WILDLIFE AND WLLDLIFE HABITAT LOSS ASSESSMENT
AT DEXTER D A M AND RESEKVOIR PKOJECT
MIDDLE FORK WILLAMETTE KIVER, OREGON

FINAL REPORT

By

J. H. Noyes
M. S. Potter
K. L. Bedrossian
Vegetation Analysis by J. B. Glad

Oregon Department of Fish and Wildlife
Environmental Management Section

Prepared For

Jim Meyer, Project Manager

U.W. Department of Energy

Bonneville Power Administration

Division of Fish and Wildlife

in compliance with Northwest Power Planning Council's

Columbia Kiver Basin

Fish and Wildlife Program

Contract NO. DE-AI-84BP18969

Project No. 84-36

September 1985

Acknowledgements

The authors wisn to thank the following people for their assistance in providing information for this report and/or participation in the habitat evaluation sessicr: Charlie Bruce, ODFW; Geoff Dorsey, USACE; Brain Ferry, ODFW; Larry Gangle, USFS: Jin Greer, ODFW; Bill Haight ODFW; Ed Harshman, OSFS; Ron Mecklenberg, USFS; Sue Trevitt-Clark, Univ. Oreg. Map Librl; Len Vaglia, USACE, Pat Wright, USFWS.

ABSTRACT

A habitat based assessment was conducted of the U.S. Army Corps of Engineers' Dexter Dam and Reservoir Project on the Middle Fork Willamette River, Oregon, to determine losses or gains resulting from the development and operation of the project. Preconstruction, post-construction, and recent vegetation cover types of the project site were mapped based on aerial photographs from 1944, 1956, and 1979, respectively. Vegetation cover types were identified within the affected area and acreages of each type at each period were determined. Fifteen wildlife target species were selected to represent a cross-section of species groups affected by the project. An interagency team evaluated the suitability of the habitat to support the target species at each time period. An evaluation procedure which accounted for both the quantity and quality of habitat was used to aid in assessing impacts resulting from the project. The Dexter Project extensively altered or affected 4,662 acres of land and river in the Middle Fork Willamette River drainage. Impacts to wildlife centered around the loss of 445 acres of riparian habitat. Impacts resulting from the Dexter Project included the loss of year-round habitat for black-tailed deer, red fox, mink, beaver, western gray squirrel, ruffed grouse, ring-necked pheasant, California quail, wood duck and nongame species. Bald eagle, osprey, and greater scaup were benefitted by an increase in foraging habitat. The potential of the affected area to support wildlife was greatly altered as a result of the Dexter Project. Losses or gains in the potential of the habitat to support wildlife will exist over the life of the project.

TABLE OF CONTENTS

I. INTRODUCTION

This loss statement addresses the impacts to wildlife resources resulting from the development and operation of the hydroelectric-related components (e.g., dam, reservoir) of U.S. Army Corps of Engineers' (USACE) Dexter Project. The study was funded by Bonneville Power Administration and was designed to meet requirements of Measure 1004(b)(2) of the Columbia River Basin Fish and Wildlife Program adopted by the Northwest Power Planning Council pursuant to Section 4(h) of the Northwest Electric Power Planning and Conservation Act of 1980.

The objectives of the study were to: 1) provide for consultation and coordination with interested parties, 2) identify probable effects of past development and operation of the Dexter Project to wildlife and wildlife habitat, and 3) determine the hydroelectric portion of the wildlife resource losses at the Dexter Project. A habitat based approach was used to identify effects of the project and to determine losses or gains in the potential of the project area to support wildlife.

II. STUDY AREA

A. Project Description

Dexter Dam and Reservoir are located at river mile 18 of the Middle Fork Willamette River in Lane County, Oregon. The project is 20 miles southeast of Eugene, and is surrounded by private, corporate and public property. State Highway 58 borders the south side of the reservoir. Dexter Reservoir and land located north of Highway 58 are located within the Oregon Department of Fish and Wildlife (ODFW) McKenzie Wildlife Management Unit. Lands south of Highway 58 are located in the Indigo Unit. The city of Lowell is adjacent to the project on the north side of the reservoir, and Lookout Point Dam and Reservoir are located immediately east of the project.

The project structure consists of an earth-fill section, gate-controlled concrete gravity spillway section, and concrete-gravity nonoverflow section, for a crest length of 2,765 feet (USACE 1982). Power is generated by one 15.000 kilowatt turbine (USACE 1982). The surface area of Dexter Reservoir-is 1,025 acres at full pool level. The reservoir is 3.3 miles long and has a maximum width of 0.75 miles. Maximum pool elevation is 697 feet and minimum power pool elevation is 690 feet (USACE 1980). Under normal conditions, the da ly water level fluctuation range is 3 feet.

Dexter Dam and Reregulating Reservoir Project was authorized by the Flood Control Act of 1950 as part of the Lookout Point Project. Dexter Dam was built concurrently with Lookout Point Dam. Construction of the Lookout Point Project was initiated in 1947. In 1954, flow regulation at Dexter commenced. The Dexter Project was considered complete in 1955 when power generation began (USACE 1955a).

B. Study Area Description

The "affected area" referred to in this report was most intensively studied and included that area directly affected by project construction and operation. The affected area encompassed the reservoir, project facilities, staging areas and relocated roads (Figures 1-3). Areas not directly affected by the project, but within the range of species using the project area, were considered when determining qualitative impacts.

The Dexter Project is located in the transitional area of the Willamette Valley Foothills Douglas-Fir/Oregon Oak Association, and the Western Hemlock Zone of higher elevations (MMGOA 1975). The reservoir site was characterized by a mixture of agricultural lands and noncultivated land consisting of conifers, deciduous trees and brush (USACE 1955b, MMGOA 1975). Agricultural crops and stock raising were the primary land uses within the project area at the time of construction. Vegetation types included oak forest, Douglas-fir/western red cedar forest, Douglas-fir/incense cedar forest, riparian and aquatic vegetation (MMGOA 1975). More detailed descriptions of vegetation cover types are provided in Section IV.A.1. of this report. The current shoreline mostly consists of gradual slopes without many bays or coves (MMGOA 1975).

The reservoir site was inhabited by black-tailed deer and possibly elk. Black bear, beaver, river otter, mink, raccoon, and skunk also inhabited the reservoir area, as did blue grouse, ruffed grouse, and ring-necked pheasant (USACE 1955b). A few resident mallards and wood ducks were also present (USACE 1955b). Preconstruction information on nongame species was not documented. In addition to those species documented to be present prior to construction, the affected area potentially supported many more wildlife species (Appendix 4). Species such as California quail, western gray and Douglas' squirrel, muskrat, coyote, red and gray fox, and bobcat probably inhabited the area (R. Jubber, ODFW, pers. commun.).

C. Land Ownership

USACE controls the water surface of the reservoir and is responsible for administration of project lands at Dexter. The project includes approximately 1,740 acres and USACE is responsible for management of the habitat within the project boundaries (USACE 1983).

III. METHODS

A. Consultation and Coordination

A list of agencies and their representatives interested in participating in the consultation/coordination process was developed and updated throughout the study. Parties on this list received correspondence informing them of the project effort and of consultation/coordination meetings. Participating agencies and individuals were contacted by phone or in person repeatedly throughout the study. Meeting minutes, draft species lists, target species lists, vegetation cover type

Vegetation cover types of the Lookout Point and Dexter Reservoir areas - preconstruction, 1944.

CO	Temperate conifer forest, open	RS	Riparian shrub
CC	Temperate conifer forest, closed	RH	Riparian hardwoods
CG	Temperate conifer forest, old growth	SC	Sand/gravel/cobble
HO	Conifer-hardwood forest, open	RC	Rock/conifers/grass
HC	Conifer-hardwood forest, closed	DB	Disturbed/bare/rock
HD	Deciduous hardwoods (oak)		Residential/urban
RA	Red alder		Agricultural, cropland
SH	Shrubland		Agricultural, orchard
GF	Grass-forb		Agricultural, pasture
OS	Oak savannah		River

N

----- Affected Area

Figure 1

Figure 2

Vegetation cover types of the Lookout Point and Dexter Reservoir areas - postconstruction, 1956.

CO	Temperate conifer forest, open	RB	Riparian shrub
CC	Temperate conifer forest, closed	RH	Riparian hardwoods
CG	Temperate conifer forest, old growth	SC	Sand/gravel/cobble
HO	Conifer-hardwood forest, open	RC	Rock/conifers/grass
HC	Conifer-hardwood forest, closed	DB	Disturbed/bare/rock
HD	Deciduous hardwoods (oak)		Residential/urban
RA	Red alder		Agricultural, cropland
SH	Shrubland		Agricultural, orchard
GF	Grass-forb		Agricultural, pasture
OS	Oak savannah		River

---- Affected Area

N

4 MILES

1000 3000 6000 9000 12000 15000 18000 21000 FEET

1 0 1 2 3 4 5 KILOMETERS

Figure 3

Vegetation cover types of the Lookout Point and Dexter Reservoir areas - recent, 1979.

CO	Temperate conifer forest, open	RS	Riparian shrub
CC	Temperate conifer forest, closed	RH	Riparian hardwoods
CG	Temperate conifer forest, old growth	SC	Sand/gravel/cobble
HO	Conifer-hardwood forest, open	RC	Rock/conifers/grass
HC	Conifer-hardwood forest, closed	DB	Disturbed/bare/rock
HD	Deciduous hardwoods (oak)		Residential/urban
RA	Red alder		Agricultural, cropland
SH	Shrubland		Agricultural, orchard
GF	Grass-forb		Agricultural, pasture
OS	Oak savannah		River

---- Affected Area

N

descriptions, acreage tables, habitat rating system descriptions, and sections of the draft report were provided to those agencies and individuals expressing interest in the loss statement. Study procedures, the species list, target species, vegetation mapping, and report drafts were discussed at meetings and comments were requested and documented. Interested agencies were represented by participants in the habitat rating process (see Section III.E.).

B. Vegetation Cover Type Mapping

Preconstruction, postconstruction, and recent vegetation cover types of the Dexter Reservoir area were mapped based on aerial photographs from 1944, 1956, and 1979 obtained from USACE in Portland and the University of Oregon Map Library. All photographs were black and white and scales varied from 1:14,400 to 1:30,000. The base map was derived from 1:62,500 USGS quadrangle maps, enlarged to 1:24,000 and screened on mylar film. The area mapped extended l/4 mile from the full pool reservoir shoreline. Vegetation cover types were based on categories described by Hall et al. (1985) and are described in section IV.A.l.

The aerial photographs were overlaid with mylar film and examined under a stereoscope. Areas of discernibly similar vegetation cover were outlined (polygons) and labeled with a symbol designating cover type. The polygons on the overlays were then transferred to the base map using known landmarks, slope, ridge and valley topography, and proportional dividers to locate each polygon accurately.

The recent map was ground truthed on 17 December 1984. Cover type categories designated on the map were visually verified and if necessary, changes were made to the draft recent map, then to postconstruction and preconstruction maps. All maps were then finalized and traced onto mylar overlays to the base map. A boundary including only the area directly affected by the project was determined from analysis of the aerial photographs and vegetation maps and was drawn on the base map. Acreages of map categories within the affected area boundary were calculated from blackline reproductions of the three maps, using the known area of the reservoir as a basis for assigning acreages to polygons. The affected area was narrow and contained many small polygons, therefore, a dot grid was used to calculate acreages. Dot counts among the three maps agreed within 4%, and counts of the reservoir surface only differed by 0.5%, indicating good accuracy had been obtained.

C. Literature Review and Interviews

ODFW, U.S. Fish and Wildlife Service (USFWS), and U.S. Forest Service (USFS) files were examined for wildlife/habitat information relevant to the Dexter Project area. An extensive review of journal articles was conducted to locate research findings pertinent to the project area. Much of the available information on the status of wildlife populations during the preconstruction and postconstruction periods was identified in the status report on wildlife mitigation at Dexter Reservoir (Bedrossian et al. 1984). Interviews were conducted with ODFW, USFWS, and USFS biologists, and other individuals knowledgeable of wildlife/habitat conditions in the project area.

D. Target Species

Wildlife species potentially occurring in the project area (Appendix A) were identified based on a list of wildlife in the Willamette National Forest (USFS undated) and on the Oregon nongame wildlife management plan review draft (Marshall 1984). From these lists, target species were selected based on factors such as threatened or endangered status, priority according to State or Federal programs, recreational or economic importance, or degree of impacts resulting from the project. Target species selected represent a cross-section of species groups (species that have similar habitat requirements) affected by the project and were used to evaluate the losses or gains in the potential of the project area to support wildlife.

E. Impact Analysis

The method used to aid in evaluating the loss or gain of wildlife habitat as a result of the Dexter Project was based on the "Habitat evaluation procedure" developed by USFWS (1976, 1980), "Ecological planning and evaluation procedures" developed by the Joint Federal-State Private Conservation Organization Committee (1974), and discussions with various USFWS, USACE, and ODFW personnel.

For each target species, the acres of cover types potentially used within the affected area were totaled to determine the acres of habitat available to each target species at preconstruction, postconstruction, and recent time periods. Tables summarizing the cover types and acreages available to each target species were prepared. Habitat rating criteria worksheets providing information on habitat requirements were prepared for each target species and are available from ODFW. The worksheets provided a standard from which ratings were based.

Participating agencies designated individuals having expertise on the project area and/or target species to attend the habitat rating meeting (Appendix B). Each person was provided with habitat rating criteria worksheets, drafts of the background information sections of the loss statement report, and tables of cover type acreages. Cover type maps and aerial photos were available and were consulted frequently during the rating session. The habitat rating group spent one day touring the project area, looking at habitat that was similar to that altered by the project, and discussing preconstruction, postconstruction, and present habitat conditions as well as target species. At the rating session, acres of habitat available for each target species were agreed upon based on cover types, location, and other factors (e.g., forest stand condition) which might indicate whether an area was used as habitat. Once the available habitat was identified, the quality of the habitat at preconstruction, postconstruction, and recent time periods was rated on a scale of 1 to 10 (1=low quality habitat, 5=average quality habitat, 10=optimum habitat) for each target species. Ratings were derived from the site visit, aerial photographs, vegetation maps, habitat requirements of the target species, and the biologists' expertise. Reasons for assigning each suitability rating were documented and are discussed in this report. Factors other than hydroelectric development and operation which may have influenced the value of the habitats were considered but

did not affect the assigned ratings unless otherwise noted in the text of this report.

The ratings for each target species at each time period were then divided by the optimum habitat value (10) to provide a habitat suitability index. The habitat suitability index was then multiplied by the number of acres of habitat available to that species at that time period to determine habitat units (HU's) available. HU's provide a relative index of the importance of the habitat to that particular species. One HU is equal to one acre of optimum quality or prime habitat for that species.

HU's available to each target species prior to project construction were subtracted from postconstruction HU's to determine the loss or gain of the potential of the habitat to meet the requirements of each target species as a result of project construction. Preconstruction HU's also were subtracted from recent HU's to determine the loss or gain of the potential of the habitat to support the target species 23 years after project construction. When the number of HU's lost or gained at postconstruction differed from the number of HU's lost or gained at the recent time period, the reason for the difference (such as revegetation of an area that was disturbed during construction) was determined and documented. The HU's lost or gained represent the change in potential of the habitat to support the given species at one point in time. That potential, however, was lost or gained over the entire life of the project. To simplify the loss statement and loss/gain accounting process, the loss or gain at the recent time period was used in the report summary.

Other factors such as density estimates, impacts not directly affecting habitat quality, and impacts resulting from other causes were analyzed when information was available and are discussed in the text of this report. Losses incurred from construction and operation of the project were considered relative to benefits.

IV. RESULTS AND DISCUSSION

A. Vegetation Cover Types

1. Descriptions

Eighteen cover types were identified in the Dexter Project area and acreages within the affected area were calculated for each (Table 1, Figures 1-3). The most prominent type of vegetation prior to project construction was riparian hardwood. Agricultural cropland and closed conifer-hardwood forest also were prominent cover types.

a. Temperate conifer forest, open

There were two temperate conifer forest types in the Dexter Reservoir study area, open and closed, neither of which was abundant (1% of affected area). Major tree species in both forest types were Douglas-fir and western hemlock. There were minor inclusions of other conifers and several hardwood species within the stands. Crown closure

Table 1. Acreages of cover types within the affected area [1] during preconstruction, postconstruction and recent conditions and losses and gains in acreages from preconstruction to postconstruction and preconstruction to recent conditions, Dexter Reservoir, Oregon.

Vegetation Cover Type/ Map Category	Pre-construction (1944)	Post-construction (1956)	Recent (1979)	Loss or gain (+ or -) Pre to Post-construction	Loss or gain (+ or -) Pre to Recent
	Acres	Acres	Acres		
Temperate conifer forest, open	20	0	17	-20	-3
Temperate conifer forest, closed	0	0	8	0	+8
Conifer-hardwood forest, open	0	47	0	+47	0
Conifer-hardwood forest, closed	263	111	256	-152	-7
Deciduous hardwoods (oak)	0	36	15	+36	+15
Oak savannah	135	0	30	-135	-105
Red alder	78	4	7	-74	-71
Shrubland	72	18	0	-54	-72
Grass-forb	33	134	132	+101	+99
Riparian shrub	49	4	3	-45	-46
Riparian hardwoods	498	31	99	-467	-399
Sand/gravel/cobble	176	5	0	-171	-176
Disturbed/bare/rock	20	343	187	+323	+167
Residential/urban	115	205	221	+90	+106
Agricultural, cropland	291	30	10	-261	-281
Agricultural, pasture	125	8	0	-117	-125
River	156	30	21	-126	-135
Reservoir	0	1,025	1,025	+1,025	+1,025
TOTALS	2,031	2,031	2,031		

1 The "affected area" was the area directly affected by project construction and operation and included the reservoir, project facilities, staging areas, and relocated roads.

Open temperate conifer forest stands were those where overstory crown closure was less than 70%. Often these stands appeared to be in areas where selective cutting or other disturbance had occurred. Thin soil over rock, such as that at Eagle Rock south of Lookout Point Dam, may have prevented the development of denser stands of conifer forest.

b. Temperate conifer forest, closed

The only stand of closed temperate forest in the Dexter Reservoir study area was of pole-sized trees with a crown closure greater than 70%. The stand appeared only during the recent period.

c. Conifer-hardwood forest, open

Areas mapped as conifer-hardwood forest were comprised of mixtures of conifers and hardwoods (e.g., red alder, bigleaf maple, Oregon white oak), with the hardwoods contributing 30-70% of the total crown cover. Open stands occurred only on the postconstruction aerial photos and comprised only 2% of the affected area. Selective cutting, mostly of conifers within the stands, had taken place in the recent past. Very little ground cover was present due to extensive surface disturbance. Areas mapped in this category had patchy tree cover with small areas of shrubland and bare ground scattered among the remaining trees.

d. Conifer-hardwood forest, closed

Closed conifer-hardwood forest stands occurred both along the river and on slopes above the reservoir area. These stands were maintained by periodic logging and continued disturbance. Stands along the river had a high percentage of oak and black cottonwood among the hardwood component, which indicated site characteristics may differ from those in hillside stands. The closed conifer-hardwood forest comprised 13% of the affected area at the preconstruction and recent periods, and was reduced to 5% immediately after construction.

e. Deciduous hardwoods (oak)

Generally, Oregon white oak was a minor component of other communities in the Dexter Reservoir study area; however, a few stands dominated by oak did occur. The crown closure of this vegetation type was 60-90%. If other trees were present, they were usually conifers. The understory was dominated by grasses, with few shrubs present. Deciduous hardwoods did not occur in the study area prior to construction, but comprised 2% of the affected area at postconstruction and 1% at the recent period.

f. Oak savannah

This vegetation cover type was common on the low slopes north of Dexter Reservoir and made up 7% of the affected area prior to construction. Oak savannah was characterized by grassland with scattered stands of Oregon white oak, sometimes accompanied by Douglas-fir. This cover type may have been encouraged by past fires and/or grazing, although oak

savannahs were common elsewhere in the Willamette Valley. Comparison of preconstruction and postconstruction aerial photographs indicated that conifers and other hardwoods were invading the oak savannah. The 30 acres (1%) present in 1979 may eventually develop into conifer-hardwood forest.

g. Red alder

Stands dominated by red alder in the Dexter Reservoir study area comprised 4% of the affected area prior to construction and less than 1% after construction. They appeared to have resulted from disturbance, commonly occurring near residences or agricultural areas. Most red alder stands were probably seral to conifer-hardwood or temperate conifer forest. Crown closure was nearly complete and few understory species occurred among the closely growing trees.

h. Shrubland

The affected area contained 4% shrubland prior to construction and less than 1% after construction. Shrub communities had 40% or more woody crown cover, but woody vegetation was less than 15 feet tall (Hall et al. 1985). Most of the shrub communities occurred along the reservoir and were dominated by dense thickets of blackberry. These shrub communities were also common along railroad and road rights-of-way. Atypically, some shrub communities were dominated by seedling conifers and were a seral stage in the regeneration of the temperate conifer forest.

i. Grass-forb communities

Some map units in this category were representative of the first stage in revegetation of disturbed areas and weedy species were common. These sites were downslope of the roads around the reservoir, along the railroad right-of-way, and in recent clearcuts. Woody plant cover was less than 40% (Hall et al. 1985), and tree seedlings were sometimes present. Another type of grass-forb community occurred on south-facing slopes and represented remnants of the extensive grasslands which once covered much of the Willamette Valley. There were practically no shrubs or tree seedlings associated with this community. These areas appeared on all three maps. Grass-forb communities increased from 2% to 7% of the affected area between the preconstruction and postconstruction periods.

j. Riparian shrub

This vegetation cover type was limited to areas along the banks of the river, on sand/gravel/cobble bars, and in meander channels. Vegetation consisted of seedling willows and black cottonwood, with scattered forbs. Most of the riparian shrub stands should be considered ephemeral, as they occurred where high water could erode them within a few years. A few stands might develop into riparian hardwood communities due to channel changes. Riparian shrub comprised 2% of the affected area prior to construction and less than 1% after construction.

k. Riparian hardwoods

Riparian hardwood was the most extensive cover type (25%) within the affected area before construction. Black cottonwood was an important component of this cover type. Other deciduous tree species were sometimes present, as were conifers. No particular cover values were assigned to black cottonwood. Stands where black cottonwood trees were more than 15 feet tall and in greater abundance than red alder or conifers were mapped in this category. At Dexter Reservoir, riparian hardwoods occurred on reservoir and river shorelines. The stands appeared to be seral to temperate conifer forest because of the increasing size and abundance of conifers seen from 1956 to 1979; however, flooding and channel changes may have maintained them in their present species composition for extended periods. Riparian hardwoods increased from 2% of the affected area in 1956 (postconstruction) to 5% of the area in 1979.

l. Sand/gravel/cobble

These areas occurred along the river and comprised 9% of the affected area at preconstruction. They may have supported a thin herbaceous cover. Sand/gravel/cobble areas were probably under water during spring runoff and other periods of high water. Their extent would therefore vary with river level. Some sand/gravel/cobble areas could, given time, develop sufficient vegetation to become stabilized and would then gradually develop from riparian shrub to riparian hardwood communities. Less than 1% of the affected area was of sand/gravel/cobble following construction.

m. Disturbed/bare/rock

This map category included Dexter Dam as well as those areas where severe or continued disturbance had prevented the reestablishment of vegetation. Most of this map category during preconstruction (1% of affected area) and recent (9%) periods represented State Highway 58, other roads, and the railroad. The extensive disturbed areas on the postconstruction map (17%) were associated with dam construction, reservoir clearing, and road and railroad relocation.

n. Residential/urban

The towns of Dexter and Lowell were included in this map category, as were rural residences and outbuildings, and the fish hatchery below Dexter Dam. Residential/urban areas made up 6% of the affected area before construction of Dexter Dam, and 10% following construction.

o. Agricultural, cropland

This map category included those areas where evidence of regular cultivation appeared on aerial photographs. Nearly one-fourth of the area inundated by Dexter Reservoir was in agricultural use prior to construction, much of it as cropland (14%). Less than 1% remained in the affected area by 1979.

p. Agricultural, pasture

Pasture was distinguished from grasslands by evidences of past cultivation or by fencelines and regular shapes. Most pastures were fenced, but some areas mapped as grass-forb may have been used for grazing. The pasture shown on the preconstruction map (6% of affected area) has since been converted to the residential/urban category.

q. River

The area in this category included the main river channel only. Tributaries were too narrow to show up on the map and/or aerial photographs and therefore were not included in the acreage figures. The affected area consisted of 8% river prior to construction, and about 1% was river after construction.

r. Reservoir

The area mapped as reservoir included the full pool level of the reservoir and comprises 50% of the affected area. Under normal conditions the daily water level fluctuation range is 3 feet or less. The difference between maximum and minimum pool elevation is 7 feet (USACE 1980).

2. Changes resulting from the project

Dexter Reservoir inundated 1,025 surface acres. The actual land base lost was, of course, greater than the reservoir surface acreage. Over 3 miles of the Middle Fork Willamette River were inundated. Surrounding land was altered by relocated roads, project facilities, and construction activities. The reservoir inundated the lower fringes of the town of Lowell. Cover types reduced in acreage were riparian hardwood, agricultural cropland and pasture, oak savannah, red alder, shrubland, sand/gravel/cobble, and river (Table 1). More riparian hardwood was eliminated than any other cover type. Riparian vegetation associated with rivers and streams is considered to be of importance by wildlife managers. Riparian habitat is generally thought to provide for higher density and diversity of wildlife than most other habitats. In addition, a reduction of riparian habitat downstream from the project may have occurred as a result of the Dexter Project and/or effects of the Willamette Reservoir System. The effects of the loss of cover types within the area directly affected by the project is discussed in greater detail in the Target Species sections of this report.

Cover types which increased within the affected area included the reservoir, disturbed/bare/rock, residential/urban, grass-forb, and deciduous hardwoods (oak). As a result of natural revegetation and succession during the years following project construction, disturbed/bare/rock, grass-forb, and riparian shrub cover types developed into open conifer forest, closed conifer forest, closed conifer-hardwood forest, oak savannah, riparian hardwood, and red alder on about 270 acres of the area surrounding the reservoir.

Changes have occurred in the Willamette Basin since the time of project construction as a result of increased timber harvest and increased human

development. It is not possible to say how management of the area would have been different without the project. The potential to manage the area for wildlife would exist if the project had not been constructed. Because the project was constructed, the potential for the inundated area to support many species of wildlife was eliminated.

B. Target Species

1. Black-tailed deer

a. Importance

Black-tailed deer are pursued by more hunters than any other big game species in western Oregon. Deer hunting provided 104,675 hunter-days of recreation in the McKenzie Wildlife Management Unit during 1983 (Ingram 1984). Black-tailed deer prefer a variety of habitat types, from open areas to old-growth forest (Witmer et al. 1985). With inundation of the Dexter Project site, year-round habitat and important deer winter range was lost (USACE 1955b). The black-tailed deer was chosen as a target species for this study because of management emphasis, recreational value, loss of winter range due to the project, and to represent other species with similar habitat requirements.

b. Habitat requirements

Black-tailed deer are associated with open areas, such as burns, clear-cuts, and natural openings found along streams or in old-growth forests, as well as brush and edge habitat (Mace 1953, Aney 1967). These areas produce the grasses, forbs, and shrubs upon which deer forage. The value of these forage areas for deer is dependent upon the proximity to cover. Black-tailed deer remain near the edge between cover and open areas. Deer use of open forage areas increases from the edge to 200 feet, then gradually decreases beyond 200 feet, and decreases rapidly beyond 600 feet from cover (Wilms 1971, Witmer et al. 1985). Hanley (1983) observed peak deer use of open forage areas approximately 550 feet from cover. Old-growth forest stands are used by deer for hiding cover and during adverse weather conditions because supplemental forage and thermal cover are provided (Lindzey 1943, Witmer et al. 1985). Riparian zones provide water, forage, and shade, and are used as travel corridors by black-tailed deer. Riparian habitat receives greater use during fawning periods, dry summer months, and times of heavy snowfall (Witmer et al. 1985).

Use of plant species by black-tailed deer for forage varies depending on the season and availability. Wallmo (1981) conducted a deer forage study west of Corvallis, Oregon, and found that deer used browse species most frequently. Wallmo's study indicated forb use by deer increased in spring and summer, and grasses were consumed consistently in winter. Browse species such as trailing blackberry, huckleberry, and salal were found to be important to black-tailed deer in the Oregon Coast Range and in western Washington (Lindzey 1943; Brown 1961; Miller 1966, 1968; Hines undated). The primary browse for black-tailed deer in the Cascade Range, Lowell Ranger District, is ceanothus. The most important species of ceanothus are deerbrush, redstem, and snowbrush (R. Jubber, ODFW,

pers. commun.). Some of the highest quality deer winter ranges in the central and south Cascades contain one or more of these species (E. Harshman, USFS; R. Jubber, ODFW, pers. commun.).

c. History in the project area

Information on deer populations in the project area prior to construction is limited. Deer inhabited the project area before inundation (USACE 1955b). The Oregon State Game Commission (OSGC 1948) estimated 5 deer per square mile occupied the Middle Fork Willamette River watershed in 1948. The deer population in the Willamette Basin peaked between 1955 and 1960 (Aney 1967). Three years after completion of the project, 17 deer were documented in the Lowell vicinity after hunting season (ODFW files). During the early spring of 1959, 8 deer per mile were counted on Lowell Butte above Dexter Dam (ODFW files).

In 1967, the estimated black-tailed deer population within the Willamette Basin was 135,000 (Aney 1967). ODFW estimated the 1980 black-tailed deer population in Lane County was 92,100 animals. With approximately 4,200 square miles of deer habitat within the county, the estimated density was 22 deer/square mile of habitat (ODFW files).

d. Assessment of impact

It was assumed that the open-conifer, closed-conifer, open and closed conifer-hardwood forest, riparian shrub, riparian hardwood, shrubland, grass-forb, and agricultural vegetation cover types within the affected area were available to black-tailed deer (Table 2). The evaluation team rated the 1,564 acres of deer habitat 8 (high) for year-round use. The interspersion of open areas and cover, and the availability of forage was good for deer. The low elevation of the project area made it important during the critical winter period. The rating was no higher than 8 due to human disturbance in the area. Following the impact analyses methods described in Section III.E., the rated value of the habitat (8) was divided by the optimum potential value (10) resulting in a habitat suitability index of 0.8. The habitat suitability index was then multiplied by the number of acres of habitat available (1,564) resulting in a habitat unit (HU) value of 1,251. Since 1 HU is equivalent to 1 acre of optimum habitat, the 1,564 acres of deer habitat within the affected area prior to construction was equivalent to 1,251 acres of prime deer habitat.

In 1956, upon completion of the project, 423 acres of black-tailed deer habitat remained within the affected area. The small proportion of riparian vegetation, disturbance of the remaining habitat, and disturbance from road and human activity contributed to the rating of 1 (low). A loss of 1,209 available HU's resulted from construction of the project, with the remaining habitat having a value of 42 HU's.

Available black-tailed deer habitat increased to 577 acres by 1979 as a result of natural revegetation. The evaluation team rated this habitat 3 (below average) which resulted in 173 HU's. This was a loss of 1,078 HU's compared with the preconstruction value. The decrease in HU's for black-tailed deer represents a loss in the potential of the project area

Table 2. Black-tailed deer: Acres of habitat available and lost, habitat ratings, and habitat units at Dexter Project.

Cover Type	Pre-construction (1944)	Post-construction (1956)	Recent (1979)	Loss or gain (+ or -) Pre- to Post-construction	Loss or gain (+ or -) Preconstruction to recent
Temperate conifer forest, open	20	0	17	-20	-3
Temperate conifer forest, closed	0	0	8	0	+8
Conifer-hardwood forest, open	0	47	0	+47	0
Conifer-hardwood forest, closed	263	111	256	-152	-7
Deciduous hardwood (oak)	0	36	15	+36	+15
Oak savannah	135	0	30	-135	-105
Red alder	78	4	7	-74	-71
Shrubland	72	18	0	-54	-72
Grass-forb	33	134	132	+101	+99
Riparian shrub	49	4	3	-45	-46
Riparian hardwood	498	31	99	-467	-399
Agric., cropland	291	30	10	-261	-281
Agric., pasture	125	8	0	-117	-125
TOTAL ACRES	1,564	423	577	-1,141	-987
Habitat Rating	8	1	3		
HABITAT UNITS	1,251	42	173	-1,209	-1,078

to support deer and other wildlife species with similar habitat requirements. Deer use the riparian areas below both Lookout Point and Dexter dams, and are seen south of the pond at Lowell Park (R. Mecklenberg, USFS, pers. commun.). Railroad and highway traffic, and human activity reduce the value of habitat available to black-tailed deer within the affected area. The Dexter Project area "retains no undisturbed ecosystems since the area has been almost entirely altered" (MMGOA 1975). OSGC predicted Dexter and Lookout Point reservoirs would "displace habitat for about 40 deer" (USACE 1955b). The importance of the project site as winter range during severe winter weather was not considered in that estimate.

2. Red fox

a. Importance

The red fox is associated with areas of diverse vegetation and prefers a mixture of croplands and cover stands, which characterized the impoundment area prior to project construction. The red fox was selected as a target species because of the impact of the project on habitat of the fox and its prey.

b. Habitat requirements

Red foxes prefer open country to dense forests (Seton 1953, Rue 1981, Samuel and Nelson 1982). The highest densities of red foxes occur in relatively open agricultural lands interspersed with brushy pastures, woodlots, croplands, mixed hardwood stands, forested bluffs, and the edges of open areas (Maser et al. 1981, Samuel and Nelson 1982, Deems and Pursley 1983). Meadows interspersed with brush and timber patches contain more prey species, and provide for easier access to prey as well as escape cover for the fox (Maser et al. 1981, Rue 1981). Red foxes make heavy use of edges (Samuel and Nelson 1982).

Red foxes seldom use dens, except to raise litters. They find cover under trees, rocks, or brush (Seton 1953, Rue 1981, Maser et al. 1981). Resting areas include the tops of banks, boulders, logs, or stumps which provide vantage points (Seton 1953). Dens are generally located on or near a south-facing slope (Seton 1953, Maser et al. 1981). Red foxes use abandoned burrows of other animals or dig their own dens (Mace 1979, Maser et al, 1981, Samuel and Nelson 1982). Dens may be in hollow logs or standing trees, in the ground, or in rock crevices (Seton 1953, Ingles 1965).

The red fox is an opportunistic omnivore (Maser et al. 1981, Deems and Pursley 1983). Rodents and small mammals are their dietary staples, but they also eat birds and eggs, insects and other invertebrates, fish, reptiles, amphibians, carrion, and fruits and berries (Seton 1953, Mace 1979, Maser et al. 1981, Rue 1981, Samuel and Nelson 1982, Deems and Pursley 1983)

c. History in the project area

The red fox was native to Oregon, but disappeared after settlement. The present population is descended from eastern U.S. stock introduced for hunting purposes, and most are found in the Willamette and Rogue Valleys (Mace 1979). No documentation was found of the presence of red fox in the project area prior to construction; however, conditions were appropriate for a red fox population. The inundated area was a mixture of agricultural lands, and noncultivated lands comprised of conifers, deciduous trees, and brush (USACE 1955b, MMGOA 1975). The site was inhabited by a variety of red fox prey, such as rabbits, muskrats, grouse, and ring-necked pheasants (USACE 1955b).

In 1982, ODFW estimated the Pleasant Hill/Fall Creek area (northwest of Dexter) had a red fox density of 6 per square mile of habitat, and 2 per square mile were estimated for outlying areas such as Oakridge (southeast of Dexter and Lookout Point) (ODFW files).

d. Assessment of impact

There were 1,544 acres of habitat available to red fox in 1944, prior to construction (Table 3). The interagency evaluation team assigned the habitat a rating of 4 (below average). Although there was a mixture of cultivated and noncultivated land in the affected area, the contiguous blocks of riparian habitat reduced the value for red fox. Preconstruction conditions had a value of 618 HU's.

Construction of the Dexter Project resulted in a loss of 1,129 acres of red fox habitat. The remaining 415 acres of habitat were considered to be poor and were given a rating of 2. Conditions were highly disturbed following construction and the fox prey species were also affected by the reduction in habitat. The postconstruction habitat for red fox had a value of 83 HU's, a reduction of 535 HU's from the preconstruction value.

By 1979 there had been an increase in habitat for red fox to 552 acres. The evaluation team still considered it to be poor for red fox, since the most productive cover types (grass-forb, oak savannah, cropland) comprised only one-fourth of the acreage. The high proportion of closed forest cover types and the poor mixture of brush areas, combined with human disturbance, resulted in a rating of 2 for a value of 110 HU's (Table 3). This represents a loss of 508 HU's from preconstruction conditions. The decline in HU's for red fox represents a loss in the potential of the project area to support fox and other wildlife species with similar habitat requirements.

3. Mink

a. Importance

The mink is a semiaquatic mammal dependent upon water and its associated riparian habitat for survival. Dexter Reservoir inundated over 3.3 miles of river, permanently removing it from use by mink and other aquatic furbearers, such as muskrat, otter and nutria. The mink was

Table 3. Red fox: Acres of habitat available and lost, habitat ratings, and habitat units at Dexter Project.

Cover Type	Pre-construction (1944)	Post-construction (1956)	Recent (1979)	Loss or gain (+ or -) Pre- to Post-construction	Loss or gain (+ or -) Preconstruction to recent
Conifer-hardwood forest, open	0	47	0	+47	0
Conifer-hardwood forest, closed	263	111	256	-152	-7
Deciduous hardwood (oak)	0	36	15	+36	+15
Oak savannah	135	0	30	-135	-105
Red alder	78	4	7	-74	-71
Shrubland	72	18	0	-54	-72
Grass-forb	33	134	132	+101	+99
Riparian shrub	49	4	3	-45	-46
Riparian hardwood	498	31	99	-467	-399
Agric., cropland	291	30	10	-261	-281
Agric., pasture	125	0	0	-125	-125
TOTAL ACRES	1,544	415	552	-1,129	-992
Habitat Rating	4	2	2		
HABITAT UNITS	618	83	110	-535	-508

selected as a target species because of its dependence upon riparian habitat, to represent wildlife with similar habitat requirements, and because of impacts incurred as a result of the Dexter Project.

b. Habitat requirements

Mink generally occur in or near some type of wetland habitat (Deems and Pursley 1983) and are common along streams, lakes, and the coastline of Oregon (Mace 1979). They can be found in riparian alder, willow/sedge marsh, cedar swamp, coastal lake, tideland river, and mountain river habitats in Oregon (Maser et al. 1981). Mink are most commonly associated with brushy or woody cover adjacent to aquatic habitat and generally avoid open or exposed areas (Seton 1953, Linscombe et al. 1982, Allen 1983).

Mink are seldom found far from a permanent source of water and prefer a relatively undisturbed stream or lake habitat (Ingles 1965, Aney 1967, Mace 1979, Maser et al. 1981, Allen 1983). Major activities usually occur within 100 feet of the stream edge and mink are seldom observed beyond 660 feet from water (Allen 1983).

Optimum habitat conditions for cover, denning, and foraging for mink occur when the tree and/or shrub canopy closure within 330 feet of the water's edge meets or exceeds 75% (Allen 1983). Mink appear to prefer habitats associated with small streams to those associated with large, broad rivers (Allen 1983). Mink use burrows, rock crevices, and other forms of shelter in the absence of woody vegetation (Allen 1983).

After breeding, many female mink leave big lakes and rivers to seek small streams with more protective cover (Rue 1981). The most common den sites are in cavities beneath tree roots at the water's edge. The most preferred but less common den sites are within cavities or piles of rocks well above the water line (Allen 1983). Mink also den in the abandoned dens or burrows of other animals, as well as under tree roots, stumps, hollow logs or trees, bank holes or depressions, and logjams (Seton 1953, Mace 1979, Maser et al. 1981, Rue 1981, Allen 1983).

Mink forage in aquatic habitats; however, they are unable to forage efficiently in open water and therefore use stream and lake edges (Allen 1983). Mink forage on fish, invertebrates, amphibians, reptiles, small mammals, insects, birds and eggs, and carrion (Seton 1953, Ingles 1965, Mace 1979, Maser et al. 1981, Linscombe et al. 1982, Deems and Pursley 1983). Fish and other aquatic species appear to comprise the major portion of the mink diet (Linscombe et al. 1982), but small mammals also play an important role (Mace 1979).

c. History in the project area

The only site specific information available on mink was the statement by USACE (1955b) that mink were present in the project area prior to inundation. Population estimates specific to the project site were not found. In 1967, the Willamette Basin population was estimated at less than 10,000 mink (Aney 1967). Population estimates for Lane County made in 1982 were based on 4 linear miles of stream as equivalent to 1 square

mile of mink habitat. At that time, densities for fish producing streams were estimated at 6 mink/square mile, and 8 mink/square mile on ponds and lakes (ODFW files).

d. Assessment of impact

It was assumed the river, riparian, and closed conifer-hardwood habitats were available to mink, for a total of 1,162 acres before construction (Table 4). The high percentage of riparian habitat, amount of available slackwater, and good supply of prey resulted in a rating of 8 (high) for a value of 930 HU's.

In 1956, after completion of the project, 288 acres of habitat remained for mink, a loss of 874 acres. Ten percent of the reservoir surface was assumed to be used by mink for foraging. Approximately two-thirds of the preconstruction riparian habitat was lost, resulting in a rating of 1 (low). Only 29 HU's were available after construction for a reduction of 901 HU's from the preconstruction value.

Natural revegetation of closed conifer-hardwood forests and riparian hardwoods accounted for an increase of potential habitat to 489 acres by 1979. Despite the increase, the overall area was considered poor and rated 2. Denning probably does not occur within the affected area, and the reservoir receives considerable recreational use. The recent value of the habitat was calculated at 98 HU's, a reduction of 832 HU's from preconstruction conditions. The decline in HU's represents a loss in the potential of the project area to support mink and other species with similar habitat requirements.

4. Beaver

a. Importance

The beaver has an important place in Oregon's history, so much so that the species was selected as the state animal. The fur trade attracted the first white men to the Oregon territory, and beaver are still of economic value today. Beaver are dependent upon a relatively stable source of water and its associated riparian habitat for survival, where they create ponds and pools used by many species of fish and wildlife for rearing, feeding, and resting. The beaver was selected as a target species for this assessment because of historic, recreational, and economic value, dependence upon riparian habitats, loss of habitat due to the project and to represent other wildlife species with similar habitat requirements.

b. Habitat requirements

Slow-flowing streams, small streams or lakes surrounded by a fairly dense stand of deciduous trees, and some agricultural waterways and wetlands may be selected for colonization by beaver (Aney 1967, Mace 1979, Deems and Pursley 1983). A minimum of 0.5 miles of stream channel or 0.5 square miles of lake or marsh habitat must be available before an area is suitable for beaver colonization (Allen 1982a). Beaver need a permanent and relatively stable water source (Allen 1982a). Stream

Table 4. Mink: Acres of habitat available and lost, habitat ratings, and habitat units at Dexter Project.

Cover Type	Pre-construction (1944)	Post-construction (1956)	Recent (1979)	Loss or gain (+ or -) Pre- to Post-construction	Loss or gain (+ or -) Preconstruction to recent
Conifer-hardwood forest, closed	263	111	256	-152	-7
Red alder*	20	4	7	-16	-13
Riparian shrub	49	4	3	-45	-46
Riparian hardwood	498	31	99	-467	-399
Sand/gravel/cobble	176	5	0	-171	-176
River	156	30	21	-126	-135
Reservoir**	0	103	103	+103	+103
TOTAL ACRES	1,162	288	489	-874	-673
Habitat Rating	8	1	2		
HABITAT UNITS	930	29	98	-901	-832

*Represents a portion of total acres present.

**Represents 10% of reservoir area.

gradient, which may be the most significant factor in determining suitability of riverine habitat for beaver, must be less than 15% (Allen 1982a). Beaver construct dams to stabilize water depths (Shay 1978, Mace 1979), and to create ponds which fulfill cover, feeding, and reproductive requirements (Rue 1981, Allen 1982a, Deems and Pursley 1983).

A deciduous tree and/or shrub canopy closure between 40-60% is an indication of optimum food availability for beaver (Allen 1982a). For maximum suitability, the diameter at breast height (dbh) of trees should range from 1-6 inches, and shrubs should be at least 6 1/2 feet tall (Allen 1982a). Tree species used include aspen, willow, cottonwood, alder, red osier dogwood, birch, maple, cherry, and poplar (Townsend 1953, Mace 1979, Allen 1982a). Beaver feed primarily on the bark and cambium layer of deciduous trees, as well as the twigs and leaves. Small quantities of Douglas-fir, western hemlock, and Scotch broom also appear in the beaver diet (Maser et al. 1981). The majority of foraging occurs within 330 feet of the water's edge, and may extend to distances of 660 feet (Allen 1982a). Aquatic vegetation is preferred and herbaceous vegetation appears to be preferred over woody vegetation (Allen 1982a). Sedge and water lily rhizomes are consumed during the summer (Seton 1953, Townsend 1953, Allen 1982a).

Beaver construct dens which fulfill their cover and reproductive needs (Allen 1982a). Three basic forms of dens are constructed by beaver: a standing lodge in open water, a bank lodge with a burrow into the bank, and a burrow into the bank without a lodge (Ingles 1965, Allen 1982a).

c. History in the project area

Quantitative information on furbearer populations in the project area prior to construction was not available. The reservoir site supported beaver, otter, mink, raccoon, and muskrat (USACE 1955b).

Historical records indicate the Willamette Basin supported large beaver populations when the earliest trappers and explorers arrived in the early 1800's (Aney 1967). Beaver trapping in Oregon was restricted by a statewide closure in 1899 and did not resume until 1951 (Kebbe 1960, Mace 1979). Beaver populations had become seriously depleted due to over-trapping and habitat losses (Kebbe 1960). In 1932, a program was begun to live-trap beaver from damage sites or areas of healthy populations and transfer them to suitable habitat in an effort to reestablish beaver in their historical habitat (Scheffer 1941, Kebbe 1960, Shay 1978). The Willamette Basin beaver population in 1967 was estimated at 10,000 (Aney 1967). In 1982, ODFW estimated for Lane County a beaver density of 10 beaver per linear mile on rivers over 100 feet wide, 7 beaver per linear mile on streams 20-100 feet wide, and 5 beaver per linear mile on streams 8-20 feet wide (ODFW files).

d. Assessment of impact

Prior to inundation, 1,162 acres of conifer-hardwood, riparian shrub, riparian hardwood, red alder, sand/gravel/cobble, and river were available to beaver within the affected area (Table 5). The evaluation team

Table 5. Beaver: Acres of habitat available and lost, habitat ratings, and habitat units at Dexter Project.

Cover Type	Pre-construction (1944)	Post-construction (1956)	Recent (1979)	Loss or gain (+ or -) Pre- to Post-construction	Loss or gain (+ or -) Preconstruction to recent
Conifer-hardwood forest, closed	263	111	256	-152	-7
Red alder	20	4	7	-16	-13
Riparian shrub	49	4	3	-45	-46
Riparian hardwood	498	31	99	-467	-399
Sand/gravel/cobble	176	5	0	-171	-176
River	156	30	21	-126	-135
Reservoir*	0	103	103	+103	+103
TOTAL ACRES	1,162	288	489	-874	-673
Habitat Rating	8	1	2		
HABITAT UNITS	930	29	98	-901	-832

*Represents 10% of the reservoir area.

rated the habitat 8 (high) resulting in a value of 930 HU's. The affected area provided excellent forage, with half the affected area in riparian hardwoods, the primary food source for beaver. Prior to construction, areas of backwater and slow flows were available to beaver. Rocky river banks were not good for denning, but beaver probably utilized the backwater areas to fulfill this requirement. Human disturbance from nearby farms and residences kept the rating below optimum.

Upon completion of the project, beaver habitat was reduced to 288 acres. This included 103 acres of reservoir (10% of the full pool surface). The postconstruction habitat was rated 1 (low). Few riparian hardwood species remained as forage and the area was highly disturbed. The dam may not have completely blocked beaver dispersal along the river, but it did create a barrier. The habitat was valued at 29 HU's, a loss of 901 HU's from the preconstruction value.

Natural revegetation increased the more recent (1979) available habitat to 489 acres. The increase was mostly in closed conifer-hardwood forest; however, riparian hardwoods were increased by 68 acres. The habitat was given a rating of 2 (poor), resulting in a value of 98 HU's. This represents a loss of 832 HU's from preconstruction to recent conditions. The reservoir was considered poor beaver habitat by the evaluation team. The quality of beaver habitat located below both Dexter and Lookout Point dams improved the overall evaluation. The major impact of the project was the loss of riparian hardwoods, the major food source for beaver. The decline in HU's for beaver represents a loss in the potential of the project area to support beaver and other wildlife species with similar habitat requirements and species which use the ponds and pools created by beaver.

5. Western gray squirrel

a. Importance

The western gray squirrel was selected as a target species because of its recreational value, to represent species dependent upon deciduous cover types, and because of the loss of habitat resulting from construction of the project.

b. Habitat requirements

Western gray squirrels usually inhabit hardwood and mixed conifer-hardwood forests (Flyger and Gates 1982). Optimum habitat conditions for cover and reproduction are provided by a moderately dense understory (20-30%), a tree canopy closure of 40-75%, and overstory trees averaging at least 15 inches in diameter (Allen 1982b). Western gray squirrels nest in tree cavities or construct stick and leaf nests among branches (Burt and Grossenheider 1976).

Acorns are a primary food item and, along with seeds of conifers, are critical sources of energy for wintering squirrels (Ingles 1965, Flyger and Gates 1982). Conifer forests provide marginal western gray squirrel habitat and primarily are used as forage areas when severe winter

weather restricts the availability of food in preferred habitat (S. Foster, Mt. Hood Community College, pers. commun.). Fungi, especially subterranean forms, are a staple food. Other foods consumed include forbs and bark from tree branches (Flyger and Gates 1982).

c. History in the project area

Information was not available on gray squirrel populations in the project area prior to construction.

d. Assessment of impact

Prior to project construction, 923 acres of habitat were available to gray squirrels (Table 6). Preconstruction habitat was rated 4 (below average), resulting in a value of 369 HU's. The below average rating was based primarily on the limited number of mast producing tree species in the affected area.

After construction, 225 acres of potential gray squirrel habitat remained. The lack of deciduous tree species and disturbed nature of the area resulted in a rating of 1 (low), which meant 23 HU's were available for gray squirrels at postconstruction. This represented a loss of 346 HU's from preconstruction.

Habitat conditions improved only slightly from postconstruction to the recent (1979) time period. An increase of 200 acres of habitat occurred, most of it in closed conifer-hardwood forest. Habitat was in small, scattered parcels, and mast producing tree species were still few in number. For these reasons, the 425 acres of available western gray squirrel habitat were rated 2 (poor), for a value of 85 HU's, and loss of 284 HU's from the preconstruction period (Table 6). The decrease in HU's represents a loss in the potential of the project area to support squirrels and other wildlife species with similar habitat requirements.

6. Ruffed grouse

a. Importance

Upland game birds potentially affected by construction of the Dexter Project included ruffed grouse, blue grouse, mountain quail, California quail, ring-necked pheasant, and band-tailed pigeon. The ruffed grouse was selected as a target species because of its recreational value, because of the habitat losses which occurred as a result of the project, and to represent other wildlife species with similar habitat requirements.

b. Habitat requirements

Thickets of alder, hawthorn, birch, maple, and other deciduous trees provide summer and fall habitat for ruffed grouse in Oregon (Masson and Mace 1974). Adjacent conifer stands are used for escape cover and winter shelter.

Table 6. Western gray squirrel: Acres of habitat available and lost, habitat ratings, and habitat units at Dexter Project.

Cover Type	Pre-construction (1944)	Post-construction (1956)	Recent (1979)	Loss or gain (+ or -) Pre- to Post-construction	Loss or gain (+ or -) Preconstruction to recent
Temperate conifer forest, open	20	0	17	-20	-3
Temperate conifer forest, closed	0	0	8	0	+8
Conifer-hardwood forest, open	0	47	0	+47	0
Conifer-hardwood forest, closed	263	111	256	-152	-7
Deciduous hardwood (oak)	0	36	15	+36	+15
Oak savannah	135	0	30	-135	-105
Shrubland	7	0	0	-7	-7
Riparian hardwood	498	31	99	-467	-399
TOTAL ACRES	923	225	425	-698	-498
Habitat Rating	4	1	2		
HABITAT UNITS	369	23	85	-346	-284

Spring, summer, and fall diets of ruffed grouse in Oregon consist of a wide variety of leaves, grasses, forbs, berries, and buds (Durbin 1979). Availability of a winter source of birch, alder, hazel, or aspen catkins may be the most important factor influencing the survival of wintering ruffed grouse (Gullion 1966). In Oregon, Durbin (1979) reported that alder buds and catkins are probably the primary winter food. Black cottonwood (buds, twigs, catkins) and buttercup are the primary winter food items of ruffed grouse in western Washington (Brewer 1980).

Ruffed grouse chicks for the first 7-10 days mostly consume invertebrates (Johnsgard 1973), which are most available in mesic conditions such as found in riparian habitat. Ruffed grouse broods use semi-open areas characteristic of early stages of woodland succession (Sharp 1963). Small hardwoods, shrubs, berry bushes, and lush herbs provide habitat preferred by ruffed grouse broods (Bump et al. 1947). Once ruffed grouse chicks reach about 4 months of age, closed-canopy hardwood forests provide suitable habitat (Chambers and Sharp 1958).

Drumming sites are an important reproductive requirement of ruffed grouse. Drumming habitat may be either deciduous or mixed forest adjacent to fields, clear-cuts, or regrowth areas which contain suitable logs (Brewer 1980). Adequate nesting habitat is another requirement of ruffed grouse. Hardwood stands or mixed hardwoods are the most frequently used forest types for nesting (Edminster 1947, Maxson 1978). Nest sites are most often at the base of large trees, but some are located at the base of stumps, logs, or bushes, usually within 50 feet of clearings or fields (Edminster 1947).

c. History in the project area

Quantitative information on grouse populations in the project area prior to construction was not available. OSGC estimated 4 grouse per square mile on the Middle Fork Willamette in 1948. In 1982, ODFW estimated densities of 40 ruffed grouse per square mile of mixed conifer-hardwood forest, hardwood forest, or riparian habitats within Lane County (ODFW files).

d. Assessment of impact

Riparian hardwood, closed conifer-hardwood forest, and oak savannah comprised the majority of the 1,163 acres evaluated as ruffed grouse habitat prior to project construction (Table 7). The suitability of this habitat was rated 7 (above average). Disturbance resulting from nearby development was probably the limiting factor for grouse populations in the area. The relative value of the affected area for ruffed grouse prior to construction was 814 HU's.

Construction of the project resulted in the immediate loss of 770 acres of ruffed grouse habitat, including 512 acres of riparian habitat. The 393 acres of remaining habitat were rated 1 (low), because of the isolation of habitat patches. The 39 HU's available represented a loss of 775 HU's resulting from project construction.

Table 7. Ruffed grouse: Acres of habitat available and lost, habitat ratings, and habitat units at Dexter Project.

Cover Type	Pre-construction (1944)	Post-construction (1956)	Recent (1979)	Loss or gain (+ or -) Pre- to Post-construction	Loss or gain (+ or -) Preconstruction to recent
Temperate conifer forest, open	20	0	17	-20	-3
Temperate conifer forest, closed	0	0	8	0	+8
Conifer-hardwood forest, open	0	47	0	+47	0
Conifer-hardwood forest, closed	263	111	256	-152	-7
Deciduous hardwood (oak)	0	36	15	+36	+15
Oak savannah	135	0	30	-135	-105
Red alder	78	4	7	-74	-71
Shrubland	72	18	0	-54	-72
Grass-forb	33	134	132	+101	+99
Riparian shrub	49	4	3	-45	-46
Riparian hardwood	498	31	99	-467	-399
Agric., pasture*	15	8	0	-7	-15
TOTAL ACRES	1,163	393	567	-770	-596
Habitat Rating	7	1	2		
HABITAT UNITS	814	39	113	-775	-701

*Represents a portion of total acres present.

Evaluation of recent (1979) conditions in the project area indicated a rating of 2 (poor) for the 567 acres of habitat available at that time. The large proportion of closed conifer-hardwood forest (45%) and grass-forb (23%) cover types within the available habitat, roads, and human disturbance during the nesting period were reasons for the poor habitat rating. The 113 HU's calculated for the recent conditions represented a loss of 701 HU's from preconstruction conditions. The decline in HU's represents a loss in the potential of the project area to support ruffed grouse and other wildlife species with similar habitat requirements.

7. Ring-necked pheasant/California quail

a. Importance

The ring-necked pheasant and California quail were chosen as target species because of their high recreational value, association with cultivated lands, and because of habitat losses resulting from the project.

b. Habitat requirements

Pheasants and quail both occur in a variety of habitat types in Oregon, but are typically associated with farmlands. Pheasants eat waste grain, weed seeds, and other vegetable matter through much of the year. Insects, weed seeds, and green vegetation are consumed by pheasants during spring and summer (Masson and Mace 1974). Quail diets are composed of herbaceous leafy materials and seeds, with grains and fruits of lesser importance (Masson and Mace 1974).

Both species nest on the ground, usually in relatively dense herbaceous cover such as weeds, grasses, and brush. Trees or low shrubs provide roost sites for quail and evergreen species are preferred for winter cover (Masson and Mace 1974).

c. History in the project area

Information was not available on quail populations in the project area prior to construction. USACE (1955b) reported that ring-necked pheasants inhabited the impounded area prior to inundation. OSGC reported pheasant densities of 94 per square mile and California quail densities of 6.4 per square mile in Lane County in 1949 (Gullion 1951). Historical records indicate large pheasant populations existed in ODFW's Lane District during the early 1950's (B. Ferry, ODFW, pers. commun.). Based on 1979 and 1980 data, current density estimates for Lane County are approximately 62 pheasants per square mile of habitat, and 35 California quail per square mile of habitat (ODFW files).

d. Assessment of impact

The amount of available habitat (1,203 acres, Tables 8 and 9) was the same for pheasants and quail in the project area prior to construction. The suitability of this habitat was rated 3 (below average) for pheasants and 6 (above average) for quail. Limiting factors influencing the rating were the large proportion of riparian hardwoods, lack of edge, and human disturbance.

Table 8. Ring-necked pheasant: Acres of habitat available and lost, habitat ratings, and habitat units at Dexter Project.

Cover Type	Pre-construction (1944)	Post-construction (1956)	Recent (1979)	Loss or gain (+ or -)	
				Pre- to Post-construction	Preconstruction to recent
Deciduous hardwood (oak)	0	36	15	+36	+15
Oak savannah	135	0	30	-135	-105
Shrubland	72	18	0	-54	-72
Grass-forb	33	134	132	+101	+99
Riparian shrub	49	4	3	-45	-46
Riparian hardwood	498	31	99	-467	-399
Agric., cropland	291	30	10	-261	-281
Agric., pasture	125	8	0	-117	-125
TOTAL ACRES	1,203	261	289	-942	-914
Habitat Rating	3	1	1		
HABITAT UNITS	361	26	29	-335	-332

Table 9. California quail: Acres of habitat available and lost, habitat ratings, and habitat units at Dexter Project.

Cover Type	Pre-construction (1944)	Post-construction (1956)	Recent (1979)	Loss or gain (+ or -) Pre- to Post-construction	Loss or gain (+ or -) Preconstruction to recent
Deciduous hardwood (oak)	0	36	15	+36	+15
Oak savannah	135	0	30	-135	-105
Shrubland	72	18	0	-54	-72
Grass-forb	33	134	132	+101	+99
Riparian shrub	49	4	3	-45	-46
Riparian hardwood	498	31	99	-467	-399
Agric., cropland	291	30	10	-261	-281
Agric., pasture	125	8	0	-117	-125
TOTAL ACRES	1,203	261	289	-942	-914
Habitat Rating	6	1	2		
HABITAT UNITS	722	26	58	-696	-664

As a result of project construction, 942 acres of potential pheasant and quail habitat, mostly agricultural and riparian cover types, were eliminated. The 261 acres of habitat remaining for pheasant and quail after construction were rated 1 (low) for both species because of the low proportion of croplands and disturbance of the habitat. The result was a loss of 335 HU's for pheasants and 696 HU's for quail from preconstruction conditions.

By 1979, available pheasant and quail habitat increased to 289 acres. The habitat was assessed a minimum suitability rating of 1 for pheasant and 2 for quail. The remaining habitat lacked winter cover and seeds and grain for food, and provided marginal nesting cover. Wide distances between grass-forb areas used for foraging increased vulnerability to predation. Ring-necked pheasants lost 332 HU's from preconstruction to recent conditions. California quail experienced a loss of 664 HU's from preconstruction to recent conditions. The decline in HU's for ring-necked pheasants and California quail represents a loss in the potential of the project area to support pheasant and quail, and other wildlife species with similar habitat requirements.

8. Waterfowl (Wood duck and greater scaup)

a. Importance

Waterfowl were chosen as target species because of their high recreational value, their dependence on aquatic habitat, and the impacts which occurred as a result of the project. Wood duck and greater scaup were selected to represent breeding and wintering waterfowl affected by the Dexter Project.

b. Habitat requirements

Wood ducks inhabit creeks, rivers, floodplain lakes, swamps, and beaver ponds characterized by overhanging deciduous trees or shrubs, or flooded woody vegetation (McGilvrey 1968, Bellrose 1976). Bottomland hardwoods provide important nesting habitat. Conifers rarely contain suitable nesting cavities (McGilvrey 1968). Wood ducks prefer nest trees close to water (McGilvrey 1968). Wood ducks nest near streams where maximum water current speed does not exceed 3 mph, although broods seldom use areas with currents greater than 1 mph (McGilvrey 1968). Optimal brood cover is dense cover (emergent herbaceous vegetation, emergent shrubs, trees, or woody downfall) well interspersed with small, open water channels (Sousa and Farmer 1983).

Adult wood ducks usually are herbivorous, except prior to nesting when they consume invertebrates (Drobney and Fredrickson 1979). Acorns and other mast are important fall and winter foods (Gabrielson and Jewett 1940, Landers et al. 1977). During late summer and early fall, filbert orchards on Willamette Valley foothills provide food for wood ducks (R. Jubber, ODFW, pers. commun.). Aquatic plants, seeds, and occasionally waste grain are also consumed by wood ducks (Gabrielson and Jewett 1940, Landers et al. 1977). Young ducklings require animal foods (primarily insects), and forage where both food and protective cover are present. As they mature, ducklings gradually consume more plant food

and by about 6 weeks of age their diets are similar to those of adults (Hocutt and Dimmick 1971).

Greater scaup breed almost entirely in the Arctic and Subarctic (Bellrose 1976). Most greater scaup in Oregon winter along the Pacific Coast but are occasionally found in small numbers on inland waters in western Oregon (Gabrielson and Jewett 1940). Greater scaup are among the most abundant waterfowl species wintering at Dexter Reservoir (L. Gangle, USFS, pers. commun.).

Foods of greater scaup consist of both plant and animal matter, but in most areas mollusks are the principal food item (Bellrose 1976). Munro (1941) reported that mollusks comprised nearly the entire diet of greater scaup on saltwater areas. In freshwater areas, muskgrass, pondweeds, and other aquatic plants are consumed more frequently (Cottam 1939, Udvardy 1977).

c. History in the project area

Quantitative information was not available on waterfowl populations in the project area prior to construction. "A few" resident mallards and wood ducks inhabited the area, although waterfowl use of the area was considered negligible by OSGC (USACE 1955b).

As of the early 1980's, limited waterfowl feeding and nesting occurred at Dexter Reservoir. Small numbers of coots and other waterfowl winter on the reservoir (Denney 1982, J. Greer, ODFW, pers. commun.). Waterfowl migrating between the Willamette Valley and the Klamath Basin use the reservoir for resting during migration.

d. Assessment of impact

Habitat available to wood ducks prior to project construction totaled 858 acres, most of which consisted of riparian cover types and river (Table 10). The quality of this habitat was rated high (8) for wood ducks, primarily because of the available slack water areas which are attractive to wood ducks. Old-growth cottonwoods were available for nesting. The lack of mast-producing tree species limited the forage value of the habitat and reduced the suitability rating. The value of preconstruction habitat was 686 HU's for wood ducks.

Construction of the project resulted in the loss of 721 acres of habitat available to wood ducks. The remaining 137 acres of habitat were given a rating of 1 (low) because of the limited riverine and riparian habitat. The postconstruction value of the habitat for wood ducks was 14 HU's (Table 10).

By 1979 (recent), wood ducks had 209 acres of available habitat, a reduction of 649 acres from the preconstruction period. Lack of brushy shoreline vegetation and high levels of human disturbance kept the rating at no higher than 2 (poor). The recent HU's totaled 42 for wood ducks, a loss of 644 HU's from 1944 (preconstruction) (Table 10).

Table 10. Wood duck: Acres of habitat available and lost, habitat ratings, and habitat units at Dexter Project

Cover Type	Pre-construction (1944)	Post-construction (1956)	Recent (1979)	Loss or gain (+ or -) Pre- to Post-construction	Loss or gain (+ or -) Preconstruction to recent
Conifer-hardwood forest, closed	20	5	10	-15	-10
Deciduous hardwood, oak	0	36	0	+36	+15
Oak savannah	135	0	0	-135	-105
Riparian shrub	49	4	4	-45	-46
Riparian hardwood	498	31	3	-467	-399
River	156	30	26	-126	-135
Reservoir*	0	31	128	+31	+31
TOTAL ACRES	858	137	171	-721	-649
Habitat Rating	8	1	1		
HABITAT UNITS	686	14	17	-672	-644

*Represents a portion of total acres present.

There was no habitat available to greater scaup prior to construction (Table 11). Greater scaup gained 1,025 surface acres of reservoir, but because a forage base of invertebrates was not yet established, the habitat was rated 1 resulting in 103 HU's available to scaup in 1956 (Table 11).

Conditions for migrating and wintering greater scaup improved between 1956 and 1979 as the population of freshwater clams grew. The evaluation team rated the 1,025-acre reservoir 8 (high) resulting in 820 HU's available to greater scaup (Table 11). The human disturbance factor and distance from a flyway makes the Dexter Project less than optimum for greater scaup.

9. Yellow warbler

a. Importance

The yellow warbler is on the 1982 USFWS list of sensitive bird species for Region One, which includes the project area. Although populations do not show significant changes in Oregon, they are declining throughout the region. The yellow warbler was chosen as a target species because of its use of riparian habitat, to represent other species with similar habitat requirements, and because of its sensitive status.

b. Habitat requirements

Preferred habitats of yellow warblers are wet areas with abundant shrubs or small deciduous trees (Hoffman 1927, Bent 1953). Nesting habitat is provided by deciduous shrubs and trees including willows, alders, and cottonwoods near streams. Coniferous areas and closed canopy forests are usually avoided by yellow warblers (Hoffman 1927, Schroeder 1982). Yellow warblers forage in deciduous shrubs and trees and primarily consume insects (Bent 1953, Schroeder 1982).

c. History in the project area

Information was not available on yellow warbler populations during the preconstruction period. The yellow warbler is considered a common species in Oregon (USFWS 1982). Breeding Bird survey data collected throughout the region over 11 years do not indicate significant population changes for Oregon overall, however, population reductions have occurred in certain localities within the state (USFWS 1982).

d. Assessment of impact

Habitat available to yellow warblers prior to project construction consisted of 960 acres, most of which was closed conifer-hardwood and riparian vegetation (Table 12). Braided stream channels with riparian shrub and hardwood vegetation provided good habitat for yellow warblers. The amount of closed conifer-hardwood in the affected area kept the quality of the habitat below optimum. A suitability rating of 8 (high) was given for the preconstruction habitat conditions resulting in 768 HU's available at that time.

Table 11. Greater scaup: Acres of habitat available and lost, habitat ratings, and habitat units at Dexter Project.

Cover Type	Pre-construction (1944)	Post-construction (1956)	Recent (1979)	Loss or gain (+ or -) Pre- to Post-construction	Loss or gain (+ or -) Preconstruction to recent
Reservoir	0	1,025	1,025	+1,025	+1,025
TOTAL ACRES	0	1,025	1,025	+1,025	+1,025
Habitat Rating		1	8		
HABITAT UNITS	0	103	820	+103	+820

Table 12. Yellow warbler: Acres of habitat available and lost, habitat ratings, and habitat units at Dexter Project.

Cover Type	Pre-construction (1944)	Post-construction (1956)	Recent (1979)	Loss or gain (+ or -)	
				Pre- to Post-construction	Preconstruction to recent
Conifer-hardwood forest, open	0	47	0	+47	0
Conifer-hardwood forest, closed	263	111	256	-152	-7
Deciduous hardwood (oak)	0	36	15	+36	+15
Red alder	78	4	7	-74	-71
Shrubland	72	18	0	-54	-72
Riparian shrub	49	4	3	-45	-46
Riparian hardwood	498	31	99	-467	-399
TOTAL ACRES	960	251	380	-709	-580
Habitat Rating	8	2	3		
HABITAT UNITS	768	50	114	-718	-654

After construction of the Dexter Project (1956), 251 acres of habitat were available, a loss of 709 acres. Most of the habitat lost was riparian hardwood and shrub. The value of the remaining habitat was rated 2 (poor) because over 44% of the available habitat consisted of closed conifer-hardwood forest and only 14% consisted of riparian vegetation. In addition, recent disturbance to the vegetation probably resulted in a relatively undeveloped shrub layer. Only 50 HU's were available at that time for yellow warblers.

By 1979, 380 acres of habitat were available. An increase in riparian hardwood and closed conifer-hardwood forest accounted for most of the habitat increase. Over 67% of the available habitat consisted of conifer-hardwood forest, however, riparian vegetation increased to 27%. The habitat was rated 3 (below average), resulting in 114 HU's available to yellow warblers, a loss of 654 HU's from preconstruction conditions. The decrease in HU's represents a loss in the potential of the project area to support yellow warblers and other species with similar habitat requirements.

10. American dipper

a. Importance

The American dipper was chosen as a target species because of its dependence on free-flowing stream habitat and because of impacts which occurred as a result of the project.

b. Habitat requirements

Dippers inhabit fast-flowing mountain streams throughout western North America. Characteristics of nest sites vary with local habitat conditions, but usually include proximity to water, location above high water, inaccessibility to terrestrial predators, and location on a horizontal ledge or crevice for support (Sullivan 1973). Nests are often placed among rocks or behind waterfalls (Gabrielson and Jewett 1940). Escape cover is provided by logs, streamside vegetation, or the water in the stream (Sullivan 1965).

Dippers ordinarily forage in riffles and faster waters 1/2-2 feet deep where many of the favored foods are concentrated (Bakus 1959). Aquatic insect larvae are a major food source; terrestrial and flying insects, amphibians, and fish are consumed less frequently (Bakus 1959, Thut 1970, Sullivan 1973).

c. History in the project area

Information was not available on populations of dippers during the pre-construction period. It may be assumed, however, that because river and stream habitats were more plentiful in the project area, more dippers inhabited the project area prior to project construction than at present.

d. Assessment of impact

Prior to construction of the Dexter Project, 406 acres of available habitat existed for dippers in the project area (Table 13). The quality of the habitat was rated 3 (below average), primarily because of the lack of riffles and smaller tributary streams. Although insect production was probably good on the gravel bars, there appeared to be minimal nesting habitat. The value of the habitat was 122 HU's.

Construction of the project resulted in a reduction of 362 acres of available habitat from preconstruction conditions to 1956. The habitat was rated 1 (low) by the evaluation team due to the recent disturbance. The 44 acres of habitat were valued at 4 HU's.

Available dipper habitat was reduced to 29 acres by 1979. The majority of this habitat located below Dexter Dam was rated 1, a value of 3 HU's. The width of the stream, lack of riffles and tributaries, and uncertain forage base were the basis for this low rating. As a result of the project, 119 HU's for dippers were lost. The decrease in HU's represents a loss in the potential of the project area to support dippers and other species which use river and stream habitat.

11. Bald eagle

a. Importance

The bald eagle is classified by ODFW and USFWS as "threatened" in Oregon. The Pacific States Bald Eagle Recovery Team (1982) set recovery goals for bald eagle populations in Oregon and identified a potential nesting area near Dexter Reservoir. Potential nesting areas were determined by historical nest records, occasional sightings of adult eagles, and/or presence of old-growth forests within 1 mile of a water body possessing a good supply of fish and/or waterfowl. The bald eagle was chosen as a target species because of its threatened status, management emphasis within Oregon, and because bald eagles may have benefited from construction of the Dexter Project.

b. Habitat requirements

Bald eagles find optimum nesting and roosting habitat in old-growth forests (Meslow et al. 1981). In western Oregon, Douglas-fir is the most frequently used tree species for nesting (Anthony et al. 1982). Forest stand structure appears to be more important than tree species in the selection of nest trees. Nest trees typically are the largest tree in an uneven-aged stand and are usually located within 1 mile of large bodies of water (Anthony et al. 1982). Winter roosting sites are characterized by a protected microclimate, stout perches high above the ground, a clear view of surrounding terrain, and freedom from human activity (Hansen et al. in Stalmaster et al. 1985). Bald eagles use both deciduous roosts in riparian habitat and coniferous roosts for protection from adverse weather (Stalmaster and Newman 1979). Bald eagles use mature or old-growth trees that are larger than the average size of surrounding trees for roosting (Hansen et al. 1980, Keister 1981, Anthony et al. 1982).

Table 13. American dipper: Acres of habitat available and lost, habitat ratings, and habitat units at Dexter Project.

Cover Type	Pre-construction (1944)	Post-construction (1956)	Recent (1979)	Loss or gain (+ or -)	
				Pre- to Post-construction	Preconstruction to recent
Riparian shrub	49	4	3	-45	-46
Riparian hardwood*	25	5	5	-20	-20
Sand/gravel/cobble	176	5	0	-171	-176
River	156	30	21	-126	-135
TOTAL ACRES	406	44	29	-362	-377
Habitat Rating	3	1	1		
HABITAT UNITS	122	4	3	-118	-119

*Represents a portion of total acres present.

Bald eagles forage in open areas, usually associated with rivers, lakes, or coastal shorelines (Stalmaster et al. 1985). The Pacific States Bald Eagle Recovery Team (1982) stated that food supply is probably the most critical component of bald eagle wintering habitat in the Pacific Region. The most common foods of eagles in this region include fish, waterfowl, and carrion. Anadromous fish, trout, whitefish, squawfish, carp, suckers, and tui chubs are consumed by eagles (Pacific States Bald Eagle Recovery Team 1982). The most common food for eagles in Dexter Reservoir is coarse scale sucker. Trout, whitefish, squawfish, large-mouth bass and crappie are also available to bald eagles at Dexter Reservoir (E. Harshman, USFS, pers. commun.). Waterfowl are an important food item for eagles in the Klamath Basin (Keister 1981) and at some reservoirs on the Columbia River (Fielder 1982). Studies in western Washington (Servheen 1975, Stalmaster 1976) identified mammalian carrion as an important alternate food source. Because the young are less tolerant of food deprivation than adults, a constant food supply is most important during the nesting season (Stalmaster et al. 1985).

Perching sites are another important feature of bald eagle habitat. Proximity to food is the primary factor governing selection of perching sites (Steenhof et al. 1980). Preferred perching sites are on the edge of stands and include the tallest trees with strong, lateral branches high in the crown (Stalmaster et al. 1985). Perches may also be used as "sentry" sites by breeding adults for defending the nest. Snags are preferred perching sites in winter, and when near the nest tree, are preferred perching locations during the nesting season (Stalmaster and Newman 1979, Forbis et al. in Stalmaster et al. 1985).

c. History in the project area

Information is not available on the status of bald eagle populations in the project area prior to construction. According to Gullion (1951) the status of bald eagles in Lane County during the 1940's was uncertain. No nests have been located in the reservoir area (Isaacs and Anthony 1983). Bald eagles currently forage on waterfowl and fish at the reservoir and have been observed in winter, perching on an osprey nest adjacent to the reservoir. Eleven bald eagles were observed at Dexter and Lookout Point reservoirs during the 1983 mid-winter bald eagle survey (W. Haight, ODFW, pers. commun.).

d. Assessment of impact

Prior to project construction, the affected area contained 1,113 acres of bald eagle habitat (Table 14). Most of this acreage was riparian hardwood, which provided potential perching sites; however, nesting sites probably were not available within the affected area. The 3.3 miles of river provided a limited prey base. Human disturbance may have limited use of the project area by bald eagles. The suitability of this habitat was rated 3 (below average) for bald eagles, indicating 334 HU's were available prior to project construction.

Construction of the Dexter Project resulted in the loss of 763 acres of terrestrial habitat used by bald eagles for perching. The project created an additional 899 acres of aquatic habitat used by

Table 14. Bald eagle: Acres of habitat available and lost, habitat ratings, and habitat units at Dexter Project.

Cover Type	Pre-construction (1944)	Post-construction (1956)	Recent (1979)	Loss or gain (+ or -) Pre- to Post-construction	Loss or gain (+ or -) Preconstruction to recent
Temperate conifer forest, open	20	0	0	-20	-20
Conifer-hardwood forest, open	0	47	0	+47	0
Conifer-hardwood forest, closed	263	111	111	-152	-152
Riparian hardwood	498	31	99	-467	-399
Sand/gravel/cobble	176	5	0	-171	-176
River	156	30	21	-126	-135
Reservoir	0	1,025	1,025	+1,025	+1,025
TOTAL ACRES	1,113	1,249	1,256	+136	+143
Habitat Rating	3	2	4		
HABITAT UNITS	334	250	502	-84	+168

bald eagles for foraging. Waterfowl use of the reservoir probably was not established by 1956 and nongame fish were not available because of chemical treatment of the reservoir. The recent construction activity and human disturbance probably limited the use of the reservoir area by bald eagles. The suitability of the habitat directly after completion of the project (1956) was rated 2 (poor) for bald eagles.

By 1979, 1,256 acres of bald eagle habitat were present in the affected area. The suitability of the habitat was rated 4 (below average). The relative value of that habitat was 502 HU's. The waterfowl and nongame fish populations provided a stable food supply. Nesting sites were not available within the affected area and perch sites were limited. Human activity was high during the summer. From preconstruction conditions to 1979, 168 HU's were gained as a result of the project.

12. Osprey

a. Importance

The osprey is included on the USFWS (1982) list of national species of special emphasis and was chosen as a target species because of management interest within Oregon, and because this species may have benefited from the construction of the Dexter Project.

b. Habitat requirements

Ospreys inhabit mid- to late-stage forests near lakes or large rivers. Nests are usually located within 1 mile of water (Koplin 1971). Nests are most commonly on the top of partially or completely dead trees ranging in height from 50-250 feet (French and Koplin 1972). Lind (1976) reported an average height of 120 feet and average dbh of 43 inches for osprey nest trees adjacent to Crane Prairie Reservoir, Oregon. In addition to the nest tree, at least one other large tree located within 150 yards of the nest is regularly used by the nesting pair and fledglings for sunning, protection from wind, and as a "lookout" perch and feeding post (Lind 1976, Zarn undated). Ospreys require open and clear water for foraging. Their diet is almost exclusively fish, generally 6-12 inches in length (Lind 1976).

c. History in the project area

The only information available on osprey populations during the preconstruction period was a study by Gullion (1951), in which the osprey was reported to be an uncommon summer resident of Lane County during the period from 1938 to 1948. In 1976, Henny et al. (1978) identified 3 nesting pairs at Dexter Reservoir. There is currently 1 active osprey nest located within the affected area at the southwest corner of Dexter Reservoir (R. Mecklenberg, USFS, pers. commun.). Reasons for the decline of nesting ospreys at Dexter are not documented. USFS personnel have speculated that the presence of bald eagles in the area may be a factor (E. Harshman, USFS, pers. commun.).

d. Assessment of impact

Osprey habitat within the affected area consisted of open conifer forest, open and closed conifer-hardwood forest, riparian hardwood, sand/gravel/cobble, and river cover types. Prior to construction of the project, 1,113 acres of habitat were available to osprey within the affected area (Table 15). The suitability of the habitat for ospreys during the breeding season was assessed as 7 (above average) by the interagency evaluation group. Thus, 779 HU's were available to ospreys prior to construction. Anadromous smolts and nongame fish provided an adequate prey base and pools for foraging were available to ospreys, as well as potential nest sites. Human disturbance from nearby farms may have reduced the value of the habitat.

Construction of the Dexter Project resulted in a loss of 763 acres of terrestrial habitat available to ospreys for nesting and perching. The project created an additional 899 acres of aquatic habitat which could be used by ospreys for foraging. The suitability of the available habitat was rated 6 (above average) by the evaluation team resulting in a value of 749 HU's. The project resulted in increased human access and disturbance which may adversely affect nesting success.

As of 1979, 1,256 acres of habitat were available to ospreys. The reservoir and river provided 1,046 acres of foraging habitat with a good supply of fish. The suitability of the habitat was rated 8 (high), resulting in 1,005 HU's. This would indicate that 226 HU's were gained for osprey as a result of the project.

V. SUMMARY

The Dexter Project inundated, extensively altered, or affected 2,031 acres of land and river in the Middle Fork Willamette River drainage. Impacts to wildlife centered around the loss of 445 acres of riparian habitat. Eighteen cover types were identified within the area directly affected by construction and operation of the hydroelectric-related components of the project. Acreages of each cover type were calculated for 3 time periods: prior to project construction (1944), directly after construction (1956), and more recently (1979) (Table 1).

Project impacts were evaluated for 14 wildlife species selected from the list of wildlife likely to occur in the project area (Appendix A). A habitat-based evaluation system was used to assess the suitability of preconstruction, postconstruction, and recent habitat for the target species or species groups. Losses or gains to these species as a result of the hydroelectric-related components of the Dexter Project were calculated and are summarized in Table 16. Impacts resulting from the Dexter Project included the loss of year-round habitat for black-tailed deer, red fox, mink, beaver, western gray squirrel, ruffed grouse, ring-necked pheasant, California quail, wood duck, and nongame species. Bald eagle, osprey, and greater scaup were benefitted by an increase in foraging habitat.

Impacts to target species were measured by determining the difference between habitat units (HU's) prior to construction and after

Table 15. Osprey: Acres of habitat available and lost, habitat ratings, and habitat units at Dexter Project.

Cover Type	Pre-construction (1944)	Post-construction (1956)	Recent (1979)	Loss or gain (+ or -) Pre- to Post-construction	Loss or gain (+ or -) Preconstruction to recent
Temperate conifer forest, open	20	0	0	-20	-20
Conifer-hardwood forest, open	0	47	0	+47	0
Conifer-hardwood forest, closed	263	111	111	-152	-152
Riparian hardwood	498	31	99	-467	-399
Sand/gravel/cobble	176	5	0	-171	-176
River	156	30	21	-126	-135
Reservoir	0	1,025	1,025	+1,025	+1,025
TOTAL ACRES	1,113	1,249	1,256	+136	+143
Habitat Rating	7	6	8		
HABITAT UNITS	779	749	1,005	-30	+226

Table 16. Summary of impacts (preconstruction to recent) to target species as a result of the hydro-electric-related components of the Dexter Project, Middle Fork Willamette River, Oregon.

Species (group)	Acres of habitat lost or gained a	Habitat Units lost or gained ab	Estimated No. animals lost or gained b	Impacts
BIG GAME				
Black-tailed deer	-987	-1,078	unknown	Loss of winter/summer habitat. Migration and movement inhibited or blocked. Increased disturbance.
FURBEARERS				
Red fox	-992	-508	-3 to 9 c	Loss of year-round habitat. Increased disturbance.
Mink	-673	-832	-5 to 23 c on Middle Fork only, does not include tributary streams	Loss of year-round habitat. Movement inhibited or blocked.
Beaver	-673	-832	-23 to 33 c on Middle Fork only, does not include tributary streams	Loss of year-round habitat, Movement inhibited or blocked. Increased disturbance.
UPLAND GAME				
Western gray squirrel	-498	-284	unknown	Loss of year-round habitat, Movement inhibited. Increased disturbance.
Ruffed grouse	-596	-701	-5 to 48 d	Loss of year-round habitat,
Ring-necked pheasant	-914	-332	unknown	Loss of year-round habitat.
California quail	-914	-664	unknown	Loss of year-round habitat,

Table 16 (cont.). Summary of impacts (preconstruction to recent) to target species as a result of the hydroelectric-related portions of the Dexter Project, Middle Fork Willamette River, Oregon.

Species (group)	Acres of habitat lost or gained a	Habitat Units lost or gainedab	Estimated No. animals lost or gained b	Impacts
WATERFOWL				
Wood duck	-649	-644	unknown	Loss of year-round habitat.
Greater scaup	+1,025	+820	unknown	Addition of foraging and resting migratory and winter habitat,
NONGAME SPECIES				
Yellow warbler	-580	-654	unknown	Loss of breeding and migratory habitat.
American dipper	-377	-119	unknown	Loss of year-round habitat.
Bald eagle	+143	+168	unknown	Loss of roosting habitat. Increased disturbance. Foraging habitat increased.
Osprey	+143	+226	unknown	Loss of nesting and perching habitat, Increased disturbance. Foraging habitat increased,

a From preconstruction (1944) to recent (1979).
b This number represents losses or gains at one point in time, not over the life of the project.
c Based on 1982 ODFW density estimates for Lane County (see target species section of report).
d Based on 1948 or 1949 OSGC and 1980 or 1982 ODFW estimates (see target species section of report).

construction. HU's are a measure of the quantity (habitat area) and quality (rating of suitability) of available habitat. One HU is equivalent to 1 acre of optimum habitat. In most cases, the losses in HU's were greater immediately following project construction than when measured 23 years after completion of the project because of natural revegetation in the portion of affected area which was not inundated. These differences are discussed in the target species sections of the report. To simplify the summary table, however, only losses or gains which occurred from preconstruction to the more recent condition were addressed. The habitat units lost or gained (Table 16) represent the change in the potential of the habitat to support the given species at one point in time. That potential, however, was lost over the entire life of the project, a point which should be remembered when planning mitigation. It should also be noted that HU's lost or gained are not totaled among species. Each species was evaluated separately. When mitigation, enhancement, or protection measures are conducted, a single activity may improve the habitat for more than one species and would be credited for doing so. If it is not possible to mitigate in-kind (for the same species which experienced losses), out-of-kind mitigation, and hence trade-off mitigation may have to be negotiated. Benefits to bald eagles and ospreys, for example, may be credited against losses to other species during the process of establishing trade-off mitigation levels.

In most cases it was not practical or possible to estimate the number of animals lost or gained as a result of the project. Site specific wildlife population estimates prior to construction were not available. Density estimates were available for the Middle Fork Willamette River drainage in 1948 (OSGC) for deer and grouse, but these figures were generalized and not representative of the losses which occurred at the Dexter Project. For example, density estimates for deer do not reflect the level of use the project area might have received during relatively severe winter conditions and, thus, its long-term importance to the deer population in the drainage. The Dexter site was considered to be above average ruffed grouse habitat, which may have supported a larger density of birds than indicated by the average for the drainage. The technique used in 1948 to estimate deer and grouse densities was not documented. Perhaps the factor which most complicates the attempt to estimate the number of animals lost or gained as a result of the Dexter Project is the considerable change in conditions for wildlife in the Willamette Basin caused by timber harvesting and increased human development. The number of animals using the site at a given time does not adequately reflect the level of project impact because population fluctuations have occurred as a result of other factors. The potential of the affected area to support wildlife was altered as a result of the project and that change can be quantified in terms of HU's.

The Dexter Project is a reregulation dam and reservoir, therefore, impacts considered in this report were related to hydroelectric power generation. The quantitative assessment of impacts was limited to the area directly affected by the project. Cumulative or system-wide impacts were not quantitatively assessed. Losses of wildlife and wildlife habitat resulting from increased human development as a result of the Willamette Reservoir System were not addressed. Indirect impacts such as degradation of habitat adjacent to the project site as a result

of increased human development, recreational use, or blockage of anadromous fish passage were not measured.

No documentation was found nor were resource agency personnel aware of any mitigation, enhancement, or protection measures implemented by USACE at the Dexter Project to offset impacts to wildlife resulting from construction or operation of the project (Bedrossian et al. 1984). During consultation/coordination meetings, USACE representatives requested the Dexter loss statement acknowledge USACE's implementation of mitigation measures for anadromous fish. Since October 1983, 7 acres of land adjacent to the Lookout Point Project office have been set aside as the "Dexter Wildlife Area" (L. Vaglia, USACE, pers. commun.). A prescribed burn was conducted and crops and wildflowers have been planted on this wildlife area. Approximately 25 songbird and 7 wood duck nest boxes have been placed in the Dexter Project area. Also, 2 posts were installed and 1 tree was topped to provide potential osprey nest sites or perch sites for ospreys or bald eagles. Vehicles and hunting have been restricted in an area frequently used by bald eagles. Other measures designed to reduce erosion on project lands may benefit wildlife also.

VI. REFERENCES CITED

Allen, A. W. 1982a. Habitat suitability index models: beaver. U.S. Dep. Inter., Fish and Wildl. Serv. FWS/OBS-82/10.30. 20 pp.

_____. 1982b. Habitat suitability index models: gray squirrel. U.S. Dep. Inter., Fish Wildl. Serv. FWS/OBS-82/10.19. 11 pp.

_____. 1983. Habitat suitability index models: mink. U.S. Dep. Inter., Fish Wildl. Serv. FWS/OBS-82/10-61. 19 pp.

Aney, W. W. 1967. Wildlife of the Willamette Basin, present status. Basins Invest. Sect., Oreg. State Game Comm., Portland. 139 pp.

Anthony, R. G., R. L. Knight, G. T. Allen, R. B. McClelland, and J. I. Hodges. 1982. Habitat use by nesting and roosting bald eagles in the Pacific Northwest. Trans. North Am. Wildl. and Nat. Resour. Conf. 47:332-342.

Bakus, G. J. 1959. Observations on the life history of the dipper in Montana. Auk 76:190-207.

Bedrossian, K. L., R. D. Carleson, J. H. Noyes, and M. S. Potter. 1984. Status review of wildlife mitigaton at Columbia Basin hydroelectric projects, Oregon facilities. Oreg. Dep. Fish and Wildl., Environ. Manage. Sect. and U.S. Dep. Energy, Bonneville Power Adm., Div. Fish and Wildl. Paging various.

Bellrose, F. C. 1976. Ducks, geese and swans of North America. Stackpole Books, Harrisburg, Pa. 540 pp.

Bent, A. C. 1953. Life histories of North American wood warblers. U.S. Natl. Mus. Bull. 203. 734 pp.

Brewer, L. W. 1980. The ruffed grouse in western Washington. Biol. Bull. No. 16, Wash. State Dep. Game, Olympia. 101pp.

Brown, E. R. 1961. The black-tailed deer of western Washington. Biol. Bull No. 13, Wash. State Dep. Game, Olympia. 124 pp.

Bump, G., R. W. Darrow, F. D. Edminster, and W. F. Crissey. 1947. The ruffed grouse: life history, propagation, management. New York State Conserv. Dep., Albany. 915 pp.

Burt, W. H., and R. P. Grossenheider. 1976. A field guide to the mammals, third edition. Houghton Mifflin Co., Boston. 289 pp.

Chambers, R. E., and W. M. Sharp. 1958. Movement and dispersal within a population of ruffed grouse. J. Wildl. Manage. 22:231-239.

Cottam, C. 1939. Food habits of North American diving ducks. U.S. Dep. Agric. Tech. Bull. 643. 140 pp.

Deems, E. F., Jr., and D. Pursley. 1983. North American furbearers: a contemporary reference. Int. Assoc. Fish and Wildl. Agencies. 223 pp.

Denney, R. 1982. Willamette Valley waterfowl status report. Oreg. Dep. Fish and Wildl., Portland. np.

Drobney, R. D., and L. H. Fredrickson. 1979. Food selection by wood ducks in relation to breeding status. J. Wildl. Manage. 43(1):109-120.

Durbin, K. 1979. The forest drummer, a look at the ruffed grouse in Oregon. Oreg. Wildl. 34(9):3-7.

Edminster, F. C. 1947. The ruffed grouse: its life story, ecology and management. The Macmillan Co., N.Y. 383 pp.

Fielder, P. C. 1982. Food habits of bald eagles along the mid-Columbia River, Washington. Murrelet 63:46-50.

Flyger, V., and J. E. Gates. 1982. Fox and gray squirrels. Chapter 11 in J. A. Chapman and G. A. Feldhamer, eds. Wild mammals of North America. The Johns Hopkins Univ. Press, Baltimore. 1147 pp.

French, J. M., and J. R. Koplin. 1972. Distribution, abundance, and breeding status of ospreys in northwestern California. Pages 223-240 in J. C. Ogden, ed. Trans. North Am. Osprey Res. Conf., Coll. of William and Mary, Williamsburg, Va. 258 pp.

Gabrielson, I. N., and S. G. Jewett. 1940. Birds of Oregon. Republ. in 1970 as Birds of the Pacific Northwest, Dover Publ., Inc., New York. 650 pp.

Gullion, G. W. 1951. Birds of the southern Willamette Valley, Oregon. Condor 53:129-149.

_____. 1966. A viewpoint concerning the significance of studies of game bird food habits. Condor 68:372-376.

Hall, F. C., L. W. Brewer, J. F. Franklin, and R. L. Werner. 1985. Plant communities and stand conditions. Pages 17-31 and append. 5 and 6 in E. R. Brown, ed. Management of wildlife and fish habitats in forests of western Oregon and Washington. Part 1 and 2. U.S. Dep. Agric., For. Serv., Pacific Northwest Reg.

Hanley, T. A. 1983. Black-tailed deer, elk, and forest edge in a western Cascades watershed. J. Wildl. Manage. 47(1):237-242.

Hansen, A.J., M. V. Stalmaster, and J. R. Newman. 1980. Habitat characteristics, function, and destruction of bald eagle communal roosts in western Washington. Pages 221-229 in Knight et al., eds. Proc. Washington Bald Eagle Symposium, The Nature Conservancy, Seattle, Wash.

Henny, C. J., J. A. Collins, and W. J. Deibert. 1978. Osprey distribution, abundance, and status in western North America: II. The Oregon population. Murrelet 59:14-25.

Hines, W. W. undated. Aspects of Oregon black-tailed deer management, prepared for intradepartmental consideration and use. Oreg. State Game Comm. Unpubl. rep. Paging various.

Hocutt, G. E., and R. W. Dimmick. 1971. Summer food habits of juvenile wood ducks in east Tennessee. J. Wildl. Manage. 35(2):286-292.

Hoffman, R. 1927. Birds of the Pacific states. The Riverside Press, Cambridge, Mass. 353 pp.

Ingles, L. G. 1965. Mammals of the Pacific states. Stanford Univ. Press, Stanford, Calif. 506 pp.

Ingram, R. 1984. 1983 Big game harvest. Oreg. Wildl. 39(5):3-10.

Isaacs, F. B., and R. G. Anthony. 1983. Bald eagle nest locations and history of use in Oregon through 1983. Unpubl. rep., Oreg. Coop. Wildl. Res. Unit, Dep. Fish and Wildl., Oreg. State Univ., Corvallis. 11 pp.

Johnsgard, P. A. 1973. Grouse and quails of North America. Univ. Nebr. Press, Lincoln. 553 pp.

Joint Federal-State-Private Conservation Organization Committee. 1974. Ecological planning and evaluation procedures. U.S. Dep. Inter., Fish and Wildl. Serv., Washington, D.C. 269 pp.

Kebbe, C. E. 1960. Oregon's beaver story. Oreg. State Game Comm. Bull. 15(2):3-6.

Keister, G. P., Jr. 1981. Characteristics of winter roosts and populations of bald eagles in the Klamath Basin. M. S. Thesis, Oreg. State Univ., Corvallis. 82 pp.

Koplin, J. R., ed. 1971. Osprey workshop: summary of research findings and management recommendations. Trans. Calif.-Nev. Sect. The Wildl. Soc.:114-122.

Landers, J. L., T. T. Findley, and A. S. Johnson. 1977. Feeding ecology of wood ducks in South Carolina. J. Wildl. Manage. 41(1):118-127.

Lind, G. S. 1976. Production, nest site selection, and food habits of ospreys on Deschutes National Forest, Oregon. M.S. Thesis, Oreg. State Univ., Corvallis. 53 pp.

Lindzey, J. S. 1943. A study of Columbian black-tailed deer Odocoileus hemionus columbianus (Richardson), and its habitat in Oregon. M. S. Thesis, Oreg. State Coll., Corvallis. 67 pp.

Linscombe, G., N. Kinler, and R. J. Auerlich. 1982. Mink. Chapter 31 in J. A. Chapman and G. A. Feldhamer, eds. Wild mammals of North America. The Johns Hopkins Univ. Press, Baltimore. 1147 pp.

Mace, R. U. 1953. Oregon's big game resources. Oreg. State Game Comm., Portland. 34 pp.

_____. 1979. Oregon's furbearing mammals. Wildl. Bull No. 3, Oreg. Dep. Fish and Wildl., Portland. 82 pp.

Marshall, D. B. 1984. Oregon nongame wildlife management plan, review draft. Oreg. Dep. Fish and Wildl., Portland. Paging various.

Maser, C., B. R. Mate, J. F. Franklin, and C. T. Dyrness. 1981. Natural history of Oregon coast mammals. U.S. Dep. Agric., For. Serv., Gen. Tech. Rep. PNW-13. Pacific Northwest For. and Range Exp. Station, Portland, Oreg. 496 pp.

Masson, W. V., and R. U. Mace. 1974. Upland game birds. Wildl. Bull. No. 5, Oreg. Wildl. Comm., Portland. 44pp.

Maxson, S. J. 1978. Spring home range and habitat use by female ruffed grouse. J. Wildl. Manage. 42(1):61-71.

McGilvrey, F. B. (compiler). 1968. A guide to wood duck production habitat requirements. Bur. of Sport Fish. and Wildl., Resour. Publ. 60. 32 pp.

Meslow, E. C., C. Maser, and J. Verner. 1981. Old-growth forests as wildlife habitat. Trans. North Am. Wildl. and Nat. Resour. Conf. 46:329-335.

Miller, F. L. 1966. Distribution patterns of black-tailed deer (Odocoileus hemionus columbianus) in relation to environment. M. S. Thesis, Oreg. State Univ., Corvallis. 90 pp.

_____. 1968. Observed use of forage and plant communities by black-tailed deer. J. Wildl. Manage. 32:142-148.

MMGOA. 1975. Dexter Lake master plan, Dexter Lake, Willamette River, Oregon. Design Memorandum No. 6. Prepared for U.S. Army Corps of Engineers, Portland District. Paging various.

Munro, J. A. 1941. Studies of waterfowl in British Columbia: greater scaup duck, lesser scaup duck. Can. J. Res. 19:113-136.

Oregon State Game Commission and Fish Commission of Oregon. 1948. Fish and wildlife problems arising from the Willamette Valley Project. Portland, Oreg. 99 pp.

Pacific States Bald Eagle Recovery Team. 1982. Pacific states bald eagle recovery plan. Tech. review draft. Unpubl. rep., U.S. Dep. Inter., Fish and Wildl. Serv., Portland, Oreg. 73 pp + append.

Rue, L. L., III. 1981. Furbearing animals of North America. Crown Publishers, Inc., N.Y. 343 pp.

Samuel, D. E., and B. B. Nelson. 1982. Foxes. Chapter 22 in J. A. Chapman and G. A. Feldhamer, eds. Wild mammals of North America. The Johns Hopkins Univ. Press, Baltimore. 1147 pp.

Scheffer, V. B. 1941. Management studies of transplanted beavers in the Pacific Northwest. Trans. North Am. Wildl. Conf. 6:320-325.

Schladweiler, J. L., and G. L. Storm. 1969. Den-use by mink. J. Wildl. Manage. 33:1025-1026.

Schroeder, R. L. 1982. Habitat suitability index models: yellow warbler. U.S. Dep. Inter., Fish and Wildl. Serv. FWS/OBS - 82/10.27. 8 pp.

Servheen, C. W. 1975. Ecology of the wintering bald eagles on the Skagit River, Washington. M. S. Thesis, Univ. Wash., Seattle. 96 pp.

Seton, E. T. 1953. Lives of game animals. Charles T. Branford Co., Boston. np.

Sharp, W. M. 1963. The effects of habitat manipulation and forest succession on ruffed grouse. J. Wildl. Manage. 27(4):664-671.

Shay, R. 1978. Oregon's beaver. Oreg. Wildl. 33(2):3-5.

Sousa, P. J., and A. H. Farmer. 1983. Habitat suitability index models: wood duck. U.S. Dep. Inter., Fish and Wildl. Serv. FWS/OBS-82/10.43. 27 pp.

Stalmaster, M. V. 1976. Winter ecology and effects of human activity on bald eagles in the Nooksack River Valley, Washington. M. S. Thesis, West. Wash. State Coll., Bellingham. 100 pp.

_____, and J. R. Newman. 1979. Perch-site preferences of wintering bald eagles in northwest Washington. J. Wildl. Manage. 43:221-224.

_____, R. L. Knight, B. L. Holder, and R. J. Anderson. 1985. Bald eagles. Pages 269-290 in E. R. Brown, ed. Management of wildlife and fish habitats in forests of western Oregon and Washington. Part 1. U.S. Dep. Agric., For. Serv., Pacific Northwest Reg.

Steenhof, K., S. S. Berlinger, and L. H. Fredrickson. 1980. Habitat use by wintering bald eagles in South Dakota. J. Wildl. Manage. 44:798-805.

Sullivan, J. O. 1965. "Flightlessness" in the dipper. Condor 67(6):535-536.

_____. 1973. Ecology and behavior of the dipper, adaptations of a passerine to an aquatic environment. PhD Thesis, Univ. Mont., Missoula. 212 pp.

Thut, R. N. 1970. Feeding habits of the dipper in southwestern Washington. Condor 72:234-235.

Townsend, J. E. 1953. Beaver ecology in western Montana with special reference to movements. J. Mammal. 34:459-479.

Udvardy, M. D. F. 1977. The Audubon Society field guide to North American birds: western region. Alfred A. Knopf, Inc., N.Y. 855 pp.

U.S. Army Corps of Engineers. 1955a. Pages 1526-1528 in Annual Report of the Chief of Engineers, Report on civil works activities FY 1955. U.S. Dep. Army, Corps of Eng., Portland Distr. U.S. Gov. Printing Office, Wash., D.C.

_____. 1955b. The master plan, reservoir management and public use development, Lookout Point Project, Middle Fork Willamette River, Oregon. U.S. Dep. Army, Corps of Eng. 60 pp + append.

_____. 1980. Project operating limits. U.S. Dep. Army, Corps of Eng., North Pacific Div., Reservoir Control Center, Portland, Oreg. 35 pp + append.

_____. 1982. Page 37-20 in Annual report of the Chief of Engineers, report on civil works activities FY 1982. U. S. Dep. Army, Corps of Eng., U. S. Gov. Printing Office, Wash., D. C.

_____. 1983. Report on utilization of civil works lands and facilities. Dexter Lake project, Lane County. U.S. Dep. Army, Corps of Eng., Portland Distr. np.

U.S. Fish and Wildlife Service. 1976. Habitat evaluation procedures. U.S. Dep. Inter., Div. Ecol. Serv., Wash., D.C. 30 pp + tables.

_____. 1980. Habitat evaluation procedures. Ecol. Serv. Man. 102 and 103. U.S. Dep. Inter., Div. Ecol. Serv., Wash., D.C. Paging various.

_____. 1982. Identification of national species of special emphasis. Federal Register 47(178):39890-39891.

U.S. Forest Service. undated. Use of habitats by wildlife species for reproducing. Mimeographed list. U.S. Dep. Agric., For. Serv., Willamette Natl. For. np.

Wallmo, O. C., ed. 1981. Mule and black-tailed deer of North America. Univ. Nebr. Press, Lincoln. 605 pp.

Wilms, W. D. 1971. The influence of forest edge, elevation, aspect site index and roads on deer use of logged and mature forests on northern Vancouver Island. M.S. Thesis, Univ. British Columbia, Vancouver, B.C. 184 pp.

Witmer, G. W., et al. 1985. Deer and elk. Pages 231-258 in E. R. Brown, ed. Management of wildlife and fish habitats in forests of western Oregon and Washington. U.S. Dep. Agric., For. Serv., Pacific Northwest Reg.

Zarn, M. undated. Habitat management series for unique or endangered species, Report No. 12 - Osprey. Tech. Note 254. U.S. Dep. Inter., Bur. Land Manage. 41 pp.

APPENDIX A

WILDLIFE SPECIES POTENTIALLY OCCURRING IN THE DEXTER DAM AND RESERVOIR PROJECT AREA [1] (PRECONSTRUCTION AND/OR POSTCONSTRUCTION)

Herptiles

Northwestern salamander
Long-toed salamander
Cope's giant salamander
Pacific giant salamander
Olympic salamander
Clouded salamander
Oregon slender salamander
Ensatina
Dunn's salamander
Larch mountain salamander
Western redback salamander
Roughskin newt
Western toad
Pacific tree frog
Tailed frog
Red-legged frog
Foothill yellow-legged frog
Cascade frog
Bullfrog
Spotted frog
Western pond turtle
Northern alligator lizard
Southern alligator lizard
Short-horned lizard
Western fence lizard
Western skink
Rubber boa
Racer
Sharptail snake
Ringneck snake
Gopher snake
Western terrestrial garter snake
Northwestern garter snake
Common garter snake
Western rattlesnake

Birds

Common loon
Pied-billed grebe
Horned grebe
Red-necked grebe
Eared grebe
Western grebe
Double-crested cormorant
American bittern
Great blue heron
Great egret
Green-backed heron
Greater white-fronted goose
Canada goose
Wood duck
Green-winged teal
Mallard
Northern pintail
Blue-winged teal
Cinnamon teal
Northern shoveler
Gadwall
American wigeon
Canvasback
Redhead
Ring-necked duck
Greater scaup
Lesser scaup
Harlequin duck
White-winged scoter
Common goldeneye
Barrow's goldeneye
Bufflehead
Hooded merganser
Common merganser
Ruddy duck
Turkey vulture
Osprey
Bald eagle
Northern harrier
Sharp-shinned hawk
Cooper's hawk
Northern goshawk
Red-tailed hawk
Golden eagle
American kestrel
Merlin
Peregrine falcon
Prairie falcon
Ring-necked pheasant
Blue grouse

1 Based on species list for reproductive habitat, Willamette National Forest and Oregon Nongame Wildlife Management Plan, review draft.

Birds (Continued)

Ruffed grouse
California quail
Mountain quail
Virginia rail
Sora
American coot
Sandhill crane
Killdeer
Greater yellowlegs
Solitary sandpiper
Spotted sandpiper
Western sandpiper
Least sandpiper
Baird's sandpiper
Dunlin
Long-billed dowitcher
Common snipe
Wilson's phalarope
Ring-billed gull
Western gull
Black tern
Rock dove
Band-tailed pigeon
Mourning dove
Barn owl
Western screech owl
Great horned owl
Northern pygmy owl
Spotted owl
Barred owl
Great gray owl
Long-eared owl
Northern saw-whet owl
Common nighthawk
Black swift
Vaux's swift
Calliope hummingbird
Rufous hummingbird
Allen's hummingbird
Belted kingfisher
Lewis' woodpecker
Red-breasted sapsucker
Williamson's sapsucker
Downy woodpecker
Hairy woodpecker
White-headed woodpecker
Three-toed woodpecker
Black-backed woodpecker
Northern flicker
Pileated woodpecker
Olive-sided flycatcher
Western wood pewee
Willow flycatcher
Hammond's flycatcher
Dusky flycatcher
Western flycatcher
Western kingbird
Horned lark
Purple martin
Tree swallow
Violet-green swallow
Northern rough-winged swallow
Bank swallow
Cliff swallow
Barn swallow
Gray jay
Steller's jay
Scrub jay
Clark's nutcracker
American crow
Common raven
Black-capped chickadee
Mountain chickadee
Chestnut-backed chickadee
Bushtit
Red-breasted nuthatch
White-breasted nuthatch
Pygmy nuthatch
Brown creeper
Rock wren
Canyon wren
Bewick's wren
House wren
Winter wren
Marsh wren
American dipper
Golden-crowned kinglet
Ruby-crowned kinglet
Western bluebird
Mountain bluebird
Townsend's solitaire
Swainson's thrush
Hermit thrush
American robin
Varied thrush
Wrentit
Water pipit
Bohemian waxwing
Cedar waxwing
European starling
Solitary vireo
Hutton's vireo
Warbling vireo
Red-eyed vireo

Birds (Continued)

Tennessee warbler
Orange-crowned warbler
Nashville warbler
Yellow warbler
Black-throated blue warbler
Yellow-rumped warbler
Black-throated gray warbler
Townsend's warbler
Hermit warbler
American redstart
MacGillivray's warbler
Common yellowthroat
Wilson's warbler
Yellow-breasted chat
Western tanager
Black-headed grosbeak
Lazuli bunting
Green-tailed towhee
Rufous-sided towhee
Brown towhee
Chipping sparrow
Brewer's sparrow
Vesper sparrow
Savannah sparrow
Fox sparrow
Song sparrow
Lincoln's sparrow
Golden-crowned sparrow
White-crowned sparrow
Harris' sparrow
Dark-eyed junco
Red-winged blackbird
Western meadowlark
Brewer's blackbird
Brown-headed cowbird
Northern oriole
Rosy finch
Pine grosbeak
Purple finch
Cassin's finch
House finch
Red crossbill
White-winged crossbill
Pine siskin
Lesser goldfinch
American goldfinch
Evening grosbeak
House sparrow

Mammals

Virginia opossum
Vagrant shrew
Dusky shrew
Pacific shrew
Water shrew
Pacific water or Marsh shrew
Trowbridge's shrew
Shrew-mole
Townsend's mole
Coast mole
Little brown myotis
Yuma myotis
Long-eared myotis
Fringed myotis
Long-legged myotis
California myotis
Silver-haired bat
Big brown bat
Hoary bat
Townsend's big-eared bat
Pallid bat
Pika
Brush rabbit
Snowshoe hare
Mountain beaver
Yellow-pine chipmunk
Townsend's chipmunk
Siskiyou chipmunk
Yellow-bellied marmot
California ground squirrel
Golden-mantled ground squirrel
Western gray squirrel
Douglas' squirrel
Northern flying squirrel
Botta's pocket gopher
Western pocket gopher
Beaver
Deer mouse
Dusky-footed woodrat
Bushy-tailed woodrat
Heather vole
White-footed vole
Townsend's vole
Long-tailed vole
Creeping vole
Water vole
Muskrat
House mouse
Pacific jumping mouse
Porcupine
Nutria
Coyote
Red fox
Gray fox
Black bear
Ringtail

Mammals (Continued)

Raccoon
Marten
Fisher
Ermine
Long-tailed weasel
Mink
Wolverine
Badger
Western spotted skunk
Striped skunk
River otter
Mountain lion
Lynx
Bobcat
Roosevelt elk
Mule deer
Black-tailed deer

APPENDIX B

Interagency Habitat Evaluation Group
Dexter Project

Name	Agency
Karen Bedrossian	ODFW
Geoff Dorsey *	USACE
Larry Gangle	USFS
Ron Mecklenberg	USFS
Jim Noyes	ODFW
Mary Potter	ODFW
Pat Wright	USFWS

* Geoff Dorsey participated in the project site tour, but not the rating session. His comments and suitability ratings obtained during the informal draft review were incorporated into this report.

APPENDIX C

Comments

(1) State agency (ODFW)

(2) Federal agencies (USFWS and USFS)

(3) Tribes

No tribes are involved with the actions taken at the Dexter Project.

(4) Facility operator (USACE)

BPA requested comments on the May 1985 Dexter draft report by 26 July 1985. USACE had not submitted comments by 3 September 1985 when the final report was typed; therefore, USACE comments could not be incorporated into the report.

(5) Other (PNUCC)

ODFW Comments:

Department of Fish and Wildlife
506 S.W. MILL STREET, P.O. BOX 3503, PORTLAND, OREGON 97208

July 23, 1985

Mr. James R. Meyer
Division of Fish and Wildlife
Bonneville Power Administration
PO Box 3621
Portland, OR 97208

Dear Mr. Meyer:

The following comments respond to your request, dated 21 June 1985, to review the Loss Assessment Report for Dexter Dam and Reservoir Project.

The Dexter Loss Assessment presents an analysis of the impacts to wildlife and wildlife habitat resulting from the construction and operation of the hydroelectric-related components of the project. The Dexter Project inundated, extensively altered, or directly affected 2,031 acres of land and river in the Middle Fork Willamette River drainage. Impacts to wildlife centered around the loss of 445 acres of riparian habitat. Year-round habitat was lost for black-tailed deer, red fox, mink, western gray squirrel, beaver, ruffed grouse, ring-necked pheasant, California quail, wood duck, and nongame species. Impacts of the project included: blockage or inhibition of animal migration or movement; loss of thermal and/or hiding cover; alteration of open area and cover interspersion; loss of breeding, parturition and/or rearing habitat; fragmentation of contiguous habitat; loss or alteration of available forage; loss of nesting, perching and/or roosting sites; and avoidance of the project area by wildlife during construction.

The Dexter Loss Assessment clearly shows the potential of the area to support wildlife was altered as a result of the project. That change was quantified in terms of Habitat Units. In this study, the Habitat Units lost or gained represent the change in the potential of the habitat to support the given species at one point in time. That potential, it should be emphasized, was lost over the entire life of the project. Habitat Units also may serve as a guide toward developing mitigation plans, as well as provide a method of measuring the success of mitigation implementation.

The Oregon Department of Fish and Wildlife has a legal mandate "To maintain all species of wildlife at optimum levels and prevent the serious depletion of any indigenous species," and "To develop and manage the lands and waters of this state in a manner that will enhance the production and public enjoyment of wildlife." In accordance with this mandate, the Oregon Department of Fish and Wildlife has a policy to request mitigation when losses to animal populations and habitat result from project construction and operation. These policies are consistent with the Northwest Power Planning Act and Wildlife Program purpose "to protect, mitigate, and enhance fish and wildlife to the

Explanations or Modifications:

No explanations or report modifications necessary.

ODFW Comments (cont.):

extent affected by the development and operation of any hydroelectric project of the Columbia River and its tributaries..."

In order to "protect, mitigate, and enhance" wildlife resources affected by hydroelectric generating facilities, it is necessary to develop and implement mitigation plans. The Dexter Loss Assessment represents the beginning of the process to achieve mitigation for the impacts to the wildlife resource resulting from construction of the project. The next step in the Council's Wildlife Program is the preparation of mitigation plans. I strongly urge the participating agencies to move forward in implementing the Wildlife Program of the Northwest Power Planning Council. The Oregon Department of Fish and Wildlife is ready to take the lead in developing a mitigation plan for the Willamette Basin. Consultation and coordination with the appropriate agencies involved in the project will be an integral part of the process. The Northwest Power Planning Act and the Power Council's Fish and Wildlife Program have provided the opportunity to correct past misunderstanding and short-sightedness regarding wildlife resources affected by the development and operation of hydroelectric power in the Columbia River Basin. The Oregon Department of Fish and Wildlife wants to see that opportunity realized to the fullest degree possible in a timely, effective, and cost-efficient manner.

I appreciate your assistance in this program and look forward to working with you in a cooperative way to achieve our mutual objectives.

Sincerely,

John R. Donaldson, PhD
Director

Explanations or Modifications(cont.):

No explanations or report modifications necessary.

USFWS Comments:

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Division of Ecological Services
Portland Field Office
727 N. E. 24th Avenue
Portland, Oregon 97232

Reference FWimm

September 13, 1985

Mr. John Palensky, Director
Division of Fish and Wildlife
Attn: James Meyer
Bonneville Power Administration
P. O. Box 3621
Portland, Oregon 97208

Dear Mr. Palensky:

We have reviewed the draft loss statement reports for Cougar, Hills Creek, Dexter, and Lookout Point hydroelectric projects. The following comments are being provided for inclusion in each of the final loss statements.

In our opinion, the reports are well written and adequately describe the on-site wildlife impacts of each project. A comprehensive evaluation, based on habitat supported by population data when available, was conducted by a diverse team of wildlife biologists familiar with the area's wildlife resources. Our agency actively participated in each evaluation and we believe the methods employed to identify the wildlife impacts at each project resulted in a fair and accurate analysis of project impacts.

It is important to note that during each of the evaluations, the impacts were identified on a concensus basis by the evaluation team. This format provided for a thorough discussion of impacts, both beneficial and adverse, and provided a forum for resolving differences in a manner mutually acceptable to each agency's team representative. To the best of our knowledge, the impacts identified in the loss statements accurately reflect both the discussions and decisions of the evaluation teams.

The evaluations did not address cumulative impacts that these and the other major Willamette Valley hydroelectric projects may have had on wildlife. We believe the extensive development that has occurred along the Willamette River's floodplain has significantly reduced a variety of wildlife habitats and related resources. In our opinion, that development and resultant wildlife losses would have been considerably less without the construction and operation of the aforementioned hydroelectric projects. Accordingly,

Explanations or Modifications:

No explanations or report modifications necessary.

USFWS Comments (cont.):

the Power Council, BPA, and the Corps of Engineers, together with the wildlife management agencies should address the cumulative impacts of the major Willamette Basin hydroelectric projects on wildlife.

In conclusion, we believe the magnitude of on-site wildlife losses identified in the loss statements for the Cougar, Hills Creek, Dexter, and Lookout Point hydroelectric projects warrants that mitigation planning be initiated as early as possible as provided for in the Power Council's Fish and Wildlife Program. We are eager to assist in these efforts and look forward to the day when on-the-ground mitigation can be implemented.

Sincerely,

Russell D. Peterson
Field Supervisor

Explanations or Modifications:

No explanations or report modifications necessary.

USFS Comments:

United States Department of Agriculture — Forest Service

JUL 11 1985

2600
July 25, 1985

James R. Meyer, Wildlife Program Area Manager
Biological Studies Branch
Department of Energy
Bonneville Power Administration
P. O. Box 3621
Portland, OR 97208

Dear Mr. Meyer:

Our Forest Wildlife Biologist, Ed Harshman, has reviewed the drafts for Cougar, Hills Creek, and Lookout Point reservoirs and has transmitted corrections directly to Karen Bedrossian, Oregon Department of Fish and Wildlife.

Regarding the meeting on July 11, concerning mitigation plans, we urge all possible speed in completing those plans so they can be incorporated into our Forest Land Use Plan.

Sincerely,

for MICHAEL A. KERRICK
Forest Supervisor

DO/EH.62F/072585

Explanations or Modifications:

Corrections or modifications were made where applicable.

PNUCC Comments: JUL 3 0

PNUCC

PACIFIC NORTHWEST UTILITIES CONFERENCE COMMITTEE

July 29, 1985

Mr. John R. Palensky - PJ
Director, Division of Fish and Wildlife
Bonneville Power Administration
1002 N.E. Holladay
P.O. Box 3621
Portland, Oregon 97208-3621

Dear Mr. Palenskyt

This letter comprises the Pacific Northwest Utilities Conference Committee's (PNUCC) review of the Wildlife and Wildlife Habitat Loss Assessments prepared by Oregon Department of Fish and Wildlife for Dexter Dam, Lookout Point Dam, and Hills Creek Dam on the middle fork of the Willamette River, and Cougar Dam on the south fork of the McKenzie River. Our major technical comments are outline below.

1. The objectives of the impact assessments have not been stated. It is not clear whether the authors intended a general, overall impact assessment, or whether they were interested in specific resource categories such as a habitat type or a species. The presentation of the results seems too detailed and specific for a general assessment, but the resource categories for a specific evaluation are unclear. The focus appears to be species since the habitat units were evaluated across cover types for each species. However, the discussion at the consultation meeting on July 11 suggested that, at least in some cases, the resource category of interest was habitat. As an example, the authors may have selected to investigate losses of species such as pileated woodpeckers, bald eagles, and yellow warblers. Or they may have selected to investigate losses of old growth forest, bald eagles, and certain passerines, a combination of species categories including a guilding method, and habitat categories. Although the same species and selection criteria may be used in either approach, the goals and objectives for a mitigation plan and the plan which results will differ considerably. It is important to identify goals and objectives at the outset since initiating the loss assessments without first identifying objectives may produce costly and unnecessary information, may fail to produce required information, and could lead to a lack of understanding and continuity between interested parties, through personnel changes, and over long-term projects. The potentially high cost of wildlife programs make the requirement of clearly documented objectives especially crucial.

2. The authors used a technique called a "modified" Habitat Evaluation Procedure (HEP) and presented their results in terms of Habitat Units (HU). HEP is a published procedure and modifications of this procedure should be precisely identified and documented. The validity of new and altered assumptions should be discussed. For example, one of the modifications in these reports is a backward projection of baseline conditions from a "future" target year. In a usual HEP, using aerial photos, one ground truths baseline habitat conditions as a standard procedure. Aerial photos, even infrared photos, are of limited value without this step. Future projections can also be verified by monitoring conditions after the impact. The backward projection

Explanations or Modifications:

Objectives of the impact assessments are stated in the introduction.

The method used was a habitat-based assessment, using target species to evaluate habitat. See Sections III.D. and III.E.

Objectives of the impact assessments are stated in the Introduction. Objectives of mitigation plans will be stated early in the planning process.

The procedure used was not "called a 'modified' Habitat Evaluation Procedure (HEP)." The procedure was based on HEP, other studies, and discussions with various agency personnel, including USFWS. See Section III.E.
Cover type maps of recent habitat conditions were ground truthed. See Section III.B.

PNUCC Comments (cont.):

can never be ground truthed, or linked in any way to on-site population estimates. Further problems arise in using historical photos. The HEP procedure assumes the project site is evaluated under "average" habitat conditions. Information from aerial photos will vary according to the time of year of the flight and long-term climatic cycles. The loss assessments do not indicate that these variables were taken into account. Therefore, the backward projection adds additional unverifiable assumptions that may limit the procedure and should be stated and discussed.

3. The Habitat Suitability Index models in a HEP are the most controversial and important part of the procedure. The models, or "rating criteria" used in this study are not described in these reports. A model may be either qualitative or quantitative, but it must be documented and it must include as much verification and testing as possible. Models must be repeatable to be credible. A margin of error of repeatability should be provided. Likewise, the sampling design and techniques used to ground truth the aerial photos and apply the models must be described. Sample sizes should be included. The sampling procedure must also produce repeatable results within a stated margin of error and the design must satisfactorily reflect habitat conditions. A specific problem that arises in these loss assessments is the frequent result that more acres of "ideal habitat" ("HUs") than of actual habitat is claimed to have been lost. The authors seem to be indicating that different zones of habitat were variably impacted by the hydropower portion of the project such that some acres were "lost" while others were "altered." This could be a controversial claim but it cannot be evaluated since the HSI models, or rating criteria, and sampling procedures are not described.

4. HEP is based on certain assumptions including the assumption that HSI correlates linearly with carrying capacity. It is also assumed that carrying capacity is full so that habitat is limiting. A projection of the Willamette Basin loss assessments to population numbers would give an estimate of a decline in species such as elk, deer, beaver, and others, and an increase in, for example, the bald eagle. Actual population trends during the 1950s and 1960s when the projects came on line indicate the reverse: deer, elk, beaver, and some others increased or maintained populations, and bald eagles decreased in the Willamette Valley.[1] It appears the HEP assumptions are invalid in this case. Habitat replacement cannot be supported if there are no documented wildlife losses as a result of the projects.

5. We are concerned about how the "losses" in the impact assessments relate to the land management and wildlife agencies' established goals and objectives for wildlife in the Willamette Basin. Willamette National Forest, the major land manager in the area of these projects, will be including targets for many species in their Forest Plan.[2] Wildlife goals under the Council's program must be consistent with the Forest Service targets and other existing state and federal programs. For example, the present management strategies of the Oregon Department of Fish and Wildlife suggest that Willamette Basin game populations are healthy rather than depressed.

---

[1]/Pacific Northwest River Basins Commission (1969) Willamette Basin Comprehensive Study of Water and Related Land Resources, App. D Fish and Wildlife.

[2]/Willamette National Forest draft Forest Plan is due by the end of Fiscal Year 1985.

Explanations or Modifications (cont.):

No attempt was made to link habitat conditions to on-site population estimates.
Cover types identified from aerial photos will not vary from year to year, however, wildlife population size will. See Summary, Section V. for discussion of population estimates and habitat conditions.
See Section III.E. for discussion of rating criteria. Target species rating criteria worksheets are available from ODFW.

For some species, the loss of HU's exceeded the direct loss of acres of habitat. This was a result of the loss of acreage plus the degradation in the quality of the remaining habitat.

Population trends for the Willamette Valley do not necessarily reflect conditions at the project site. See Summary, Section V., for discussion.

Objectives will be identified early in the mitigation planning process. All appropriate agencies will be invited to participate in the development of these objectives.

PNUCC Comments (cont.):

We hope these comments will contribute to a useful and informative final document. Thank you for the opportunity to review the reports.

Sincerely,

Kathryn Kostow

Kathryn E. Kostow
Fish and Wildlife Specialist

KK:gh:163DD

cc: Karen Bedrossian, ODFW
Jan Chrisman, NWPPC
Marty Montgomery, NWPPC
Jim Meyer, BPA

Explanations or Modifications (cont.):

No explanations or report modificaitons necessary.