**Temporal and Spatial
Fall Chinook Salmon Redd
Distribution Near Hanford
1967-1976**

by
D. G. Watson

December 6, 1976

**Prepared for the Energy Research
and Development Administration
under Contract EY-76-C-06-1830**

Battelle

Pacific Northwest Laboratories

NOTICE

This report was prepared as an account of work sponsored by the United States Government. Neither the United States nor the Energy Research and Development Administration, nor any of their employees, nor any of their contractors, subcontractors, or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness or usefulness of any information, apparatus, product or process disclosed, or represents that its use would not infringe privately owned rights.

PACIFIC NORTHWEST LABORATORY
operated by
BATTELLE
for the
ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION
Under Contract EY-76-C-06-1830

Printed in the United States of America
Available from
National Technical Information Service
U.S. Department of Commerce
5285 Port Royal Road
Springfield, Virginia 22151
Price: Printed Copy \$____*; Microfiche \$3.00

*Pages	NTIS Selling Price
001-025	\$4.50
026-050	\$5.00
051-075	\$5.50
076-100	\$6.00
101-125	\$6.50
126-150	\$7.00
151-175	\$7.75
176-200	\$8.50
201-225	\$8.75
226-250	\$9.00
251-275	\$10.00
276-300	\$10.25

**Temporal and Spatial
Fall Chinook Salmon Redd
Distribution Near Hanford
1967-1976**

by
D. G. Watson

December 6, 1976

**Battelle
Pacific Northwest Laboratories
Richland, Washington 99352**

TEMPORAL AND SPATIAL FALL CHINOOK SALMON REDD
DISTRIBUTION NEAR HANFORD 1967-1976

Annual surveys of fall chinook salmon in the Hanford section (Ringold to Priest Rapids) of the Columbia River have been conducted annually since 1947. Estimates of the relative numbers of fall chinook spawning in this section of the river are obtained through several aerial surveys made each fall. The possible relationships of environmental factors to the size of the local salmon population have been reported for the period 1947-1969 (Watson 1970) and each year's survey results are summarized in Battelle Pacific Northwest Laboratory Annual Reports to USERDA (formerly USAEC) Division of Biomedical and Environmental Research.

This report was prepared to provide more detailed information, than is available in previous reports, on the timing of spawning in the principal breeding areas during recent years. The redd counts for each survey date for each of the major spawning areas are given in Table 1 and the location of the major spawning areas is shown in Figure 1.

Caution should be exercised in the use of this information to estimate salmon spawning population size among major spawning areas and during any annual period of observation. Aerial survey enumeration of redds is useful in providing an index of relative abundance. Their application to the estimation of precise population size, however, is very limited. This is due principally to the highly variable conditions under which the surveys are conducted. These variables include the amount and angle of sunlight on the water surface, cloud reflection, wind action on the water surface, the effect

of winds on the stability of light aircraft used in surveys and the elevation and turbidity of the river. These conditions can vary among surveys and also during the course of a single survey. Additionally, all spawning areas can not be surveyed with the same degree of accuracy. For instance, in Areas 7 and 9, spawning occurs in water depths greater than in some of the other areas and this greater depth adds to the difficulty of clearly viewing the river bottom. Area 9 is perhaps the most difficult to survey because it is more subject to high river elevations due to the daytime release of water from Priest Rapids Dam immediately upstream. The high rocky bluff on the south side of the river at times produces severe air turbulence with south or southwest winds, and also casts shadows over part of the area in November during the later part of the spawning season.

Reference

Watson, D. G. 1970. Fall Chinook Salmon Spawning in the Columbia River near Hanford 1947-1969. BNWL-1515. Battelle Northwest, Richland, Washington, 46 pp.

FIGURE 1. Major Fall Chinook Spawning Areas in Hanford Reach of the Columbia River

HANFORD FALL CHINOOK REDD COUNTS BY MAJOR SPAWNING AREA AND SURVEY DATE 1967-1976

Spawning Areas*

Survey Date	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6	Area 7	Area 8	Area 9
1967									
Sept. 28	0	0	0	0	0	0	0	0	0
Oct. 16	0	0	0	0	0	0	0	0	0
Oct. 26	0	5	4	6	8	13	35	4	348
Nov. 2	20	148	77	207	342	110	162	15	775
Nov. 8	20	180	160	248	499	155	244	6	1340
Nov. 15	28	205	160	182	458	150	455	17	640
Nov. 22	16	124	115	209	480	110	307	4	780
1968									
Oct. 2	0	0	0	0	0	0	0	0	1
Oct. 14	0	10	0	5	0	0	0	0	10
Oct. 21	24	46	61	51	44	0	31	1	0
Oct. 29	79	175	300	186	355	135	182	35	1500 (estimate)**
Nov. 6	130	250	300	169	427	107	138	50	910 (estimate)
Nov. 15	111	214	320	144	742	79	162	52	1400 (estimate)
1969									
Oct. 13	11	0	0	0	0	0	0	0	0
Oct. 21	7	16	12	4	15	0	10	0	80
Oct. 30	82	155	190	245	246	60	106	32	710
Nov. 6	145	401	410	427	903	126	362	50	1034 (estimate)
Nov. 17	252	189	220	309	365	97	180	14	1011 (estimate)
Nov. 23	175	237	210	375	752	111	260	no survey	1050 (estimate)
1970									
Oct. 8	14	1	10	0	0	0	0	2	39
Oct. 15	22	6	16	0	1	0	0	0	66
Oct. 22	13	20	41	22	27	20	26	2	130
Oct. 28	21	244	230	237	322	63	115	72	980
Nov. 5	74	360	215	302	541	152	228	34	1428 (estimate)
Nov. 12	90	367	210	277	746	159	259	43	1486 (estimate)
Nov. 19	65	195	150	239	566	99	209	17	1094

HANFORD FALL CHINOOK REDD COUNTS BY MAJOR SPawning AREA AND SURVEY DATE 1967-1976

Spawning Areas

Survey Date	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6	Area 7	Area 8	Area 9
1971									
Oct. 18	20	10	2	7	6	1	0	0	36
Oct. 28	43	108	47	32	86	22	48	0	310
Nov. 4	156	308	160	370	659	72	130	0	1120
Nov. 16	167	367	180	386	740	32	220	10	1361
1972									
Oct. 13	4	0	0	0	1	0	0	0	0
Oct. 24	6	0	0	0	0	0	0	0	0
Nov. 6	71	78	67	120	109	23	74	0	96
Nov. 14	77	54	66	59	110	52	69	4	127
Nov. 27	71	131	103	131	88	42	33	0	61
1973									
Oct. 15	121	40	7	0	26	6	37	9	110
Oct. 26	55	108	32	73	151	55	95	59	429
Nov. 2	44	86	40	114	288	82	144	59	599
Nov. 13	43	330	123	170	722	176	282	7	819
1974									
Oct. 15	76	11	0	0	0	2	0	0	13
Oct. 24	54	13	11	4	8	9	8	0	30
Nov. 5	34	44	0	1	16	5	54	1	153
Nov. 15	61	74	12	12	86	13	67	0	76
Nov. 26	59	113	28	49	72	47	62	4	142
1975									
Oct. 16	68	105	2	0	0	0	0	0	37
Oct. 29	62	263	140	256	373	50	215	46	427
Nov. 7	7	261	120	261	359	79	151	no survey	no survey
Nov. 19	3	19	0	no survey	no survey	no survey	no survey	no survey	no survey
Nov. 20	0	146	54	21	13	13	124	86	995

HANFORD FALL CHINOOK REDD COUNTS BY MAJOR SPAWNING AREA AND SURVEY DATE 1967-1976

Spawning Areas

Survey Date	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6	Area 7	Area 8	Area 9
1976 Oct. 12	15	0	0	6	0	0	0	0	5
Oct. 26	17	110	106	84	367	79	110	105	320
Nov. 5	2	137	140	185	377	105	103	182	599
Nov. 15	2	162	102	158	356	76	140	123	497

* See Figure 1 for Spawning Area Locations

** Redds overlap making individual redd enumeration impossible

BNWL-2163
UC-11

DISTRIBUTION

<u>No. of Copies</u>		<u>No. of Copies</u>	
	<u>OFFSITE</u>		<u>ONSITE</u>
1	<u>ERDA Chicago Patent Group</u> U.S. Energy Research and Development Administration Argonne, IL 60439 A. A. Churm	4	<u>ERDA, Richland Operations Office</u> C. E. Crouch P. G. Holsted W. Lei M. W. Tiernan
27	<u>ERDA Technical Information Center</u>	40	<u>Battelle-Northwest</u> R. F. Foster R. C. Free J. J. Fuquay T. L. Page J. A. Strand W. L. Templeton B. E. Vaughan D. G. Watson (30) Technical Information Files (3)