSERT(2)	
259	=SELECT("R91:R92")	
260	=INSERT(2)	
261	=SELECT("R79:R77")	
262	=INSERT(2)	
263	=SELECT("R61:R62")	
264	=INSERT(2)	
265	=SELECT("R45:R46")	
266	=INSERT(2)	
267	=SELECT(!A30)	
268	=RETURN()	
269		
270		
271		
272		
273		
274		< this macro is run if data is elev; it takes either
275		the 15th day elev or the end of month elev
276		NOTE:
277		!!!!!!If either of those is missing, it returns 0!!!!!!
278	Elev	
279	=SELECT("R45C2")	
280	=FORMULA("=R[-1]C")	
281	=COPY()	
282	=SELECT("R45C2:R45C82")	
283	=PASTE()	
284	=SELECT("R63C2:R63C82")	
285	=PASTE()	
286	=SELECT("R80C2:R80C82")	
287	=PASTE()	
288	=SELECT("R97C2:R97C82")	
289	=PASTE()	
290	=SELECT("R114C2:R114C82")	
291	=PASTE()	
292	=SELECT("R132C2:R132C82")	
293	=PASTE()	
294	=SELECT("R149C2:R149C82")	
295	=PASTE()	
296	=SELECT("R167C2:R167C82")	
297	=PASTE()	
298	=SELECT("R184C2:R184C82")	
299	=PASTE()	
300	=SELECT("R217C2:R217C82")	
301	=PASTE()	
302	=SELECT("R235C2:R235C82")	
303	=PASTE()	
304	=SELECT("R252C:R252C(80)")	
305	=PASTE()	
306	=SELECT("R269C2:R269C82")	
307	=PASTE()	
308	=SELECT("R286C2:R286C82")	
309	=PASTE()	
310	=SELECT("R304C2:R304C82")	
311	=PASTE()	
312	=SELECT("R321C2:R321C82")	
313	=PASTE()	
314	=SELECT("R338C2:R338C82")	
315	=PASTE()	
316	=SELECT("R355C2:R355C82")	
317	=PASTE()	
318	=SELECT("R373C2:R373C82")	
319	=PASTE()	
320	=SELECT("R390C2:R390C82")	
321	=PASTE()	
322	=SELECT("R408C2:R408C82")	
323	=PASTE()	
324	=SELECT("R425C2:R425C82")	
325	=PASTE()	
326	=SELECT("R442C2:R442C82")	
327	=PASTE()	
328	=SELECT("R200C2")	
329	=CANCEL.COPY()	
330	=FORMULA("=R[-2]C")	
331	=COPY()	
332	=SELECT("R200C2:R200C82")	
333	=PASTE()	
334	=COPY("R199C2:R199C82")	
335	=SELECT("R200C2")	
336	=PASTE.SPECIAL(1,1,TRUE,FALSE)	
337	=SELECT(!A30)	
338	=RETURN()	
339		

	A	B
340		
341		
342		
343		< this macro takes elev calculated
344		and moves them to a table
345		beginning in A525
346		
347	ElevToTable	
348	= SELECT(TEXTREF(A126,TRUE))	selects years
349	= SELECT("RC11")	
350	= SELECT("RC:RC105")	
351	= COPY()	copies years
352	= SELECT("R625C1")	passes dates to row 525
353	= PASTE.SPECIAL(1,1,FALSE,TRUE)	
354	= SELECT("R625C1")	passes dates to row 525
355	= PASTE.SPECIAL(1,1,FALSE,TRUE)	
356	= SELECT("R623C1")	puts headings on tables
357	= IF(OR(A#153=2,A#153=72020),FORMULA("End of Month Elevations Above MSL"),FOR	.
358	= SELECT("R624C2")	.
359	= TableHeading()	.
360	= SELECT("R623C1")	.
361	= IF(OR(A#153=2,A#153=72020),FORMULA("15 Day Elevations Above MSL"),FORMULA	.
362	= SELECT("R624C2")	.
363	= TableHeading()	.
364	= SELECT("R45C2:R45C82,R60C2:R60C82,R114C2:R114C82,R149C2:R149C82,R184C2:R1	selects half month elevations
365	= COPY()	and passes them into table
366	= SELECT("R625C2:R625C13")	.
367	= PASTE.SPECIAL(3,1,FALSE,TRUE)	.
368	= FORMAT.NUMBER("0")	rounds numbers to nearest whole number
369	= SELECT("R63C2:R63C82,R97C2:R97C82,R132C2:R132C82,R167C2:R167C82,R200C2:R2	selects half month elevations
370	= COPY()	and passes them into table
371	= SELECT("R625C2:R625C13")	.
372	= PASTE.SPECIAL(3,1,FALSE,TRUE)	.
373	= FORMAT.NUMBER("0")	rounds numbers to nearest whole number
374	= SELECT("R30C1")	
375	= RETURN()	
376		
377		< Saves elev data to its own
378		spreadsheet and transforms
379		data from metric to Eng
380		if nec.
381	ElevSaveIt	
382	= COPY(TEXTREF("lb"ٍ,TRUE),I#A#521)	copies station number
383	= COPY(TEXTREF("lb"ٍ,TRUE),I#A#621)	copies station number
384	= COPY(TEXTREF("lb"ُ,TRUE),I#A#522)	copies station name
385	= COPY(TEXTREF("lb"ُ,TRUE),I#A#622)	copies station name
386	= SELECT(I#A#28)	
387	= IF(ISBLANK(ACTIVE.CELL()),GOTO(A390),)	selects data table of data from wk1 file and
388	= SELECT("R6:11C")	puts it into its own sheet
389	= SELECT.END(4)	.
390	= SELECT("RC112")	.
391	= DEFINE.NAME("end")	.
392	= SELECT(I#A521:end)	.
393	= COPY()	.
394	= NEW(1)	.
395	= PASTE()	.
396	= IF(I17=2,CanMetToEng(),)	if Can data runs conversion macro defined below
397	= CANCEL.COPY()	
398	= ACTIVATE.NEXT()	
399	= CLOSE(FALSE)	closes wk1 file
400	= ACTIVATE.PREV()	
401	= RETURN()	
402		
403		< transforms metric to Eng. units
404	CanMetToEng	
405	= IF(A17=1)	if elev data, mult by 3.28,
406	= FORMULA(3.28,A412)	
407	= ELSE,IF(A17=2)	
408	= FORMULA(35.315,A412)	if of mult by 35.315
409	= ELSE()	
410	= FORMULA(1,A412)	if storage multiply by one
411	= END.IF()	
412	35.315	mult factor
413	= SELECT(I#B5)	selects whole month to multiply
414	= DEFINE.NAME("top")	.
415	= SELECT("RC:1")	.
416	= SELECT.END(4)	.
417	= SELECT("RC112")	.
418	= SELECT(I#top:ACTIVE.CELL())	.
419	= COPY(A412)	.
420	= PASTE.SPECIAL(1,4,TRUE,FALSE)	.
421	= FORMAT.NUMBER("0")	rounds to nearest whole number
422	= SELECT(I#B105)	selects half month to multiply
423	= DEFINE.NAME("top")	.
424	= SELECT("RC:1")	.
425	= SELECT.END(4)	.
426	= SELECT("RC112")	.
427	= SELECT(I#top:ACTIVE.CELL())	.
428	= COPY(A412)	.
429	= PASTE.SPECIAL(1,4,TRUE,FALSE)	.
430	= FORMAT.NUMBER("0")	rounds to nearest whole number

	A	B
431	=IF(A17=1)	if af data converts number 2 half month ave
432	=SELECT(I18208)	.
433	=DEFINE.NAME("top")	.
434	=SELECT("RC1:1")	.
435	=SELECT.END(4)	.
436	=SELECT("RC12:1")	.
437	=SELECT(I1top:ACTIVE.CELL())	.
438	=COPY(A412)	.
439	=PASTE.SPECIAL(1,4,TRUE,FALSE)	.
440	=FORMAT.NUMBER("0")	.
441	=ELSE()	.
442	=END.IF()	.
443	=IF(OR(A17=1,A17=2),FORMULA("English units",I181),)	puts formula english units to notify user
444	=SELECT(I1A1)	
445	=RETURN()	
446		
447		
448		< this macro is run if data is sh; it both
449		the 15th day ave or the end of month ave
450	Ave	
451	=SELECT("R45C2")	
452	=FORMULA("=AVERAGE(R1:15)C:R1:1)C")	
453	=COPY()	
454	=SELECT("R45C2:R45C82")	
455	=PASTE()	
456	=SELECT("R80C2:R80C82")	
457	=PASTE()	
458	=SELECT("R114C2:R114C82")	
459	=PASTE()	
460	=SELECT("R149C2:R149C82")	
461	=PASTE()	
462	=SELECT("R184C2:R184C82")	
463	=PASTE()	
464	=SELECT("R217C2:R217C82")	
465	=PASTE()	
466	=SELECT("R252C2:R252C82")	
467	=PASTE()	
468	=SELECT("R286C2:R286C82")	
469	=PASTE()	
470	=SELECT("R321C2:R321C82")	
471	=PASTE()	
472	=SELECT("R355C2:R355C82")	
473	=PASTE()	
474	=SELECT("R390C2:R390C82")	
475	=PASTE()	
476	=SELECT("R425C2:R425C82")	
477	=PASTE()	
478	=SELECT("R63C2")	
479	=FORMULA("=AVERAGE(R1:18)C:R1:1)C")	
480	=COPY()	
481	=SELECT("R63C2:R63C82")	
482	=PASTE()	
483	=SELECT("R132C2:R132C82")	
484	=PASTE()	
485	=SELECT("R167C2:R167C82")	
486	=PASTE()	
487	=SELECT("R235C2:R235C82")	
488	=PASTE()	
489	=SELECT("R304C2:R304C82")	
490	=PASTE()	
491	=SELECT("R373C2:R373C82")	
492	=PASTE()	
493	=SELECT("R408C2:R408C82")	
494	=PASTE()	
495	=SELECT("R97C2")	
496	=FORMULA("=AVERAGE(R1:15)C:R1:1)C")	
497	=COPY()	
498	=SELECT("R97C2:R97C82")	
499	=PASTE()	
500	=SELECT("R269C2:R269C82")	
501	=PASTE()	
502	=SELECT("R338C2:R338C82")	
503	=PASTE()	
504	=SELECT("R442C2:R442C82")	
505	=PASTE()	
506	=SELECT("R200C2")	
507	=FORMULA("=AVERAGE(R1:14)C:R1:1)C")	
508	=COPY()	
509	=SELECT("R200C2:R200C82")	
510	=PASTE()	
511	=SELECT("R64C2")	
512	=FORMULA("=AVERAGE(R1:17)C:R1:2)C:R1:34)C:R1:20)C")	
513	=COPY()	
514	=SELECT("R64C2:R64C82")	
515	=PASTE()	
516	=SELECT("R133C2:R133C82")	
517	=PASTE()	
518	=SELECT("R168C2:R168C82")	
519	=PASTE()	
520	=SELECT("R236C2:R236C82")	
521	=PASTE()	
522	=SELECT("R305C2:R305C82")	

	A	B
522	=PASTE()	
523	=SELECT("R374C2:R374C82")	
524	=PASTE()	
525	=SELECT("R409C2:R409C82")	
526	=PASTE()	
527	=SELECT("R88C2")	
528	=FORMULA("=AVERAGE(R1:18 C:R1:2 C:R1:33 C:R1:19 C)")	
529	=COPY()	
530	=SELECT("R88C2:R88C82")	
531	=PASTE()	
532	=SELECT("R270C2:R270C82")	
533	=PASTE()	
534	=SELECT("R338C2:R338C82")	
535	=PASTE()	
536	=SELECT("R443C2:R443C82")	
537	=PASTE()	
538	=SELECT("R201C2")	
539	=FORMULA("=AVERAGE(R1:19 C:R1:2 C:R1:32 C:R1:18 C)")	
540	=COPY()	
541	=SELECT("R201C2:R201C82")	
542	=PASTE()	
543	=SELECT(A30)	
544	=RETURN()	
545		<this macro takes ave's calculated
546		and moves them to a table
547		beginning in A525
548		copies years
549		
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	A	B
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590		< Types table headings
591	TableHeading	
592	=FORMULA("Oct")	(types the month starting with Oct
593	=SELECT("RC11")	.
594	=FORMULA("Nov")	.
595	=SELECT("RC11")	.
596	=FORMULA("Dec")	.
597	=SELECT("RC11")	.
598	=FORMULA("Jan")	.
599	=SELECT("RC11")	.
600	=FORMULA("Feb")	.
601	=SELECT("RC11")	.
602	=FORMULA("Mar")	.
603	=SELECT("RC11")	.
604	=FORMULA("Apr")	.
605	=SELECT("RC11")	.
606	=FORMULA("May")	.
607	=SELECT("RC11")	.
608	=FORMULA("Jun")	.
609	=SELECT("RC11")	.
610	=FORMULA("Jul")	.
611	=SELECT("RC11")	.
612	=FORMULA("Aug")	.
613	=SELECT("RC11")	.
614	=FORMULA("Sep")	.
615	=RETURN()	
616		
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618		
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629		
630		
631		< Saves end month and 15 day avgs
632		table to separate spreadsheet
633		
634	Savet	
635	=COPY(TEXTREF("B"&B13,TRUE),I0A0521)	copies station number
636	=COPY(TEXTREF("B"&B13,TRUE),I0A0521)	copies station number
637	=COPY(TEXTREF("B"&B15,TRUE),I0A0522)	copies station name
638	=COPY(TEXTREF("B"&B15,TRUE),I0A0522)	copies station name
639	=SELECT(I0A720)	selects data table of data from wrt1 file and
640	=IF(ISBLANK(ACTIVE.CELL()),GOTO(A043),)	puts it into its own sheet
641	=SELECT("R11C")	
642	=SELECT.END(4)	
643	=SELECT("RC112")	.
644	=DEFINE.NAME("end")	.
645	=SELECT(I0A521:end)	.
646	=COPY()	.
647	=NEW()	.
648	=PASTE()	.
649	=IF(I17=2,CanMetToEng(),)	
650	=CANCEL_COPY()	if Can data run conversion macro defined below
651	=ACTIVATE.NEXT()	
652	=CLOSE(FALSE)	closes wrt1 file
653	=ACTIVATE.PREV()	
654	=RETURN()	
655		

	K	L	M
1		Don't	
2		write in	
3		the	
4	MoveToHform	column	
5	=ECHO(FALSE)		
6	=ALERT("This macro's purpose is to move data to Hform. Only the macro sheet and the data sh		
7	=IF(K9=FALSE,RETURN(),)		
8	=INPUT("If you wish to move data to new Hform, press 'Cancel'. If you want to move data to a	FALSE	
9	=FORMULA(K9,L9)		
10	=IF(L9=FALSE,GOTO(K11),GOTO(K14))		
11	=OPEN("c:\bp\macro\hform.xls")		
12	=ACTIVATE.NEXT()		
13	=GOTO(K10)		
14	=OPEN(L9)		
15	=ACTIVATE.NEXT()		
16	=INPUT("Type month the data begins with (the 3 letter abbreviation ONLY) or press 'Cancel'." 3		
17	=INPUT("Enter WATER YEAR data begins with (e.g., Oct. 1929 is actually Oct of water year 19		
18	=INPUT("Enter month the data ends with (the 3 letter abbreviation ONLY)." 3,"End Month")		
19	=INPUT("Enter WATER YEAR the data ends with." 3,"End Year")		
20	=IF(OR(K10=FALSE,K17=FALSE,K18=FALSE,K19=FALSE),RETURN(),)		
21	=SELECT(IA1)		
22	=ACTIVATE.PREV()		
23	=SELECT(IA1)		
24	=ACTIVATE.NEXT()		
25	=FORMULA.FIND(K10,2,1,1)		find start month
26	=COLUMN(ACTIVE.CELL())	2	record start column
27	=FORMULA(K26,L26)		
28	=FORMULA.FIND(K17,1,1,1)		find start year
29	=ROW(ACTIVE.CELL())	8	record start row
30	=FORMULA(K29,L29)		
31	=FORMULA.FIND(K18,2,1,2)		find end month
32	=COLUMN(ACTIVE.CELL())	13	record end column
33	=FORMULA(K32,L32)		
34	=FORMULA.FIND(K19,1,1,1)		find end year
35	=ROW(ACTIVE.CELL())	18	record end row
36	=FORMULA(K35,L35)		
37	=IF(OR(K25=FALSE,K28=FALSE,K31=FALSE,K34=FALSE),RETURN(),)		ends if no match
38	=FORMULA.GOTO(INDEX(IA01:IDW0300,0L029,0L029))		go to first cell of data
39	=DEFINE.NAME("begin")		block
40	=IF(AND(0K019-0K017=0,NOT(0K018="sep")),FORMULA.GOTO(INDEX(IA01:IDW0300,0L		
41	=SELECT(Ifbegin:ACTIVE.CELL())		
42	=GOTO(K40)		
43	=SELECT.END(2)		selects first partial
44	=IF(ISBLANK(ACTIVE.CELL()),SELECT.END(1),)		year
45	=SELECT(Ifbegin:ACTIVE.CELL())		
46	=ACTIVATE.PREV()		
47	=FORMULA(0K017-1922,0L047)	28	calc. first part. yr. start place on Hform
48	=FORMULA.GOTO(INDEX(IA01:IDW0300,0L047,0L029))		finds appropriate
49	=ACTIVATE.NEXT()		place on Hform
50	=COPY()		copies partial year
51	=ACTIVATE.PREV()		date
52	=PASTE.SPECIAL(3,1,TRUE,FALSE)		paste partial year
53	=ACTIVATE.NEXT()		to Hform
54	=CANCEL.COPY()		
55	=IF(0K018-0K017=0,GOTO(K07),)		cond for only 1 year
56	=FORMULA(0L029+1,0L056)	7	calc first wh. yr. start on ssgs sheet
57	=FORMULA.GOTO(INDEX(IA01:IDW0300,0L056,2))		go to first row of whole yr.
58	=DEFINE.NAME("top")		
59	=IF(OR(0K018="sep",0K018-0K017=1),FORMULA(0L035,0L059),FORMULA(0L035-1,0L059))	18	if date end in Sep select
60	=IF(0K018-0K017=1,FORMULA.GOTO(INDEX(IA01:IDW0300,0L059,0L032)),FORMULA.GO		
61	=DEFINE.NAME("bottom")		
62	=SELECT(Iftop:Ifbottom)		
63	=ACTIVATE.PREV()		
64	=FORMULA(0K017-1921,0L064)	27	calc first wh. yr start on Hform
65	=FORMULA.GOTO(INDEX(IA01:IDW0300,0L064,2))		sel. Hform 1 below
66	=ACTIVATE.NEXT()		partial year
67	=COPY()		
68	=ACTIVATE.PREV()		
69	=PASTE.SPECIAL(3,1,TRUE,FALSE)		
70	=ACTIVATE.NEXT()		
71	=CANCEL.COPY()		
72	=IF(OR(0K018-0K017=1,0K018="sep"),GOTO(K07),)		
73	=FORMULA.GOTO(INDEX(IA01:IDW0300,0L035,0L032))		if end date is Sep done
74	=DEFINE.NAME("begin")		go to last month&yr.
75	=SELECT.END(1)		
76	=SELECT("RC(1)")		
77	=SELECT(Ifbegin:ACTIVE.CELL())		
78	=ACTIVATE.PREV()		
79	=FORMULA(0K019-1922,0L079)	10	calc last part. yr start on Hform
80	=FORMULA.GOTO(INDEX(IA01:IDW0300,0L079,2))		paste last part. yr. to
81	=ACTIVATE.NEXT()		Hform
82	=COPY()		
83	=ACTIVATE.PREV()		
84	=PASTE.SPECIAL(3,1,TRUE,FALSE)		
85	=ACTIVATE.NEXT()		
86	=CANCEL.COPY()		
87	=SELECT(IA1)		
88	=FORMULA.GOTO(INDEX(IA01:IDW0300,0L029+100,0L029))		go to first cell of data

	K	L	M
98	=DEFINE.NAME("begin")		block
99	=IF(AND(\$K\$19:\$K\$17=0,NOT(\$K\$18="esp")),FORMULA.GOTO(INDEX(10A\$1:10DW\$300,\$L		
100	=SELECT(10begin:ACTIVE.CELL())		
101	=GOTO(K99)		
102	=SELECT.END(2)		
103	=IF(ISBLANK(ACTIVE.CELL()),SELECT.END(1),)		select first partial
104	=SELECT(10begin:ACTIVE.CELL())		year
105	=ACTIVATE.PREV()		
106	=FORMULA.GOTO(INDEX(10A\$1:10DW\$300,\$L\$47+98,\$L\$26))		calc. first part. yr. start place on Hform
107	=ACTIVATE.NEXT()		finds appropriate
108	=COPY()		place on Hform
109	=ACTIVATE.PREV()		copies partial year
110	=PASTE.SPECIAL(3,1,TRUE,FALSE)		27018.3333333333
111	=ACTIVATE.NEXT()		paste partial year
112	=CANCEL.COPY()		to Hform
113	=IF(\$K\$19:\$K\$17=0,GOTO(K122),)		
114	=FORMULA(\$L\$29+101,\$L\$105)	107	
115	=FORMULA.GOTO(INDEX(10A\$1:10DW\$300,\$L\$105,2))		calc first wh. yr. start on gape sheet
116	=DEFINE.NAME("top")		go to
117	=IF(OR(\$K\$18="esp", \$K\$19:\$K\$17=1),FORMULA(\$L\$35+100,\$L\$108),FORMULA(\$L\$35-1	118	first row of whole yr.
118	=IF(\$K\$19:\$K\$17=1,FORMULA.GOTO(INDEX(10A\$1:10DW\$300,\$L\$108,\$L\$32)),FORMULA.G		if date end in Sep select
119	=DEFINE.NAME("bottom")		wh. rect. if not 2 steps
120	=SELECT(10top:10bottom)		
121	=ACTIVATE.PREV()		
122	=FORMULA(\$K\$17-1823,\$L\$113)	125	
123	=FORMULA.GOTO(INDEX(10A\$1:10DW\$300,\$L\$113,2))		calc first wh. yr start on Hform
124	=ACTIVATE.NEXT()		est. Hform 1 below
125	=COPY()		partial year
126	=ACTIVATE.PREV()		
127	=PASTE.SPECIAL(3,1,TRUE,FALSE)		
128	=ACTIVATE.NEXT()		
129	=CANCEL.COPY()		
130	=IF(OR(\$K\$19:\$K\$17=1,\$K\$18="esp"),GOTO(K122),GOTO(\$K\$127))		
131	=FORMULA.GOTO(10A\$1)		
132	=ACTIVATE.PREV()		
133	=FORMULA.GOTO(10A\$1)		
134	=ACTIVATE.NEXT()		
135	=GOTO(\$K\$142)		
136	=FORMULA.GOTO(INDEX(10A\$1:10DW\$300,\$L\$35+100,\$L\$32))		if end date is Sep done
137	=DEFINE.NAME("begin")		go to last month&yr.
138	=SELECT.END(1)		
139	=SELECT("RC11")		
140	=SELECT(10begin:ACTIVE.CELL())		
141	=ACTIVATE.PREV()		
142	=FORMULA(\$K\$19-1824,\$L\$133)	108	
143	=FORMULA.GOTO(INDEX(10A\$1:10DW\$300,\$L\$133,2))		calc last part. yr start on Hform
144	=ACTIVATE.NEXT()		paste last part. yr. to
145	=COPY()		Hform
146	=ACTIVATE.PREV()		
147	=PASTE.SPECIAL(3,1,TRUE,FALSE)		
148	=FORMULA.GOTO(10A\$1)		
149	=ACTIVATE.NEXT()		
150	=FORMULA.GOTO(10A\$1)		
151	=ACTIVATE.PREV()		
152	=PasteSpkToHalf()		
153	=IF(\$B=FALSE,GOTO(HEADINGS),)		
154	=INPUT("Type name (including path) to save as (e.g. c:\lbpai3-author3h.xls) or press 'Cancel' if y		
155	=FORMULA(K145,K147)		
156	FALSE		
157	=IF(K147=FALSE,RETURN(),SAVE.AS(K147,1,"",FALSE,"",FALSE))		
158	=RETURN()		
159			
160			
161			
162			
163	PasteSpkToHalf		
164	=ECHO(FALSE)		
165	=SELECT(10K\$104)		
166	=DEFINE.NAME("topHalf")		
167	=SELECT(10AB\$4)		
168	=DEFINE.NAME("top")		
169	=FOR("Count",1,12)		
170	=SELECT.END(4)		
171	=SELECT("R1-14C")		
172	=COPY(10top:ACTIVE.CELL())		
173	=SELECT(10topHalf)		
174	=PASTE.SPECIAL(3,1,TRUE,FALSE)		
175	=IF(Count=3,SELECT("R11C-11"),SELECT("RC11"))		
176	=DEFINE.NAME("topHalf")		
177	=SELECT(10top)		
178	=SELECT("RC2")		
179	=DEFINE.NAME("top")		
180	=NEXT()		
181	=DELETE.NAME("top")		
182	=DELETE.NAME("topHalf")		
183	=SELECT(10A1)		
184	=RETURN()		

	Q	P	Q
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6			HONGS NOTES
7	=INPUT("Enter project identifier (3 char.):",3,"Site code?")	asks for 3 char site abbr.	=COPY(\$O\$9,\$O\$11)
8	=FORMULA(O7,O9)		=COPY(\$O\$12,\$O\$11)
9	SLA		=IF(O12="3H",GOTO(Q10),GOTO(Q12))
10	=INPUT("Enter data type (2 or 3 char.):",3,"Data type?")	asks for 2 or 3 char data type	=COPY(\$CZ\$2,\$Q\$4)
11	=FORMULA(O10,O12)		=GOTO(\$Q\$44)
12	3H		=IF(O12="3F",GOTO(Q13),GOTO(Q15))
13	=FORMULA(UPPER(O9),O9)	capitalizes site and	=COPY(\$CZ\$3,\$Q\$4)
14	=FORMULA(UPPER(O12),O12)	datatype	=GOTO(\$Q\$44)
15	=IF(OR(O7=FALSE,O10=FALSE),RETURN(),GOTO(Q16))	if entry is not made for site code or data type, halt	=IF(OR(O12="3B",O12="3P",O12="3G",GOTO(Q16),GOTO(Q1
16	=FORMULA.GOTO(Q82)	gets top of Proj List	=COPY(\$CZ\$4,\$Q\$4)
17	=WHILE(\$NOT(O7=ACTIVE.CELL()))	finds 3 char site code	=GOTO(\$Q\$44)
18	=SELECT("R11C7")	in Proj List	=IF(O12="3B",GOTO(Q19),GOTO(Q21))
19	=IF(ISBLANK(ACTIVE.CELL()),GOTO(Q46))		=COPY(\$CZ\$5,\$Q\$4)
20	=NEXT()		=GOTO(\$Q\$44)
21	=SELECT("RC41")		=IF(O12="3A",GOTO(Q22),GOTO(Q24))
22	=COPY(ACTIVE.CELL(),O31)	copies page # to below	=COPY(\$CZ\$6,\$Q\$4)
23	=SELECT("RC11")		=GOTO(\$Q\$44)
24	=COPY(ACTIVE.CELL(),O32)	copies site name	=IF(O12="3M",GOTO(Q26),GOTO(Q27))
25	=SELECT("RC11")		=COPY(\$CZ\$7,\$Q\$4)
26	=COPY(ACTIVE.CELL(),O33)	copies river	=GOTO(\$Q\$44)
27	=SELECT("RC11")		=IF(O12="3PL",GOTO(Q28),GOTO(Q30))
28	=COPY(ACTIVE.CELL(),O34)	copies river mile	=COPY(\$CZ\$8,\$Q\$4)
29	=SELECT("RC11")		=GOTO(\$Q\$44)
30	=COPY(ACTIVE.CELL(),O35)	copies DA	=IF(O12="3D",GOTO(Q31),GOTO(Q33))
31			=COPY(\$CZ\$9,\$Q\$4)
32	ALTERNATIVE 4 DAM SITE		=GOTO(\$Q\$44)
33	SLAVE		=IF(O12="3D",GOTO(Q34),GOTO(Q36))
34			=COPY(\$CZ\$10,\$Q\$4)
35			=GOTO(\$Q\$44)
36	=ACTIVATE.NEXT()		=IF(O12="3E",GOTO(Q37),GOTO(Q39))
37	=COPY(O32,\$Q\$2)		=COPY(\$CZ\$11,\$Q\$4)
38	=COPY(O31,\$Q\$3)		=GOTO(\$Q\$44)
39	=COPY(O33,\$Q\$5)		=IF(O12="3EE",GOTO(Q40),GOTO(Q44))
40	=COPY(O34,\$Q\$6)		=COPY(\$CZ\$12,\$Q\$4)
41	=COPY(O35,\$Q\$7)		=GOTO(\$Q\$44)
42	=FORMULA(O44,O12,Q1)		=ALERT("DATA TYPE code not found. Do you want to change ent
43	=SELECT(Q1)		=IF(O42=TRUE,GOTO(Q8),GOTO(\$Q\$44))
44	=GOTO(HONGS NOTES)		=SELECT("R1:R16384")
45	=ALERT("Site code not found; do you wish to change your entry?")		=FORMAT.FONT("MS Sans Serif",10,FALSE,FALSE,FALSE,FALSE)
46	=IF(O45=TRUE,GOTO(Q7),RETURN())		=SELECT("R1C1")
47	=RETURN()		=INPUT("Type name (including path) to save as (e.g. c:\bpe3-afu
48			=FORMULA(O47,Q49)
49			FALSE
50			=IF(O48=FALSE,RETURN(),SAVE.AS(O48,1,"FALSE","FALSE"))
51			=RETURN()
52			
53			
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	S	T
7	PRNTVWY PowerPublish	
8	2	1 prints water yr, 2 power yr
9	=DIALOG.BOX(Print)	runs dialog box defined to the right
10	=IF(S8=FALSE,RETURN())	if 'Cancel', halts macro
11	=ECHO(FALSE)	turns off screen updating
12	=IF(AND(\$AA\$12=TRUE,\$AA\$13=TRUE))	if both power year and water year,
13	=PrintWaterYear()	prints water year
14	=PrintPowerYear()	prints power year
15	=ELSE,IF(AND(\$AA\$12=TRUE,\$AA\$13=FALSE))	if only water year,
16	=PrintWaterYear()	prints water year
17	=ELSE,IF(AND(\$AA\$12=FALSE,\$AA\$13=TRUE))	if only power year
18	=PrintPowerYear()	prints power year
19	=ELSE()	otherwise halts macro
20	=HALT()	
21	=END,IF()	
22	=RETURN()	
23		
24	PrintWaterYear	
25	=FORMULA(1,\$S\$8)	
26	=MainBody()	
27	=RETURN()	
28		
29	PrintPowerYear	
30	=FORMULA(2,\$S\$8)	
31	=MainBody()	
32	=RETURN()	
33		
34		
35	MainBody	
36	=PasteToNewSheet()	runs macro defined below
37	=PrintHeadings()	runs macro defined below
38	=IF(OR(\$S\$116="F",\$S\$116="P",\$S\$116="G"))	don't do AVG's for "F" sheets
39	=ELSE()	
40	=AveForPrint()	runs macro defined below
41	=END,IF()	
42	=InsertLines()	runs macro defined below
43	=DeleteUnneededYears()	runs macro defined below
44	=PrintSetup()	runs macro defined below
45	=RETURN()	
46		
47		
48		
49		
50		
51		
52	PasteToNewSheet	
53	=SELECT(\$A\$6:\$N\$82)	select area to be printed
54	=COPY()	copies it
55	=NEW()	opens new worksheet
56	=ZOOM(50)	shrinks screen
57	=SELECT(\$A\$4)	selects appropriate place
58	=PASTE.SPECIAL(3,1,TRUE,FALSE)	pastes only values
59	=ACTIVATE.NEXT()	
60	=COPY()	copies formats
61	=ACTIVATE.PREV()	
62	=PASTE.SPECIAL(4,1,TRUE,FALSE)	pastes formats to new sheet
63	=SELECT(\$B\$4:\$N\$4)	aligns months to right
64	=ALIGNMENT(4)	
65	=ACTIVATE.NEXT()	
66	=COPY(\$Q\$1:\$Q\$7)	copy headings stuff from hform
67	=ACTIVATE.PREV()	
68	=SELECT(\$AA\$1)	paste it to a1
69	=PASTE()	
70	=IF(\$S\$8=2,PowerYearFormat(),)	if necessary converts to power year
71	=RETURN()	
72		
73		< if power year runs this one
74		
75	PowerYearFormat	
76	=SELECT(\$B\$1:\$N\$100)	inserts two blank columns
77	=CUT()	
78	=SELECT(\$D\$1)	
79	=PASTE()	
80	=SELECT(\$N\$4)	selects top of August
81	=DEFINE.NAME("top")	finds bottom of Sep
82	=SELECT("RC(1)")	
83	=SELECT.END(4)	
84	=SELECT((top:ACTIVE.CELL())	
85	=CUT()	cuts it
86	=SELECT(\$B\$5)	moves Aug-Sep in front of Oct
87	=PASTE()	
88	=DELETE.NAME("top")	delete the name "top" for later use
89	=SELECT(\$B\$5:\$C\$5)	moves the actual words Aug & "Sep"

	S	T
90	=CUT()	to appropriate place
91	=SELECT(I18B94)	.
92	=PASTE()	.
93	=COPY(\$Y\$703:\$Y\$778)	copies power year avg. formulas
94	=SELECT(I18N66)	.
95	=PASTE()	pastes them on print sheet
96	=COPY()	.
97	=PASTE.SPECIAL(3,1,TRUE,FALSE)	.
98	=SELECT("RC-1")	.
99	=SELECT.END(4)	.
100	=SELECT("R11C1")	.
101	=CLEAR()	.
102	=FORMULA("AVE.",I18N64)	types "AVE"
103	=SELECT(I18N64)	.
104	=ALIGNMENT(4)	aligns "AVE" right
105	=RETURN()	.
106		
107		
108	PrintHeadings	
109	=SELECT(I18A95)	find bottom left corner of sheet to be printed
110	=SELECT.END(4)	.
111	=DEFINE.NAME("BottomLeftDelete")	defines it accordingly
112	=SELECT("R16C")	.
113	=DEFINE.NAME("BottomLeft")	.
114	=FORMULA(MID(I18AA61,5,1),I18S115)	determines what sort of data it is
115	D	.
116	=COPY(I18AA61,ACTIVE.CELL())	copy ???37 to bottom left
117	=SELECT(I18D61)	copy site name to d1
118	=COPY(I18AA62,ACTIVE.CELL())	.
119	=COPY(I18AA64,I18A62)	copy description to e2
120	=IF(I18S115="D",GOTO(I18I36),)	if depictions, only puts some of headings stuff
121	=FORMULA("USGS #",I18A61)	type "USGS #" to e1
122	=FORMULA(""&I18AA63,I18B61)	copy USGS # to b1
123	=COPY(I18AA65,I18I1)	copy river to i1
124	=COPY(I18AA66,I18M62)	copy river mile to m2
125	=COPY(I18AA67,I18M61)	copy drainage area to m1
126	=FORMULA("River:",I18H61)	type river in h1
127	=SELECT(I18H61)	formats "river"
128	=ALIGNMENT(3)	.
129	=FORMULA("River Mile:",I18L62)	types "River Mile" in l2
130	=SELECT(I18L62)	formats "River Mile"
131	=ALIGNMENT(4)	.
132	=FORMULA("Drainage Area:",I18L61)	types "Drainage Area" in l1
133	=SELECT(I18L61)	formats Drainage Area
134	=ALIGNMENT(4)	.
135	=FORMULA("Sq. Mi.",I18N61)	types "Sq Mi" in n1
136	=SELECT(I18BottomLeft:I18N61)	formats whole sheet
137	=FORMAT.FONT("MS Sans Serif",12,FALSE,FALSE,FALS	.
138	=SELECT(I18D61)	formats station name big and bold
139	=FORMAT.FONT("MS Sans Serif",14,TRUE,FALSE,FALS	.
140	=IF(I18S115="D")	if dept, reformat heading so that name
141	=COPY(I18D61,I18A61)	is aligned left
142	=SELECT(I18D61)	.
143	=CLEAR()	.
144	=ELSE()	.
145	=END.IF()	.
146	=SELECT(I18BottomLeft)	.
147	=FORMAT.FONT("MS Sans Serif",14,TRUE,FALSE,FALS	.
148	=RETURN()	.
149		
150		
151	AveForPrint	
152		
153	=SELECT(I18A65)	goes to bottom of sheet and types,
154	=SELECT.END(4)	"mean" and "median"
155	=SELECT("R2C")	.
156	=FORMULA("MEAN")	.
157	=DEFINE.NAME("PlaceForFormula")	.
158	=IF(OR(I18S115="S",I18S115="D",I18S115="E"))	if change in contents, dept, evap,
159	=SELECT("R1")	.
160	=EDIT.DELETE(2)	.
161	=SELECT("R-1C")	.
162	=ELSE()	don't do median
163	=SELECT("R1C")	.
164	=FORMULA("MEDIAN")	.
165	=END.IF()	.
166	=SELECT("R2C")	.
167	=DEFINE.NAME("BottomLeft")	.
168	=SELECT(I18A65)	.
169	=FOR("CounterPrint",1,13)	begin loop
170	=SELECT("RC1")	finds top of data (first nonzero or nonblank value)
171	=IF(OR(I18S115="S",I18S115="E"))	.
172	=WHILE(OR(ACTIVE.CELL()=0,ISBLANK(ACTIVE.CELL()))	.

	S	T
173	=SELECT("R11C")	
174	=IF(ROW(ACTIVE.CELL())>81)	
175	=SELECT.END(3)	
176	=SELECT.END(3)	
177	=BREAK()	
178	=END.IF()	*
179	=NEXT()	*
180	=ELSE.IF(AND(CounterPrint<>12,\$S\$8=2))	power year
181	=SELECT("R11C")	
182	=ELSE.IF(AND(OR(CounterPrint<10,CounterPrint>12),	water year
183	=SELECT("R11C")	
184	=END.IF()	
185	=DEFINE.NAME("top")	*
186	=SELECT.END(4)	goes to bottom
187	=IF(OR(\$S\$115="S",\$S\$115="E",CounterPrint=13))	
188	=WHILE(OR(ACTIVE.CELL()=0,ISBLANK(ACTIVE.CELL())))	searches up for first nonzero and nonblank cell
189	=SELECT("R[-1]C")	*
190	=IF(ROW(ACTIVE.CELL())<7)	
191	=BREAK()	
192	=END.IF()	
193	=NEXT()	*
194	=END.IF()	
195	=SELECT(top:ACTIVE.CELL())	selects top to bottom
196	=DEFINE.NAME("MonAve")	defines it MonAve
197	=SELECT(PlaceForFormula)	goes to bottom
198	=SELECT("RC(1)")	
199	=DEFINE.NAME("PlaceForFormula")	
200	=FORMULA("=average(MonAve)")	pastes average formula
201	=IF(OR(\$S\$115="S",\$S\$115="D",\$S\$115="E"))	if change in contents, depl, evap,
202	=ELSE()	don't do max, min, median
203	=SELECT("R(1)C")	selects down 1 row
204	=FORMULA("=median(MonAve)")	pastes median formula
205	=SELECT("R(1)C")	select down 1 row
206	=FORMULA("=max(MonAve)")	pastes max formula
207	=SELECT("R(1)C")	select down 1 row
208	=FORMULA("=min(MonAve)")	pastes min formula
209	=SELECT("R[-3]C:RC")	selects ave:min
210	=END.IF()	
211	=FOR.CELL("CurrentCell",TRUE)	formats them as follows:
212	=IF(CurrentCell<10000)	if < 10,000 rounds to nearest integer
213	=FORMULA(ROUND(CurrentCell,0),CurrentCell)	
214	=ELSE.IF(AND(10000<CurrentCell,CurrentCell<100000)	if between 10 ⁻⁴ and 10 ⁻⁵ rounds to tens place
215	=FORMULA(ROUND(CurrentCell,-1),CurrentCell)	
216	=ELSE()	if > 10 ⁻⁵ rounds to hundreds
217	=FORMULA(ROUND(CurrentCell,-2),CurrentCell)	
218	=END.IF()	
219	=NEXT()	
220	=COPY()	copies mean:min
221	=PASTE.SPECIAL(3,1,TRUE,FALSE)	pastes values over formulas
222	=IF(OR(\$S\$115="S",\$S\$115="D",\$S\$115="E"))	if change in contents, depl, evap,
223	=ELSE()	don't do max, min, median
224	=FindMaxMin()	runs macro defined below
225	=END.IF()	
226	=SELECT("R[-78]C")	back up to top of column
227	=NEXT()	end of loop
228	=DELETE.NAME("MonAve")	deletes the various names defined
229	=DELETE.NAME("top")	*
230	=DELETE.NAME("PlaceForFormula")	*
231	=RETURN()	
232		
233		
234		
235	FindMaxMin	
236	=SELECT("R(2)C")	
237	=DEFINE.NAME("max")	defines cell with max formula, as "max"
238	=SELECT("R(1)C")	
239	=DEFINE.NAME("min")	defines cell with min formula, as "min"
240	=SELECT(MonAve)	selects top:bottom
241	=FOR.CELL("CurrentCell",TRUE)	for each cell rounds it as follows
242	=IF(CurrentCell<10000)	if < 10,000 rounds to nearest integer
243	=FORMULA(ROUND(CurrentCell,0),CurrentCell)	
244	=ELSE.IF(AND(10000<CurrentCell,CurrentCell<100000)	if between 10 ⁻⁴ and 10 ⁻⁵ rounds to tens place
245	=FORMULA(ROUND(CurrentCell,-1),CurrentCell)	
246	=ELSE()	if > 10 ⁻⁵ rounds to hundreds
247	=FORMULA(ROUND(CurrentCell,-2),CurrentCell)	
248	=END.IF()	
249	=IF(CurrentCell=I(Max)	also for each cell compares it to min and max
250	=FORMULA(REFTEXT(CurrentCell,TRUE),S255)	if max, puts cell's ref in cell 5 lines down
251	=ELSE.IF(CurrentCell=I(Min)	
252	=FORMULA(REFTEXT(CurrentCell,TRUE),S256)	if min, puts cell's ref in cell 4 lines down
253	=END.IF()	
254	=NEXT()	end of for.cell loop
255	Sheet13!\$N\$33	max ref

	S	T
256	Sheet13!\$N\$18	min ref
257	=FORMULA.GOTO(TEXTREF(\$S\$255,TRUE))	gets max location
258	=FORMAT.FONT("Fixedsys",12,TRUE,TRUE,TRUE,FALSE)	format it to make it noticeable
259	=FORMULA.GOTO(TEXTREF(\$S\$256,TRUE))	gets min location
260	=FORMAT.FONT("Fixedsys",12,TRUE,TRUE,TRUE,FALSE)	format it to make it noticeable
261	=SELECT((Max:Min))	deletes max and min at bottom of page
262	=EDIT.DELETE(2)	.
263	=SELECT("R1-2 C")	.
264	=RETURN()	
265		
266		
267		
268		
269		
270		
271		
272		
273		
274		<this macro inserts blank lines of height 6 every 5 lines (i.e. under every year that is a multiple of 5)
275	InsertLines	
276	=SELECT("R6")	
277	=INSERT(2)	
278	=ROW.HEIGHT(6)	
279	=SELECT("R11")	
280	=INSERT(2)	
281	=ROW.HEIGHT(6)	
282	=FOR("CounterPrint",1,14)	
283	=SELECT("R(6)")	
284	=INSERT(2)	
285	=ROW.HEIGHT(6)	
286	=NEXT()	
287	=RETURN()	
288		
289		
290		
291		<this one deletes blank years from 2004 back to current year + 1
292	DeleteUnneededYears	
293	=SELECT((BottomLeftDelete))	
294	=IF(\$S\$8=1)	
295	=SELECT("RC(1)")	one column right
296	=SELECT.END(3)	up to last cell
297	=SELECT.END(2)	all the way to the right
298	=SELECT("R(1) C")	down one row
299	=ELSE.IF(\$S\$8=2)	
300	=SELECT.END(2)	all the way to the right
301	=SELECT("RC(-1)")	
302	=SELECT.END(3)	up to last cell
303	=SELECT("R(2) C(1)")	
304	=END.IF()	
305	=SELECT((BottomLeftDelete:ACTIVE.CELL))	select BottomLeftDelete to current cell
306	=EDIT.DELETE(2)	delete it
307	=SELECT((BottomLeft))	reformats rows containing mean and median stuff
308	=SELECT("R(0):R(-4)")	
309	=ROW.HEIGHT(12.75)	
310	=IF(\$S\$8=1,SELECT((\$B\$8:\$J\$8),SELECT((\$B\$8:\$L\$8	deletes any data that may be in Oct-Jun '27
311	=CLEAR(3)	
312	=RETURN()	
313		
314		
315		
316	PrintSetup	
317	=SELECT((BottomLeft:\$N\$1))	select whole sheet
318	=SET.PRINT.AREA()	sets print area
319	=PAGE.SETUP(" ",1,0.25,0.5,0.5,FALSE,FALSE,FALSE	page setup
320	=PRINT(1,,,1,FALSE,FALSE,1,FALSE,1,-4)	print
321	=CLOSE(FALSE)	
322	=RETURN()	

	AD	AE
1		
2		
3	DoWhateverToAllFilesInTemp	
4	=ECHO(TRUE)	turns off screen updating
5	=SET.NAME("FileArray",FILES("c:\bps\3-all\temp*.xls"))	puts in an array all files in c:\bps\3-all\temp\
6	=FOR("Index",1,COUNTA(FileArray))	start of loop
7	=INDEX(FileArray,1,Index)	
8	=OPEN("c:\bps\3-all\TEMP\"&NextFile,,FALSE)	opens each file in temp one at a time
9	=MESSAGE(TRUE,"Processing "&NextFile&" ... ")	puts message informing user which file is being processed
10		< YOUR COMMANDS HERE
11		< No need to delete extra blank lines
12		<
13		<
14		<
15		<
16		<
17		
18	=CLOSE(FALSE)	< type close(true) if you want to save changes to files in temp
19	=NEXT()	
20	=MESSAGE(FALSE)	
21	=RETURN()	
22		
23		< Examples of some possible commands to be entered
24	=PrintPowerYear()	in blanks above
25	=PrintWaterYear()	
26	=FORMULA("Rush Limbaugh for Prez. '96",IA600)	
27		
28		
29		

SECTION G

LIST OF CONTACTS

FOR

BASIC DATA

**Adjusted and Modified Streamflows
LIST OF CONTACTS**

**ADJUSTED AND MODIFIED STREAMFLOWS (1928 through 1989)
Published in April 1993.**

Prepared by A. G. Crook Co. under contract to BPA

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**Historical streamflow, reservoir change-of-contents and irrigation depletion data furnished
by:**

Commercial

- **Earth Info, Inc. 5541 Central Avenue Boulder, CO 80301-2846**
 - USGS and Environment Canada Streamflow data on CD-ROMS**
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