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**Avifauna of Waste Ponds
ERDA Hanford Reservation
Benton County, Washington**

June 1975

**Prepared for the U.S. Energy
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Battelle
Pacific Northwest Laboratories

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Avifauna of Waste Ponds ERDA Hanford Reservation Benton County, Washington

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June 1975

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SUMMARY OF OBSERVATIONS

The presence of small ponds on the 200 Area plateau provides attractive habitats for birds. During a 29-month period, 126 bird species were observed utilizing these ponds, their associated vegetation and air space.

The greatest abundance of birds occurred during the autumn migration when Canada geese, ringneck ducks, buffleheads, American wigeon, American coot, and scaup were abundant (100-800 birds) on certain days. Mallards, American wigeon, cinnamon teal, pintail, redhead, lesser scaup, and ruddy ducks nested on the ponds and reared young in small numbers. The most abundant breeding bird was the American coot.

Perching birds and other small birds not strongly oriented to the aquatic habitat were attracted to U-Pond, which had the best-developed tree-shrub shoreline community. Shorebirds were observed at all ponds but were most abundant at West Lake which had the least developed shoreline vegetation. The largest pond, Gable Mountain Pond, attracted the greatest numbers of diving ducks and also supported the largest population of American coots.

Waterfowl are the important agents of dispersal of radionuclides from waste ponds based on food habits, abundance, migratory habits, and importance as food in the diet of people. Abundance, long residence time, and food habits identify the American coot as the single most important species to be considered in the biological dispersal of radionuclides from waste ponds.

There were no rare or endangered bird species observed utilizing the ponds and adjacent habitat.

The great blue heron nests in trees on riparian areas of the Hanford Reservation.

Ring-billed gull.

CHAPTER 1

INTRODUCTION

The purpose of this investigation was to identify all avian species utilizing ponds in waste management areas and to establish their abundance at all seasons of the year for a period of two and one-half years and to relate pertinent features of life history and abundance of each species to waste management procedures.

The possible spread of radiocontaminants to man by birds is of major concern, but nuisance spreads are not overlooked and some attention needs to be given to the assurance that body burdens are not sufficient to harm the birds themselves.

Data reported herein are important both for their use in waste management planning and for their scientific interest since this is the first survey of bird usage of waste ponds after 30 years of operation of nuclear facilities on the Hanford Reservation. An interim report (Fitzner and Price, 1973) summarizes a one-year survey of pond use by avifauna.

METHODS EMPLOYED

Observations at near weekly intervals were initiated in September 1971 at B, U, Redox, and Gable Mountain ponds and in February 1972 at West Lake. These observations continued until March 1, 1974. Generally, bird counts were conducted during the morning from 0900 hr to 1200 hr. An observer drove slowly around each pond, stopping at prescribed points and scanned each pond and border vegetation with 7 x 50 power binoculars. The species seen or heard were recorded. This technique, although not allowing a complete census, reveals trends in abundance and species diversity. Also, observations concerning human disturbances near each of the ponds and meteorological information were made in order to assess their effects on observed bird counts. Records of these observations on each census date were compiled for computer storage and retrieval. The computer generated a table for each species, showing the number of individuals sighted on each census date at each pond and the total number of individuals sighted at all ponds. The entire set of raw data has been bound and filed in the Hanford Technical Library for reference use. In the following chapters the information in these raw data sets is summarized and discussed.

STUDY AREAS

The areas of study consisted of five shallow ponds located in or near the 200 Areas of the Hanford Reservation. The waste ponds are commonly referred to as Gable Mountain, B, U, and Redox (Figure 1.1). Another pond is West Lake. Historical information on these ponds is briefly summarized in Table 1.1.

TABLE 1.1. A summary of pond history and surface acreage to 1974.

	Gable Mountain Pond	B- Pond	U- Pond	Redox Pond	West Lake
Date of initiation	1957	1945	1944	1956	1957(?)
Age (yrs)	17	29	30	*	~17
Size (acres)	71	46	14	~31	~12

* Decommissioned 1972.

Gable Mountain Pond has been in use since December 1957, and is currently active. The water source is primarily from condenser coolant water which is discharged continuously. The largest of the ponds studied, Gable Mountain Pond, occupies approximately 71 surface acres.

B-Pond has been active since April 1945, and receives its water from condenser coolant and a chemical sewer. This is the second largest pond under study with an area of 46 surface acres. Shoreline construction and herbicide applications in 1971 and 1972 destroyed most riparian and emergent aquatic plants and may have reduced plant life within the pond. Human activity in the vicinity of the pond has been restricted mostly to routine water sampling by radiological monitors with the exception of activities associated with the shoreline modifications in 1971 and the applications of herbicides in 1971 and 1972. The close proximity of the 200-E Area (1/2 mile) adds a noise factor which is absent at the more isolated Gable Mountain Pond.

Since July 1944, U-Pond has been receiving condenser coolant water and chemical waste water. It is currently active. This pond covers 14 surface acres. Prior to July 1972, there was little interference to plant growth by humans. In July 1972, a chemical herbicide Krovar (50% Hivar and 50% Karmex) was applied at 20 lb/100 gal water/acre. This had the immediate effect of defoliating approximately 80% of the cottonwoods and willows. Other species, both terrestrial and aquatic, were less affected. In the spring of 1972, some of the trees, mostly cottonwoods, showed new growth. About one-half of the original live canopy cover is present today. U-Pond surpasses all other study ponds with regard to frequency of human visitations. Construction of the evaporation facility began in the spring of 1972 and continued through June 1973. The attendant noise and human activity were great, particularly during 1973. In the late fall of 1973, boardwalks were placed over a large part of the pond and a mobile laboratory trailer was moved to the east shoreline. Frequent visits by biological researchers have caused disturbance at U-Pond ever since. Effects of this increased human activity on bird usage of U-Pond are difficult to ascertain.

Redox Pond was created in September 1956 and remained active until June 1972. Prior to deactivation, Redox Pond covered about 31 surface acres. A nonvegetated shoreline ran approximately 10 feet inland from the edge of the water and met a rim of willows approximately 8 feet high. Emergent aquatic plants were represented by a few scattered stalks of reeds and cattail, but submergent aquatic plants were abundant.

West Lake is about 12 acres in size. It is highly alkaline with a unique plant species composition. Like Gable Mountain Pond, West Lake receives relatively little human disturbance except for routine biotic and water sampling by radiation monitoring personnel.

A diagrammatic representation of vegetation zonation around the ponds is shown in Figure 1.2. U-Pond is characterized by patches of cattails, Typha latifolia, and reeds, Scirpus acuta, that grow rooted beneath the water. Tree willows, Salix amygdaloides, and cottonwoods, Populus sp., grow rooted in the moist soil along the pond margins and are up to 30 feet tall. Dense growths of weeds, ranging between 0.5 and 1.0 meters tall composed of Russian knapweed, Centurea repens, and cudweed, Gnaphalium margaritacea, grow in the moist soil not occupied by trees. Gable Mountain Pond, in time, is expected to show the same vegetational zonation as U-Pond. Cattail and reed patches are extensive and peachleaf willow trees are widely scattered but smaller in size and not as old as U-Pond trees.

B-Pond differs from both U-Pond and Gable Mountain Pond because the shoreline has been artificially banked to discourage the establishment of cattails, reeds and trees. Some isolated reed patches occur in the pond but the shoreline is ringed by a narrow zone of barnyard grass, Echinochloa crus-galli.

West Lake supports only scattered patches of shoreline reeds. The shoreline consists in part of salt encrusted mudflats (at low water). The adjacent terrestrial vegetation consists of thick swards of salt grass Distichlis stricta, and seepweed, Bassia hyssipifolia in localized areas.

RADIOACTIVITY OF POND WATER

One of the relatively long-lived gamma-emitting radionuclides of biological concern is ^{137}Cs . Concentrations of radiocesium in pond water measured at different seasons in 1970, 1971, and 1972 are shown in Table 1.2. Values range from below detection limits to 200 picocuries per liter. The source of ^{137}Cs is effluent from the operation of chemical processing facilities in the 200 Areas and from worldwide fallout.

RADIOACTIVITY IN WATERFOWL

There is no question that radionuclides occur in the flesh of waterfowl. A small amount can be attributed to worldwide fallout, but some is contributed by the waste pond environment. The data presented in Table 1.3 show that ducks shot on ponds had higher body burdens of ^{137}Cs than ducks shot on the Columbia River. The important questions to be asked are: can body burdens be significant contributors of radionuclides to man and are they of significance

TABLE 1.2 Radiocesium in pond water in pCi/liter during 1970, 1971, and 1972. Data are taken from reports by Bramson and Corley (see Figure 1.3).

	Gable Mountain Pond	B- Pond	U- Pond	Redox Pond
1970				
Winter	--	--	--	--
Spring	--	29	--	--
Summer	70	--	55	--
Fall	37	--	--	--
1971				
Winter	24	*	52	*
Spring	40	31	49	*
Summer	100	41	60	--
Fall	96	*	41	*
1972				
Winter	9	*	*	*
Spring	37	*	*	*
Summer	90	*	220	*
Fall	32	*	*	--

*Below detection limits

--No analysis

to the birds? The first question needs to be answered in terms of health physics and the latter question needs an ecological answer.

TABLE 1.3. Concentration of ^{137}Cs in the flesh of waterfowl collected on the Hanford Reservation during 1971 and 1972.¹

Location	Species	pCi ^{137}Cs /g wet wt.			
		1971	(no. sampled)	1972	(no. sampled)
U-Pond	Ducks	78	(4)	27	(2)
Redox Pond	Ducks	51	(4)	3.1	(2)
Gable Mtn.	Ducks	34	(4)	26	(4)
B-Pond	Ducks	2.2	(4)	3.3	(4)
300 Pond	Ducks	*	(2)	*	(5)
100-F Trench	Ducks	0.17	(2)	0.14	(3)
T Swamp	Ducks		(0)	70	(1)
West Lake	Ducks		(0)	4.2	(1)
Columbia River	Ducks	0.046	(79)	0.070	(71)
Columbia River	Geese	0.097	(10)	0.11	(32)

* Less than the analytical limit.

¹ Modified from Bramson, P. E. and J. P. Corley, 1972. Environmental Status of the Hanford Reservation for 1971. BNWL-B-228. 75 p. and Bramson, P. E., J. P. Corley and W. L. Nees. 1973. Environmental Status of the Hanford Reservation for CY-1972. BNWL-B-278. 70 p.

FIGURE 1.1. Map showing locations of ponds in the 200 Areas and vicinity.

FIGURE 1.2. Diagrammatic representation of vegetation zonation four ponds.

CHAPTER 2

AQUATIC BIRDS

Aquatic birds are the most important of the avifauna in terms of radionuclide dispersal from waste ponds. These kinds of birds eat pond-dwelling algae and macrophytes as well as small invertebrates such as adult and larval insects, snails, and crustaceans. This group of birds also has access to pond sediments which can be ingested along with food items. Certain species are killed for food by sportsmen and this provides a potential for ingestion of radionuclides by people. Aquatic birds are represented by a broad spectrum of feeding strategies that change from species to species and from season to season. For these reasons it is important to recognize species and to know if the species is represented on the ponds as a visitant or as a nesting species.

Although the species listed in this chapter are diverse taxonomically, these are grouped here because of their strong affinities for pond habitats, attracted because ponds provide food and nest sites, or serve as a resting place or as a refugium from human molestation.

Order: Podicipediformes - (Grebes)

Family: Podicipedidae

Podiceps auritus - Horned Grebe

Status and Distribution - An uncommon spring and fall migrant, the horned grebe was sighted on all ponds with the exception of Redox. Gable Mountain and B-Pond attracted the greatest numbers. The earliest sight record was April 27, 1972 at B-Pond, while the latest sighting occurred on December 3, 1971 at Gable Mountain Pond. No nesting was observed.

Biology - The vegetational development of the various ponds may not be the main attractive force to this species. Since pre-flight taxi requires several yards of unobstructed water, one may suppose that pond size also plays a role. The three largest ponds, all vegetationally different, had more use than the smaller ponds. Foods consist mostly of aquatic vertebrates and invertebrates, supplemented by small amounts of vegetable matter.

Waste Management Consideration - Food habits of this species may facilitate the accumulation of radiocontaminants. Hanson and Watson (1960) reported that grebes utilizing the Columbia River during the 1959 hunting season had a concentration factor of beta emitters which was 20 times greater than ducks. The predominant radionuclide in the Columbia River was at that time ^{32}P and, hence, these data may not present a clear picture of the food chain buildup of fission products as they occur in the waste ponds today. They do, however, indicate that grebes have a potential to concentrate radiocontaminants via food chains.

Podiceps caspicus - Eared Grebe

Status and Distribution - An uncommon summer resident and spring and fall migrant, this species was sighted only on B, West Lake, and Gable Mountain Ponds. The earliest date of sighting was March 30, 1972; the latest date was October 6, 1972. Nesting occurred at West Lake in 1974. One young, approximately 5 weeks old, was sighted swimming with two adults on July 10, 1974.

Biology - Similar to the horned grebe.

Waste Management Considerations - See horned grebe.

Aechmophorus occidentalis - Western Grebe

Status and Distribution - An uncommon fall migrant, the western grebe was sighted only on B and Gable Mountain Ponds. Earliest date sighted was July 28, 1972; latest date was November 10, 1972. There are no nesting records for the Hanford Reservation.

Biology - This species, like other grebes, seems to prefer the larger ponds. Its piscivorous feeding tendencies may also limit its distribution to only those ponds in which fish are present.

Waste Management Consideration - See horned grebe.

Podilymbus podiceps - Pied-billed Grebe

Status and Distribution - The pied-billed grebe, a common fall and spring migrant and summer resident, was observed on all ponds with the exception of West Lake. A histogram of total numbers recorded for all ponds is presented in Figure 7.1. This species was commonly found nesting on Gable Mountain Pond, which also showed the greatest total use.

Biology - See horned grebe.

Waste Management Considerations - See horned grebe.

Order: Anseriformes - (Waterfowl)

Family: Anatidae - Ducks, Geese, Swans, and Mergansers

Mergus merganser - Common Merganser

Status and Distribution - This large fish-eating duck has been observed at all 200 Area ponds, but Gable Mountain Pond has received 99% of the usage. The seasonal variation in numbers for the ponds (Figure 7.1) shows that the common merganser used them only during the fall and winter months. No nesting occurred at the ponds, but several broods have been observed on the Columbia River near the White Bluffs townsite.

Biology - Common mergansers feed almost exclusively on fish. A large flock of more than 100 birds was seen feeding on goldfish at Gable Mountain Pond on December 30, 1971. The sizable population of resident goldfish at this pond must be a major influence in attracting these birds.

Waste Management Considerations - Should contamination be present in fish tissue, one would suppose that mergansers, through food chain build-up, could accumulate a significant body burden of radionuclides. The common merganser is hunted and eaten by man and the possibility of eating a bird which has foraged on any of the 200 Area waste ponds is not to be overlooked. During the 1972 and 1973 Pacific Flyway Duck seasons, 7,000 and 5,400 mergansers (common and red-breasted, respectively) were shot by hunters (Schroeder et al., 1974).

Lophodytes cucullatus - Hooded Merganser

Status and Distribution - Only three individuals of this species have been observed. Two were recorded at U-Pond on March 16, 1972, and one was sighted at Gable Mountain Pond on January 4, 1973. Nesting has not been recorded on the Hanford Reservation.

Biology - Fitzner and Fitzner (1973) reported that these small fish-eating ducks are fairly abundant along the lower reaches of the Yakima River. Their rarity on the 200 Area ponds seems to indicate that the river habitats are preferred. Perhaps aquatic invertebrates and small fish, their primary food items, are more abundant in river habitats.

Waste Management Considerations - Due to small numbers of sighting, combined with their relatively short stay on the ponds, radioecological problems are not predicted. Hunters killed approximately 5,900 to 1,500 during the 1972 and 1973 Pacific Flyway hunting seasons, respectively (Schroeder et al., 1974).

Anas platyrhynchos - Mallard

Status and Distribution - The mallard is a common summer and winter resident and spring and fall migrant on the Hanford Reservation. The Columbia River, in particular, attracts thousands of winter residents. An 8-year mean (1961-1969) records over 250,000 ducks in the Hanford reach of the Columbia River. The winter of 1972-73, however, saw a substantial drop to 70,000 ducks (Fitzner et al., 1973). Those mallards wintering on the waste ponds are partly a reflection of these river birds. The ponds often freeze during the colder winter months, however, and cause a drop in pond usage. The ponds received the greatest use during the fall and spring migration (Figure 7.2). Fall migration (Oct.-Nov.) tended to show the greatest number of mallards while spring migration (March-May) showed substantially lower numbers. This would be expected since hunter activity and other limiting factors substantially reduce the populations by spring-time. Mallards also utilize the waste ponds for nesting and brood rearing. In 1972, approximately 15 broods averaging 9 young per brood were noted for all 200 Area ponds. In 1973, there were slightly fewer broods recorded. Gable Mountain Pond produced the highest number of broods while Redox Pond produced none. Yocum and Hansen (1960) reported that a total of 4,449 broods of mallards were recorded in Eastern Washington from 1948-56. They also point out that 25 percent of the annual waterfowl crop, consisting of 42 percent mallards, is produced in the Columbia Basin Project. The increased use of irrigation in this area will result in numerous new marshes and irrigation ditches which will provide new nesting habitat, primarily for mallards (Jeffrey and Oliver, 1955). This should cause a substantial increase

in their abundance. Waste ponds will also continue to be used by these birds as long as suitable nesting, feeding, and loafing areas exist there.

Biology - Mallards are members of the puddle duck group and are therefore fond of areas with shallow water and abundant food. Most of the waste ponds fit well into this category and, therefore, receive a great deal of use. Mallards are mostly vegetarians, feeding on 90 percent plant material (pond weeds, clover, grass, weed seeds, and grains) and 10 percent animal material (aquatic and terrestrial invertebrates and other animal matter). Many of their preferred foods are present at the waste ponds.

Waste Management Considerations - This is certainly the first species in importance when considering radionuclide transport to man. It is the most important waterfowl species harvested by hunters. Mallards retrieved by hunters amounted to 338,994 and 312,632 in the 1972 and 1973 hunting seasons, respectively, in the state of Washington. These figures represent 55 percent of the total number of ducks harvested during these years (Table 2.1).

Anas strepera - Gadwall

Status and Distribution - The gadwall is fairly common at the waste ponds during the spring and fall migration periods, but only a small number of birds seem to stay on the ponds during summer (Figure 7.2). Gable Mountain Pond received the greatest total use. No nest or broods have ever been observed on the Hanford Reservation.

Biology - Like the mallard, the gadwall is primarily a vegetarian. It feeds on a variety of aquatic plants and domestic grains. The advanced successional state of Gable Mountain Pond and its close proximity to grain and alfalfa fields north of Pasco are probably the major reasons for its being used to a greater extent than any of the other ponds.

Waste Management Considerations - The gadwall was one of the least abundant of the waterfowl species occurring on the 200 Area ponds, and formed a small segment of the hunter's bag in the state of Washington during the 1972-73 hunting seasons (Table 2.1). This, combined with the fact that there appeared to be frequent sporadic turnovers of individuals implies that gadwalls are unlikely to pick up and transport radiocontaminants to the degree that other ducks could. There could still be a small number of birds involved in nuisance spreads of contaminants, however.

Mareca americana - American Wigeon (Baldpate)

Status and Distribution - In examination of pond usage, an interesting point was noted. In 1971, U and Redox Ponds accounted for a substantial fraction of the total number of birds sighted. In 1972, virtually no wigeons were sighted on these ponds. Human disturbance may have been a major force causing this decrease. Gable Mountain Pond has continued to attract a fair number of birds from year to year. Nesting has been infrequent in the study area with only one brood being sighted on Gable Mountain Pond in August 1973.

TABLE 2.1 Percentages of waterfowl species harvested in Washington by hunters during the combined 1972-1973 waterfowl seasons.¹

Waterfowl	% Composition	Rank
Mallard	54.7	1
American Wigeon	12.5	2
Pintail	9.6	3
Green-winged Teal	8.8	4
Geese ²	6.2	5
Coots	1.3	6
Bufflehead	1.1	7
Shoveler	1.0	8
Goldeneye	1.0	9
Scaup	0.9	10
Ringneck Duck	0.7	11
Gadwall	0.5	12
Hooded Merganser	0.3	13
Other Mergansers	0.3	14
Redhead	0.2	15
Blue-winged Teal	0.2	16

¹Percentages extrapolated from an Administrative Report - United States Fish and Wildlife Service, entitled, Waterfowl Harvest and Hunter Activity in the United States During the 1973 Hunting Season, by Lonnie D. Schroeder et al.

²Includes the Canada Goose.

Biology - The Wigeon is similar to the mallard and gadwall in its habits. Like these other puddle ducks, it dabbles and tips in shallow waters searching for food, which consists mostly of vegetable matter. It may also fly considerable distances in foraging for domestic grains, later returning to the confines of the Reservation.

Waste Management Considerations - This is the second most abundant duck shot by Washington hunters (Table 2.1).

Anas carolinensis - Green-winged Teal

Status and Distribution - This small puddle duck is fairly abundant on the 200 Area ponds, particularly during fall and spring migration (Figure 7.3). It was observed on all ponds but seemed to prefer West Lake. No nesting has been recorded even though some individuals spent the summer on the ponds.

Biology - The green-winged teal feeds on a variety of aquatic invertebrates and plants and also on domestic grains.

Waste Management Considerations - This duck was the fourth most abundantly harvested waterfowl species for the 1972 and 1973 hunting seasons in the state of Washington (Table 2.1). The most important seasons to consider in evaluating the role of this species in waste management would be fall and spring migration periods. During those times, we could expect frequent population turnover.

Anas discors - Blue-winged Teal

Status and Distribution - This species was most frequently observed during late spring and early summer (Figure 7.4). Like the green-winged teal, it seems to prefer West Lake. It probably nests on the ponds even though nesting records are lacking. Yocom and Hansen (1960) report that this is a common nester on the ponds south of Moses Lake, Grant County, Washington.

Biology - The blue-winged teal feeds on a variety of aquatic plants and invertebrates as well as domestic grains. It is commonly seen surface feeding on shallow well-vegetated ponds (Bent, 1962).

Waste Management Considerations - The blue-winged teal is uncommon on the Hanford Reservation. It was the sixteenth most commonly harvested duck in Washington in the 1972 and 1973 hunting seasons (Schroeder, op cit.) (Table 2.1). These points, coupled with the fact that the blue-winged teal is seldom seen on the ponds during the hunting season, would be indicative of low importance to waste management. Should nesting occur on the ponds, the potential for uptake of radiocontaminants would increase. Young birds and brooding adults would be staying on the ponds for several months and could ingest contaminated food.

Anas cyanoptera - Cinnamon Teal

Status and Distribution - The cinnamon teal is a common spring and fall migrant and summer resident on the 200 Area ponds (Figure 7.4). Like the blue- and green-winged teals, the cinnamon preferred West Lake. The earliest date sighted was March 30, 1973, while the latest date of

sighting was December 21, 1973. Broods were observed at West Lake and Gable Mountain Pond in 1973. Probably three or four pair in total nested on these ponds.

Biology - The attractive force of West Lake for all teal species is presently unexplained. Perhaps the abundance of wigeon grass has something to do with this. Future studies on food habits of birds may give some clues. The food habits of this teal are similar to the blue- and green-winged teals. It feeds principally on plant foods (pondweeds, grasses, and sedges) and also on aquatic invertebrates.

Waste Management Consideration - Like other nesting species, the cinnamon teal is important to consider in a sound waste management program for the 200 Area waste ponds. The nesting and brood rearing periods are fairly long (4-5 months) with both young and adults staying on the ponds during this period. The feeding strategies of young progressively change from aquatic and terrestrial animal matter to vegetable matter as they age. This may facilitate the accumulation of a larger body burden of radiocontaminants for these juveniles than for their more vegetarian parents.

Spatula clypeata - Shoveler

Status and Distribution - The shoveler is a common spring and fall migrant and uncommon summer and winter resident (Figure 7.5). There was a noticeable use of B-Pond and U-Pond during fall migration while Gable Mountain and West Lake were used mainly during fall migration. The earliest date sighted was January 7, 1972, while the latest date of sighting was December 30, 1971. Nesting may occur on the ponds; however, no broods or nests have been observed.

Biology - This is principally a surface-feeding duck. Using its highly adapted bill to strain food from water and mud, it feeds principally on vegetable matter. Yocom (1951) states that pondweeds (*Potamogetons*) and viscid bulrush (*Scirpus acutus*) formed over 90 percent of their diet.

Waste Management Considerations - Fluctuation of individuals, particularly during fall, indicates that birds are mostly moving through the Reservation staying for only a short period. It is, therefore, doubtful that any significant quantities of radiocontaminants are being removed from the ponds by this species. Shovelers are fairly important as a game bird in Washington, being the eighth most commonly harvested waterfowl by hunters and forming 1 percent of the total kill during the 1972 and 1973 hunting seasons (Table 2.1).

Anas acuta - Pintail

Status and Distribution - The pintail is a common spring and fall migrant and a winter and summer resident on the 200 Area ponds (Figure 7.5). It was most commonly seen on West Lake and Gable Mountain Ponds. The earliest recorded sighting occurred on January 4, 1973, while the latest sighting took place on December 30, 1971. Nesting occurred on Redox and West Lake. Redox produced one brood of seven young in 1972, while West Lake produced one and possibly two broods in 1973.

Biology - The pintail is principally a vegetarian, feeding 87 percent on vegetable food and 13 percent on animal foods.

Waste Management Considerations - The pintail was the third most commonly harvested waterfowl species in Washington's 1972 and 1973 hunting seasons (Table 2.1).

Aythya americana - Redhead Duck

Status and Distribution - The redhead duck is a common spring and fall migrant and summer and winter resident on the 200 Area ponds (Figure 7.6). Gable Mountain Pond attracted the majority of individuals during all seasons. The earliest sighting was January 17, 1974, while the latest sighting was December 28, 1973. Nesting has occurred on West Lake and Gable Mountain Ponds only. Probably two or three broods were produced each year on both ponds combined.

Biology - According to Cottam (1939), plants form nearly 90 percent of the food of the redhead while insects and mollusks combine to form the other 10 percent. Pirnie (1935) reports that pondweeds were the principal food of 16 redheads collected in Michigan. The abundance of pondweeds at Gable Mountain Pond might, therefore, be a major attracting force for the redhead.

Waste Management Considerations - The redhead is not an important waterfowl species harvested in the state of Washington. It formed only 0.22 percent of the retrieved waterfowl kill for the years of 1972 and 1973 combined (Table 2.1). The redhead does nest on certain ponds and can, therefore, be considered an important species to waste management. Young and parents could be living on the ponds for several months.

Aythya valisneria - Canvasback

Status and Distribution - The canvasback is mainly a fall migrant and winter resident on the 200 Area ponds (Figure 7.6). Spring migrants are noticeably lacking. Gable Mountain and West Lake received the greatest use, probably a reflection of their large size and abundance of aquatic foods. The earliest date sighted was January 4, 1973, while the latest date of a sighting was December 30, 1971. The canvasback is a rare breeder in Eastern Washington (Yocom and Hansen, 1960) and has not been recorded nesting on the 200 Area ponds.

Biology - The canvasback seeks the open water of large lakes, as well as salt water bays and estuaries during migration. On fresh water, it prefers the deeper water of sloughs, lakes, and slow-moving rivers where margins are densely grown with marsh vegetation. Gable Mountain and West Lake fit these criteria fairly well and as a result received more use than other ponds. The foods of this duck consist of approximately 80 percent plant material and 20 percent animal. Pondweeds supply nearly three-tenths of the entire food (Cottam, 1939). The healthy growth of pondweeds at Gable Mountain Pond is an attracting force.

Waste Management Considerations - Federal law prohibiting the shooting of more than one bird per day per hunter, coupled with the low number of canvasbacks migrating through Washington, make this a relatively unimportant game species. The small number of individuals using the 200 Area ponds during migration and in winter indicates that it plays a minor role in waste management.

Aythya affinis - Lesser Scaup*

Aythya marila - Greater Scaup

Status and Distribution - Scaups are common spring and fall migrants and winter residents on the 200 Area ponds, but are uncommon summer residents. Sighted on all ponds, they seemed to prefer B, Gable Mountain, and West Lake Ponds. Nesting by a single pair occurred at B-Pond in 1971 and 1972, with no more than five young being produced each year.

Biology - Like other diving ducks, the scaup prefers large bodies of water with an abundance of aquatic plant and invertebrate foods. For nesting, the lesser scaup prefers lakes and marshes that have relatively stable water level with some cattail and Scirpus beds. Gable Mountain, B and West Lake all seem to provide the basic needs of this duck. The foods of the lesser scaup consist of approximately 60 percent plant and 40 percent animal material (Cottam, 1939).

Waste Management Considerations - Averaging the 1972 and 1973 hunting seasons in Washington, the scaup was the tenth most commonly retrieved waterfowl, forming 0.89 percent of the total retrieved kill (Table 2.1). This bird is not one of the more important game species. It is important to consider in waste management, however, since many individuals stay on the ponds for extended periods during the fall and winter months. This fact, coupled with the high animal composition of its diet, could feasibly result in uptake and transfer of low level radiocontamination to man.

Bucephala clangula - Common Goldeneye**

Bucephala islandica - Barrow's Goldeneye

Status and Distribution - A common fall and spring migrant and winter resident on the 200 Area ponds, goldeneyes were found mostly on the larger ponds, B, Gable Mountain, and West Lake Ponds. Common goldeneyes probably do not nest in Washington, but Barrow's do nest near mountain streams and lakes. One brood of nearly fledged Barrow's goldeneyes was sighted on the Columbia River near the White Bluffs townsite in July 1974.

* Due to the difficulty in distinguishing between the greater and lesser scaup, they have been combined. Observations were more likely of the lesser scaup, since the greater generally prefers the coastal areas of the state.

** These species are combined since their appearance and behavior are quite similar and often makes accurate identification impossible, particularly when examining the females.

Biology - Goldeneyes are fond of large bodies of water. Like other diving ducks, they need a sizable stretch of unobstructed water for takeoff. B, Gable Mountain and West Lake are the 200 Area ponds which best meet their needs. Both species of goldeneyes feed on over 75 percent animal matter (insects, mollusks and crustaceans) and 25 percent plant material (Cottam, 1939). These animal feeding tendencies place goldeneyes higher on the trophic level than most waterfowl, putting them in a position that often facilitates the uptake of various contaminants.

Waste Management Considerations - Goldeneyes were the ninth most commonly retrieved waterfowl by Washington hunters during 1972 and 1973 hunting seasons, forming 0.96 percent of the total retrieved kill (Table 2.1). The small percentage utilized by hunters can be misleading unless we examine the winter distribution of goldeneyes in Eastern Washington. The nearby Yakima, Snake and Columbia River systems all attract large numbers of goldeneyes. Other areas of Eastern Washington are lacking in good goldeneye habitat. The hunter kill could, therefore, conceivably be centered in the Columbia Basin area and increase the chances for a local hunter to shoot a bird that has foraged at a waste pond.

Bucephala albeola - Bufflehead

Status and Distribution - The bufflehead is a common fall and spring migrant and winter resident on the 200 Area ponds (Figure 7.7). It is chiefly found on the three largest ponds, B, Gable Mountain and West Lake. It breeds mainly around inland lakes in the forests of Northwestern Canada, using cavities within tree trunks for its nest sites (Erskine, 1971).

Biology - This is considered to be the smallest of the diving ducks. It is most often found on coastal bays, but does occur inland. It is a very hardy bird, staying north whenever open water and food are present. Like other diving ducks, it prefers larger and more open bodies of water with a depth ranging from 4 to 15 feet. The bufflehead is similar to the goldeneye in its food habits, feeding approximately 80 percent on animal matter (insects, crustaceans, mollusks) and 20 percent plants (pondweeds, wigeon grass) (Cottam, 1939).

Waste Management Considerations - The bufflehead was the seventh most commonly retrieved waterfowl by Washington hunters in the 1972 and 1973 hunting seasons, forming 1.1 percent of the total retrieved kill (Table 2.1). This coupled with the fact that many individuals stay on the ponds for extended periods during the winter and that buffleheads are higher on the trophic level than most waterfowl species, makes them important to consider in a waste management program.

Aythya collaris - Ring-necked Duck

Status and Distribution - The ring-necked duck is an abundant spring and fall migrant and summer and winter resident on the 200 Area ponds (Figure 7.7). B, Gable Mountain, and West Lake receive the majority of the usage. This species is generally found breeding in the high mountain lakes of Northeastern Washington. No records have been made of nesting on any of the 200 Area ponds.

Biology - Ring-necks seem to prefer the marshes and sloughs to the open lakes and streams. They forage in somewhat shallower and more marshy situations than other divers and subsist to a large extent upon seeds of both submerged and marsh plants. Over 80 percent of their diet consists of plant materials while the other 20 percent consists of insects and mollusks. Yocom (1951) found this species to be a common spring and fall migrant throughout the state and an occasional winter resident east of the Cascades. He also reported that it was an occasional summer resident in the Columbia plateau. The data gathered on the Hanford Reservation verify his findings and reveal that ring-necks are common during the summer and winter.

Waste Management Considerations - A large number of ring-necks migrate through the Hanford Reservation, particularly during the fall. Some may stay for a few days, weeks, and even months. No doubt many simply pass through on their way to the Southern United States. The amount of contamination any one bird could accumulate would depend on the time spent on the pond, the level of contaminants in food, and the turnover rate of the isotope. At present, we know little about any of these points. Ring-necks are not abundantly harvested waterfowl species in Washington. They were the eleventh most commonly retrieved waterfowl in 1972 and 1973 seasons combined (Table 2.1). They are important on the 200 Area ponds, however, comprising 8.8 percent of all waterfowl observed. The large percentage using the 200 Area ponds indicates that this species is available for harvest by local hunters, particularly those hunting the larger bodies of water around McNary Wildlife Refuge and similar areas. The transitory nature of the birds on the 200 Area ponds implies that they are available for harvest by man.

Oxyura jamaicensis - Ruddy Duck

Status and Distribution - This small diving duck is a common spring and fall migrant and an occasional winter and summer resident on the 200 Area ponds (Figure 7.8). Gable Mountain Pond received the greatest use, but sightings were made at all ponds. Nesting occurred on U and Gable Mountain Ponds during 1972 and 1973. One brood was observed at each pond each year.

Biology - In summer, the ruddy duck occurs on ponds and sloughs with extensive swampy growths of cattails and reeds. In migration and winter, it prefers more open water, either fresh or salt, and often occurs in large flocks (Larrison and Sonnenberg, 1968). The ruddy duck obtains most of its food on the bottom and feeds mainly on vegetable matter.

Waste Management Considerations - Ruddy ducks move on and off the 200 Area ponds at frequent intervals (Figure 7.8). Few nest but a fair number do migrate through. During their visit, they could ingest contaminated foods and, thereby, accumulate a measurable body burden. Washington's 1972 and 1973 hunting seasons saw very few of these ducks harvested (Table 2.1).

Clangula hyemalis - Oldsquaw

Status and Distribution - A rare fall and winter visitor to the 200 Area ponds, oldsquaws were sighted on B, Gable Mountain, and West Lake. They do not nest in Washington.

Biology - Yocom (1951) reports that oldsquaws are quite rare east of the Cascades, but four individuals were sighted from 1917 to 1924. The bird is a powerful diver, using to some extent both wings and legs in its underwater movements. It normally feeds in 12 to 25 feet of water but often goes much deeper. Its diet consists of 88 percent animal materials (crustaceans, mollusks, insects, fishes) and 12 percent vegetable (grasses and pondweeds) (Cottam, 1939).

Waste Management Considerations - Few individuals stay for a short time period so this is an unimportant waterfowl species to consider in waste management.

Branta canadensis - Canada Goose

Status and Distribution - The Canada goose is a common fall migrant and winter resident on the 200 Area ponds (Figure 7.8), preferring B, Gable Mountain, and West Lake. Nesting did not occur on any of the 200 Area ponds, but occurs on islands throughout the Hanford stretch of the Columbia River (Hanson and Eberhardt, 1971).

Biology - The Hanford stretch of the Columbia River is unique in that it has its own resident population of Canada geese (Branta canadensis moffitti). This flock, which averages 400 individuals, tends to remain in the vicinity of the Hanford Reservation year around but may move considerable distances in their foraging for food. Gable Mountain, B, and West Lake Ponds were used mainly as feeding and loafing areas. Grassy areas around Gable Mountain Pond and West Lake serve as feeding areas, particularly during late winter when cheatgrass (Bromus tectorum) leaves are young and tender. Other foods consumed by the Canada goose include foliage of native and cultivated grasses, cultivated grains and seeds and foliage of marsh and water plants. Animal matter is rarely consumed (Yocom, 1951). Large numbers of geese migrate through and often winter in the Columbia Basin. In November 1973, approximately 800 geese rested at Gable Mountain Pond. All of the 200 Area ponds are potential resting and feeding areas, but none of them seem to offer suitable habitat for year-round use.

Waste Management Considerations - The Canada goose utilizes the 200 Area ponds principally during the fall and winter months, a time when they are also hunted. The foraging behavior of these geese probably includes not only frequent use of the 200 Area ponds, but also use of local wheat and alfalfa fields. During the time spent away from the Reserve, many birds are shot by sportsmen and are eaten. The Canada goose was the third most abundant waterfowl species observed on the 200 Area ponds, 8.9 percent of the total. It rated fifth in the Pacific Flyway, comprising 6.2 percent of the total retrieved waterfowl kill (Table 2.1).

Olor columbianus - Whistling Swan

Status and Distribution - A migrant and winter visitor on the 200 Area ponds, whistling swans were observed on Redox, Gable Mountain and West Lake Ponds. Nesting does not occur in Washington.

Biology - This is the largest waterfowl species to be observed on the 200 Area ponds. The whistling swan is not a legal game species in Washington, but is hunted elsewhere in the United States. Its diet consists almost entirely of vegetable matter. Its long neck is well-suited for gathering tubers and stems of aquatic plants in shallow water.

Waste Management Considerations - No more than six swans were seen at any given time. It is believed, however, that the same individuals often stayed for 2 or 3 weeks. This would increase their chances of picking up radiocontaminants, particularly if any of their preferred foods concentrated the contaminants.

Order: Gruiformes (Crane-like Birds)

Family: Gruidae - (Cranes)

Grus canadensis - Sandhill Crane

Status and Distribution - The large size of the six individuals sighted on Redox Pond, October 5, 1973, infers that these were the Greater Sandhill, Grus canadensis tabida. Jewett et al. (1953) state that they are rare migrants and summer residents on the open plains of Eastern Washington. Hudson and Yocom (1954) believed that cranes migrating through Eastern Washington at the present time probably represent the Little Brown Crane (G. c. canadensis), a fairly regular migrant through the state.

Biology - The crane feeds on field mice, berries, foliage, and rootlets of various plants, and where obtainable, grain (Jewett et al., 1953).

Waste Management Considerations - The single sighting of six birds at Redox Pond signifies that they probably stopped for only a brief rest during migration. It is unlikely that cranes play any appreciable role in waste management operations.

Family: Rallidae - (Rails and Gallinules)

Porzana carolina - Sora Rail

Status and Distribution - An uncommon summer resident, a single sora rail was observed on May 4, 1973, and on June 22, 1973, at Gable Mountain Pond. Probably more common than records indicate, they may breed near the more vegetated ponds.

Biology - The sora, like other rails, is a marsh-dwelling bird. Only two waste ponds fit this description, U and Gable Mountain, with Gable Mountain having the only records of use. The sora feeds largely on animal matter, although vegetable material is often eaten (Bent, 1963).

Waste Management Considerations - Soras depart for their winter homes early in the fall, making it of negligible value as a game bird in Washington (Jewett et al., 1953).

Fulica americana - American Coot

Status and Distribution - The American coot is a very common migrant and summer and winter resident on the 200 Area ponds (Figure 7.9), using Gable Mountain, U and B Ponds heavily. Breeding occurred at U, B and Gable Mountain Ponds with most broods on Gable Mountain Pond. It is estimated that 10 to 15 broods of coots were produced each year on Gable Mountain Pond with another 3 to 5 broods being raised on U and B Ponds. These estimates probably do not indicate true nesting densities, since thick vegetation and the secretive behavior of the coots precluded careful observations.

Biology - The coot or mudhen is one of the most abundant and widely known waterfowl. They occur commonly during nesting season whenever a small stretch of fresh water and a few clumps of reeds provide the necessary environment and shelter. All 200 Area ponds are suitable as coot habitat, but some, particularly Gable Mountain, afford optimum habitat. Johnsgard (1956) found that ponds in the Potholes area of Grant County, Washington, which were similar in succession to Gable Mountain, were heavily used by coots, principally because they provided a great abundance of food and adequate nesting substrate. The major food items eaten by coots frequenting the waste ponds have been reported by Hanson and Browning (1957). Bulrush, wild millet, algae, smartweed, and sandbur were the major foods, while insects comprised only 2 percent of the diet by volume.

Waste Management Considerations - Coots were the sixth most commonly harvested waterfowl in the Pacific Flyway during the combined 1972-73 hunting seasons, comprising 1.3 percent of the total retrieved kill (Table 2.1). They were the most abundant waterfowl species observed on the waste ponds, forming 36 percent of the total waterfowl observed. Assuming that 20 broods are produced and that each brood contains 9.9 eggs (Kiel, 1955), it becomes apparent that a large number of coots, perhaps as many as 200, could hatch on the 200 Area ponds. Limiting factors substantially reduce this figure, however. Sooter (1945) found that there was an average of 8.22 eggs in every successful clutch with only 2.47 coots growing to adulthood, and only 77 percent of the entire season's nests were successful. Therefore, only 1.9 (approximately 2) birds per nesting pair could be expected to reach flight age. High mortality is attributed to the careless treatment adults give the young. Assuming that two young reach flight age, a total of 40 birds could be produced on the waste ponds. If these individuals migrate off the Reservation, particularly during the fall hunting season, they probably will be harvested. Burton (1959) found that 79 percent of the total coot harvest consisted of young birds. Emphasis has been placed mostly on young birds produced on the ponds because flightless birds had to stay on the ponds for a period of approximately 4 months. During this time they fed on a variety of foods that contained radionuclides.

CHAPTER 3

UPLAND GAME BIRDS

Upland game birds are not as important as aquatic birds because of generally low population. Also, they derive most of their foods from terrestrial plants and insects that are not in close contact with radionuclides present in pond water and sediments. Upland game birds are not generally as migratory as waterfowl. All species present in the 200 Areas, except the mourning dove, are residents.

Upland birds are hunted for sport and killed and eaten by people. They are therefore, of concern to radiological monitoring programs. Upland game birds would be an important consideration if ponds were drained and seed-producing weeds were permitted to grow on the exposed sediments. It is reasonable to expect that radionuclides would be transferred from soil to plant to seeds and then to game birds.

Order: Galliformes - (Fowl-like Birds)

Family: Phasianidae - (Quail and Pheasants)

Lophortyx californicus - California Quail.

Status and Distribution - A permanent resident on the Hanford Reservation, California quail were uncommon around the ponds, being sighted only twice--at B-Pond on June 22, 1972, and at U-Pond on July 28, 1972. Nesting has not been recorded at any of the ponds.

Biology - California quail occur in mixtures of brush and open areas where the following ecological necessities are supplied: dense brush for roosting, open grassy areas and edges for foraging, and fresh water in summer for drinking. Several ponds would appear to meet these criteria. In the late winter and spring, tender leaves constitute the major foods. In other seasons, seeds, particularly of legumes, are the staple food (Martin et al., 1961).

Waste Management Considerations - The California quail is an important game bird in Washington. It is doubtful that the birds visiting the ponds come in contact with hunters since a covey will generally inhabit a particular area, seldom venturing far from it.

Phasianus colchicus - Ringneck Pheasant

Status and Distribution - An introduced, permanent resident on the Hanford Reservation, the ringneck pheasant was sighted at B, U, and Redox Ponds. It probably nests around these ponds, though no broods or nests have ever been seen. Young birds have been observed at Benson Ranch on project ALE.

Biology - It prefers open fields, brushy areas, tall grass swales, hedgerows, weedy ditches, marshes and especially grain, hay, and corn fields. It feeds primarily on domestic grains and seeds of wild plants (Larrison and Sonnenberg, 1968).

Waste Management Considerations - See California quail.

Alectoris graeca - Chukar Partridge

Status and Distribution - A common, introduced, permanent resident on the Hanford Reservation, the chukar was seen only once near B-Pond on September 8, 1972. Nesting occurs on the Reservation, but has not been observed near any of the 200 Area ponds.

Biology - Chukars prefer steep rugged habitats and broken terrain. They are commonly observed around Gable and Rattlesnake Mountains. A nest was found near Gable Butte. They feed primarily on seeds and other vegetable matter, including cheatgrass seeds (Savage et al., 1969).

Waste Management Considerations - See California quail.

Order: Columbiformes - (Pigeon-like Birds)

Family: Columbidae - (Pigeons and Doves)

Columba livia - Rock Dove (Domestic Pigeon)

Status and Distribution - An uncommon, introduced, permanent resident, the rock dove was sighted at U-Pond only in September 1973. Large colonies of these feral pigeons presently nest on the White Bluffs and in the reactor outflow and intake buildings which occur upstream from the old Hanford townsite. A few individuals probably nest on the buildings in the 200 Areas.

Biology - The rock dove is native to the old world, where it commonly nests on crevices and shelves on rocky cliffs. They probably use the Reservation for nesting and resting only, preferring to feed on domestic grains in the agricultural lands north of Pasco, Washington.

Waste Management Considerations - At the present time, this species is of little concern to waste management. Should a colony or colonies take up residence at the 200 E or W Area, then these birds would be important, particularly if contaminated water or grit were available.

Zenaidura macroura - Mourning Dove

Status and Distribution - A common summer resident and spring and fall migrant (Figure 7.12), the mourning dove is most abundant at U-Pond. The earliest date sighted was on April 20, 1973. The latest date sighted was on September 8, 1971. This species is a common nester on the entire Reservation. It generally nests on the ground, but will sometimes select a tree or bush for this purpose. At least two broods are produced during the warm summer months.

Biology - In fall, mourning doves can be seen in flocks preparatory to migration. During winter they concentrate in southern states where they are regarded as important game birds. The favorite feeding places of this bird are fields, orchards, or other open weedy areas where seeds can be gleaned readily. It also visits watering places frequently (Martin et al., 1961). The 200 Area ponds primarily function as watering areas for this species.

Waste Management Considerations - The large number of doves sighted during the summer of 1972 is probably a reflection of young birds which were hatched and raised on the reservation. The ponds serve as watering areas where these birds congregate before migrating south. Should contaminated drinking water be present, this species could be expected to consume it and would incorporate radiocontaminants in their tissues. During their migration south, they would be subjected to hunting kills.

CHAPTER 4

HAWKS, EAGLES AND OWLS

The raptors have become more seriously depleted in numbers during the past 100 years than other birds, primarily due to a reduction of isolated habitat acreage and also to the widespread use of chemical pesticides. The food of raptors consists of other birds, small and medium-sized mammals, snakes and lizards and large insects. The larger-sized raptors can kill ducks. The potential exists for trophic level transfers of radionuclides, but raptors are top-level consumers which, in turn, are not eaten by people. The concern here is not radionuclide transfers to man, but to the welfare of the birds. The isolation of the Hanford Reservation is attractive to raptors. Ponds help provide nest sites by permitting tree growth and also contribute to the production of animals that serve as raptor food.

Order: Falconiformes - (Hawk-like Birds)

Family: Accipitridae

Circus cyaneus - Marsh Hawk

Status and Distribution - The marsh hawk is a common migrant and summer and winter resident on the Hanford Reservation. It was observed around all ponds and probably nests near several although no nests were found.

Biology - The marsh hawk prefers broad, open fields, marshlands, damp meadows and grasslands. Nests are in brush or tall grass bordering more open areas. The marsh hawk, in common with most other predators, seems to feed upon whatever it finds conveniently available, whether that food be carrion (of fresher grades) or captured prey. The carrion eaten is, in large measure, carcasses of animals killed along highways; the prey includes young rabbits, mice, and the smaller ground squirrels, passerine birds, and young or crippled individuals of larger species, including ringnecked pheasants (Errington and Breckenridge, 1936).

Waste Management Considerations - Birds of prey are important in waste management programs, especially nuisance spreads of radioactivity in pellets and fecal droppings.

Accipiter striatus - Sharp-shinned Hawk

Status and Distribution - The sharp-shinned hawk is a rare migrant on the Hanford Reservation. One adult bird was sighted at U-Pond on May 14, 1973. This species seems to be most common at lower elevations in the spring and fall, moving into the mountainous areas during the summer nesting season.

Biology - This is one of the smaller hawks of Washington. It is seldom seen since it generally flies close to the ground, foraging among bushes for birds and mammals.

Waste Management Considerations - See marsh hawk.

Buteo jamaicensis - Red-tailed Hawk

Status and Distribution - A common migrant and summer resident on the Hanford Reservation, the red-tailed hawk, was sighted at every pond except Redox. This is one of the most common nesting species on the Reservation. A total of twelve pairs were found nesting in 1973 with the highest concentration (four pairs) in or near the old town of Hanford (Olendorf, 1973).

Biology - This species is a common resident throughout Washington, though somewhat less numerous in winter east of the Cascades. It prefers open fields and prairies. Its diet consists mostly of small rodents with birds and snakes being occasionally taken (Larrison and Sonnenberg, 1968).

Waste Management Considerations - See marsh hawk.

Buteo swainsoni - Swainson's Hawk

Status and Distribution - This common summer resident and migrant on the Hanford Reservation was sighted at B, U and Redox Ponds. Field studies conducted during 1973 and 1974 indicate that approximately fifteen nesting pair stay on the Reservation during the spring and summer months.

Biology - The Swainson's hawk is restricted to the hot dry sagebrush plains and grasslands of Eastern Washington where it is a fairly common nester. Winters are spent far to the south, mostly in Argentina. Miscellaneous observations taken at nesting sites on the Hanford Reservation indicate that snakes (Coluber constrictor and Pituophis melanoleucus) are their principal prey.

Waste Management Considerations - See marsh hawk.

Aquila chrysaetos - Golden Eagle

Status and Distribution - The golden eagle is a common winter resident on the Hanford Reservation. It was observed at U and Gable Mountain Ponds. No nests have been located on the Reservation, even though it lies within the eagle's nesting range.

Biology - The lack of an abundant ground squirrel-to-jackrabbit sized prey base has been related to the absence of this species as a nester on the Hanford Reservation (Olendorf, 1973).

Waste Management Considerations - See marsh hawk.

Family: Falconidae

Falco sparverius - Sparrow Hawk

Status and Distribution - A common summer resident and migrant on the Hanford Reservation, sparrow hawks were sighted at U, Gable Mountain and West Lake. Nests have been observed at the old townsites of Hanford and White Bluffs.

Biology - Most nesting occurs in trees (old flicker holes or magpie nests); however, rocky cliffs and buildings are also utilized. Their diet consists mostly of small mammals, passerine birds and insects (Smith et al., 1972).

Waste Management Considerations - See marsh hawk.

Order: Strigiformes - (Owls)

Family: Strigidae - (Typical Owls)

Bubo virginianus - Great Horned Owl

Status and Distribution - A common permanent resident on the Hanford Reservation, the great horned owl was sighted frequently at U-Pond. This large owl nested at U-Pond in 1972, 1973, and 1974 and at least two young fledged each year.

Biology - This large owl is the most conspicuous and, perhaps, the most abundant strigiform bird on the Hanford Reservation. They nest mostly near the Columbia River along White Bluffs and Umtanum Ridges, and in the cliffs of Gable Butte. Only a few have moved away from the river into nesting situations created by man. The U-Pond birds are a notable example. Analysis of pellets collected on the Hanford Reservation reveals that this owl feeds primarily on small mammals, occasionally consuming medium-sized mammals (jackrabbits and cottontail rabbits) and birds.

Waste Management Considerations - See marsh hawk.

Speotyto cunicularia - Burrowing Owl

Status and Distribution - The burrowing owl is a common summer resident and migrant on the Hanford Reservation. One bird was sighted at Redox Pond on June 22, 1972, and two birds were sighted there on April 27, 1973. A nest located approximately 1/2 mile from Redox Pond probably accounts for these sightings.

Biology - The burrowing owl is a common nesting species on the Reservation, preferring to nest in abandoned coyote and badger dens. This species is listed as "Status Undetermined" in the United States Department of Interior, Fish and Wildlife Service Report (1973), Threatened Wildlife of the United States. This suggests that the species is possibly threatened with extinction, but not enough information is available to determine its status. Future research on the Hanford Reservation may show that a fairly large nesting population of burrowing owls resides here. Observations by R. E. Fitzner in 1972, 1973, and 1974 indicate that no fewer than 15 nesting pair and possibly as high as 50 may nest on the Reservation. The diet of this species consists largely of insects, but mammals comprise the greatest biomass.

Waste Management Considerations - See marsh hawk.

CHAPTER 5

HERONS, GULLS AND SHOREBIRDS

This group of birds is well represented by species but they are not as important, as far as abundance is concerned, as waterfowl. This group also does not include species that are normally hunted for sport nor eaten as food by people. There are several species that appear to be involved in nuisance dispersal of radionuclides, i.e. the great blue heron and gulls, especially ring-billed and California gulls. These birds are resident and nest within easy travel distance of waste ponds.

Order: Ciconiiformes - (Herons)

Family: Ardeidae

Botaurus lentiginosus - American Bittern

Status and Distribution - An uncommon migrant and summer resident, the American bittern was sighted only at U and Gable Mountain Ponds. Earliest sighting occurred on April 27, 1972. Latest date sighted was June 11, 1973. Probably this species nests around the more vegetated ponds.

Biology - The American bittern is widely distributed over the United States whenever it can find secluded bogs and swamps, where it leads a rather solitary existence. It is less gregarious and more retiring in its habits than the other herons. Thus, it is less conspicuous and not as well-known as the others even in localities where it is common. Its diet consists mostly of frogs and small fish, supplemented by meadow mice, lizards, snakes, crayfish, mollusks, dragonflies, grasshoppers, and other insects (Bent, 1963).

Waste Management Considerations - The bittern probably stays on the ponds during the summer, leaving before the first freeze occurs. The animal diet places this species high on the trophic level and, hence, in a position of importance when considering the uptake of radiocontaminants. Since the bittern is not consumed by man, we could expect no direct contact via food web mechanisms. Should contaminants be available for either external or internal deposition in the bird, we could expect their removal and subsequent spread to areas outside the Hanford Reservation.

Ardea herodias - Great Blue Heron

Status and Distribution - The great blue heron is a permanent resident on the Hanford Reservation. It most commonly visits those ponds which are most successional advanced, namely U and Gable Mountain. It was observed during every month of the year except April. A nesting colony of approximately 40 pair is located in a stand of cottonwoods on a peninsula near the White Bluffs townsite.

Biology - The protection afforded by the Hanford Reservation coupled with adequate nesting and feeding habitats provide the herons an excellent situation in which to live. Few colonies presently exist in Washington, no doubt a result of habitat deterioration and illegal shooting. The diet of this large heron is quite similar to the American bittern and sheds some light on the reason the most successional advanced ponds are most widely used.

Waste Management Considerations - The great blue heron, being a permanent resident on the Reservation, stands a greater chance of picking up and transporting radiocontaminants, than the bittern. Examination of fecal remains and egg shells around the rookery would give valuable information on the role of this species in waste management. This species, because of its trophic level position, could serve as a useful indicator species if nondestructive radiological monitoring techniques were available.

Nycticorax nycticorax - Black-crowned Night Heron

Status and Distribution - An uncommon summer resident on the Hanford Reservation, two juvenile birds were sighted at Redox Pond on July 28, 1973, and one adult was observed at Gable Mountain Pond on August 25, 1972. A nesting colony was located on Locke Island in 1971 and 1972, but moved to a peninsula near White Bluffs in 1973. Approximately 10 pair presently nest on the Reservation.

Biology - The small breeding population located on the Reservation may be supplying those individuals which have been sighted on the ponds. The food of the night heron is similar to other herons, consisting mostly of fish, crabs, lizards, mice and insects (Jewett et al., 1953).

Waste Management Considerations - See American bittern.

Order: Charadriiformes

Family: Laridae - Gulls

Larus delawarensis - Ring-billed Gull

Status and Distribution - A permanent resident and visitor to the Hanford Reservation, the ring-billed gull was observed at all ponds except B. Gable Mountain Pond received the greatest use. This species was seen during every month except January and December. It is commonly found nesting on the islands of the Columbia River from Richland to Priest Rapids Dam. Hanson (1963) reported 3,937 and 5,758 nests of ring-billed and California gulls, respectively, for the years of 1967 and 1968 in the combined locations of Coyote Rapids and Ringold. Nests contained an average of 2.6 eggs each in 1967 and 2.7 per nest in 1968.

Biology - Gable Mountain Pond is probably used because of its proximity to the Columbia River and the preponderance of goldfish it harbors. Gulls have often been observed feeding voraciously on schools of these fish.

Waste Management Considerations - Ring-billed gulls could effectively remove radiocontaminants from the waste ponds, should their prey (goldfish) be contaminated. Present and future studies by Battelle aquatic ecology personnel should clearly reveal the potential for radioisotope uptake and retention by the fish, which will point out any possibilities for transfers of radionuclide to these birds.

Larus californicus - California Gull

Status and Distribution - A visitor and permanent resident on the Hanford Reservation, the California gull was observed at Gable Mountain, B, and West Lake. The majority of the sightings occurred at Gable Mountain Pond. Sightings were sporadic with the largest number, 51, being recorded on March 16, 1972. Nests are found on islands in the Columbia River. See ring-billed gull for further information on nesting.

Biology - See ring-billed gull.

Waste Management Considerations - See ring-billed gull.

Larus philadelphia - Bonaparte's Gull

Status and Distribution - A rare fall visitor on the Hanford Reservation, only three birds were sighted at Redox Pond on November 2, 1973. Hudson and Yocom (1954) reported few sightings in southeastern Washington with the majority occurring at O'Sullivan Dam, Grant County.

Family: Phalaropodidae

Lobipes lobatus - Northern Phalarope

Status and Distribution - A rather common fall migrant and uncommon spring migrant (Figure 7.10), the northern phalarope was most often observed at West Lake and B-Pond. Earliest date sighted was May 14, 1973, while the latest date of a sighting was September 30, 1972. It nests far to the north in summer--along the west coast of the continent, from the Aleutian Islands north to Northern Alaska (Jewett et al., 1953).

Biology - Phalaropes are swimming sandpipers. They have the peculiarity of spinning about like tops while feeding on the water surface. The predominant use of B and West Lake is a direct result of their relatively unvegetated shorelines which serve as excellent feeding areas for shorebirds. The diet of phalaropes consists primarily of aquatic insects, mollusks and crustaceans (Martin et al., 1961).

Waste Management Considerations - Hanson and Browning (1957) found that birds which consumed significant amounts of insects consistently contained greater ^{32}P concentrations than those whose diet was primarily fish. Willard (1960) reports that assimilation of radionuclides (^{90}Sr and ^{137}Cs) is directly related to how close to the ground birds feed. Birds which were grubbing around in the soil were found to contain the greatest concentration of fission products. This occurred as a direct result of the ingestion of contaminated soil. All shorebirds, including the phalaropes, are insect feeders and often mud grubbers. This may facilitate the ingestion of contaminated soil.

Steganopus tricolor - Wilson's Phalarope

Status and Distribution - An uncommon spring migrant sighted from May 4 through June 8, the majority of the Wilson's phalaropes occurred at West Lake. Hudson and Yocom (1954) report that this phalarope is a locally common summer resident and breeds about some of the scabland lakes. No nesting was recorded on the ponds, however.

Biology - See northern phalarope.

Waste Management Considerations - See northern phalarope.

Family: Recurvirostridae - (Avocets and Stilts)

Recurvirostra americana - American Avocet

Status and Distribution - An uncommon summer resident, the American avocet was sighted principally at West Lake. The earliest sighting occurred on April 27, 1972, while the latest observation occurred on October 5, 1973. Observed nesting was only on West Lake with as many as two pairs nesting there each year.

Biology - The avocet feeds primarily on aquatic insects, using its upcurved bill to sweep them from muddy bottoms of ponds and lakes.

Waste Management Considerations - See northern phalarope.

Family: Scolopacidae

Capella gallinago - Wilson's Snipe

Status and Distribution - A rare migrant and possible summer resident, only six sightings were recorded--three at U-Pond, one at Redox, and two at West Lake. The earliest observation was February 4, 1972, while the latest date was October 27, 1972. This species probably does not nest on the 200 Area ponds.

Biology - The Wilson snipe prefers marshes or coastal flats covered with low vegetation where it feeds principally on aquatic insects, crustaceans, earthworms, freshwater snails, and small fishes (Martin et al., 1961).

Waste Management Considerations - See northern phalarope. This species is a popular game bird being hunted during the fall and winter.

Limnodromus griseus - Long-billed Dowitcher

Status and Distribution - The long-billed dowitcher was sighted only on West Lake and B Ponds. The earliest sighting was on May 14, 1973. Latest date of a sighting was on October 11, 1973.

Biology - This snipe-like shorebird feeds in shallow water or on mud flats, drilling its long bill repeatedly into the sand or mud in search of small animal life (Martin et al., 1961).

Waste Management Considerations - See northern phalarope.

Erolia melanotus - Pectoral Sandpiper

Status and Distribution - A rare spring migrant, six individuals were sighted at West Lake on May 4, 1973.

Biology - This bird seems to prefer salt water areas, but is occasionally found farther inland by fresh water. It feeds primarily on insects (Larrison and Sonnenberg, 1968).

Waste Management Considerations - See northern phalarope.

Erolia minutilla - Least Sandpiper

Status and Distribution - A spring and fall migrant, the least sandpiper was sighted only on Gable Mountain and West Lake. The earliest sighting occurred on April 27, 1972, while the latest recorded observation was on August 23, 1973. Washington is merely a convenient way station for the least sandpipers. Breeding takes place far to the north, and the winter home on the Pacific side of the continent extends from California to Chile and the Galapagos Islands.

Biology - The smallest of shorebirds visiting Washington and also one of the most numerous, it frequents shores near salt and fresh water. The diet consists mainly of aquatic insects and other assorted invertebrates (Larrison and Sonnenberg, 1968).

Waste Management Considerations - See northern phalarope.

Erolia alpina - Red-backed Sandpiper (Dunlin)

Status and Distribution - A fall migrant, the red-backed sandpiper was observed mainly on West Lake. Earliest sight record was July 14, 1972; latest sight record was September 30, 1972. It does not nest in Washington.

Biology - This is apparently a very common species west of the Cascades, but is rather rare eastward. One was collected at Pullman on November 3, 1901, and two were sighted 32 miles southeast of Yakima on May 29, 1921 (Jewett et al., 1953).

Waste Management Considerations - See northern phalarope.

Ereunetes mauri - Western Sandpiper

Status and Distribution - This is the most common sandpiper to visit the 200 Area ponds. It was sighted during fall and spring migration (Figure 7.11) and observed on every pond with the exception of Gable Mountain. Earliest sighting occurred on May 18, 1972, while the latest date of a sighting was September 23, 1973. Nesting does not occur in Washington.

Biology - The Western sandpiper is probably the most abundant shorebird in the state of Washington. It is found on mud flats, sandy beaches, and grassy areas near water by both salt and fresh water locations and feeds primarily on aquatic insects and other invertebrates (Jewett et al., 1953).

Waste Management Considerations - See northern phalarope.

Crocethia alba - Sanderling

Status and Distribution - A rare fall migrant, the sanderling was sighted on Gable Mountain Pond during August 1973. Nesting does not occur in Washington.

Biology - The sanderling is typically found along sandy ocean beaches, rarely occurring on fresh water. Hudson and Yocom (1954) report only four records in Eastern Washington. Food consists of marine worms, minute shellfish, crustaceans, and insects (Jewett et al., 1953).

Waste Management Considerations - See northern phalarope.

Totanus melanoleucus - Greater Yellowlegs

Status and Distribution - A common fall migrant, the greater yellowlegs was observed on all 200 Area ponds, with the exception of U-Pond. Earliest date observed was July 21, 1972. Latest date observed was October 21, 1972. It does not breed in Washington.

Biology - This shorebird is generally seen wading in shallow water in tidal marshes and in shallow freshwater ponds and sloughs close to shore. It feeds mostly on aquatic invertebrates.

Waste Management Considerations - See northern phalarope.

Totanus flavipes - Lesser Yellowlegs

Status and Distribution - A rare fall migrant, all observations were made at West Lake.

Biology - The ecology and habits of the Lesser Yellowlegs are very similar to those of the Greater Yellowlegs (Larrison and Sonnenberg, 1968).

Waste Management Considerations - See northern phalarope.

Actitis macularia - Spotted Sandpiper

Status and Distribution - A common fall but uncommon spring migrant, the spotted sandpiper was sighted at all 200 Area ponds, generally preferring B-Pond. Earliest sighting was on May 18, 1972. Latest sighting was on October 29, 1971. It breeds both east and west of the Cascade Mountains; however, no nests have been found around the 200 Area ponds.

Biology - This species prefers the margins of lakes, ponds, streams and rivers. It feeds on a variety of aquatic insects and other invertebrates (Larrison and Sonnenberg, 1968).

Waste Management Considerations - See northern phalarope.

Numenius americanus - Longbilled Curlew

Status and Distribution - A common summer resident on the Hanford Reservation, being observed from April 6 through August 9, over 100 pairs of these birds presently nest on the Reservation.

Biology - The United States Department of Interior, Fish and Wildlife Service has placed this species on the list of "Status Undetermined Birds," suggesting that it may possibly be threatened with extinction. Spring plowing and other agricultural practices destroy many of their nests, and only a small amount of undisturbed land remains for them to inhabit. In spring they are often seen feeding on insects in the cheatgrass prairie regions of the Reservation. They leave the area by early summer, before the dry season begins.

Waste Management Considerations - See northern phalarope.

Charadrius vociferus - Northern Killdeer Plover

Status and Distribution - A common fall and spring migrant and summer resident on all 200 Area ponds (Figure 7.11). The earliest date sighted was on February 17, 1972, while the latest date of a sighting was November 9, 1973. This is certainly the most common nesting shorebird about the 200 Area ponds. Young have been observed at U and B Ponds and West Lake on several occasions.

Biology - The killdeer is found in a variety of habitats. While its preference is for the margins of lakes or rivers or for moist fields, pastures, or meadows, it has been observed on prairies, in alfalfa fields, potato patches, and orchards. Insects are the main staple of its diet (Larrison and Sonnenberg, 1968).

Waste Management Considerations - See northern phalarope.

CHAPTER 6

PERCHING BIRDS AND OTHER SMALL BIRDS

Perching birds are mostly appreciated for bright coloration and melodious songs. These attributes have created a strong aesthetic appeal for the conservation of avifauna in the United States. Clearly the development of riparian vegetation over the past years is responsible for the diversity of avifauna associated with waste ponds. The surrounding sagebrush dominated steppe vegetation has historically attracted and supported relatively few bird species as compared to riparian vegetation. This group encompasses many species with a variety of foraging strategies and breeding behavior. These are not important in food chains that lead to man. Some could be involved in nuisance spreads of radionuclides. As a group, they contribute to environmental quality and some, e.g., the starling, are regarded as pests.

Order: Passeriformes - (Perching Birds)

Family: Tyrannidae - (Tyrant Flycatchers)

Contopus sordidulus - Western Wood Pewee

Status and Distribution - A rare spring migrant, this species was sighted twice at U-Pond on May 13 and 18, 1973. No nesting records are known for the Hanford Reservation.

Biology - This species prefers the timbered areas of the Transition and Lower Canadian Zones throughout the state. It feeds on insects in the air-ways around the crowns and upper parts of trees (Larrison and Sonnenberg, 1968).

Waste Management Considerations - Flycatchers, as their name implies, feed primarily on insects. Feeding strategies vary among the species, but they all tend to capture their prey on the wing, seldom venturing to the ground. This behavior eliminates any chances of ingesting contaminated soil, but could result in some uptake of radiocontaminants should contaminated insects be available for consumption.

Tyrannus tyrannus - Eastern Kingbird

Status and Distribution - A common migrant and summer resident on the Hanford Reservation, the eastern kingbird was sighted at all ponds except West Lake. Earliest date observed was May 31, 1973, and the latest date August 9, 1972. This species nested at U-Pond during 1972 and 1973.

Biology - The eastern kingbird prefers open places with scattered trees and tall brush, interspersed with water. Foraging is by capturing insects on the wing. It frequently picks insects off floating aquatic plants (Larrison and Sonnenberg, 1968).

Waste Management Considerations - See western wood pewee.

Tyrannus verticalis - Western Kingbird

Status and Distribution - A common summer resident and migrant on the Hanford Reservation, this species was sighted at all ponds, with the exception

of West Lake. Earliest date observed was April 27, 1973. Latest date for a sighting was August 25, 1972. Nesting has been observed on power poles and buildings in and around the 200 E and W Areas.

Biology - Commonly found in hot dry areas and rough rocky country; its feeding strategies are similar to the eastern kingbird.

Waste Management Considerations - See western wood pewee.

Myiarchus cinerascens - Ash-Throated Flycatcher

Status and Distribution - A rare migrant and summer resident, this species was sighted at B, U and Redox Ponds. Earliest date sighted was April 27, 1972. Latest date sighted was July 14, 1972. It may nest on the Hanford Reservation, but no records presently exist.

Biology - An arid country flycatcher, the ash-throated fly-catcher nests in brush and scattered trees in dry, open areas. Nests are placed in and around the tops of brush and low trees (Larrison and Sonnenberg, 1968).

Waste Management Considerations - See western wood pewee.

Sayornis saya - Say's Phoebe

Status and Distribution - The Say's Phoebe is a common migrant and summer resident on the Hanford Reservation. U-Pond has been the only pond, however, for which any sightings have been made. The earliest recorded observation was April 27, 1973. The latest observation was recorded on August 23, 1973. This species nests commonly in buildings in the 200, 300 and 600 Areas of the Reservation. One pair nested in a covered basement stairwell at the 222-S Building, 200 W Area, during 1972 and 1973. Two broods were produced each year by this pair.

Biology - The Say's Phoebe lives in open country and is often noted in the desert where other birds are scarce. Like many other flycatchers, it catches insect prey by making erratic sorties from its perching post. Frequently one is seen poising on fluttering wings only 2 to 4 feet above the ground, apparently watching the ground intently for insect prey (Jewett et al., 1953).

Waste Management Considerations - See western wood pewee.

Order: Coraciiformes

Family: Alcedinidae

Megaceryle alcyon - Belted Kingfisher

Status and Distribution - An uncommon migrant and summer resident, the belted kingfisher was sighted at U and Gable Mountain Ponds only. No nesting records are known for the Hanford Reservation.

Biology - This bird prefers fish-inhabited waters with adequate perches from which to watch for its prey. The goldfish populations at U and Gable Mountain Ponds are no doubt the major attracting force for the kingfisher.

Waste Management Considerations - So few sightings of this piscivorous bird exist that it probably poses no problem in waste management. See American bittern for more detail.

Order: Piciformes

Family: Picidae

Dendrocopos villosus - Hairy Woodpecker

Status and Distribution - The hairy woodpecker is a rare migrant, having been sighted once at U-Pond on November 2, 1973.

Biology - Most members of the Picidae feed primarily on insects which they obtain from the branches and from under the bark of trees. The hairy and downy woodpeckers actually peck holes into the woody parts of trees, searching for wood boring beetles and moth larvae.

Waste Management Considerations - The rarity of the hairy and downy woodpeckers places them in a position of small importance in waste management. They would only be important to consider if contaminated prey were available for consumption.

Dendrocopos pubescens - Downy Woodpecker

Status and Distribution - A rare spring migrant, the downy woodpecker has been sighted twice at U-Pond, once on April 20, 1972, and again on March 16, 1973.

Biology - See hairy woodpecker.

Waste Management Considerations - See hairy woodpecker.

Asyndemus lewis - Lewis' Woodpecker

Status and Distribution - A rare spring migrant, three Lewis woodpeckers were sighted at B-Pond on April 27, 1973, and one bird at U-Pond on May 4, 1973.

Biology - This species lives in the open semi-wooded country, particularly burned and logged-over areas. It forages in bark and wood, also feeds on fruit in orchards and spends much time in the air capturing insects on the wing.

Waste Management Considerations - The Lewis' woodpecker is fairly unimportant to waste management operations, considering its rarity.

Colaptes cafer - Red-shafted Flicker

Status and Distribution - A common summer resident and migrant on the Hanford Reservation, but not abundant around the 200 Area ponds, the red-shafted flicker was sighted at U and Redox Ponds only. Nests have been found in trees near the Columbia River, particularly near the old townsites of Hanford and White Bluffs.

Biology - This species occurs in a wide variety of habitats, especially semi-open or broken woodland or forests where both trees and open soil surface are available. The flicker obtains much of its food from the ground, feeding on ants and other terrestrial insects. In the winter, they primarily feed on vegetable matter (Martin et al., 1961).

Waste Management Considerations - Being a ground insect feeder places this species in a position of importance as far as waste management is concerned. Insects generally have a higher concentration factor for fission products than vegetable matter, and ground feeding birds can ingest contaminated dirt (Willard, 1960).

Order: Caprimulgiformes

Family: Caprimulgidae

Chordeiles minor - Common Nighthawk

Status and Distribution - A common summer resident on the Hanford Reservation, the common nighthawk was observed at all 200 Area ponds. Earliest date sighted was June 2, 1972. Latest date observed was August 1, 1973.

Biology - A characteristic bird of the evening skies in summer, it wheels and dives, foraging on insects. These birds have been seen feeding on newly emerged midges and other insects at U Pond.

Waste Management Considerations - Nighthawks, like swallows, feed entirely on insects which they catch on the wing. These birds are frequently seen foraging about the ponds and probably consume large quantities of chironomids, mayflies, and other aquatic insects which have spent a large part of their existence living in the pond sediments or in other niches present in the pond community. If contamination were present in these prey items, it could be expected to also occur in the nighthawk.

Family: Corvidae

Pica pica - Black-billed Magpie

Status and Distribution - A common permanent resident on the Hanford Reservation (Figure 7.12), the black-billed magpie was sighted at all ponds except West Lake. Nests were found at B, U and Redox Ponds.

Biology - The magpie is without a doubt one of the most conspicuous birds on the Reservation. They are usually in small flocks, noisily searching for whatever food, dead or alive, they may find. Road-killed jackrabbits often attract a dozen or more of these birds.

U-Pond is an important nesting area for magpies, having 6 to 10 pair nesting in its thick brush and trees. After the breeding season, magpies wander extensively, some even to the Cascades and open areas of Western Washington (Larrison and Sonnenberg, 1968).

Waste Management Considerations - The habit of using mud in the construction of its nest may cause some waste management problems, particularly around U-Pond, where radioactive mud is available at times. Its omnivorous feeding habits may also pose a problem if contaminated food of any sort should be available. Being a permanent resident increases the chances of this species to take part in the nuisance spread of radioactivity to onsite and offsite areas.

Corvus corax - Common Raven

Status and Distribution - The common raven is a permanent resident on the Hanford Reservation. It was observed at all ponds, but most frequently at B-Pond. Nests have been located on Army Loop Road and on Gable Mountain.

Biology - The raven prefers nonpopulated and noncultivated areas. It requires large areas of open to semi-open terrain for foraging and steep cliffs or rocky points with shelves or niches for safe nesting. Its diet is similar to the magpie.

Corvus brachyrhynchos - Common Crow

Status and Distribution - The common crow is a permanent resident and occurs at all ponds except West Lake. Nests were found at Redox, U, B, and Gable Mountain Ponds.

Biology - The common crow occurs throughout the state, but mostly in the lowlands, where soil is cultivated or stock is pastured. Its diet is similar to the magpie.

Waste Management Considerations - See black-billed magpie.

Order: Passeriformes

Family: Alaudidae

Eremophila alpestris - Horned Lark

Status and Distribution - A common migrant and summer and winter resident on the Hanford Reservation, the horned lark was sighted at Gable Mountain, B and Redox Ponds. It is a dominant nesting species on the Hanford Reservation.

Biology - The horned lark is found throughout the Hanford Reservation except in riparian vegetation. The species feeds principally on insects during the summer, particularly weevils (Curculionidae). In the winter, however, they become almost exclusively granivorous (Rotenberry, 1974).

Waste Management Considerations - Being a ground feeding insectivore-granivore, these birds are in a position of importance as far as waste management is concerned, particularly if contaminated soil is available for this consumption. Their preference for nonriparian areas, however, reduces their chances for coming in contact with pond-associated contamination.

Family: Sturnidae

Sturnus vulgaris - Common Starling

Status and Distribution - A common permanent resident, being most abundant at U and Gable Mountain Ponds, starlings probably nest on buildings in the 200 E and W Areas, but are most abundant on the bluffs along the Columbia River from Richland to the 100-H Area.

Biology - Twenty years ago the bird was rare in Washington. Now it is distributed throughout the state, mostly around human habitats in the lowlands. Open places are required for foraging and it is a cavity nester. Large flocks of a hundred or more birds were seen at U-Pond in the summer of 1972 and 1973. These flocks consisted mostly of newly fledged birds. The diet of the starling consists of insects and assorted vegetable matter (Larrison and Sonnenberg, 1968).

Waste Management Considerations - Starlings seem to be a very adaptable bird in their feeding techniques. They have been observed feeding on insects and seeds along the ground and in tall and low vegetation. This fact, coupled with their abundance during certain summer months, would tend to rank them as fairly important in radioactive waste management.

Family: Icteridae - (Blackbirds)

Molothrus ater - Brown-headed Cowbird

Status and Distribution - A rare migrant and summer resident, the brown-headed cowbird was sighted at Redox and U Ponds only. No records of nesting on the Reservation exist.

Biology - The cowbird prefers pastures, meadows, suburban area, willow and brush growth, and orchards. It forages on the open ground, often in close proximity to cattle and horses. Their diet consists of a variety of insects and weed seeds which are generally taken off the ground (Larrison and Sonnenberg, 1968).

Waste Management Considerations - See common starling.

Xanthocephalus xanthocephalus - Yellow-headed Blackbird

Status and Distribution - A common summer resident around the 200 Area ponds (Figure 7.13), this species was sighted at all ponds but seemed to avoid Redox. The earliest date observed was April 27, 1972, while the latest date of a sighting was December 21, 1973. Nesting was observed at B, U, Gable Mountain, and West Lake.

Biology - This species prefers freshwater marshes with dense stands of rushes or cattails growing in standing water of one to several feet in depth. The birds nest in the marsh vegetation- but forage in adjacent meadows and fields. The diet of the yellow-headed blackbird consists of aquatic insects and seeds which are taken from the ground or low brush (Larrison and Sonnenberg, 1968).

Waste Management Considerations - The yellow-headed and red-winged blackbirds spend their summers nesting and feeding about the 200 Area ponds. Should contaminants be available for consumption, these birds should certainly reveal it. If radiocontaminants were consumed, they could be transported to offsite areas as soon as migration occurs.

Agelaius phoeniceus - Red-winged Blackbird

Status and Distribution - The red-winged blackbird is a common summer resident and uncommon winter visitor (Figure 7.14) and was observed at all ponds. Earliest date sighted was January 11, 1974, with the latest sighting on October 21, 1972. It is a common nesting species on all ponds.

Biology - See yellow-headed blackbird.

Waste Management Consideration - See yellow-headed blackbird.

Sturnella neglecta - Western Meadowlark

Status and Distribution - A common migrant and summer resident on the Hanford Reservation (Figure 7.13), the western meadowlark was sighted around all 200 Area ponds. Earliest date observed was February 24, 1972. Latest date recorded was November 5, 1971. Nesting by this species is a common occurrence of the Reservation, except in riparian areas.

Biology - The meadowlark is one of the most abundant of birds on the plains of Eastern Washington. Their diet consists of about 63 percent animal matter (ground beetles, grasshoppers, crickets, cut worms, wire worms,

stink bugs, and ants) and about 37 percent plant material. They forage for food almost entirely on the ground (Jewett et al., 1953).

Waste Management Considerations - Willard (1960) found that ground feeding birds stood a greater chance of ingesting radiocontaminants than do those species which feed in bushes and trees. This was attributed to the fact that contaminated dirt was often consumed along with a food item. Should fission products be available in the mud or dirt associated with the 200 Area ponds, this species would have the potential for consuming them. The abundance of meadowlarks around the ponds would compound this problem.

Icterus bullockii - Bullock's Oriole

Status and Distribution - A common migrant and summer resident on the Hanford Reservation, this species was observed only at U-Pond. The earliest date of a sighting was May 14, 1973. The latest date sighted was August 1, 1973. Nests were observed at U-Pond, but no young have ever been sighted.

Biology - This species is commonly found in deciduous tree growth along water and in settled areas in the open semiarid and arid lowlands of Eastern Washington. Its diet consists primarily of insects, with some seeds and fruits occasionally being eaten. Mainly it feeds in trees, seldom venturing to the ground (Jewett et al., 1953).

Waste Management Considerations - The degree of contact this species has with radioactive substances may be very slight. It doesn't generally feed on the ground, therefore no contaminated soil is ingested.

Euphagus cyanocephalus - Brewer's Blackbird

Status and Distribution - An uncommon spring migrant and summer resident, the Brewer's blackbird was sighted at all ponds except West Lake. The earliest observation was made on March 30, 1972. The latest date of a sighting was July 28, 1972. One nest containing four eggs was found in June 1972 on a billboard adjacent to the 200 W badgehouse.

Biology - The bird prefers open country, meadows, fields, or sagebrush, with trees, bushes or fence posts for lookouts or roosting. Nesting is generally done in brush. It forages for insects and seeds on the ground and in low brush (Jewett et al., 1963).

Waste Management Considerations - The tendency for this species to feed and live in brush close to the ground reduces its chances for direct contact with contaminated soil. It still may consume food which could possibly be contaminated. The small amount of biomass represented by this species precludes conceivable waste management problems.

Family: Fringillidae - (Grosbeaks, Finches, Buntings, and Sparrows)

Carpodacus mexicanus - House Finch

Status and Distribution - The house finch is a rare winter and spring visitor to the 200 Area ponds. There were 20 birds at Gable Mountain Pond on December 30, 1971, and 10 birds at U-Pond on March 16, 1973. No nesting records are known for the Hanford Reservation.

Biology - The house finch occupies a variety of sites, but the following environmental factors must be present: (1) water within reach; (2) open area for the growth of seed-producing plants, especially composites; (3) bushes and trees supplying fruit and berries in season; (4) trees, natural tree groves, backyard thickets, etc., for cover. U-Pond comes the closest to meeting these requirements, but is apparently lacking in enough of them to be a great attractant for this species.

Waste Management Considerations - See Brewer's blackbird.

Spinus tristis - American Goldfinch

Status Distribution - The American goldfinch is an uncommon migrant and resident on the Hanford Reservation. It was sighted at U, Redox and Gable Mountain Ponds. The earliest date sighted was January 28, 1972. The latest date for an observation was November 5, 1971. Nesting records for the Reservation are absent.

Biology - This is the state bird of Washington, occurring widely throughout the state, except in the mountains. Foraging is done in open areas where thistles, dandelions, and other composites abound (Jewett et al., 1953). This is the primary reason why U, Redox, and Gable Mountain were the only ponds utilized by the goldfinch.

Waste Management Considerations - See Brewer's blackbird.

Passerculus sandwichensis - Savannah Sparrow

Status and Distribution - A common migrant and summer resident on the Hanford Reservation, but uncommon around the 200 Area ponds, the Savannah sparrow was sighted at U, Gable Mountain, and West Lake. It is known to nest on the Reservation.

Biology - This species commonly inhabits open meadows and prairies at lower elevations throughout the state. Its diet consists of seeds and insects.

Waste Management Considerations - See Brewer's blackbird.

Chondestes grammacus - Lark Sparrow

Status and Distribution - A common migrant and summer resident on the Hanford Reservation, this species was observed at U and Redox Ponds only. Earliest recorded sighting was on May 31, 1973; latest observation, on August 31, 1972. It is a common nesting species on the Reservation; however, no nests were found around any of the ponds.

Biology - This is a species common to the open sagebrush and grassy communities of Eastern Washington, preferring open country with scattered trees and bushes. It forages about in brush for insects and seeds (Larrison and Sonnenberg, 1968).

Waste Management Considerations - See Brewer's blackbird.

Zonotrichia leucophrys - White-crowned Sparrow

Status and Distribution - The white-crowned sparrow, a common migrant and uncommon winter resident, was sighted at all ponds except West Lake. The earliest sighting was on January 4, 1973, and the latest on December 1, 1972. No nesting records exist for the Hanford Reservation.

Biology - White-crowned sparrows utilize the ponded areas for resting and feeding areas while migrating to and from their nesting areas which are primarily located in the timbered sections of the state. They forage about in the brush and on the ground for insects and seeds.

Waste Management Considerations - See Brewer's blackbird.

Zonotrichia atricapilla - Golden-crowned Sparrow

Status and Distribution - This species is a rare spring migrant, having been sighted only twice at U-Pond, on May 4, 1972, and on April 27, 1973. Six and two birds were sighted, respectively, on these dates. Nesting does not occur in Washington.

Biology - Eastern Washington is not in the main migration path of this species. It primarily migrates through the brush and deciduous mixed woods in spring and through the sub-alpine meadows in fall (Jewett et al., 1953). This explains why no fall records occurred at any of the waste ponds. Its diet consists almost entirely of plant material (Martin et al., 1961).

Waste Management Considerations - See Brewer's blackbird.

Spizella arborea - Tree Sparrow

Status and Distribution - One individual was observed at U-Pond on March 16, 1973. This was highly unusual, as most reports indicate this to be a winter visitor. It does not nest in Washington (Jewett et al., 1953).

Biology - The tree-sparrow is strictly a winter visitor in Washington, preferring open areas and weedy fields, where it forages primarily for weed seeds.

Waste Management Considerations - See Brewer's blackbird.

Junco oreganus - Oregon Junco

Status and Distribution - A rare spring and fall migrant, the Oregon junco was sighted only at U-Pond. There were two spring sightings, one on February 24, 1972 when 20 individuals were recorded, and one on March 16, 1973 with 5 birds being recorded. A fall record on November 9, 1973 reports 12 birds sighted. There are no nesting records for the Hanford Reservation.

Biology - The Oregon junco prefers open forests and woodlands, particularly brushy and wooded edges by open ground. In summer it frequents dry open forests where nests are placed in grass, pine needles, and low forbs. It feeds on a variety of small insects and seeds.

Waste Management Considerations - See Brewer's blackbird.

Amphispiza belli - Sage Sparrow

Status and Distribution - The sage sparrow is a common summer resident on the Hanford Reservation, yet rarely seen around any of the 200 Area ponds. Three sightings of lone individuals occurred on May 18, June 18, and October 5, 1973 at Gable Mountain Pond. This is a regular nester in sagebrush communities.

Biology - This sparrow is strongly restricted to sagebrush. It spends most of its time in the undersagebrush bushes, foraging for insects, primarily Curculionid beetles (Rotenberry, 1974).

Waste Management Considerations - See Brewer's blackbird.

Melospiza melodia - Song Sparrow

Status and Distribution - The song sparrow is a common migrant and winter and summer resident around the 200 Area ponds. It was observed at all ponds except West Lake. The earliest sighting was made on January 28, 1972. The latest date observed was December 3, 1971. They probably nest around several of the ponds, but no observations have been made.

Biology - In Eastern Washington the song sparrow is restricted to brushy areas along water (Jewett et al., 1953). This explains why the bird is not more common around the 200 Area ponds, and also why U and Gable Mountain Ponds receive the greatest use. This species feeds primarily on insects and weed seeds.

Waste Management Considerations - See Brewer's blackbird.

Melospiza georgiana - Swamp Sparrow

Status and Distribution - A rare accidental visitor, the swamp sparrow was sighted once at U-Pond on February 17, 1972. As far as we can tell, this is the only record for a swamp sparrow in Washington. Burleigh apparently collected this species in Lewiston, Idaho (Hudson and Yocom, 1954).

Biology - It is common in bogs and marshes in Eastern United States and feeds primarily on insects and weed seeds (Robbins et al., 1960).

Waste Management Considerations - See Brewer's blackbird.

Pipilo erythrophthalmus - Rufous-sided Towhee

Status and Distribution - A rare spring migrant, one rufous-sided towhee was sighted at U-Pond on March 9, 1972.

Biology - Larrison and Sonnenberg (1968) report this species to be a common, though irregular, migrant and summer resident and uncommon winter resident in deciduous brush east of the Cascades, except the arid desert areas. It feeds on both insect and plant material which it finds primarily by scratching and kicking in leaf litter.

Waste Management Considerations - See Brewer's blackbird.

Family: Thraupidae - (Tanagers)

Piranga ludoviciana - Western Tanager

Status and Distribution - An uncommon migrant and summer resident the western tanager was sighted only at U-Pond. The earliest record was May 4, 1973. The latest sighting occurred on August 1, 1973. It probably does not nest on the Hanford Reservation.

Biology - The western tanager is an occupant of the open coniferous forests and mixed deciduous-coniferous woodlands where sufficient openings and edges provide the necessary well lighted foraging habitats. Food searching is done among the leaves of the larger sunlit branches (Larrison and Sonnenberg, 1968). It feeds on insects, berries, and fruit.

Waste Management Considerations - See Bullock's oriole.

Family: Hirundinidae - (Swallows)

Petrochelidon pyrrhonota - Cliff Swallow

Status and Distribution - A common migrant and summer resident (Figure 7.14), the cliff swallow was observed at all 200 Area ponds. Earliest date sighted was April 7, 1973. Latest date sighted was September 17, 1971. Nesting occurs commonly around buildings and water towers on the Reservation and along White Bluffs from Ringold to the 100-H Area.

Biology - In order for this species to reside in an area, the locality must supply: 1) rocky cliffs, vertical concrete walls, or wooden walls of old buildings, to which nests may be fastened; 2) mud for building the nest; 3) water for drinking; 4) insect-laden airways over water or wetlands for foraging. All of these requirements are met around the 200 Area ponds. This is an aerial feeder, consuming only insects (Larrison and Sonnenberg, 1968).

Waste Management Considerations - See Common Nighthawk. The swallows build a mud nest while nighthawks simply lay their eggs in a small depression on the ground. Should contaminated mud be available to the swallows, they would undoubtedly transport it to their nesting sites for nest building purposes.

Hirundo rustica - Barn Swallow

Status and Distribution - A common migrant and summer resident (Figure 7.14), barn swallows were sighted at all ponds. The earliest date sighted was April 27, 1972. The latest date observed was September 28, 1973. Nests have been observed in buildings around the 200 E and 200 W Areas.

Biology - This species builds a mud nest among eaves and timbers of farm buildings and structures such as bridges and trestles. They require water nearby to mold mud for nests. Nests must be overhung by some projection to preserve them from the rain. The bird forages for insects mostly over water, marshes, and wetlands.

Waste Management Considerations - See cliff swallow.

Family: Laniidae

Lanius ludovicianus - Loggerhead Shrike

Status and Distribution - The loggerhead shrike is a common migrant and summer resident and uncommon winter visitor. It was observed at all ponds excluding West Lake. Earliest date sighted was January 14, 1972, and the latest was October 5, 1971. It nested around Redox, U, and B Ponds.

Biology - The loggerhead shrike is commonly found in open sagebrush and cultivated field areas of Eastern Washington. It feeds on insects, small mammals and birds. It nests in densely foliated trees and shrubs (Larrison and Sonnenberg, 1968). The shrike is not considered as a raptor, but it has similar feeding habits.

Waste Management Considerations - See marsh hawk.

Family: Vireonidae - (Vireos)

Vireo olivaceus - Red-eyed Vireo

Status and Distribution - An uncommon summer resident, the red-eyed vireo was sighted only at U-Pond. Earliest sighting was on June 8, 1972. Latest date observed was August 25, 1972. It probably nested at U-Pond; however, no nests or young birds were ever observed.

Biology - The red-eyed vireo occurs mostly in deciduous tree growth near water. It forages for insects in the upper parts of tall willows and cottonwoods.

Waste Management Considerations - The vireos and warblers are typically found in the canopy of trees where they forage for insects. Willard (1960) indicates that the white-eyed vireo and Kentucky warbler, species not unlike the vireos and warblers found in Washington, had very little radioactivity in their tissues--amounting to 1/20 that of birds which feed on or close to the ground of the White Oak Lake bed at Oak Ridge, Tennessee. This fact, coupled with the few numbers of sightings of these birds, would infer low waste management consideration.

Vireo gilvus - Warbling Vireo

Status and Distribution - A migrant and summer visitor, the warbling vireo was sighted only at U and Redox Ponds. The earliest sighting occurred on May 4, 1972. The latest date observed was August 25, 1972. There are no nesting records for the Hanford Reservation.

Biology - The species occurs throughout Washington in deciduous and mixed deciduous-coniferous woodlands at low to moderate elevations. It feeds primarily on insects which it hunts in the upper canopy of tall trees (Larrison and Sonnenberg, 1968).

Waste Management Considerations - See red-eyed vireo.

Vireo huttoni - Hutton's Vireo

Status and Distribution - An uncommon spring migrant, a single Hutton's vireo was sighted at U-Pond on March 20, 1972 and on April 20, 1972. No nesting records for the Hanford Reservation are known.

Biology - This small vireo is restricted to the dense deciduous and mixed thickets and woods of the lowlands of the Cascades. It forages for insects in the upper reaches of trees.

Waste Management Considerations - See red-eyed vireo.

Family: Parulidae - (Wood Warblers)

Vermivora ruficapilla - Nashville Warbler

Status and Distribution - A rare spring migrant, two birds were sighted on April 27, 1972, and seven on May 4, 1973, all at U-Pond. No nesting records for the Hanford Reservation are known.

Biology - This warbler prefers the yellow pine-covered hillsides with a thick growth of ninebark, ocean spray, ceanothus or serviceberry for undercover. It forages for insects in the lower parts of trees often 25 to 50 feet above the ground and nests on the ground surface (Larrison and Sonnenberg, 1968).

Waste Management Considerations - See red-eyed vireo.

Vermivora celata - Orange-crowned Warbler

Status and Distribution - A rare spring migrant, two birds were observed at U-Pond on April 27, 1973. No nesting records for the Hanford Reservation are known.

Biology - The orange-crowned warbler is a bird of the open deciduous woods and dry hillside brush. The habitat it likes best is that characterized by open to medium-closed shrubbery overtopped by an open deciduous tree growth, mostly of a second-growth or successional nature. It forages for insects in bushes close to the ground (Larrison and Sonnenberg, 1968).

Waste Management Considerations - See red-eyed vireo.

Dendroica petechia - Yellow Warbler

Status and Distribution - An uncommon spring migrant, two birds were sighted at U-Pond on May 4, 1972 and one on May 14, 1973.

Biology - Same as red-eyed vireo.

Waste Management Considerations - See red-eyed vireo.

Dendroica coronata - Myrtle Warbler

Status and Distribution - A rare spring and fall migrant, two birds were sighted at U-Pond on March 30, 1972, and six birds were also sighted there on October 6, 1972. No nesting records exist for the Hanford Reservation.

Biology - Similar to red-eyed vireo.

Waste Management Considerations - See red-eyed vireo.

Dendroica auduboni - Audubon's Warbler

Status and Distribution - A common spring migrant, the Audubon's warbler was primarily sighted at U-Pond. The earliest date sighted was April 13, 1972. The latest date observed was May 18, 1972. There are no nesting records for the Hanford Reservation.

Biology - This species prefers the open coniferous woods and mixed groves of both coniferous and deciduous trees. Food-seeding is done in the middle and upper parts of the trees (Larrison and Sonnenberg, 1968).

Waste Management Considerations - See red-eyed vireo.

Oporornis tolmiei - Macgillivray's Warbler

Status and Distribution - A rare spring migrant, single birds were sighted on May 18 and May 24, 1972 at U-Pond. No nesting records for the Hanford Reservation are known.

Biology - This warbler is a common migrant and summer resident in brushy habitats, often near water, throughout the state. It seeks high humidity in its leafy environment, and dense brushy stream canyons or boggy places are much to its liking. It forages for insects in brush low to the ground (Larrison and Sonnenberg, 1968).

Waste Management Considerations - See red-eyed vireo.

Wilsonia pusilla - Wilson's Warbler

Status and Distribution - A common spring migrant, this species was sighted at U-Pond only. The earliest date sighted was May 4, 1972. The latest date observed was June 29, 1972. Nesting was not observed on the Hanford Reservation.

Biology - It prefers the brushy parts of the coniferous woods where it places its nest at the base of a small conifer closely surrounded by salal and ferns (Larrison and Sonnenberg, 1968).

Waste Management Considerations - See red-eyed vireo.

Dendroica townsendii - Townsend's Warbler

Status and Distribution - A spring migrant, the bird was sighted only at U-Pond on May 4, 1972 and May 31, 1973.

Biology - The Townsend's warbler is not known to nest on the Hanford Reservation.

Waste Management Considerations - See red-eyed vireo.

Family: Ploceidae - (Weaver Finches)

Passer domesticus - House Sparrow

Status and Distribution - An uncommon permanent resident on the Hanford Reservation, two individuals were sighted at U-Pond on September 8, 1971. They probably nest around the buildings of the 200 E and W Areas.

Biology - The house sparrow is not native to the United States. A few birds were introduced in the early 1900's and their numbers have since grown tremendously, especially around areas inhabited by man. It does not occur in the wild.

Waste Management Considerations - See Brewer's blackbird.

Family: Motacillidae

Anthus spinoletta - Water Pipit

Status and Distribution - An uncommon spring migrant, this species was sighted at Gable Mountain Pond on August 27, 1972, and at B-Pond on May 18, 1972. It nests in the Arctic-Alpine zone of Washington.

Biology - These birds prefer open places, nesting in Arctic tundra. In Washington they spend summers above timberline. As the cold weather encroaches, they move down to open places at lower elevations (Larrison and Sonnenberg, 1968).

Waste Management Considerations - This species is a ground foraging bird, feeding primarily on insects. Some plant materials are also consumed. Willard (1960), in examining birds living around the White Oak Lake bed at Oak Ridge, Tennessee, found that ground dwelling species living close to the lake shore exhibited the highest levels of radiocontaminants in their tissues. They were also subjected to continuous external gamma radiation. These features point out the importance of this species in a sound waste management program.

Family: Mimidae - (Mockingbirds and Thrashers)

Oreoscoptes montanus - Sage Thrasher

Status and Distribution - This is an uncommon summer resident on the Hanford Reservation with one sighting at B-Pond on September 8, 1971. Undoubtedly, they nest on the Reservation, but no nests or young birds have been observed.

Biology - It prefers the sagebrush areas of Eastern Washington but its numbers have been reduced considerably with the elimination of sagebrush and increased cultivation. It feeds primarily on insects which it finds around sagebrush.

Waste Management Considerations - The habits of this species are similar to those of the Brewer's blackbird, except this species seems to feed more on insects, thus placing it somewhat higher on the trophic level and perhaps more prone to picking up radiocontaminants should they be available.

Mimus polyglottos - Mockingbird

Status and Distribution - A rare summer visitor, mockingbirds were sighted at U-Pond on June 17 and June 22, 1972. Several other sightings occurred around the Reservation in June and July of 1973. At least four individuals resided on the Hanford Reservation in June 1974.

Biology - It feeds principally on insects during the summer months, but its diet will shift to more than half fruit in the fall and winter (Martin et al., 1961).

Waste Management Considerations - See sage thrasher.

Family: Troglodytidae - (Wrens)

Catherpes mexicanus - Canyon Wren

Status and Distribution - This is a rare bird around the 200 Area ponds, being sighted only at West Lake.

Biology - This species occurs in the open arid regions of Eastern Washington, frequenting canyon walls, rock slides, or basaltic outcroppings near water. Insects of many kinds and spiders are the main foods of wrens (Martin et al.).

Waste Management Considerations - See sage thrasher.

Troglodytes troglodytes - Winter Wren

Status and Distribution - A rare fall visitor, two birds were sighted at U-Pond on November 29, 1971. It does not breed on the Hanford Reservation.

Biology - This species shuns human civilization and makes its home in the wilderness, preferring the deep, dark, moist coniferous woods. It feeds primarily on insects.

Waste Management Considerations - See sage thrasher.

Telmatodytes palustris - Long-billed Marsh Wren

Status and Distribution - An uncommon spring migrant and summer resident on the Hanford Reservation, this species was sighted only at Gable Mountain Pond. The earliest date observed was February 26, 1973. The latest date sighted was June 22, 1973. It probably nests at Gable Mountain Pond.

Biology - This is a bird of the marshes, preferring freshwater cattail areas where the nests are attached to the flowering stems of Scirpus. Foraging for insects is done mostly on cattail stems (Larrison and Sonnenberg, 1968).

Waste Management Considerations - See sage thrasher.

Family: Sittidae - (Nuthatches)

Sitta canadensis - Red-breasted Nuthatch

Status and Distribution - A rare fall visitor, one bird was sighted at U-Pond on September 8, 1971. Hudson and Yocom (1954) report that this species is occasionally observed in the Columbia Basin.

Biology - This species is usually found in the coniferous forests, especially where a few dead snags are available for excavating nest holes. It is often seen very high in trees. It feeds principally on bark-inhabiting insects (Martin et al., 1961).

Waste Management Considerations - See hairy woodpeckers.

Family: Regulidae - (Kinglets)

Regulus satrapa - Golden-crowned Kinglet

Status and Distribution - A rare spring visitor, six birds were sighted on U-Pond on April 27, 1972. It does not nest on the Hanford Reservation.

Biology - Widely distributed throughout Washington, primarily in wooded areas, this species forages for insects in the upper and middle branches of trees.

Waste Management Considerations - See red-eyed vireo.

Regulus calendula - Ruby-crowned Kinglet

Status and Distribution - An uncommon spring migrant, the ruby-crowned kinglet was sighted only at U-Pond. Four were observed on April 27, 1972; one on May 4, 1972; and one on April 27, 1973. No nesting records for the Hanford Reservation are known.

Biology - See golden-crowned kinglet.

Waste Management Considerations - See red-eyed vireo.

Family: Turdidae - (Thrushes)

Mayadestes townsendii - Townsend's Solitaire

Status and Distribution - A rare spring migrant, one bird was sighted at U-Pond on May 4, 1973.

Biology - Most commonly found on forested mountain slopes and canyons. It selects high trees for singing and flycatching and feeds primarily on insects which it pursues at all levels near the ground, in brush and in the air (Larrison and Sonnenberg, 1968).

Waste Management Considerations - See sage thrasher.

Hylocichla guttata - Hermit Thrush

Status and Distribution - A rare spring migrant, two birds were sighted at U-Pond on May 18, 1972. Nesting on the Hanford Reservation is unknown.

Biology - A common summer resident and breeder in the open sub-alpine forests of the Hudsonian Zone of the mountains. It forages mostly for insects on the forest floor (Larrison and Sonnenberg, 1968).

Waste Management Considerations - See water pipit.

Turdus migratorius - Western Robin

Status and Distribution - An uncommon migrant and summer resident, the Western robin was sighted only at U-Pond. The earliest date observed was February 26, 1973. The latest date sighted was October 6, 1972. No nests have been observed on the Hanford Reservation.

Biology - Robins are commonly seen on lawns and grassy stretches in city yards and parks, in open timber, along water, and any place where moist soft ground will supply earthworms. They are also seen in bushes and trees where berries are to be found. Other environmental requirements involve the availability of mud for lining their nests and brush and trees for cover and nesting sites (Larrison and Sonnenberg, 1968).

Waste Management Considerations - See water pipit.

Ixoreus naevius - Varied Thrush

Status and Distribution - A rare spring and fall migrant, two were sighted on April 16, 1973 at U-Pond and one on November 2, 1973 at Redox Pond.

Biology - This thrush summers in the most dense coniferous forests of the mountains. It also occurs in deep fir and hemlock woods all the way to the sea (Larrison and Sonnenberg, 1968). It often wanders to open areas in late winter and early spring, explaining why these are the only periods it was sighted on the Reservation.

Sialia mexicana - Western Bluebird

Status and Distribution - A rare spring migrant, one bird was sighted at U-Pond on March 16, 1973.

Biology - It occurs mostly in open woodlands and farming districts at the lower altitudes. Dead trees or snags are needed to provide the holes for nesting sites and lookout posts. It forages for insects on the ground and also by hovering a few feet above it (Larrison and Sonnenberg, 1968).

Waste Management Considerations - See water pipit.

CHAPTER 7

SEASONAL DISTRIBUTION AND ABUNDANCE

There is no other group of terrestrial animals that has the ability to travel as far and as fast as birds. In no other group is the tendency for long distance seasonal migration so well-developed. At the same time, some birds do not migrate. These are regarded as residents, with movements restricted to foraging for food, reproduction, rearing of young and avoidance of predatory animals.

In this study, most of the aquatic-oriented birds showed strong seasonal migration patterns with high populations associated with autumn and spring migration periods. Low populations occurred in mid-winter when pond surfaces were frozen, although some birds, e.g., mallards, rested on the ice.

Waste ponds attracted grebes, ducks, geese, swans, coots, gulls, herons and a variety of shorebirds. Shoreline tree-shrub vegetation attracted perching and other small birds. During the observational period, 61 species of small birds were recorded as using waste pond areas (Table 7.1). The well developed tree-shrub vegetation at U-Pond attracted 55 species, more than twice the number of species recorded at any other pond. The maximum abundance of grebes, ducks, geese, swans and coots recorded on each of the waste ponds is shown in Table 7.2. These data show that maximum numbers by species were in the hundreds rather than thousands of birds. Gulls, herons and shorebirds were not as numerous as ducks, geese and coots (Table 7.3). The maximum counts of these birds showed that West Lake attracted more shorebirds than other ponds.

Although several species of grebes utilized the ponds, the pied-billed grebe was the most abundant (Figure 7.1). It occurred throughout the year but was most abundant in fall and spring.

The common merganser occurred as an erratic visitor in the waste ponds, mostly in autumn and early winter (Figure 7.1). One hundred and thirty birds occurred on the ponds in December 1971.

Mallards were present throughout the year. Maximum abundance occurred in late November or early December; at times nearly 300 birds were present on the ponds (Figure 7.2).

Gadwalls were not nearly as abundant as mallards with maximal numbers of about 40 birds occurring in autumn and spring (Figure 7.2).

The American wigeon occurred throughout the year with maximal abundance in spring and fall. The maximal abundance was about 90 individuals (Figure 7.3).

The blue-winged teal was absent from waste ponds during winter months. The maximal abundance occurred in June 1972 when 50 birds were counted (Figure 7.4).

The cinnamon teal was absent during winter months except for two individuals recorded in December 1973. Maximal abundance of individuals occurred in early May 1973 when nearly 50 birds were counted (Figure 7.4).

Shovelers were generally present throughout the year with low populations in winter and summer (Figure 7.5). Maximal abundance approached 55 birds in November 1971.

Pintails occurred throughout the year with low populations in summer and winter (Figure 7.5). Maximal populations approached 140 birds in March 1973.

Redheads were present throughout the year with lowest abundance in winter (Figure 7.6). Maximal abundance was 50 birds counted in July 1972.

Canvasbacks were most abundant during fall migration and were sparsely represented in spring and summer (Figure 7.6). A maximum count of 40 individuals occurred in October 1972.

Ringneck ducks were present throughout the year with maximal abundance during autumn and spring. Nearly 400 individuals were counted on a day in October 1972 (Figure 7.7).

Buffleheads were most abundant during autumn and spring migration. Maximal abundance was 140 individuals in March 1972 (Figure 7.7).

Ruddy ducks were present throughout the year with maximal abundance in spring and fall. Maximal abundance was 40 birds in May 1972 (Figure 7.8).

Canada geese visited the ponds in fall and winter with maximal numbers of 800 individuals counted (Figure 7.9).

The American coot was present on waste ponds throughout the year (Figure 7.9). Maximal abundance was 600 individuals in early October 1972.

The great blue heron occurred throughout the year ranging in abundance from 1-7 individuals (Figure 7.9).

The northern phalarope occurred as a late summer and early fall migrant with a maximal abundance of about 90 birds in August 1972 (Figure 7.10).

The American avocet occurred in spring and summer months with a maximal abundance of 10 individuals in June 1973 (Figure 7.10).

The western sandpiper occurred in the waste ponds in summer months. Maximal abundance occurred in July 1973 with about 90 individuals counted (Figure 7.11).

The killdeer was present throughout the year except during the late fall and winter months (Figure 7.11). Maximal abundance occurred in July 1972 when 30 birds were counted.

The California quail, ring-necked pheasant, mourning dove, and chukar partridge all classed as upland game birds occurred around the 200 Area ponds. The mourning dove is the only one of these which occurs in large enough numbers to show trends in seasonal abundance. This bird is not a permanent resident. Figure 7.12 shows that the mourning dove is a summer resident and spring and fall migrant.

Ring-billed and California gulls are common on the Hanford Reservation and nest in colonies on islands in the Columbia River. They can be considered mainly as permanent residents. They seem to move from the river area to the 200 Area ponds at no set interval. They are absent from the ponds during December and January, probably because of icing on the ponds.

The abundance of perching and other small birds is difficult to determine because of wariness and the concealment provided by dense vegetation that some species prefer. A bird that is conspicuous throughout the Reservation area is the black-billed magpie. The magpie is a year-long resident with maximal abundance in the vicinity of waste ponds recorded at 38 individuals (Figure 7.12). The western meadowlark prefers open vegetation and is not ecologically closely associated with waste ponds although it occurs in the vicinity. As many as 48 birds have been observed in the vicinity of waste ponds (Figure 7.13). Yellow-headed and red-winged blackbirds are spring and early summer residents nesting in the aquatic emergent vegetation of waste ponds. Populations of blackbirds are relatively small. About 40 have been recorded for yellow-headed blackbirds (Figure 7.13), and in the 80's for red-winged blackbirds (Figure 7.14). Swallows are summer residents on the Hanford Reservation (Figures 7.14 and 7.15). Because the birds are aerial feeders, numbers are difficult to estimate but cliff swallows are numerous with perhaps as many as 600 feeding in the area above and adjacent to waste ponds.

Table 7.1. Occurrence of perching birds and other small birds
in the vicinity of waste ponds.

Species	Ponds				
	B	U	Redox	Gable	WL
Western Wood Pewee	0	+	0	0	0
Belted Kingfisher	0	+	0	+	0
Hairy Woodpecker	0	+	0	0	0
Downy Woodpecker	0	+	0	0	0
Lewis Woodpecker	+	+	0	0	0
Red-shafted Flicker	0	+	+	0	0
Eastern Kingbird	+	+	+	+	0
Western Kingbird	+	+	+	+	0
Ash-Throated Flycatcher	+	+	+	0	0
Say's Phoebe	0	+	0	0	0
Horned Lark	+	0	+	+	0
Black-billed Magpie	+	+	+	+	0
Common Raven	+	+	+	+	+
Common Crow	+	+	+	+	0
Common Starling	+	+	+	+	+
Brown-headed Cowbird	0	+	+	0	0
Yellow-headed Blackbird	+	+	+	+	+
Red-winged Blackbird	+	+	+	+	+
Western Meadowlark	+	+	+	+	+
Bullock's Oriole	0	+	0	0	0
Brewer's Blackbird	+	+	+	+	0
House Finch	0	+	0	+	0
American Goldfinch	0	+	+	+	0
Savannah Sparrow	0	+	0	+	+
Lark Sparrow	0	+	+	0	0
White-crowned Sparrow	+	+	+	+	0
Golden-crowned Sparrow	0	+	0	0	0
Tree Sparrow	0	+	0	0	0
Oregon Junco	0	+	0	0	0
Sage Sparrow	0	0	0	+	0
Song Sparrow	+	+	+	+	0
Swamp Sparrow	0	+	0	0	0
Rufous-sided Towhee	0	+	0	0	0
Western Tanager	0	+	0	0	0
Cliff Swallow	+	+	+	+	+
Barn Swallow	+	+	+	+	+
Loggerhead Shrike	+	+	+	+	0
Red-eyed Vireo	0	+	0	0	0
Warbling Vireo	0	+	+	0	0
Hutton's Vireo	0	+	0	0	0

Table 7.1 (Cont.)

Species	Ponds				
	B	U	Redox	Gable	WL
Nashville Warbler	0	+	0	0	0
Orange-crowned Warbler	0	+	0	0	0
Yellow Warbler	0	+	0	0	0
Myrtle Warbler	0	+	0	0	0
Audubon's Warbler	0	+	+	0	0
Townsend Warbler	0	+	0	0	0
McGillivray's Warbler	0	+	0	0	0
Wilson's Warbler	0	+	0	0	0
Water Pipit	0	0	0	+	0
Sage Thrasher	+	0	0	0	0
Mocking Bird	0	+	0	0	0
Canyon Wren	0	0	0	0	+
Winter Wren	0	+	0	0	0
Marsh Wren	0	0	0	+	0
Golden-crowned Kinglet	0	+	0	0	0
Ruby-crowned Kinglet	0	+	0	0	0
Townsend's Solitaire	0	+	0	0	0
Hermit Thrush	0	+	0	0	0
Robin	0	+	0	0	0
Varied Thrush	0	+	+	0	0
Western Bluebird	0	+	0	0	0
Total (61)	18	55	24	23	9

Table 7.2 Maximum abundance of birds on any given day by species and by pond.

Species	Ponds				
	B-Pond	U-Pond	Redox	Gable	West Lake
Pied-billed Grebe	11	5	0	150	0
Common Merganser	1	2	6	132	0
Mallard	72	170	60	128	60
Gadwall	2	6	30	41	20
American Wigeon	15	250	125	137	140
Green-winged Teal	25	20	25	20	50
Blue-winged Teal	12	8	15	7	50
Cinnamon Teal	20	6	5	20	30
Shoveler	50	36	6	30	25
Pintail	20	13	7	100	75
Redhead	30	6	0	50	20
Scaup	50	36	24	110	75
Canvasback	0	4	0	40	17
Ringneck Duck	125	24	24	321	100
Goldeneye	55	6	1	150	100
Bufflehead	77	5	8	52	50
Old Squaw	1	0	0	5	2
Ruddy Duck	11	5	4	34	19
Canada Goose	300	0	0	800	175
Whistling Swan	0	0	2	6	3
American Coot	100	20	8	335	95
California Gull	1	0	0	95	1
Ring-billed Gull	0	3	3	6	6
American Bittern	0	1	0	1	0
Great Blue Heron	5	2	1	3	0
Black-crowned Night Heron	0	0	2	1	0
Northern Phalarope	26	0	2	4	80
Wilson's Phalarope	4	0	2	0	20
American Avocet	2	2	1	1	10
Wilson's Snipe	0	1	1	0	1
Pectoral Sandpiper	0	0	0	0	6
Least Sandpiper	0	0	0	8	50
Dunlin	12	0	0	0	45
Western Sandpiper	40	6	20	0	64
Sanderling	0	0	0	20	0
Greater Yellowlegs	2	0	3	4	3
Lesser Yellowlegs	0	0	0	0	7
Spotted Sandpiper	6	2	1	2	10
Long-billed Curlew	6	8	2	1	0
Killdeer	20	8	6	10	20

Figure 7.1. Seasonal abundance of pied-billed grebes and common mergansers on all ponds.

Figure 7.2. Seasonal abundance of mallards and gadwalls on all ponds.

Figure 7.3. Seasonal abundance of American wigeons and green-winged teal on all ponds.

Figure 7.4. Seasonal abundance of blue-winged and cinnamon teal on all ponds.

Figure 7.5. Seasonal abundance of shovelers and pintails on all ponds.

Figure 7.6. Seasonal abundance of redheads and canvasbacks on all ponds.

Figure 7.7. Seasonal abundance of ringneck ducks and buffleheads on all ponds.

Figure 7.8. Seasonal abundance of ruddy ducks and Canada geese on all ponds.

Figure 7.9. Seasonal abundance of American coots and great blue herons on all ponds.

Figure 7.10. Seasonal abundance of northern phalaropes and American avocets on all ponds.

Figure 7.11. Seasonal abundance of western sandpipers and killdeers on all ponds.

Figure 7.12. Seasonal abundance of mourning doves and black-billed magpies on all ponds.

Figure 7.13. Seasonal abundance of western meadowlarks and yellow-headed blackbirds on all ponds.

Figure 7.14. Seasonal abundance of red-winged blackbirds and cliff swallows on all ponds.

Figure 7.15. Seasonal abundance of barn swallows on all ponds.

CHECK LIST OF BIRDS SEEN ON AND
NEAR HANFORD RESERVATION WASTE PONDS

ORDER PODICIPEDIFORMES

Family Podicipedidae

- Horned Grebe Podiceps auritus
- Eared Grebe Podiceps caspicus
- Western Grebe Aechmophorus occidentalis
- Pied-billed Grebe Podilymbus podiceps

ORDER CICONIIFORMES

Family Ardeidae

- Great Blue Heron Ardea herodias
- Black-crowned Night Heron Nycticorax nycticorax
- American Bittern Botaurus lentiginosus

ORDER ANSERIFORMES

Family Anatidae

- Whistling Swan Olor columbianus
- Canada Goose Branta canadensis
- Mallard Anas platyrhynchos
- Gadwall Anas strepera
- Pintail Anas acuta
- Green-winged Teal Anas carolinensis
- Blue-winged Teal Anas discors
- Cinnamon Teal Anas cyanoptera
- American Wigeon Mareca americana
- Shoveler Spatula clypeata
- Redhead Aythya americana
- Ring-necked Duck Aythya collaris
- Canvasback Aythya valisineria
- Greater Scaup Aythya marila
- Lesser Scaup Aythya affinis

Common Goldeneye Bucephala clangula
Barrows Goldeneye Bucephala islandica
Bufflehead Bucephala albeola
Old Squaw Clangula hyemalis
Ruddy Duck Oxyura jamaicensis
Hooded Merganser Lophodytes cucullatus
Common Merganser Mergus merganser

ORDER FALCONIFORMES

Family Accipitridae

Sharp-shinned Hawk Accipiter striatus
Red-tailed Hawk Buteo jamaicensis
Swainson's Hawk Buteo swainsoni
Golden Eagle Aquila chrysaetos
Marsh Hawk Circus cyaneus

Family Falconidae

Sparrow Hawk Falco sparverius

ORDER GALLIFORMES

Family Phasianidae

California Quail Lophortyx californicus
Ring-necked Pheasant Phasianus colchicus
Chukar Alectoris graeca

ORDER GRUIFORMES

Family Gruidae

Sandhill Crane Grus canadensis

Family Rallidae

Sora Porzana carolina
American Coot Fulica americana

ORDER CHARADRIIFORMES

Family Charadriidae

Killdeer Charadrius vociferus

Family Scolopacidae

Common Snipe Capella gallinago

Long-billed Curlew Numenius americanus

Spotted Sandpiper Actitis macularia

Greater Yellowlegs Totanus melanoleucus

Lesser Yellowlegs Totanus flavipes

Pectoral Sandpiper Erolia melanotos

Least Sandpiper Erolia minutilla

Dunlin Erolia alpina

Long-billed Dowitcher Limnodromus scolopaceus

Western Sandpiper Ercunetes mauri

Sanderling Crocethia alba

Family Recurvirostridae

American Avocet Recurvirostra americana

Family Phalaropodidae

Wilson's Phalarope Steganopus tricolor

Northern Phalarope Lobipes lobatus

Family Laridae

California Gull Larus californicus

Ring-billed Gull Larus delawarensis

Bonaparte's Gull Larus philadelphia

ORDER COLUMBIFORMES

Family Columbidae

Rock Dove Columba livia

Mourning Dove Zenaidura macroura

ORDER STRIGIFORMES

Family Strigidae

Great Horned Owl Bubo virginianus

Burrowing Owl Speotyto cunicularia

ORDER CAPRIMULGIFORMES

Family Caprimulgidae

Common Nighthawk Chordeiles minor

ORDER CORACIIFORMES

Family Alcedinidae

Belted Kingfisher Megaceryle alcyon

ORDER PICIFORMES

Family Picidae

Red-shafted Flicker Colaptes cafer

Lewis' Woodpecker Asyndesmus lewis

Hairy Woodpecker Dendrocopos villosus

Downy Woodpecker Dendrocopos pubescens

ORDER PASSERIFORMES

Family Tyrannidae

Eastern Kingbird Tyrannus tyrannus

Western Kingbird Tyrannus verticalis

Ash-throated Flycatcher Myiarchus cinerascens

Say's Phoebe Sayornis saya

Western Wood Peewee Gontopus sordidulus

Family Alaudidae

Horned Lark Eremophila alpestris

Family Hirundinidae

Barn Swallow Hirundo rustica

Cliff Swallow Petrochelidon pyrrbonota

PASSERIFORMES (contd)

Family Corvidae

Black-billed Magpie Pica pica

Common Raven Corvus corax

Common Crow Corvus brachyrhynchos

Family Sittidae

Red-breasted Nuthatch Sitta canadensis

Family Troglodytidae

Winter Wren Troglodytes troglodytes

Long-billed Marsh Wren Telmatodytes palustris

Canon Wren Catherpes mexicanus

Family Mimidae

Mockingbird Mimus polyglottos

Sage Thrasher Oreoscoptes montanus

Family Turdidae

Robin Turdus migratorius

Varied Thrush Ixoreus naevius

Hermit Thrush Hylocichla guttata

Western Bluebird Sialia mexicana

Townsend's Solitaire Myadestes townsendi

Family Sylviidae

Golden-crowned Kinglet Regulus satrapa

Ruby-crowned Kinglet Regulus calendula

Family Motacillidae

Water Pipit Anthus spinoletta

Family Laniidae

Loggerhead Shrike Lanius ludovicianus

Family Sturnidae

Starling Sturnus vulgaris

PASSERIFORMES (contd)

Family Vireonidae

- Hutton's Vireo huttoni
- Red-eyed Vireo Vireo olivaceus
- Warbling Vireo Vireo gilvus

Family Parulidae

- Orange-crowned Warbler Vermivora celata
- Nashville Warbler Vermivora ruficapilla
- Yellow Warbler Dendroica petechia
- Myrtle Warbler Dendroica coronata
- Audubon's Warbler Dendroica auduboni
- Townsend's Warbler Dendroica townsendi
- MacGillivray's Warbler Oporornis tolmiei
- Wilson's Warbler Wilsonia pusilla

Family Ploceidae

- House Sparrow Passer domesticus

Family Icteridae

- Western Meadowlark Sturnella neglecta
- Yellow-headed Blackbird Xanthocephalus xanthocephalus
- Red-winged Blackbird Agelaius phoeniceus
- Bullock's Oriole Icterus bullockii
- Brewer's Blackbird Euphagus cyanocephalus
- Brown-headed Cowbird Molothrus ater

Family Thraupidae

- Western Tanager Piranga ludoviciana

Family Fringillidae

- House Finch Carpodacus mexicanus
- American Goldfinch Spinus tristis
- Rufous-sided Towhee Pipilo erythrophthalmus
- Savannah Sparrow Passerculus sandwichensis
- Lark Sparrow Chondestes grammacus
- Sage Sparrow Amphispiza belli

PASSERIFORMES (contd)

Oregon Junco Junco oreganus
Tree Sparrow Spizella arborea
White-crowned Sparrow Zonotrichia leucophrys
Golden-crowned Sparrow Zonotrichia atricapilla
Swamp Sparrow Melospiza georgiana
Song Sparrow Melospiza melodia

The following taxonomic changes listed in the "Thirty-second supplement to the American Ornithologists' Union checklist of North American Birds" Auk 90: 411-419 (1973) are applicable to the avifauna listed above.

Anas carolinensis is considered a subspecies of A. crecca and becomes A. crecca carolinensis

Mareca americana becomes Anas americana

Spatula clypeata becomes Anas clypeata

Alectoris graeca becomes Alectoris chukar

Totanus melanoleucus becomes Tringa flavipes

Erolia minutilla becomes Calidris minutilla

Erolia melanotus becomes Calidris melanotus

Zenaidura macroura becomes Zenaida macroura

Colaptes cafer becomes Colaptes auratus

Dendroica auduboni becomes Dendroica coronata

Icterus bullocki becomes Icterus galbula

Junco oreganus becomes Junco hyemalis

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