design memorandum for wildlife habitat development

lower snake river project

NPDPL-ER (7 Feb 75) 3rd Ind
SUBJECT: Design Memorandum for Wildlife Habitat Development, Lower Snake River Project, January 1975

DA, North Pacific Division, Corps of Engineers, 210 Custom House, Portland, Oregon 97209 2 July 1975

TO: District Engineer, Walla Walla

The subject Design Memorandum has been approved by OCE. You are authorized to proceed subject to the comments contained in this correspondence.

FOR

EDWIN S. TOWNSLEY
Colonel, Corps of Engineers
Division Engineer

1 Incl
nc

DEPARTMENT OF THE ARMY
WALLA WALLA DISTRICT, CORPS OF ENGINEERS
BLDG. 602, CITY-COUNTY AIRPORT
WALLA WALLA, WASHINGTON 99362

NPWEN-PL

7 February 1975

SUBJECT: Design Memorandum for Wildlife Habitat Development, Lower Snake River Project, January 1975

Division Engineer, North Pacific

1. Forwarded herewith are 15 copies of the subject design memorandum for your review and approval.

2. The estimated costs for work shown in the DM do not include Engineering and Design or Supervision and Administration, which are estimated at 10 and 6 percent, respectively. The total estimated cost of the development is $2,240,000, plus $225,000 E&D and $135,000 S&A, for a total of $2,600,000.

3. This DM covers proposed work which is considered to be within the existing authority of the Corps of Engineers, in connection with project shoreland management. Completion of the proposed habitat development on project lands will fulfill a portion of the wildlife compensation for the Lower Snake River project. Early approval and implementation of the plans outlined in this DM are important. The overall plan for fish and wildlife compensation, which will later be submitted for Congressional authorization, takes into account the work which is proposed here for the project lands. The overall compensation report and the accompanying revised Draft Environmental Impact Statement are to be forwarded to your office in May 1975.

1 Incl (15 cys)
as

NELSON P. CONOVER
Colonel, CE
District Engineer

NPDPL-ER (7 Feb 75) 1st Ind
SUBJECT: Design Memorandum for Wildlife Habitat Development, Lower Snake River Project, January 1975

DA, North Pacific Division, Corps of Engineers, 210 Custom House, Portland, OR 97209 15 May 1975

TO: HQDA (DAEN-CWP-V)
WASH DC 20314

1. Forwarded under separate cover are 10 copies of the subject Design Memorandum for your review.

2. We concur with the District Engineer and recommend early approval of this design memorandum subject to the following comments. We believe that the implementation of this plan offers a valuable opportunity to demonstrate the potential for mitigating project caused wildlife losses on project lands.

3. The 10 percent E&D cost indicated in paragraph 2 of the transmittal letter should be reviewed. This cost appears high considering the limited scope of work and simplicity of design effort involved.

4. The cost of habitat development on project lands will be charged to construction general, Lower Granite Project, and to construction general, additional units, Ice Harbor, Lower Monumental and Little Goose Projects.

5. Additional staff comments are inclosed.

2 Incl
1. 5 cys wd (10 cys fwd sep)
Added 1 Incl
2. Staff Comments

RICHARD A. CHIDLAW
Colonel, Corps of Engineers
Division Engineer

DAEN-CWP-V (7 Feb 75) 2nd Ind
SUBJECT: Design Memorandum for Wildlife Habitat Development, Lower Snake River Project, January 1975

DA, Office of the Chief of Engineers, Washington, D.C. 20314 26 June 75

TO: Division Engineer, North Pacific

Subject Design Memorandum is approved subject to comments included with 1st Indorsement and the following:

a. Prior to the acquisition of the fee parcel of Site 15-N, a report must be submitted to Congress in accordance with the Fish and Wildlife Coordination Act.

b. It will be necessary to renegotiate the easement interests of those landowners whose reservations do not restrict their cattle watering access to specified areas. A REDM, in letter form, shall be submitted to the Chief of Engineers for his approval of these acquisitions. Congressional approval is not necessary.

c. In those instances where the landowners' easements already restrict their cattle watering access to specific corridors, the construction of a fenced right-of-way would not constitute an interference with their easement interest. Therefore, no additional interests need to be acquired from these landowners for this action.

d. Since the DM proposes extensive habitat development for migratory waterfowl (geese), it should be coordinated with the U.S. Fish and Wildlife Service.

FOR THE CHIEF OF ENGINEERS:

for ADOLPH A. HIGHT
Colonel, Corps of Engineers
Assistant Director of Civil Works,
Pacific

1 Incl
1. wd incl
2. Staff Comments

NPDPL-ER 15 May 1975

NPD STAFF COMMENTS ON DM FOR
WILDLIFE HABITAT DEVELOPMENT
LOWER SNAKE RIVER PROJECT, JAN. 1975

1. Acquisition of easements to restrict cattle watering access to specified corridors may be required in some instances where such rights were not specifically delineated in reservations to the owner at time of purchase. However, in most cases, specific corridors were designated at time of purchase and it appears re-negotiation of watering rights will be minimal and generally isolated in nature. Insofar as those areas where stock watering access easements are described, it is the opinion of this office that the right-of-way can be fenced without further negotiation with the owner, other than notification of the Government's intention to do so. The design memorandum on page 97(3), Habitat 24-S, refers to watering rights as leases, whereas the terminology is more correctly perpetual easements.

2. The only land acquisition proposed in the subject DM is a fee parcel at site 15-N. This parcel and all other acquisition for Lower Snake River fish and wildlife compensation will be included in the report covering that feature now being prepared for submittal to Congress. Acquisition of the land at site 15-N will be under standard Corps acquisition procedures and condemnation will be utilized if negotiated purchases cannot be accomplished, since the need for the land is apparently justified and upon Congressional authorization, the land will be acquired by the Government.

3. The District intends that additional alternative irrigation systems and development plans are to be analyzed during preparation of plans and specifications. To assure that the best plan is selected, we believe that all alternatives should have been analyzed to the fullest extent possible prior to the preparation of plans and specifications.

4. Since the use of floats for goose nesting is an experiment, consideration should be given to testing a number of different types that might result in greater acceptability, durability and lower cost.

5. The boundary of site 31-S begins at the dam, not Offield Canyon. Although there may be no seasonal conflicts, it should be recognized that Offield Canyon is designated as an intensive recreational use area in the existing Master Plan.

6. Regarding power supply lines to proposed irrigation pumping sites, consideration should be given to underground power lines for esthetic purposes as required in the proximity of recreation areas.

7. An important aspect apparently overlooked is the fact that planted trees, the presence of game and the existence of the floats will attract people. A positive public control program will be necessary to minimize adverse impacts on the wildlife purposes of this project. Properly done, this could be accomplished by offering the public an educational-interpretive experience involving the wildlife resources as a part of our ongoing visitor programs. Such a program could be designed to keep people away from sensitive areas as necessary.

8. Regarding the discussion on the Palouse River Canyon beginning on page 110, a recent value engineering study by the District has resulted in elimination of the proposed trail along the Palouse River from Lyons Ferry to the State Park.

9. Page 114, last line - 61% should be 72%.

DESIGN MEMORANDUM

FOR

WILDLIFE HABITAT DEVELOPMENT

ON PROJECT LANDS

Lower Snake River Project

JANUARY 1975

U. S. ARMY ENGINEER DISTRICT
WALLA WALLA, WASHINGTON

assisted by

WIRTH ASSOCIATES
Billings, Montana - Phoenix, Arizona

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Lower Snake River Project
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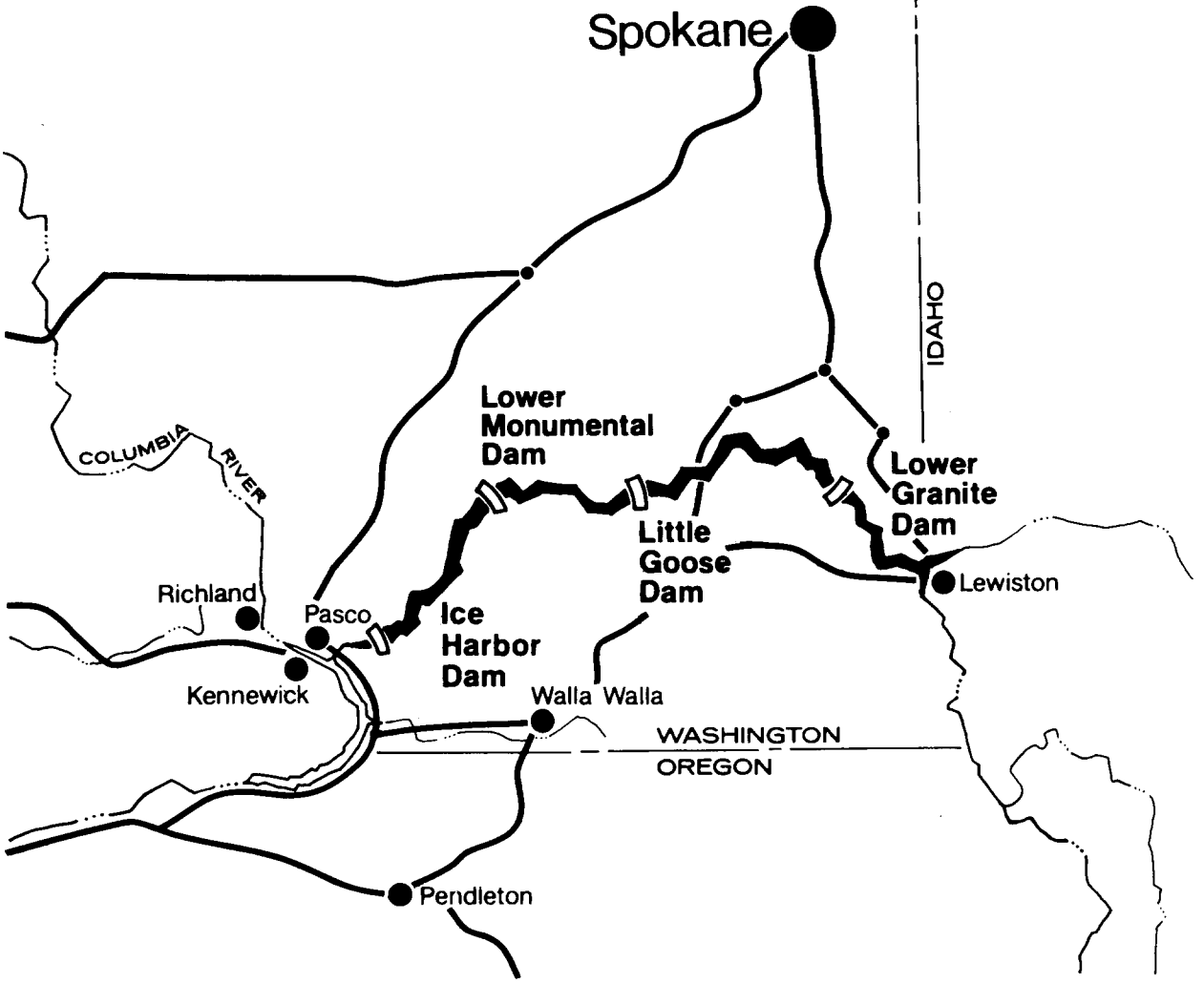


1

INTRODUCTION

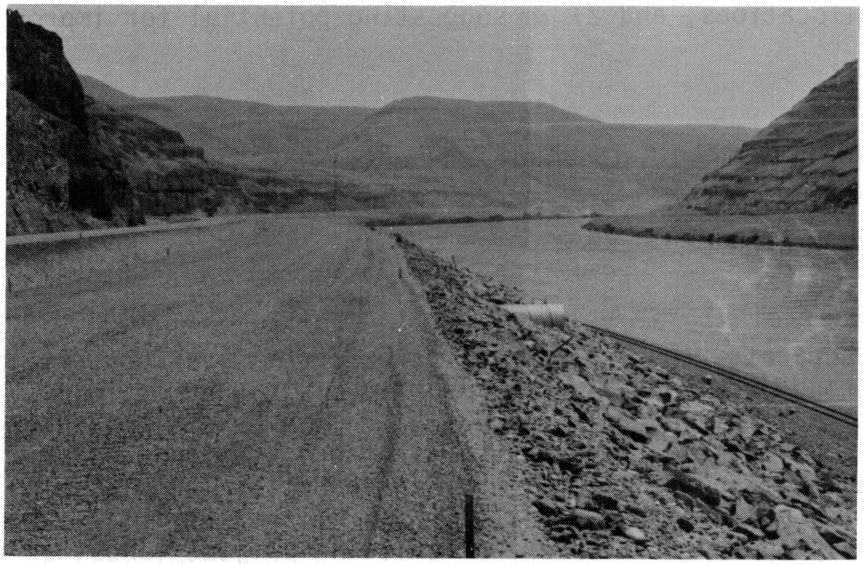
The twofold purpose of this report is to discuss physical characteristics that suggest potential to support wildlife on 22 areas selected from project land administered by the Army Corps of Engineers in the Lower Snake River Project, and to recommend appropriate wildlife management practices to develop carrying capacity on these areas. The 22 areas vary in size from approximately 30 to 770 acres, and for the purpose of identification are referred to as Wildlife Habitats in this report. They occur as irregular shaped parcels of land bordering Ice Harbor, Lower Monumental, Little Goose, and Lower Granite Reservoirs (Lower Snake River Project) between normal operating pool level and project boundary. In two cases project lands supporting good wildlife habitats extend inland for relatively short distances along the sides of tributary streams - Alkali Flat Creek and the Tucannon River. The 22 sites were defined on the basis of a composite of factors including soil, vegetation, water, animal use, and land use.

Procedural guidelines for conducting the survey on which this report is based indicated that all project lands could be considered for assignment to wildlife use, irrespective of whether certain lands were presently indicated for other use or if other land-use agreements had been made. Lands previously assigned to wildlife use were evaluated by the same criteria used in studying wildlife potential of all project lands.

One of the difficult aspects of evaluating river development schemes is determination of such intangibles as the impact of impoundments on wildlife and habitat. In this instance a large population of resident and migratory waterfowl, harvested by the entire western United States, and an important regional population of upland game are affected by destruction of much wildlife habitat on parts of about 280 miles of shorelands and on numerous islands by construction of the four dams and reservoirs which comprise the study area. No meaningful analysis of the impacts of these dams should ignore or minimize such a related resource, yet waterfowl and upland game losses are widely debated and compensation for these wildlife losses is conjectural. Why does this occur? First, there are few valid methods of determining harm (or possible benefits) to these wild animals. Likewise, there is no valid and widely accepted way to assign a dollar value to esthetics and quality hunting - the basis on which the professional field of wildlife management was founded. Finally, various agencies involved in river development schemes have widely differing economic and political interests in wildlife losses and their mitigation. As a consequence of these imponderables, compensation for wildlife losses usually winds up in a cellar position compared to monies allocated for other resource developments in water management schemes.

What is important to remember in evaluating compensation for wildlife losses in the Lower Snake River Project is that if every

acre of project land were dedicated to intensive management for wildlife, and if all the slopes between the project boundary and the canyon rim from Ice Harbor Dam to Clarkston were reserved expressly for wildlife such compensation would fall short of full restitution for wildlife losses resulting from the four impoundments. This conclusion is based on the fact that before impoundment there were miles of subirrigated riparian habitat along the river banks. Most of this habitat has been or will be flooded thereby precluding development of an equal sized area of equal quality on project lands. Translocation of a highway and railroad resulted in stripping, or covering by riprapping, much non-project land that formerly supported valuable wild-



Translocation of a railroad and highway plus much riprapping along the north bank of Lower Granite Reservoir leaves little soil for developing wildlife habitat on project land.

life habitat.

Recommending possible ways to provide full compensation for wildlife losses, however, is not a part of this report which involves project lands only.[1/] The intent here is to emphasize the importance of careful and scientific selection of project lands for wildlife improvement and the necessity for conducting management practices on these lands that will result in maximum improvement of wildlife habitat.

Selection of wildlife habitats was based on the status of six physical characteristics or criteria. These criteria were assigned status levels and used for developing a matrix which served a two-fold purpose: 1) in final selection of wildlife habitats by comparative rating of criteria levels with those of other recommended land use allocations, and 2) in suggesting potential for improvement.

The criteria matrix is shown on page 107 of this report.

1/ A separate report entitled "Lower Snake River Compensation Plan" is being prepared for submittal to obtain Congressional authorization. This overall compensation plan covers the full needs and opportunities, including use of private lands under easement and willing-seller purchase agreements. The plan also includes fish hatchery proposals.

The proposed development of existing project lands, as outlined in this design memorandum, is consistent with the overall compensation objectives; however it is considered that project land habitat development can proceed without the special new Congressional authorization which is required for the balance of the overall compensation plan. One exception to this is noted on the bottom of page 116 of this report.

A. CRITERIA USED FOR HABITAT SELECTION

A field inventory was conducted over a four-month period to determine the status of the physical characteristics of all project lands as they pertained to wildlife. The field check sheet which follows was used in accomplishing this task. Working maps were prepared from the check sheets in order to evaluate all possible wildlife habitat improvement areas. The information gathered is too voluminous to include in this report, however, the detail of the investigation is evidenced by the field check sheet. In addition, a soils survey using USCS information was conducted for use in this report and others. A description of soils is attached as Appendix F.

1) Soil Characteristics. The Lower Snake River Project is located on a tilted plateau that extends eastward from the Columbia Basin across southeast Washington to the forested foothills of the Moscow Mountains in western Idaho. This plateau is topographically characterized by undulating soils over basalt. Reservoir impoundment resulted in replacement of rich alluvial bottom land soils by rocky dry steep slopes with practically no soil. On some of the remaining gentle slopes shallow soil occurs; deep soil is rare generally occurring as sandy alluvial deposits.

All too often in land classification and allocation some soils are of such low quality that they are of little use for anything, so the decision is made to give them to wildlife. This type decision is not acceptable because such soils cannot support vegetation which will support a diverse and rich fauna. In contrast, the present

WILDLIFE INVENTORY - LOWER SNAKE RIVER PROJECT - FIELD CHECK SHEET

Reservoir:_____Site#_____Date_____

SOILS

Erosion potential: high____, med. ____, low _____
Quality of vegetative cover for soil: exel.____, good_____, poor_____
Depth_____, Series_____, Characteristics_____
_____

PLANT COMMUNITIES (All in Agropyron-Poa Zone)

Give plant association(s)_____, _____
Give plant community _____, _____
Species in community _____, _____
_____, _____
Available water (precipitation) _____, (subirrigation) ____
Future areas of succession: _____
_____
Geographic quantity of community (region) _____
(locality) _____
Plant density 75-100% _____50-74%____25-49%____0-24%_____
Canopy coverage (high)_____, (med.)_____, (low)___
Rare-endangered plants (known)_____
(Potential habitats)_____
Sensitivity to modification (long short-term change)_____
(ability to revegetate)_____
Adjacent vegetation (out of take-line)_____
_____
Existing disturbances and their reduction of ecological values:
(roads)_____
(R.O.W.)_____
(overgrazing) high_____, (med.)_____, (low)____
(farming) high_____, (med.)_____, (low)____

ANIMAL COMMUNITIES

Species in most used plant communities:_____
_____
_____
Rare-endangered animals (known)_____
(Potential habitats)_____
(sensitivity to change) high_____, (med.)_____, (low)____

IMPACT OF INUNDATION ON WILDLIFE

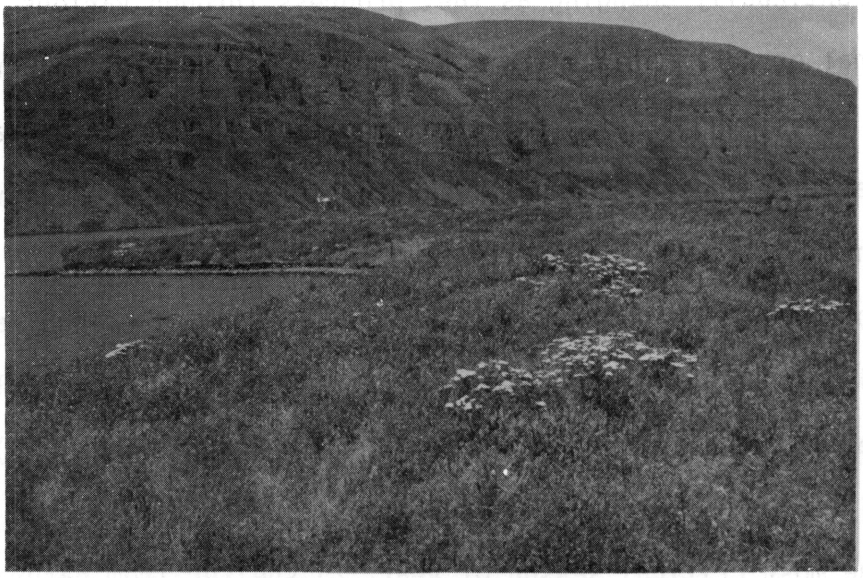
Species abundant before inundation:_____
_____
_____
Species remaining post-inundation:_____
_____
_____
Characteristics of area desirable to animals (by species)_____
_____
_____
_____

study has included basic soil data as important information. Scientists have long recognized that the best soils produce the best crops, animal and vegetable, in both quantity and quality.

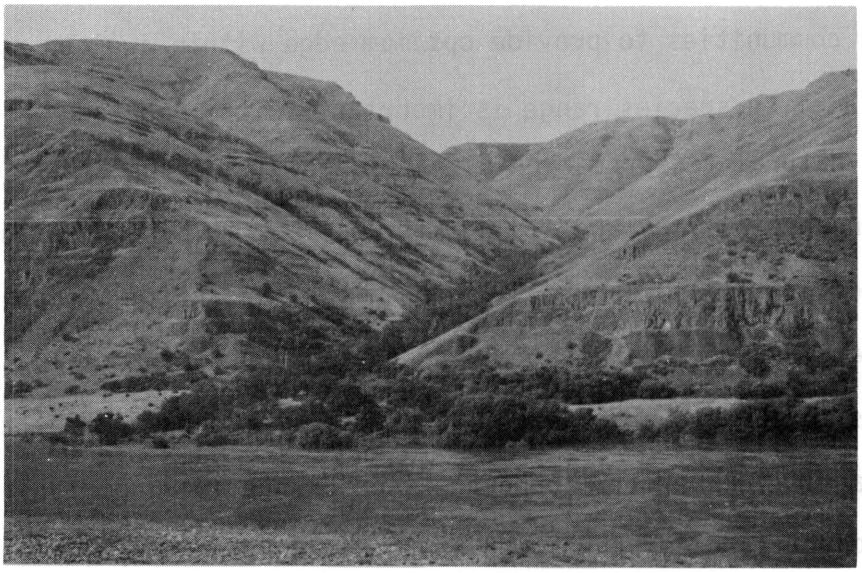
The importance of high quality soil to wildlife was appropriately summarized by Denney (1944) who states that; "The abundance of any species of wildlife within an occupied range is basically determined by the fertility of the land, and secondarily by the type and intensity of land use." Equally appropriate is the conclusion by Albrecht (1946) who concluded that; "The soil fertility is the raw material by which we run a wildlife factory, and the product put out by it is no more numerous and no better in quality than is allowed by the stock of raw material in the soil for growing it."

2) Vegetation Characteristics. The entire Lower Snake River Project occurs within the Agropyron-Poa (bluebunch wheatgrass-bluegrass) vegetation zone (Daubenmire 1970, p. 5). Local topographic and soil features, kinds and degree of disturbances, and a precipitation gradient from lower to upper end of the project caused by the tilted plateau, have resulted in development of many plant communities within the project. Generally, the lower reaches of the project are dominated by grasses and forbs, and shrub communities become progressively more abundant in proceeding toward the upper end of the project. Thus the lack of shrubs and greater open expanses of the lower part of the project attracts more waterfowl and has greater potential for development of their habitat than the upper parts of the project which is more attractive and has greater potential for upland and big game.

Intensive land use is causing rapid disappearance of Scabland Sagebrush which is a valuable plant for upland game cover.



Deep alluvial soil of Swift Bar supports dense herbaceous cover of high value to upland game and waterfowl for nesting and feeding. Photo taken 6 June 1974.



The slopes and tributary canyons of Lower Granite Reservoir support more woody vegetation than occurs in the lower reaches of the Lower Snake River Project.

(pre-impoundment photo)

Wherever wild animals occur they live by racial affinity in homes or habitats comprised of plant communities. These communities are continually changing as they progress through various successional or seral stages from bare ground to annuals, to perennials, to forbs, and finally to climax vegetation of prairie grasses, forest trees, or aquatic communities. In the entire sequence from denudation to climax there usually is only one succession stage (or combination of several) which will support, in real abundance, an animal belonging to that succession. Density of an animal population is determined by a vegetative community which provides: 1) a food supply which is generally far greater than the animals can consume at the most critical season of year, 2) shelter from natural enemies of such high order that the effects of predation are negligible, and 3) shelter from the elements precluding climatic disaster. In addition the location, configuration, and juxtapositioning of vegetative communities to provide optimum edge within a given space or within a given species range is important to the habitat. When these natural resource requisites are fulfilled, animal population abundance will go up, and density will be in direct ratio to the combined available resources of the given land unit. The wildlife manager must remember that all such abundance in preclimax successions is temporary, and changes as the habitat grows out of the maximum stage which permits abundance (see Grange 1949, p. 135).

On project lands of the Lower Snake River Project habitats studied were frequently made up of one or occasionally several plant communities. Some of these habitats had not reached a stage of good

Upland game, deer, and non-game animals thrived in riparian habitat of the quality shown in this photo taken before removal for impoundment of Lower Granite Reservoir, 1971.

food or cover production but several years from now could support far more animals. Thus habitats were evaluated in respect to both their present utility and their future potential to wildlife.

3) Water Availability. According to Thornthwaite's (1948) classification which assumes six inches of soil moisture storage, annual evapotranspiration for a study plot near Clarkston in the bluebunch wheatgrass-bluegrass vegetation zone is 13.1 inches. The entire zone is hot and dry in summer, with precipitation in the form of rain or snow occurring in winter.

Although natural plant communities, as well as agricultural crops, require reasonably deep and fertile soils for optimal growth, both types of vegetation will achieve maximum development only where water requirements are maintained during the growing period. Importance of available water for plant growth is clearly indicated by Allen (1962) in stating that; "Nearly 30 percent of the crops in 11 western states are irrigated, and this acreage produces more than half the agricultural income."

Natural vegetation on most upper slopes and uplands surrounding the Lower Snake River Project is sparse and of low stature reflecting semi-arid conditions. On subirrigated lands of deep alluvial soil bordering permanent water supplies, riparian vegetation of trees and shrubs grows profusely and luxuriantly. Thus availability of water is an important factor for development and maintenance of wildlife habitats on project lands of the Lower Snake River Project.

4) Slope of land. The higher elevation of the tilted plateau above the

MEAN TEMPERATURE AND PRECIPITATION OF THE LOWER SNAKE RIVER AREA

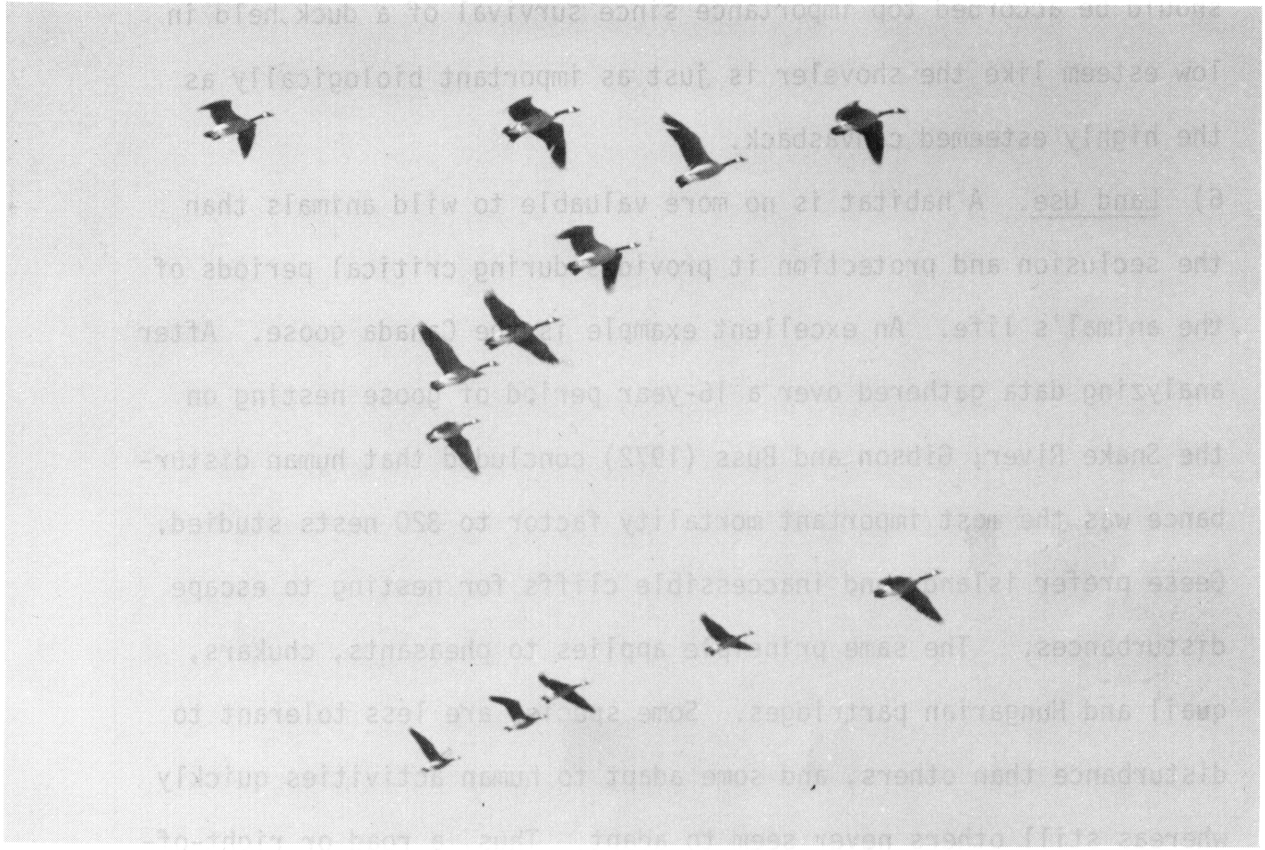
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Lewiston													
Mean Temp.	33	38	46	54	62	68	77	75	66	54	41	36	
Mean Precip.	1.41	1.17	1.18	1.09	1.46	1.51	.48	.47	.92	1.23	1.48	1.45	13.85
Wawawai													
Mean Temp.	36	40	47	55	62	68	76	74	67	56	43	39	
Mean Precip.	2.43	1.80	2.01	1.23	1.38	1.58	.30	.38	1.03	1.63	2.38	2.59	18.74
Kennewick													
Mean Temp.	32	38	47	55	63	69	75	73	65	54	42	36	
Mean Precip.	1.05	.82	.56	.48	.54	.63	.17	.14	.33	.73	.95	1.09	7.49

upper end of the Lower Snake River Project results in a cooler winter than occurs at the lower end of the project. This cooler winter climate together with slightly higher average precipation is associated with and very probably responsible for woody plant growth in the upper part of the project.

Degree of slope is directly related to rate of water run off and indirectly related to water percolation. Slope exposure to sun and wind is also important. On south facing slopes evaporation rate is relatively high since these slopes are exposed more than others to the sun and prevailing southwesterly winds. Thus north facing slopes of Lower Granite and the upper part of Little Goose Reservoir have more woody vegetation and support more upland game and deer than the drier south facing slopes. Considering the low average annual precipitation for the Lower Snake River Project, loss of any water through run off or evaporation has a significant impact on plant growth which is fundamental to quality of wildlife habitats.

Although degree of slope has not been given equal weight to soil, water, and vegetation characteristics, slope has been included in evaluation of wildlife habitats on project lands of the Lower Snake River Project.

5) Animal Status. Evidence of animals associated with or using wildlife habitats was recorded and used in habitat evaluation. Direct sightings of animals, tracks and trails, droppings, dens, nests, and reports (sightings and hunter kills) provided information on kind and extent of animal use of habitats. Occurrence of rare and endangered

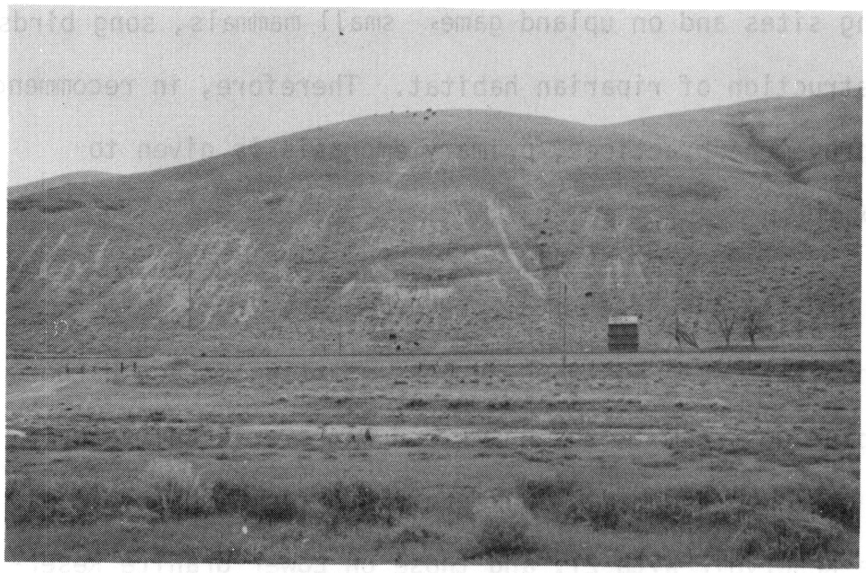


Many people rank Canada geese highest in grandeur among all wild animals living in the Snake River Canyon.

species, threatened species, or those placed on the National Audubon Society's Blue List, was given special consideration in studying and evaluating habitats. No attempt is made to rank animals in order of their importance or value. An economist might consider deer the number one species on the basis of dollars spent in connection with deer hunting. A statistician might choose the most frequently shot chukar as the top species. Many waterfowl hunters would argue that the Canada goose provides the highest quality hunting of all game animals. Finally, the wildlife technician could rightly claim that a rare species

should be accorded top importance since survival of a duck held in low esteem like the shoveler is just as important biologically as the highly esteemed canvasback.

6) Land Use. A habitat is no more valuable to wild animals than the seclusion and protection it provides during critical periods of the animal's life. An excellent example is the Canada goose. After analyzing data gathered over a 16-year period of goose nesting on the Snake River, Gibson and Buss (1972) concluded that human disturbance was the most important mortality factor to 320 nests studied. Geese prefer islands and inaccessible cliffs for nesting to escape disturbances. The same principle applies to pheasants, chukars, quail and Hungarian partridges. Some species are less tolerant to disturbance than others, and some adapt to human activities quickly whereas still others never seem to adapt. Thus, a road or right-of-way, a railroad, the wake and noise of a high speed boat, overgrazing by domestic stock, or various farming practices can render useless a habitat that would otherwise be highly useful to wildlife. Notable among farming practices is the mortality to pheasants during the nesting season by power drawn hay mowers. Ready access by humans to wildlife habitats often results in unintentional disturbance, vandalism, and poaching. High speed traffic can and does kill more wild animals in some areas than hunters shoot legally. In certain cases recreation activities are compatible with certain wildlife use; in others such activities are semicompatible, and in still others they are incompatible. For example, a trail for hikers should not be close



Overgrazing by cattle caused disappearance of vegetation and finally resulted in soil erosion on this slope in upper Alkali Flat Creek Wildlife Habitat (note light vertical streaks on slope). Photo taken in April 1974.

to a falcon's territory. Also a boat launching and landing site in conjunction with a recreation area (such as Central Ferry) is completely incompatible to nearby goose nesting, particularly with a high speed highway and a port facility close to the area. In winter after recreational activities have subsided or ended, parts of this same recreation area with green grass might be valuable as a grazing area for geese wintering in the vicinity. In studying the potential impacts of these land use activities on habitability of wildlife habitats, emphasis was directed to the animal species most involved and to the probability of increased future disturbance in specific locations.

Changes in land use resulting from impoundment and direct effects of impoundment had their greatest impact in resident Canada geese by flooding nesting sites and on upland game, small mammals, song birds, and deer by destruction of riparian habitat. Therefore, in recommending habitat improvement practices, primary emphasis is given to a variety of species.

B. DESIGNATION OF HABITAT AREAS

Wildlife habitats were assigned numbers starting at Ice Harbor Dam and proceeding upstream to the upper end of Lower Granite Reservoir. Numbers on Lower Monumental Reservoir started with 11, those on Little Goose Reservoir with 21, and those on Lower Granite Reservoir with 31. Numbers referring to habitats on the south bank are followed by the letter S; those on the north bank are followed by the letter N.

All wildlife habitats are identified by the above numbering system on Maps 2 through 5. Approximate boundaries are indicated on these maps by straight lines drawn at the upper and lower extremity of each habitat. The maps are found following page 125.

C. OPTIONS FOR WILDLIFE DEVELOPMENT

Numerous options or techniques were considered for wildlife habitat development. Five of these techniques were ultimately selected for their economic and biologic feasibility in improving the 22 wildlife habitats of the Lower Snake River Project. These techniques include restricting land use; controlling grazing on ad-

jacent lands; planting, irrigating, and harvesting; installing artificial nesting structures; stocking game farm pheasants and/or developing a vegetation nursery. Aspects of these options are discussed on the following pages, with the specific development program outlined for each site in a later part of this report.

Present vegetation on New York Island provides excellent goose nesting habitat; nesting geese are hidden by herbaceous plants yet they can detect approaching danger by lifting their heads above the plants. Photo taken 6 June 1974.

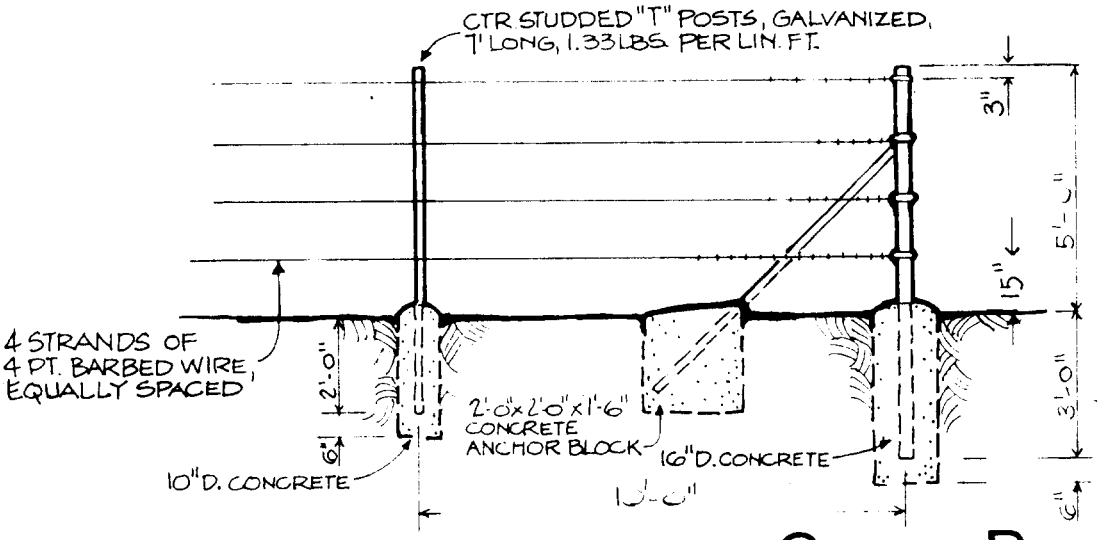
1) Restricting Land Use. On several wildlife areas, and particularily along the south side of Lower Granite project, native vegetation now supports good wildlife populations. In these several areas there is no need to make habitat plantings. Natural habitat improvement will occur if cutting, burning, grazing, and other land use is restricted

on these lands. Fencing is proposed in these several areas, which may be inside or outside of the designated habitat areas, in order to restrict grazing or other unwanted use.

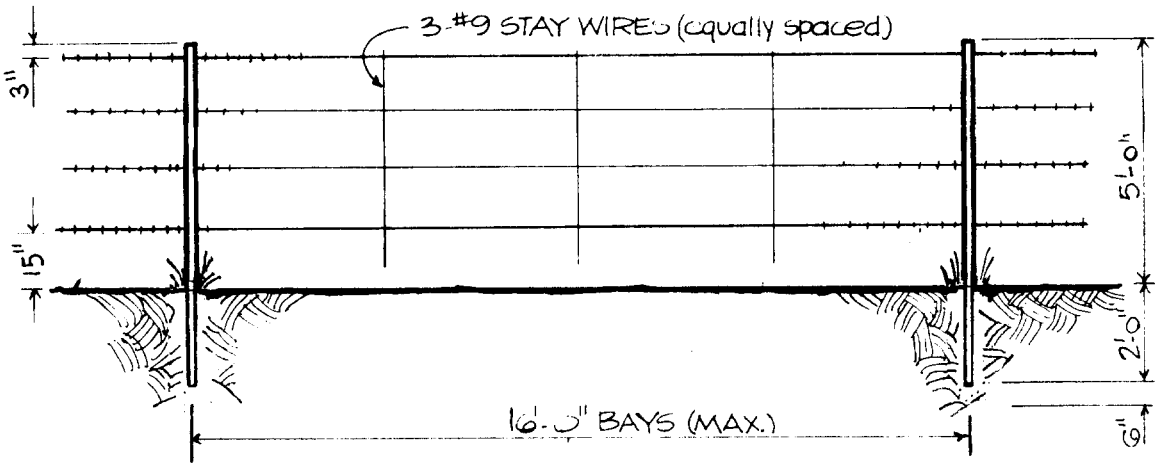
In addition it is desireable to renegotiate the present cattle watering rights on Wildlife Habitats 5-N, 8-S, 9-N, 11-N, 14-N, 21-S, 22-N, 24-S, 25-N, 26-S, and 27-N to allow a fenced corridor of about 25 to 50 feet in width, and reduce grazing and habitat destruction on these areas. Fencing is an essential need for habitat areas not already fenced by railroad right-of-way in order to exclude cattle, however, the corridors would allow the cattle watering to also continue in some areas.

A sketch of the kind of fencing to be used is shown on the next page. The posts would not be set in concrete in firm soil areas, but concrete may be needed in some locations.

2) Controlling Grazing on Adjacent Lands. In some areas adjoining project lands grazing has reached an advanced stage and is nearly universal. Such intense grazing has helped to extinguish wildlife from numerous areas, and others become non-habitable year by year. Conversely, in parts of the Snake River Canyon, where grazing is light and vegetation is sustained at annual production level, some of the best wildlife habitat and the existing cattle habitat are coextensive. In other words, grazing impact is a question of degree and is like fire - a little of it on part of the range is good for most wildlife; a lot of it all over the range is lethal.



Corner Panel



Intermediate Panel

FOUR STRAND BARBED WIRE FENCE

Between Lower Granite Dam and Alpowa Creek on the south side of the reservoir, there is much excellent habitat for deer and upland game on the slopes and in the canyons outside the project boundary. Much of this land is lightly grazed and supports excellent wildlife populations. On some areas intense grazing by cattle has greatly reduced or even eliminated upland game, deer, and nongame habitat. Controlling grazing on this area would improve habitability for both cattle and wildlife, and greatly improve the value of the adjoining wildlife habitat for all wild animals.

Even though desireable from a wildlife management point of view, control of grazing on adjacent lands is beyond the scope of this report and is not proposed at this time. It may be considered in the future as part of state game management activities or, in a limited way, it could be considered under the easement and watering device portion of the potential program of the overall Lower Snake River compensation plan. This overall plan is discussed in a separate report and will require Congressional authorization before implementation.

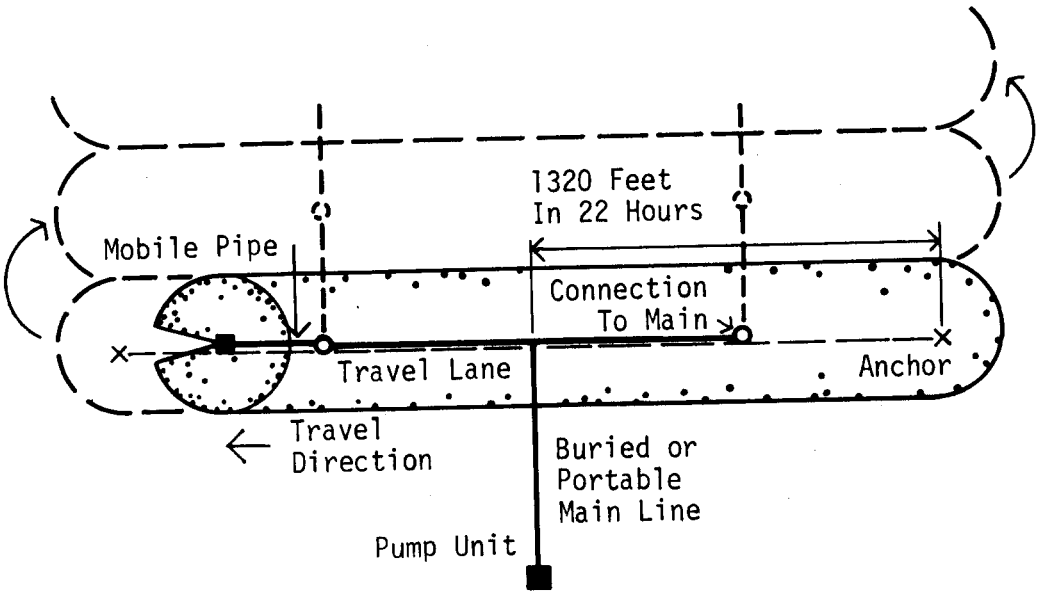
3) Planting, Irrigation, and Managing Habitats. This option provides the greatest values to wildlife of all the options by increasing the carrying capacity of the land. Among the major objectives of the food and cover planting program which follows are (a) to provide the maximum amount of food and cover for animal species found on project lands with

emphasis on upland game animals; (b) to provide this food and cover planting within optimum initial and future economic limits; and (c) to allow for a minimum of both initial and long range operation and maintenance cost.

Five schemes for planting food and cover plants, for irrigating newly planted crops and cover plants, and for managing crops are recommended for improving wildlife habitats on project lands of the Lower Snake River Project. The schemes are illustrated on the following pages and are designated as to their use at the various habitats on Plates 2 thru 5. Irrigation will be accomplished with one of two sprinkler system types with one exception at Snake River Junction (Wildlife Habitat 7N). This site was chosen as a location to test the use of a windmill to maintain a continuous stream of water in an existing intermittent stream. The objective would be to determine how this type of water source would affect upland game bird populations. Other locations which provide similar characteristics of terrain and existing vegetation may be equally suited for such a test and may be considered in lieu of this site for other reasons such as proximity to other test sites.

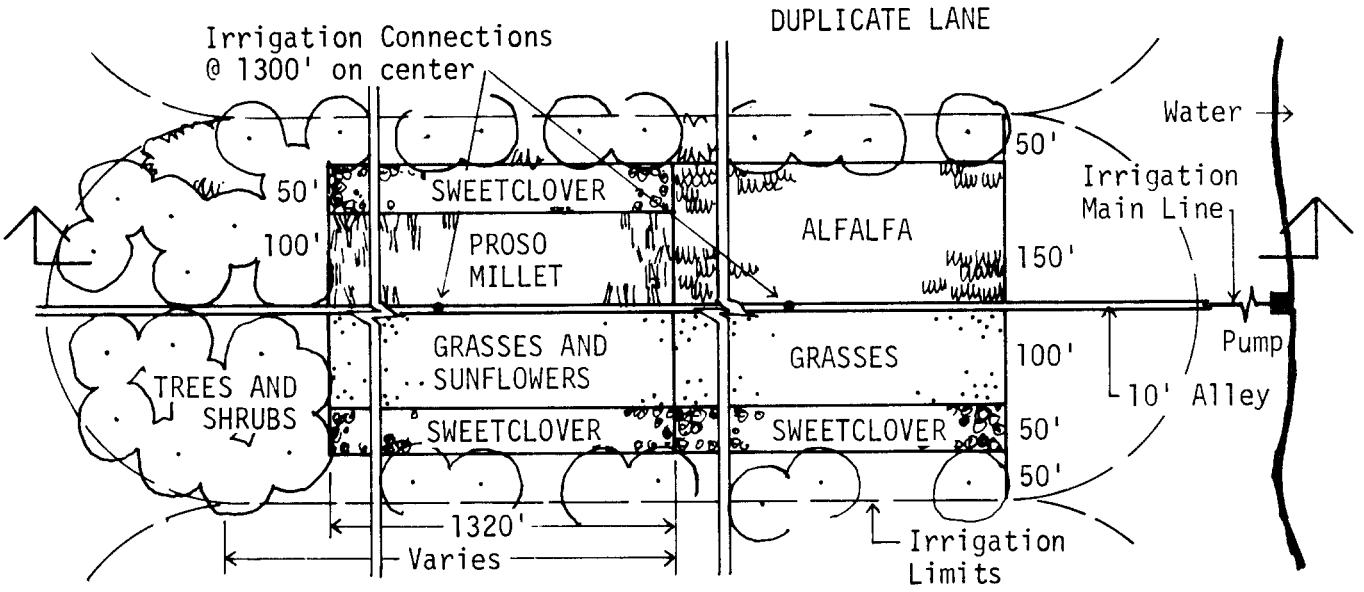
A traveling sprinkler with a coverage radius of 200 feet is the heart of one system of irrigation. It is proposed for use in schemes one, two and three. As can be seen on Plates 2 thru 5, these schemes are designated for use in conjunction with other schemes at

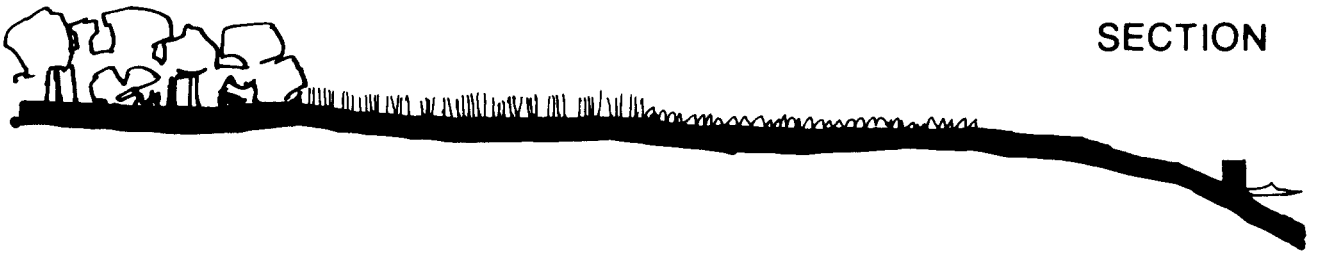
wildlife habitats 1S, 3N, 5N, 6S, 11N, 12S, 15N, 24S, 25N, 26S, and 27N. The sprinkler utilizes a solid set aluminum or plastic main-line which may vary in size from 4 to 6 inches in diameter depending on site conditions such as elevation and distance. Hose connections are spaced at 1300 foot intervals which is determined by the flexible water supply hose which is 660 feet long. It is possible to use a 1320 foot hose with connections set at 2500 foot intervals, however, in most cases this is not necessary, and for reasons of standardization, the 660 foot hose is proposed.



TYPICAL LAYOUT FOR A TRAVELING SPRINKLER SYSTEM

MANAGEMENT SCHEME 1





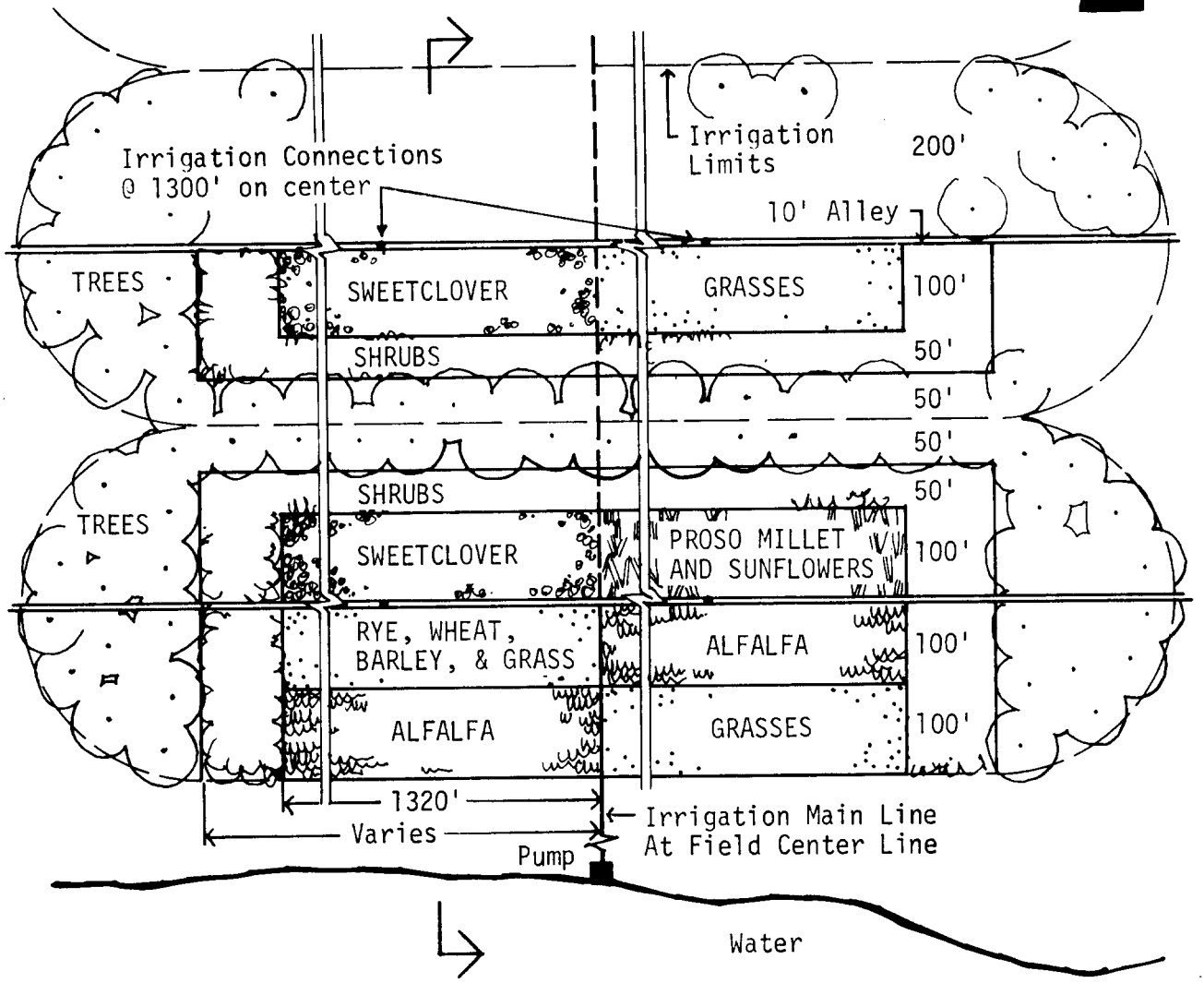
SECTION

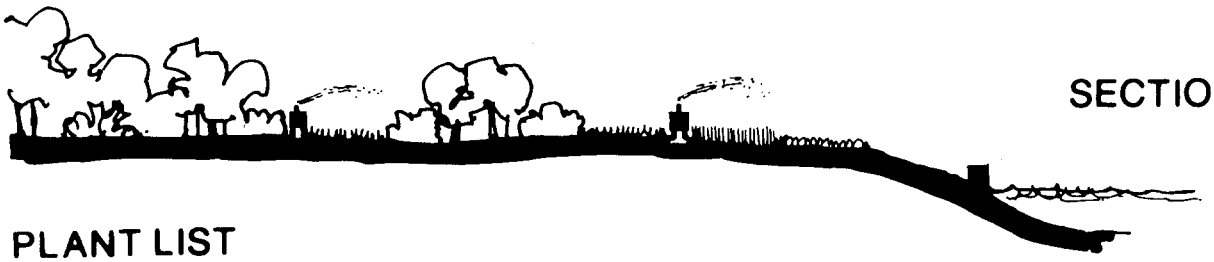
PLANT LIST

TREES	SHRUBS	FORBS	GRASSES
Black Locust	Nanking Cherry	Buckwheat	Marfed Spring Wheat
Mulberry*	Bladder Senna*	Sunflowers	Orchard Grasses
Willow	Blueleaf Honeysuckle	Sweetclovers	Meadow Barley
Sumac*	Multiflora Rose	Alfalfa	Idaho Fescue
Russian Olive	Chokecherry		Elymus
Black Cottonwood*	Snowberry		Proso Millet
	Serviceberry		Intermediate wheatgrass
	Red-Osier Dogwood*		
	Black Hawthorn		
	River Alder		
	Caragana		

*Best Results Above Little Goose Dam

MANAGEMENT SCHEME 2



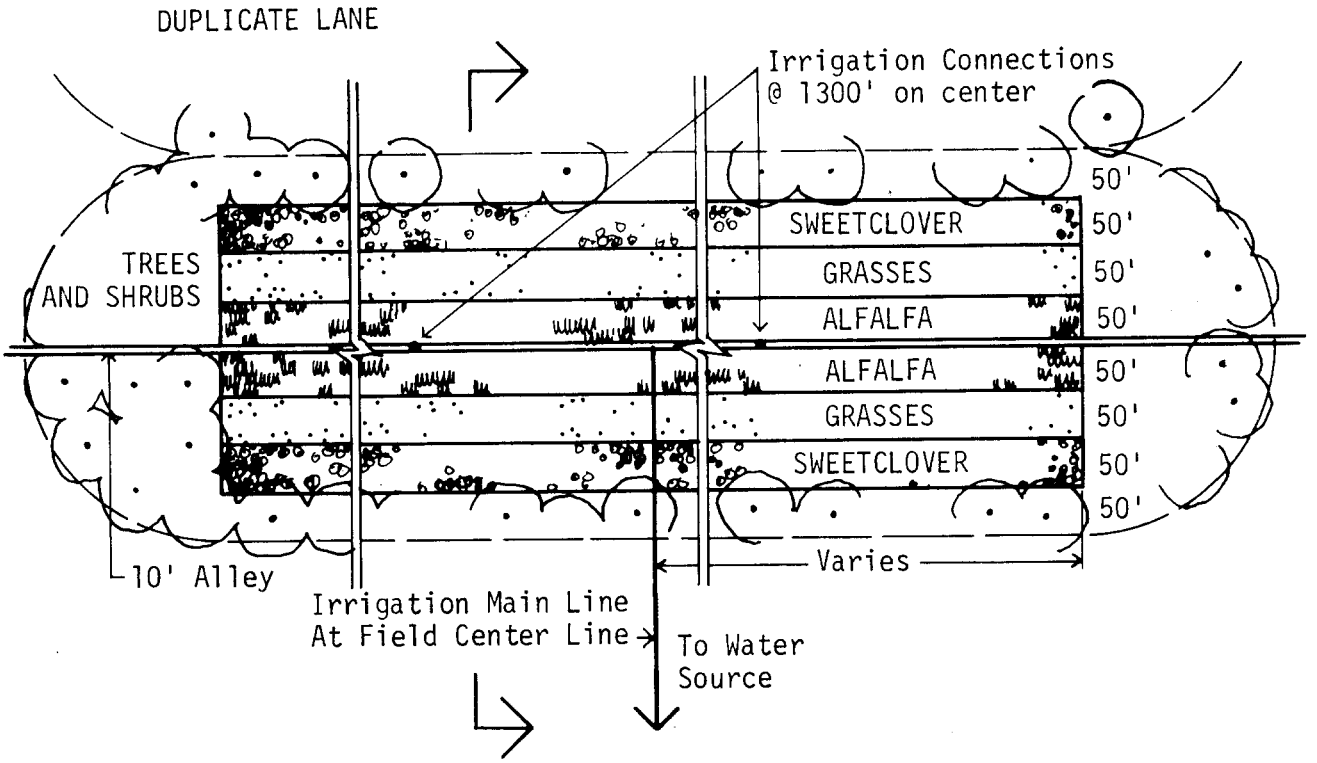


SECTION

PLANT LIST

TREES	SHRUBS	FORBS	GRASSES
Black Locust	Nanking Cherry	Buckwheat	Marfed Spring Wheat
Mulberry*	Bladder Senna*	Sunflowers	Orchard Grasses
Willow	Blueleaf Honeysuckle	Sweetclovers	Meadow Barley
Sumac*	Multiflora Rose	Alfalfa	Idaho Fescue
Russian Olive	Chokecherry		Elymus
Black Cottonwood*	Snowberry		Proso Millet
	Serviceberry		Intermediate wheatgrass
	Red-Osier Dogwood*		
	Black Hawthorn		
*Best Results Above Little Goose Dam	River Alder		
	Caragana		

MANAGEMENT SCHEME 3



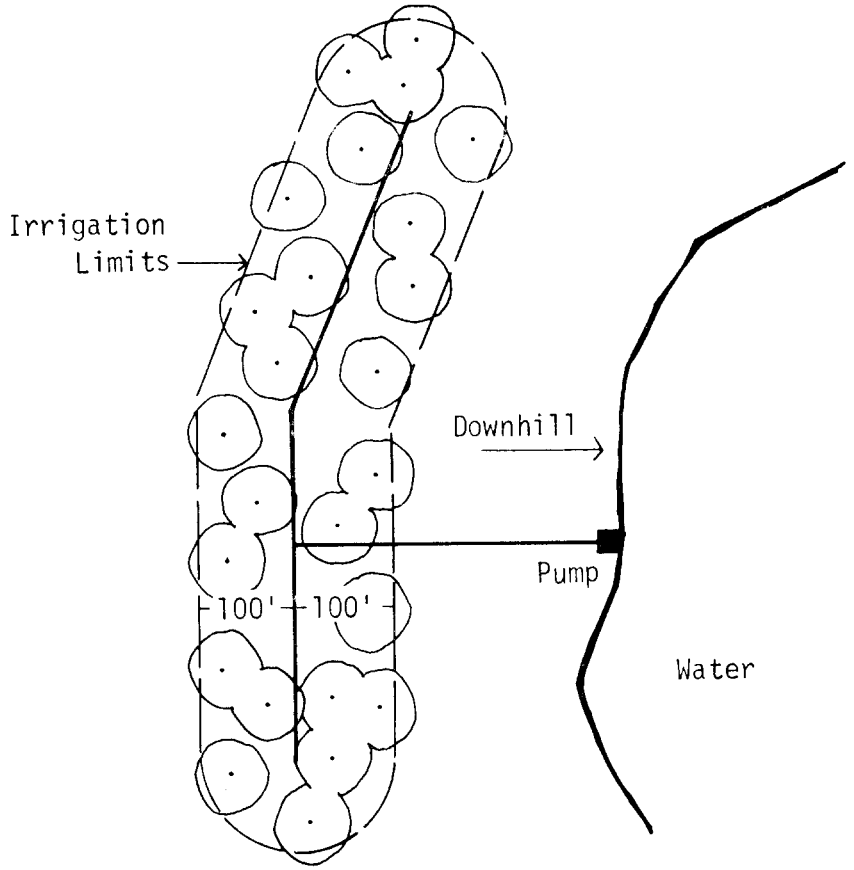
SECTION

PLANT LIST

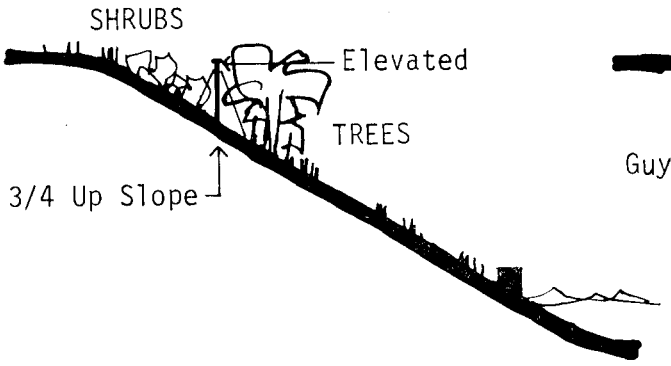
TREES	SHRUBS	FORBS	GRASSES
Black Locust	Nanking Cherry	Buckwheat	Marfed Spring Wheat
Mulberry*	Bladder Senna*	Sunflowers	Orchard Grasses
Willow	Blueleaf Honeysuckle	Sweetclovers	Meadow Barley
Sumac*	Multiflora Rose	Alfalfa	Idaho Fescue
Russian Olive	Chokecherry		Elymus
Black Cottonwood*	Snowberry		
	Serviceberry		
	Red-Osier Dogwood*		
	Black Hawthorn		
	River Alder		
	Caragana		

*Best Results Above Little Goose Dam

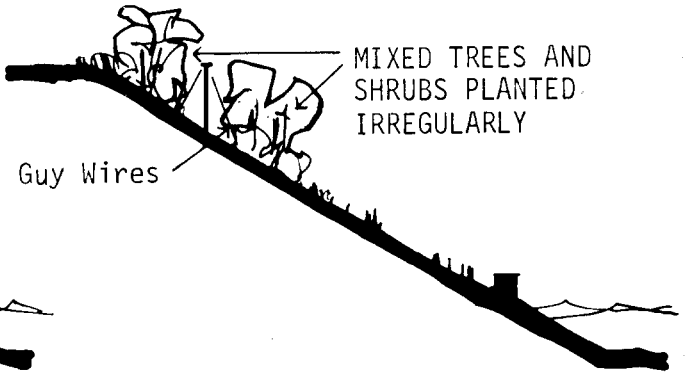
MANAGEMENT SCHEME 4 and 4a



SECTION 4



SECTION 4a

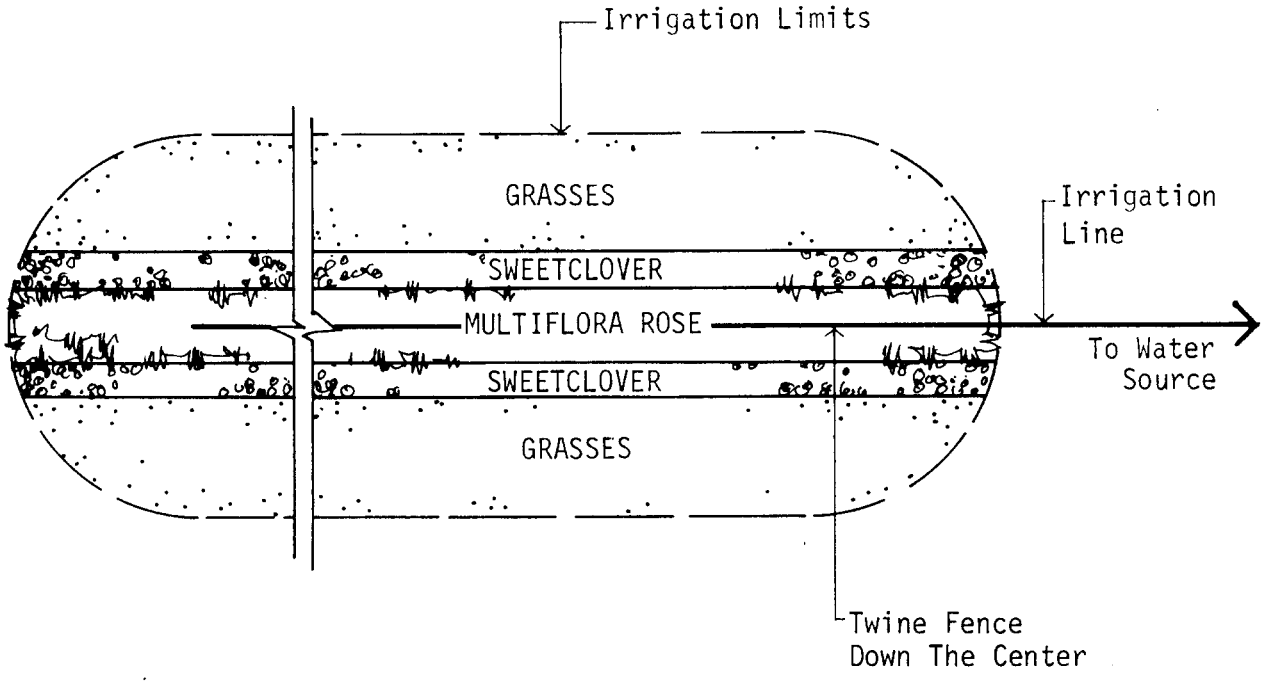


PLANT LIST

TREES	SHRUBS	
Black Locust	Nanking Cherry	Black Hawthorn
Mulberry*	Bladder Senna*	River Alder
Willow	Blueleaf Honeysuckle	Caragana
Sumac*	Multiflora Rose	
Russian Olive	Chokecherry	
Black Cottonwood*	Snowberry	
	Red-Osier Dogwood*	

*Best Results Above Little Goose Dam

MANAGEMENT SCHEME 5



PLANT LIST

SHRUBS	FORBS	VINES	GRASSES
Multiflora Rose	Sweetclovers	Clematis	Orchard Grass
		American Vetch	Idaho Fescue

Specific features of the self-propelled, mechanized, traveling sprinkler system which warrant mentioning are:

a) Water-piston traveler drive - operating on water supply pressure, the speed compensator drive assures uniformly constant speed at any of numerous travel speed settings. This drive system has few moving parts and is simple to maintain.

b) Low Cost - The system is completely mechanized so that once it is in position and attached to pre-set cable anchors and water is supplied to it, no hand labor is involved. Features such as automatic shut-off at cable anchor points and an automatic shut-off at the pump with a loss in water pressure makes unattended operation possible. This system is one of the least expensive mechanized systems available.

c) Hose and accessory equipment - A specially designed swivel riser and rear-mounted cable drum assures straight line tracking. When straight line paths are not possible, a contour cable release feature establishes automatic turning points. A horizontal hose reel trailer with air pump is used to purge water from the hose and to mechanically reel the hose for convenient movement. This increases the hose life and reduces hand labor.

With 100 psi of water pressure at the nozzle, the traveling system will maintain the necessary moisture content in most soils on a maximum of 130 acres with a 12-day maximum rotation period. None of the management areas will require such a lengthy rotation period, however, due to their size.

The other irrigation system which is used in schemes 4 and 5 utilizes 4-inch diameter aluminum pipe (hand-carry type) which is solid set and elevated nozzles. The diameter of coverage varies from 100-feet to 200-feet. This system will be used at wildlife habitats 1S, 2N, 3N, 4S, 5N, 6S, 7N, 8S, 9N, 11N, 13S, 21S, 22N, and 24S.

Both irrigation systems will be powered by electric lines wherever possible. Local power, which is considered to be close at hand within a few thousand feet or so from the proposed water pump site, is available at wildlife habitats 1S, 2N, 4S, 6S, 7N, 8S, 12S, 15N, 21S, 22N, 24S, and 26S. Distant power, indicated at wildlife habitat 13S, means that electric power is available at a greater distance than local power and will therefore be more costly to make available to the wildlife habitat site.

Portable power is indicated for use at areas 3N, 5N, 9N, 11N, 25N, and 27N. In general this means that a 6-cylinder diesel engine and high head pump to provide about 600 gallons of water per minute at about 150 psi will be required. The portable power unit can be either wheel mounted, base mounted, or it can be semi-permanently installed in a small building. This type of pump unit will satisfy water requirements for irrigation designs with 450 feet of total dynamic head.

It is important to mention that with each of the two irrigation systems, the amount of water to apply and the frequency of application will vary with local soil and weather conditions and types of crops being irrigated. For example, scheme 3 at habitat 27N will probably not require as much water per acre as scheme 3 at habitat

IS because of the difference in natural precipitation rates and differences in subirrigation. Under midsummer conditions of bright sunshine and high air temperatures, a dense stand of growing alfalfa may remove one-third inch or more of water from moist soil in a day.

Food patches, within scheme configurations, are to be rotated every three to five years and will be 1320 feet long to correspond to the maximum travel length of the sprinkler system. Food patch planting will be accomplished at three-year intervals using high quality inoculated seed planted as early in the spring as possible. All food patches will be allowed to grow voluntarily, however, alfalfa may be mown after the first of July to provide young shoots for winter browse.

Seedling plants will be used in all planting schemes. The reason for this is one of economics. A total of about 1094 acres are to be planted. The difference of cost between seedlings at about 15 cents each installed and larger stock of say three-years old or larger at several dollars each installed is considerable. Several 3 to 4-foot trees should be used, however, as planting area markers and as indicators of beaver or rodent damage. When beavers are noted in an area by means of inspecting these plants, a live trapping program should be initiated to remove the animal until the wildlife habitat is established. Rodents can be controlled by use of repellents.

Seedling trees are to be planted at about 8 to 10-feet on center. Seedling shrubs should be planted at 3 to 4-feet on center. Grasses are to be planted at a rate of 12 pounds to the acre and alfalfa at

20 pounds per acre. The cost estimates for planting the various schemes has been based on this type of planting. Local sources of planting stock will be used to the extent possible.

The sketches of the various planting schemes illustrate a rather regular type of planting, and the discussions later in this report refer to various rectangular field sizes. This has been done for ease of reference and to establish the scope of the work involved. It is not the intent that the wildlife habitat planting be done to give a "farm-type" appearance; rather during the implementation phase the planting will be tailored to fit the natural characteristics of each individual site. Grouping of trees and shrubs will be randomly spaced with forb and grass plantings to provide the most naturalistic appearance possible. Maximum use will be made of good soil areas, and local terrain configurations, including local drainage ways.

One factor which will influence the arrangement of the habitat areas will be the need for a set irrigation pattern; however, within the irrigated areas there will be many options for varied arrangement of plantings. District biologists and landscape architects will direct field location and layout of planting to accomplish the naturalistic arrangements.

In many places where habitat planting is done, it is expected that indigenous vegetation will remain and/or become established. This will be particularily true in those areas where tilling is not done and in those areas under long-term irrigation with the absence of future tillage. Increased growth of indigenous species could be

either positive or negative depending on the composition of the plant community. This aspect would have to be considered in the annual maintenance program.

4) Installing Artificial Goose Nesting Structures. Canada geese probably nested on islands and cliffs in the Snake River Canyon for many centuries. Since there probably never were trees in the canyon of the Lower Snake River Project large enough to support goose nests, ground nesting became firmly established as a behavior pattern.

Under these conditions of traditional ground nesting, a floating type of structure would seem most appropriate and acceptable by geese for nesting.

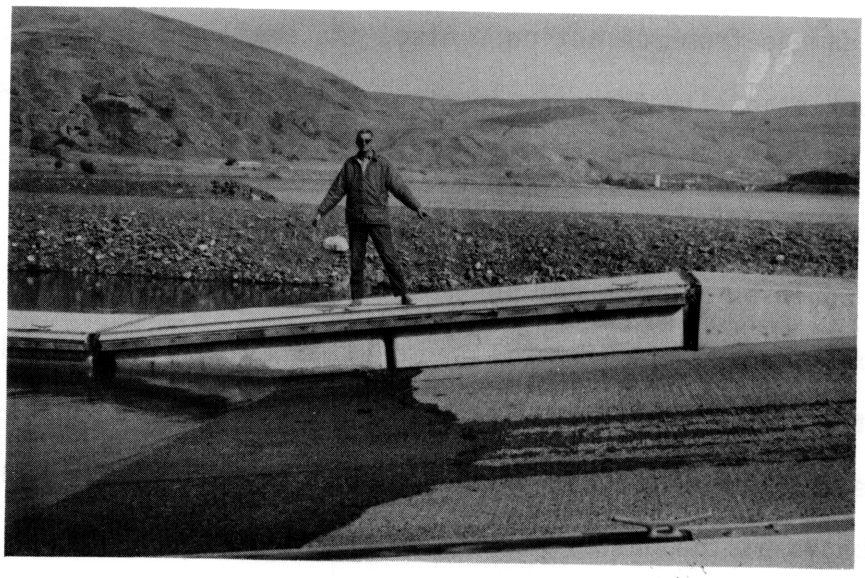
After carefully studying and evaluating designs of various floating structures, the following one was selected and is recommended for installation at 17 spots on the Lower Snake River Project. The structure, which measures 20 feet long by six feet wide, is one section of a hinged concrete dock or Unifloat used extensively by the Corps of Engineers made by Builders Concrete, Inc., "C" and Maple Streets, Bellingham, WA 98225. When placed in water the Unifloat has about 14 inches of free board. A "lip" or edge about two to three inches high should be added to the upper rim of the Unifloat so that sand and gravel placed on it will not wash or blow off easily. A steel anchor chain attached at each end of the structure should be adjusted in length to allow the Unifloat to rise and

fall with changing water levels, but not allow it to drift sideways and touch land or bottom. In addition to placing sand and gravel as a nesting substrate on the Unifloat, a small log and several pieces of driftwood should be placed near the upwind end of the Unifloat to help protect the nest from wind and water. A hinged ramp about four feet wide should be attached to one side of the structure allowing the free end of the ramp to float in the water and thus provide a walkway for young and adult geese. Vegetation may be placed on several Unifloats and not placed on others in order to see which is best.

The concrete Unifloat appears to have several advantages over the small wooden structure described and used successfully by Will and Crawford (1970) in Larimer County, Colorado. Their structure is made of wood, is relatively small, and requires removal from the water before winter for drying and storing to increase its life and prevent damage from ice action. Also, the small and light structure might lack stability for safe nesting in water areas of the size occurring in the Lower Snake River Project. The size and weight of the concrete Unifloats would assure stability even under high wave action, would be a permanent installation, and would require very little maintenance. Vulnerability to vandalism would be low because of construction. Conflicts with boaters, water skiers and fishermen could be reduced by the out of the way location, signing, and by the use of buoys at the head of the embayments.

Where space permits, a floating wooden structure such as the one referred to on the previous page should be installed near the concrete Unifloat for comparative testing on preference and use by geese. Several platform nest designs could also be evaluated in proximity to brooding areas on land. Comparative evaluations should carefully weigh and consider such things as life of the structure; silt deposition; time required for maintenance; nest damage by wind, water, and predators; and average cost per gosling produced over a projected period of up to 50 or more years.

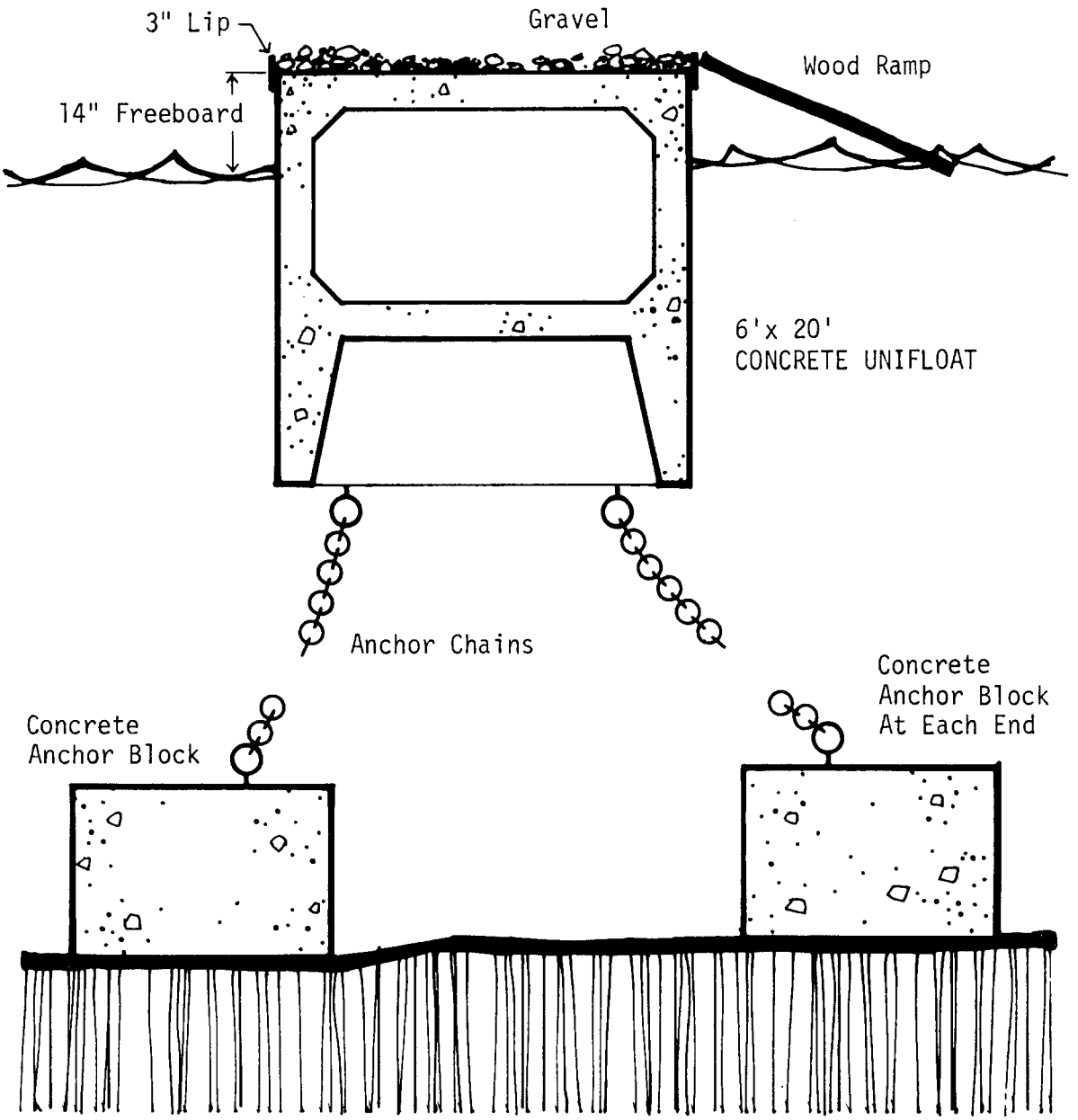
Initially, five Unifloat structures will be installed and tested for a two-year nesting period prior to proceding with the installation of the other twelve units. Should the proposed floating goose nest structures not be proven satisfactory, alternative measures would be considered.



Concrete Unifloat recommended for installation as a floating goose nesting structure.

FLOATING CONCRETE GOOSE NESTING STRUCTURE

End Section



5) Stocking Game Birds Compared to a Habitat Nursery. During the preparation of this report, considerable discussion was directed at the subject of raising and stocking of game farm pheasants as compared to developing a propagation nursery for habitat vegetation planting. Diverse opinions have been expressed concerning the relative merits of the use of game farm birds. Dr. Irvin O. Buss, professor of wildlife at Washington State University, has expressed a strong view in opposition to game bird stocking and a concurrent strong view in favor of a vegetation nursery. This point of view contends that the stocking of game farm birds is economically and biologically unsound. The opinion is based on past figures which show a high cost of producing birds, and on research information which indicate a difficulty for game farm birds to adjust and survive when placed in the wild. The annual stocking of birds for hunters to shoot is directed at satisfying immediate desires of the hunters, rather than letting hunters wait for the gradual upgrading of the habitat which then will in turn produce an increase in wild birds.

According to the Washington Department of Game, the program of stocking game farm birds is not considered to be competative in purpose with the concept of a vegetation nursery for habitat improvement. The following excerpts are taken from a letter furnished by the game department in response to a request for review of a draft of this report (See also Appendix G).

> Like fish hatcheries, game farms are designed to replace consumptive wildlife recreation in areas where seasonal habitat limitations will not allow an equal,