

# Ice Harbor Master Plan Appendix B - Fish And Wildlife Management Plan



MAY 1982

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US Army Corps  
of Engineers  
Walla Walla District

NPDOP-RM (25 Mar 82) 1st Ind

SUBJECT: Ice Harbor Master Plan Appendices - Final Draft

DA, North Pacific Division, U.S. Army Corps of Engineers, P.O. Box 2870,  
Portland, Oregon 97208 11 May 1982

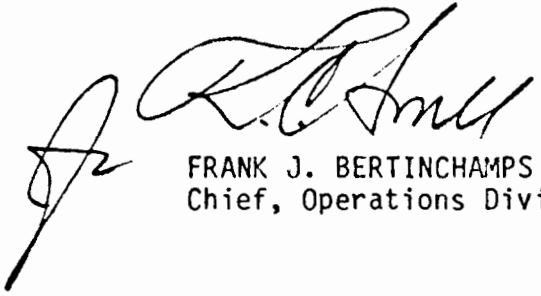
TO: Commander, Walla Walla District, ATTN: NPWOP-RM

1. We have completed our review of the Ice Harbor Master Plan Appendices - Appendix A - Project Resources Management Plan; Appendix B - Natural Resources Management Plan; Appendix C - Fire Protection Plan; and Appendix D - Safety Plan. Appendix E - Sign Plan was not available for review.

2. Appendices A to D are approved subject to the comments in the attached inclosure, "NPD Staff Comments - Ice Harbor Master Plan Appendices A to D". All comments have been verbally discussed with Mr. Brad Daley, NPWOP-RM.

FOR THE COMMANDER:

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*File*  
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*113*  
*#25* *APP B*  
1 Incl  
wd Incls 1 & 2  
Added 1 Incl  
3. Staff Comments



FRANK J. BERTINCHAMPS  
Chief, Operations Division

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North Pacific Division - Staff  
Comments - Ice Harbor Master Plan Appendices A to D  
10 May 1982

1. Appendix A

a. Page 5-9, Para 5.06(g). It would be useful to mention that non-fee camping will be permitted at Windust Park when Levey Park is closed to camping.

b. Page 6-2, Para. 6.03. Add discussion relative to the impact of PL 96-95 - Archeological Resources Protection Act of 1979. Also, ER 1130-2-460 has been rescinded, which presents a problem relative to OCE policy guidance.

c. Page 6-3, Para. 6.04. The relevance of using PL 96-95 versus or in addition to 36 CFR 327 requires some discussion.

d. Page 10-6, Para. 10.13. In discussing the Sign Manual reference NPDR 1130-2-6, dated 15 Sep 1981.

e. Page 12-4., Para. 12.05. The new NPD Supplement dated 30 March 1982, to ER 1130-2-413 - Pest Control Program for Civil Works Projects, dated 1 Feb 82, should be cited for pesticide applicator training requirements.

2. Appendix B.

The final draft of Appendix B is a substantial improvement over previous drafts. This draft of the Fish and Wildlife Management Plan in its present format, should provide the guidance required to operate and maintain Big Flat, Lost Island and Hollenbeke. However, future documents should include more detailed information and insight in those sections dealing with authority, management objectives and species occurrence. These comments will be elaborated upon during the 24 May 1982 discussion of the Mill Creek Wildlife Management Plan.

3. Appendix C. No comment.

4. Appendix D.

a. Page 2-4, Para. 2.10. We assume that the "No Lifeguard on Duty - Swim at Your Own Risk" signs will be posted only at authorized and designated swim areas.

b. Page 4-2. and 6-1. Change reference to the Sign Manual to incorporate NPDR 1130-2-6, dated 15 Sep 81.

Ice Harbor Master Plan:

Recreation - Resource Management Appendices

Appendix B - Fish and Wildlife Management Plan

June 1982

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## Section 1 - Introduction

### 1.01 Purpose.

The purpose of this plan is to describe and outline the program for the management of the fish and wildlife resources of the Ice Harbor Project. This appendix will also serve as a five year plan for managing the fish and wildlife resources of this project. It is intended that this plan will ensure that the management of fish and wildlife resources is given treatment equal to other objectives in the management of the project.

### 1.02 Authority.

This plan is prepared under the authority of ER 1130-2-400, Recreation - Resource Management of Civil Works Water Resource Projects, dated 28 May 1971. Upon approval, it is Appendix B to the Ice Harbor Master Plan (U.S. Army, 1977a).

### 1.03 Scope.

This plan covers the management of fish and wildlife resources on the Ice Harbor Project (plants and animals, game and non-game species, and aquatic as well as terrestrial species). Although management of fish and wildlife resources on this project is unavoidably related to the other lower Snake River projects, discussion in this plan will be limited to the lands and waters within the Ice Harbor Project.

### 1.04 Coordination.

The draft of this plan was sent to the following agencies and organizations for comment. An asterisk indicates that comments were received.

- U.S. Department of the Interior
  - \* U.S. Fish and Wildlife Service
- U.S. Department of Commerce
  - National Marine Fisheries Service
- U.S. Environmental Protection Agency
- \* Washington Department of Game
- \* Washington Department of Fisheries
- \* Washington Department of Ecology
- \* Oregon Department of Fish and Wildlife

## Section 2 - Management Objectives

The objectives of this management plan are:

(1) to preserve and protect the natural resources of the project to prevent environmental degradation in accordance with applicable Federal laws and regulations and accepted conservation practices;

(2) to manage existing natural resources on project lands and waters to increase their value for aesthetics, recreation, and wildlife uses;

(3) to develop and create habitat for all selected species of wildlife under the guidance of the Lower Snake River Fish and Wildlife Compensation Plan (U.S. Army, 1975a) to replace that which was inundated with the filling of Lake Sacajawea;

(4) to manage the project in a manner which encourages sustained public use of natural resources within the carrying capacity of the area and consistent with aesthetic and ecological values, while avoiding or minimizing use conflicts;

(5) to provide and maintain selected areas which are managed in as near their natural state as possible;

(6) to establish and maintain a diversity of animal and plant species to minimize the possibility of complete loss by natural causes such as disease;

(7) to foster fish and wildlife species with the intent of providing an annual recreational harvest;

(8) to manage habitats for a diversity of species of wildlife, not simply those of value as game species; and

(9) to manage and develop in a manner that is consistent with the natural character of the land to minimize or avoid visual impacts.

## Section 3 - Project Description

### 3.01 Physiography.

The Ice Harbor Project is located in the Columbia Plateau physiographic province which is bounded on the west by the Cascade Mountains, on the north and east by the Rocky Mountains, and on the south by the Basin and Range Provinces. The region is noted for its thick accumulation of lava flows and rates among the largest expanses of lava in the world. These basalt flows cover an area of over 200,000 square miles with a maximum depth in excess of 10,000 feet (Waters, 1961).

The Snake River is one of several rivers that flow through this province, all of which have been actively downcutting through the layers of basalts and other lava-derived materials. As a result, cliffs and rounded basalt bluffs dominate the shoreline of the Ice Harbor Project although the terrain here generally is not as high or as rugged as it is farther upriver.

Numerous steep angular side canyons or coulees intersect the gorge, and some of the alluvial deposits or fans associated with them extend into and along the gorge above the level of the lake. These create interspersed areas which slope gently down to the shoreline.

The steep, often rugged character of the Ice Harbor Project generally restricts development of recreation sites and wildlife management areas to these few gently sloping areas.



Figure 3.1 The terrain of the Ice Harbor Project varies from steep basalt cliffs to gently sloping alluvial fans.

### 3.02 Soils.

The soils of the Ice Harbor Project were formed from material transported by wind and water, ranging in texture from gravels to silt loams. Shallow soils do occur on some of the gentler slopes and some of the benches along the shoreline have soils of moderate depth. However, deep soils are rare and are found primarily as alluvial deposits along the rivers and in some of the small canyons and embayments along the shore.

#### a. Bottomlands and Low Terraces.

These soils are formed from alluvium that has been transported from the upland plateaus upstream of or surrounding the project, or from colluvium. Some of these soils consist mainly of coarse sand and gravel. Others

range from silt loams to sandy loams which are excessively drained but can be cultivated when irrigated and fertilized.

Quincy loamy fine sand and Sagemoor silt loams dominate these areas. These soils are prone to wind erosion but are suitable for development of recreation areas and intensive wildlife management areas. They also have good bearing capacity and slight compressibility.

b. Steep Canyons and Escarpments.

The soils in these areas are shallow and rocky and are formed from a mixture of loess and fragments of basalt that overlay basalt bedrock. The surface is broken by numerous rock outcrops. These soils are too rocky for cultivation although techniques are being studied for vegetating these areas.

Accurate mapping of soil series is available from the Soil Conservation Service (SCS), U.S. Department of Agriculture. Detailed descriptions of the physical properties and limitations of the various soil series are also available from them.

3.03 Climate.

The climate of the Ice Harbor Project is arid. Precipitation averages 10 inches or less annually, with much of it occurring as light, intermittent rains and cold drizzles during the winter and spring. Infrequent shower activity and a few regional storm systems also occur during the remainder of the year, but severe storms with heavy precipitation are rare. Snowfall is infrequent and is usually light, with accumulations rarely lingering for more than a few days except in drifts.

During the winter and spring, extended periods of cloudiness are common with January minimum temperatures reaching -10 degrees F. but averaging near 30 degrees F. Summers are generally very warm and dry with abundant sunshine and maximum temperatures as high as 110 degrees F. but averaging near 90 degrees F.

Winds average less than 10 m.p.h., predominately out of the southwest blowing upstream, however, stronger gusty winds are common. They are a significant factor influencing soil erosion, shoreline erosion from wave action, the planting of vegetation able to withstand strong winds, and the design of wildlife management areas providing shelter.

The small amount of precipitation when coupled with the hot summers, excessively drained soils, and occasionally strong winds serve to provide unfavorable, if not severe, growing conditions. These factors must be considered in the management of natural resources on this project.

#### 3.04 Pool Fluctuation.

The elevation of Lake Sacajawea at the Ice Harbor Dam varies between 437 and 440 mean sea level (MSL). At most times the lake level at the upstream end near Windust Park stays within this range. However, during snowmelt when the river flows are higher, the lake level at the upper end may rise above 440 MSL due to the backwater effect. During rare periods of very high river flows, the lake level may exceed 445 MSL. Backwater profiles for Lake Sacajawea at various river flows are contained in Section 2 of the Ice Harbor Master Plan.

#### 3.05 History of Land Use.

Prior to construction of the dam, the land acquired by the Government for the Ice Harbor Project was used principally for grazing purposes in connection with the operation of large wheat farms lying on the uplands on the south shore and the farm and ranch areas on the north shore. There were several locations on each bank, immediately adjacent to the river, where limited irrigated farming operations were carried on. The arable land in the area was very productive and the irrigated portions usually were devoted to the production of alfalfa. The acreage of orchard and other specialized crops was limited. Non-irrigable lands were used for wheat farming or grazing.

There were 12 farm and residential units scattered along the river, four grain elevators, and three railroad lines which ran along the river. The Northern Pacific Railway and the Spokane, Portland and Seattle Railway ran on the north shore while the Union Pacific Railway ran along the south shore.

Unfortunately, the history of grazing, and most importantly overgrazing, has resulted in the reduction of native dryland bunchgrasses which are of greater wildlife value than the cheatgrass which has replaced them.

#### 3.06 Special Problems.

Hot summer temperatures, inadequate precipitation

during the growing season, strong winds, intermittent steep topography, rocky, shallow, and excessively drained soils, fluctuation of the lake level, and the history of grazing on the Ice Harbor Project all contribute to make the management of natural resources a difficult task. In addition to those problems, the presence of railroad right-of-ways on both sides of the lake along its entire length restricts public use and access.

In many cases, tracts of land with good potential for wildlife habitat development are significantly disrupted, if not altogether cut off from the river by these railroad right-of-ways. The presence of the railroad along the shoreline in most cases significantly reduces the value of project lands for wildlife habitat development.

## Section 4 - Description of Project Lands.

During the period from 1973 through 1975, members of the Idaho Cooperative Wildlife Research Unit at the University of Idaho conducted an inventory of riparian habitats and associated wildlife along the Snake River from its mouth near the Tri-Cities, Washington to River Mile 345.5 near Weiser, Idaho and along Lake Wallula (McNary Project) on the Columbia River in Washington. This inventory was done under contract for the Walla Walla District of the Corps of Engineers. Sampling at the Ice Harbor Project was included as part of this study. The results of this inventory are published in Volume IIIA of Inventory of Riparian Habitats and Associated Wildlife along the Columbia and Snake Rivers (Asherin and Claar, 1976).

### 4.01 Vegetative Communities.

Natural vegetation on most upland areas surrounding Lake Sacajawea is generally sparse and low growing, due to semi-arid conditions and shallow soils. Riparian vegetation exists in isolated areas where deep alluvial soils border the lake.

According to the above-mentioned inventory of riparian habitats, the Ice Harbor Project is dominated by a rubber rabbitbrush vegetation type. Approximately 75 percent of the total project acreage falls into this classification. The rubber rabbitbrush vegetation type corresponds to Daubenmire's (1970) big sagebrush - bluebunch wheatgrass (Artemisia tridentata - Agropyron spicatum) and bluebunch wheatgrass - sandberg bluegrass (Agropyron spicatum - Poa sandbergii) habitat types and consists mainly of rubber rabbitbrush (Chrysothamnus nauseosus) and big sagebrush in the shrub layer, scattered populations of bluebunch wheatgrass and a variety of forbs, and a heavy ground covering of sandberg bluegrass and cheatgrass brome (Bromus tectorum).

Much of the remaining acreage is rock riprap, road fill, bare ground, or rock cliffs. The rock cliffs provide nesting habitat for raptors and some Canada geese and habitat for chukar partridge. Approximately 50 percent of the shoreline of the Ice Harbor Project is rock riprap.



Major areas of riparian vegetation are found along Lake Sacajawea in six locations. These areas are:

	<u>Snake River Mile</u>
Big Flat	RM 15-18 N
Fishhook	RM 17 S
Lost Island	RM 23 N
Hollebeke	RM 25 S
Snake River Jct.	RM 26 N
Walker	RM 30 S

All of these areas have one or more embayments and are dominated by white alder (Alnus rhombifolia), Russian olive (Elaeagnus angustifolia), shrub willow (Salix spp.) and common cattail (Typha latifolia). In addition, there is one minor area of riparian vegetation at Couch Landing (RM 32N).

In addition to the natural vegetation, there are five recreation areas - Ice Harbor Dam, and Charbonneau, Levey, Fishhook, and Windust Parks - where large turf areas have been established and trees and shrubs have been planted to make them attractive, stabilize the shoreline, and provide a ground cover that will withstand heavy public use. These areas are sustained by irrigation systems.

A more complete and detailed inventory of riparian communities along Lake Sacajawea is contained in Volumes IIIA and IIIB of the Inventory of Riparian Habitats and Associated Wildlife along Columbia and Snake Rivers (Asherin and Claar, 1976).

#### 4.02 Plant Inventory.

The following list was compiled mainly from Asherin and Claar (1976).

##### Grasses

Bluebunch wheatgrass	<u>Agropyron spicatum</u>
Cheatgrass brome	<u>Bromus tectorum</u>
Foxtail barley	<u>Hordeum jubatum</u>
Indian ricegrass	<u>Oryzopsis hymenoides</u>
Reed canarygrass	<u>Phalaris arundinacea</u>
Kentucky bluegrass	<u>Poa pratensis</u>
Sandberg bluegrass	<u>Poa sandbergii</u>
Needle-and-Thread	<u>Stipa comata</u>

## Grasslike Plants

Sedge  
Raynolds sedge  
Common spikerush  
American bulrush

Carex spp.  
Carex raynoldsii  
Eleocharis palustris  
Scirpus americanus

## Forbs

Yarrow  
Tessellate fiddleneck  
Hemp dogbane  
Milkvetch, Locoweed  
Sagebrush mariposa  
Starry cerastium  
Common chicory  
Canada thistle  
Thistle  
Yellow spiderflower  
Mountain tansymustard  
Teasel  
Spring draba  
Fireweed  
Horsetail  
Field horsetail  
Western scouringrush  
Smooth scouringrush  
Lineleaf fleabane  
Shaggy fleabane  
Storcksbill  
Field filago  
American licorice  
Cottonbatting cudweed  
Sneezeweed  
Common sunflower  
Goatweed  
Belvedere summer cypress  
Canada wild lettuce  
Prickly lettuce  
Clasping pepperweed  
Perennial flax  
Grays biscuitroot  
Rough bugleweed  
White sweetclover  
Mosses  
Pale evening-primrose  
Indianwheat  
Wiry knotweed  
Curly dock  
Tumblemustard

Achillea millefolium  
Amsinckia tessellata  
Apocynum cannabinum  
Astragalus spp.  
Calochortus macrocarpus  
Cerastium arvense  
Cichorium intybus  
Cirsium arvense  
Cirsium brevistylum  
Cleome lutea  
Descurainia richardsonii  
Dipsacus sylvestris  
Draba verna  
Epilobium angustifolium  
Equisetum spp.  
Equisetum arvense  
Equisetum hyemale  
Equisetum laevigatum  
Erigeron linearis  
Erigeron pumilus  
Erodium cicutarium  
Filago arvensis  
Glycyrrhiza lepodota  
Gnaphalium chilense  
Helenium autumnale  
Helianthus annuus  
Hypericum perforatum  
Kochia scoparia  
Lactuca canadensis  
Lactuca serriola  
Lepidium perfoliatum  
Linum perenne  
Lomatium grayi  
Lycopus asper  
Melilotus alba  
Oenothera pallida  
Plantago patagonica  
Polygonum majus  
Rumex crispus  
Sisymbrium altissimum

Missouri goldenrod  
Western goldenrod  
Goatsbeard  
Common cattail

Solidago missouriensis  
Solidago occidentalis  
Tragopogon miscellus  
Typha latifolia

#### Shrubs

Rubber rabbitbrush  
Tall green rabbitbrush  
Threadleaf fleabane  
Snow eriogonum  
Coyote willow  
MacKenzie willow

Chrysothamnus nauseosus  
Chrysothamnus viscidiflorus  
Erigeron filifolius  
Eriogonum niveum  
Salix exigua exigua  
Salix rigida mackenziana

#### Trees

White alder  
Russian olive  
Black locust

Alnus rhombifolia  
Elaeagnus angustifolia  
Robinia pseudoacacia

#### 4.03 Wildlife Inventory.

The following is a compilation of species found or known to occur on the Ice Harbor Project grouped by taxonomic classification. For more detailed information on individual species such as breeding activity, age distribution, occurrence by vegetative community, food habits, abundance, etc., or sampling techniques, refer to the inventory by Asherin and Claar (1976).

#### Class Amphibia (Amphibians)

Order Anura (Frogs and Toads)

Western toad (Bufo boreas)

Woodhouse's toad (Bufo woodhousei)

Pacific treefrog (Hyla regilla)

Bullfrog (Rana catesbeiana)

Great Basin spadefoot toad (Scaphiopus intermontanus)

Order Urodela (Salamanders)

Long-toed salamander (Abystoma macrodactylum)

Class Reptilia (Reptiles)

- Order Squamata (Snakes and Lizards)
  - Western skink (Eumeces skiltonianus)
  - Western fence lizard (Sceloporus occidentalis)
  - Sagebrush lizard (Sceloporus graciosus)
  - Western yellow-bellied racer  
(Coluber constrictor mormon)
  - Western rattlesnake (Crotalus viridis)
  - Great Basin gopher snake (Pituophis melanoleucus)
  - Wandering garter snake (Thamnophis elegans vagrans)
  - Common garter snake (Thamnophis sirtalis)

Class Aves (Birds)

- Order Pelecaniformes (Pelicans)
  - White pelican (Pelecanus erythrorhynchos)
  - Double-crested cormorant (Phalacrocorax auritus)
- Order Gaviiformes (Loons)
  - Common loon (Gavia immer)
- Order Podicipediformes (Grebes)
  - Pied-billed grebe (Podilymbus podiceps)
  - Western grebe (Aechmophorus occidentalis)
  - Horned grebe (Podiceps auritus)
  - Eared grebe (Podiceps caspicus)
- Order Ciconiiformes (Herons)
  - Great blue heron (Ardea herodias)
  - Black-crowned night heron (Nycticorax nycticorax)
  - American bittern (Botaurus lentiginosus)
  - Common egret (Casmerodius albus)
  - Snowy egret (Leucophoyx thula)
- Order Gruiformes (Cranes)
  - American coot (Fulica americana)
  - Sandhill crane (Grus canadensis)
  - Virginia rail (Rallus limicola)
- Order Anseriformes (Ducks and Geese)
  - Whistling swan (Cygnus columbianus)
  - Snow goose (Chen hyperborea)
  - White-fronted goose (Anser albifrons)
  - Canada goose (Branta canadensis)
  - Mallard (Anas platyrhynchos)
  - Blue-winged teal (Anas discors)
  - Cinnamon teal (Anas cyanoptera)
  - Green-winged teal (Anas carolinensis)
  - Pintail (Anas acuta)
  - Gadwall (Anas strepera)
  - American widgeon (Mareca americana)
  - European widgeon (Mareca penelope)
  - Northern shoveler (Spatula clypeata)
  - Redhead (Aythya americana)
  - Canvasback (Aythya valisineria)
  - Ring-necked duck (Aythya collaris)

Wood duck (Aix sponsa)  
 Ruddy duck (Oxyura jamaicensis)  
 Bufflehead (Bucephala albeola)  
 Lesser scaup (Aythya affinis)  
 Common goldeneye (Bucephala clangula)  
 Barrow's goldeneye (Bucephala islandica)  
 Common merganser (Mergus merganser)  
 Hooded merganser (Lophodytes cucullatus)  
 Order Charadriiformes (Shorebirds and Gulls)  
 Killdeer (Charadrius vociferus)  
 Spotted sandpiper (Actitis macularia)  
 Long-billed curlew (Numenius americanus)  
 Herring gull (Larus argentatus)  
 Ring-billed gull (Larus delawarensis)  
 California gull (Larus californicus)  
 Common snipe (Capella gallinago)  
 Greater yellowlegs (Totanus melanoleucus)  
 Western sandpiper (Ereunetes mauri)  
 Least sandpiper (Erolia minutilla)  
 Bonaparte's gull (Larus philadelphia)  
 Forster's tern (Sterna forsteri)  
 Order Falconiformes (Hawks)  
 Marsh hawk (Circus cyaneus)  
 Rough-legged hawk (Buteo lagopus)  
 Red-tailed hawk (Buteo jamaicensis)  
 Swainson's hawk (Buteo swainsoni)  
 Cooper's hawk (Accipiter cooperii)  
 Sharp-shinned hawk (Accipiter striatus)  
 Osprey (Pandion haliaetus)  
 Bald eagle (Haliaeetus leucocephalus) - rare transient  
 Golden eagle (Aquila chrysaetos)  
 Prairie falcon (Falco mexicanus)  
 American kestrel (Falco sparverius)  
 Order Strigiformes (Owls)  
 Barn owl (Tyto alba)  
 Long-eared owl (Asio otus)  
 Short-eared owl (Asio flammeus)  
 Great horned owl (Bubo virginianus)  
 Burrowing owl (Speotyto cunicularia)  
 Order Caprimulgiformes (Goatsuckers)  
 Common nighthawk (Chordeiles minor)  
 Order Piciformes (Woodpeckers)  
 Common flicker (Colaptes auratus)  
 Hairy woodpecker (Dendrocopos villosus)  
 Downy woodpecker (Dendrocopos pubescens)  
 Lewis' woodpecker (Asyndesmus lewis)  
 Order Columbiformes (Pigeons and Doves)  
 Rock dove (Columba livia)  
 Mourning dove (Zenaidura macroura)

Order Galliformes (Gallinaceous birds)  
     Chukar (Alectoris graeca)  
     Gray partridge (Perdix perdix)  
     California quail (Loportyx californicus)  
     Ring-necked pheasant (Phasianus colchicus)  
 Order Coraciiformes (Kingfishers)  
     Belted kingfisher (Megaceryle alcyon)  
 Order Apodiformes (Swifts and Hummingbirds)  
     Black-chinned hummingbird (Archilochus alexandri)  
     Rufous hummingbird (Selasphorus rufus)  
     Calliope hummingbird (Stellula calliope)  
 Order Passeriformes (Perching birds)  
     Eastern kingbird (Tyrannus tyrannus)  
     Western kingbird (Tyrannus verticalis)  
     Say's phoebe (Sayornis saya)  
     Western wood pewee (Contopus sordidulus)  
     Horned lark (Eremophila alpestris)  
     Bank swallow (Riparia riparia)  
     Tree swallow (Iridoprocne bicolor)  
     Barn swallow (Hirundo rustica)  
     Violet-green swallow (Tachycineta thalassina)  
     Cliff swallow (Petrochelidon pyrrhonota)  
     Black-billed magpie (Pica pica)  
     Common crow (Corvus brachyrhynchos)  
     Common raven (Corvus corax)  
     Black-capped chickadee (Parus atricapillus)  
     Red-breasted nuthatch (Sitta canadensis)  
     Brown creeper (Certhia familiaris)  
     House wren (Troglodytes aedon)  
     Bewick's wren (Thryomanes bewickii)  
     Long-billed marsh wren (Telmatodytes palustris)  
     Canyon wren (Catherpes mexicanus)  
     Rock wren (Salpinctes obsoletus)  
     Sage thrasher (Oreoscoptes montanus)  
     American robin (Turdus migratorius)  
     Varied thrush (Ixoreus naevius)  
     Townsend's solitaire (Myadestes townsendi)  
     Western bluebird (Sialia mexicana)  
     Bohemian waxwing (Bombycilla garrulus)  
     Cedar waxwing (Bombycilla cedrorum)  
     Northern shrike (Lanius excubitor)  
     Loggerhead shrike (Lanius ludovicianus)  
     Starling (Sturnus vulgaris)  
     Yellow-rumped warbler (Dendroica coronata)  
     Yellowthroat (Geothlypis trichas)  
     Yellow warbler (Dendroica petechia)  
     Wilson's warbler (Wilsonia pusilla)  
     House sparrow (Passer domesticus)  
     Western meadowlark (Sturnella neglecta)  
     Red-winged blackbird (Agelaius phoeniceus)

Yellow-headed blackbird  
     (Xanthocephalus xanthocephalus)  
 Northern oriole (Icterus galbula)  
 Brewer's blackbird (Euphagus cyanocephalus)  
 Brown-headed cowbird (Molothrus ater)  
 Western tanager (Piranga ludoviciana)  
 Evening grosbeak (Hesperiphona vespertina)  
 Lazuli bunting (Passerina amoena)  
 House finch (Carpodacus mexicanus)  
 Pine siskin (Spinus pinus)  
 American goldfinch (Carduelis tristis)  
 Rufous-sided towhee (Pipilo erythrophthalmus)  
 Savannah sparrow (Passerculus sandwichensis)  
 Grasshopper sparrow (Ammodramus savannarum)  
 Lark sparrow (Chondestes grammacus)  
 Dark-eyed junco (Junco hyemalis)  
 White-crowned sparrow (Zonotrichia leucophrys)  
 Lincoln's sparrow (Melospiza lincolni)  
 Song sparrow (Melospiza melodia)  
 Tree sparrow (Spizella arborea)  
 Chipping sparrow (Spizella passerina)

Class Mammalia (Mammals)

Order Chiroptera (Bats)

Long-legged bat (Myotis volans)  
 Yuma bat (Myotis yumanensis)  
 Little brown bat (Myotis lucifugus)  
 Western pipistrel (Pipistrellus hesperus)  
 Pallid bat (Antrozous pallidus)

Order Rodentia (Rodents)

Great Basin pocket mouse (Perognathus parvus)  
 Deer mouse (Peromyscus maniculatus)  
 Western harvest mouse (Reithrodontomys megalotis)  
 Ord's kangaroo rat (Dipodomys ordi)  
 Washington ground squirrel (Citellus washingtoni)  
 Townsend ground squirrel (Citellus townsendi)  
 Northern pocket gopher (Thomomys talpoides)  
 Yellow-bellied marmot (Marmota flaviventris)  
 Muskrat (Ondatra zibethicus)  
 Beaver (Castor canadensis)

Order Lagomorpha (Hares and Rabbits)

White-tailed jackrabbit (Lepus townsendi)  
 Black-tailed jackrabbit (Lepus californicus)  
 Mountain cottontail (Sylvilagus nuttalli)

Order Artiodactyla (Even-toed Ungulates)

White-tailed deer (Odocoileus virginianus)  
 Mule deer (Odocoileus hemionus)

Order Carnivora (Carnivores)

Coyote (Canis latrans)  
 Striped skunk (Mephitis mephitis)

Badger (Taxidea taxus)  
Raccoon (Procyon lotor)  
Bobcat (Lynx rufus)  
Mink (Mustela vison)

4.04 Endangered or Threatened Species.

Bald eagles, under threatened status in Washington, are sighted almost every winter on the Ice Harbor Project. These occasional observations are reported to the WDG.

A list of endangered, threatened, proposed, and candidate species known to occur in the Ice Harbor Project area was requested from the U.S. Fish and Wildlife Service (Olympia Area Office) in accordance with Section 7(c) of the Endangered Species Act of 1973, 16 U.S.C. 1531, et seq. Their response indicated no species are known to occur on the Ice Harbor Project.



## Section 5 - Management of the Terrestrial Environment

The wildlife management program at all of the four lower Snake River projects is dominated by the Special Report: Lower Snake River Fish and Wildlife Compensation Plan (U.S. Army Engineer District Walla Walla, Washington 1975a; hereafter referred to as the Compensation Plan). This plan recommended development of wildlife habitat on project lands and the acquisition and development of off-project lands to compensate for losses incurred by local fish and wildlife populations as a result of the construction of the lower Snake River dams. This plan was authorized for construction by the Water Resources Development Act of 1976, Public Law 94-587, 94th Congress.

In accordance with the recommendations of the Compensation Plan, the Design Memorandum for Wildlife Habitat Development: Lower Snake River Project (U.S. Army Engineer District Walla Walla, Washington 1975b) was prepared. This report identified nine sites on the Ice Harbor Project with a potential for wildlife habitat development and recommended appropriate wildlife management practices on these areas.

This report was augmented by the Design Memorandum for Wildlife Habitat Development (U.S. Army Engineer District Walla Walla, Washington 1979b; hereafter referred to as Supplement No. 1). This report proposed intensive wildlife management at three sites, moderate wildlife management at six sites, and no management at six sites. It also included detailed site development plans for the three intensively managed units (Big Flat, Lost Island, and Hollebeke).

These plans call for electric-powered Big Gun irrigation systems at the three intensively managed units (called Habitat Management Units or HMU's) as well as the development of a variety of habitat components (Table 5.1). These habitat components include tree and shrub plantings, meadows, pastures, fields, annual food plots, fence associations, bird watering cisterns, nest platforms, nest boxes, guzzler complexes, and quail roosts. The site development plans show the planned arrangement and location of the irrigation systems and the habitat components (Plates 1-3).

Table 5.1 Approximate acreages of habitat components to be established on the three intensively-managed habitat units on the Ice Harbor Project.

<u>Habitat Components</u>	<u>Big Flat</u>	<u>Lost Island</u>	<u>Hollebeke</u>	<u>Total</u>
<b>IRRIGATED</b>				
Tree/Shrub Areas	74	18	35	127
Meadows	140	6	64	210
Fields	12	7	5	24
Pastures - mixed	48	5	18	71
- legume	20	12	7	39
Fence Associations	16	4	8	28
Annual Food Plots	<u>18</u>	<u>6</u>	<u>6</u>	<u>30</u>
Sub-Total	328	58	143	529
<b>NON-IRRIGATED</b>				
Tree/Shrub Areas	0	0	0	0
Meadows	28	0	4	32
Fields	0	0	0	0
Pastures - mixed	0	0	0	0
- legume	0	0	0	0
Fence Associations	0	0	0	0
Annual Food Plots	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Sub-Total	28	0	4	32
<b>TOTAL ACRES PLANTED</b>	<b>356</b>	<b>58</b>	<b>147</b>	<b>561</b>

5.01 Existing Development.

a. Work Accomplished Prior to the Compensation Plan.

Prior to the Compensation Plan, some habitat development was done at Big Flat. Two windmill-powered trickle irrigation systems and a diesel-powered Big Gun irrigation system were installed in 1977. Trees and shrubs were planted in all three units. In all, approximately 5,000 plants of 20 different species were planted. The two trickle systems covered approximately 3 acres total while the Big Gun system covered approximately 14 acres.

b. Work Performed Under the Compensation Plan.

By October 1982, all habitat development listed in the Supplement at Big Flat, Hollebeke, and Lost Island will be complete.

5.02 Habitat Components.

a. Tree and Shrub Areas.

1. Objective.

The primary value of shelter belts, hedgerows, thickets, fence associations, and other tree and shrub areas is that they provide cover for many species of wildlife. These areas also provide roosting sites for upland game birds and some raptors and songbirds. California quail, mourning doves, cottontail rabbits, mergansers and wood ducks, and some raptors and songbirds will nest in these areas. They also serve as a direct food source for most wildlife species and, by attracting songbirds, serve as an indirect food source for some raptors. Table 5.2 summarizes the benefits and uses of tree and shrub areas.

Table 5.2 Wildlife uses of tree and shrub areas

Species	Food	Cover	Nesting	Roosting
Ring-necked pheasant	X	X		X
Gray partridge	X	X		X
Chukar partridge		X		
California quail	X	X	X	X
Mourning dove	X	X	X	X
Ducks			1	1
Canada goose				
Songbirds	X	X	X	X
Raptors	2	X	some	X
Cottontail rabbit	X	X	X	
Mule deer	X	X		

1 - Mainly wood ducks and mergansers.

2 - Indirect food source. Feed on songbirds which are attracted to tree and shrub plantings.

## 2. Planting.

Within tree and shrub areas, meadow mixture M-(9) is sown; meadow mixture M-(6) is sown within fence associations (FA). Table 5.4 lists species included in meadow seed mixtures.

To prepare the site for planting, an area three feet in diameter is scalped of all herbaceous plants. Minimum depth of holes for trees and large shrubs is 10 inches, measured from finished grade. The diameter of holes is at least three times greater than the diameter of the ball, container, or spread of roots.

After the plant has been placed in the hole, it should be backfilled no higher than halfway up the root ball. Fertilizer tablets are then spaced evenly around the root ball and the backfill operation completed. The number of tablets placed in each hole should be as recommended by the manufacturer of the tablet.

Plants should be thoroughly settled by tamping and watering. They should be set plumb and rigidly braced in position until the soil has been tamped solidly around the ball or roots. To facilitate watering, a shallow saucer approximately 3 inches deep and 2 feet in diameter is formed around each plant by forming a ridge of topsoil around the edge of each filled-in hole. Shortly after planting, each plant is watered.

For container-grown trees, shrubs and vines, the containers are opened and the plants carefully removed so that the earth around the roots of the plants remains unbroken.

For more information, refer to the Planting of Tree, Shrub, and Vine Seedlings Guide (available from NPWDP or NPWEN-DB).

## 3. Maintenance.

(a) Cultivation - Herbaceous plant material within 1.5 feet of all tree, shrub and vine plantings will be removed to reduce competition and assist their establishment. This will be done as often as necessary to keep the woody plants exposed to sunlight and to sustain a healthy growth rate. Cultivation will be required at least three times a year from May through September, but possibly more often depending upon climatic conditions. Cultivation will probably be necessary for several years until the plants reach a height where they are

not overgrown by surrounding vegetation. Hand tools and portable equipment will be used to prevent damage to the plants.

(b) Soil Sampling - In FY 1982, three composite soil samples were taken from each habitat management unit. The first was taken from representative tree and shrub areas, meadows, fields, and guzzler strips; the second from pastures; the third from annual food plots. In addition to these three samples, additional samples were taken in areas that exhibited vegetation growth problems. The samples were sent to a qualified soil testing laboratory for analysis.

This type of extensive soil sampling will be done again in FY 1987 and every five years thereafter. In FY 1983-1986, soil samples will be taken annually only in problem areas in December.

(c) Fertilization - Fertilizer is selected based on the soil sample analysis and requirements of the plants. The same type of fertilizer applied in 1982 will be applied annually in 1983-1986 except in problem areas where soil samples indicate a different fertilizer is needed. Application should be accomplished in April-May. If soil samples indicate that the soil contains adequate levels of required nutrients, fertilizer will not be applied.

(d) Replacement - A survey of tree, shrub and vine mortality will be conducted twice annually through 1987 in May and September in order to estimate the number of each species that have not survived. Replacement plants will be obtained that are of the same type and size as originally planted. If the mortality rate for a certain species is unacceptably high, a different species of the same type and size may be substituted in its place. Replacement planting will be done only if the surviving vegetation will not satisfy the target species needs. In obtaining replacement plants, refer to the Tree, Shrub, and Vine Tubling Propagation Guide (available from NPWDP or NPWEN-DB).

Replacement planting will be done generally in October and November depending on climatic conditions following directions in Section 5.02-a.2.

b. Meadows.

1. Objective.

These areas are characterized by large undisturbed areas planted to a wide variety of grasses and forbs including wheatgrass, wildrye, sweet clover, alfalfa, and sunflower. They are designed primarily to provide nesting cover for ring-necked pheasants, gray partridge, ducks, and geese. Marsh hawks, short-eared owls, and burrowing owls may also nest in these areas. Meadows will also provide secondary benefits as a food source for most species. Table 5.3 summarizes the benefits and uses of meadows.

Table 5.3 Wildlife uses of meadows

Species	Food	Cover	Nesting	Roosting
Ring-necked pheasant	X	X	X	X
Gray partridge	X	X	X	X
Chukar partridge	X	X		X
California quail	X	X	X	
Mourning dove	X			
Ducks	X		X	
Canada goose	X			
Songbirds	X	X	X	X
Raptors	1		2	
Cottontail rabbit	X	X	X	
Mule deer	X			

1 - Indirect food source. Feed on small rodents and other prey which are found in these areas.

2 - Marsh hawks, short-eared owls, and burrowing owls.

2. Planting.

Table 5.4 lists species included in meadow seed mixtures and rates of application. Seed was obtained in 1980 under three separate contracts.

Table 5.4 Meadow seed mixtures

Mixture	Scientific Name	Common Name	Rate of Application lb/ac
M-(1)	<u>Poa ampla</u>	Sherman big blue	5
	<u>Medicago sativa</u>	Ladak alfalfa	2
	<u>Melilotus officinalis</u>	Yellow sweet clover	$\frac{1}{8}$
M-(2)	<u>Elymus giganteus</u>	Mammoth wildrye	3
	<u>Festuca arundinacea</u>	Tall fescue	8
	<u>Medicago sativa</u>	Ladak alfalfa	2
	<u>Melilotus officinalis</u>	Yellow sweet clover	$\frac{1}{14}$
M-(3)	<u>Agropyron inerme</u>	Whitmar wheatgrass	4
	<u>Agropyron intermedium</u>	Intermediate wheatgrass	6
	<u>Medicago sativa</u>	Ladak alfalfa	2
	<u>Melilotus officinalis</u>	Yellow sweet clover	$\frac{1}{13}$
M-(4)	<u>Agropyron cristatum</u>	Fairway crested wheatgrass	6
	<u>Agropyron inerme</u>	Whitmar wheatgrass	8
	<u>Agropyron trachycaulum</u>	Slender wheatgrass	8
	<u>Medicago sativa</u>	Ladak alfalfa	2
	<u>Melilotus officinalis</u>	Yellow sweet clover	$\frac{1}{25}$
M-(5)	<u>Agropyron elongatum</u>	Tall wheatgrass	5
	<u>Elymus giganteus</u>	Mammoth wildrye	3
	<u>Medicago sativa</u>	Ladak alfalfa	2
	<u>Melilotus officinalis</u>	Yellow sweet clover	$\frac{1}{11}$
M-(6)*	<u>Elymus giganteus</u>	Mammoth wildrye	8
	<u>Melilotus officinalis</u>	Yellow sweet clover	2
	<u>Helianthus annuus</u>	Sunflower	1
	<u>Helianthus tuberosus</u>	Jerusalem artichoke	$\frac{1}{11}$

\* Fence association

Table 5.4 Meadow seed mixtures (Continued)

Mixture	Scientific Name	Common Name	Rate of Application lb/ac
M-(7)	<u>Elymus giganteus</u>	Volga wildrye	(See planting sprigs)
	<u>Lolium multiflorum</u>	Annual ryegrass of wheat, oats, and barley as a nursery crop	
M-(8)	<u>Agropyron desertorum</u>	Crested wheatgrass	8
	<u>Elymus junceus</u>	Russian wildrye	8
			<u>16</u>
M-(9)*	<u>Dactylis glomerata</u>	Latar orchard grass	8
	<u>Festuca arundinacea</u>	Tall fescue	2
	<u>Trifolium repens</u>	New Zealand white clover	1
	<u>Helianthus annuus</u>	Sunflower	1
			<u>12</u>
M-(10)	<u>Agropyron cristatum</u>	Fairway crested wheatgrass	5
	<u>Agropyron inenme</u>	Whitmar wheatgrass	8
	<u>Agropyron sibiricum</u>	Siberian wheatgrass	8
	<u>Medicago sativa</u>	Ladak alfalfa	1
	<u>Melilotus officinalis</u>	Yellow sweet clover	0.5
			<u>22.5</u>

\* Tree/Shrub Areas

(a) Clearing - All woody vegetation, stones, roots, cable, wire, grade stakes, and other materials that might interfere with seeding must be removed from the site. Existing beneficial sagebrush thickets and shrubs will not be removed. Unwanted woody vegetation may be used for brush piles, burned, or disposed of.

(b) Plowing/Discing - Areas which have not been farmed for several years may require plowing



followed by discing and packing. Areas which have been farmed recently or which have light soils or sparse ground cover may only require discing and packing. Light soils, sand, or sandy loams should be tilled a minimum number of times to incorporate existing vegetation while heavier soils, such as clay soils can be thoroughly worked. Existing grades, natural undulations, or irregularities in the ground surface shall be maintained to the extent possible providing that seed beds are adequately prepared. Existing bunchgrass stands will be preserved.

(c) Cheatgrass Control - Where cheatgrass or other undesirable species are a problem, irrigation should follow the last discing and packing. As soon as the cheatgrass germinates and reaches a height of about three inches, the field should be disced to a depth of three inches to kill the cheatgrass, then packed.

(d) Fertilization - Fertilizer will be applied prior to or concurrent with seeding. The selection of a fertilizer is based on soil samples taken before planting. The requirements of the plants to be seeded is considered in selecting a fertilizer.

(e) Seeding - Immediately after the last discing, the field shall be planted. When conditions are such, by reason of drought, excessive precipitation or other factors, that satisfactory results cannot be obtained, delays in planting may be considered. Meadows, pastures, fields, and guzzler strips are seeded using a Brillion seeder. Annual food plots are drilled.

(f) Establishment - Seeded areas should be irrigated as needed after seeding to encourage germination and prevent dessication of the new plants before they establish a root system. Care should be exercised however, to prevent erosion in recently seeded areas.

(g) Legume Inoculants - All legume seeds must be inoculated with the appropriate host-specific inoculant for nitrogen-fixing bacteria. One known manufacturer of this material is Nitragin Co., Inc., 3101 W. Custer Ave., P.O. Box 09186, Milwaukee, WI 53209 (Phone: 414-462-7600). The seed and inoculant should be mixed in accordance with the manufacturer's instructions. Whenever possible, fresh inoculant should be used as it has a limited shelf-life. Surplus inoculant should be kept refrigerated but never beyond the expiration date listed on the package.

(h) Planting Sprigs - Volga wildrye sprigs were planted at Big Flat and Hollebeke. None were included in planting plans for Lost Island. In planting replacement sprigs, the same procedures should be followed. Clumps of sprigs are planted at 20-inch intervals and covered so that the surface is level at the existing grade. (One-fourth to one-third of each sprig clump is exposed after leveling to the existing grade.)

(i) Planting Tubers - Jerusalem artichoke tubers shall be planted following seeding of the other species in mixture M-(6). They shall be planted 2 feet apart and 4 inches deep.

### 3. Maintenance.

(a) Mowing - Meadows will be mowed only when a serious weed problem exists.

(b) Soil Sampling - Soil samples will be taken in meadows in accordance with Section 5.02-a.3(b).

(c) Fertilization - Fertilizer will be applied annually in accordance with Section 5.02-a.3(c).

(d) Replacement - A survey of meadows will be conducted twice annually in May and September to estimate the mortality of the species planted. Areas that become damaged or where an adequate percentage of seed planted does not germinate or survive will be replanted. If the mortality rate for a certain species is unacceptably high, a different species may be substituted in its place. The decision to replant an area will be based on the ability of the existing habitat to fulfill the target species' needs. Replacement seed will be obtained in accordance with specifications of Contract Nos. DACW68-80-C-85, DACW68-80-C-86, and DACW68-80-C-87. Reseeding and resprigging will be done following the directions in the previous section (5.02-b.2).

### c. Pastures.

#### 1. Objective.

Pastures are designed specifically as brooding areas for Canada geese. They are planted to grasses and forbs such as clover, orchard grass, timothy, blue grass, and ryegrass which will be grazed heavily by goslings. The development of pastures will also benefit other wildlife species such as ring-necked pheasants, mule

deer, and cottontail rabbits. Table 5.5 summarizes wildlife uses of pastures.

Table 5.5 Wildlife uses of pastures

Species	Food	Cover	Nesting	Roosting
Ring-necked pheasant	X		2	
Gray partridge	X		2	
Chukar partridge				
California quail			2	
Mourning dove	X			
Ducks	X			
Canada goose	X			
Songbirds	X		2	
Raptors	1			
Cottontail rabbit	X			
Mule deer	X			

1 - Indirect food source. Feed on small rodents which are found in these areas.

2 - Pastures seeded with mixture E are designed to provide nesting cover for this species.

Some pastures (Mixtures 1-4, and 6) contain a mixture of legumes and grasses. They are referred to as mixed pastures and will be kept to a maximum height of 12 inches to provide grazing areas for Canada geese. Mixture 5 contains only legumes and is designed to permit nesting by upland game. Areas planted with this mixture are referred to as legume pastures and will be mowed after July 15.

## 2. Planting.

The seeding of pastures was completed in 1982. Table 5.6 lists species included in pasture seed mixtures and rates of application. Seed was obtained in 1980 under three separate contracts. Procedures for seeding pastures are identical to those for meadows as specified in Section 5.02-b.2.

Table 5.6 Pasture seed mixtures

Mixture	Scientific Name	Common Name	Rate of Application lb/ac
P-(1)	<u>Poa pratensis</u>	Kentucky blue grass	8
	<u>Trifolium repens</u>	New Zealand white clover	$\frac{2}{10}$
P-(2)	<u>Lolium multiflorum</u>	Annual ryegrass	6
	<u>Trifolium repens</u>	New Zealand white clover	$\frac{4}{10}$
P-(3)	<u>Bromus inermis</u>	Manchar smooth brome	7
	<u>Medicago sativa</u>	Ladak alfalfa	3
	<u>Trifolium repens</u>	New Zealand white clover	$\frac{1}{11}$
P-(4)	<u>Dactylis glomerata</u>	Latar orchard grass	5
	<u>Lotus corniculatus</u>	Birdsfoot trefoil	$\frac{5}{10}$
P-(5)	<u>Medicago sativa</u>	Ladak alfalfa	5
	<u>Trifolium fragiterum</u>	Strawberry clover	5
	<u>Trifolium repens latum</u>	Ladino white clover	$\frac{5}{15}$
P-(6)	<u>Festuca arundinacea</u>	Tall fescue	10
	<u>Phleum pretense</u>	Timothy	5
	<u>Trifolium repens latum</u>	Ladino white clover	5
	<u>Trifolium hybridum</u>	Alsike clover	$\frac{5}{25}$

### 3. Maintenance.

(a) Mowing - Mixed pastures will be mowed approximately five times annually between April 1 and September 30 depending on climatic conditions and the growth rate of the vegetation. The intent is to maintain the height of vegetation between 6 and 12 inches throughout the

year. Legume pastures (Mixture 5) will be mowed approximately twice annually between July 15 and September 30.

Flush bars or other similar devices are suggested for use on tractors during mowing to flush nesting birds before they are killed by the mower.

(b) Soil Sampling - Soil samples will be taken in pastures in accordance with Section 5.02-a.3(b).

(c) Fertilization - Fertilizer will be applied annually in accordance with Section 5.02-a.3(c).

(d) Replacement - A survey of pastures will be conducted annually, once in May and again in September, to estimate the mortality of the species planted. Areas that become damaged or where an adequate percentage of seed planted does not germinate or survive will be replanted. If the mortality rate for a certain species is unacceptably high, a different species may be substituted in its place. The decision to replant a pasture will be based on the ability of the existing habitat to fulfill the target species' needs. Replacement seed will be obtained in accordance with specifications of Contract Nos. DACW68-80-C-85, DACW68-80-C-86, and DACW68-80-C-87. Reseeding will be done following the directions in Section 5.02-b.2.

#### d. Fields.

##### 1. Objective.

Fields are planted in perennial grasses such as indian ricegrass (Oryzopsis hymenoides) and sand dropseed (Sporobolus cryptandrus) to provide food for mourning doves, ring-necked pheasants, and mule deer during the spring and early summer. These areas, in conjunction with annual food plots which will provide food for wildlife in the late summer, fall, and winter, will insure availability of food throughout the year. Table 5.7 summarizes the benefits and wildlife uses of fields.

Table 5.7 Wildlife uses of fields

Species	Food	Cover	Nesting	Roosting
Ring-necked pheasant	X	X	X	X
Gray partridge	X	X		
Chukar partridge	X	X		
California quail	X	X	X	
Mourning dove	X			
Ducks	X			
Canada goose	X			
Songbirds	X	X	X	
Raptors	1			
Cottontail rabbit	X	X		
Mule deer	X			

1 - Indirect food source. Feed on prey found in these areas.

## 2. Planting.

Initial seeding of fields was completed in the spring of 1982 at all three units. Table 5.8 lists species seeded in fields and rates of application. Seed was obtained in 1980 under three separate contracts.

(a) Site preparation - Procedures for preparing fields for seeding are identical to those for meadows as specified in Section 5.02-b.2(a-d).

(b) Seeding - Fields are seeded with a Brillion seeder in 12-inch strips spaced 60 inches apart. The areas between the grass strips are planted with strawberry clover. The rate of application is specified for each species in Table 5.8.

(c) Establishment - Fields need irrigation after seeding to promote their establishment as specified in Section 5.02-b.2(f).

(d) Legume Inoculants - The strawberry clover seed must be inoculated as specified in Section 5.02-b.2(g).

Table 5.8 Field seed mixtures

Mixture	Scientific Name	Common Name	Rate of Application lb/ac
F-(1)	<u>Oryzopsia hymenoides</u>	Indian rice grass	15
F-(2)	<u>Sporobolus cryptandrus</u>	Sand dropseed	15
F-(3)	<u>Sporobolus airoides</u>	Alkali sacaton	15

### 3. Maintenance.

(a) Mowing - Fields will be mowed only when a serious weed problem exists.

(b) Soil Sampling - Soil samples will be taken in fields in accordance with Section 5.02-a.3(b).

(c) Fertilization - Fertilizer will be applied annually in accordance with Section 5.02-a.3(c).

(d) Replacement - A survey of fields will be conducted annually, once in May and again in September, to estimate the mortality of the species planted. Areas that become damaged or where an adequate percentage of seed planted does not germinate or survive will be replanted. If the mortality rate for a certain species is unacceptably high, a different species may be substituted in its place. The decision to replant a field will be based on the ability of the existing habitat to fulfill the target species' needs. Replacement seed will be obtained in accordance with specifications of Contract Nos. DACW68-80-C-85, DACW68-80-C-86, and DACW68-80-C-87. Reseeding will be done following the directions in Section 5.02-d.2.

e. Annual Food Plots.

1. Objective.

Grain, millet and other annuals are planted to compliment field plantings by providing food and cover during the late summer, fall, and winter. All upland game species, as well as some songbirds, ducks, Canada geese, cottontail rabbit, and mule deer will make use of these areas. They also will provide cover during the winter for upland game birds. Table 5.9 summarizes the benefits and uses of annual food plots.

Table 5.9 Wildlife uses of annual food plots

Species	Food	Cover	Nesting	Roosting
Ring-necked pheasant	X	X	X	
Gray partridge	X	X	X	
Chukar partridge	X	X		
California quail	X	X	X	
Mourning dove	X			
Ducks	X			
Canada goose	X			
Songbirds	X		X	
Raptors	1			
Cottontail rabbit	X			
Mule deer	X			

1 - Indirect food source. Feed on prey found in these areas.

2. Planting.

Initial seeding of annual food plots at all three units was done in the spring of 1982. Table 5.10 lists species planted and rates of application. Seed was obtained in 1980 under three separate contracts.

(a) Site preparation - Procedures for preparing annual food plots for seeding are identical to those for meadows as specified in Section 5.02-b.2(a-d).



(b) Seeding - Annual food plots were drilled in 1982. The rate of application is specified for each mixture in Table 5.10.

Table 5.10 Annual food plot seed mixtures

Mixture	Scientific Name	Common Name	Rate of Application lb/ac
A-(1)	<u>Echinochloa frumentacea</u>	Japanese millet	30
A-(2)	<u>Panicum milaceum</u>	Proso millet	30
A-(3)	<u>Echinochloa frumentacea</u> <u>Panicum milaceum</u>	Japanese millet Proso millet	15 15 <u>30</u>
A-(4)	<u>Setaria italica</u>	Foxtail millet	15
A-(5)	<u>Sorghum vulgure</u> <u>Fagopyrum esculentum</u> <u>Panicum milaceum</u>	Grain sorghum Buckwheat Proso millet	15 10 5 <u>30</u>
A-(6)	<u>Triticum aestivum</u>	Wheat	60

(c) Establishment - Annual food plots need irrigation after seeding to promote their establishment as specified in Section 5.02-b.2(f).

### 3. Maintenance.

(a) Replanting - Since these areas will be planted to annual plants, they will have to be seeded each year. This will be done in accordance with previous paragraphs on planting. A survey of annual food plots will be conducted twice annually in May and September to determine the planting success and survival of each species. If a certain species does not lend itself to establishment in a certain area, a different species may be substituted in its place.

(b) Soil Sampling - Soil samples will be taken in annual food plots in accordance with Section 5.02-a.3(b).

(c) Fertilization - Fertilizer will be applied in accordance with Section 5.02-a.3(c), except that application will be done prior to annual seeding.

f. Guzzler Strips.

1. Objective.

Guzzler strips are strips of a food crop planted as part of a guzzler complex at designated locations throughout each wildlife habitat area. These guzzler complexes provide food, water, and cover all within a short distance. This type of development is very attractive to most upland game birds. The guzzler strips will provide food for ring-necked pheasants, gray partridge, California quail, mourning doves, some songbirds and mule deer.

2. Planting.

Guzzler strips at all three units were seeded with a Brillion seeder in 1982. Planting procedures are identical to those for meadows as described in Section 5.02-b.2. Table 5.11 lists species seeded and rates of application. Seed was obtained in 1980.

3. Maintenance.

(a) Replanting - All guzzler strips containing annuals (Mixtures 4-6) will be seeded every year. Planting will be done according to procedures for seeding as specified in Section 5.02-b.2.

(b) Soil Sampling - Soil samples will be taken in accordance with Section 5.02-a.3(b).

(c) Fertilization - Fertilizer will be applied annually in accordance with Section 5.02-a.3(c), except that guzzler strips containing annuals (Mixtures 4-6) will be fertilized prior to annual seeding.

Table 5.11 Guzzler strip and mixtures

Mixture	Scientific Name	Common Name	Rate of Application lb/ac
GS-(1)	<u>Oryzopsia hymenoides</u>	Indian rice grass	8-10
GS-(2)	<u>Sporobolus cryptandrus</u>	Sand dropseed	8-10
GS-(3)	<u>Sporobolus airoides</u>	Alkali sacaton	8-10
GS-(4)	<u>Eriogonum</u> spp.	Wild buckwheat	10
GS-(5)	<u>Setaria italica</u>	Foxtail millet (Siberian or Kunsk)	15
GS-(6)	<u>Erodium cicutarium</u>	Filaree	10

(d) Replacement - A survey of guzzler strips will be conducted annually, once in May and again in September, to estimate the mortality of the species planted. Areas that become damaged or where an adequate percentage of seed planted does not germinate or survive will be replanted. If the mortality rate for a certain species is unacceptably high, a different species may be substituted in its place. The decision to replant a guzzler strip will be based on the ability of the existing habitat to fulfill the target species' needs. Replacement seed will be obtained in accordance with specifications of Contract Nos. DACW68-80-C-85, DACW68-80-C-86, and DACW68-80-C-87. Reseeding will be done following the directions in Section 5.02-b.2.

g. Bird Watering Cisterns.

1. Objective.

Given the presence of other habitat requirements, the survival and reproductive success of California quail, ring-necked pheasant, chukar partridge, and gray partridge is dependent on the availability of sources of water. These self-filling subterranean cisterns will provide a dependable source of water for upland game birds allowing them to expand their range into water-limited

areas and minimizing mortalities during dry periods. Cisterns will be scattered throughout the units and most will be developed as guzzler complexes composed of a cistern, quail roost, food strips, and a surrounding meadow with trees and shrubs. All cisterns installed in irrigated areas will be developed as guzzler complexes.

2. Installation.

Cisterns were installed in 1981 at all three units. These were obtained in 1978 under Contract No. DACW68-78-C-120.

3. Maintenance.

Cisterns will be cleaned out annually. This will be done by hand from January through March. Repairs will be made as necessary.

h. Nest Platforms.

1. Objective.

Nest platforms are installed to provide nesting sites for Canada geese which offer some protection from predators and human disturbance. They also provide perching sites for raptors.

2. Maintenance.

(a) Relocation - The locations of nest platforms will be evaluated annually. If any platforms are to be relocated, this will be done during annual refurbishing. Nest platform sites should be located in the pool within 100 feet of the normal pool shoreline and, if possible, out of visual range of adjacent platforms.

(b) Refurbishing - Nest platforms will be cleaned annually from January through February 15 before the nesting season for Canada geese. New bedding material will be installed to 3 inches below the rim of the bowl. Ballast will be added if necessary. All platforms will be operational by February 15. Bedding material such as cattail leaves and stems, straw, hay, tall wheatgrass stems, and round stem bulrush stems will be collected in the fall of each year (October-December).

(c) Repair - Damaged platforms will be repaired if possible or removed and replaced if damaged beyond repair.

i. Nest Boxes.

1. Objective.

Artificial nesting boxes of several different sizes are installed to increase the number of nesting sites for cavity nesters. Boxes are designed specifically for bluebirds, wrens, downy woodpeckers, hairy woodpeckers, barn swallows, tree or violet-green swallows, common flickers, screech owls, and wood ducks.

2. Construction and Installation.

Nest boxes have been constructed and installed at various locations at Big Flat, Hollebeke, and Lost Island.

3. Maintenance.

Nest boxes will be cleaned out annually from January 1 to March 15. All nesting materials will be removed and those specific materials, such as wood chips and sawdust required by woodpecker, flickers, and wood ducks to nest successfully, will be replaced. Repairs will be made if necessary. If the box is occupied, the use shall be recorded and the birds shall not be disturbed.

j. Quail Roost.

1. Objective.

The objective of the quail roost is primarily to provide a roosting site for California quail. Many birds use shrubs, brush piles, or small trees for loafing and sleeping and inspecting a water hole prior to drinking. The quail roosts will provide this type of cover while the trees and shrubs are growing to a height sufficient to be used. Cottontail rabbits may nest in the roost to some extent depending on the density of brush.

2. Construction and Installation.

Quail roosts were constructed and installed in 1982.

3. Maintenance.

Quail roosts shall be maintained in a sound condition by replacing components or tightening bolts, as well as adding dead woody plant material from January through March.

### 5.03 Structural Components.

#### a. Fences.

Annual aerial inspections of all boundary and corridor fences shall be conducted twice annually, once in May and again in September. Damaged fences will be repaired as soon as possible. Damaged fences that result in cattle trespass will be repaired immediately.

#### b. Signs.

All signs will be maintained in a sound condition in accordance with Chapter 5 of the Division Sign Manual (NPDR 1130-2-6; 15 September 1981). Severely damaged or missing signs will be replaced.

#### c. Parking Lots and Roads.

All parking lots and gravelled roads in the habitat areas will be sterilized between November 1 and January 31. If plant growth persists, the areas shall be mowed in June and again in September. This is done to maintain these roads as firebreaks. Dirt roads crossing pastures and legume plantings will not be sterilized.

#### d. Firebreaks.

The many roads throughout the areas will act as firebreaks.

### 5.04 Irrigation Systems.

#### a. Electric-Powered Systems.

The three wildlife habitat units are equipped with solid set, Big Gun irrigation systems. All are driven by electric-powered pumps. These electric-powered systems take water from the Snake River, distribute it through an underground piping network and broadcast it through portable Big Gun sprinkler heads. The Big Gun irrigation systems are designed to provide ten sprinkler settings for a five-day week. Based on a maximum of eight hours per setting, all areas will receive water once each week.

The duration of irrigation may be selected by adjusting a timer controlling the pump. This should be based on weather conditions such as temperature, wind, humidity, and amount of natural precipitation, and soil type and soil moisture content. (See Table 5.12 for a guide to soil moisture content.) The soil moisture content of the soil will be checked at least weekly using a hand-held moisture meter connected to imbedded gypsum blocks. These

gypsum blocks are installed at various depth within the root zone at various locations in irrigated areas. If the soil moisture readings in certain areas are low, the frequency of irrigation will be increased. Care must be exercised to prevent soil erosion from irrigation runoff. Areas that have high soil moisture readings will be irrigated less often.

b. Windmills.

The two windmills located at Big Flat and one at Charbonneau pump water into tanks that have an automatic dump feature. The siphon inside the tanks will start the water flowing when a certain level is reached. If the siphon does not function, it may be losing its air. If this occurs, the air leak should be fixed.

c. O&M Manual.

For more information, refer to the Operation and Maintenance Manual for Irrigation Systems at Wildlife Habitat Areas (U.S. Army, 1980).

5.05 Noxious Plant Control.

Noxious plants are and will continue to be controlled on wildlife habitat areas in accordance with SECTION 12 of Appendix A - Project Resources Management Plan and all laws and ordinances of the State of Washington. Noxious weeds as listed in WAC 16-750-010 Proposed Noxious Weed List for the State of Washington (RCW 17.10.080) will be controlled on wildlife habitat areas by manual, mechanical, or chemical methods. Common target species are morning glory, Canada thistle, bull thistle, Russian thistle, yellow star-thistle, and other broadleaf weeds.

a. Storage.

All pesticides will be stored in the Pesticide Storage Building at the Levee Maintenance Shop, Big Pasco Industrial Park, Pasco, Washington.

b. Application.

All pesticides will be applied in accordance with current State of Washington Department of Agriculture regulations and the Washington State Pesticide Handbook. Table 5.13 lists recommended herbicides and their uses.

TABLE 5.12 Guide for judging soil moisture

Feel/Appearance of Soil				
Soil Moisture Remaining	Very Light Soil (sand)	Light Texture (loamy and sandy loam)	Medium Texture (fine sandy loam, silt loam, sandy clay loam)	Heavy and Very Heavy Texture (silty clay loam, clay loam)
0 Percent	Dry, loose, single grained, flows through fingers	Dry, loose, flows through fingers	Powdery dry, sometimes crusted, but easily broken down into powdery condition	Hard, baked, cracked; sometimes has loose crumbs on surface
50 Percent or less	Appears to be dry; will not form a ball with pressure	Appears to be dry; will not form a ball	Somewhat crumbly, but will hold together when squeezed firmly	Somewhat pliable; will ball under pressure
50 to 70 Percent	Same as above	Tends to ball under pressure, but seldom holds together when bounced lightly in hand	Forms a ball, somewhat plastic; will stick if relatively high in clay	Forms a ball, will ribbon out between thumb and forefinger, has slick feeling
75 Percent to field capacity (100 percent)	Tends to stick together slightly; sometimes forms a very weak ball under pressure	Forms weak ball; breaks easily when bounced in hand; will not stick	Forms a ball; is very pliable and sticks readily if relatively high in clay	Easily ribbons out between thumb and forefinger; has a slick feeling
At field capacity (100 percent)	Upon squeezing no free water appears on soil, but wet outline of ball is left on hand	Same as very light texture. Soil sticks to thumb when rolled between thumb and forefinger	Same as light texture	Same as light texture



Table 5.13 List of recommended herbicides, their uses and characteristics

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Krovar	Will damage or kill all types of plants (grasses, forbs, shrubs, and trees) and has a strong residual effect. This herbicide should be used to sterilize parking lots, roads, and firebreaks.
Roundup	Like Krovar, it will damage or kill all types of plants; however, it has a very weak residual effect and lasts only three days after application. This herbicide is used effectively prior to seeding as a cheatgrass and weed control agent.
Tordon 22K	Kills all broadleaf plants with residual effects lasting up to six months. This herbicide cannot be applied in tree and shrub areas.
2,4-D and Banvel D	When used in combination, this mixture can be used to control broadleaf weeds among grasses (except millets). It can also be used to control broadleaf weeds in tree and shrub areas in the spring before the leaf buds of the trees and shrubs open.
2-4,D (amine salt form)	This herbicide will kill all broadleaf plants and can be applied at any time of the year. The ester form of this herbicide should not be used at any time.

Pesticides shall be applied following label instructions by certified pesticide applicators and used only for the purpose described on the label. Treated areas shall be posted with warning signs.

c. Record Keeping.

NPW Form 178, "NPWOP Pesticide Application Record," will be completed for each pesticide application. Copies of these forms are kept at the Ice Harbor-Lower Monumental Project Office as well as the Walla Walla District Office.

5.06 Litter and Refuse Collection.

Litter and refuse scattered throughout the habitat unit will be routinely collected. Refuse containers located at each unit will be emptied monthly or more often if necessary and disposed of in refuse containers at Corps recreation areas.

5.07 Evaluation.

a. Pre-Construction Evaluation.

An evaluation of the wildlife habitat on the Ice Harbor Project prior to development under the Compensation Plan was completed by WDG under contract in April 1980 (Contract No. DACW68-78-C-23). This provided baseline information against which future evaluations will be compared to measure the success of the wildlife habitat development.

b. Major Evaluations.

Evaluations similar in scope and intensity to the pre-construction evaluation will be conducted at five year intervals in 1985, 1990, and so on. The purposes of these evaluations are to monitor changes within selected animal populations, to determine the responses of selected animal and plant populations to specific habitat components and management techniques, and to provide technical information that can be used in evaluating the wildlife habitat development plan and the operation and maintenance plans.

c. Interim Evaluations.

To supplement information obtained from the major evaluations, interim evaluations will be conducted annually. These evaluations will be similar in format but less extensive.

1. Shrub and Tree Mortality.

Shrub and tree areas should be inspected twice annually in May and September to determine mortality. As-built drawings and nursery labels, if available, should be used to identify species. The information collected will be used to determine numbers and species of replacements. Records will be kept of the number, species, and location of mortalities, the causes of mortality, and replacements.

2. Meadow and Pasture Establishment.

Visual estimates of the success of establishment of meadows and pastures will be made twice annually in May and September. This data will be used to determine whether reseeding is necessary. At the same time, noxious weed infestations will be recorded to determine the need for spraying or other control methods.

3. Photographic Documentation.

Camera stations are installed at various locations in each wildlife area. Four times each year (January, April, July, and October) photographs will be taken from each camera station to document changes in vegetative growth. This will be done in conjunction with the avian density transects.

Photographs will also be taken of farming practices, plant and animal mortalities, irrigation, and wildlife observations. Records shall be kept for each photograph which include the date, location, camera station, and the view or subject. All photographs should be taken with slide film and stored in slide boxes.

4. Nest Box Use.

Nest boxes will be inspected monthly during April, May, and June. For each inspection, a record will be kept of whether or not the box was occupied, the number of eggs, the number of young present, evidence of predation or starling use.

5. Goose Nesting Surveys.

Inspection of all nest platforms will be conducted twice each spring. This will be done in conjunction with surveys of islands on the project to locate goose nests. The first inspection is normally scheduled for the first week of April with the second during the first week of May. Data collected from nest searches and nesting platform inspections includes occupancy or vacancy of nest platforms, the number of eggs, the number of goslings, predominant surrounding vegetation, horizontal distance from

high water, and evidence of predation or abandonment. This data will be used to calculate nesting success, hatching success, and the number of young produced. Goose nest surveys will be coordinated by District biologists with assistance from project personnel. WDG biologists will also be invited to participate.

6. Deer/Chukar/Coyote Surveys.

Helicopter surveys of the entire project will be conducted twice annually to determine the population densities of mule deer, white-tailed deer, chukar, and coyote. The first survey will be conducted in late December - early January while antlers are still present on the male deer. Sex and age information will be gathered during this survey. The second survey will be conducted in late February - early March. Numbers of deer will be recorded on this survey. Numbers of chukar coveys, individual chukars, and individual coyotes will be gathered on both surveys. During these surveys, observations of raptors shall also be recorded.

7. Ring-necked Pheasant Counts.

Flush counts of ring-necked pheasant populations will be conducted each spring. In March, sex ratio counts will be conducted followed by crowing counts in April or May. These will be conducted by project resource management personnel with assistance provided by District office biologists. WDG biologists will also be invited to participate. During these surveys, observations of other upland game such as chukar partridges, California quail, gray partridges, mourning doves, and mountain cottontail shall be counted and recorded.

8. Mourning Dove Coo Counts.

These counts will be done in conjunction with the ring-necked pheasant crow counts in April or May.

9. Avian Density Surveys.

Line transect and variable circular plot surveys will be conducted seasonally to determine avian densities.

5.08 Off-Project Compensation.

As previously mentioned, the wildlife management program at all four lower Snake River projects is dominated by the Lower Snake River Fish and Wildlife Compensation Plan. Besides the development of wildlife habitat on project lands, this plan also recommended the acquisition

and development of off-project lands. The off-project component of the Compensation Plan consists of four facets.

a. Acquisition and Development of Habitat for Ring-necked Pheasants and California Quail.

This facet includes the acquisition in fee of 400 acres of riparian habitat off project land for pheasants and quail and the acquisition in easement of 8,000 acres of adjacent farmland for hunting and hunter access. Acquisition of lands is to be conducted by the Washington Department of Game (WDG) on a willing-seller basis funded by the Corps of Engineers with construction funds. Initial development will consist of the construction of parking areas and fencing by WDG, funded by the Corps of Engineers with construction funds. Annual operation and maintenance of these lands will be conducted and funded by WDG. To date, acquisition attempts have been unsuccessful.

b. Acquisition and Development of Habitat for Chukar Partridges.

The second facet of the off-project wildlife compensation program involves the acquisition in easement of 15,000 acres along the Snake River Canyon adjacent to project lands to replace lost chukar partridge habitat and assure future public access for chukar partridge hunting. This component also includes the acquisition in easement or fee of approximately 50 small parcels of land (0.1 acre each) located in draws along the Snake River for the construction of bird watering cisterns. These lands, which will be managed by the Corps, are to be acquired and developed by the Corps with construction funds. To date, acquisition attempts have been unsuccessful.

c. Stocking Game Birds.

The third facet proposes that the Corps of Engineers enters into an agreement with WDG to provide 20,000 game birds per year for a 20 year period to stock project and acquired off-project lands. However, WDG has recently decided to review the game bird stocking concept and consider other options.

d. Monitoring and Evaluation.

The fourth and last part of the off-project wildlife compensation program consists of a monitoring program to determine if the prescribed compensation goals stated in the Compensation Plan are being met. This will be the responsibility of the Corps of Engineers, however, current plans are to enter into a contract with WDG for this facet of the program. Following initial monitoring, periodic follow-up monitoring will be

accomplished every five years beginning in FY 1985, coinciding with follow-up monitoring of wildlife management areas on project lands (Section 5.07-b.). Interim monitoring and evaluation will be performed by Corps and WDG personnel.

This is a brief summary of the off-project wildlife compensation program. A more detailed description can be found in either the Lower Snake River Fish and Wildlife Compensation Plan (U.S. Army; 1975a) or Lower Snake River Fish and Wildlife Compensation Plan: D.M. 6 - Wildlife Compensation and Fishing Access Site Selection (U.S. Army; 1979a).

#### 5.09 Development of Dryland Sites.

In addition to the three intensively managed sites, there are six sites where a moderate level of management is planned. These sites will not be irrigated but developed instead as dryland sites. Specific plans have not yet been developed but a design memorandum is being prepared covering development of these dryland sites.

#### 5.10 Management of Endangered and Threatened Species.

In accordance with Section 7 of the Endangered Species Act, any proposed action or project that may adversely affect a listed species or its critical habitat requires consultation with the U.S. Fish and Wildlife Service (Olympia Area Office). This contact, if necessary, should be made by District office personnel.

Bald eagles are sighted almost each winter on the Ice Harbor Project. These occasional observations are reported to the Washington Department of Game. The reporting of these sightings is the only form of bald eagle management practiced at this project.

5.11 Annual Work Plan (FY 1983-1987).

October

1. Begin planting replacement trees and shrubs.
2. Begin collecting bedding material for goose nest platforms.
3. Fence and sign repair if necessary.
4. Complete winterization of irrigation systems.
5. Litter and refuse collection.
6. Conduct fall avian density transects and photo surveys.

November

1. Continue collecting bedding material for goose nest platforms.
2. Fence and sign repair if necessary.
3. Begin sterilization of parking lots and gravel roads.
4. Begin inspection and repair of irrigation equipment.
5. Litter and refuse collection.
6. Complete planting replacement trees and shrubs.

December

1. Complete collection of bedding material for goose nest platforms.
2. Fence and sign repair if necessary.
3. Continue sterilization of parking lots and gravel roads.
4. Continue inspection and repair of irrigation equipment.
5. Litter and refuse collection.
6. Conduct winter deer/chukar/coyote survey (late December - early January).

### January

1. Continue inspection and repair of irrigation equipment.
2. Begin cleaning, refurbishing, repair, and relocation of goose nesting platforms.
3. Begin cleaning bird watering cisterns.
4. Begin cleaning and refurbishing nest boxes and record use.
5. Begin maintenance of quail roosts.
6. Fence and sign repair if necessary.
7. Litter and refuse collection.
8. Complete sterilization of parking lots and gravel roads.
9. Conduct winter avian density transects and photo surveys.

### February

1. Begin soil sampling and obtain fertilizer.
2. Continue inspection and repair of irrigation equipment.
3. Complete cleaning, refurbishing, repair, and relocation of goose nesting platforms by February 15.
4. Continue cleaning bird watering cisterns.
5. Continue cleaning and refurbishing nest boxes and record use.
6. Continue maintenance of quail roosts.
7. Fence and sign repair if necessary.
8. Litter and refuse collection.
9. Conduct deer/chukar/coyote survey (late February - early March).

### March

1. Complete soil sampling and obtain fertilizer.
2. Complete inspection and repair of irrigation equipment.
3. Complete cleaning bird watering cisterns.
4. Complete cleaning and refurbishing of nest boxes and record use by March 15.
5. Complete maintenance of quail roosts.
6. Fence and sign repair if necessary.
7. Litter and refuse collection.
8. Begin noxious weed control if necessary.
9. Conduct pheasant sex-ratio counts.



### April

1. Begin fertilization of tree/shrub areas, meadows, pastures, fields, and perennial guzzler strips.
2. Begin mowing mixed pastures if necessary.
3. Spring start-up of irrigation systems.
4. Begin operation of irrigation systems if necessary.
5. Fence and sign repair if necessary.
6. Litter and refuse collection.
7. Continue noxious weed control.
8. Conduct spring avian density transects and photo surveys.
9. Begin pheasant crow and dove coo counts.
10. Conduct initial goose nest survey.
11. Conduct initial nest box surveys.

### May

1. Complete fertilization of tree/shrub areas, meadows, pastures, fields, and perennial guzzler strips.
2. Survey of all plantings and obtain replacements.
3. Begin replanting of meadows, pastures, fields, and perennial guzzler strips if necessary.
4. Begin planting of annual food plots and annual guzzler strips.
5. Begin cultivation of tree/shrub areas.
6. Continue mowing mixed pastures if necessary.
7. Continue operation of irrigation systems.
8. Inspect boundary and corridor fences (helicopter).
9. Fence and sign repair if necessary.
10. Litter and refuse collection.
11. Continue noxious weed control.
12. Complete pheasant crow and dove coo counts.
13. Conduct second goose nest survey.
14. Conduct second nest box surveys.

### June

1. Complete replanting of meadows, pastures, fields, and perennial guzzler strips if necessary.
2. Complete planting of annual food plots and annual guzzler strips.
3. Continue cultivation of tree/shrub areas.
4. Continue mowing mixed pastures if necessary.
5. Continue operation of irrigation systems.
6. Fence and sign repair if necessary.
7. Litter and refuse collection.
8. Continue noxious weed control.
9. Conduct final nest box surveys.

### July

1. Continue cultivation of tree/shrub areas.
2. Begin mowing legume pastures after July 15.
3. Continue mowing mixed pastures if necessary.
4. Continue operation of irrigation systems.
5. Fence and sign repair if necessary.
6. Litter and refuse collection.
7. Continue noxious weed control if necessary.
8. Conduct summer avian density transects and photo surveys.

### August

1. Continue cultivation of tree/shrub areas.
2. Continue mowing legume pastures if necessary.
3. Continue mowing mixed pastures if necessary.
4. Continue operation of irrigation systems.
5. Fence and sign repair if necessary.
6. Litter and refuse collection.
7. Complete noxious weed control if necessary.

September

1. Survey of all plantings and obtain replacements.
2. Complete cultivation of tree/shrub areas.
3. Continue operation of irrigation systems.
4. Begin winterizing irrigation systems.
5. Inspect boundary and corridor fences (helicopter).
6. Fence and sign repair and maintenance if necessary.
7. Litter and refuse collection.
8. Complete mowing of legume and mixed pastures.



WILDLIFE HABITAT CONTRACTS - LOWER SNAKE RIVER

WILDLIFE HABITAT DEVELOPMENT

CONTRACT NO.

PLANTING

DACW68-78-C-0019	Tree and Shrub Planting (Big Flat)
DACW68-79-C-0058	Plants for Wildlife Habitat Areas (Plant Propagation - Phase I)
DACW68-80-C-0085	Seeds (Grasses, Forbs, Legumes) and Tubers for Lower Snake River Wildlife Habitat
DACW68-80-C-0086	Seeds (Grasses, Forbs, Legumes) and Tubers for Lower Snake River Wildlife Habitat
DACW68-80-C-0087	Seeds (Grasses, Forbs, Legumes) and Tubers for Lower Snake River Wildlife Habitat
DACW68-80-C-0164	Planting of Tubelings - Phase I (Big Flat, Ridpath, Chief Timothy)
DACW68-80-M-6498*	Plants for Wildlife Habitat Areas - Phase II, Part 1
DACW68-81-M-5936*	Plants for Wildlife Habitat Areas - Phase II, Part 2
DACW68-81-M-5935*	Plants for Wildlife Habitat Areas - Phase II, Part 3
DACW68-81-C-0022	Plants for Wildlife Habitat Areas - Phase III
DACW68-81-C-0061	Planting of Tubelings - Phase II (Big Flat, Hollebeke, Chief Timothy)

\* Purchase Orders

FENCING

DACW68-76-C-0250	Fencing of Wildlife Habitat Area - Tucannon River
DACW68-77-C-0183	Phase I (Little Goose)
DACW68-77-C-0187	Phase II (Lower Snake)
DACW68-77-C-0188	Phase III (Lower Granite)
DACW68-80-C-0165	Phase IV (Swift Bar)
DACW68-81-C-0095	Phase V (Quarter Circle, Tucannon, Chief Timothy, Wilma)
DACW68-81-C-0105	Phase VI (Lake Charlene, Sargent)

IRRIGATION

DACW68-77-C-0060	Irrigation and Tree and Shrub Planting (Big Flat)
DACW68-78-C-0152	Phase I (Big Flat, Hollebeke, Fifty-Five Mile, Ridpath, Chief Timothy)
DACW68-79-C-0171	Phase II (Big Flat)
DACW68-79-C-0137	Phase III (Hollebeke, Lost Island, Skookum, Fifty-Five Mile, New York Bar, Swift Bar)
DACW68-81-C-0065	Phase IV, Replace Pumps (Ridpath and Chief Timothy)

CONTRACT NO.

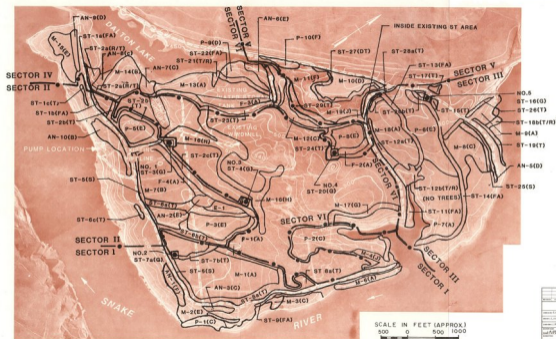
DACW68-80-C-0014  
DACW68-80-C-0028  
DACW68-80-C-0058  
DACW68-80-C-0061  
DACW68-80-C-0106  
DACW68-80-C-0112  
DACW68-80-C-0113  
DACW68-81-C-0088  
DACW68-81-C-0137  
DACW68-82-C-0067

POWERLINES

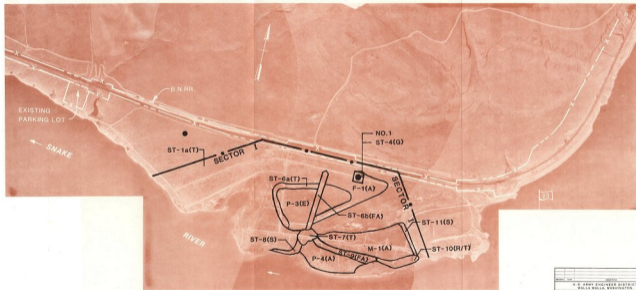
Chief Timothy  
Power to Wildlife Habitat Headquarters  
Big Flat  
Hollebeke  
Ridpath  
Swift Bar  
Fifty-Five Mile  
New York Bar  
Lost Island  
Planting of Tubelings - Phase III (Lost Island,  
Skookum, Fifty-Five Mile, New York Bar, Swift  
Bar, Wilma)

MISCELLANEOUS

DACW68-77-C-0013 Native Plant Propagation Study (WSU)  
DACW68-78-C-0023 Evaluation of Wildlife Habitat (WDG)  
DACW68-78-C-0039 Native Plant Propagation Study (WSU)  
DACW68-78-C-0079 Service for Development of Wildlife Habitat (WDG)  
DACW68-78-C-0120 Bird Watering Cisterns  
DACW68-79-C-0165 Wildlife Habitat Headquarters (WDG O&M Building)  
DACW68-80-C-0026 Nest Platforms  
DACW68-80-C-0076 Wildlife Habitat Development, Operations and  
Maintenance (O&M Contract)  
DACW68-80-C-0147 Road Development (Hollebeke and Skookum)  
DACW68-81-C-0100 Water Well - Lower Goose Pasture, Clearwater  
River  
DACW68-82-C-0001 Cooperative Agreement for Lower Snake River  
Project Wildlife Habitat Development Program  
(WDG)  
DACW68-82-C-0103 Fertilizer for Lower Snake River Wildlife  
Habitat Areas



U.S. ARMY ENGINEER DISTRICT WALLA WALLA, WASHINGTON	
LOWER SNAKE RIVER FISH AND WILDLIFE COMPLETION WILDLIFE HABITAT PROGRAM DESIGNING FOR ANADROMOUS FISH HABITAT	
PROJECT NO.	516 PLAT
DATE	HABITAT MANAGEMENT UNIT
DESIGNED BY	
CHECKED BY	
APPROVED BY	
LSR-1-12-175	



SCALE IN FEET (APPROX)



Scale	AS SHOWN
Sheet No.	37
U. S. ARMY ENGINEER DISTRICT WALLINGFORD, WASHINGTON	
LOWER SNAKE RIVER FLOOD CONTROL DISTRICT WALLINGFORD PROJECT CONCRETE DAM	
LOST ISLAND HABITAT IMPROVEMENT PLAN	
Project No.	1-10-1076
Plate No.	1-10-1076
Scale	AS SHOWN
Sheet No.	37
Project No.	1-10-1076
Plate No.	1-10-1076





## Section 6 - Description of Project Waters

### 6.01 General.

The Ice Harbor Dam has created a lake 31.9 miles long, varying in width from 200 yards to a mile, in depth from approximately 20 feet at the tailwater to 100 feet at the forebay, with 80 miles of shoreline and 9,482 acres of water surface. Normal pool elevation varies between 440 and 437 MSL. There are no significant Snake River tributaries which enter the lake.

### 6.02 Water Quality.

#### a. Nutrient Levels.

The Snake River and its tributaries drain vast areas of agricultural land in southeastern Washington, eastern Oregon, central and southern Idaho, and northern Utah. Consequently, the water of the Snake River is very rich in nutrient material. Two reports (U.S. Army, 1973b; and U.S. Army, 1977b) contain results of intensive water quality sampling done by the University of Idaho and Washington State University under contract for the Corps of Engineers.

#### b. Turbidity.

The results of turbidity measurements taken in the lower Snake River are included in reports by Johnstone and Bailey (1974) and the Walla Walla District Corps of Engineers (U.S. Army; 1973b). Increases in the turbidity of Lake Sacajawea in the spring are caused by the growth of the floral and faunal micro-communities and the extremely heavy silt loads contributed by upstream tributaries. Information on sediment transported by the Snake River may be obtained from the U.S. Geological Survey in Spokane or the SCS.

#### c. Temperature.

The temperature of the lower Snake River varies slightly between Clarkston and Pasco, Washington, ranging approximately from 38 degrees F. in the winter to 74 degrees F. in the summer. A study by the University of Idaho and Washington State University (U.S. Army; 1977b) has demonstrated that exceptional mixing occurs in the Snake River and there is very little vertical stratification.

#### d. Hydraulic Residence Time.

The hydraulic residence time is a theoretical measure of the time required for a particle of

water to travel the length of the reservoir. It may also be thought of as the turnover time; that is, the time required for a complete exchange of reservoir water. It is only theoretical since it assumes complete mixing of reservoir water which does not occur. It also varies as a function of the flow rate of the river.

Lake Sacajawea has a hydraulic residence time of 1.02 days during high flows (200,000 cfs), 8.16 days at mean annual discharge (49,800 cfs), and 13.47 days during low flows (15,200 cfs).

### 6.03 Biological Inventory.

#### a. Algae.

The algal community of the lower Snake River was sampled and analyzed between 1970 and 1972 under a joint contract with the University of Idaho and Washington State University for the Walla Walla District Corps of Engineers. In Volume 2 of the report (U.S. Army; 1973b), diatoms were listed as the dominant form of algae throughout the year. Their greatest numbers occurred in the spring; major species identified were Asterionella formosa and Cyclotella sp. The numbers of planktonic green algae did not show an increase in the summer, as expected, but remained very low in relation to the level of diatoms. Also reported was heavy growth of Spirogyra sp. (a periphytic green alga) along the shoreline of the lower Snake River and Aphanizomenon flos-aquae (a planktonic blue-green alga).

Similar results were described in a report published one year later (Johnstone and Bailey; 1974). This study was designed to evaluate the water quality at recreation areas on the lower Snake River; samples on the Ice Harbor Project were taken at Levey Park and Fishhook Park. Table 5 of the report by Johnstone and Bailey (1974) contains numbers and types of algae found at these sites. This table is quite comprehensive as it includes 17 genera of diatoms, 13 genera of green algae, and 2 genera of blue-green algae.

In 1975, another joint University of Idaho - Washington State University study was initiated, under contract for the Corps of Engineers, with the objective of describing the aquatic ecology of the lower Snake River. This study indicated the dominance of the diatoms Cyclotella sp. and Melosira sp. within the algal community and the presence of Aphanizomenon flos-aquae (a blue-green algae).

b. Aquatic Macrophytes.

A preliminary study of aquatic macrophytes (U.S. Army; 1972) reported the dominance of Potamogeton nodosus (Long-leaved Pondweed) in Lake Sacajawea with Potamogeton crispus (Curly-leaved Pondweed) of secondary importance. A later report by the U.S. Army Corps of Engineers (1973a) reported some very dense beds of P. crispus.

As part of a comprehensive lower Snake River water quality study done by the University of Idaho and Washington State University for the Walla Walla District Corps of Engineers, the aquatic macrophytic community was sampled and analyzed. The report (U.S. Army; 1973b) identified only Potamogeton crispus and did not consider aquatic weed growth in Lake Sacajawea to be of nuisance proportions. It was concluded that throughout the lower Snake River there is a high potential for aquatic vascular development in shallow areas with a water depth of less than ten feet provided that there is no strong wave or current action, and the substratum is stable and other than solid rock.

In 1972, a study was undertaken by the University of Idaho under a contract with the Walla Walla District Corps of Engineers to survey the aquatic vascular flora of the Columbia and Snake River drainage basins and the coastal drainages of Washington. One of the primary objectives of this survey was to identify and describe the distribution of aquatic vascular vegetation. The report (U.S. Army; 1974) indicated the presence of P. crispus and P. pectinatus in Lake Sacajawea.

In 1975, another joint University of Idaho - Washington State University study was initiated under contract for the Corps of Engineers, with the objective of describing the aquatic ecology of the lower Snake River. This report (U.S. Army; 1977b) lists in decreasing order of abundance throughout the lower Snake River, Potamogeton crispus, P. nodosus, Elodea sp., and P. richardsonii.

c. Zooplankton.

Zooplankton populations were found to increase between the Lower Granite and Ice Harbor Projects (U.S. Army; 1977b). This report lists Daphnia galeata, Bosmina sp., Cyclops vernalis, C. bicuspidatus, and Diaptomus sp. as the dominant organisms between River Mile 18 and 83.

d. Aquatic Macroinvertebrates.

Little attention has been given in the past to developing an inventory of aquatic invertebrates for any of the lower Snake River projects. Two studies were done on the free-flowing sections of the lower Snake River prior to inundation (Edwards, et. al.; 1974 and The Institute of Paper Chemistry; 1970), however it is certain that the transformation of the Snake River from a free-flowing river into a lake resulted in drastic changes in species composition. A limnological study of the lower Snake River projects has recently been completed by the University of Idaho and Washington State University. An interim report (U.S. Army; 1977b) indicates that the lower Snake River is dominated by oligochaetes (aquatic worms), pelecypods (freshwater clams), and chironomid midge larvae. A later report by the Institute of Paper Chemistry (1978) confirms this finding.

e. Aquatic Vertebrates.

Several species of fish are found in Lake Sacajawea. These include many anadromous species as well as several resident species. The major anadromous species include chinook, coho, and sockeye salmon, steelhead trout, and American shad. The major resident species managed are largemouth and smallmouth bass, black and white crappie, yellow perch, channel catfish, white sturgeon, and mountain whitefish. Appendix C of the Final Environmental Impact Statement - Fish and Wildlife Compensation (U.S. Army; 1976a) contains a complete inventory of all fish species.

Besides fishes, there are several species of amphibians known to occur along the lower Snake River. These are listed in Volume IIIA of the Inventory of Riparian Habitats and Associated Wildlife along the Columbia and Snake Rivers (Asherin and Claar; 1976). The only aquatic reptile known to occur on the lower Snake River is the western painted turtle.

The inventory cited above also indicates the presence of beaver on this project, but their abundance is limited.

f. Threatened and Endangered Species.

There are no aquatic species on the Ice Harbor Project listed as either Threatened or Endangered Species by the U.S. Fish and Wildlife Service.

## Section 7 - Management of the Aquatic Environment

### 7.01 Anadromous Fish Management.

#### a. Upstream Passage Facilities.

Facilities were constructed at Ice Harbor Dam to allow upstream migration of adult salmon and steelhead trout. These facilities include two fish ladders which were part of the initial dam construction. The ladder on the north shore is located adjacent to the spillways and climbs up along the side of the navigation lock. The south shore fish ladder passes through the visitor center which has underwater windows for public fish viewing. Both of these ladders are used by adult upstream migrants en route to their spawning grounds. The ladders were not designed to pass shad, but modifications to allow shad passage were completed in 1980.

Fish counters are normally on duty at the south shore fish counting station 16 hours per day from 1 April to 31 October and record the numbers of the major species that pass up the ladders. However, in 1979, 1980, and 1981, fish counters began counting on 1 March and continued through 30 November because of the dredging contract below the dam. A television camera focused on the window at the north shore station transmits a live picture to the south shore station. The information collected by the fish counters is reviewed and used by Federal and state fishery agencies in managing these species. Besides the fish ladders, upstream migrants may use the navigation lock but it is believed that this contribution to upstream passage is negligible.

Both fish ladders and the navigation lock are operated and maintained by the Operations and Maintenance Sections at the Ice Harbor-Lower Monumental Project Office; the seasonal fish counters are assigned to the Operations Section. The Recreation-Resource Management Branch at the District Office provides training for fish counters and fish counter supervisors, and acts as liaison between the project and the federal and state fisheries agencies with respect to the operation of the fish ladders. The Resource Management Section at the project level has no responsibilities in the anadromous fish management program.

#### b. Downstream Passage Facilities.

The majority of fingerlings coming down the Snake River are collected at Lower Granite and Little Goose Dams and transported downstream past Ice Harbor Dam.

Those fish not collected at Lower Granite or Little Goose Dams have several possible routes past Ice Harbor Dam. Two of these, the fish ladders and navigation lock, are relatively insignificant in terms of the numbers of fish passed. Two other routes, over the spillways or through the turbines, are the major downstream pathways.

Repetitive experiments demonstrated that approximately 10-15 percent of the fingerlings that pass through the turbines are killed, or stunned and subject to predation (U.S. Army, 1975a). Since then, a number of modifications to powerhouses to reduce mortality have been tested at the lower Snake River projects. At Ice Harbor Dam there are no facilities, such as traveling screens, to deflect fingerlings up into the powerhouse intake bulkhead slots. However, an undetermined percentage of those that enter the powerhouse intakes find their way into the bulkhead slots where they pass through orifices into the ice and trash sluiceway. This sluiceway conducts them through the powerhouse and down to an area past the south shore fish ladder entrance where they are discharged into the tailrace. In 1981, two sluiceway gates were automated to allow fingerlings in the surface forebay water to spill directly into the ice and trash sluiceway. A third gate was automated prior to the 1982 outmigration. This should increase the percentage of fingerlings passed through the ice and trash sluiceway thereby bypassing the turbines. The effectiveness of this bypass method was studied in 1982.

Operation and maintenance of the ice and trash sluiceway is the responsibility of the Operations and Maintenance Sections at the Ice Harbor-Lower Monumental Project Office.

c. Operation Fish Run.

The juvenile fish collection and transportation program has evolved since the construction of Ice Harbor Dam and figures to be a component of the downstream migration program in the future. The table on the next page summarizes results of this program to date.

Table 7.1 Juvenile Fish Transport Summary

<u>Year</u>	<u>Total Fish Transported (Millions)</u>	<u>Transport Method (%)</u>	
		<u>Truck</u>	<u>Barge</u>
1978	3.0	52%	48%
1979	5.0	40%	60%
1980	7.9	38%	62%
1981	8.3	38%	62%

Operation Fish Run is a project administered by the Corps of Engineers and was conducted under the fish research contract with the National Marine Fisheries Service (NMFS) from 1968 - 1980. In 1981, Corps district and project personnel took over operation of the program with NMFS assistance. Beginning in 1982, the program was run entirely by the Corps.

Through FY 1980, Operation Fish Run was entirely funded and organized at the North Pacific Division Office under the Fish Research and Protection Program (FRPP). This program is discussed in Section 7.03-a. It coordinates and funds many fisheries research projects throughout the division. Beginning in FY 1981, most aspects of Operation Fish Run were funded at the district level as operation and maintenance activities. The following table lists those aspects of Operation Fish Run which were funded at the district level in FY 1982 separately from FRPP.

Contract Services	\$170,000
Transport Operations	508,000
Truck and Barge Operation and Maintenance	95,000
Project Support	4,000
Tractor Rental Operation and Maintenance	20,000
Tugboat Rental	373,000
	<u>\$1,170,000</u>

Not to be included in district office level funding are studies done by NMFS to evaluate the success of the transportation program as well as other studies done in conjunction with this program. These studies will continue to be funded under FRPP.



The district level costs of Operation Fish Run are divided as follows:

		<u>FY 1982</u>
McNary	25.0%	\$292,500
Ice Harbor	12.5%	146,250
Lower Monumental	12.5%	146,250
Little Goose	25.0%	292,500
Lower Granite	25.0%	292,500

The construction of several fish hatcheries between 1981 and 1985 along the Snake River and its tributaries will increase the number of downstream migrating smolts from some 6 million fish to an estimated 20-30 million. This increase will result in gradual increases in O & M costs at the Ice Harbor Project for Operation Fish Run during this period as listed below.

FY 1982	\$146,250
FY 1983	175,000
FY 1984	175,000
FY 1985	190,000
FY 1986	205,000
FY 1987	205,000

d. Fish and Wildlife Compensation Plan.

The Lower Snake River Fish and Wildlife Compensation Plan (U.S. Army, 1975a; hereafter referred to as the Compensation Plan) recommended that three main measures be implemented to compensate for fishery losses as a result of the construction of Ice Harbor, Lower Monumental, Little Goose, and Lower Granite Dams. These measures call for:

- o the construction of hatcheries and associated facilities to produce spring, summer, and fall Chinook salmon, and steelhead trout for release into the Snake River or its tributaries;
- o the acquisition of 750 acres of land along the Snake River and tributaries of streams adjacent to the lower or middle Snake River in easement or fee for fisherman access; and,
- o the construction of hatchery facilities capable of producing rainbow trout annually for stocking local streams.

The first two of these measures will be discussed in this section since they relate to anadromous fish but the last measure, which relates to resident fish, will be discussed in Section 7.02.

1. Hatchery Construction.

To compensate for the reductions in the anadromous fish runs which resulted from construction of the four dams along the lower Snake River, the Compensation Plan recommended construction of hatcheries and associated facilities to produce juvenile salmon and steelhead trout for release into the Snake River or its tributaries. The production requirements are listed by species in the table below:

Table 7.2 Proposed production levels of fish hatcheries

<u>Species</u>	<u>No. of Smolts</u>	<u>Pounds of Smolts</u>	<u>No. of Returning Adults</u>
Spring chinook	5,830,000	388,700	50,700
Summer chinook	920,000	61,300	8,000
Fall chinook	9,160,000	101,800	18,300
Steelhead	11,020,000	1,377,500	55,100

Construction of the McCall Hatchery, the first hatchery to be constructed under the Compensation Plan, was completed in July 1980. Lands have been purchased for hatcheries at Lyons Ferry and Lookingglass Creek and construction of these two facilities began in FY 1981. Expansion of Dworshak National Fish Hatchery began in September 1981 and will be completed in July 1982. Expansion of Hagerman National Fish Hatchery began in March 1982 and design work has begun on the Crystal Springs and Sawtooth Hatcheries. Site selection for other hatcheries to fulfill the remainder of the compensation requirements is continuing.

The construction of all of the above hatcheries is being funded by the Corps of Engineers with construction funds. The operation and maintenance will be funded by USFWS, however, actual work will be performed by the respective state fish and game agencies. The Hagerman National Fish Hatchery will continue to be funded

and operated by USFWS. Dworshak National Fish Hatchery is operated by USFWS with Corps funding for the steelhead trout program and USFWS funding for the spring chinook program.

## 2. Fishermen Access.

To compensate for the loss of 150 miles of stream-type steelhead and salmon sport fishery along the Snake and Clearwater Rivers, plans are underway to acquire 750 acres (700 acres in Washington and 50 acres in Idaho) of streamside lands along tributaries of the Snake River for assured fishermen access. The Lower Snake River Fish and Wildlife Compensation Plan: D. M. No. 6 - Wildlife Compensation and Fishing Access Site Selection (U.S. Army; 1979a) identifies land along the Walla Walla, Touchet, Tucannon, Yakima, Grande Ronde Rivers, and Mill, Alpowa, and Asotin Creeks which is suitable for acquisition. Upon approval of the D.M., these lands will be acquired on a willing-seller basis by WDG and Idaho Department of Fish and Game with Corps approval.

The acquisition and initial development of these lands will be funded by the Corps of Engineers with construction funds. Operation, maintenance, and any future development will be the responsibility of WDG. The Corps of Engineers will fund an evaluation program for fisherman use and success on lands acquired under this program. Funds are included in the follow-up monitoring program for off-project wildlife lands (Section 5.08-d.).

### 7.02 Resident Fish Management.

Prior to dam construction, important resident fish species included smallmouth bass, channel catfish, sturgeon, and mountain whitefish. These species, which were dependent upon the flowing stream environment, generated an intensive sport fishery in the project area. Project completion created a large, slow-moving lake more favorable to other species (U.S. Army, 1975a).

It has been estimated that approximately 67,500 stream resident fish angler-days per year were lost due to construction of the four dams along the lower Snake River. This loss is cumulative over all four lower Snake River projects. All management programs will be implemented to compensate for the losses over all four projects rather than attempting to compensate for the losses at each project individually.

To date, little work has been accomplished in the area of resident fish management. There are many avenues to

be explored in managing resident fish species but little progress has been made to date in determining which of these avenues to pursue. However, on 2 June 1978, WDG and USFWS agreed to substituting a warmwater fishery enhancement program and an in-stream trout habitat improvement program for up to 50 percent of the resident trout requirements specified in the Lower Snake River Fish and Wildlife Compensation Plan (U.S. Army; 1975a) if research demonstrates a potential for the success of such a program.

Research is being conducted under contract with the Idaho Cooperative Fishery Unit at the University of Idaho in Moscow to determine the potential for developing a warmwater fishery at the four lower Snake River projects. Preliminary results indicate that the sport fishery for smallmouth bass, largemouth bass, crappie, pumpkinseed, bluegill, yellow perch, channel catfish, and sturgeon is viable. The formation of local bass clubs and staging of bass tournaments on the Snake River indicate that interest in these species is growing. Another study is being conducted under contract with WDG to develop recommendations for in-stream habitat improvements for trout in tributaries.

a. Hatchery Construction.

In 1981, construction began on the Lyons Ferry Fish Hatchery designed to produce steelhead trout, Chinook salmon, and 45,000 pounds of rainbow trout (approximately half of the resident trout compensation requirement of 93,000 pounds). When completed, this hatchery will produce legal size fish to be planted in Snake River tributaries in southeastern Washington and western Idaho. Operation and maintenance of the hatchery will be the responsibility of WDG and Washington Department of Fisheries (WDF) with funding provided by USFWS.

b. Habitat Development.

The inundation of the Snake River Canyon altered thousands of acres of fish habitat. In most cases, spawning areas, cover, and food sources for resident fish were altered or reduced, which undoubtedly had a significant negative impact on resident fish populations. Therefore, any resident fish management program along the lower Snake River must incorporate projects to establish spawning areas, increase protective cover, and provide food sources. A design memorandum for the management of resident fish will be developed in the near future for the lower Snake River. The following paragraphs describe three types of projects which may be implemented under this program.

- o Construction of Artificial Reefs and Stake Beds - These structures are most commonly built of tires, pipe, rough lumber, or trees fastened together in a close arrangement to provide cover for prey and predator fish.
- o Development of Spawning Areas - This type of development will depend upon the species being managed. Spawning areas for smallmouth bass may be developed by depositing gravel in small beds in four to eight feet of water.
- o Shoreline Revegetation - Shoreline vegetation benefits fish populations by reducing shoreline erosion which results in siltation and disturbance of spawning areas. The vegetation also increases insect populations in the area, which are a major food source for the fish. The roots of shoreline vegetation exposed underwater provide cover, while the canopy provides some shade over the water.

c. Stocking.

Since 1968, fish biologists from WDG have been stocking a small two acre pond near Fishhook Park with rainbow trout. While initial stockings consisted of fry, recent stockings have consisted of legal-size fish. WDG plans to continue stocking this pond in the future. No other areas on the Ice Harbor Project are stocked and WDG has no plans to initiate any new stocking.

d. Control of Water Level Fluctuations.

It is possible to improve the hatching success of desirable species of fish like bass by stabilizing the lake level after their spawning period. Conversely, the hatching success of undesirable species of fish like carp can be severely reduced by fluctuating or lowering the lake level to expose their spawning areas after they have spawned.

Besides the effects of lake level fluctuations on the hatching success of fish, these fluctuations can also have other undesirable effects. For example, lowering of lake levels can adversely affect island inhabitants such as Canada geese if access routes are exposed to predators during low lake levels. Also, fish may be stranded in small pools for extended periods of time by low lake levels leading to high mortality among desirable species from greater predation, higher water temperatures, or oxygen depletion. These impacts of lake level

fluctuations must be considered in this fish management technique.

Although the control of water level fluctuations is a possible technique in resident fish management, it is not likely to be used due to overriding concerns governing lake levels such as power production.

### 7.03 Research Activities.

#### a. Fishery Research and Protection Program.

This is a division-wide program to fund salmonid passage research at Corps projects. One part of this program is an on-going study by the Corps of Engineers to evaluate the adult fish powerhouse collection facilities at the lower Columbia and Snake River dams. During FY 1982, the facilities at Ice Harbor and Lower Monumental Dams were studied.

Also included in this program is a continuing study to evaluate the juvenile salmonid transportation program (Operation Fish Run) at McNary, Little Goose, and Lower Granite Dams. During FY 1981, the Ice Harbor Project contributed \$169,900 to this program out of the O & M funds. Funding for the period FY 1982 - FY 1987 is listed below.

FY 1982	\$230,000
FY 1983	247,000
FY 1984	209,000
FY 1985	183,000
FY 1986	129,000
FY 1987	137,000

#### b. Sonar Monitoring.

This program was initiated by the National Marine Fisheries Service in 1977 to monitor the presence and abundance of juvenile salmonids passing over the John Day Dam. In 1979, the Walla Walla District initiated a similar program designed to enhance juvenile salmonid passage over district dams during the annual outmigration. This program involves scanning sonar units used to detect juveniles near the dam. When large numbers of juveniles are detected, the spillbays are opened to pass the fish. The program was expanded in 1980 with the hiring of a full-time permanent fish biologist in the District Office to coordinate and direct the program in addition to hiring eight temporary technicians to operate sonar units at McNary, Ice Harbor, and Lower Monumental Dams. Sonar monitoring was conducted

at Ice Harbor Dam in 1981, however, with the automation of three sluiceway gates at the dam, sonar monitoring was not continued in 1982.

c. Warmwater Fish Survey.

In February 1979, a study was initiated by David Bennett, et. al. of the Fishery Resource Department, University of Idaho to assess the status of the warmwater fishery and determine the potential of improving warmwater fish habitat in lower Snake River reservoirs.

The purposes of this study are to:

- o assess angler attitudes and quantify species preference and catch in lower Snake River reservoirs;
- o assess species composition, relative abundance, fish species associations, habitat preferences, and movement of fishes in lower Snake River reservoirs;
- o evaluate food habits, age structure and growth of selected warmwater fishes in lower Snake River reservoirs;
- o evaluate reproductive cycles and spawning habitat preferences of selected warmwater fishes in lower Snake River reservoirs; and,
- o correlate fish behavior with limnological characteristics of lower Snake River reservoirs.

This survey was funded with construction funds as part of the Compensation Plan.

7.04 Control of Undesirable Species.

In isolated cases, certain fish species may reach population levels where they compete with more desirable species or create operational problems. These undesirable species include, but are not limited to, carp, squawfish, and suckers. Carp uproot vegetation and increase water turbidity, inhibiting plant growth that would benefit most other fish as well as waterfowl. Squawfish are predacious, preying on all species including juvenile salmonids and other desirable species.

Suckers become a problem when they, in conjunction with carp and squawfish, crowd the fish ladders

during the summer months. These species can become so numerous that they not only hamper the passage of salmon and steelhead through the ladders, but also expose anadromous fish to diseases (Fujihara and Hungate; 1971).

Three methods may be used to control undesirable species.

- o Piscicide Application - Rotenone is a chemical used to help control undesirable species.
- o Electrofishing Equipment - This equipment can be very effective in controlling undesirable fish in the fish ladders. However, it is also harmful to desirable species such as large salmonids.
- o Control of Lake Levels - As mentioned in Section 7.02-d., the hatching success of undesirable species such as carp could be reduced by fluctuating the lake level after these species have spawned.

#### 7.05 Wetlands Inventory.

As a result of the Presidential Executive Order 11990 entitled, "Protection of Wetlands" (24 May 1977), the Resource Management Section began an inventory of wetlands in 1978. This Order directs all federal agencies to take action to preserve and protect all federally owned wetlands from degradation and destruction. These areas are preserved and protected in accordance with this Executive Order.

The table below lists wetland areas identified on the Ice Harbor Project. Other sites will be added as they develop and are identified. Management of these areas involves protecting them from encroachment.



Table 7.3 Wetlands inventory

<u>Area</u>	<u>River Mile</u>	<u>Shore</u>	<u>Approx. Acreage</u>
Lake Charlene	12	N	1
Charbonneau Pond	12	S	1
Levey Park	13	N	5
unnamed	12-13	S	50
Big Flat	15-17	N	150
Fishhook Lake	17	S	15
Fishhook Pond	17	S	5
Fishhook Park	18	S	1
Lake Emma	19	N	10
Lost Island Pond	22	N	5
Lost Island	23	N	30
Hollebeke	25	S	50
Lower Walker Pond	30	S	20
Upper Walker Pond	31	S	20
unnamed	36-38	N	10

## Section 8 - Management of Public Use

Hunting and fishing are the primary activities on project lands allocated specifically for the development and management of fish and wildlife resources. According to visitation data from 1981, one percent of visitors to the Ice Harbor Project hunted, while 11 percent fished. In addition to the activities mentioned above, fish and wildlife management lands are also used by the public for hiking, primitive camping, trapping, birding, environmental education, and wildlife photography.

### 8.01 State Regulations - Hunting and Trapping.

The primary responsibility for regulating hunting and trapping in the State of Washington lies with the Washington Department of Game (WDG). They set seasons and publish regulations annually. In Franklin and Walla Walla Counties, waterfowl hunting is prohibited within one-half mile of the Snake River. This effectively closes the entire Ice Harbor Project to waterfowl hunting.

Enforcement of state game regulations is the responsibility of WDG Wildlife Agents, local county sheriffs, and the Washington State Patrol.

### 8.02 State Regulations - Fishing.

The regulation of salmon, sturgeon, shad, and carp is accomplished by the Washington Department of Fisheries. The Snake River and its tributaries have been closed to salmon fishing for several years. Regulations are available from the Department of Fisheries in Olympia or license dealers.

Fishing regulations for all other species (trout, bass, crappie, and other game fish) are established by the Washington Department of Game.

### 8.03 Federal Regulations.

Besides various Federal laws, such as those protecting migratory birds and endangered species, hunting, fishing, and trapping on Corps-administered lands is regulated under authority of the Code of Federal Regulations (CFR). It states (Title 36, Section 327.8; 8 March 1979) that hunting, fishing, and trapping are permitted on project land in accordance with applicable Federal, state, and local laws except in areas designated by the District Engineer.

Safety zones are established at all developed public recreation areas (Ice Harbor Dam, Charbonneau, Levey, Fishhook, and Windust Parks, and Matthews) and at areas adjacent to the dam where hunting is prohibited to protect the public. Signs are posted around these areas.

Project personnel with citation authority can issue citations for violation of this regulation. For more information on citation authority, refer to Section 11.02 of Appendix A - Project Resources Management Plan.

#### 8.04 Enforcement.

While each state and Federal agency is responsible for the enforcement of its own regulations, generally, WDG is the primary fish and game enforcement agency in this area. Although Corps of Engineers personnel are not authorized to enforce Federal or state fish and game regulations, they are familiar with them and report violations to the local Game Department Wildlife Agents.

Reporting procedures vary with the urgency of the situation. Under circumstances where prompt attention is required, one should contact the Washington State Patrol which, in turn, can quickly contact the proper agent by radio. When a violation is detected in the field away from a public phone, the Control Room Operator should be contacted by radio to relay the information to the State Patrol. In less urgent cases, one may contact the agent directly by phone as soon as possible.

Wildlife Enforcement Directory

Washington State Patrol	
Franklin County (Kennewick)	783-6102
Walla Walla County (Kennewick)	783-6102
Washington Department of Game - Wildlife Agents	
Franklin County	
Kennewick	783-3867
Walla Walla County	
Regional Office (Walla Walla)	527-4418
Lower Snake River Habitat Mgmt. Area Office	545-2420

Section 9 - Personnel and Funding Requirements

9.01 Personnel.

Most of the work involved in the management programs outlined in this appendix will be accomplished under contracts or by WDG under a cooperative agreement. Corps personnel from the Walla Walla District Office will provide some assistance to the project mainly in the area of coordinating and administering the programs. The other work will be accomplished by project personnel.

A Park Ranger with a wildlife biology background was hired in 1980 mainly to oversee the wildlife habitat development and the operation and maintenance of the wildlife management areas. Other members of the Resource Management Section will assist in the fish and wildlife management program as needed.

Work to be performed by project personnel will be done mainly by members of the Resource Management Section. Since their salaries are listed in Section 16 of Appendix A and included as part of the labor costs for the project already, they will not be listed in this appendix.

9.02 Funding.

<u>FY 1983</u>	
O&M of on-project wildlife management areas	\$125,000
Operation Fish Run	175,000
Fisheries Research and Protection Program	247,000
	<u>\$547,000</u>
<u>FY 1984</u>	
O&M of on-project wildlife management areas	\$125,000
Operation Fish Run	175,000
Fisheries Research and Protection Program	209,000
	<u>\$509,000</u>
<u>FY 1985</u>	
O&M of on-project wildlife management areas	\$125,000
Evaluation of on-project habitat development	44,100
Operation Fish Run	190,000
Fisheries Research and Protection Program	183,000
	<u>\$542,100</u>

FY 1986

O&M of on-project wildlife management areas	\$125,000
Operation Fish Run	205,000
Fisheries Research and Protection Program	<u>129,000</u>
	\$459,000

FY 1987

O&M of on-project wildlife management areas	\$125,000
Operation Fish Run	205,000
Fisheries Research and Protection Program	<u>137,000</u>
	\$467,000

Section 10 - References

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