Potholes Reservoir
Resource Management Plan

Grant County, Washington
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U.S. Department of the Interior
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Upper Columbia Area Office
Ephrata Field Office
Ephrata, Washington

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CHAPTER 1
INTRODUCTION TO THE RESOURCE MANAGEMENT PLAN

1.1 OVERVIEW

This Resource Management Plan (RMP) was developed for the Potholes Reservoir area (Potholes Management Area), in Grant County, Washington, to provide management guidance for the land and water resources under U.S. Bureau of Reclamation (Reclamation) jurisdiction at Potholes Reservoir (Figure 1.1-1 RMP Location Map). The primary purpose of Potholes Reservoir is to receive and store irrigation return, flood and public surface waters and to provide irrigation water supply to the East Columbia Basin and the South Columbia Basin Irrigation Districts via the Potholes East Canal. The United States, acting through the Secretary of Interior and the irrigation districts will operate the Potholes Reservoir to fulfill primary purpose obligations in an efficient manner. The Potholes Reservoir will be operated in a safe and effective manner while serving these purposes.

Reclamation will meet the contractual irrigation commitments related to operation of the Potholes Reservoir. Commitments to collect return waters from the East and Quincy Districts will also be met. The reservoir will be operated within established constraints on water surface elevation necessary to meet irrigation commitments, and assure public safety and protection of property. Reclamation will meet other resource needs as feasible within the constraints of these objectives. Once these obligations have been fulfilled, Reclamation turns its attention to other resources like fish and wildlife and their habitats, cultural resources, recreational activities, and educational opportunities.

Since 1952, the land and water resources found at Potholes Reservoir have been managed under a Memorandum of Agreement (MOA) between the United States, acting through Reclamation, and the State of Washington. Under the MOA, the state - acting through the Washington State Parks and Recreation Commission (SPRC) and the Washington Department of Fish and Wildlife (WDFW) - agreed to be partners in the administration of the lands and waters at Potholes Reservoir for public recreation, fish and wildlife habitat, and related responsibilities. The existing MOA expires in 2002. Under Reclamation policy, any new management agreement will require the state to follow an approved RMP. The U.S. Fish and Wildlife Service (USFWS) assisted Reclamation with the development of this RMP by preparing the Fish and Wildlife Coordination Act Report (CAR) for the Potholes Reservoir Management Area; the CAR (Appendix A) is in accordance with the provisions of the Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). Reclamation supports the completion of this RMP for the Potholes Reservoir Management Area to direct future management decisions.

1.2 AUTHORITY

The National Environmental Policy Act (NEPA), established by Congress in 1969, provides a mandate and a framework for federal agencies to consider all reasonably foreseeable environmental effects of their actions; hence an Environmental Impact Statement (EIS) and Record of Decision (ROD) were completed for management of the Potholes Reservoir. The document focused on issues and concerns identified by the public and involved resource agencies during the scoping process. Reclamation initiated the public involvement efforts by collecting information from the public and representatives from the state and federal agencies through a series of workshops, interviews, and consultations. Responding to input from the public and the agencies' concerns, an Ad Hoc work group, Reclamation, WDFW, and SPRC developed integrated management policies and actions to ensure the use of Reclamation lands and waters at Potholes Reservoir maintain, protect, and enhance natural resources as well as provide a mixture of recreational opportunities.

The AD Hoc work group, consisting of a broad cross-section of resource, Tribal, and local agency personnel, addressed both the public and the agencies' concerns by identifying the goals and objectives of the RMP. The EIS informed decision makers and the public of the impacts associated with each alternative. Based on the outcome of Reclamation's environmental decision process, this resulting RMP was developed for the preferred alternative. As approved and adapted by Reclamation, this RMP authorizes the coordination of adaptive management to ensure all future decisions in the planning area will include a multiple-use approach to natural resources.

1.3 APPLICABILITY

An EIS was completed for Potholes Reservoir to analyze and discuss the environmental consequences associated with three management alternatives (plus the no action alternative). Reclamation study team and decision makers selected Alternative B - The Preferred Alternative. Therefore, the scope of this RMP will *only* discuss the establishment and integration of Alternative B, as selected through the EIS process, into the Potholes Reservoir Management Area. The RMP captures the overall resource goals and objectives of Alternative B and examines each Land Management Area (LMA) individually across the entire Potholes Management Area rather than examining interrelated resources found in predetermined sections of the management area. This technique is referred to as a broad-scale approach or programmatic and is particularly effective in natural resource management (Haufler et al., 1996).

Four management actions remained constant in all the alternatives because of existing laws, regulatory requirements, or Reclamation policy. Consequently, they are also included in the preferred alternative; the understanding is as follows:

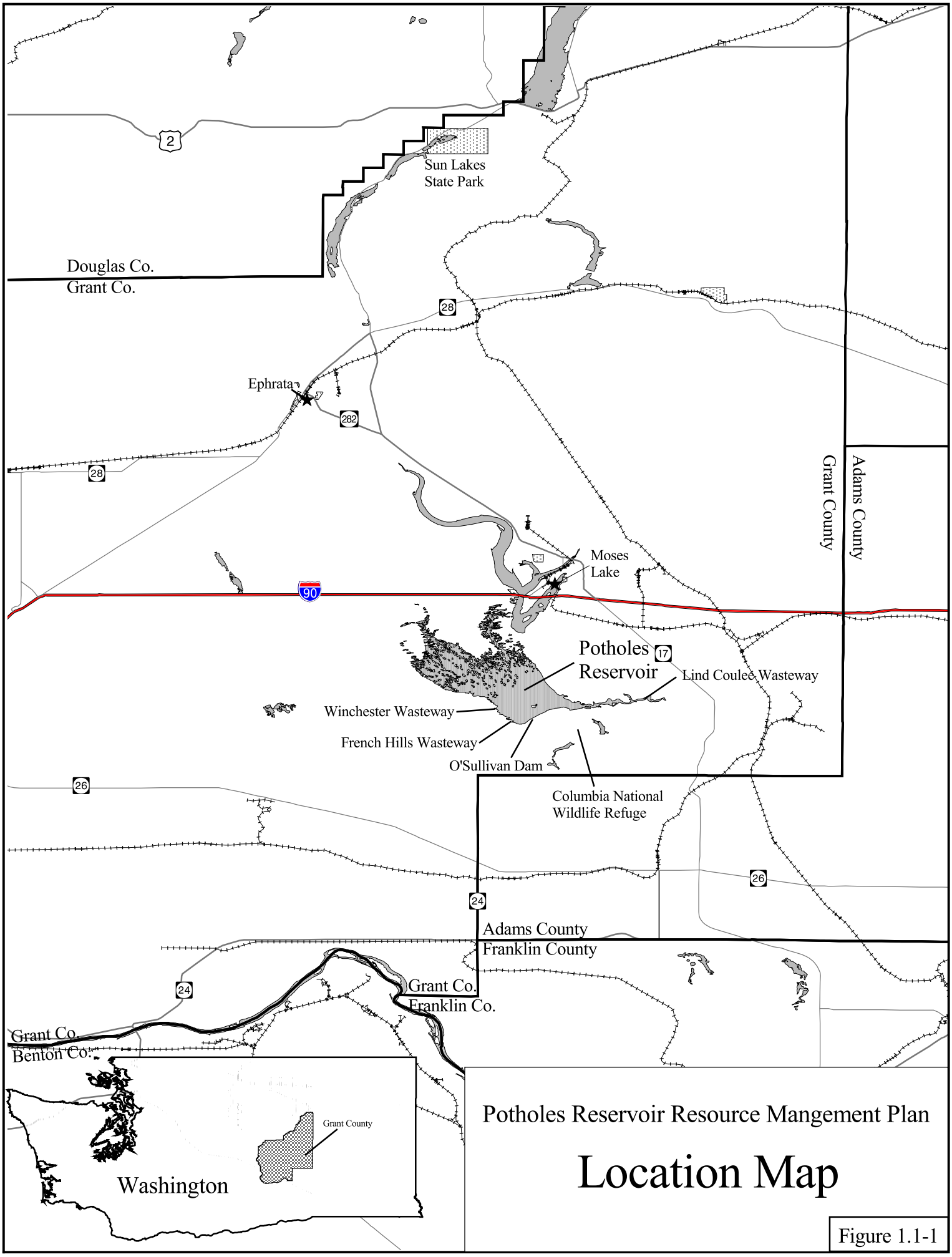

Sun Lakes
State Park
Douglas Co.
Grant Co.
Ephrata
Moses
Lake
Grant County
Adams County
Potholes
Reservoir
Lind Coulee Wasteway
Winchester Wasteway
French Hills Wasteway
O'Sullivan Dam
Columbia National
Wildlife Refuge
Adams County
Franklin County
Grant Co.
Franklin Co.
Grant Co.
Benton Co.
Grant County
Washington
Potholes Reservoir Resource Mangement Plan
Location Map

Figure 1.1-1

1) Continue to meet all contractual obligations of the 1968 contracts between the U.S. and Columbia Basin Project (CBP) irrigation districts.
2) Continue to operate Potholes Reservoir in accordance with Reclamation law and the Columbia Basin Project Act dated March 10, 1943 (Chapter 14, 57 STAT, 14).
3) Continue to meet existing operational constraints placed on Potholes Reservoir water surface elevations due to CBP contractual obligations.
4) Continue to administer Reclamation lands and waters through an updated MOA between the United States and Washington State. Day-to-day resource and recreation management activities will continue to be provided by the SPRC and WDFW with oversight by Reclamation.

1.4 PURPOSE

The purpose of this RMP is to provide management guidance and jurisdictional and administrative boundaries for the land and water resources at Potholes Reservoir for a 10-year period. Management actions outlined by the RMP will be carried out as soon as the plan is accepted by Reclamation. Revisions to the plan should occur every 10 years, but no later than 15 years after the approval of the original plan. In the interim, the RMP will act as a "living document" that may be amended as needed by land managers and resource personnel with jurisdictional authority within the Potholes Reservoir Management Area. Additionally, the RMP will provide direction for future proposed projects (while monitoring the progress of management prescriptions as they become implemented) in the Potholes Reservoir Management Area.

Changes to the EIS may require supplementary NEPA analysis and subsequent public involvement. This scenario will require an addendum document to the original EIS but will not require the preparation of a new EIS. NEPA documents do not expire; the original EIS can be supplemented with the more recent information. However, some management actions (outlined by the RMP) may require site-specific NEPA analysis, particularly with actions that require ground-disturbing activities. While these projects will be evaluated on a case-by-case basis, a new NEPA document will be required that pertains only to the management action(s) being proposed. The author should refer the readers back to the original EIS for more information; this process is known as "tiering," and it prevents the unnecessary duplication of documents. The authority to supplement the existing EIS or tier to a new EIS will be the responsibility WDFW and the SPRC with oversight from Reclamation.

1.5 PLAN STRUCTURE

The RMP is organized into seven chapters:

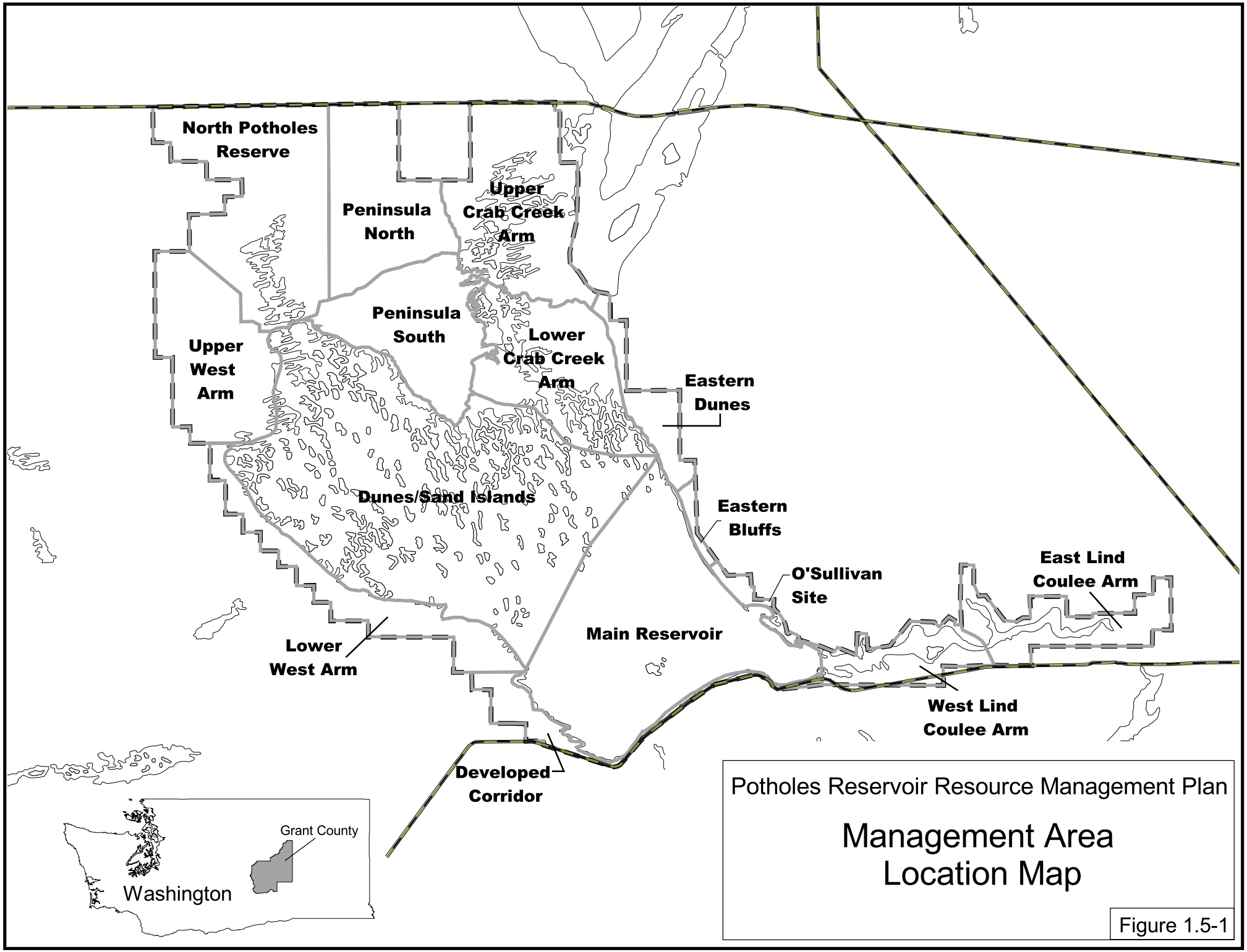
1 Introduction to the Resource Management Plan
2 Agency Coordination and Standards
3 Existing Resource Conditions
4 Resource Goals and Objectives
5 Land Management Area Recommendations
6 Monitoring
7 References
Appendices

Subsections, corresponding with these chapters, can be located in the Table of Contents. Chapter 3, Existing Resource Conditions, provides a general description of the Potholes Management Area's existing natural, cultural, visual and socioeconomic resources. Chapter 4 specifically addresses each resource in the Potholes Reservoir RMP including: (1) General Management, (2) Recreation, (3) Public Health and Safety and Environmental Protection, (4) Land Use Management, (5) Grazing Management, (6) Natural Resources, (7) Cultural Resources, (8) Volunteer Programs, (9) Funding, (10) Information and Education, and (11) Facilities and Services. Chapter 4 also outlines the concerns, goals, and objectives for each resource by providing protocol, or guideline, for the management agency to follow. Chapter 5 outlines the specific management actions for each of the 16 LMAs identified within the Potholes Management Area (see Figure 1.5-1, Management Area Location Map).

1.6 POTHOLES RESERVOIR MANAGEMENT AREA DESCRIPTION

O'Sullivan Dam was constructed nearly 50 years ago forming Potholes Reservoir. The reservoir was created as part of the CBP to provide irrigation water to the fertile but arid lands of the Columbia Plateau in central Washington State. Potholes Reservoir generally fills up in the winter and early spring months, with the water level falling from May through September in response to irrigation demand.

At O'Sullivan Dam, the Potholes East canal flows southward from the Potholes Reservoir outlet to the southern portion of the CBP's irrigation area. Reclamation operates the reservoir within established constraints for surface water elevation to meet contractual obligations, assure public safety, and protect property. Other resource needs are viewed as secondary within existing operational constraints.


North Potholes Reserve
Peninsula North
Upper Crab Creek Arm
Peninsula South
Lower Crab Creek Arm
Upper West Arm
Eastern Dunes
Dunes/Sand Islands
Eastern Bluffs
O'Sullivan Site
East Lind Coulee Arm
Main Reservoir
Lower West Arm
West Lind Coulee Arm
Developed Corridor
Grant County
Washington
Potholes Reservoir Resource Management Plan
Management Area Location Map
Figure 1.5-1

Interstate 90, to the north, and state route (SR) 17, to the east, are the primary travel corridors for Potholes Reservoir. Interstate 90 separates portions of Moses Lake to the north from Potholes Reservoir to the south. SR 262 provides access across O'Sullivan Dam along the south shore of the reservoir. Local city and county roads also serve the Potholes Reservoir area. Some shoreline areas can only be accessed by boat.

CHAPTER 2
AGENCY COORDINATION AND STANDARDS

2.1 EXISTING JURISDICTIONAL BOUNDARIES

The Potholes Reservoir RMP Management Area encompasses approximately 36,200 acres of land (18,500 acres) and water (17,700 acres). Of this total, an estimated 34,920 acres are under Reclamation's jurisdiction with the remaining acreage under the jurisdiction of the Washington Department of Natural Resources (WDNR).

Although the lands and waters under Reclamation jurisdiction were transferred to the State of Washington for administration and management under a MOA with the United States, Reclamation maintains a basic interest in the uses authorized on them. Reclamation's continued interest and involvement insure that (1) nothing is done which conflicts with the primary purposes of the CBP, and (2) the land receives proper use in accordance with appropriate land management principles and practices.

Reclamation's Ephrata Field Office is responsible for providing the oversight and approval of proposed land use activities on Reclamation properties within the Potholes Reservoir Management Area. The SPRC and WDFW are the state agencies currently responsible for most of the day-to-day activities and decisions which directly affect the Potholes Reservoir Management Area. Of the 34,920 acres under Reclamation jurisdiction, approximately 6,620 acres (18 percent) were withdrawn from the public domain and 28,300 acres (81 percent) were acquired in fee title for the construction and operation of Potholes Reservoir and other CBP purposes.

The following sections describe the existing management situation and involved work groups, existing management agreements, land use agreements, and land use activities which directly affect the Potholes Reservoir Management Area's present landscape and resources. Existing management plans, applicable state and local laws and ordinances, county comprehensive plans, and adjacent land uses are identified and described.

2.1.1 Land Management Agency and Ad Hoc Work Groups

A Land Management Agency Work Group, consisting of representatives from Reclamation, WDFW, SPRC and the Grant County Sheriff's Office, provided critical input throughout the RMP/EIS study process. This input was received through Land Management Agency Work Group meetings as well as one-on-one agency contact and consultation with the study team. Since these agencies are directly responsible for the day-to-day management and law enforcement activities within the overall

management area, Land Management Agency participation was particularly instrumental in identifying the goals and objectives used to complete the alternatives development process. Their participation also provided the agency with perspective, direction, guidance and input needed to insure that the alternatives developed addressed the depth and breadth of issues and concerns identified.

An Ad Hoc Agency Work Group was established to bring together all of the agencies associated with Potholes Reservoir, and to act as a sounding board for the Land Management Agency Work Group. The Ad Hoc Agency Work Group consisted of a broad cross-section of resource, Tribal, and local agency personnel (e.g., USFWS, U.S. Bureau of Land Management (BLM), the CBP Irrigation Districts, Grant County Noxious Weed Control Board, WDNR, and others).

Reclamation initiated direct contact with the Confederated Tribes of the Colville Reservation, the Confederated Tribes of the Yakama Indian Nation, and the Spokane Indian Tribe. Invitations to Public Scoping, Ad Hoc Meetings and Land Management Agency Work Groups were sent to tribal affiliates. Native Americans with interests at Potholes Reservoir were consulted, as appropriate, to identify, protect, or mitigate effects to sacred or traditional cultural properties.

Cultural resource investigations and consultations for developments proposed in the areas not previously surveyed have been conducted. In most cases, if cultural resources are present in a proposed development area, actions would include: avoidance of the site, or, if avoidance is not possible, minimize the adverse effect(s) with appropriate management or mitigative actions. Management actions would be defined in a MOA with the Washington State Historic Preservation Office (SHPO) and the Advisory Council on Historic Preservation (the Advisory Council).

2.1.2 Fish and Wildlife Coordination Act

In accordance with the Fish and Wildlife Coordination Act (48 Stat 401, as amended, 16 U.S.C. 661 et seq.), the USFWS provided Reclamation a draft Planning Aid Report in January 1999 documenting the preliminary findings of the Service's Habitat Evaluation Procedures (HEP) analysis conducted in 1999 (Appendix B). The objective of the HEP study was to quantify and describe current wildlife habitat conditions on Special Areas of Concern (SAC) and on adjacent control sites. SACs were defined as those areas under consideration by Reclamation for management changes under the RMP recommended action.

A final Planning Aid Report was submitted to Reclamation on March 24, 2000, and provided additional information gained through the HEP analysis. The purpose of the HEP study was to identify (1) baseline data on current habitat conditions, (2) impacts from recreational use on wildlife/vegetative communities, (3) project habitat changes from the RMP alternative actions based on the HEP analysis,

and (4) management recommendations. The March report addressed the first and second goals of the HEP study and set aside the third and fourth goals for the subsequent Coordination Act Report to be prepared by the USFWS.

A Draft CAR was submitted to Reclamation on April 14, 2000 and a final on July 21, 2000 to assist in the preparation of the Potholes Reservoir RMP/EIS. The report detailed the USFWS perspective on impacts to wildlife resources and habitats at Potholes Reservoir with each of the RMP/EIS alternatives. The final report identifies and recommends mitigation measures to reduce or minimize potential adverse impacts on wildlife. Listed below are the recommended and approved mitigation measures (Appendix C).

- Every attempt will be made to meet the objectives of the RMP for habitat restoration.

- It is not anticipated that the managing agencies, with financial assistance from Reclamation, will be more aggressive in attempting control of non-native plants. It is believed with the limitation on funding and technology that such attempts may result in more damage to plant communities than benefits from control of weeds.

- Managing agencies would be directed by the RMP to meet the objectives of habitat protection for fish and wildlife when implementing any project.

- It is not anticipated that Reclamation will provide funding for law enforcement in the Potholes Management Area. Managing agencies may, on their own, choose to direct more of their resources to protection of resources within the area.

- When additional information is available, Reclamation will evaluate possible measures to protect or enhance the Northern leopard frog's habitat.

- Reclamation will encourage the managing agencies to identify and protect gray cryptantha.

- It in not anticipated that Reclamation will fund a study of grebes in the Potholes Management Area. Reclamation might participate with other managing agencies in such a study.

- Reclamation anticipates that the managing agencies will establish monitoring procedures (to address fish and wildlife habitat) and recommend changes to management actions when warranted.

- When major construction or development activities occur, Reclamation will consult with the USFWS.

- Reclamation will work with the WDFW to site Watchable Wildlife areas in the least intrusive (to wildlife) locations.

- The RMP will be structured to allow for adaptive management.

2.2 MANAGEMENT AGREEMENTS

Under the terms of a 50-year MOA dated July 10, 1952, between the United States and the State of Washington, the state assumed management responsibility for the recreational, fish, and wildlife resources occupying Reclamation lands and waters at Potholes Reservoir. The SPRC and WDFW are the principle state agencies responsible for managing essentially all Potholes Reservoir land use activities until the MOA terminates in 2002.

Under the MOA, Reclamation retains primary jurisdiction over developments within the Reclamation Zone for Potholes Reservoir. The Reclamation Zone includes all lands on which O'Sullivan Dam and their appurtenant works are situated, and that portion of the reservoir area generally lying within a strip 200 feet in horizontal width above the reservoir's full pool elevation of 1,046.5 feet. Such jurisdiction is maintained by Reclamation for the purpose of insuring proper operation and protection of the reservoir. All developments and actions affecting lands within the Reclamation Zone must be approved by Reclamation.

As a guide to the administration of the area, the MOA requires the state to prepare development plans within the reservoir area. Such plans are to be submitted to Reclamation for review and for consultation with the National Park Service (NPS) and the USFWS. The state may build and maintain any facility or service for recreation purposes and may set aside lands as refuges for wildlife or public shooting grounds. All such actions and developments, however, require prior approval by Reclamation.

The MOA empowers the state to issue and administer licenses, permits, and concession contracts for the purpose of providing commodities and public services at the reservoir. All licenses, permits and contracts are submitted and approved by Reclamation before issuance. The MOA also empowers the state, within the limits of its jurisdiction, to make and enforce rules and regulations for the use of the reservoir area as necessary to protect public health and safety; to protect plants, fish and wildlife; and to preserve the scenic, scientific, aesthetic, historic, and archaeological resources of the area.

The state is required to report its revenues from licenses, permits and concession contracts, and its expenditures of such receipts for area administration. Any surpluses of such receipts over expenditures are transferred to the United States.

Memorandum of Agreement between State of Washington Department of Game and State of Washington State Parks and Recreation Commission

Under a MOA dated July 15, 1952 between the WDFW (formerly the Department of Game) and the SPRC, all lands transferred from the United States to the state are to be administered by the WDFW with the exception of the following SPRC administered areas: O'Sullivan, Blythe, Peninsula and Lind Coulee Sites, and Potholes State Park. Each agency is responsible for the development, maintenance and management of their respective areas.

Although the existing MOA divided and determined specific responsibilities between the two agencies, the reader should note that the lands administered by the SPRC are currently limited to the O'Sullivan Site (North and South) and Potholes State Park. All other RMP lands are currently administered by the WDFW.

2.3 LAND USE AGREEMENTS

As described below, most land use activities at Potholes Reservoir are authorized by specific land use agreements with either the SPRC, WDFW, or Reclamation. The SPRC uses a lease agreement as its primary authorization instrument, whereas the WDFW administers a grazing permit and agricultural lease program. Currently there are no second party subleases, concession agreements, or special use permits authorized in the Potholes Reservoir Management Area.

Interlocal Cooperative Agreement between Washington State Parks and Recreation Commission and the Washington Department of Natural Resources

Dated April 1, 1999, this SPRC administered agreement authorizes the WDNR to provide for the management of recreational resources on 30-acres of Reclamation land currently used for the Mar Don Resort facility. Currently, this Reclamation parcel, together with a WDNR parcel, are leased under a separate agreement (see Lease No. 62395) for the resort. The term of the interlocal agreement is from April 1, 1999 to July 10, 2002. Renewal or extension of the agreement is subject to the extension or replacement of the 1952 MOA between the United States and Washington State, and to the additional approval of Reclamation. The annual fee paid to the SPRC is $6,000.

State of Washington Department of Natural Resources (Lease No. 62395)

Under a lease dated April 1, 1979 between the WDNR and The New Mar Don Resort, Inc. (lessee), approximately 30 acres of Reclamation land (per above agreement) and 30 acres of WDNR lands are authorized for motel facilities, permanent mobile home space rental, overnight camping for trailers, recreational vehicles (RVs), tents, picnic facilities, swimming, boating and beach use. The previous lease with Mar Don expired on March 31, 1999 and was extended to the year 2002 per the interlocal agreement described above.

Land Use Agreement

A land use agreement dated November 16, 1993, between the WDFW and Grant County, allows the county to operate and maintain an Off Road Vehicle (ORV) Area on approximately 2,144 acres of Reclamation land (based on a reservoir elevation of 1,039 feet). Currently, an estimated 105 acres located in the Eastern Bluffs management area are included in the land use agreement, but situated outside the authorized ORV riding area.

Potholes East Canal Headworks Powerplant Project Agreement

An agreement dated July 21, 1986 between Public Utility District (PUD) No. 2 of Grant County and the South Columbia Basin, East Columbia Basin, and Quincy-Columbia Basin irrigation districts (Districts) allows the PUD to construct and operate an electric generating plant at the Potholes East Canal (PEC). The agreement terminates 40 years from the beginning operation date for the project or October 1, 2032, whichever occurs first.

Agreement for Fisheries Mitigation for PEC Headworks Project (FERC No. 2840-003)

An agreement dated September 25, 1987 between the WDFW and the Districts satisfies Article 40 under Federal Energy Regulatory Commission (FERC) License No. 2840-003. Article 40 requires the Districts to develop a fishery mitigation plan for losses due to the PEC Headworks Project. The plan calls for trout hatchery production at the Columbia Basin Hatchery and a rearing facility at the Moran Slough at Priest Rapids Dam. The rearing facility has not yet been developed, although the permit for Moran Slough expires in the year 2005. This agreement is effective until the expiration of FERC License No. 2840-003.

Washington Department of Fish and Wildlife Fire Protection Contract

A fire protection contract between Fire Protection District Numbers 4, 5, and 11 and the WDFW stipulates that the districts provide fire protection services to all lands, buildings, and equipment owned,

controlled or managed by the WDFW within and/or adjacent to the boundaries of each fire district. The contract term extends for an indefinite period and can be terminated by either party with 90 days written notice before the end of each year. The WDFW is required to pay to the districts a fee based on the assessed land and building valuation calculated at the same rate levied on similar private property. Such fees are paid at the end of each contract year (December 31).

Memorandum of Understanding between Grant County Mosquito Control District No. 1 and the Washington Department of Fish and Wildlife

A 1991 Memorandum of Understanding (MOU) between Grant County Mosquito Control District No. 1 and the WDFW was renewed on April 11, 1997. The 5-year MOU gives the district jurisdiction to apply mosquito control actions on lands owned, controlled, or managed by the WDFW. The WDFW is extremely interested in minimizing the use of chemicals or mosquito control applications that could impact non-target species important to the food chains of local fish and wildlife. The district agrees to use biological pesticides as their primary pesticide, as approved through the State Environmental Protection Act (SEPA) process. The district is required to comply with the restrictions outlined in the MOU on the application of chemicals on lands and waters managed by the WDFW.

In an effort to assist the district in understanding WDFW's concerns and special requirements, the WDFW is required to provide the district a Master Plan identifying:

- a map of the lands managed by WDFW;
- a map of non-fish waters of special concern to WDFW (i.e., waterfowl and nongame waters);
- plans for increasing habitat by flooding, shoreline work, or any other water projects;
- waterways and wetlands of specific concern for federal/state endangered, threatened and/or species of concern; and
- plans for proposed ponds and wetland developments for wildlife enhancement.

Washington Department of Fish and Wildlife Grazing Permit

A single, 5-year grazing permit (#TP-01), issued and administered by the WDFW, authorizes livestock grazing in the upper northwest portion of the Potholes Reservoir Management Area. Table 2.3-1 summarizes the permit. The following general permit conditions apply:

- WDFW reserves the right to alter and change the provisions of the grazing use plan to include reduction in acres of pasture available and number of Animal-Unit-Months (AUMs) authorized when WDFW determines that such changes are required to benefit fish or wildlife management or public hunting and other recreational uses.

- WDFW reserves the right to cancel the permit in the event the area authorized for grazing in the permit is included in a land use plan determined by WDFW to be a higher and better use. Such cancellation will be in writing, will state the reason for cancellation, and notice will be at least 90 days before cancellation.

- Range improvements such as seeding, water developments, fertilization, etc. may be agreed upon and performed by the permittee only with WDFW written approval.

- Major fence repairs will be the responsibility of WDFW when their examination reveals that replacement is warranted. Minor fence maintenance is the responsibility of the permittee to assure the fences will contain and control livestock.

- All permit lands will remain open for public hunting, fishing, and other recreational uses.

- Permittees are obligated to pay a 12.84 percent leasehold excise tax on all grazing fees in addition to the annual payment of an AUM fee based on fair market value.

- The terms and conditions of a renewed permit are subject to change in land area, grazing management, AUM allotment, and fees. If it is found that permit renewal is in the best interest of WDFW, the permittee will be provided the option of meeting the highest bid made at public auction.

Washington Department of Fish and Wildlife Agricultural Leases

There are six agricultural leases (encompassing about 52 acres) issued and administered by the WDFW within the Potholes Management Area. All of them involve Reclamation lands in the Lind Coulee Arm (East and West) and authorize the production of food and cover for wildlife. Each lease also provides for continued recreation use while granting exclusive right to the lessee for farming. Table 2.3-1 summarizes the leases. The following general conditions apply to all the agricultural leases issued within the Potholes Reservoir Management Area:

- Lessee agrees to provide all labor, water, seed, fertilizer, herbicides, and equipment for establishing crops.

- Use good farm management according to local standards to ensure ecosystem health and protection of soils.

- Weed control should be done using mutually acceptable standards.

- Lands should be prevented from becoming a fire hazard.

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- Land shall be open at all times for hunting, fishing and other recreational uses managed by the WDFW.

Table 2.3-1
Agricultural Leases and Grazing Permits Administered by the Washington Department of Fish and Wildlife at Potholes Reservoir

Lessee	Lease No.	Total Acreage	Term	Rent/Year	Allocation
Ray Dagnon	TP-01 (Grazing Permit)	7400	4 grazing seasons Commence: 1/1/95 Terminate: 12/31/99	Fair market value per AUM	600 AUMs
Lee Williams	TP-02 (Agricultural Lease)	19	5 crop years Commence: 1/1/99 Terminate: 12/31/03	2.1 acres of standing grain over winter	
Cheryl Gunderson	TP-04 (Agricultural Lease)	4.6	5 crop years Commence: 3/31/96 Terminate: 12/31/00	$50/acre	
Lee Walker	TP-06 (Agricultural Lease)	17.5	5 crop years Commence: 3/31/96 Terminate: 12/31/00	17.5 acres of wildlife food and cover	
Leif Ludvigson	TP-07 (Agricultural Lease)	1.17	5 crop years Commence: 3/31/96 Terminate: 12/31/00	$58.50	
Terry Hulbert	TP-08 (Agricultural Lease)	2.7	5 crop years Commence: 3/31/96 Terminate: 12/31/00	$100.00	
Bruce Roylance	TP-09 (Agricultural Lease)	7	5 crop years Commence: 4/1/95 Terminate: 12/31/99	$420.00 plus excise tax or 16-foot strip standing grain around perimeter	

2.4 OTHER LAND USES

2.4.1 Gravel and Landfill Sites

A gravel pit is located in the Potholes Reservoir Management Area within the northeast 1/4 of Section 35, Township 19 North, Range 28 East, and is accessed by D.5 SE Road just south of Interstate 90. An inactive landfill site is located within the northwest 1/4 of Section 21, Township 19 North Range 28 East and is accessed from South Frontage Road just south of Interstate 90.

2.4.2 North Potholes Reserve

Established in 1979, North Potholes Reserve was established by the State Game Commission. Managed by the WDFW, the reserve encompasses about 3,650 acres. The amount of water varies in size from approximately 250 acres at low water in September to about 750 acres at high water in March. Within the boundaries of the reserve, it is unlawful to hunt game animals, game birds, or to trap fur-bearing animals.

The primary purpose of the reserve is to provide migrating waterfowl with a protected resting area in the north part of the Columbia Basin. In September 1978, the north-south access road near the west boundary of the preserve was closed to motor vehicle travel. Vehicular access to Jobs Corps Dike which separates the main reservoir from the reserve is still available via the channel access road to the east.

2.4.3 Potholes State Park

Potholes State Park is about 640 acres in size and managed by the SPRC. Located on the southwest shore of the reservoir and north of State Highway 262, the park is a well-maintained facility with a wide variety of overnight and day use facilities. Recreation facilities provided by the SPRC include campsites with or without utility hookups, picnic sites, a swimming area, boat launch lanes, fish cleaning stations, comfort stations, access roads, and other support facilities and amenities. A detailed discussion of recreation resources, use, and access is provided in Chapter 4.

2.4.4 Boat Launch Sites

Within the administration areas established between the SPRC and WDFW, the SPRC is responsible for the operation and maintenance of one boat launch site within Potholes State Park, and the WDFW

is responsible for seven boat launch sites at Potholes Reservoir (see Table 2.4-1). Operation and maintenance responsibilities for the other boat launch site located at the Mar Don Resort is the responsibility of the respective lessee.

Table 2.4-1
Boat Launch Sites and Operation and Maintenance Responsibilities
Potholes Reservoir, Washington

Washington Department of Fish and Wildlife Blythe Boat Launch Glen Williams Boat Launch West Lind Coulee Boat Launch Road "M" Boat Launch Powerline Boat Launch Cartop Boat Launch (informal/unmaintained) Job Corps Dike Boat Launch (informal/unmaintained)
Washington State Parks and Recreation Commission Potholes State Park
Mar Don Resort Lessee Mar Don Resort

2.5 EXISTING LAND MANAGEMENT PLANS

A number of specific land management plans have been developed by federal, state, and local agencies to assist in the management of land use activities and resources within or near the Potholes Reservoir Management Area. Existing management plans affecting the Potholes Reservoir area are identified and summarized below.

Grant County Comprehensive Plan - The Grant County Comprehensive Plan was adopted in September, 1999 pursuant to the Washington State Growth Management Act (RCW 36.70A). The updated Plan addresses land use, critical areas and resource lands, housing, transportation, capital

facilities, and utilities within county boundaries. Specific to the "Open Space and Recreation" designation which encompasses the Potholes Reservoir Management Area, the Growth Management Act (GMA) goal for these lands encourages the retention of open space, the development of recreational opportunities, the conservation of fish and wildlife habitat, and access to natural resource lands and water. This GMA goal and the associated policies outlined in the Plan were considered in development of alternatives. Similarly, the management actions under consideration could indirectly affect areas under county jurisdiction and authority.

Columbia Basin Wildlife Area Management Plan - As part of the WDFW's public holdings, the Columbia Basin Wildlife Area (CBWA) incorporates many scattered tracts of land developed as a result of Reclamation's Columbia Basin Project. In 1997, the plan was drafted to provide guidance for the management of these tracts. While Potholes Reservoir is one of the sixteen management units within the CBWA, no specific wildlife management proposals or activities were developed for the unit.

Grant County Shorelines Management Master Program - Potholes Reservoir is listed as a shoreline of statewide significance in the Grant County Shorelines Management Master Program (WAS 173-20-290). To the extent practicable, shorelines under Reclamation jurisdiction are managed in accordance with Grant County guidelines. The recommended action under the RMP adheres to the objectives established for each of the Master Program environments identified at Potholes Reservoir.

Ground Water Management Area - In 1998, under recommendation of the Washington State Interagency Ground Water Committee (WIGWC), a Ground Water Management Area (GWMA) was established that encompasses Grant, Adams, and Franklin counties. The state, in cooperation with the county health districts, monitors nitrate levels throughout the GWMA to identify areas of particular concern for implementing additional agricultural "Best Management Practices" (BMPs).

CHAPTER 3
EXISTING RESOURCE CONDITIONS

3.1 ASSESSMENT OF THE NEED FOR CHANGE

The Potholes Reservoir Management Area has a rich diversity of natural resources and is recognized locally and regionally for its recreation opportunities. The reservoir offers fishing, camping, swimming, boating, wildlife observation, and other recreation opportunities to thousands of visitors annually. There is an inherent need for a comprehensive management plan in each of the defined management areas to conserve and protect the land and water resources so the public may continue to enjoy all the recreation opportunities available at Potholes Reservoir.

Arid ecosystems, like the lands surrounding Potholes Reservoir, tend to be more susceptible to human disturbance and require longer periods of time to recover than do wetter areas that receive more rainfall. Drier landscapes usually require restoration to expedite vegetative succession, but some disturbed areas never recover. Other factors influencing the fragility of the acreage around Potholes Reservoir include precipitation events and erosion. While xeric landscapes receive little rainfall annually (< 12"/year) compared to other mesic areas, the precipitation events are characterized by short, intense thunderstorms. When they occur, these storm bursts inevitably wash the soil into the reservoir, and water resources/quality begin to be effected. Arid landscapes are prone to erosion, and the soil loss is rapid following the disturbance. Consequently, land use effects water resources and vice versa. Proper land and water management practices will prevent or reduce potential environmental and resource-related problems. The implementation of a RMP for the Potholes Reservoir Management Area will only further contribute to the uniqueness of the area by providing a safe and beautiful place for people and natural resources to exist together.

With increased use from the recreating public, the quality of the natural resources found at Potholes Reservoir is projected to decline as well as accelerate conflicts between future recreation and natural resource protection needs. This trend is expected to continue unless future resource and recreation management decisions are made through a coordinated and integrated RMP tailored to the existing resource conditions and needs.

3.2 NATURAL RESOURCE SUMMARY

This chapter summarizes existing resource conditions in the Potholes Reservoir Management Area at the time of implementing the RMP (see Figures 3.2-1 and 3.2-2 “Current Conditions”). Natural, cultural, and aesthetic resources are addressed, followed by a general description of the local and regional management area relative to social and economic resources.

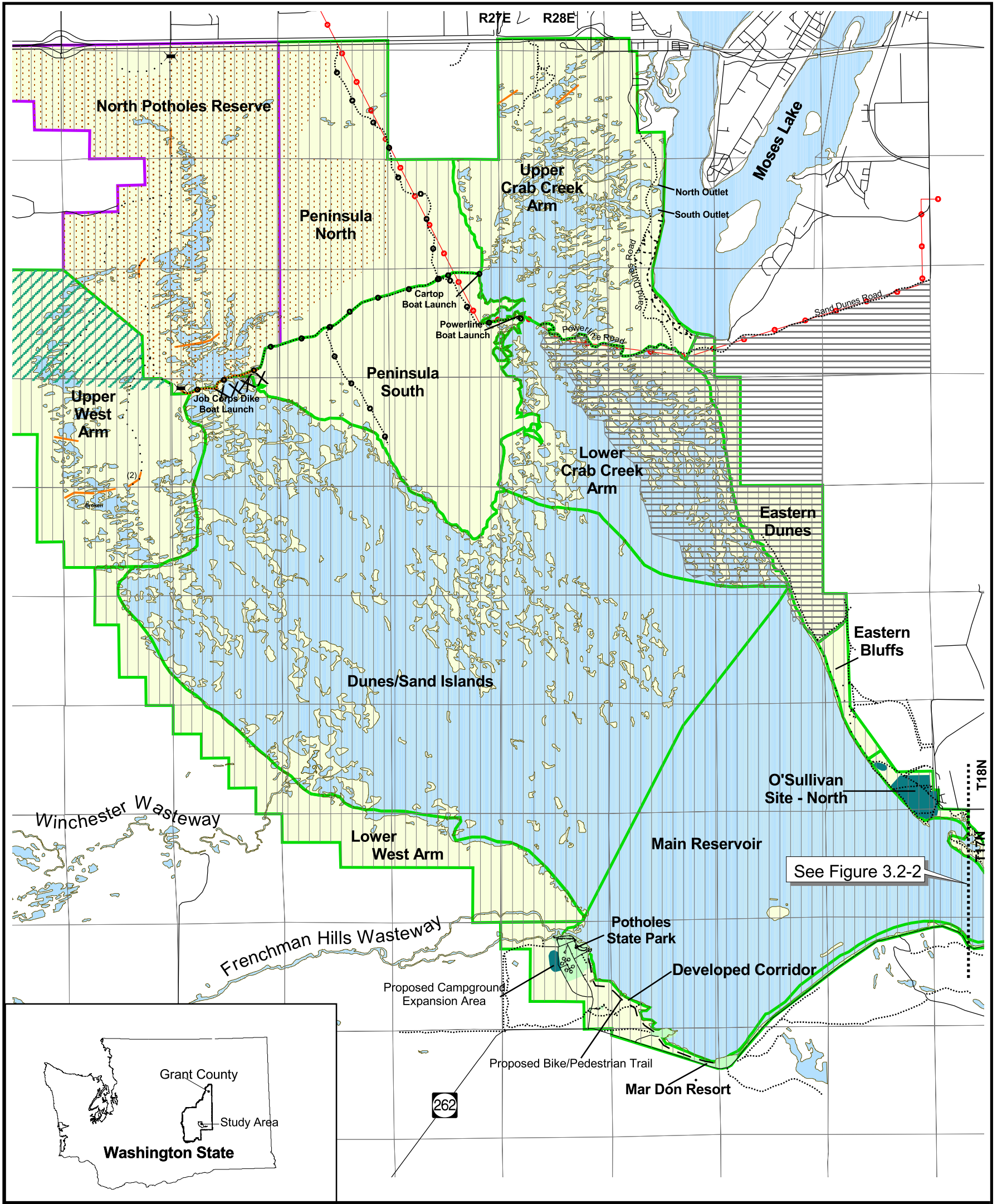
North of the dam, pothole wetlands, riparian, and shrub-steppe plant communities and sand dunes characterize the area. A unique system of sand islands was created when the shifting sand dunes were inundated. Over time, wetland and riparian plant communities recolonized the dynamic island and reservoir shoreline. Emergent wetland communities developed, and riparian forest and shrub communities dominated by willow matured in these shoreline areas. These changes have created new or enhanced habitat for some wildlife populations along with additional recreation opportunities.

Potholes Reservoir is managed by WDFW under the CBWA Management Plan. The CBWA includes eastern Washington lands within Grant, Adams, Franklin, and Douglas Counties. The WDFW owns 43,000 acres fee title, leases some tracts from the WDNR, and has agreements for management of federal lands with the USFWS, the U.S. Department of Energy (USDOE), the BLM, and Reclamation. The WDFW manages a total of 260,000 acres under the plan. To date, no specific CBWA management plan for the Potholes Reservoir unit has been developed.

3.2.1 Climate

The Cascade Range and the Rocky Mountains greatly influence the climate in the Columbia Basin and Potholes Reservoir Management Area. The Rocky Mountains shield the Columbia Basin from the more severe winter storms moving southward across Canada, while the Cascade Range forms a barrier to the easterly movement of moist air from the Pacific Ocean (SCS, 1984). However, some air from each of these sources reaches the Columbia Basin and affects the climate at Potholes Reservoir.

Due to Pacific high pressure systems from May through September, the recreation season is generally hot and dry. From late June until September, sunshine is abundant. Summer precipitation mainly occurs either as brief showers or as short, intense thunderstorms. In the winter, the average temperature at Quincy (the nearest climatological station) is 30°F. The average daily minimum temperature is 21°F. In the summer, the average temperature is 83°F. The total annual precipitation is about eight inches and the average snowfall is 22 inches. Chinook winds which blow down slope and are warm and dry, often melt and evaporate the snow. The prevailing wind is from the west-northwest. Average windspeed is highest in the spring at eight miles per hour (Soil Survey of Grant County Washington). The water at Potholes Reservoir can be extremely rough and dangerous within minutes of a storm's approach, requiring boaters to seek shoreline refuge as quickly as possible.



RMP Study Area
Management Areas
Grant County ORV Area
Designated Dispersed Camping Areas

Watchable Wildlife Areas

North Potholes Vehicle Route
Open Access
Restricted Access
Developed Recreation Area

Dispersed Camping Areas

Closed Year Round
Open Year Round
Seasonally Open (Closed March 15-June 30)
Designated Dispersed Camping Areas

Grazing Permit TP-01

Seasonal Grazing March 15 - April 15
Seasonal Grazing November 1 - March 15

Misc. Improvements

Dikes
Powerline
Install Vault Toilet
Provide Seasonal Toilets
Provide Courtesy Dock

Roads

Highway/Improved Roads
Primitive (Closed)
Primitive (Open)
ORV Trails
Gate

Current Conditions

Potholes Reservoir Resource Management Plan

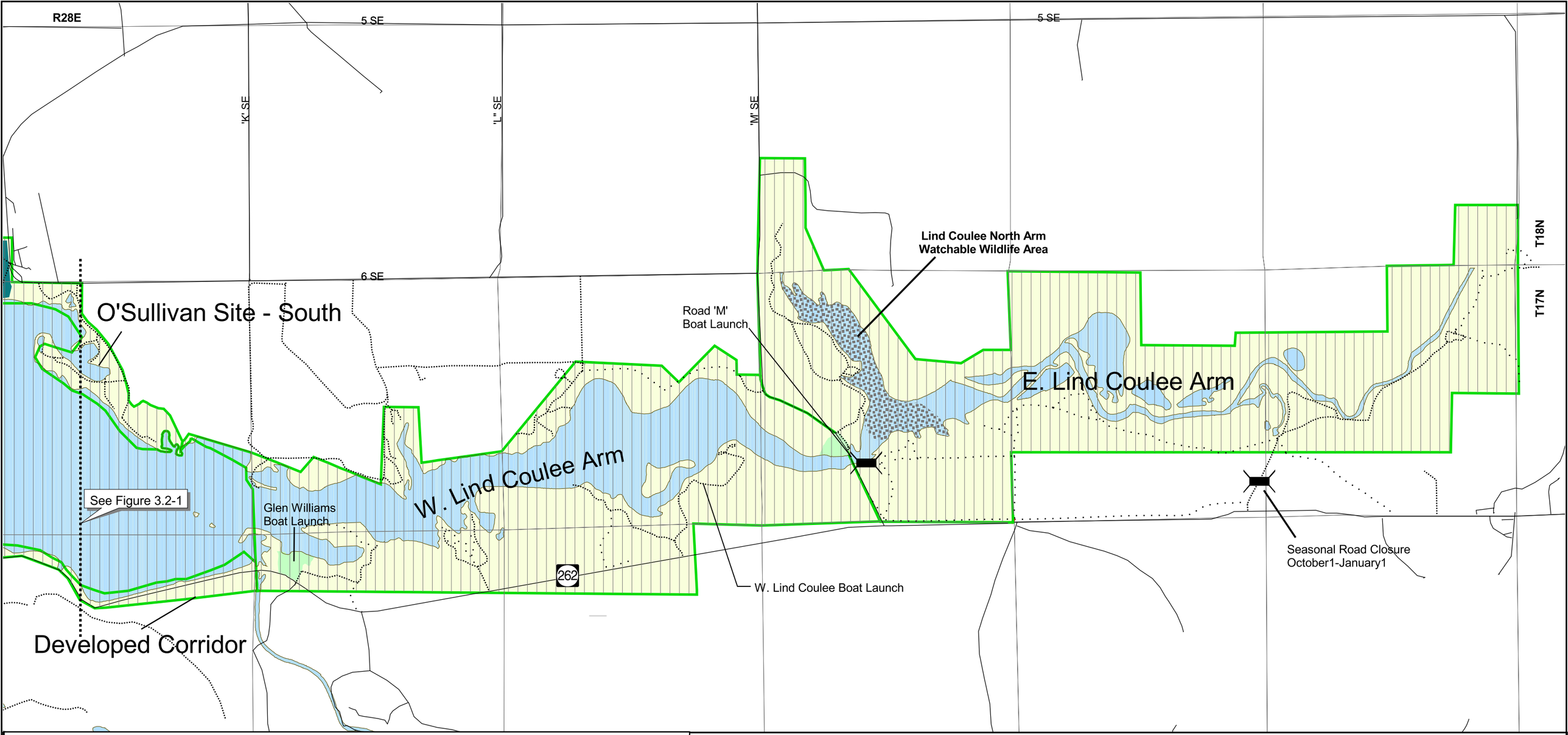
N

0.5 0 0.5 1 1.5 2 Miles

U.S. DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

Current Conditions - Potholes Reservoir RMP
Figure 3.2-1



Current Conditions
Potholes Reservoir Resource Management Plan

RMP Study Area

Management Areas

Watchable Wildlife Areas

Developed Recreation Area

Dispersed Camping Areas

Open Year-Round

Roads

Highway/Improved Roads

Primitive (Closed)

Primitive (Open)

Gate

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

N

Scale 1:24,000

0.5 0 0.5 Miles

Current Conditions - Potholes Reservoir RMP
Figure 3.2-2

3.2.2 Air Quality

The Washington State Department of Ecology's (WDOE) Eastern Regional Air Pollution Control Authority Office and the U.S. Environmental Protection Agency (EPA) monitor air quality in the Columbia Basin region under the provisions of the Clean Air Act, as amended. Washington has developed a State Implementation Plan (SIP) in part to maintain Ambient Air Quality Standards. The status of criteria pollutants, the six principal pollutants regulated by the EPA, are tracked statewide. The six criteria pollutants are particulate matter 10 microns or smaller in diameter (PM_{10}), sulfur dioxide (SO_2), oxides of nitrogen (NO_x), carbon monoxide (CO), ozone (O_3), and lead (Pb).

Grant County does not have permanent or mobile monitoring stations. Therefore, air quality information in the area is limited. The closest monitoring sites to Potholes Reservoir are Spokane to the northeast, and Yakima to the west. These cities also are the nearest non-attainment areas for CO and PM_{10}. Although air quality information for the region is limited, the WDOE and the EPA have designated Grant County as an area currently in attainment for all standards (Seheibner, 1999).

Class I areas have the highest air quality classification and include all international parks, wilderness areas, memorial parks which exceed 5,000 acres, and all national parks which exceed 6,000 acres. Class I areas have land and resource use restrictions to prevent damage to visibility, plant, soil, and other resources. The closest Class I area to Potholes Reservoir is the Spokane Indian Reservation to the east. WDOE's plans for protecting and improving visibility in Class I areas are contained in the air quality SIP.

Locally, particulates are generated from area sources such as dirt roads and plowed fields. Wind erosion is a significant factor in particulate distribution, particularly in the spring and fall when high winds and dry soil conditions create dust storms. The agricultural practice of burning field residue following harvest can also produce high levels of particulate matter. The burning season lasts about one month during late August and September. Although the typical management practice directs smoke away from population centers, total emissions within the airshed are not reduced (Grant County, 1999).

High ORV use at Potholes Reservoir contributes increased air emissions on peak weekends when as many as four thousand ORV recreationists may use the ORV area (Cooke et al., 1997). Specifically these pollutants include hydrocarbons, particulate matter, nitrogen oxides, carbon monoxide, and carbon dioxide. The amount of pollutants generated by current activities has not been estimated.

3.2.3 Geology

The Columbia River flows in a deep valley along the southwestern boundary of the county. The northern part of the county is characterized by loess (windblown silt) mantled hills that have been dissected by the Channeled Scablands (land eroded by cataclysmic flooding in excess of 13,000 years ago). The southern part is generally smooth with a southward-sloping plain that is deeply dissected and is interrupted by the Saddle Mountains and Frenchman Hills. Babcock Ridge and Beezly Hills border the northern part of the plain (USDA, 1984).

The Potholes Reservoir Management Area lies within the Colombia Basin subprovince of the Columbia Intermontane Province. The Columbia Intermontane Province is the product of Miocene flood basalt volcanism and regional deformation that occurred over the past 17 million years. The Columbia Plateau is that portion of the Columbia Intermontane Province that is underlain by the Columbia River Basalt Group.

The Potholes Reservoir is located in the Quincy Basin, a synclinal trough in the folded Columbia Plateau. The Pleistocene floodwaters formed a fast draining lake as they entered this broad basin and as a result dumped large quantities of sediment completely burying the basalt bedrock. Most of the floodwater drained through the Drumheller channels south of the Potholes Reservoir into the Othello Basin where it ponded again to make another temporary lake.

Since the end of the Pleistocene, winds have locally reworked the flood sediments, depositing dune sands in the lower elevations and loess at higher elevations.

The Eastern Bluffs management zone area has a steep relief, generally unvegetated, with the slopes composed of unconsolidated materials (i.e., silt/sand, cobble). These slopes are highly vulnerable to erosion and border directly on the reservoir. This limits possible development and use of the area. The Potholes Reservoir has a continuing inflow of suspended sediment from the wasteways that result in a build-up of sediment which is deposited near mouths of these wasteways. The boat launch area at the State Park is highly impacted by this sediment build-up.

3.2.4 Topography

The landscape of the Potholes Reservoir Management Area is dominated by low relief plains. The surface topography has been modified within the past several million years by several geomorphic processes such as, Pleistocene cataclysmic flooding Holocene eolian activity. Cataclysmic flooding occurred when ice dams in western Washington and northern Montana were breached, allowing large volumes of water to spill across eastern and central Washington forming the channeled scablands and depositing sediment in the Potholes Reservoir area. The last major flood occurred about 13,000 years

ago during the late Pleistocene Epoch. Anastomosing flood channels, giant current ripples, bergmounds, and giant flood bars are among the landforms created by the floods (Easterbrook *et al.*, 1970.)

3.2.5 Soils

Grant County resides in a regional structural basin. The County rests on the lower limb of the Grand Coulee Monocline to the north/northwest and the northern limb of the Frenchman Hills Anticline to the southwest. The region to the northeast, including the Potholes Management Area, is subjected to a 0 to 5 degree dip in the southwest direction. The effect of these structural features is the formation of a regional sediment and groundwater cache basin in and around Potholes Reservoir. In addition to groundwater, this structural low has been the deposition location for southwest prevailing wind-borne silt and sand, making the area an eolian depositional basin as well.

Nearly all of the soils on the Columbia Plateau and in the Columbia drainage basin have been formed under grassland or shrub-grassland vegetation. Soil parent materials in this region include basalt, volcanic ash, sedimentary deposits, glacial outwash, and alluvial, fluvial, and colluvial deposits. Soils are generally covered with windblown sand and silt. Caliche layers occur in most of the soils and are generally seven feet deep. Loess dominated subsoils are moderately saline and contain a moderate amount of exchangeable sodium.

The most recent and comprehensive soils data available for the Potholes Management Area was obtained from the *Soil Survey of Grant County Washington* (SCS, 1984) prepared by the U.S. Department of Agriculture's Natural Resources and Conservation Service (NRCS), formerly the Soil Conservation Service (SCS). The soil survey is an inventory and evaluation of the soils found in Grant County which includes the Potholes Management Area. The survey can be used to adjust existing land uses and land use plans to the limitations and natural potentials of soil resources and their environment (USDA, 1984).

Potholes Reservoir is in the southeast part of Grant County. The RMP Management Area in and around the reservoir includes about 36,200 acres. At high water, about 18,500 acres of soil are exposed, and at low water this number increases considerably. Soils in the RMP management area consist of two broad soil groups and a total of seven general soil map units. Each of the general soil units identifies a broad area that has a distinctive pattern of soils, relief, drainage, and landscape. There is a total of 56 detailed soil map units within the Potholes Reservoir Management Area.

Soils on terraces, active dunes, and alluvial fans are primarily found in the north and western portion of the RMP area (Units 2-7, see Table 3.2-1).

Soils on benches, terraces, hillsides, and ridgetops in areas of channeled scablands dominate the soil types (Units 11 and 12) found only in the southern portion of the management area.

Tables 3.2-1, 3.2-2, 3.2-3and 3.2-4 summarizes Erosion Susceptibility, Limitation Ranges for Building Site Development, Potential Ranges for Providing Wildlife Habitat, and Limitation Ranges for Recreation Development at Potholes Reservoir, respectively.

Table 3.2-1
Soil Unit Erosion Susceptibility
Potholes Reservoir, Washington

Soil Unit	Water Erosion Hazard Range	Wind Erosion Hazard Range
Unit 2: Timmerman-Quincy	Slight to Moderate	Highly Erodible to Extremely Erodible
Unit 4: Ephrata-Malaga	Slight to Moderate	Erodible to Extremely Erodible
Unit 5: Burbank-Quincy	Slight to Moderate	Very Slightly Erodible to Highly Erodible
Unit 6: Quincy	Slight to Moderate	Highly Erodible to Extremely Erodible
Unit 7: Taunton-Scoon	Slight to High	Highly Erodible
Unit 11: Starbuck-Bakeoven-Prosser	Slight to Moderate	None to Highly Erodible
Unit 12: Schawana	Moderate	Slightly Erodible to Highly Erodible

Table 3.2-2
Soil Unit Limitation Ranges for Building Site Development

Soil Unit	Shallow Excavation	Dwelling Without Basement	Local Roads and Streets	Lawns and Landscaping	Septic Tank Absorption Fields
Unit 2: Timmerman-Quincy	Severe	Slight to severe	Slight to severe	Moderate to severe	Severe
Unit 4: Ephrata-Malaga	Severe	Slight to moderate	Moderate	Slight to severe	Severe
Unit 5: Burbank-Quincy	Severe	Slight to severe	Slight to severe	Moderate to severe	Severe
Unit 6: Quincy	Severe	Slight to severe	Slight to severe	Moderate to severe	Severe
Unit 7: Taunton-Scoon	Severe	Moderate to severe	Moderate to severe	Moderate to severe	Severe
Unit 11: Starbuck-Bakeoven-Prosser	Severe	Moderate to severe	Severe	Severe	Severe
Unit 12: Schawana	Severe	Severe	Severe	Severe	Severe

Table 3.2-3
General Soil Unit Potential Ranges for Providing Wildlife Habitat at Potholes Reservoir, Washington

Soil Unit	Openland Wildlife	Wetland Wildlife	Rangeland Wildlife
Unit 2: Timmerman-Quincy	Poor to Good	Very Poor	Not Rated
Unit 4: Ephrata-Malaga	Very Poor to Good	Very Poor	Not Rated
Unit 5: Burbank-Quincy	Poor to Fair	Very Poor	Poor
Unit 6: Quincy	Poor to Fair	Very Poor	Poor
Unit 7: Taunton-Scoon	Fair to Good	Very Poor to Fair	Not Rated
Unit 11: Starbuck-Bakeoven-Prosser	Very Poor to Poor	Very Poor	Poor to Fair
Unit 12: Schawana	Very Poor	Very Poor	Very Poor

Table 3.2-4
Soil Unit Limitation Ranges for Recreation Development Potholes Reservoir, Washington

Soil Unit	Camp Areas	Picnic Areas	Playgrounds	Paths and Trails
Unit 2: Timmerman-Quincy	Slight to Severe	Slight to severe	Slight to severe	Slight to Severe
Unit 4: Ephrata-Malaga	Slight to moderate	Slight to moderate	Moderate to severe	Slight to severe
Unit 5: Burbank-Quincy	Slight to Severe	Slight to severe	Moderate to severe	Slight to severe
Unit 6: Quincy	Slight to Severe	Slight to severe	Severe	Slight to severe
Unit 7: Taunton-Scoon	Slight to Severe	Slight to Severe	Slight to Severe	Slight to Severe
Unit 11: Starbuck-Bakeoven-Prosser	Moderate to severe	Moderate to severe	Severe	Severe
Unit 12: Schawana	Severe	Severe	Severe	Slight to moderate

3.2.6 Water Quality

The CBP was started in the early 1930's to provide irrigation water to the fertile but arid lands of the Columbia River basin in central Washington. Water for the CBP originates from the Columbia River where it is pumped from Lake Roosevelt at Grand Coulee Dam into Banks Lake - one of the CBP's principal reservoirs. At the south end of Banks Lake, irrigation diversions are made into the Main Canal at Dry Falls Dam. Main Canal waters flow through lined and unlined sections, tunnels, and siphons before terminating downstream from Billy Clapp Lake into the East Low Canal and West Canal which more or less form the CBP's project's east and west boundaries.

Annually, the CBP diverts about 2.6 million acre-feet of water out of the Columbia River to deliver irrigation water to agricultural lands that normally receive less than 10 inches of precipitation a year. After use in the north half of the CBP (on the Quincy and East Columbia Basin Irrigation Districts), much of the water is collected and returned through a series of wasteways to Potholes Reservoir for reuse in the southern half of the CBP by the South Columbia Basin Irrigation District.

Moses Lake, the largest natural lake in the area, receives its water in the form of natural inflow, irrigation return flows, and canal water originating from the Columbia River. Natural inflow comes from Upper Crab Creek, an intermittent tributary with its headwaters west of Spokane, Rocky Ford Creek, a year-round spring-fed creek that originates southeast of Soap Lake, and a few small drainages to the east. Moses Lake serves as the main supply route for water passing from the East Low Canal, Upper Crab Creek, and Rocky Ford Creek south to Potholes Reservoir.

Created by O'Sullivan Dam, Potholes Reservoir lies immediately downstream of Moses Lake in the Lower Crab Creek Basin. Built as part of the CBP, the reservoir's main water supply is operational waste and irrigation return flow from northern CBP lands irrigated from the East Low and West Canals. This water supply is supplemented by natural flows in Crab Creek, Rocky Coulee, Weber Coulee, and Lind Coulee. Reservoir inflows originate from Moses Lake through the Crab Creek channel on the north side, from the Lind Coulee Wasteway on the east side, and from the Winchester and Frenchman Hills Wasteways on the west side. Shallow groundwater seepage is also a water source entering Potholes Reservoir. Irrigation water for the southern part of the CBP is distributed via the Potholes East Canal which begins at O'Sullivan Dam.

At a full pool elevation of 1,046.5 feet, Potholes Reservoir covers an estimated 27,800 acres and has a total storage capacity of 511,700 acre-feet. Of this capacity, 179,200 acre-feet is inactive, 300 acre-feet is dead pool, and 332,200 acre-feet is active conservation allocated for irrigation use. The reservoir has an average depth of 18 feet and a maximum depth of 142 feet.

When the difference between outflow and inflow (outflow being higher) is greatest, from June to August, the reservoir elevation on average is about 12 feet below full pool. At low water levels, many of the dunes/sand islands located in the northern half of the reservoir area become exposed and difficult to access. These islands are very popular for dispersed camping, sunbathing, and other recreational activities in the spring and early summer when reservoir elevations are high and optimal for boat-in accessibility. As reservoir water surface elevations decline, so does recreational visitation and use within the Potholes Management Area.

Surface Water Quality

Updated in November 1997, the surface water quality standards for the State of Washington are described in Chapter 173-201A of Washington's Administrative Code (WAC). The chapter establishes surface water quality standards consistent with public health and enjoyment, and the propagation and protection of fish, shellfish, and wildlife (WAC 173-201A-010). In conformance with present and potential uses of the state's surface waters and in consideration of natural water quality limitations and potential, the state has classified its waters according to the beneficial uses that can be obtained from them and has established water quality criteria for each classification.

The water quality standards and beneficial use criteria applicable to Potholes Reservoir are defined under the "Lake Class" designation. Lake Class waters are expected to meet or exceed the requirements for water supply (domestic, industrial, agricultural), stock watering, fish and shellfish (salmonid and fish migration, rearing, spawning and harvesting, and clam, mussel and crayfish rearing, spawning, and harvesting), wildlife habitat, recreation (primary contact recreation, sport fishing, boating, and aesthetic enjoyment), and commerce and navigation.

Although there is a general lack of water quality data specific to Potholes Reservoir, water samples collected from various reservoir locations on September 4 and October 3, 1998 were reviewed to assess potential lake conditions and/or limitations.

Under the State's Lake Water Quality Assessment Program, a lake specific study was conducted at Potholes Reservoir during the summers of 1998 and 1999 by the WDOE. The assessment was conducted to determine appropriate total phosphorus concentrations to protect characteristic lake uses.

None of the water quality data gathered to date show constituent concentrations above the maximum contaminant levels (MCLs) established under the National Primary Drinking Water Regulations (EPA, 1997). These determinations consider the criteria for chemical, biological, or physical parameters which have been established to provide a level of water quality that supports designated beneficial uses (Planning File).

Environmental Contaminants and Biota

Potholes Reservoir fish and bottom sediment samples were collected and analyzed in 1992-1993. Whole-body largescale suckers were analyzed for EPA priority pollutant metals, organophosphate pesticides, chlorinated pesticides, and polychlorinated biphenyls (PCBs). Fish muscle tissue samples were analyzed for mercury, chlorinated pesticides, organophosphate pesticides, and PCBs. Bottom

sediment samples were analyzed for all of the above constituents as well as semivolatile organics and triazine herbicides.

Of the five lakes which underwent the WDOE's comprehensive survey, the overall contamination of sediment and fish at Potholes Reservoir was the lowest. None of the Potholes sediment samples exceeded the Ontario Province Sediment Quality Guidelines for metals or organic compounds, and low concentrations of nine chlorinated pesticides, including, were detected in Potholes fish. Only lake whitefish and largemouth bass muscle tissues exceeded the EPA human health criterion for dieldrin.

On the basis of the dieldrin concentrations measured, Potholes Reservoir remains listed on the State's 1998 Section 303(d) list submitted to EPA. Under the Clean Water Act, the 303(d) list identifies water quality limited, impaired, and threatened waters needing additional work beyond existing controls to achieve or maintain the surface water quality standards established (WDOE, 1996). Also listed on the 303(d) list is Potholes East Canal.

Ground Water Quality

Existing data for the public water supply wells found within or near the Potholes RMP boundary were reviewed to determine whether the MCLs established for ground water were being met. Sulfate concentrations ranged from 9.0 to 87.0 mg/L, with a mean of 42.8 mg/L. Sodium ranged from 21.0 to 60.0 mg/L (mean of 38 mg/L); chloride from 5.0 to 58.0 mg/L(mean of 32.8 mg/L); nitrate from 4.2 to 16.7 mg/L (mean of 8.63 mg/L); iron from 0.01 to 1.09 mg/L (mean of 0.20 mg/L); and manganese from 0.01 to 0.07 mg/L (mean of 0.022 mg/L). Cumulatively, these total dissolved solids (TDS) ranged from 286 to 609 mg/L, with an average value of 480 mg/L. In general, ground-water from shallow wells was the most contaminated and water taken at depth was the least contaminated.

With the exception of the Sunrise Water Association, whose well is screened off below 500 feet, all the public groundwater systems examined had water quality problems and MCL exceedances. Of the eleven wells examined, four wells exceeded the 10 mg/L MCL for nitrate, eight wells exceeded the MCL for lead, three exceeded the MCL for TDS, two exceeded the MCL for manganese, and one exceeded the MCL for iron. Overall, the well data generally indicate that groundwaters pumped from the shallower overburden aquifer around Potholes Reservoir are suitable for agriculture and industrial use, and those pumped from depths equivalent to the lower aquifer units are suitable for all beneficial uses including public drinking water supplies.

Nitrate concentrations in ground water supplies are currently monitored by the Washington Department of Health (WDOH), in cooperation with the county health districts, since they are a good indicator of potentially acute public health effects. The WIGWC report noted that irrigation and agricultural

practices account for a majority of the nitrogen loading. Shallow wells (less than 300 feet in depth) appear to be at much greater risk for nitrate contamination than deeper wells. Most larger public water supply wells are drilled deep to maximize the volume of water available, and most private domestic drinking water wells are shallow and rarely exceed the first major water bearing zone encountered. This practice places the shallow domestic wells at higher risk for water quality problems (WIGWC, 1996).

3.2.7 Vegetation

The Potholes Reservoir Management Area is within the shrub-steppe vegetation zone described by Franklin and Dyrness (1973). This upland zone is dominated by sagebrush, bitterbrush, and large perennial bunchgrasses such as bluebunch wheatgrass (*Agropyron spicatum*) and Idaho fescue (*Festuca idahoensis*). Community composition depends upon many factors including substrate, topography, wind action, and human disturbances (Franklin and Dyrness, 1973).

Before the construction of O'Sullivan Dam, vegetation within the Potholes Management Area was arranged in zones along a moisture gradient. These zones from dry to wet were: (1) no vegetation on high, dry, shifting sand dunes; (2) *Psoralea* sp. on the windward faces of lower shifting dunes with sand dock and willows on the leeward faces; (3) rabbitbrush, sagebrush, spiny hopsage, cheatgrass, Indian ricegrass and alkali cordgrass on semi-stable sand dunes; (4) Baltic rush-sedge meadows; (5) bulrush-cattail wetlands; and (6) submerged aquatic plants (USFWS, 2000). Permanent and temporary potholes (800-1,000), flooded flats, creeks fed by springs fed potholes, and extensive marshlands covered the area (Harris 1954).

Overgrazing in the early part of the century resulted in the destruction of native plant cover and the formation of a broad area of active sand dunes (Zook, 1978). Fire also likely impacted the native shrub-steppe plant communities. Due to the area's arid climate and presence of sandy soils, however, native plant community recovery is slow. As indicated by Franklin and Dyrness (1973), such recovery is further hampered in the fragile uplands due to their susceptibility to invader plant establishment on disturbed sites.

The upland vegetation currently found at the reservoir is dominated by native shrubs and introduced annual grasses. There are only remnant patches of native vegetation (as described by Franklin and Dryness, 1973) remaining. Since the creation of Potholes Reservoir, the aerial extent of riparian habitat, particularly riparian shrub and riparian forest, has increased considerably and is dominated by woody species such as willow. Large areas of emergent herbaceous wetlands are also present, while some areas have only minimal vegetative cover.

The USFWS conducted a HEP study at Potholes Reservoir in 1999 (USFWS, 2000) to acquire baseline data on current habitat conditions and to determine impacts from recreational use on wildlife and vegetative communities. Based on the vegetative data collected, the USFWS concluded "it appears that recreational activities, especially ORV use, have lowered habitat quality, or at least prevented it from recovering from previous conditions." Specifically, the study showed that the areas subjected to ORV use have less vegetative cover and fewer desirable native species.

Aside from ORV use, other dispersed activities have impacted the area's vegetative communities. These disturbances have also allowed various weeds to proliferate along the edges of roads, "informal" roads leading to popular fishing spots, undeveloped boat launch sites, camping sites, have all removed a certain amount of habitat. Camping and parking areas have caused similar losses and changes (USFWS, 2000).

Dominant Cover Types and Conditions by Management Area

Table 3.2-5 lists the dominant vegetative cover types by management area and identifies their relative condition (very poor to excellent) by acreage. The lesser cover types occurring within the management area are not represented. The Main Reservoir Management Area is comprised of water year round and is not applicable.

Table 3.2-5
Dominant Cover Types, Condition, and Acreage by Management Area

Management Area	Cover Type	Condition	Acreage
North Potholes Reserve	Shrub Grass	good	749
	Shrubland	good	1838
	Riparian Forest	good to excellent	595
Peninsula North	Shrub Grass	good to excellent	454
	Shrubland	good to excellent	1616
Peninsula South	Exposed	poor	189
	Shrub Grass	fair to good	185
	Shrubland	good to excellent	1497
	Dense Shrubland	good to excellent	159
Upper Crab Creek Arm	Shrubland	fair to good	757

Table 3.2-5
Dominant Cover Types, Condition, and Acreage by Management Area

Management Area	Cover Type	Condition	Acreage
	Emergent Wetland	poor to fair	491
	Riparian Forest	fair to good	244
	Shrub Grass	fair to good	201
	Grassland	fair to good	112
	Dense Shrubland	good	79
Lower Crab Creek Arm	Shrubland	fair	124
	Emergent Wetland	poor to good	95
	Riparian Forest	poor to good	99
	Riparian Shrub	poor to good	464
	Grassland	poor to good	93
Eastern Dunes	Exposed	very poor	191
	Shrubland	poor	394
	Shrub Grass	poor to fair	62
Eastern Bluffs	Shrubland	poor to good	82
	Agriculture	good	29
Upper West Arm	Shrubland	good	1027
	Riparian Shrub	good	230
	Riparian Forest	good to excellent	379
	Shrub Grass	good to excellent	128
Lower West Arm	Shrub Grass	fair to good	137
	Shrubland	good	600
	Dense Shrubland	good	200
	Very Dense Shrubland	good	122
	Riparian Shrub	good	135
Developed Corridor	Shrubland	good	143
	Very Dense Shrubland	good to excellent	49
	Riparian Forest	good	41

Table 3.2-5
Dominant Cover Types, Condition, and Acreage by Management Area

Management Area	Cover Type	Condition	Acreage
	Dense Shrubland	good to excellent	117
Dunes/Sand Islands	Grassland	fair	84
	Riparian Shrub	fair to good	1144
O'Sullivan (North and South)	Grassland	very poor	98
	Shrub Grass	poor	21
	Shrubland	poor to fair	39
West Lind Coulee Arm	Grassland	poor	313
	Shrub Grass	poor	108
	Dense Shrubland	poor to good	83
	Shrubland	poor to good	44
	Riparian Shrub	poor to fair	27
	Riparian Forest	poor to fair	14
East Lind Coulee Arm	Grassland	fair to good	190
	Shrub Grass	good	206
	Shrubland	good	333
	Dense Shrubland	good	155
	Riparian Forest	good	102

Invasive Plants and Noxious Weeds

Invasive plants, or weeds, interfere with the maintenance of healthy and diverse ecosystems and can degrade or destroy native plant communities, wildlife habitat, recreational opportunities, and agricultural use of the land. Weeds are a common problem throughout the Potholes Management Area and generally colonize and occupy sites that have been previously disturbed by fire, livestock grazing, motorized vehicular travel, and/or dispersed camping. Non-native plants can displace native plants and generally are of lower forage value to wildlife, livestock, and wildlife requisites such as cover and nesting habitat. They are difficult to control or eliminate once established, and generally colonize and occupy sites where the native plant community or ground cover has been lost or severely disturbed. Consequently, weed control is an integral part of any resource management program.

Noxious weeds are defined by the Washington State Noxious Weed Control Board (1999) as "non-native plants that are destructive, competitive, or difficult to control due to their aggressive growth and lack of natural enemies." These species are regulated by the Board and are categorized into three classes (A, B, and C) on the State Noxious Weed List. The categories are based on the seriousness of the threat they pose in the State. Class A weeds have the highest priority for control with eradication required by law, followed by Class B and C weeds. For species in any class, new infestations with limited distribution generally have the highest priority because the potential for contamination is greater than for more widely distributed species.

Class A weeds are those that are not yet abundant across the State, so the potential for eliminating them is high. Saltcedar or tamarisk (*Tamarix ramosissima*) is the only Class A weed known to occur at Potholes Reservoir. Because the Potholes environment is suitable for the establishment of saltcedar, a yearly monitoring "search and destroy" program is recommended by the Grant County Noxious Weed Board for this species. *Tamarix* spp. is discussed by Leonard (1996) as the species originally found at Potholes. However, species of this genus are notoriously difficult to identify and have confusing taxonomy and synonymy; it is best to assume that the species in question is the invasive, Class A species.

Class B weeds are limited to small portions of the State. The control emphasis is to prevent new infestations from becoming established in other parts of the State. The Class B weeds known to occur within the Potholes Management Area include kochia, purple loosestrife, puncture vine, perennial pepperweed, Eurasian water milfoil, Swainson pea, and the knapweeds (diffuse, spotted and Russian).

Because they are widespread, Class C weed control is dependent on the feasibility of control and the level of harm the weed poses locally. Class C weeds known to occur at Potholes Reservoir include Canada thistle and reed canary grass.

Weeds are associated with certain kinds of disturbance, plant communities, or land use activities that enhance their ability to proliferate. Roads, ORV travel, and dispersed camping are disturbance activities that promote the proliferation of Russian thistle, kochia, knapweeds, Dalmatian toadflax, and cheatgrass. Roads (vehicular travel) and recreationists function as weed dispersers and serve as vectors for introducing new weed species into new areas. This can be seen at staging areas or dispersed campsites. A typical scenario is the removal of vegetation through ground disturbance, bare soil exposure, and new weed seed deposition - creating ideal conditions for the establishment of a new weed population. Grazing promotes the proliferation of cheatgrass and knapweeds. The knapweeds are dispersed by cattle as the seed heads cling to animal fur. Reservoir fluctuations provide good conditions for purple loosestrife and cocklebur proliferation.

At present, purple loosestrife is firmly established throughout most of the Potholes Management Area; particularly thick stands have become established at the Winchester and Frenchman Hills Wasteway outlets. There is currently no reasonable control method for eliminating this species from areas where it has become established to the extent that has occurred at Potholes Reservoir. Herbicides (those approved for use near water) or hand removals are recommended for controlling individual plants and small populations only (Swearington, 1997). Biological control insects are seen as the most likely method of effective long term control of large populations (Swearington, 1997), due to the high cost and relatively ineffective results of herbicide application.

Cheatgrass, knapweeds, and Canada thistle are currently the most prolific weeds present at Potholes Reservoir regardless of the disturbance level. Canada thistle can invade any moderately wet site although it reaches higher densities in disturbed areas where it can easily outcompete native species. Canada thistle is a particularly difficult weed to control due to its vast underground root system (Whitson et al., 1999).

Weed invasion in wetlands is also a predominant problem. In general, weeds are more difficult to eradicate from wetlands because there are a limited number of herbicides that can be used near water. Also, wetlands often have dense vegetation with desirable native species having noxious weeds intermixed. Targeting only the weeds is sometimes impossible.

The proliferation of undesirable plants within the Potholes Management Area is managed through the integrated weed management program established between Reclamation, the State, and the Noxious Weed Control Board of Grant County. The various Reclamation and state issued land use agreements (i.e., grazing and agricultural leases) require the lessee, licensee or permittee to maintain a weed control program to prevent the spread or establishment of noxious weeds. Herbicides that are highly toxic to people, fish or wildlife are not allowed. Each entity is responsible for either taking appropriate weed control measures, or is required to reimburse the administering agency for any weed control costs incurred as a result of that entity's failure to control weeds on the involved property.

According to information obtained from the Noxious Weed Control Board of Grant County, the Potholes Management Area is monitored for weed control by the County, but treatment is administered by the WDFW and Reclamation. On occasion, subcontractors conduct the County's prescribed weed control measures. Reclamation is generally concerned with Eurasian water milfoil control because infestation is a source of propagules for other waters in eastern Washington (Reclamation, 1989). Current control measures and management techniques involve water level manipulation, mechanical control, herbicides, biological controls, and light-screening measures (Remaley, 1999). Mechanical control is effective only if all parts of the plant are removed. Light manipulation is done through bankside plantings, dyes, or shade barriers that block light to the plants. Water level manipulations up or down can also be used - raising the level "drowns" the plants by preventing light from reaching them

and lowering the level exposes the plants and roots to the elements. This technique is highly effective in controlling the plant, but has not eliminated it. Complete eradication does not appear to be practical, but one or some combination of these techniques may be the most effective.

3.2.8 Fish

Fish habitat at Potholes Reservoir is changing over time. Willows and water smartweed are increasing along the shoreline. These plants provide cover for fish from winter through early summer. Bulrushes and other emergent and aquatic plants provide cover and sites for insect eggs. When water levels drop in the summer, fish often must move to open water with less cover where they are more vulnerable to predation (McMahon and Bennett, 1996). A lack of available cover during low water levels could be a limiting factor for adult fish populations, particularly for black crappie and largemouth bass (Zook, 1978).

Beaver lodges provide considerable cover for fish, especially during low water levels. Zook (1978) has found up to one hundred bass at a single beaver lodge site. Beaver structures provide some of the limited cover at low water. Beaver numbers generally fluctuate depending upon annual trapping pressure, and their lodges break down quickly once abandoned. Fewer beavers means less structural cover for fish during low water.

Recreational users can affect shoreline habitats. In particular, personal watercraft (PWC), due to their low draft and internal water jet design, are able to travel into areas too shallow for other boats. When they jet around in these shallow and sometimes vegetated shoreline areas, their fast movement creates waves that disturb and erode shorelines, and they may uproot emergent plants and disturb submerged plants and shoreline animals like fish and aquatic insects. These watercraft can therefore have a detrimental effect on shoreline habitat, especially during low water levels (Field Observations by Jim Tabor, WDFW).

A biological fish survey was conducted in September, 1978 to collect age composition and growth data for major game species, and the relative abundance of all major fish species in the reservoir (Zook, 1978).

The most recent biological survey of fish at Potholes Reservoir was conducted September 11-21, 1978. The goal of the preliminary survey was to determine species composition, relative abundance of warmwater fishes, and age class and growth data for game fishes. Perch were the most abundant species, and carp were second in abundance (Zook, 1978). Other species found at Potholes were largemouth and smallmouth bass, bluegill, long-nose sucker, black crappie, pumpkinseed, sculpin, rainbow trout, brown bullhead, and walleye. The same fish species are present today, but the relative

abundances are no doubt considerably different than they were 22 years ago. For example, anglers at Potholes Reservoir have reported a substantial decline in the abundance of yellow perch.

Fish introduced into the Columbia River system have the potential to enter Potholes Reservoir from Moses Lake via the Crab Creek Arm. Most reservoir fish species were introduced into the Columbia River system in the late 1800's and early 1900's (Wydoski and Whitney, 1979).

Prior to the start of this RMP process, the last creel census was conducted in 1973-74. A stomach content analysis conducted on major game fish at the reservoir was completed in 1973 (Tate). Growth was considered average for perch and bluegill and higher than average in other eastern Washington waters for black crappie and largemouth bass.

The WDFW has stocked Potholes Reservoir with rainbow trout since 1959 (Zook, 1977). Approximately 100,000 to 150,000 trout have been stocked each year since the 1970's. Fish are generally stocked in the fall and measure 5-6 inches in length. To improve growth and recruitment, 60,000 trout were retained in net pens in 1996 for a spring release of trout in 1997, averaging 9-10 inches. Rather than stocking rainbow trout directly into the reservoir, these fish are transferred into net pens to enhance survival and growth before release into the reservoir. This net pen experiment appeared successful with trout making up the majority of fish caught at the reservoir through mid-July that year. More pens will likely be added until all 150,000 trout can be accommodated (Personal Communication with Jeff Korth, WDFW). Small numbers of walleye have also been stocked, but other reservoir fisheries are not maintained by stocking.

Fish predators in Potholes Reservoir include established predatory fish, birds, and humans. Walleye, bass, and bullheads are some of the main fish predators present. Walleye, first observed in the reservoir in 1973, continue to feed all year while other species slow down during cooler months. They feed heavily on yellow perch, bullheads, and sculpins (Wydoski and Whitney, 1979).

Some fish-eating bird populations, such as double-crested cormorants and great egrets, have increased in recent years. Cormorants have recently become one of the most abundant colony nesting, fish-eating birds at the reservoir. The number of cormorant nests surveyed increased from 30 nests in 1983 to 652 nests in 1997. The diet of cormorants may include yellow perch, bullheads, crappies, carp, and sunfishes. Other fish-eating birds found in large breeding colonies include grebes, gulls, terns, and herons. The Western grebe consumes carp, perch, bluegills, grasshoppers, mayflies, and beetles (Terres, 1995). Large flocks of white pelicans can sometimes be found foraging in the reservoir or wasteways in late summer. Many other fish-eating marsh and shorebirds migrate through the area in fall and spring. Overall, these breeding and migrating birds consume large numbers of juvenile and small adult fish.

Angling pressure by humans may also have an effect on fish populations. While most fish are released, fishing contests still may have an impact on target populations. Rough estimates of visitors from car counter data, field observations, and questionnaires show an increase from 130,000 anglers in 1981 to 245,915 anglers in 1995 (Columbia Basin Wildlife Area Use Report Data).

The Job Corps Dike effectively isolated the North Potholes portion of the reservoir from the main reservoir body. This enabled biologists to eliminate all carp and other fish in the northern area. Largemouth bass and bluegill were subsequently restocked in 1977. Soon after carp were removed, the density of aquatic plants, invertebrates, muskrat, waterfowl, and other wildlife increased dramatically and the water became visibly clearer (Zook, 1978, Field Observations by Jim Tabor, WDFW). Bass and bluegill reproduced and showed a higher initial growth rate than in the main reservoir (Zook, 1978).

Although the Potholes Reservoir remains a popular fishing area, experienced Potholes anglers claim that some game species like perch, bluegill, crappie, and even largemouth bass appear to be declining. While carp, bullhead, smallmouth bass, and walleye populations appear to be on the rise this decade. Many factors may be contributing to the apparent declines in some species, including interactions of predatory fish, fish-eating birds, increased carp abundance, changes in habitat structure, water quality changes, reservoir productivity, annual water level fluctuations, and reservoir management. Fish diseases or parasites could also be factors. No systematic studies have been conducted to identify causal factors.

Today the goals of fisheries management at Potholes Reservoir include maintaining game fish species diversity and abundance with an emphasis on warm water species, and maintaining and enhancing recreational fishing opportunities. Although rainbow trout stocking is currently a major component of fisheries management, it is of secondary importance to maintaining other desired fish like perch, walleye, bluegill, crappie, and bass.

3.2.9 Wildlife

Construction of O'Sullivan Dam caused dramatic vegetative community changes within the RMP boundary. Wetland emergent and riparian habitats increased at the expense of shrub-steppe. This change was beneficial to some wildlife species because it created extensive emergent wetland and riparian habitat in an area where it had been limited.

Dispersed recreation within the Potholes area has also altered the vegetative communities at Potholes. Unlike the vegetative changes caused by dam construction, dispersed recreation has had a negative impact on wildlife habitat within the RMP area.

Irrespective of any past or current impacts, Potholes Reservoir provides suitable habitat for several classes of common and sensitive terrestrial game and nongame wildlife species (Figures 3.2-3 and 3.2-4 "Wildlife Resources Map"). The diverse habitat types, ranging from exposed sand dunes to lush riparian forests, are utilized by numerous wildlife groups including: mammals, birds, reptiles, and amphibians. Descriptions of the wildlife that occurs at Potholes Reservoir are listed below by group. Sections may be further subdivided into descriptive categories such as "game" or "nongame" where appropriate.

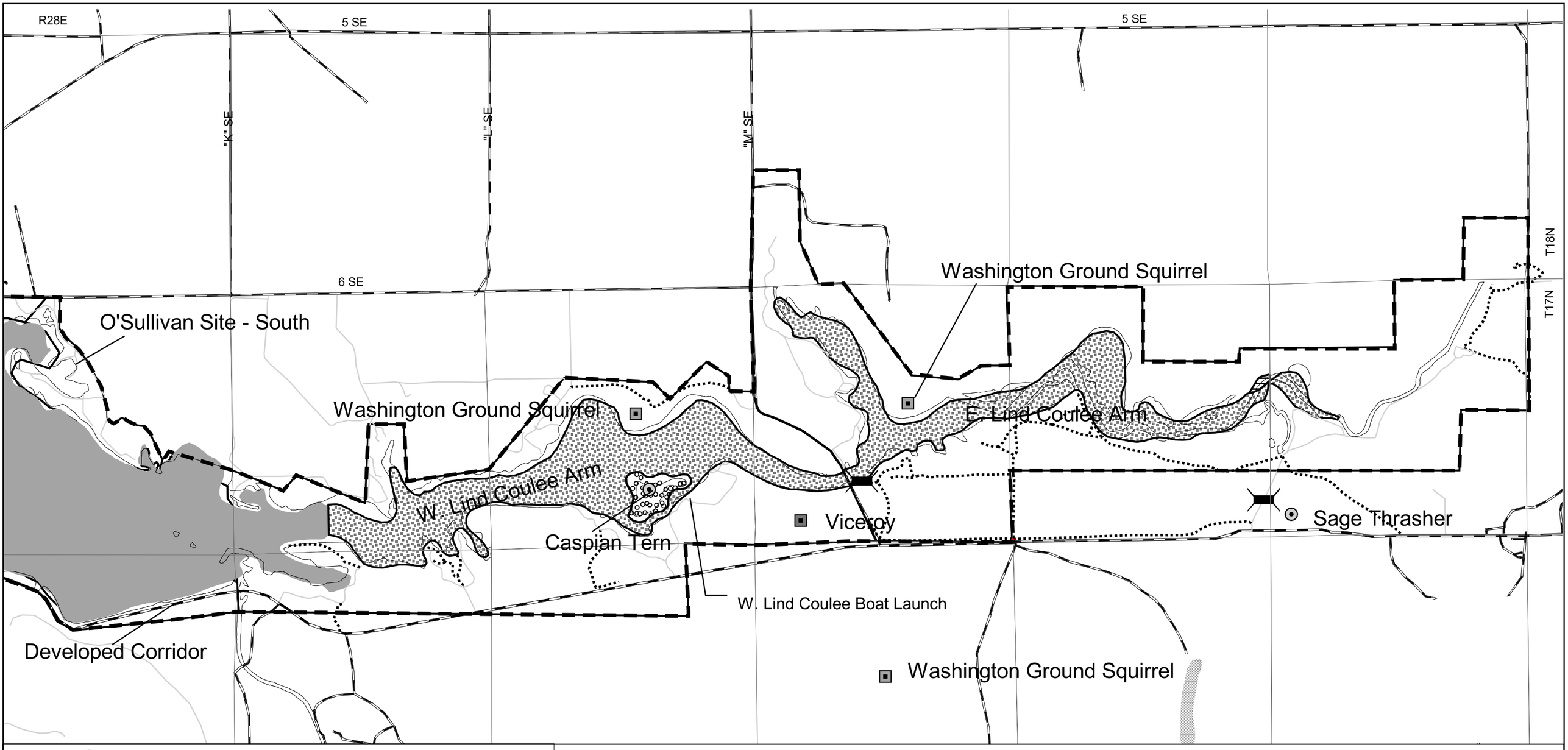
Mammals

Big game species within the reservoir area include mule deer (*Odocoileus hemionus*) and white-tailed deer (*Odocoileus virginianus*). Mule deer are more common with a population approaching 300-400 individuals, including the Winchester and Frenchman Hills Wasteways. The mule deer population has increased in the past few years. Fawn/doe ratios climbed to 100 fawns per 100 does in 1996 from a ratio of about 15 fawns per 100 does in the past (Tabor, 1996).

White-tailed deer sightings are rare near the reservoir. The most recent sighting was recorded in October 1996 near Potholes State Park (Tabor, 1996).

Furbearing Species

Furbearers in the Potholes Management Area include beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), mink (*Mustela vison*), raccoon (*Procyon lotor*), coyote (*Canis latrans*), long-tailed weasel (*Mustela frenata*), badger (*Taxidea taxus*), striped skunk (*Mephitis mephitis*)(Tabor, 1996, Foster *et al*. 1982) and rabbits (black-tailed jackrabbit *Lepus californicus* and Nuttall's cottontail rabbit *Silvilagus nuttallii*). Potholes Reservoir is also considered a major concentration area for beavers (Foster *et al.*, 1982). Although no official surveys have been conducted to quantify beaver population size, incomplete counts and observations indicate that at least one hundred beaver colonies (approximately 500 beaver) populate the Potholes Management Area (Tabor, 1996). The highest beaver concentrations occur in the northern section of the Potholes Reservoir Management Area in the West Arm, North Potholes Reserve, the Dune/Sand Islands, and the Crab Creek Arm. These areas are comprised of numerous pothole wetlands with a mixture of tree and shrub willow cover. Wetland plant community composition and the presence of many ponded areas are closely related to the dam building activities of beaver. Beaver lodges are key habitat structures in Potholes Reservoir. They provide nurseries for fish when the water level drops and shoreline areas are no longer available for cover (Zook, 1978), perches for herons and other birds, and basking sites for western painted turtles.



Wildlife Resources
Potholes Reservoir Resource Management Plan

Boundaries
- RMP Study Area
- Management Areas

Roads
- Highway/Improved Roads
- Primitive (Closed)
- Primitive (Open)
- Gate

Priority Species
- Breeding Occurance
- Individual Occurance
- Regular Small Occurance

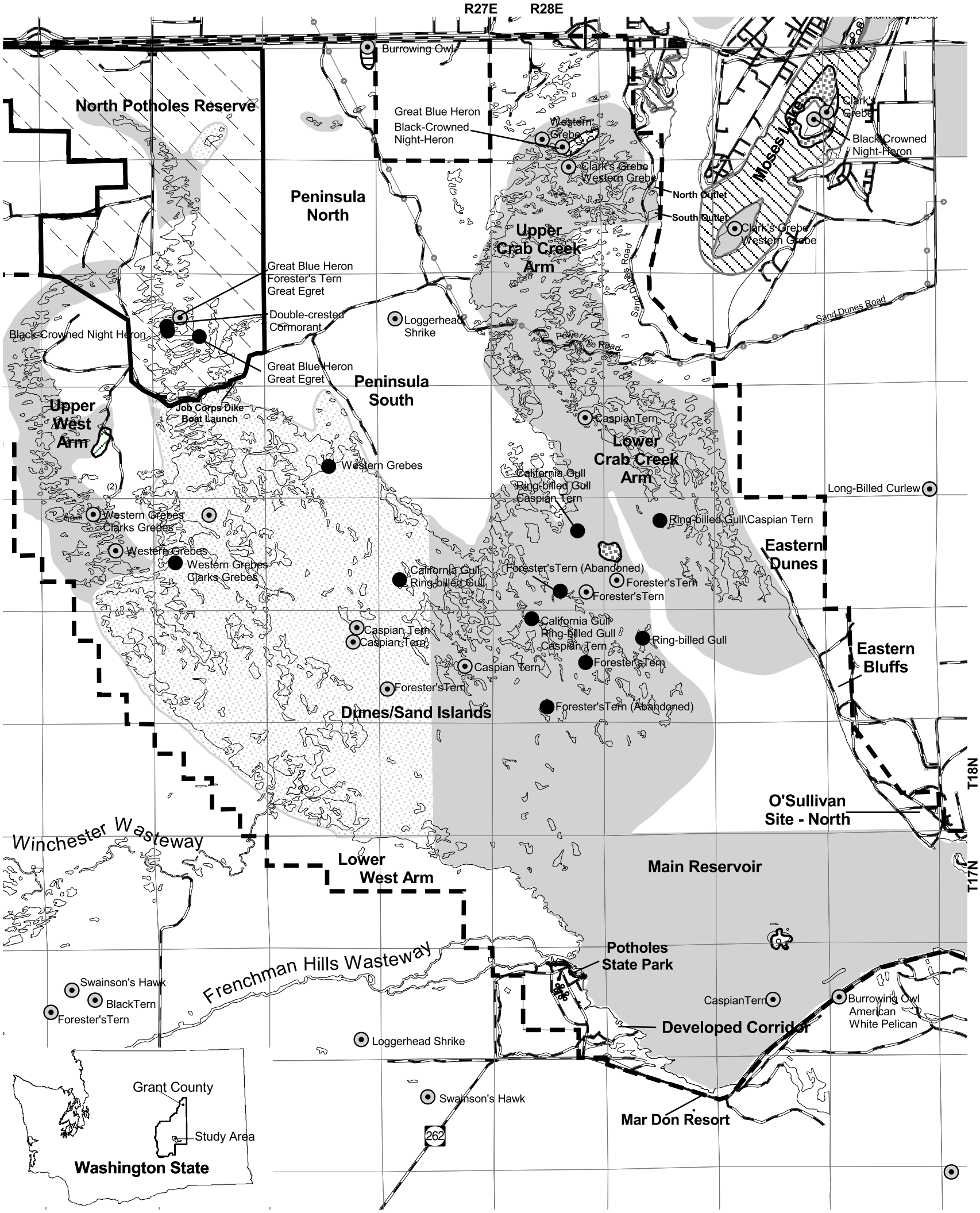
Shorebird and Waterfowl Concentrations
- Bald Eagle Wintering Habitat
- Waterfowl Breeding Concentrations
- Waterfowl Large Concentrations

N

Scale 1:30,000

0.4 0 0.4 0.8 Miles

Wildlife Resources
Potholes Reservoir RMP **Figure 3.2-4**



Wildlife Resources

Potholes Reservoir Resource Management Plan

Boundaries
- RMP Study Area
- Management Areas

Roads
- Highway/Improved Roads
- Primitive (Closed)
- Primitive (Open)
- ORV Trails
- Gate

Misc. Improvements
- Dikes
- Powerline

Priority Species
- Breeding Occurence
- Individual Occurence
- Regular Small Concentration
- Nesting Colony

Shorebird and Waterfowl Concentrations
- Shorebird Breeding Area
- Shorebird Large Concentrations
- American White Pelican Regular Concentration
- Bald Eagle Wintering Habitat
- Burrowing Owl Breeding Occurrence
- Clark's Grebe Breeding Occurrence
- Great Blue Heron Breeding Occurrence
- Priority Habitat Island
- Western Grebe Breeding Occurrence
- Waterfowl Large Concentrations

N

0.5 0 0.5 1 1.5 2 Miles

Wildlife Resources
Potholes Reservoir RMP
Figure 3.2-3

Nongame Species/Small Mammals

Pocket mice and pocket gophers are dominant species in sandy areas, and montane voles are abundant in association with moist sites. Washington ground squirrels are limited to the Lind Coulee Arm where soils are silt loam rather than sand. Several bat species are known to occur in the Potholes Management Area. However, the paucity, or shortage, of caves, rock outcrops, and mature trees limits bat roost sites in the reservoir area.

Birds

Upland game birds in the Potholes Management Area include ring-necked pheasants (*Phasianus colchicus*), California quail (*Callipepla californica*), mourning dove (*Zenaida macroura*), and gray partridge (*Perdix perdix*). Ring-necked pheasants are locally abundant in wetland and adjacent upland areas. In winter, they congregate under coyote willows in the East Lind Coulee Arm, and in Russian olive thickets (WDFW, 1997). Pheasants are hunted in all areas surrounding the reservoir. California quail are most abundant in the Potholes State Park and Crab Creek Arm, and a few quail are hunted along the West Arm each year. Mourning doves nest and winter in the dense wetland habitats surrounding the reservoir (Tabor, 1996). The gray partridge population is low but possibly increasing (Tabor, 1997).

Waterfowl

Potholes Reservoir is a major waterfowl hunting area of statewide importance. The North Potholes Reserve is located north of the Job Corps Dike and extends north to Interstate 90. No hunting or trapping is allowed in this reserve, which serves as a resting area for thousands of ducks and geese. During the hunting season the reserve promotes hunting on other parts of the reservoir by holding ducks in the area (Foster et al., 1984). The reserve also serves as an important Canada goose rearing area.

Canada geese in the Columbia Basin nest primarily on islands found within the reservoirs and other large water bodies of the region (Foster et al., 1984). At Potholes Reservoir, geese nest at the edges and on the highest points of the Sand Islands, on gull colony islands, on beaver lodges, and in trees also used by nesting herons.

The reservoir has limited high quality breeding habitat and food resources for ducks. Prime breeding and foraging habitat is found predominantly near carp-free waters along the reservoir perimeter. It has been hypothesized that the presence of carp reduces quality duck breeding and foraging habitat. For example, duck brood count numbers were relatively high for several species during a study conducted

prior to the construction of O'Sullivan Dam: coots (156 in 1950 and 180 in 1951), mallards (43 in 1950 and 58 in 1951), and blue-winged and/or cinnamon teal (40 in 1950 and 34 in 1951). However, waterfowl were not observed in pothole ponds with carp (Harris, 1954). More recently, the presence of carp in Columbia Basin ponds has been correlated with a lack of submergent vegetation, and significantly lower waterfowl abundances (Foster et al., 1984) than carp-free ponds for mallards, gadwalls, northern shovelers, cinnamon teal, blue-winged teal, American coot, ruddy duck, and redheads (Clement, 1980; Tabor, 1996).

Colonial Nesting Birds

Three areas are particularly conducive to colony nesting. North Potholes Reserve, the reservoir arms (West Arm, Job Corps, and Crab Creek Arm), and the Sand Islands collectively provide nesting habitat for all the colonial nesting birds that occur at the reservoir.

North Potholes Reserve

Many factors make the North Potholes Reserve ideal habitat for large colonial nesting birds. At the North Potholes Rookery, tall peachleaf willow stands loom above a complex of willow shrub, emergent, and open water wetlands. These willow trees, up to 50 feet tall, have matured since the 1970's to provide nesting habitat for black-crowned night herons, great blue herons, great egrets, and double-crested cormorants. The numerous ponds at this site and the reservoir supply these birds with food (i.e., fish and other aquatic organisms). Human disturbances within the reserve are minimal as motorized boats and automobiles are prohibited except in the vicinity of Job Corps Dike.

The Reserve has provided unique bird watching opportunities for many years. It contains the largest black-crowned night heron rookery and the first great egret breeding record in Washington state (Clement, 1980; Fitzner et al., 1979). In addition, three of the four main colony nesting birds here have State protective status as monitor species including the black-crowned night heron, great blue heron, and great egret. Breeding areas for all four species are considered priority habitats by the WDFW.

Reservoir Arms

The reservoir arms (West Arm, Job Corps, and Crab Creek Arm) are characterized by scattered tree willows, shrub willow dominated shorelines, and numerous ponds and islands bordered by emergent wetland vegetation. Black-crowned night herons and great blue herons have nested in relatively low

densities in Crab Creek rookeries. Fishing and PWC uses are sometimes concentrated in these arms (Finger and Tabor, 1997) especially at high water when access is not limited.

Sand Islands

Gulls and terns have nested on the Sand Islands since the 1950's (Harris and Yocom, 1952; Johnsgard, 1954). Islands selected by nesting gulls and terns are usually bare to sparsely vegetated with steppe grasses or shrubs. The shorelines may support willows and emergent plants. At Potholes Reservoir, these ground nesting birds scrape cup-shaped nests into the sand and line them with twigs and feathers (Finger and Tabor, 1997). Island colonies are very dynamic, with birds selecting different islands for nest sites, sometimes on a yearly basis.

The abandonment of entire island colonies appears to be relatively common at Potholes. Three out of five gull and tern colony islands containing approximately 673 ring-billed gull, 94 California gull, and 119 Caspian tern nests were abandoned a few weeks after Memorial Day 1997. After these abandonments another island colony was established. However, this newly established colony was also abandoned by June 23. In addition, two out of three Forester's tern island colonies were abandoned in 1997 (Finger and Tabor, 1997). It is not known whether the increase in human activity in the spring and summer contributes to the abandonment of nests and colonies.

Western Grebe - Grebe breeding areas are classified as priority habitat by the WDFW. Western grebe observations at Moses Lake and Potholes Reservoir date from the 1950's during early reservoir development (Harris and Yocom, 1952; Johnsgard, 1954). In 1997, the estimated number of western grebe breeding pairs was greater than 1,000, despite a large percentage of nest failures due to changing water levels, and wave action from boats and other water craft (Field Observations by Jim Tabor, WDFW). Grebes nested primarily in thick stands of bulrush in the Crab Creek Arm in the early 1990's (Tabor, 1997).

In 1997, western grebes nested along the West and Job Corps Arms, and Clark's grebes nested along the West Arm (see Figures 3.2-3 and 3.2-4 “Wildlife Resources Map”). There were 240 active western grebe nests, and at least 13 Clark's grebes nests. Nests were made of smartweed and bulrush. The first nests were observed on June 29 (Finger and Tabor, 1997). Grebes did not nest in the Crab Creek Arm in 1997.

Cormorant - The double-crested cormorant colony became established in the late 1970's. The colony has grown in recent years to become one of the largest fish-eating bird colonies in North Potholes Reserve. Before establishing nesting populations at Potholes, cormorants were noted as common migrants in the area (Johnsgard, 1954). In 1978, approximately 16 adult birds were observed in North

Potholes Reserve. By 1982, the cormorant population was very productive with at least 30 nests, each containing 3-4 young. The colony grew to approximately 425 nesting pairs in 1991. Nest production was high with many nests containing 4-5 young. Large numbers of non-breeding birds (up to 100 in 1983) were also using the reservoir (Friesz, 1997). In 1997, 652 nests were active with incubation in May and hatching in June (Finger and Tabor, 1997).

Double-crested cormorants are diving foragers rather than shallow water waders (Terres, 1995). The double-crested cormorant is presently one of the dominant fish-eating birds nesting in the tree willows. During the past ten years, the cormorant and egret colonies have had the highest growth rates of all of the colony nesting birds.

Other Water Birds and Shorebires

Water bird and shorebird breeding at Potholes Reservoir include sora rail, Virginia rail, American coot, killdeer, long-billed curlew, common snipe, and spotted sandpiper. Long-billed curlews nest in steppe grasslands and in high quality shrub-steppe habitat such as found within the Peninsula North, Peninsula South, and North Potholes Reserve Management Areas.

The white pelican is a state endangered species and is one of the more sought after birds by bird watchers. As such, the white pelican is a "high profile" species of concern at the reservoir. White pelicans are very opportunistic foragers and they will flock to areas with a rich supply of available fish. At Potholes Reservoir this supply of fish is most readily available when the water levels are low, causing fish to be restricted to pools where they are more vulnerable to predation. Significant numbers of white pelicans are present in the late summer and early fall, and in recent years their summer presence has increased. Counts of white pelicans have varied between 200 and 1,600 birds from 1978 to 1990 (WDFW, 1997). About 1,000 pelicans were observed in September 1996 foraging and resting in the wasteways. Part of the population is believed to be associated with the breeding colony of William Lake, B.C., estimated to be around 200-300 birds (Personal Communication with Jim Tabor, WDFW).

Reptiles

Sagebrush lizards (*Sceloporus graciosus)* are found in shrub-steppe habitats surrounding the reservoir. The Sand Islands and the uplands around the reservoir provide habitat for Northern sagebrush lizards, horned lizards (*Phrynosoma douglassii*), racers (*Coluber constrictor*), gopher snakes (*Pituophis catenifer*), and garter snakes (*Thamnophis spp*.). Painted turtles (*Chrysemys picta*) are abundant in the North Potholes Reserve and Crab Creek Arm. Painted turtles are often seen sunning themselves

on logs or hummocks in the pothole wetlands, and their tracks are often visible crossing the sandy ORV trails within the Lower Crab Creek Arm.

Although there are no known records of night snakes (*Hypsiglena troquata*) within the Potholes Management Area, habitat is available in basalt rocks at the southern end of the reservoir and in rodent burrows in the sandy soils found throughout the area. There is record of a night snake south of the West Lind Coulee Arm (WDFW, 1997).

Amphibians

Northern leopard frogs (*Rana pipiens*) are only known to occur in two Washington state locations. These most recent records are at Potholes Reservoir and in parts of Crab Creek north of Moses Lake. The Potholes Management Area's small, localized population is found in the Crab Creek Arm and North Potholes Reserve where they seem to prefer moist soil grown over with cockleburs during late summer and fall. Little is known about their breeding habits in this area (Friesz, 1997).

Tiger salamanders (*Ambystoma tigrinum*) are found in and near fish-free ponds along the Potholes Reservoir perimeter. They attach their eggs to submerged vegetation in shallow water where larva may take from one to two summers to metamorphose into terrestrial adults.

3.2.10 Threatened and Endangered Species

Information on federal and state special status plant and wildlife species in the Potholes Reservoir Management Area was obtained from databases maintained by the Washington Natural Heritage Program (WNHP) and USFWS. Included are those federally listed as Threatened or as "Species of Concern," and those with Endangered, Threatened, Sensitive or Review State status. In general, however, the presence or absence of a special status species at the site-specific location remains undetermined without additional field inventories.

Special Status Plant Species

Species with Federal Status

The WNHP indicated that there are no federally listed species known or suspected to occur in the project area (1996, 1999). However, the USFWS (March 29, 1999) included Ute ladies'-tresses (*Spiranthes diluvialis*) in their list of federally listed species that may occur at Potholes Reservoir.

The probability is very low that Ute ladies'-tresses occur in the Potholes Management Area due to the lack of appropriate habitat conditions. The USFWS (1998) states that Ute ladies'-tresses do not occur along slow meandering streams out in the flats - a good description of the streams near the Potholes Management Area. Most wetlands within the area are subject to long periods of inundation followed by severe drawdowns during the irrigation season, another condition specifically discussed by the USFWS as inappropriate. Lastly, the microclimates and elevations found at Potholes Reservoir are generally not conducive to the species.

Species with State Status

A Washington State Sensitive Species is defined by WNHP as "a species that is vulnerable or declining and could become Endangered or Threatened in the State without active management or removal of threats." According to the WNHP (WNHP, 1999), gray cryptantha (*Cryptantha leucophaea*), an upland forb and state sensitive species, occurs at one location in the Peninsula South management area and west of the Lower West Arm management area near the Winchester Wasteway. It typically grows in dry, often sandy places and is associated with rabbitbrush (*Chrysothamnus* spp.) and/or sagebrush (*Artemisia tridentata*) shrub communities and with cheatgrass (*Bromus tectorum*) and bluebunch wheatgrass (*Agropyron spicatum*) (WNHP, 1981). There is a large amount of this habitat type in the Potholes Management Area, though most of it is degraded. The cause of its rarity is unknown. Also, it is unknown how this species responds to disturbance.

Special Status Wildlife Species

Special status species are species that have been classified by the USFWS or WDFW as Threatened, Endangered, Species of Concern, or Monitor species.

Species with Federal Status

The bald eagle is the only federally listed Threatened species that occurs within the Potholes Management Area. There are no federal Endangered species listed within the overall management area since the de-listing of the peregrine falcon.

Individual adult bald eagles have been observed during the spring and summer months around the North Potholes rookery area in the last five years, leading to the speculation that at least one pair may be attempting to nest in the area. However, no nest has been found (Field Observations, WDFW).

The Washington ground squirrel is the only federally listed Candidate species within the Potholes Management Area.

Species with State Status

There are three State listed Endangered species (American white pelican, sandhill crane, and peregrine falcon) and two state listed Threatened species (Ferruginous hawk and bald eagle) that use the Potholes Management Area. In addition, there are nine State candidates for listing as Threatened and Endangered (western big-eared bat, Washington ground squirrel, common loon, western burrowing owl, sage thrasher, loggerhead shrike, sage sparrow, Columbia spotted frog, and northern leopard frog) and fifteen species on the state Monitor list (fringed myotis (bat), small-footed myotis, Kincaid's meadow vole, western grebe, Clark's grebe, Forster's tern, great blue heron, great egret, black-crowned night heron, black-necked stilt, long-billed curlew, prairie falcon, grasshopper sparrow, night snake, and tiger salamander).

Special Status Fish Species

No fish species with State or federal status (Endangered, Threatened, Species of Concern, or Monitor) are known to occur within the Potholes Management Area. However, State priority game fish including large and smallmouth bass, walleye, and rainbow trout are present.

3.3 CULTURAL RESOURCES SUMMARY

Cultural resources are defined as buildings, sites, structures, or objects, each of which may have historical, architectural, archeological or scientific importance. There are several laws and regulations directing federal agencies to locate, identify, evaluate, preserve, protect and manage cultural resources significant to the nation's heritage and history, the focus of which, is the National Register of Historic Places.

3.3.1 Findings

A Class III cultural resource survey was conducted for the Potholes RMP area (36,200 acres) in 1999. Of the 18,597 acres of dry land, including islands, 13,235 acres were surveyed. The 5,362 acres not covered by on-the-ground reconnaissance were inaccessible. Ten sites, all dating to the historic era, were recorded, along with 44 isolated finds (Axton *et al*, 2000). Of the 44 isolated finds,

all but four also dated to the historic era. The four non-historic represented American Indian occupations. Thus the dominant human occupation of the Potholes vicinity, as determined by cultural resources surveys, relates to the post American Indian occupation, especially the 20th century. No cultural resources identified were deemed eligible for National Register consideration.

Were it not for the completion of Grand Coulee Dam in 1942 located in the north CBP, and the development of the vast agricultural potential of the Columbia Basin, the Potholes area would have likely remained the dry, sand-blown desert described by those who traveled through the region a century before. Because of both the importance to the success of the CBP, as well as meeting the minimum 50 year-old criterion, O'Sullivan Dam itself is potentially eligible for the National Register.

Indian Trust Assets

Indian Trust Assets (ITAs) are legal interests in property held in trust by the United States for Indian Tribes or individuals. While most ITAs are on-reservation, they may also be found off-reservation. Examples of trust assets include lands, minerals, hunting and fishing rights, and water rights. Sometimes there is disagreement between the government and the tribes regarding what is considered to be an ITA, and who holds the right. This document does not judge the validity of rights claimed by any tribe.

The United States has a trust responsibility to protect and maintain rights reserved or granted to Indian Tribes or individuals by treaties, statutes and executive orders. This responsibility is sometimes further interpreted through court decisions and regulations. This trust responsibility requires that Federal agencies take reasonable actions to protect trust assets when administering programs under their control.

Findings

The Potholes Reservoir Management Area falls within the area ceded under the Treaty of 1855 in which rights to fishing and privileges for hunting and gathering of roots and berries were retained by the tribes signing the treaty.

While much of the Potholes Reservoir Management Area retains resources that support hunting, fishing and gathering activities, some areas may have been disturbed to the extent that they no longer can support such traditional uses. Currently, these activities are allowed throughout the Potholes Reservoir Management Area except that hunting is not permitted in Potholes State Park and in the North Potholes Reserve.

3.4 PALEONTOLOGICAL RESOURCE SUMMARY

The Columbia Basin basalts in the vicinity of Potholes Reservoir do not lend themselves to fossil preservation. Some vertebrates and invertebrates are occasionally reported in the area, but not with any frequency. Preserved plant species are present elsewhere in the Basin.

3.5 AESTHETIC RESOURCE SUMMARY

3.5.1 Visual

Fieldwork to inventory the scenic quality of the Potholes Management Area consisted of driving and hiking the area surrounding the reservoir as well as boating on Potholes Reservoir to qualitatively determine general visibility of the major landforms, recreation facilities, manmade structures, and reservoir-related facilities. In 1999, a visitor profile and recreational use study provided information on viewer sensitivity and key viewpoints. This information was presented in the Potholes Reservoir EIS and used to establish goals and objectives for visual resources.

Visual Character

Landscape character gives a geographic area its visual and cultural image, and consists of the physical, biological and cultural attributes that make each landscape identifiable or unique. (SMS, 1995). The upland landscape surrounding Potholes Reservoir is semi-arid and characterized by upland shrub-steppe cover types that include native shrubs and introduce annual grasses. Typically, these appear homogenous to the casual viewer and are not highly regarded. However, changes are more noticeable in this landscape type than in other more diverse landscapes.

Widely dispersed ranches, orchards, and farm operations are visible along the eastern boundary of the Potholes Reservoir Management Area. Riparian forest and riparian shrub cover types are common along reservoir and island shorelines, in natural drainages, and along wasteways. Wind breaks and shade trees are found in developed areas where they have been planted and irrigated. Sandy beaches, wind-blown dunes, and mudflats (at low water) characterize many of the undeveloped shoreline areas found around the reservoir. Most of the dispersed campsites have fire rings, and some are visually compromised each season by the presence of trash and human waste.

At Potholes Reservoir, sensitive viewpoints include travel routes (SR 262, SR 17 and Dodson Road). In addition, there is an established network of primitive dirt, sand or gravel surfaced roads visible throughout the Potholes Reservoir Management Area. Recreation sites and areas are also considered

sensitive view points at Potholes Reservoir. Most recreation users at Potholes Reservoir are boaters and campers who utilize the facilities in the Developed Corridor. These visitors expect developed amenities and modifications to the landscape. Visitors who camp at dispersed areas tend to prefer a more primitive experience and tend to be sensitive to changes in landscape character. The ORV Area experiences high use during the Memorial Weekend, but residual trash would suggest a general disregard for the visual quality of the area.

3.5.2 Noise

Noise (generally defined as undesirable sound) can be annoying to area visitors as well as wildlife. Unfortunately, the subjective effects of noise (annoyance, nuisance, dissatisfaction) cannot as yet be measured in any completely satisfactory way. This is primarily because of the wide variation in individual thresholds of annoyance and the habituation to noise of differing individuals due to their past experiences. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by those hearing it.

The most sensitive noise receptors in the Potholes Reservoir Management Area are the existing developed recreation areas (Potholes State Park and Mar Don Resort) and important wildlife areas (Dunes/Sand Islands and North Pothole Reserve). Ambient sound levels throughout most of the Potholes Reservoir Management Area are generally rural to residential in nature. These ambient levels are affected by noise from vehicular traffic on nearby roads, motor boats and personal watercraft (jet skis) on the reservoir, and general recreational activities (ORVs), all of which exert a greater influence, individually and cumulatively, during seasonal peak-use periods.

The impacts of noise on colonial nesting birds, Neotropical Migratory Birds (NTMB), large and small mammals, and other wildlife species are not well understood. While various species probably adapt to some noise, the limits to the amount of adaption that can be made are not known. Although some species have little tolerance of noise (e.g., Canada geese) and others tolerate noise at very high levels (e.g., great egrets), noise can have other effects that are not readily apparent, such as relocation or prevention of mating and nesting behavior.

3.6 ECONOMIC AND SOCIAL RESOURCES SUMMARY

From 1930 to 1962, Grant County experienced rapid growth from 6,000 people to over 54,000. This increase was due mainly to the military installations and major construction projects dealing with the allocation and manipulation of the water resources. Since 1970, Grant County has had a relatively constant population showing only a slight overall increase. From 1989 to 1996, however, Office of

Financial Management figures show an increase to 66,400 ranking Grant County 17th in the State for population size.

Some population increases can be attributed to the migration of people from cities to rural communities. This commuting culture has created its own economic and ecological changes. For the Potholes area this mobility and desire for solitude has contributed to the influx of the recreating public. However, the majority of increase in population and changes to the Potholes and Grant County area is due to the introduction of water to several new irrigation blocks. This creates a "ripple" affect for the growth of small industry to accommodate the increased need for homes and home services. This was the case for the county leading up to the 1980's.

3.6.1 Economic Setting

Farming is the major industry in Grant County. The surrounding region produced 42 percent of the potatoes, 20 percent of the wheat, 54 percent of the sweet corn, 32 percent of the hay, and 43 percent of the peppermint in Washington state.

In 1993, one out of every four employees in the region was a farm worker. Statewide, less than 4 percent of all workers are farm workers. In Grant County there were over 5,700 farm workers. Employment rates vary greatly throughout the year and are directly related to the seasonality of farm work.

Farm income is the primary factor in the per capita average and reflects the relative volatility of farm income. Fifteen percent of Grant County income is farm related, compared with 1 percent statewide. Income distribution, measured by median household income, was $26,288 in Grant County, compared to a state median household income of $36,648 for 1992.

Grant County construction employment closely matches the State average of 5 percent. Manufacturing employment for Grant County and the State in 1993 was 17 percent and 15 percent, respectively. Seventy three percent of Grant County manufacturing is in food processing.

Since 1986, per capita income has been below the state and national averages. The national per capita income average in 1992 was $20,105. Grant County per capita income has remained relatively flat and below the state and national averages since the mid-1970's. In 1992, per capita income in Grant County was $16,289, 77 percent of the statewide average, and ranked 31st in the State.

3.6.2 Recreation/Visitation

In 1998 and 1999, "a visitor profile and recreational use survey" was conducted to gather information about visitor use and satisfaction, crowding, conflicts, recreation needs, as well as demographic and economic data pertinent to the Potholes Reservoir Management Area.

The recreation survey indicated that most Potholes Reservoir respondents were from the Puget Sound area, with 31 percent from the Seattle area. Fourteen percent of the respondents were locals from Grant County, 13 percent were from the Tacoma area, and 10 percent were from the Everett area.

About 35 percent of the respondents were return visitors, and 59 percent identified Potholes Reservoir as one of their favorite reservoirs to visit. Seventy-six percent of all users came to Potholes to be with friends, and about half of the respondents were satisfied with their trip. In support of their satisfaction, about half of the respondents would be willing to pay user fees from $1 to $10 per year. However, 26 percent indicated they were not willing to pay for facility use.

The average length of stay was five days. Twenty-three percent of respondents made arrangements and planned to stay at Potholes Reservoir one week to one month in advance of their visit. Thirty-three percent of the visitors have been coming to Potholes Reservoir for more than 10 years, 24 percent from 6 to 10 years, and 21 percent from 3 to 5 years. Thirty-four percent stayed in public dispersed camping areas and 26 percent camped at Potholes State Park. Nineteen percent of the respondents stayed at Mar Don Resort.

Overall survey use included camping (72 percent), fishing (63 percent), sunbathing (46 percent), and swimming (45 percent), however 36 percent of the survey respondents ranked fishing as the most important activity while 24 percent consider camping the most important recreation activity. Anglers ranked walleye and bass as the preferred catch, followed by trout and perch. Thirty-eight percent of the respondents used powerboats and 21 percent used PWC.

3.6.3 Solid Waste Management

Several sites surrounding Potholes Reservoir have been identified as areas where scattered litter is a common, recurring problem. To address this issue, establishing improved litter control procedures at each formal and informal day use and overnight site within the Potholes Reservoir Management Area should be a priority.

Establishing a reporting/monitoring system for litter control can include a monthly drive-by or visual site investigation of heavy use areas for loose trash, full trash receptacles, etc. Initial inspections should

record areas where receptacles need to be serviced more frequently, or problem locations where receptacles are not available (i.e., Sand Dunes and other informal camping areas). Monitoring results can direct where sanitation facilities and services should be improved or supplemented as necessary (i.e., during peak weekends). Discouraging trash dumping on public lands could be accomplished through educational programs, signage, brochures, increased monitoring, and/or law enforcement with strict penalty by Federal, State, and local officials. Adopting and encouraging "pack-in/pack-out" procedures and promoting the solid waste management survey program should be a priority in visitor brochures, and on appropriate signage.

CHAPTER 4
RESOURCE GOALS AND OBJECTIVES

4.1 INTRODUCTION

The policy of Reclamation is to provide public recreational opportunities and facilities in accordance with an approved RMP. The RMP is to include adequate facilities to protect the health and safety of the user and protect land and water resources from environmental degradation. Recreation facilities under Reclamation jurisdiction are to be operated and maintained in a safe and healthful manner.

Where Reclamation lands are directly managed by others for recreation purposes (i.e., Mar Don Resort as a privately owned concessionaire operating under a lease with the State), Reclamation shall exercise oversight responsibility to ensure that those management entities fulfill all aspects of the approved RMP. All contractual agreements with these management entities shall reflect and be consistent with the approved management plan as identified and accepted by Reclamation through completion of the Potholes Reservoir RMP/EIS (Figures 4.1-1 and 4.1-2 "RMP Management Actions").

4.2 RESOURCE MANAGEMENT GOALS

The purpose of management goals is to establish management direction during the planning period for the RMP. The goals respond to specific issues identified during the scoping period with the public and involved agencies.

The results of previous surveys and inventories were also included in the scoping process. For example, in surveys conducted by the Interagency Committee for Outdoor Recreation (IAC), the public has indicated that water access sites are among the most desired settings. Therefore, IAC tries to place priority funding on projects that serve multiple state objectives including:

- recreation access,
- preservation of habitat, and
- provision of trail opportunities to or along the water.

Six goals were developed from the scoping process and the analysis of recreation facilities and use:

Goal #1 - Provide a balance between recreation and resource protection.

The vast majority of recreation activities occurring at Potholes Reservoir are resource based. As a result, management must attempt to strike a balance between providing the public with recreation opportunities and protecting natural resources. One of the most effective ways to accomplish this goal is to identify the most appropriate locations for each activity type. Therefore, activities that typically create the greatest impacts can be located in less sensitive areas. Managers can then designate limited access to or permit only low impact activities in areas with high resource values.

Goal #2 - Expand facilities and provide access to relieve crowding and congestion.

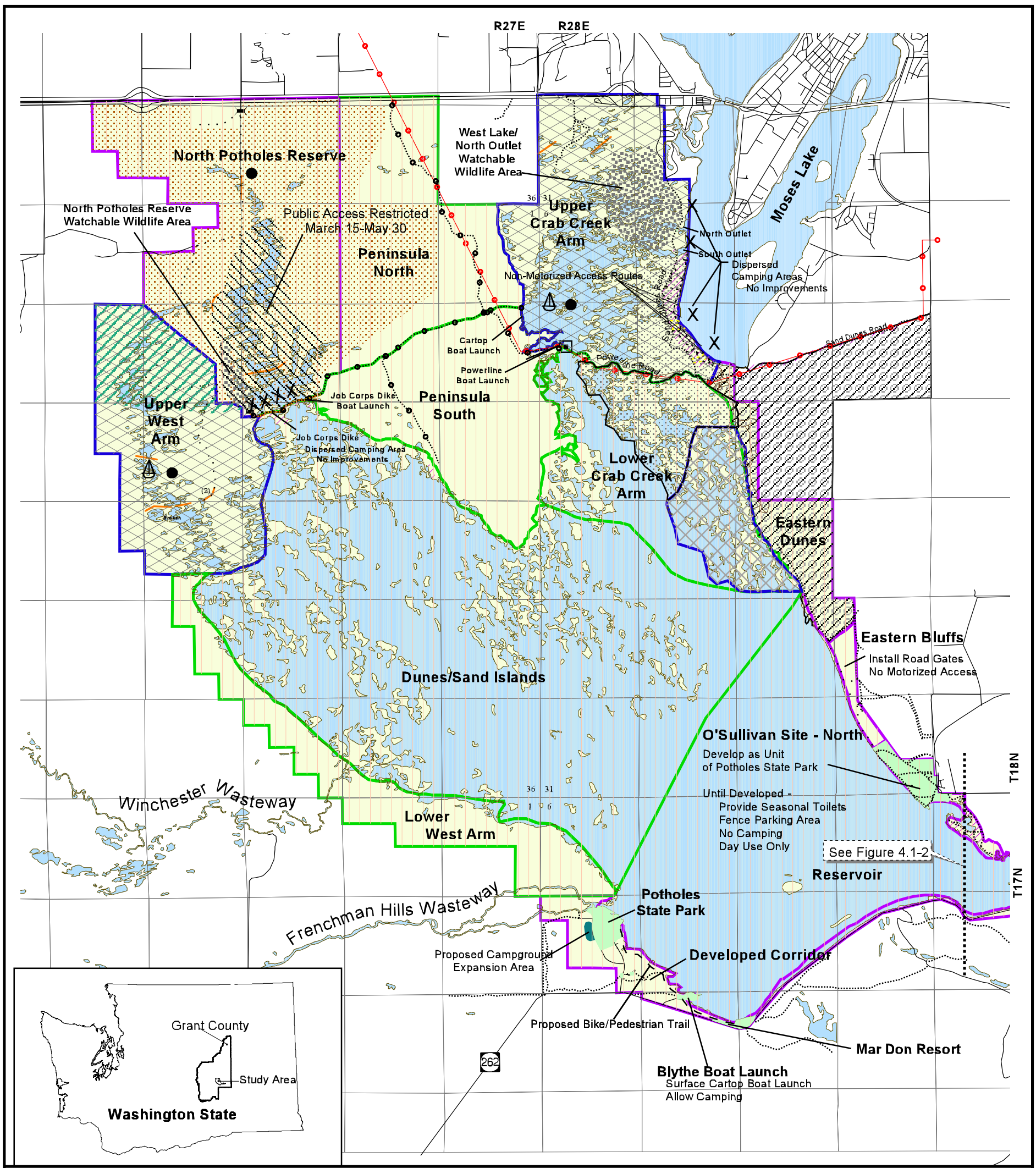
Crowding is often a matter of congestion at key recreation sites such as access points (i.e., boat ramps, trail heads, etc.) or camping sites. Congestion can usually be relieved through expansion of facilities and/or redistribution of visitors. Where appropriate, existing facilities should be improved or expanded. In some cases, improving or redesigning an existing facility can improve the ability of a site to accommodate visitors. In other cases, it may be appropriate to add new facilities in underutilized areas to distribute visitors evenly and to relieve congestion. Conversely, in some circumstances it may be desirable to maintain limited facilities at access points (i.e., controlled number of parking spaces) to discourage overuse of more sensitive areas.

Goal #3 - Provide for public health and safety and consistent enforcement of rules and regulations.

Providing for public health and safety is of primary importance. Visitors to Potholes Reservoir recreate with an expectation of doing so in a reasonably safe and healthy environment. It is essential that Reclamation protect the public from health and safety hazards. Integral to any public health and safety program is a viable law enforcement program. Laws and regulations protecting both the public and the resources of the area should be consistently and effectively enforced throughout the RMP area. Inadequate or inconsistent enforcement places public safety at risk, sends mixed messages about the importance of protecting the area's resources, and often undermines management effort to protect both visitors and resources within the RMP area.

Goal #4 - Maintain current diversity of recreation opportunities.

A wide variety of land-based recreational activities are practiced at Potholes Reservoir. Pressure for more recreational opportunities has increased in recent years and is expected to continue.



RMP Management Actions - Potholes Reservoir RMP

Figure 4.1-1

RMP Study Area
Management Areas
Habitat Management Areas
Grant County ORV Area
ORV Use Area Open Year-Round
ORV Use Area Closed Year-Round
ORV Use Area Seasonally Open (July 1 - October 1)
Minimum Wake March 15 - June 30
No Motorized Watercraft
Enhance Diking System
Designated Dispersed Camping Areas

Dispersed Camping Areas

Closed Year Round
Open Year Round
Seasonally Open (Closed March 15-June 30)
Designated Dispersed Camping Areas

Grazing Permit TP-01

Seasonal Grazing March 15 - April 15
Seasonal Grazing November 1 - March 15

Misc. Improvements

Dikes
Powerline
Install Vault Toilet
Provide Seasonal Toilets
Provide Courtesy Dock

Roads

Highway/Improved Roads
Primitive (Closed)
Primitive (Open)
ORV Trails
Gate

Watchable Wildlife Areas

North Potholes Vehicle Route
Open Access
Restricted Access
Developed Recreation Area

RMP Management Actions

Potholes Reservoir Resource Management Plan

N

0.5 0 0.5 1 1.5 2 Miles

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

R28E
5 SE
5 SE
'K' SE
'L" SE
'M' SE
T18N
T17N
6 SE
36
31
1
6

O'Sullivan Site - South
Dispersed Camping Area until
O'Sullivan Site - North is Developed
as Unit of Potholes State Park

#2 Dispersed Camping Area
No Improvements

Lind Coulee North Arm
Watchable Wildlife Area

Sampson's Pit
Dispersed Camping Areas

Sampson's Beach
Dispersed Camping Area

#1 Dispersed Camping Area
No Improvements

E. Lind Coulee Arm

W. Lind Coulee Arm

See Figure 4.1-1

Main Reservoir

Glen Williams
Boat Launch
Allow Camping

262

Road 'M' Boat Launch
Allow Camping

Seasonal Road Closure
October1 - January1

Developed Corridor

#5 Dispersed Camping Area
No Improvements

#3 Dispersed Camping Area
No Improvements

W. Lind Coulee Boat Launch
Dispersed Camping Area
No Improvements

#4 Dispersed Camping Area

RMP Management Actions
Potholes Reservoir Resource Management Plan

RMP Study Area

Management Areas

Watchable Wildlife Areas

Developed Recreation Area

Dispersed Camping Areas

Closed Year-Round
Except In Designated Areas

Designated Dispersed and Primitive Camping Areas

Misc. Improvements

Provide Seasonal Toilets

Provide Courtesy Dock

Roads

Highway/Improved Roads

Primitive (Closed)

Primitive (Open)

Gate

N

Scale 1:24,000

0.5 0 0.5 Miles

Grant County
Study Area
Washington State

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

RMP Management Actions - Potholes Reservoir RMP
Figure 4.1-2

Opportunities for visitors to participate in a variety of recreation activities should be maintained. Managers must optimize the use of their recreational resources. Many of the recreational activities occurring around Potholes Reservoir are inherently conflicting in nature. Often the only way to reduce or eliminate these conflicts is through spatial or temporal separation. This can be accomplished by identifying which areas are appropriate for each activity opportunity. By zoning the RMP area into classes and clustering compatible uses into the most appropriate area, the diversity of activities can be maximized while eliminating or reducing conflict and resource impacts. The intent of this goal is to ensure that visitors have a variety of recreation opportunities to choose from, while maintaining participation in activities that are currently predominant in the area.

Goal #5 - Maintain facilities and recreation use areas consistently throughout the RMP area.

Facilities and recreation use areas should be maintained consistently throughout the RMP area. Visitors to Potholes Reservoir should see no maintenance differences as they move across administrative boundaries. As the parent agency, Reclamation exercises oversight responsibility to ensure consistent and coordinated maintenance throughout the RMP area. Consistent and coordinated maintenance should also be a stipulation in Reclamation's land use leases.

Goal #6 - Identify and implement supplemental means of funding and manpower.

Appropriate funding for resource protection and for providing recreational resource opportunities to the public is the essential element to achieve the goals of this RMP. Funding challenges are compounded by the rapid and continuing growth in demand for resource based outdoor recreation opportunities. Funding for management and maintenance of resource based recreation has not kept pace with this explosion in demand. Managers must be proactive in developing ways of supplementing funding and manpower if they are to be successful in their assigned mission. Managers should be encouraged to be innovative in developing alternative, supplemental sources of funding and manpower to include donations, partnerships, volunteers and grants. The implementation of special user fees should also be explored when and where appropriate.

4.3 GENERAL MANAGEMENT STRATEGIES ASSOCIATED WITH THE RMP

Four general management strategies, meeting the resource management goals, were developed and applied to the RMP recommended action for (1) no motorized access, (2) managed/limited motorized access, (3) recreation sites and improvements, and (4) resource protection enhancement. Each of these strategies specifically involve the following:

4.3.1 No Motorized Access

- Close the western portion (about 0.7 miles) of Powerline Road and **919 acres of the Lower Crab Creek management unit** to motor vehicle travel/ORV use except for maintenance, administrative and emergency purposes. Approximately 18.4 miles of primitive road would be permanently closed to motorized travel.

- Install road gates, fencing, signs, and/or buoys as needed to enforce seasonal and permanent closures.

4.3.2 Managed/Limited Motorized Access:

- Maintain 41.9 miles of the primitive/gravel road network open year-round or seasonally to discourage random motor vehicle travel.

4.3.3 Recreation Sites and Improvements

- Provide permanent or portable toilets in high use dispersed camping areas where human wastes pose a public health or environmental hazard.

- Construct trails and boardwalks to control public access and foot traffic through wetland and riparian habitats in high use recreation areas (i.e., within the Developed Corridor).

- Perform minor road improvements (i.e., grading and/or the placement of gravel) as needed to improve vehicular access and/or reduce soil erosion and public safety concerns where continued primitive road access is desirable.

4.3.4 Resource Protection and Enhancement:

- Increase the public's awareness of WDFW's "pack-in/pack-out" policy and other waste management strategies. Post "pack-in/pack-out" signs at all high public use areas, dispersed camping areas, boat launches, etc.

- Seek funding and partnerships for additional staff, equipment, and/or contract services to meet reservoir-wide waste management needs, toilets and trash cleanup.

- Control dispersed camping in environmentally unsuitable or sensitive areas through appropriate access restrictions, seasonal use restrictions, or closure. Manage this use according to the "Camping" actions described below in Section 4.4.3.

- Seasonally restrict watercraft to low speed/minimum wake operation and prohibit dispersed camping (except in designated areas or sites) in Habitat Management Areas (HMAs) from March 15 through June 30 to enhance wildlife nesting and breeding success.

- On the basis of the information gathered, the management agencies would amend or rescind existing management strategies or actions to balance public recreation and resource protection policies, goals and objectives. Opportunities for public review and comment would be provided prior to adopting and implementing any management changes affecting public use.

- Manage/limit dispersed camping and/or public access with gates, fencing, signs and/or buoys as needed to seasonally or permanently close roads and/or areas to motorized travel where resource protection and enhancement needs have been identified.

- Prohibit the discharge of firearms in areas of wildlife species conflicts or for reasons of public safety in the Lind Coulee Arm, watchable wildlife areas, and other high use public recreation areas except during the primary hunting season.

- Monitor resources effected from motorized access, dispersed recreation and camping, and public use on an annual basis. If the Limits of Acceptable Change (LAC) process and monitoring reveals that impacts and action thresholds have been exceeded, the WDFW, SPRC, and Reclamation would explore and prescribe alternative management actions for resolving the problems and revising the management direction.

The following sections outline resource specific management actions developed to achieve the Desired Condition for the Potholes Reservoir Management Area.

4.4 RECREATION ACTIVITIES

The RMP provides for limited recreation development and the maintenance of existing recreation facilities and opportunities to a standard that protects the public and public investment while achieving resource protection objectives. Future developed recreation areas will be limited to Potholes State Park and O'Sullivan Site - North where a higher level of site and facility development will be provided by the SPRC.

Dispersed camping will continue to typify public recreation on lands administered by the WDFW. However, the direct and indirect environmental effects often associated with dispersed use (i.e., soil erosion and compaction, littering, improper human waste disposal, vegetative damage, wildlife disturbances, and indiscriminate motorized travel in adjacent areas) will be controlled by directing use to specific areas or sites designated "open" for dispersed use. These areas were selected through the environmental assessment process due to their suitability for public use with minimal resource conflict or environmental effect.

Table 4.4-1
General Recreation Resource Management Goals and Actions

RMP Recreation Opportunity Goals	Management Action
Maintain the current character of recreation at Potholes Management Area by providing a diverse range of quality recreational opportunities within the carrying capacity of the natural resources.	**Retain Diversity -** retain the current diversity of recreational activities as listed: **S** Hunting duck and goose hunting upland gamebird hunting carp bow hunting **S** Fishing recreational competitive tournaments (with management controls) guided sport fishing commercial carp fishing **S** Boating recreational, non competitive **S** PWC recreational, non competitive **S** Off Road Vehicle (ORV) activities recreational (with management controls) **S** Water skiing **S** Camping recreational in developed campsites, no long-term recreational dispersed in certain undeveloped areas **S** Picnicking **S** Bird Watching **S** Hiking

Table 4.4-1
General Recreation Resource Management Goals and Actions

RMP Recreation Opportunity Goals	Management Action
	S Parasailing recreational, noncommercial S Diving recreational, noncommercial S Swimming S Sunbathing **Manage Numbers -** Manage the number of visitors within Limits of acceptable use. **Retain Predominance -** Retain the current predominance of recreational uses to the extent feasible, so that major uses continue to be major uses where not limited by expansion of new or minor uses. **Identify Dispersed Recreation -** Identify, designate and manage specific areas for dispersed recreation use. Monitor impacts at these areas and modify use and management approach if impacts become unacceptable. **Evaluate Impacts -** Evaluate resource impacts of existing ORV use on Reclamation lands to assure that continued use is consistent with Reclamation policy. **Evaluate ORV Use -** Evaluate potential for ORV use of Reclamation lands adjacent to existing ORV area consistent with Reclamation policy. **Evaluate Proposal for Modified ORV Areas -** Evaluate a specific proposal advanced by Grant County ORV clubs for modification of areas allowed for seasonal ORV use and associated development. **Develop New Facilities -** Generally, develop new facilities in close proximity to existing facilities, except for those facilities that may be needed to reduce impacts to areas of dispersed use. **Fee Structure -** Identify and implement a fee structure, within

Table 4.4-1
General Recreation Resource Management Goals and Actions

RMP Recreation Opportunity Goals	Management Action
	current legal authorities, to generate additional revenues for SPRC and WDFW operation, maintenance, and management functions. **Address Congestion -** Coordinate and work with the Washington Department of Transportation (WDOT) to address congestion problems along State Route 262 during peak recreation periods. **ADA Accessibility -** Provide accessible facilities for persons with disabilities in all new developments or redevelopments as required by Section 504 of the Architectural Barriers Act. **Provide Fishing Jetty -** Provide a fishing jetty or breakwater for the physically challenged in Potholes State Park. **Provide Additional Campsites -** Provide additional campsites and associated facilities within Potholes State Park. **Dispersed Recreation in the Sand Dune Islands -** Continue to manage the Dunes/Sand Islands management area for dispersed recreation (e.g., camping, wildlife observation, picnicking, and sunbathing). No recreation improvements or sanitation facilities would be provided and trash would continue to be managed under a "pack-in/pack-out" policy. **Continued Hunting Consistent with Existing Regulations -** Hunting would continue to be allowed on all Reclamation lands consistent with existing State and local regulations. Public hunting and trapping are currently allowed throughout the Potholes Reservoir Management Area except within North Potholes Reserve and Potholes State Park. If human waste and trash disposal becomes a significant public health concern in the future, area and site closure, seasonal portable or floating toilets, and/or other management strategies would be examined by the WDFW and Reclamation and corrective action(s) taken. Opportunities for public review and comment

Table 4.4-1
General Recreation Resource Management Goals and Actions

RMP Recreation Opportunity Goals	Management Action
	would be provided prior to adopting and implementing any management changes affecting public use. **Construct Bicycle/Pedestrian Trail -** Work with the WDOT to complete a 1.7 mile asphalt-surfaced bicycle/pedestrian trail between Potholes State Park and O'Sullivan Dam (see Figure 2-2.1). This phase of the trail would link the Mar Don Resort and Potholes State Park.
Provide appropriate support services, facilities and regulations to enhance the quality and safety of recreation at Potholes Reservoir and fulfill unmet needs.	**ConsiderDevelopedExpansion-** Consider expanding state park land and construction of additional camping areas, dependent on results of a needs analysis, to relieve pressure on undeveloped areas. **Determine Litter and Waste Areas of Concern -** Determine areas where lack of refuse containers and sanitation facilities are areas of concern and are impacting visual aesthetics, human health, and wildlife health and habitat. **Develop Funding to Increase Sanitary Facilities -** Seek or develop funding sources to increase sanitary facilities and refuse containers in the Sand Island areas, open water areas and other dispersed use areas thereby reducing the potential for impact on water quality and human health. **Encourage Volunteer Cleanup -** Encourage volunteer cleanup projects by user groups in high use areas such as those projects that take place in the ORV area. **Litter Enforcement -** Increase monitoring and enforcement of litter laws. **Designate Public Swimming -** Provide designated public swimming areas at the Potholes Reservoir away from the boat docks where swimming presently occurs. Assess use of the O'Sullivan Site area which has been suggested for a designated swimming area.

Table 4.4-1
General Recreation Resource Management Goals and Actions

RMP Recreation Opportunity Goals	Management Action
	Establish No-Wake Zone - Consider a near-shore buffer/no-wake zone in Potholes Reservoir to mitigate conflict among fishermen, recreational boaters, PWC users, swimmers and water-skiers who all desire use of near shore areas for their activities. The no-wake zones may also reduce shoreline erosion caused by wave action, reduce impacts to fish nests and spawning habitat, and reduce wildlife impacts such as unintentional flooding of bird nests. **Manage Dispersed Camping in ORV Areas -** Devise a management strategy in conjunction with Grant County for the significant number of individuals camping in the existing ORV area at the northeast part of the reservoir. The strategy needs to deal with the availability of sanitation facilities, refuse containers and control of ORV access into environmentally sensitive areas. **Coordinate ORV Management with WDFW -** Coordinate ORV management strategy with the WDFW to provide a mechanism to assure protection of wildlife and habitat in the Upper and Lower Crab Creek Arms. **Manage Dispersed Camping -** Develop management strategies to mitigate the environmental effects of significant random camping in the Sand Island areas, as well as at O'Sullivan Site and the Job Corps Dike area. **Establish Litter Control -** Establish a "pack-in/pack-out" regulation for dispersed use areas. **Designate Multi-Use Trails -** Designate and maintain multi-use trails to minimize resource damage. **Identify Safety Concerns -** Identify and restrict public access to areas that present safety concerns. **Identify Appropriate Use Restrictions -** Identify and develop appropriate use restrictions for recreational and other activities. Limitations may affect: useable portions of the

Table 4.4-1
General Recreation Resource Management Goals and Actions

RMP Recreation Opportunity Goals	Management Action
	Potholes Reservoir Management Area where the activity is allowed; season when the activity is allowed; time of day when the activity is allowed, etc. Such restrictions shall be developed only as necessary to protect or enhance the environment, fish and wildlife habitat, human health and safety, or the quality of the recreational experience. **ConsiderBoat and PWC Restrictions -** Consider potential restrictions on full power boat and PWC operation in the near vicinity of O'Sullivan Dam to help prevent serious accidents due to collision with submerged rocks. **Limit Agency Liability -** Review CBP authority, liability and insurance considerations associated with providing a designated swimming area, and allowing sponsored recreational events such as tournaments, races, etc., to limit the potential liability of Reclamation, Irrigation Districts, the State of Washington, or Grant County.
Provide an appropriate range of information materials to increase public awareness of recreational opportunities, use restrictions, safety concerns, and natural and cultural resource values.	**Hazardous Boating Education -** Educate the public on the presence of submerged boating hazards due to reduced water levels. As a general policy, such hazards are not marked in non-navigable (by definition) waters. **Regulation Education -** Educate the public on "pack-in/pack-out" ethic or regulations, fishing regulations, hunting regulations, boating regulations and camping regulations.

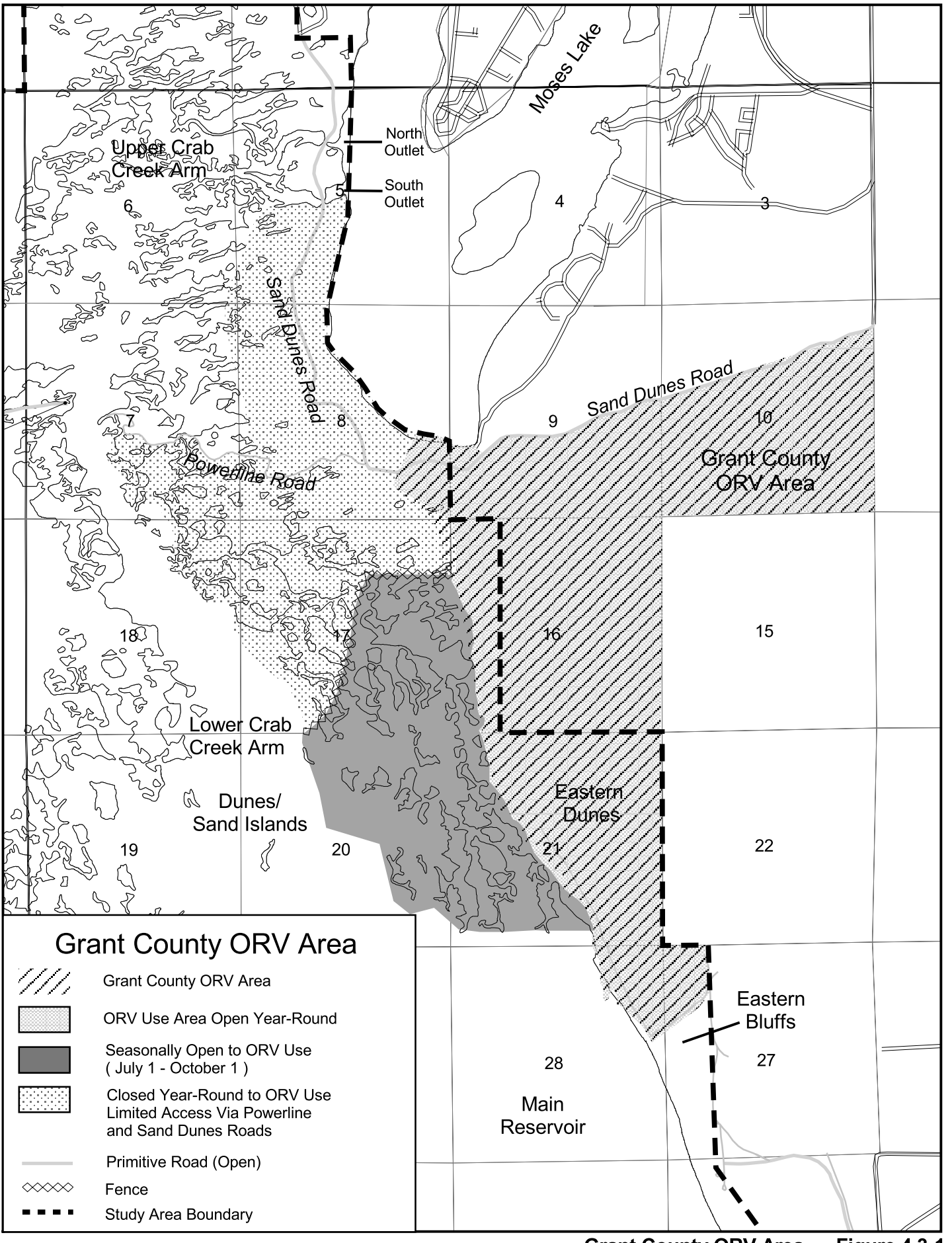
4.4.1 ORV Use

ORV use attracts upwards of 3,000 visitors on Memorial Day weekend (WDFW estimate). The heavy dune buggy and 4 x 4 use during holidays and weekends results in increased conflict between ORV user groups. The RMP recommends the Grant County ORV Area consist of 1,895 acres open year round and 539 acres of limited seasonal use. The estimated total acreage will encompass approximately 2,434 acres located inside and outside the RMP management area (Figure 4.3-1 "Grant County ORV Area").

To be an effective management plan, user groups should be encouraged to participate in all appropriate management activities. The responsible land managers should coordinate with groups, such as the Sand Commandos and IAC, in cooperative management of the ORV use area.

Table 4.4-2
Recreation Resource Management Goals and Actions for ORV Use

RMP ORV Use Goals	Management Action
Maintain and Enhance ORV Recreational Opportunities within Potholes Reservoir.	**Patrol and Monitor ORV Use -** Cooperate with the Grant County Sheriff's Office to patrol and monitor ORV use and environmental resource conditions and trends within the Grant County ORV Area. Control or eliminate ORV use and/or motorized travel in environmentally sensitive areas. **Restore Vegetation -** Restore and revegetate severely damaged areas closed to ORV use. As part of the restoration effort, locate and develop an interpretive trail in the ORV area to illustrate habitat restoration. **Define and Improve ORV Use Areas -** Fence the east side of Sand Dunes Road between South Outlet and Powerline Road to prevent indiscriminate ORV entry. Provide four hard-surfaced roadside turnouts along the east side of the Sand Dunes Road for vehicle and ORV parking. At each turnout, a nonmotorized access route would lead to a designated dispersed camping area adjacent to Moses Lake located northeast of the Potholes Reservoir Management Area. Motorized use of these access routes would be limited to administrative and emergency use only.



Grant County ORV Area Figure 4.3-1

Table 4.4-2
Recreation Resource Management Goals and Actions for ORV Use

RMP ORV Use Goals	Management Action
	Update ORV Signage - Update signs and maps (and post additional signs along Sand Dunes Road) to improve public awareness of ORV Area boundaries, regulations, and riding and camping opportunities. All Reclamation lands are closed to motorized travel except for those roads and areas designated "open" for such use.

4.4.2 Personal Watercraft and Motorized Boats

Impacts to shoreline habitats occur from boat wakes. Grant County currently has no ordinance that specifically addresses or defines a "No Wake Zone" on Potholes Reservoir. To date, the Grant County Sheriffs Department has enforced an unofficial No Wake Zone based on safety issues related to boat operations near shore, such as operating boats in an unsafe manner and towing water skiers near shore (Grant County Ordinance #6.08, revised 1994). Thus far, boat wake enforcement has not been for resource protection purposes.

4.4.3 Camping

Dispersed, unregulated camping is common throughout the Potholes Reservoir Management Area. To better manage this activity, areas of the reservoir should be specifically designated for dispersed camping. These designations should be mapped and publicly available at information kiosks near boat launches, at Mar-Don Resort, and on a public bulletin board displayed at Potholes State Park. Dispersed camping should be seasonal in nature (closed during shorebird nesting periods) with the Grant County Sheriff to enforce violations. "Pack-in/pack-out" trash policies should be strictly enforced with enclosed sanitation devices required.

Table 4.4-3
Recreation Resource Management Goals and Actions for Camping

RMP Camping Goals	Management Action
Control dispersed camping by limiting and directing use to "designated"areas or sites.	**Monitor Impacts -** Annually monitor the impacts associated with dispersed camping and recreational use. Establish baseline data and photo points to determine recreational impacts on soil, water quality, and vegetative and habitat resources. If "Limits of Acceptable Change" (LAC) monitoring reveals that impact/action thresholds have been exceeded, the WDFW and Reclamation would explore and prescribe alternative management actions for resolving the problems and revising the management direction. Opportunities for public review and comment would be provided prior to adopting and implementing any management changes affecting public use. **Sanitary Waste Disposal -** Provide centrally located toilets (permanent or seasonal) to meet human waste disposal needs in high use areas. **Limit Camping Stays -** Adopt and enforce a reservoir-wide 15-day stay limit for dispersed camping, unless posted otherwise.

4.5 PUBLIC HEALTH AND SAFETY/ENVIRONMENTAL PROTECTION

Recreational boating and jet ski enthusiasts are interfering with fishing tournaments, disrupting leisure fishing, and causing tension between the two groups. Increased law support by the Grant County Sheriff's Department is needed to provide adequate enforcement of reservoir use rules and regulations. In particular, enforcing a No-Wake Zone near shoreline developments and recreation areas could be effective in minimizing conflicts with swimming, shore fishing, and other passive uses. Thus, reducing erosion effects and noise, and prohibiting people from boating in sensitive areas (i.e., the sand dunes where shorebirds nest) or wildlife refuge management areas.

Table 4.5-1
Public Health & Safety Management Goals and Actions

RMP Public Health & Safety Goals	Management Action
Minimize conflicts and promote safety for users of Potholes Reservoir.	**Promote Boater and PWC Safety -** The number of complaints between boating and PWC enthusiasts has increased significantly in the last two years. Much of this user conflict also creates additional safety hazards throughout the reservoir. To promote boater and reservoir user safety, it is recommended that managers restrict swimming in boat launch areas by posting signage and establishing designated (buoyed) swim beaches away from boat launch areas. **Special Event Management -** Establishing designated use zones during special events (such as bass tournaments) or restricting specific areas of the reservoir from motorized use could help resolve user conflicts. **Provide Information to Reservoir Users -** In order to educate users about use designations, upon payment of boat launch fees, managers should disseminate information to reservoir users regarding known reservoir hazards, boating safety and operating rules and other regulations. **Provide Boater Signage -** Signs should be posted that require boats to use running lights before sunup and after sundown. **Identify Safety Concerns -** Identify and restrict access to areas that present public safety concerns. **Control Dispersed Camping -** Control dispersed camping in environmentally sensitive areas with appropriate site improvements, access and seasonal restrictions, or site closure. **Submit Necessary Environmental Reports -** Prior to any action which would modify the environment, the State will submit any necessary environmental reports as directed by Reclamation. Reclamation will be responsible for compliance with the NEPA. No such modification of the environment will be authorized without written approval from Reclamation.

Table 4.5-1
Public Health & Safety Management Goals and Actions

RMP Public Health & Safety Goals	Management Action
	Encourage Volunteer Effort - Encourage volunteer efforts to accomplish resource management programs and objectives. Work with user groups, clubs, and civic organizations to promote volunteer cleanup projects and a "pack-in/pack-out" ethic.

The following sections focus on those portions of the environment that are directly related to the conditions being addressed by the recommended action. The description is not meant to be a complete portrait of the Potholes Reservoir Management Area but is intended to portray the conditions and trends of most concern to the public, Reclamation, and their management partners within the RMP area.

4.6 LAND USE

The Potholes Reservoir Management Area encompasses approximately 36,200 acres of land (18,500 acres) and water (17,700 acres). Of this total, an estimated 34,920 acres are under Reclamation's jurisdiction with the remaining acreage under the jurisdiction of the WDNR.

Although the lands and waters under Reclamation jurisdiction were transferred to the State of Washington for administration and management under a MOA with the United States, Reclamation maintains a basic interest in the uses authorized on them. Reclamation's continued interest and involvement insure that (1) nothing is done which conflicts with the primary purposes of the project, and (2) the land receives proper use in accordance with appropriate land management principles and practices.

Reclamation's Ephrata Field Office is responsible for providing the oversight and approval of proposed land use activities on Reclamation properties within the Potholes Reservoir Management Area. The SPRC and WDFW are the state agencies currently responsible for most of the day-to-day activities and decisions which directly affect the management area. Of the 34,920 acres under Reclamation jurisdiction, approximately 6,620 acres (18 percent) were withdrawn from the public domain and

28,300 acres (81 percent) were acquired in fee title for the construction and operation of Potholes Reservoir and other CBP purposes.

Table 4.6-1
Land Use Administration Management Goals and Actions

RMP Land Use Administration Goals	Management Action
Assure that adjacent land uses are compatible with the desired recreational and wildlife uses in the Potholes Reservoir Management Area	**Minimize Potential Land Use Interference -** Propose future development in a way which minimizes the potential interference with the function of existing and planned land uses. **Protect Water Resources -** Manage lands to protect water resources. **Benefit Wildlife Habitat -** Land use decisions on wildlife areas will be based on benefits to wildlife and habitat.
Coordinate land use plans with Grant County to address ORV use.	**Review Reclamation Policy -** Review Reclamation policy as well as the impact on the environment to determine if additional land will be permitted or if presently-permitted land will be removed from use.
Coordinate with Grant County on implementation of its sensitive areas ordinance on lands adjacent to the Potholes Reservoir Management Area.	**County Coordination -** Coordinate with Grant County to acknowledge and address county ordinances applicable to the management area.
Maintain the partnerships and management agreements needed to implement the Potholes Reservoir RMP.	**Meet 1968 Contractual Obligations with Irrigation Districts -** Continue to meet all contractual obligations of the 1968 contracts between the US and the CBP irrigation districts. **Operate in Accordance with 1943 CBP Act -** Continue to operate Potholes Reservoir in accordance with Reclamation law and the CBP Act dated March 10, 1943 (Chapter 14, 57 STAT, 14). **Continue Cooperation with MOA -** Continue to administer Reclamation lands and waters through an updated MOA

Table 4.6-1
Land Use Administration Management Goals and Actions

RMP Land Use Administration Goals	Management Action
	between the US and the State of Washington. Day-to-day resource and recreation management activities will continue to be provided by the SPRC and WDFW with oversight by Reclamation. **Continue Lease Program -** Continue the 52-acre agricultural lease program in the Lind Coulee Arm for the benefit of wildlife. The purpose of the lease program (to produce food and cover for wildlife and manage the land for continued multi-purpose recreation), the existing prohibition on livestock grazing, and the requirement to keep the land open at all times for lawful public hunting and other recreational uses will be retained in all new or renewed leases. Lease administration will remain with the WDFW. **Renew Recreational Lease Agreement Between SPRC and WDNR -** Renew the 30-acre recreational lease agreement between the SPRC and the WDNR to operate and maintain a recreational resort on Reclamation land. The existing Mar Don Resort occupies both Reclamation and WDNR lands and is operated under a lease agreement (No. 62395) issued and administered by the WDNR. **Update 1997 MOU Between WDFW and the County -** Update the 1997 MOU between the WDFW and Grant County Mosquito Control District #1 to reflect changes in resource needs (i.e., leopard frogs) and mosquito control technologies. Reclamation should review and agree with the changes in the MOU scheduled for 2002. Under the existing MOU, the District has agreed to prepare a "Master Plan" outlining their annual spraying operations and to use biological pesticides as their primary pesticide. The WDFW has agreed to mark protected waters with buoys. **Continue Integrated Mosquito Control -** Continue integrated pest management for mosquito control in

Table 4.6-1
Land Use Administration Management Goals and Actions

RMP Land Use Administration Goals	Management Action
	accordance with an updated and renewed MOU. WDFW's goal is to avoid or minimize the use of chemical controls that could impact non-target species important to the food chains of local fish and wildlife species. **Fire Protection Contract Between WDFW and the County -** Continue fire protection at Potholes Reservoir under the fire protection contract between the WDFW and Grant County Fire Protection Districts 4, 5 and 11. **Prohibit Houseboat Use -** Prohibit houseboats in any environment at Potholes Reservoir. No houseboat is permitted in any environment under the Grant County Shorelines Management Master Program, dated June 1975. **Eliminate Unauthorized Use -** Identify and abate unauthorized uses and trespass violations on Reclamation lands. Based on regular surveillance of lands and resources where a high probability of unauthorized uses exist (i.e., adjacent to private croplands), detect, confirm and abate, all unauthorized uses or trespass violations. **Coordinate with County Planning Efforts -** Coordinate, to the extent practicable, Potholes Reservoir land use activities and plans with Grant County planning efforts (e.g., Comprehensive Plan and Shorelines Master Program) and ordinances. **Ensure Consistent Concession Contracts -** For all commercial activities on Reclamation lands, insure all new or renewed concession contracts issued by the State are consistent with the directives and standards outlined in Reclamation's concessions management policy for non-federal managers (as directed in Departmental Manual LND 04-02). The State is required to receive a fair market return of revenue under this policy.

Table 4.6-1
Land Use Administration Management Goals and Actions

RMP Land Use Administration Goals	Management Action
	Limit Concession Administration - Limit concession contract administration by the SPRC to SPRC administered lands; WDFW lands administered by Reclamation. **Amend MOAs to reflect Lead Agency Authority -** Amend land use agreements (MOAs) between the WDFW and SPRC to reflect current "lead agency" management and jurisdictional authorities. **Establish WDNR Guidelines -** Continue discussions with the WDNR to establish guidelines for land use activities on WDNR-leased lands.

4.6.1 Access

Table 4.6-2
Land Use Access Management Goals and Actions

RMP Land Use Access Goals	Management Action
Evaluate, enhance and manage vehicle, boater and pedestrian access to the Potholes Reservoir with regard to recreation, protection of cultural resources, wildlife management and operational needs in accordance with Americans with Disabilities Act (ADA) guidelines.	**Negotiate with State Highway Department -** Enter into negotiations with the state highway department to address engineering of measures to alleviate congestion along State Route 262 that occurs during high-use periods due to lack of engineered safety features, such as walkways and overpasses. **Provide Adequate Boat Access -** Provide adequate boat launch access and availability at all water levels. Identify potential new access sites and improvements needed at existing launch sites. **Provide Effective ADA Access -** Provide effective reservoir bank and boat launch access for the disabled by developing and implementing design guidelines in conformance with ADA guidelines for access areas.

4.6.2 Management and Infrastructure

When management responsibilities are transferred from one government agency to another, or involve interagency coordination, a MOA is the instrument typically used. Since the creation of Potholes Reservoir, two MOAs have provided the underlying framework used by Washington State to administer and manage the RMP management area.

Memorandum of Agreement between the United States and Washington State

Under the terms of a 50-year MOA dated July 10, 1952, between the United States and the State of Washington, the state assumed management responsibility for the recreational, fish, and wildlife resources occupying Reclamation lands and waters at Potholes Reservoir. The SPRC and WDFW are the principle state agencies responsible for managing essentially all Potholes Reservoir land use activities until the MOA terminates in 2002.

Under the MOA, Reclamation retains primary jurisdiction over developments within the Reclamation Zone for Potholes Reservoir. The Reclamation Zone includes all lands on which O'Sullivan Dam and their appurtenant works are situated, and that portion of the reservoir area generally lying within a strip 200 feet in horizontal width above the reservoir's full pool elevation of 1,046.5 feet. Such jurisdiction is maintained by Reclamation for the purpose of insuring proper operation and protection of the reservoir. All developments and actions affecting lands within the Reclamation Zone must be approved by Reclamation.

As a guide to the administration of the area, the MOA requires the state to prepare development plans within the reservoir area. Such plans are to be submitted to the Reclamation for review and for consultation with the NPS and the USFWS. The state may build and maintain any facility or service for recreation purposes and may set aside lands as refuges for wildlife or public shooting grounds. All such actions and developments, however, require prior approval by Reclamation.

The MOA empowers the state to issue and administer licenses, permits, and concession contracts for the purpose of providing commodities and public services at the reservoir. All licenses, permits and contracts are submitted and approved by Reclamation before issuance. The MOA also empowers the state, within the limits of its jurisdiction, to make and enforce rules and regulations for the use of the reservoir area as necessary to protect public health and safety; to protect plants, fish and wildlife; and to preserve the scenic, scientific, aesthetic, historic, and archaeological resources of the area.

The state is required to report its revenues from licenses, permits and concession contracts, and its expenditures of such receipts for area administration. Any surpluses of such receipts over expenditures are transferred to the United States.

Memorandum of Agreement between State of Washington Department of Game and State of Washington State Parks and Recreation Commission

Under a MOA dated July 15, 1952 between the WDFW (formerly the Department of Game) and the SPRC, all lands transferred from the United States to the state are to be administered by the WDFW with the exception of the following SPRC administered areas: O'Sullivan, Blythe, Peninsula and Lind Coulee Sites, and Potholes State Park. Each agency is responsible for the development, maintenance and management of their respective areas.

Although the existing MOA divided and determined specific responsibilities between the two agencies, the reader should note that the lands administered by the SPRC are currently limited to the O'Sullivan Site (North and South) and Potholes State Park. All other RMP lands are currently administered by the WDFW.

Table 4.6-3
Land Use Management & Infrastructure Goals and Actions

RMP Land Use Management Goals	Management Action
Develop the framework of eventual agreements between Reclamation, the State of Washington and Grant County to provide for effective future management of resources at the Potholes Reservoir.	**Delineate Agency Responsibilities -** Clearly delineate agency responsibilities and land management responsibility designations inherent in the management of resources in the Potholes Reservoir Management Area. **Identify Shared Constraints -** Identify and enumerate the constraints of staff availability, equipment shortages, and funding on management and enforcement responsibilities shared by the Grant County Sheriff, the SPRC and the WDFW. **Mitigate -** Mitigate these constraints where possible. **Establish Guidelines for DNR lands -** Discuss establishing guidelines for development and growth of activities on DNR-

Table 4.6-3
Land Use Management & Infrastructure Goals and Actions

RMP Land Use Management Goals	Management Action
	leased lands not currently managed in conjunction with other land use activities. **Investigate Funding -** Investigate fee-for-use as a potential source of funds for maintenance and improvement of recreational facilities, for waste disposal services and/or to pay for management and enforcement activities. **Examine Present Policy Compatibility -** Examine and determine the applicability of Reclamation and Washington state policies that address commercial recreational activities. [Determine if activities such as fishing guides, watercraft rentals, horseback rentals, concessions, etc., exist or have been proposed and may compete with or impact noncommercial recreational activities. Examine policies to determine if change is needed or to establish franchising or use fees.] **Fire Protection Agreements -** Develop agreements with DNR, County Fire Districts and others to provide protection and suppression services for wildfires.

4.7 GRAZING MANAGEMENT

WDFW will monitor and evaluate livestock grazing in permitted use areas twice annually and modify permit conditions and Grazing Plans accordingly. No more than 40 percent of the forage produced annually will be removed under the Grazing Plan. WDFW reserves the right to alter and change the provisions of the Grazing Plan to include reduction in acres of pasture available and number of AUMs authorized when such changes are required to benefit fish or wildlife management, public hunting, or other recreational uses. WDFW reserves the right to cancel a permit in the event the area described in the permit is included in a land use plan determined to be a higher and better use.

4.7.1 Recommended Grazing Management

Table 4.7-1
Grazing Management Goals and Actions

RMP Grazing Goals	Management Action
Continue to manage a coordinated Grazing Plan to best utilize the land while adhering to habitat preservation.	**Limit Grazing Permit -** Limit the grazing permit program at Potholes Reservoir to the existing 7,400-acre authorization under grazing permit TP-01 or when livestock grazing is used on a rotational bases to meet management objectives. **Maintain or Enhance Habitat -** Adjust livestock grazing management as needed to maintain or enhance habitat for special status plant and animal species. This may include development of livestock enclosures, or restricted use pastures where grazing systems cannot otherwise be adjusted to accommodate the habitat requirements of a special status species. **Modify Grazing Use for Improvement -** Modify AUM allocations, season-of-use authorizations, and other Grazing Plan stipulations included in renewed permits to maintain or improve native rangeland species and attain composition, density, foliar cover, and vigor appropriate to site potential and wildlife management objectives. **Provide Resting Period Following Fires -** Modify renewed grazing permits to stipulate a minimum of two growing seasons rest from livestock grazing following fires. Following this two-year rest period, evaluate range health and suitability for livestock use prior to allowing forage utilization. **Monitor Grazing Effects -** Monitor and evaluate twice annually the effect of the grazing permit on native rangeland species, plant composition, density, foliar cover, and vigor appropriate to site potential and wildlife management objectives. The evaluator would observe growing season conditions, measure grazing use, record range condition, and determine if objectives are being met. Modify Grazing Plan season-of-use and AUM allocations accordingly or when it would benefit management objectives.

4.8 NATURAL RESOURCES

The quality of the natural resources of Potholes Reservoir and the management area are important to the quality of the recreation experience of the visitors. In general, the RMP should strive to improve the quality of those resources for the health and safety of the visitors and to achieve a satisfactory recreation experience. The following reservoir-wide recommendations would help accomplish this goal.

4.8.1 Vegetation and Weed Control

Table 4.8-1
Vegetation & Weed Control Management Goals and Actions

RMP Vegetation & Weed Control Goals	Management Action
Maintain the "traditional" vegetation of the Potholes area, characterized by a native shrub-steppe plant community and a sand dune environment, along with wetland and riparian habitats in a unique geologic "potholes" setting.	**Develop Management Policies -** Develop management policies for protection of wetland, riparian, shrub-steppe and sand dune areas, which may include restrictions on use of some areas. **Conduct Surveys -** Conduct site-specific surveys focusing on endangered, threatened, and sensitive plants, wildlife, and their habitats prior to initiating development actions. **Rare Plant Distribution -** Coordinate with the WDFW, WNHP, WDNR, and BLM to exchange information on local rare plant distributions and status.
Control or eradicate noxious weeds, especially purple loosestrife, but including diffuse knapweed, spotted knapweed, Russian knapweed, perennial pepperweed, Kochia, Puncturevine, Canada Thistle, and salt cedar.	**Existing Agreements -** Comply with existing agreements and develop other necessary methods to reduce the continued spread of these weeds. **Management Activities -** Develop, implement and encourage active management activities to eliminate or reduce the presence of these weeds at Potholes Reservoir. **Coordinate with the County -** Work cooperatively with the Noxious Weed Control Board of Grant County in identifying and prioritizing areas where noxious weed control is necessary. Emphasize weed control efforts in areas with high

Table 4.8-1
Vegetation & Weed Control Management Goals and Actions

RMP Vegetation & Weed Control Goals	Management Action
	wildlife habitat value and potential for native species reestablishment. **Education -** Use signs and other educational methods to enlist increased public participation in the control of noxious weeds.
Manage other vegetation species of concern including Eurasian water milfoil, common reedgrass, and Russian olive, cheatgrass.	**Assess Extent of Situation -** Assess the extent to which Eurasian water milfoil has become established in the reservoir and the need for and desirability of control practices. **Assess Reedgrass Impacts -** Assess the impact of the increased presence of dense monoculture stands of common reedgrass on wildlife habitat in created wetlands areas of the management area, and develop management approaches as necessary. **Evaluate Effects of Russian Olive -** Evaluate the biological, social and economic cost of allowing the uncontrolled spread of Russian olive (*Elaeagnus angustifolia*). **Weed Reduction Methods -** Develop and implement methods to reduce the continued spread of these undesirable plant species. **Restore & Revegetate -** Where feasible, restore and rehabilitate areas presently degraded by land use activities. Restoration efforts would initially focus on areas severely damaged by vehicular access and/or dispersed camping where such access or use would be terminated. Revegetation efforts would use plants native to the area and beneficial to wildlife and special status species. The exact plant mix and planting densities to be used would be determined by the WDFW. **Support Private and Volunteer Effort -** Support private initiatives and volunteer efforts to plant native species in areas

Table 4.8-1
Vegetation & Weed Control Management Goals and Actions

RMP Vegetation & Weed Control Goals	Management Action
	identified for habitat enhancement or site rehabilitation projects. **Minimize Irrigated Grass -** Minimize the acreage of irrigated grass in Potholes State Park to maintain quality shrub-steppe habitat. **Monitor & Evaluate Rehabilitation -** Monitor and evaluate the success of vegetation rehabilitation and natural revegetation projects. Adjust the specific methods and techniques employed when project success needs improvement. If natives are the dominant cover type, no supplemental rehabilitation measures (e.g., plantings) would be needed. **Herbicide & Pesticide Application -** Allow limited use of spot herbicide applications to kill small patches of Eurasian water milfoil affecting public boat ramps, courtesy docks and swimming areas, and to protect wildlife habitat value (e.g., maintain open water for waterfowl nesting and feeding). Additionally, allow herbicide applications to kill patches of purple loosestrife that are colonizing wetlands and reducing/eliminating their suitability as wildlife habitat. Prior to herbicide use, the potential short- and long-term effects on special status species (e.g., leopard frog) would be evaluated. **Remove Salt Cedars -** Mechanically remove by cutting salt cedar trees (*Tamarix*) before they become heavily established.

4.8.2 Fisheries

Potholes Reservoir occupies a unique landscape different from many other reservoirs found in the region. Before O'Sullivan Dam was constructed, shifting sand dunes and hundreds of pothole wetlands were dominant features of the area with woody vegetation limited to trees lining the Crab Creek

channel and the shorelines of some small pothole lakes (Zook, 1978). After construction, the existing potholes were inundated and an extensive system of Sand Islands and new pothole wetlands were created within the large reservoir. Because of the area's unique sand dune topography, the amount of shoreline created greatly exceeded what is normally found in reservoir systems. Reservoirs and lakes with high "shoreline development" are typically the most productive.

Topography, substrate, wind action, and water fluctuations are some of the factors affecting the reservoir's physical and biological development. Fish habitat is directly related to these physical and biological parameters. There are two habitat types used by fish at Potholes Reservoir - the reservoir body and the terrestrial-aquatic interface or shoreline wetlands.

Table 4.8-2
Fisheries Management Goals and Actions

RMP Fisheries Goals	Management Action
Maintain and enhance fish habitat diversity.	**Protect & Manage Fish Habitat -** Protect and manage fish habitat inclusive of spawning habitat, nursery areas, foraging areas, areas with vegetative cover, areas with physical structures that provide cover and food production throughout the reservoir. **Develop Management Policies -** Develop management policies for protection of wetland, riparian, shrub-steppe and sand dune areas, which may include restrictions on use of some areas. **Seek Funding -** Seek funding for fishery studies designed to determine what factors are limiting the reservoir fishery and what regulatory and/or habitat improvement measures could be taken to reverse the present decline in fish species, populations, and angler success rates. The impact of fish-eating birds (i.e., cormorants) on the reservoir fishery will also be investigated.
Maintain species diversity within the designated priority species	**Warmwater Species -** Emphasize warmwater species complexes. **Panfish -** Panfish (bluegill, black crappie, yellow perch) are the priority species managed for recreational purposes.

Table 4.8-2
Fisheries Management Goals and Actions

RMP Fisheries Goals	Management Action
	Predator Species - Predator species (largemouth bass, smallmouth bass, walleye) are managed to provide improved panfish populations. **Salmonid Species -** Salmonid (trout family) species may be provided as additional sources of recreation.
Maintain and enhance the recreational fishing activity at the Potholes Reservoir as an important economic and recreation resource component.	**Family-Oriented Recreational Fishery -** Maintain and enhance a family-oriented recreational fishery that provides an opportunity for children to have a successful fishing experience, (e.g., with panfish such as yellow perch, black crappie, and bluegill). **Sport Fishing -** Maintain and enhance sport fishing activity for important gamefish such as largemouth bass and walleye by providing an opportunity for a successful fishing experience for these species. **Warmwater Species -** Emphasize warmwater species complexes.
Base species management strategies on attainable study objectives	**Determine Species Abundance -** Determine current relative abundance of fish species. **Study Objectives:** S Determine, age, growth and condition of managed species; S Inventory habitats, spatially and temporally; S Determine the relationship between each species at each life history stage and existing habitats in the reservoir; S Determine limiting factors for fish populations in Potholes Reservoir; S Determine the effects of fish-eating birds on fish populations; S Determine the effects of angling pressure on fish populations.

Table 4.8-2
Fisheries Management Goals and Actions

RMP Fisheries Goals	Management Action
Based on study results, develop and implement effective management strategies.	**Potential Strategies Include (but are not limited to:** **Regulation -** • Establish appropriate fishing size and/or catch limits and seasons for species pursued by anglers on the Potholes Reservoir • Supplementation • Determine need for supplementary stocking of fingerlings, catchable size fish, or brood stock • Manage the potential introductions of fish species into the Potholes Reservoir to prevent undesirable effects of disease, increased competition, or increased predation in the Reservoir; and to prevent inadvertent introductions and adverse effects in the Columbia National Wildlife Refuge (CNWR), Crab Creek, and the Columbia River drainage. **Habitat -** • Protect and maintain desirable habitat features for fish throughout the year • Add desirable habitat features. **Tournaments -** Manage bass and walleye tournaments on the reservoir to ensure protection of the fish caught and released, and to avoid conflicts with casual recreational fishing activities. **Underutilized fisheries -** • Promote utilization of lake whitefish • Establish carp fishing and archery regulations and/or incentives to increase carp harvest in Potholes Reservoir • Encourage commercial harvest of carp. **Species abundance -** • Use rotenone to control carp in limited areas of the reservoir • Develop feasible management approaches if necessary to control bird predation on Potholes Reservoir fishes.

Table 4.8-2
Fisheries Management Goals and Actions

RMP Fisheries Goals	Management Action
Monitor harvest to determine success of management strategies.	**Monitor Harvest -** Monitor harvest at regular intervals through creel surveys. **Contest Records -** Maintain fishing contest records. **Volunteer Angler Diary -** Encourage participation in the Volunteer Angler Diary program. **Fishing Guides -** Monitor fishing guide participation.

4.8.3 Wildlife

The construction of O'Sullivan Dam dramatically changed the existing landscape north of the dam through the formation of Potholes Reservoir. Inundation of pothole wetlands, riparian, and sand dune sagebrush communities created a unique system of Sand Islands and open water. Over the 50 years since the construction of the dam, wetland plant communities colonized the dynamic island and reservoir shorelines. Emergent marsh communities have developed, and tree and shrub willows have matured in these new shoreline areas. In addition, a dense layer of herbaceous plants covers much of the shoreline exposed during the reservoir's annual drawdown.

Irrespective of any past or current impacts, Potholes Reservoir provides suitable habitat for several classes of common and sensitive terrestrial game and nongame wildlife species. The diverse habitat types, ranging from exposed sand dunes to lush riparian forests, are utilized by numerous wildlife groups including: mammals, birds, reptiles, and amphibians.

At present, a detailed database of wildlife resources and usable habitat is not available, and would be extremely useful to delineate wildlife populations and habitats.

The CNWR, managed by the USFWS, is located adjacent to and south of Potholes Reservoir. The numerous wetlands, lakes and ponds in the refuge are fed by water seeps from Potholes Reservoir and surrounding irrigation projects. As one of the reservoir and surrounding area's important resources, wildlife habitat and wildlife populations consistent with carrying capacities of individual habitats should be preserved and enhanced, where possible. Future planning of reservoir facilities and management should be carefully evaluated to maintain current wildlife habitat conditions and identify opportunities to enhance wildlife habitat.

Lack of funding is a concern of the WDFW. Overall, they have been unable to slow the rate of habitat loss statewide through causes of urban growth, development, timber, and agriculture impacts. More than 80% of the State's citizens participate in wildlife-related recreation alone. This combination can put major stresses on the shrinking habitat base and its dependent wildlife communities. High-use sites have become a growing problem for WDFW, requiring increased staffing and site management that the agency cannot afford. For example, WDFW reports that one staff person is responsible for the maintenance of 120 public recreational fish and wildlife access sites around the State. Budgetary reasons are the primary cause of lack of available wildlife data for the Potholes Reservoir Management Area.

Table 4.8-3
Wildlife Management Goals and Actions

RMP Wildlife Goals	Management Action
Maintain, protect and enhance the species diversity of the wildlife populations within the Potholes Reservoir Management Area.	**Quantify Wildlife Populations -** Inventory and map the distribution and abundance of wildlife populations utilizing the Potholes Reservoir Management Area. Conduct site-specific surveys focusing on endangered, threatened, and sensitive plants, wildlife, and their habitats prior to initiating development actions. **Establish Species Management Strategies -** Establish species management strategies and priorities for species groups of importance including waterfowl, upland gamebirds, colonial nesting birds, neotropical migratory birds, mule deer, and beaver. **Habitat & Population Preservation -** Maintain, protect and enhance populations and habitats of endangered, threatened, candidate and sensitive species of the Potholes Reservoir Management area. **Perpetuate Wildlife Diversity -** Implement species or population management necessary to perpetuate wildlife diversity. **Perpetuate Wildlife-RelatedRecreation -** Implement only those programs, activities and management actions which directly and primarily benefit wildlife and wildlife-related recreation.

Table 4.8-3
Wildlife Management Goals and Actions

RMP Wildlife Goals	Management Action
	Monitor for Effectiveness - Monitor wildlife species and populations for effectiveness of prescribed management.
Maintain, protect and enhance wildlife habitats.	**Quantify Wildlife Habitat -** Inventory, evaluate and map habitat components present in the Potholes Reservoir Management Area. **Identify Necessary Natural Wildlife Conditions -** Identify geologic features, hydrology, vegetation and other conditions necessary for wildlife species and habitats. **Establish Habitat Management Strategies -** Establish habitat management priorities and strategies for important wildlife habitats, (e.g., open water, wetlands, riparian areas, and shrub-steppe habitats). **Monitor for Effectiveness -** Monitor to determine success or failure of management strategies.

The following recommendations provide beneficial management actions common to both fish and wildlife present within the Potholes Reservoir Management Area:

- Designate the Upper West Arm and Upper Crab Creek Arm "Habitat Management Areas" (HMAs).
- Seasonally restrict watercraft to low speed/minimum wake operation from March 15 through June 30 to enhance wildlife nesting and breeding success for grebes, waterfowl, and other shorebirds.
- Seasonally prohibit dispersed camping from March 15 through June 30 to enhance wildlife nesting and breeding success. During this seasonal closure period, HMA dispersed camping opportunities would be available at specific sites designated and posted as "open".
- Maintain and enhance the diking system located in the North Potholes Reserve, Upper Crab Creek, and Upper West Arm management areas to increase the number and extent of "carp-free" waters suitable for special status species (e.g., leopard frogs), waterfowl, and other aquatic wildlife (e.g., grebes, terns, and herons).

- Manage these diked, "carp-free" waters either for aquatic wildlife (i.e., waterfowl) and/or as a separate fishery from the main reservoir. Those waters managed for fish would target warm water species such as bass and bluegill.
- Allow the limited use of rotenone in "carp-free" management waters. However, with the recent listing of the leopard frog as a state threatened species, the practicality and desirability of this management action must be carefully evaluated.
- Identify and protect bald eagle perching and foraging winter habitat. Although wintering bald eagles use the entire reservoir, the North Potholes Reserve, Peninsula South, and Upper Crab Creek Arm management areas are the most heavily used. In the event bald eagles pioneer into or breed in an area, stipulations would be incorporated into existing management and activity plans to ensure human disturbance is kept to a minimum. Appropriate site protective dates and/or buffer zones would be established and implemented near nesting sites.
- Post signs to seasonally close specific areas, campsites or islands during critical wildlife breeding and nesting periods. Closure periods to protect breeding sites would generally apply from February 1 to June 30 for nesting species of concern: Canada geese, ducks, and colonial nesting birds (e.g., gulls, terns, herons, egrets, and grebes).
- Enhance bald eagle wintering and roosting habitat by planting additional trees (i.e., cottonwoods and willows) where natural regeneration of suitable tree species is lacking or suitable trees are being lost or nonexistent. Measures (i.e., wrap tree trunks with wire netting) would be taken to protect key roosting sites from beaver activity.
- Seek funding to conduct a natural resource's Geographic Information System (GIS) update at least every 10 years. The inventory could include an update of all the habitat, mammal and avian attributes previously mapped including such categories as waterfowl, colonial nesting birds, bald eagle perch trees and roosting sites, as well as threatened and endangered species occurrence and critical habitat locations.
- Seek funding to analyze the level of disturbance and impacts to nesting birds and other wildlife caused by motorboats, personal watercraft, and dispersed camping activities. Based on these findings, develop or modify strategies to control the time and place of these activities to reduce human-caused disturbances and protect sensitive habitat areas and vulnerable wildlife populations. These disturbance factors are particularly prevalent in the Dunes/Sand Islands management area.
- Control shoreline access and trails detrimental to wildlife habitat. Traditional fishing access would be maintained and perhaps formalized with constructed trails and/or boardwalks to prevent straying and subsequent habitat destruction.
- Seasonally restrict public access of any type in the south/central portion of North Potholes Reserve from March 15 through May 30. The purpose of this seasonal restriction is to

minimize human interaction and disturbance during waterfowl and colonial nesting bird reproductive periods.

- Eliminate roads and minimize trails through wetlands, meadows, riparian, and other sensitive wildlife habitats.
- The use of pesticides and herbicides harmful to fish and/or wildlife would be prohibited in HMAs unless authorized by WDFW and Reclamation for wildlife habitat enhancement activities.

4.8.4 Water Quality

The CBP was started in the early 1930's to provide irrigation water to the fertile but arid lands of the Columbia River basin in central Washington. Water for the CBP originates from the Columbia River where it is pumped from Lake Roosevelt at Grand Coulee Dam into Banks Lake - one of the CBPs principal reservoirs. At the south end of Banks Lake, irrigation diversions are made into the Main Canal at Dry Falls Dam. Main Canal waters flow through lined and unlined sections, tunnels, and siphons before terminating downstream from Billy Clapp Lake into the East Low Canal and West Canal, which essentially form the project's east and west boundaries.

Annually, the CBP diverts about 2.6 million acre-feet of water out of the Columbia River to deliver irrigation water to agricultural lands that normally receive less than 10 inches of precipitation a year. After use in the north half of the CBP (on the Quincy and East Columbia Basin Irrigation Districts), much of the water is collected and returned through a series of wasteways to Potholes Reservoir for reuse in the southern half of the CBP by the South Columbia Basin Irrigation District.

In order to establish acceptable water quality standards, it is recommended that managers conduct annual water quality testing at irrigation return flow areas where mixing occurs with open water, at sample locations in the sand dunes area, and at swim beaches. A reporting system should be established to educate the public about the types of constituents monitored, and when thresholds are exceeded. This could be accomplished by posting warnings in the affected area, at information kiosks throughout the developed corridor, at boat launch sites, and at popular day use areas.

As a continuation of the litter monitoring program discussed under land-based recreation, the same observer should monitor recreation use where human sanitation needs may impact water quality. Establishing an annual visual inspection (for observed trash, human waste, etc.) which coincides with other management activities, would inform managers when sanitation facilities and services become necessary to correct and/or prevent ground or surface water contamination. Floating restroom facilities is an option for future management consideration.

The RMP recommends cooperative work between Reclamation and Grant County Mosquito Control District #1 to avoid or minimize chemical mosquito control methods in the Upper West Arm, Upper Crab Creek Arm, and North Potholes Reserve management areas. If mosquito control is deemed necessary, biological control methods would be used whenever possible. In some circumstances, if biological controls fail or if human health is at risk, chemical controls would be allowed.

Table 4.8-4
Water Quality Management Goals and Actions

RMP Water Quality Goals	Management Action
Maintain, protect and enhance water quality in the Potholes Reservoir to assure compatibility with irrigation needs, swimming, aesthetic appeal, fish production and consumption.	**Identify Constraints -** Identify any water quality- driven constraints on Potholes Reservoir uses. **Maintain Sampling Stations -** Continue to maintain a baseline for reservoir water quality data at existing inlet and outlet sampling stations for routine water quality parameters (pH, alkalinity, nitrates, phosphates, etc.). **Develop Sampling Program -** Develop a water quality and sediment quality sampling program within the body of the Potholes Reservoir. **Determine Contamination Concentrations -** Determine concentrations of potential contaminants of concern (dieldrin, methoxychlor, etc.) in the waters and sediments of the Potholes Reservoir Management Area. **Sanitation-Related Parameters -** Determine sanitation-related water quality parameters (bacterial counts, etc.) for waters of the Potholes Reservoir. **Standards Comparison -** Compare water quality data to standards. **Standards Distribution -** Publish and distribute minimal sanitation standards for use of areas of the Potholes Reservoir. **Provide Routine Testing -** Provide routine testing of fish flesh for concentrations of organic pesticides, metabolic byproducts and heavy metals to assure the fishing population of the safety of these fish as a part of their food supply. **Plan Future Actions for CBP -** Plan and prioritize future actions for CBP waters and collaborate these actions through

Table 4.8-4
Water Quality Management Goals and Actions

RMP Water Quality Goals	Management Action
	the Oversight Panel consisting of Reclamation, WDOE, EPA, and CBP Irrigation District representatives. These actions include the following. • Develop appropriate water quality standards for Potholes Reservoir including uses and criteria. • Identify current and future water quality monitoring needs and determine which of these are appropriate for federal, state, or local accomplishment. • Develop water quality management plans for those waters identified in Section IV D of the MOA. **Continued Monitoring** - Continue historic and ongoing water quality monitoring programs; modify or expand these programs as necessary to make the determinations called for in Section IV A and IV B of the CWA. **Review Water Quality Data** - Semiannually review reservoir water quality data through the Oversight Panel and modify water quality monitoring needs as necessary. **Coordinate GWMA Process with Potholes Management** - Potholes Reservoir (Grant County) is within a WDOE sanctioned GWMA. Coordinate actions developed during the "GWMA" process with Potholes Reservoir management.

4.8.5 Visual Quality

Landscape character gives a geographic area its visual and cultural image, and consists of the physical, biological and cultural attributes that make each landscape identifiable or unique. (SMS, 1995). The upland landscape surrounding Potholes Reservoir is semi-arid and characterized by upland shrub-steppe cover types that include native shrubs and introduced annual grasses. Typically, these appear homogenous to the casual viewer and are not highly regarded. However, changes are more noticeable in this landscape type than in other more diverse landscapes.

Widely dispersed ranches, orchards, and farm operations are visible along the eastern boundary of the Potholes Reservoir Management Area. Riparian forest and riparian shrub cover types are common

along reservoir and island shorelines, in natural drainages, and along wasteways. Wind breaks and shade trees are found in developed areas where they have been planted and irrigated. Sandy beaches, wind-blown dunes, and mudflats (at low water) characterize many of the undeveloped shoreline areas found around the reservoir. Most of the dispersed campsites have fire rings, and some are visually compromised each season by the presence of trash and human waste.

Table 4.8-5
Visual Quality Management Goals and Actions

RMP Visual Quality Goals	Management Action
Preserve, protect, and enhance the natural scenic resources of the Potholes Reservoir Management area.	**Minimize Development -** Minimize development in areas that would adversely affect natural scenic resources. **Develop Design Guidelines -** Develop design guidelines for land development within the Potholes Reservoir Management Area. Specifically, design facilities to minimize adverse effects on visual quality. **Include Lease Provisions -** Include provisions in leases which require that form, line, texture, and building materials used must be compatible with the natural landscape. **Unused Road and Trail Rehabilitation -** Close and re-vegetate (using native plants) any roads or trails that are not planned for future use. **Design Criteria -** Criteria should be developed for the appearance of structures and natural landscape preservation. These criteria would be applied in the planning, design, land use agreements and construction of all new facilities and structures, and in the maintenance or modification of all existing facilities and structures. **Promote "Pack-in/Pack-out" -** Increase the promotion of "pack-in/pack-out" waste management practices in all visitor brochures, signs, educational materials, etc. developed for the Potholes area. **Remove Illegal Dumps -** Remove illegal trash dumps located in the Potholes Reservoir Management Area. Work with user and civic groups (i.e., hunting and fishing clubs, ORV clubs, scouting clubs, etc.) to accomplish cleanup activities.

4.8.6 Soil Conservation and Erosion Control

Grant County resides in a regional structural basin. The County rests on the lower limb of the Grand Coulee Monocline to the north/northwest and the northern limb of the Frenchman Hills Anticline to the southwest. The region to the northeast, including the Potholes Reservoir Management Area, is subjected to a 0 to 5 degree dip in the southwest direction. The effect of these structural features is the formation of a regional sediment and groundwater cache basin in and around Potholes Reservoir. In addition to groundwater, this structural low has been the deposition location for southwest prevailing wind borne silt and sand, making the area an eolian depositional basin as well.

Nearly all of the soils on the Columbia Plateau and in the Columbia drainage basin have been formed under grassland or shrub-grassland vegetation. Soil parent materials in this region include basalt, volcanic ash, sedimentary deposits, glacial outwash, and alluvial, fluvial, and colluvial deposits. Soils are generally covered with windblown sand and silt. Caliche layers occur in most of the soils and are generally within a range of seven feet deep. Loess dominated subsoils are moderately saline and contain a moderate amount of exchangeable sodium.

Table 4.8-6
Soil and Erosion Control Management Goals and Actions

RMP Soil & Erosion Control Goals	Management Action
Maintain stability of the shoreline and subsurface areas of the reservoir.	**Soil Stabilization -** Stabilize the active erosional areas along the east and north shores. **Prevent Erosion -** Prevent erosion of State Park lands that can occur in high pool elevation in the day use area and the primitive camping area. **Reduce Sediment Deposition -** Reduce sediment deposition in the vicinity of the State Park boat ramp. **Conduct Erosion Inventory -** Conduct an integrated erosion inventory and control program to identify and prioritize eroded features and areas, unstable land forms, and areas susceptible to soil erosion and/or compaction. Reclamation and the State would identify corrective measures, prioritize areas to be rehabilitated, and develop a monitoring program to assess program results.

Table 4.8-6
Soil and Erosion Control Management Goals and Actions

RMP Soil & Erosion Control Goals	Management Action
	Implement Erosion Control Measures - Implement shoreline erosion control measures with an initial emphasis on protecting cultural resources and public facilities in developed recreation areas. Specific erosion control measures would be identified on a site and project-specific basis and likely include the construction of retaining walls, the placement of rock revetments or gabions, vegetative plantings, or other such measures to halt the process of shoreline retreat. **Limitations on Recreation Activities -** Limit or eliminate motorized travel or recreation activities on soils sensitive to compaction, high soil erosion potential rating, and/or exhibit existing accelerated erosion problems. **Post Road Closures -** Post signs or install barriers to close (seasonally or permanently) those portions of the primitive road system where erosion is a problem. **Provide Shoreline Trails and Boardwalks -** Control soil and shoreline erosion and wetland and riparian habitat degradation in high use areas within the Developed Corridor by providing water access via constructed trails and boardwalks. Obliterate and restore random trails. **Monitor Success -** Monitor and evaluate the success of soil conservation and shoreline erosion control projects. Adjust the specific methods and techniques employed when project success needs improvement.

4.9 CULTURAL RESOURCES

Cultural resources are defined as buildings, sites, structures, or objects, each of which may have historical, architectural, archeological or scientific importance. There are several laws and regulations directing federal agencies to locate, identify, evaluate, preserve, protect and manage cultural resources significant to the nation's heritage and history, the focus of which, is the National Register.

The laws germane to an EIS include the National Historic Preservation Act (NHPA) of 1966, As Amended, especially Sections 106 and 110, and its implementing regulations found at 36 CFR 800, and the Archeological Resources Protection Act of 1979. These regulations require federal agencies to make determinations of eligibility, effect, and treatment in consultation with the SHPO, interested Indian tribes, and the Advisory Council on Historic Preservation. In addition to authorizing federal agencies to take cultural resources into account during project activities, these mandates also direct agencies to develop a program to actively manage cultural resources, as well as to coordinate with those segments of the American public or Tribal Governments management of Traditional Cultural Properties (TCPs) significant for their traditional cultural values. Additionally, compliance with the Native American Graves Protection and Repatriation Act (NAGPRA) in protection or removal of human burials if they are found or reported.

Reclamation and/or the State would conduct Class III surveys and prepare a Cultural Resource Management Plan (CRMP). The CRMP will outline specific actions and methods to protect cultural resources. Coordination with the Native Americans who have interests at Potholes Reservoir is recommended to prepare the CRMP and manage cultural resources.

If cultural resources are found on Reclamation lands "open" to ORV use that are eligible for the National Register, the Grant County ORV Area boundary would be adjusted to protect identified cultural resources and/or sites. Similarly, the land use agreement which authorizes the county to operate and maintain an ORV Area on Reclamation lands managed by the WDFW would be amended to exclude culturally sensitive areas from the agreement and subsequent ORV activity.

Table 4.9-1
Cultural Resource Management Goals and Actions

RMP Cultural Resources Goals	Management Action
Preserve, protect, maintain and enhance cultural resources including archaeological sites, ethnographic sites and traditional use areas within the Potholes Management Area.	**Identify Cultural Resources -** Locate, identify and describe cultural resource sites in the Potholes Reservoir Management Area and determine eligibility for National Register listing. **Manage Restricted Visitor Use -** Restrict visitor use of these sites with appropriate management techniques. **Historic Preservation -** Preserve geological formations and historic sites for the education and enjoyment of the public.

Table 4.9-1
Cultural Resource Management Goals and Actions

RMP Cultural Resources Goals	Management Action
	Historic Education Programs - Enhance cultural resources through appropriate educational programs or other management activities. **Pursue Tribal MOU -** Pursue an MOU with concerned or interested Tribal governments related to this goal, and achieving other RMP goals and objectives. **Seek Funding -** Seek funds for programmatic site management, test excavation of sites being damaged by on going land use or operations, and stabilization or other management actions for affected sites that are eligible for the National Register. **Native American Interpretive Information -** Work with Native Americans who have interests at Potholes Reservoir to develop and display appropriate interpretive information on Native American use of the area and the need to preserve and protect cultural resources. **Prepare a CRMP -** Conduct Class III surveys and prepare a CRMP. The CRMP will outline specific actions and methods to protect cultural resources. **Coordinate CRMP with Native Americans -** Coordinate with Native Americans with interests at Potholes Reservoir to prepare the CRMP and manage cultural resources.

4.10 VOLUNTEER PROGRAMS

Involving volunteers in development, maintenance, and management will be critical to fully implementing this RMP. For example, user groups and organizations having civic functions provide a valuable supplementary function to identifying needs and problems, as well as to managing and solving those problems.

Creation of a cooperating nonprofit association at Potholes Reservoir or founding a chapter of an existing association (e.g., Northwest Interpretive Association) would provide a vehicle for raising funds, soliciting donations, and organizing volunteers.

Inter-agency partnerships and agreements between agencies and nongovernmental organizations (i.e., public-private partnerships) can be a cost effective way to accomplish a project, provide maintenance, or develop management strategies. Many organizations can be enlisted to provide professional expertise, manpower, materials and equipment. These partnerships often can be arranged at no-cost or a reduced cost to the host agency. Table 4.10-1 provides a partial list of organizations and examples of projects with which partnerships may be available. Managers should be encouraged to pursue these types of mutually beneficial projects.

Encouraging participation in reservoir-wide volunteer clean up projects should be a priority. In the past, a Fish and Game Warden organized an annual sand dune clean up where volunteer boaters would meet on a Saturday morning at Mar Don Resort.

The volunteer clean up, in recent years, has not been organized. A suitable time-frame for a clean up weekend is recommended for the 3rd Saturday in September, National Fishing Day. This time frame would be suitable for collecting scattered litter at the dunes and other areas at low water levels before it has a chance to float into the reservoir. Mar Don Resort managers have agreed to distribute garbage bags to customers fueling at their marina throughout the season. Garbage bags should be available from all agency personnel when in the area and at visitor contact points. The co-op of volunteers could involve private citizens, user groups/fishing clubs, Grant County Solid Waste (garbage disposal), Mar Don Resort and other local businesses, and Potholes State Park.

Table 4.10-1
Volunteer Program Management Goals and Actions

RMP Volunteer Program Goals	Management Action
Encouraging participation in reservoir-wide volunteer projects.	**Boy Scouts/Youth Groups -** Habitat improvement, small scale trail and boardwalk construction and maintenance, facilities beautification. **Civic Groups (Lions Club, Rotary, etc.) -** Facilities improvement, project specific fund-raising, professional expertise of members.

Table 4.10-1
Volunteer Program Management Goals and Actions

RMP Volunteer Program Goals	Management Action
	User Groups (Sand Commandos, Fishing Clubs, Ducks Unlimited, Audubon Society, etc.) - Habitat improvement, issue-specific public education/awareness, facilities improvement and maintenance, project-specific fund-raising. **Retired Persons -** *Volunteer Area Use Hosts* at overnight and day use areas. Provide free RV space/utilities in exchange for host services. Host can provide a range of services including visitor information/assistance, clean up, and vandalism deterrence. Busy day-use areas could have a resident host who is present to open and close gates and look after the area. **Coast Guard Auxiliary -** Boating safety education, reservoir safety patrols, emergency visitor assistance. **National Guard/Reserve Units (engineering, construction, heavy lift/transportation) -** National Guard/Reserve units can sometimes be enlisted to provide manpower and equipment for heavy construction projects such as viewing towers, jetties/docks/piers, concrete work, and heavy lift of materials into remote/inaccessible areas by helicopter. **Universities -** undergraduate and graduate students can be used for a variety of projects including landscape and building design, interpretive displays/facilities, habitat improvement, wildlife/fisheries studies and monitoring, and prescribed burning. Student interns can also be used for a variety of duties during the summer season.

4.11 SUPPLEMENTAL FUNDING

Similar to volunteer programs, funding to supplement the current management budgets is critical to implementing this RMP. User fees are an excellent example of providing additional funding, which can

be specifically slated for those facilities generating them. Private donations can also be earmarked, used with the general management or maintenance fund, or established and managed in a fund or trust for management and maintenance of the project facilities and lands.

4.11.1 User Fees

User fees can be a potent source of supplemental funding if the fees collected can be retained at the local level. Potential sources of fees include revenue from camping, boats, boat launches, and parking facilities at day use areas. An alternative to assessing fees only to visitors using specific facilities or services is the implementation of an Area Use Fee. This alternative is becoming increasingly popular throughout the country as a means of more fairly assessing use fees across all user groups. Under the Area User Fee system, anyone entering the area is required to purchase a pass on a daily, multi-day or annual basis.

The potentials for user fees should be evaluated and selectively implemented during the RMP. Camping in developed campgrounds and boat launch facilities would be implemented first. There is also the potential to implement user fees in the ORV use area.

4.11.2 Donations

Nonprofit organizations and recreation user groups can often be used as a source of supplemental funding. These groups typically help to raise funds or make donations of money and/or time for projects of interest to their organization. Donations of materials or services are sometimes available for special projects from businesses such as local or national building material suppliers and local printers. In addition, cash donation boxes located at visitor centers or visitor contact stations provide opportunities for visitors wishing to make small cash donations. The relatively small sums received through donation boxes are important in allowing visitors to feel a sense of ownership in the area and it provides funds for inexpensive, but usually unfunded programs or items.

4.11.3 Grants

A number of grants may be available from governmental, private, and nonprofit organizations. Grants are typically for special projects or one-time capital expenditures of specific interest to the granting organization. Grants may be available through the following agencies and organizations: the National Park Service, National Audubon Society, Recreational Equipment Inc., B.A.S.S., and Ducks Unlimited.

4.12 INFORMATION AND EDUCATION

A widespread and coordinated public information and education campaign should be planned and implemented. This program should inform the public of existing policies and regulations and new changes being implemented as part of the RMP. While information and education programs alone cannot accomplish most management goals, they should be an integral part of any program aimed at altering visitor behavior (in concert with adequate enforcement and facilities/lands management).

Table 4.12-1
Information & Education Goals and Actions

RMP Information & Education Goals	Management Action
A widespread and coordinated public information and education campaign should be planned and implemented.	**Establish Web Site -** An internet web site should be established for resources and facilities at Potholes Reservoir. The agencies should coordinate the web site development and maintenance between Potholes Reservoir and those of their individual agency. **Pack-In/Pack-out Information -** All garbage should be packed out by visitors and disposed of at an approved garbage disposal facility, **Use Areas/Regulations/Maps -** Maps displaying use areas and pertinent regulations should be posted in prominent locations frequented by visitors. To be effective, these displays must be well-maintained and replaced as needed. Additionally, such material should be displayed in locations where visitors are a captive audience (e.g., inside toilet stall doors and on walls above urinals in restrooms). **Safety/Hazards -** While it is impractical to identify and post every safety hazard in an area, the most significant hazards should either be mapped or posted. General safety information should be described in a way that is easy for the visitor to understand. Graphic representations are often an ideal way to accomplish this. **No Wake Zone -** No wake zones should be mapped and displayed in locations frequented by boaters, both at the reservoir and at appropriate locations in the local community.

Table 4.12-1
Information & Education Goals and Actions

RMP Information & Education Goals	Management Action
	Sanitation - Sanitation is a growing problem at Potholes Reservoir. Every effort should be made to educate the public before it becomes a major health hazard.

4.13 FACILITIES AND SERVICES

Potholes Reservoir currently has a variety of facilities provided for the recreation visitor. However, many of these facilities are either outdated, under maintained, or inadequate to handle the current number of visitors. In addition, there are a number of facility types that would be appropriate to provide at Potholes Reservoir to enhance recreational experience and to protect natural resources.

The reservoir area provides recreational opportunities that range from the semi-primitive non-motorized (SPNM) setting of the North Potholes Reserve to rural (R) in much of the Developed Corridor and West Lind Coulee Arm. Based on the findings as presented in the Assessment and Policy Plan 1995-2001 Statewide Comprehensive Outdoor Recreation Plan (SCORP), the State of Washington would try to give priority to State Park acquisitions and developments that expand camping opportunities, provide additional types of compatible use of an existing site, and interconnect and solidify or "block up" ownership to help ensure the efficient stewardship of an existing site (e.g., acquire in-holdings). As a result of public focus group meetings, surveys of recreation and habitat professionals, and individual interviews, IAC found that people expect the state to provide essential outdoor recreation opportunities.

Among special interest groups, teenagers are most in need of more recreation opportunities. While this issue is not specifically addressed in the Comprehensive Plan for Grant County, participants in public issues meetings agreed that meeting the needs of area youth is more directed at local government than state government.

Recommendations for expanding facilities and providing additional recreation opportunities are discussed in Chapter 5 "Land Management Area Recommendations."

In conjunction with ongoing user or public opinion survey, data should be collected at regular intervals to provide an overall assessment of user satisfaction. This data should include the number of times per season that campgrounds, day use areas, or other facilities are full and a record kept of the frequency of requests for different types of opportunities desired (i.e., group use, camping, events, etc.). A log of the frequency and nature of visitor complaints (adequacy of facilities, trails, access, etc.) or user conflicts should be kept and used as a tool to direct intensive management to appropriate areas of the reservoir.

After evaluating survey responses, conducting appropriate inventories of site and facility conditions, and comparing data with standards and maintenance levels, management can develop appropriate measures and actions to solve reservoir-wide problems.

Table 4.13-1
Facilities & Services Goals and Actions

RMP Facilities & Services Goals	Management Action
Enhance recreation facilities and experiences while protecting natural resources at the Potholes Reservoir Management Area.	**Access -** Based on opinions of public land managers, focus group participants, and public input, water access is of great importance and the supply of water access has not kept up with public demand. Generally, access to the reservoir from parking areas or developed facilities has been random and unestablished at best. In order to concentrate impact and to alleviate vegetation loss and erosion, trails to water-level need to be developed in accordance with a road/access management plan. Specific recommendations have been made for each LMA to address the issue of water-level access. Properly designed and maintained trails and boardwalks are recommended to provide safe and convenient access to land and water resources. They can also be very effective in protecting sensitive resources, particularly in riparian and wetland habitats. **Parking -** Adequate parking should be provided as a means of enhancing visitor safety and reducing impacts to

Table 4.13-1
Facilities & Services Goals and Actions

RMP Facilities & Services Goals	Management Action
	surrounding resources. In popular areas where inadequate parking exists, visitors will often park in inappropriate or unsafe locations. **Restrooms** - Because current restroom facilities are inadequate, additional facilities should be provided throughout the management area. Proper sanitation is a growing problem, especially at dispersed use areas around the reservoir, on the Sand Dune Islands, and along shoreline areas accessible only by boat. The addition of floating restrooms, strategically located around the reservoir, should aid in reducing sanitation problems and in improving public health. **People with Disabilities -** In accordance with the ADA, site managers must consider handicapped accessibility when planning to construct new facilities or when upgrading existing facilities. Further opportunities for improving the level of recreational opportunities for persons with disabilities should be explored. **Boat Launches -** Existing boat launch facilities are often congested. In some cases, a larger boat ramp (i.e., longer ramp and floating dock or more lanes) may need to be built to alleviate this congestion. Congestion problems, and ultimately visitor safety, can be greatly improved by providing a courtesy boat dock area adjacent to the launch area. These docks help reduce congestion by reducing the loiter time boaters spend on the boat ramp. Courtesy docks, often with a picnic area associated with them, provide a place for boaters to dock while taking breaks, retrieving forgotten items from the car, or for loading and unloading passengers and equipment before or after launch operations. **Fishing Access -** Fishing access points should be developed in appropriate locations to help disperse anglers and improve the quality of the fishing experience. Opportunities for

Table 4.13-1
Facilities & Services Goals and Actions

RMP Facilities & Services Goals	Management Action
	developing fishing access specifically designed for disabled visitors should be actively explored. One option may be a dock or jetty extending out into the reservoir. **Observing Wildlife -** Providing blinds for wildlife watching and photography would greatly enhance opportunities to view and photograph wildlife. Observations blinds may also reduce disturbance to wildlife. **Visitor Satisfaction and Trends -** User satisfaction is a large issue in the management of recreation resources. There is not adequate data available from WDFW or Grant County at this time to provide quantitative information for use volume, conflict, crowding, or satisfaction for the management area. Some user counts have been collected for Potholes State Park, however, this data does not satisfy issues of crowding, conflicts, and overall satisfaction. The information at the remaining recreation sites is anecdotal (i.e., agency or public input) and does not provide consistent, comparable data. Visitor information surveys need to be regularly conducted during the summer, including at least one peak holiday (Memorial Day, Fourth of July, or Labor Day) to supplement and reinforce "public input."

4.14 VISITOR INFORMATION AND INTERPRETATION

The following management actions were developed to achieve the Desired Condition for Visitor Information and Interpretation in the Potholes Reservoir Management Area and are meant as additions to the existing resource management activities.

Table 4.14-1
Visitor Information & Interpretation Goals and Actions

RMP Visitor Information & Interpretation Goals	Management Action
Provide appropriate information and educational materials to increase public awareness of recreational opportunities, use restrictions, safety concerns, and natural and cultural resources.	**Post Signs -** Post or modify existing signs to inform the public of relevant Grant County ordinances and regulations. Post "Pack-In/Pack-Out" signs and posters on all signs and bulletin boards used for public information purposes. Install signs at all developed recreation areas, boat launches, and other high public use areas. Use signs, maps, and brochures to inform visitors of recreation opportunities; boating hazards; boating, camping, and motorized and ORV travel regulations and restrictions; road and area closures; etc. in the reservoir area. Provide signs to all developed and dispersed recreation areas at key road intersections, and use informational materials and maps to illustrate these primary public access routes. **Emphasize Public Education -** Develop a public education and interpretive program to increase the public's awareness of Potholes Reservoir natural resources, management problems and concerns, and the area's high desert environment and fragility. The interpretive program envisioned would focus on the areas' vegetation, wildlife, sand dune, and historian cultural features. **Develop Overall Guide/Map -** Develop an overall visitor guide/map for the Potholes Reservoir area. The guide would be a useful tool to promote and direct visitors to designated dispersed camping areas, developed recreation area facilities and services, points of interest, etc. Provide information on motorized travel restrictions and regulations; and guidance on the proper disposal of human wastes, pack-in/pack-out, fire use, and camping etiquette. **Provide ORV Information -** Install additional "ORV Area" signs to clearly direct off-road vehicle users to the authorized Grant County ORV Area. Modify the existing ORV signs posted in and near the area to accurately reflect ORV Area boundaries and the land area "open" to ORV riding.

Table 4.14-1
Visitor Information & Interpretation Goals and Actions

RMP Visitor Information & Interpretation Goals	Management Action
	Develop "Watchable Wildlife Sites - Develop "Watchable Wildlife" sites and interpretive trails in concert with the statewide Watchable Wildlife Program administered by the WDOT and WDFW. **Prohibit Primitive Camping -** No primitive camping areas would be designated or developed. **Establish Seasonal Watercraft & Dispersed Camping Restrictions -** Seasonally restrict watercraft to low speed/minimum wake operation and prohibit dispersed camping (except in designated areas or sites) in HMAs from March 15 through June 30 to enhance wildlife nesting and breeding success.

4.15 OTHER RECOMMENDATIONS

4.15.1 Leased Areas (i.e., Concessionaires) Managed Consistently with the RMP

The area covered in the RMP is managed concurrently by Reclamation, WSPRC, WDFW, Grant County Sheriffs Department, and private concessionaires (Mar-Don Resort). Due to differences in management goals, priorities, staffing, and funding levels, the management at Potholes Reservoir varies widely throughout the Potholes Reservoir Management Area.

Law enforcement, maintenance activities, and all facilities throughout the RMP area should be managed in a coordinated and consistent manner, upholding the same standards regardless of the managing entity. To visitors, management of the reservoir should appear uniform. With its dominant presence at the reservoir, SPRC is the obvious choice to take the lead in setting Law Enforcement and Management standards.

CHAPTER 5
LAND MANAGEMENT AREA RECOMMENDATIONS

5.1 LAND MANAGEMENT AREA RECOMMENDATIONS

The following sections provide key management actions developed through the preferred alternative of the Potholes Reservoir EIS. The sections are categorized by individual LMAs as identified within the Potholes Reservoir Management Area (see Figure 5.1-1).

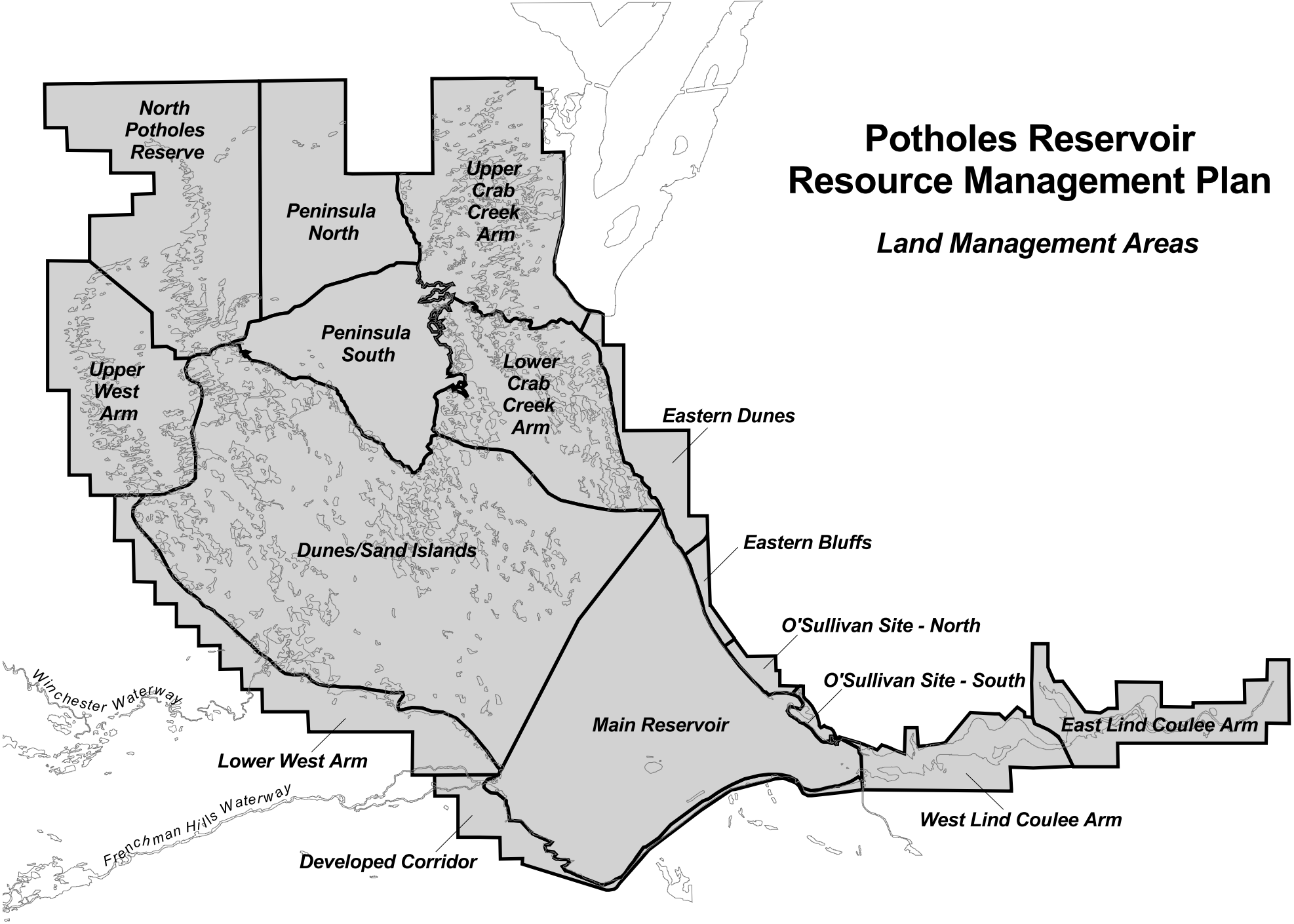
Each of the recommendations relates to one or more of the six recreation goals for the RMP that are described in Section 4.2 (Resource Management Goals) but are specific to each LMA. Where data and information were insufficient to make specific recommendations in this RMP, the recommended actions may require further site specific study, evaluation, or monitoring. Because resource management is changing and dynamic, the monitoring program will become an integral and ongoing component of the RMP's recreation management plan. LMA maps precede each of the 16 individual management areas. Refer to Figures 4.1-1 and 4.1-2, "RMP Management Actions" to supplement each of the key management actions.

5.1.1 North Potholes Reserve

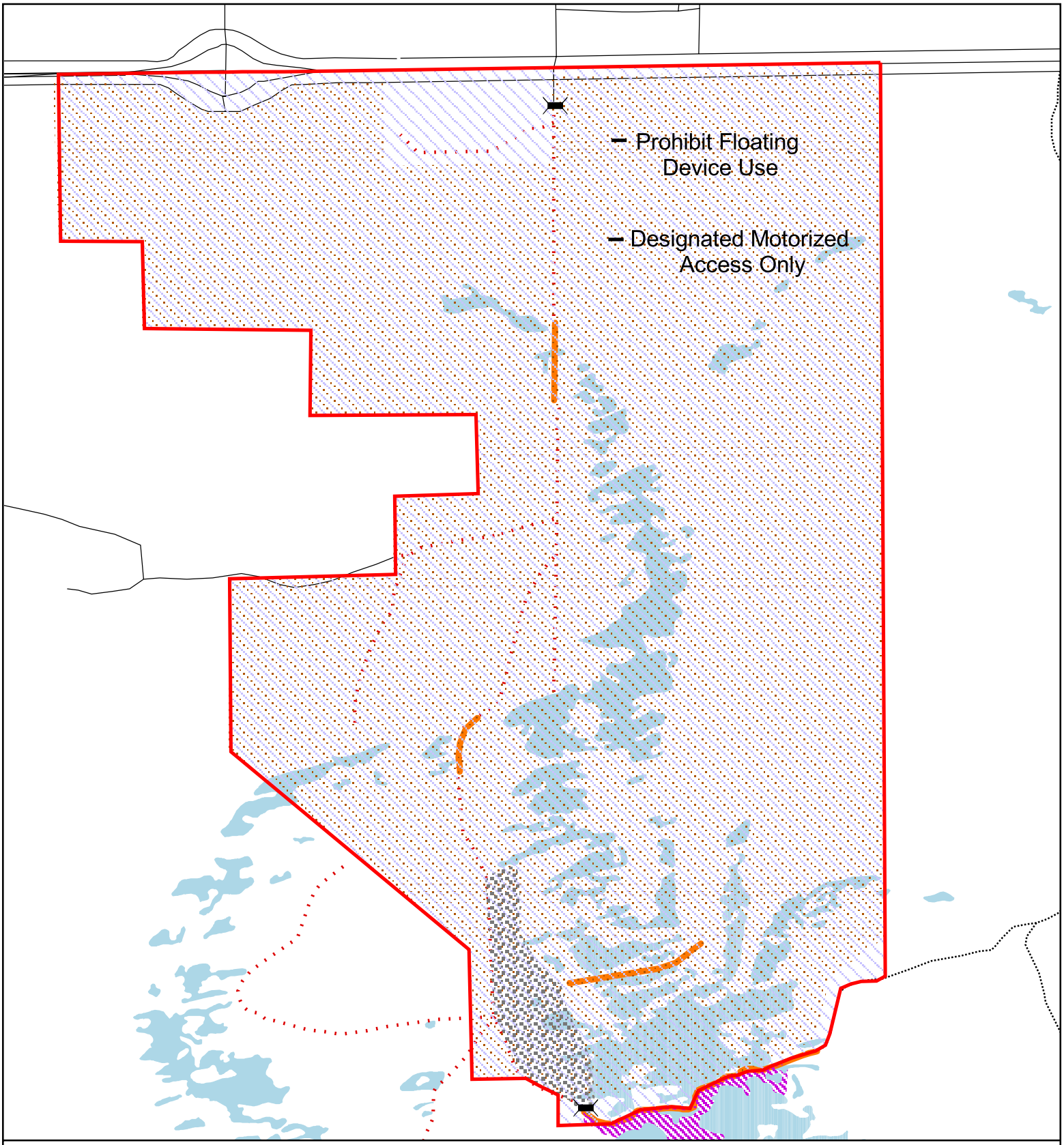
See Figure 5.1-2 "North Potholes Reserve Management Area."

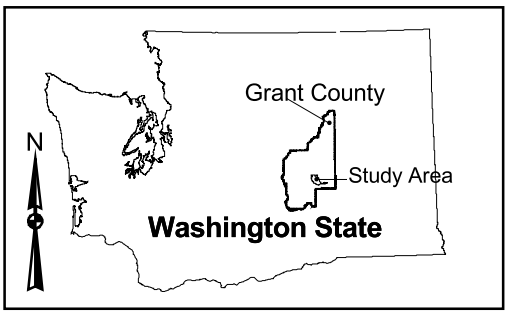
The North Potholes Reserve management area consists of approximately 3,647 acres located near the northwest corner of the Potholes Reservoir Management Area. It is primarily good quality shrubland with components of excellent riparian forest lands and a rich diversity of wildlife habitats. One of the main habitat features of this management area is the willow forest which is utilized by large numbers of colony nesting birds. Bald eagles also use these tree willows as a winter roost. Shrub willow wetland areas provide nesting sites for many bird species including blackbirds, wrens, sparrows, and warblers, as well as providing forage and building materials for beavers and muskrats. Beavers dam the numerous channels in this area creating additional wetland areas used by waterfowl and other animals.

The shrub steppe habitat in this management area is in relatively good condition, although some areas have been impacted by overgrazing. Some areas are dominated by sagebrush and others by rabbitbrush. The North Potholes Reserve is established as an important wintering area for mule deer.



Land Management Areas Figure 5.1-1





North Potholes Reserve
Designated Dispersed Camping Areas
Grazing Permit TP-01
Dikes
Gate
Watchable Wildlife Areas

Dispersed Camping

Closed Year Round

North Potholes Reserve Management Area

Potholes Reservoir Resource Management Plan

Transportation

Primary
Gravel
Closed or Seasonally Restricted

0.15 0 0.15 0.3 Miles

Figure 5.1-2

Key Management Actions

- Proposed "Watchable Wildlife" viewing opportunities including a half-mile walking loop from the North Outlet parking lot and the development of hiking trails and blinds in North Potholes Reserve would result in a small, undetermined amount of vacant land converted to non-invasive recreation use.

- Design and develop a system of hiking trails and blinds north of Job Corps Dike to view and interpret the area's colonial nesting bird rookery for great blue herons, black-crowned night herons, great egrets, and double-crested cormorants. This project would also provide excellent opportunities to view shorebirds, raptors, waterfowl, songbirds, terns, beaver and mule deer.

- Keep livestock forage utilization on the 6,700-acre pasture within the North Potholes Reserve management areas limited to no more than 600 AUMs from November 1 until March 15. Maintain grazing permit TP-01.

- Closed to dispersed camping except at designated sites along the Job Corps Dike. No improvements will be provided at these camping areas.

- Restrict floating device use.

- Seasonal restriction of any type of public access in south/central portion of North Potholes Reserve would be enforced from March 15 through May 30. The purpose of this seasonal restriction is to minimize human interaction and disturbance during waterfowl and colonial nesting bird reproductive periods.

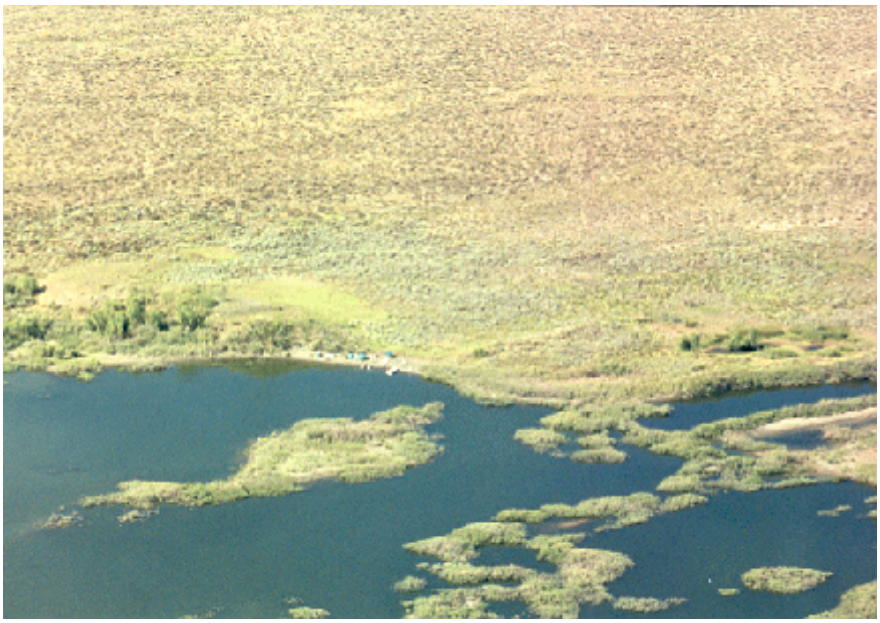
- Maintain and enhance diking system.

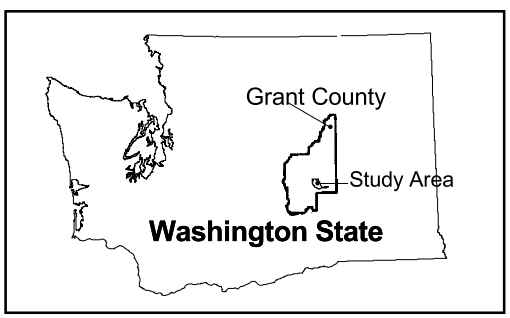
- Provide managed access, turnouts, signs, and/or interpretive trails and displays to enhance "Watchable Wildlife" viewing opportunities.

5.1.2 Upper West Arm

See Figure 5.1-3 "Upper West Arm Management Area."

The Upper West Arm management area consists of approximately 2,320 acres located southwest of the North Potholes Reserve LMA. The Upper West Arm contains relatively high quality shrub steppe, wetland, and shoreline habitats. Bitterbrush draws in this area are heavily used by mule deer as a major summer and winter habitat. The area has excellent beaver and waterfowl habitat and is managed as a carp-free area. Other riparian and wetland areas are dominated by shrub willows and emergents like bulrush, smartweed, and spike-rush.





Designated Motorized Access Only

Seasonal Minimum Wake Restriction for Watercraft (3/15 - 6/30)

Upper West Arm

Designated Dispersed Camping Areas

Grazing Permit TP-01

Dikes

Dispersed Camping

Seasonally Closed 3/15 - 6/30

Transportation

Primary

Gravel

Closed

Upper West Arm Habitat Management Area

Potholes Reservoir Resource Management Plan

0.25 0 0.25 Miles

Figure 5.1-3

Key Management Actions

- Designate as an HMA. The designation and management of the Upper West Arm HMA would preclude future development including new roads within the area.

- Designate the Upper West Arm HMA as "seasonally open" for dispersed camping (closed March 15 through June 30) to enhance wildlife reproductive success. During the seasonal closure period, dispersed camping opportunities would be available at specific sites designated and signed as "open."

- Maintain and enhance diking system.
- Seasonally restrict motorized water craft to low-speed/minimum wake operation in the HMA from March 15 through June 30. This action is designed to enhance wildlife nesting and breeding success for grebes, waterfowl, and other shorebirds.

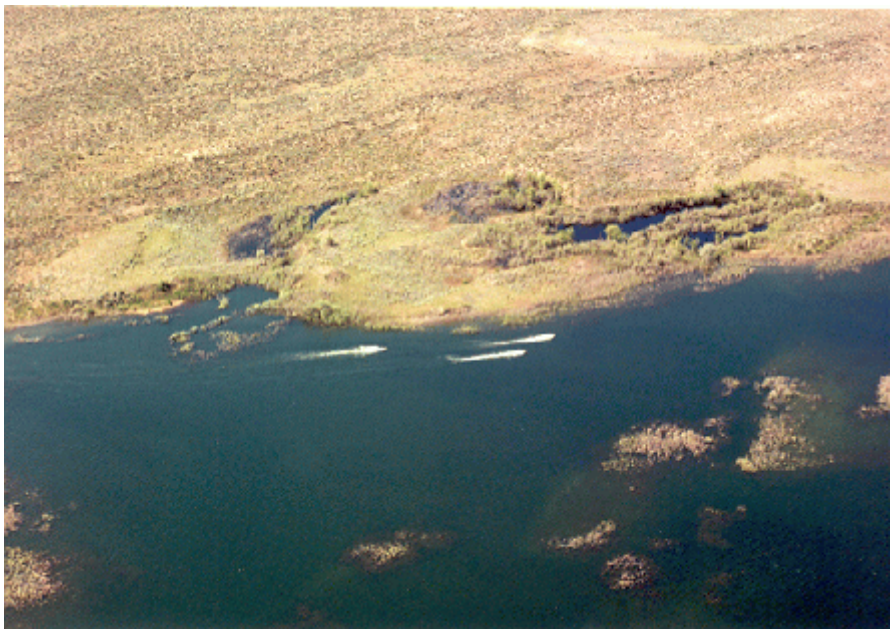
- Designate the Upper West Arm HMA as "seasonally open" for dispersed camping.

- Maintain grazing permit TP-01. Keep livestock forage utilization on the 700-acre pasture limited to no more than 600 AUMs from March 15 to April 15. This portion of grazing permit TP-01 is fenced and grazed as part of a two-pasture grazing rotation.

5.1.3 Lower West Arm

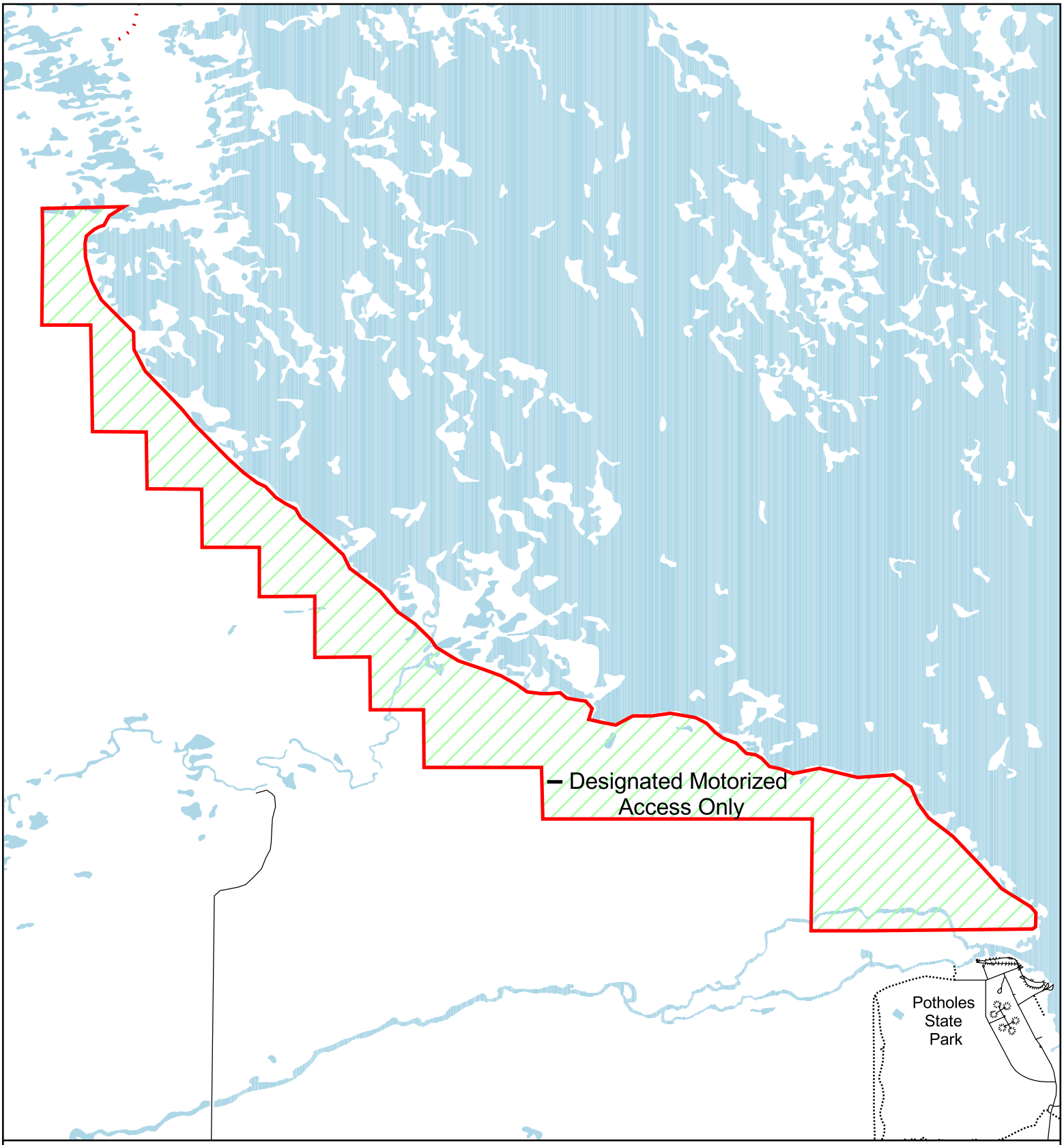
See Figure 5.1-4 "Lower West Arm Management Area."

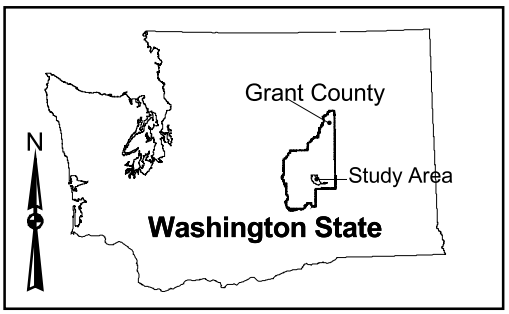
The Lower West Arm management area consists of approximately 1,490 acres located just south and continuing eastward of the Upper West Arm LMA. Throughout much of the Lower West Arm, the wetlands and fluctuating reservoir shorelines provide abundant forage and cover for many animals and fish. As with the Upper West Arm LMA, the area has excellent beaver and waterfowl habitat and is managed as a carp-free area. Purple loosestrife appears to mostly be limited to the Winchester and Frenchman Hills wasteways near the southern end of the LMA. Shrub willows and emergents like bulrush, smartweed and spike-rush are present in some of the riparian and wetland areas.



Key Management Actions

- Open year-round to dispersed camping.
- Develop "Watchable Wildlife" trail adjacent to the shoreline.





Lower West Arm

Dispersed Camping

Open Year Round

Transportation

Primary

Gravel

Closed

Lower West Arm Management Area

Potholes Reservoir Resource Management Plan

0.15 0 0.15 Miles

Figure 5.1-4

5.1.4 Peninsula North

See Figure 5.1-5 "Peninsula North Management Area."

Peninsula North is located directly east of North Potholes Reserve and has approximately 2,200 acres of good to excellent shrublands and shrub grass. The Powerline Road and powerlines run through and along the perimeter of this LMA. The condition of the shrub steppe varies while the northern portion of the management unit contains wetlands dominated by spike-rush and saltgrass. These wetlands are used heavily by waterfowl and migrating shorebirds. This area also provides good beaver habitat.

Key Management Actions

- Peninsula North is open year-round to dispersed camping.
- Grazing permit TP-01 will be maintained within the unit.
- Develop as a "Watchable Wildlife" interpretive vehicle route along the Powerline Road in conjunction with USFW.
- Provide for the periodic dredging and removal of sediments deposited at the base of the Cartop Boat launch.

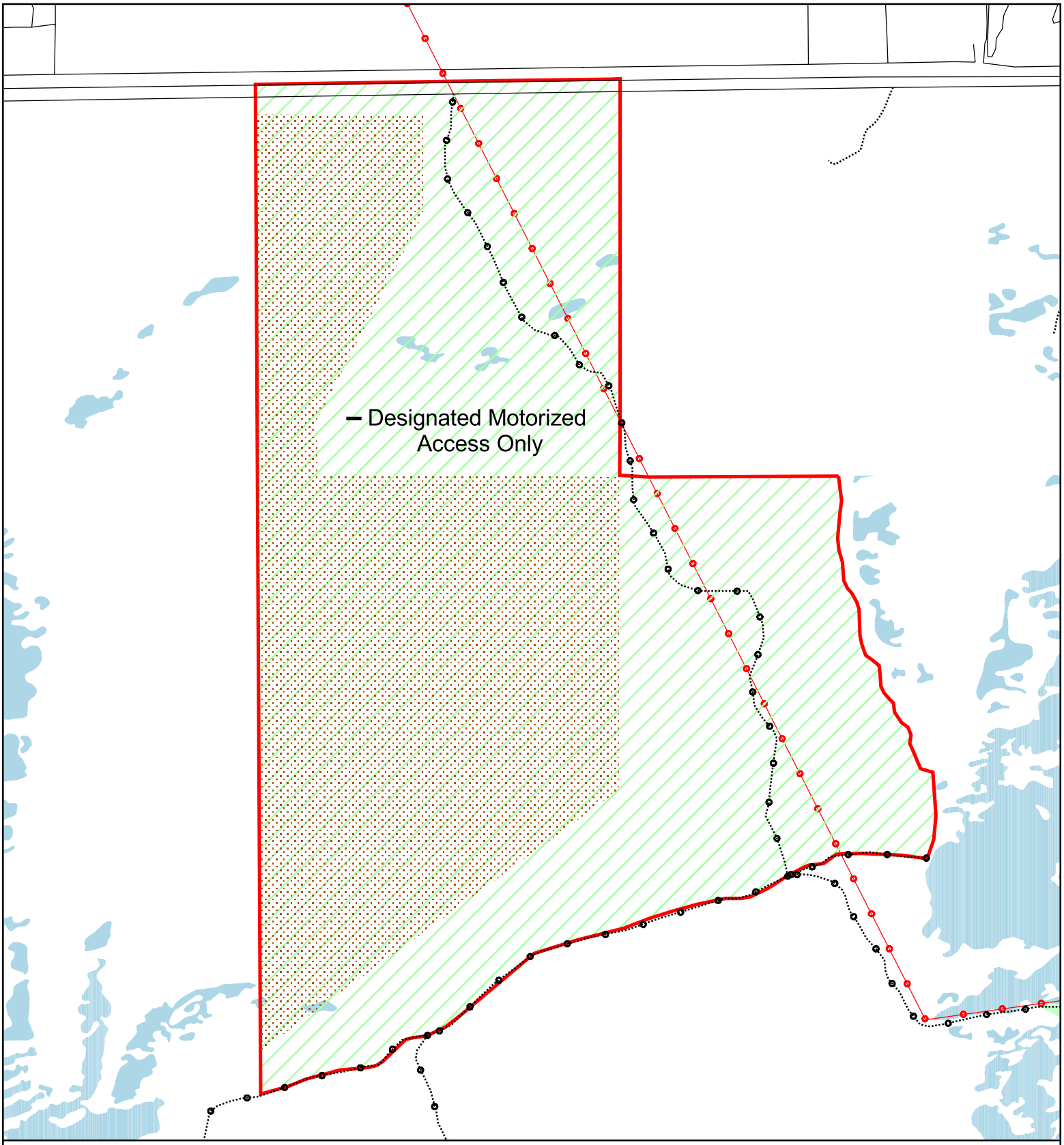
5.1.5 Peninsula South

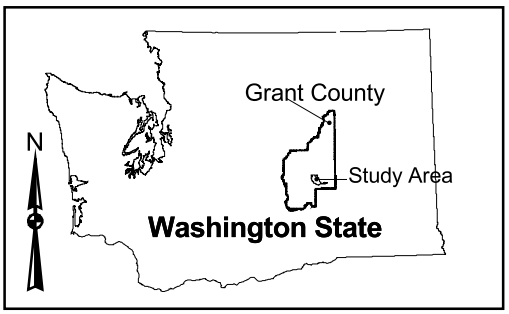
See Figure 5.1-6 "Peninsula South Management Area."

The Peninsula South management area consists of approximately 2,141 acres located directly south of the Peninsula North LMA. This area of sand dunes and shrub steppe is in relatively good condition and hosts a variety of wildlife including long-billed curlews, loggerhead shrikes, burrowing owls, reptiles, wintering raptors, and coyotes (WDFW, 1997).

Key Management Actions

- Open year-round to dispersed camping.
- Develop "Watchable Wildlife" interpretive vehicle route.
- Provide vault toilet at Powerline Boat Launch.
- Provide for the periodic dredging and removal of sediments deposited at the base of Powerline Boat Launch.
- Install "No Parking/No Camping" signs in immediate vicinity of the Powerline Boat Launch to improve vehicle and trailer maneuverability and traffic flows. (Currently, dispersed parking and/or camping in close proximity to the boat ramp hampers boat ramp operations.)





Peninsula North

Powerline

Watchable Wildlife Interpretive Vehicle Route

Grazing Permit TP-01

Dispersed Camping

Open Year Round

Transportation

Primary

Gravel

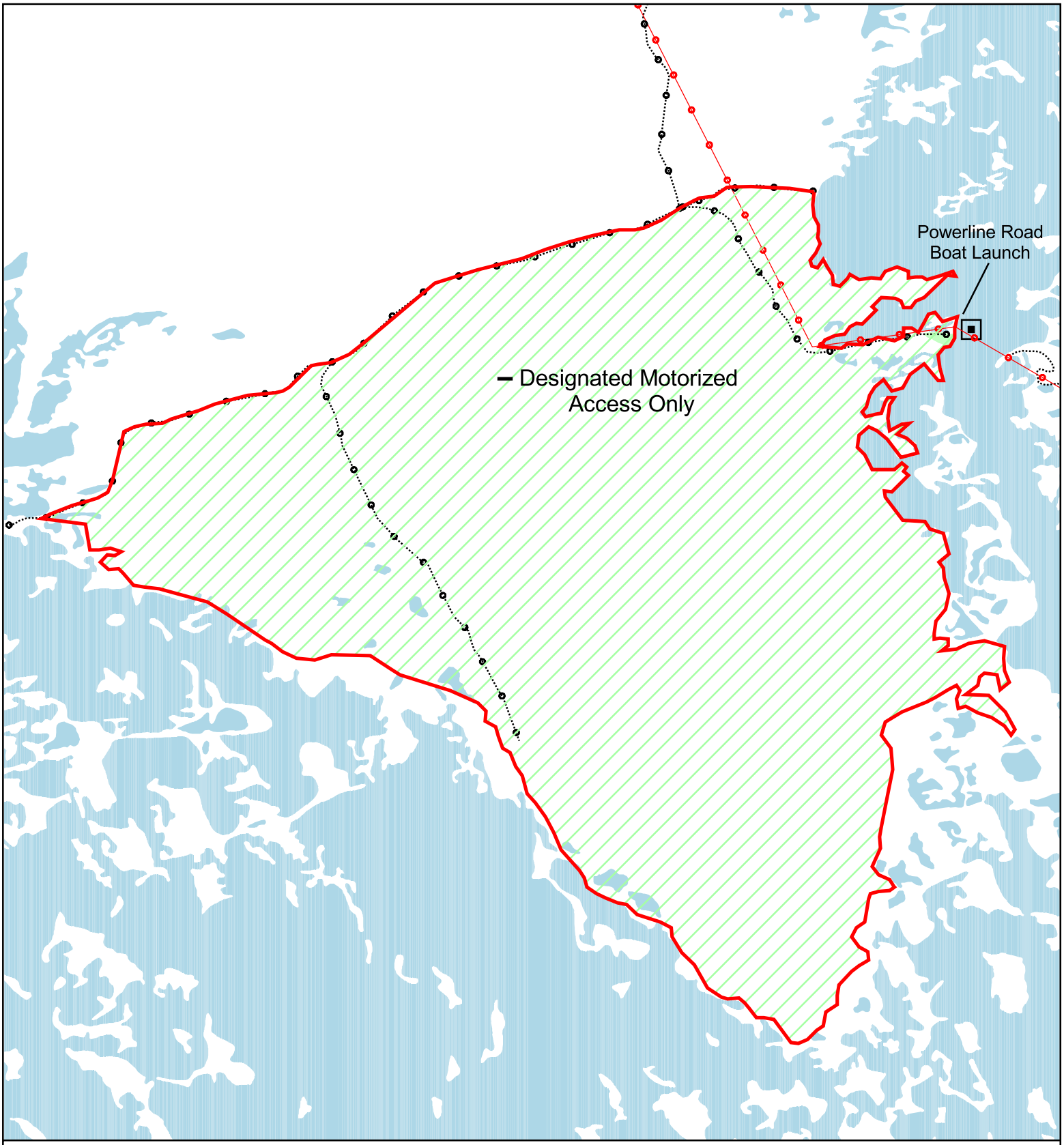
Closed

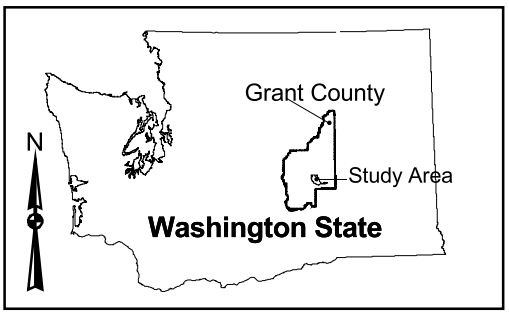
Peninsula North Management Area

Potholes Reservoir Resource Management Plan

0.2 0 0.2 0.4 Miles

Figure 5.1-5





Peninsula South
Powerline
Watchable Wildlife
Interpretive Vehicle Route
Developed Recreation Area
Vault Toilet

Transportation
Primary
Gravel
Closed

Dispersed Camping
Open Year Round

Peninsula South Management Area

Potholes Reservoir
Resource Management Plan

0.25 0 0.25 Miles

Figure 5.1-6

5.1.6 Upper Crab Creek Arm

See Figure 5.1-7 "Upper Crab Creek Arm Management Area."

The Upper Crab Creek Arm management area consists of approximately 2,839 acres located directly east of the Peninsula North LMA. There are relatively high quality tree willow, shrub willow, bulrush and cattail emergent stands which provide habitat for many wildlife species, especially waterfowl and beaver. Canada geese nest throughout this area and ducks nest mostly along the edges and to the north. Flocks of white pelicans are found here in late summer and fall. Beaver lodges are key habitat structures present which provide perch sites, feeding sites, and cover for many wildlife and fish species. The northen leopard frog is abundant as well. WDFW biologists speculate that movement out of the area by grebes, and great blue herons may occur due to human disturbances which are traditionally greater here than in some of the other LMAs with similar quality habitat.

The shrub-steppe habitat has been impacted by ORVs and grazing pressures, with rabbit brush and/or cheatgrass dominating in places. Russian knapweed is found at some sites, and Canada thistle (designated an invasive weed) is found in some moist areas near roads.

Key Management Actions

- Seasonally close to dispersed camping (March 15-June 30) except at designated sites to enhance wildlife reproductive success. During the seasonal closure period, dispersed camping opportunities would be available at specific sites designated and signed as "open."

- Close to ORV use.

- Provide West Lake/North Outlet "Watchable Wildlife" area.

- The designation and management of the Upper Crab Creek Arm as an HMA would preclude future development, including new roads, within the units.

- Maintain and enhance diking system.

- Fence east side of Sand Dunes Road between South Outlet and Powerline Road to prevent indiscriminate ORV entry. Provide parking turnouts and non-motorized access routes leading to west shore of Moses Lake.

- Designate and manage seven dispersed camping areas including North and South Outlets and five along the west shore of Moses Lake.

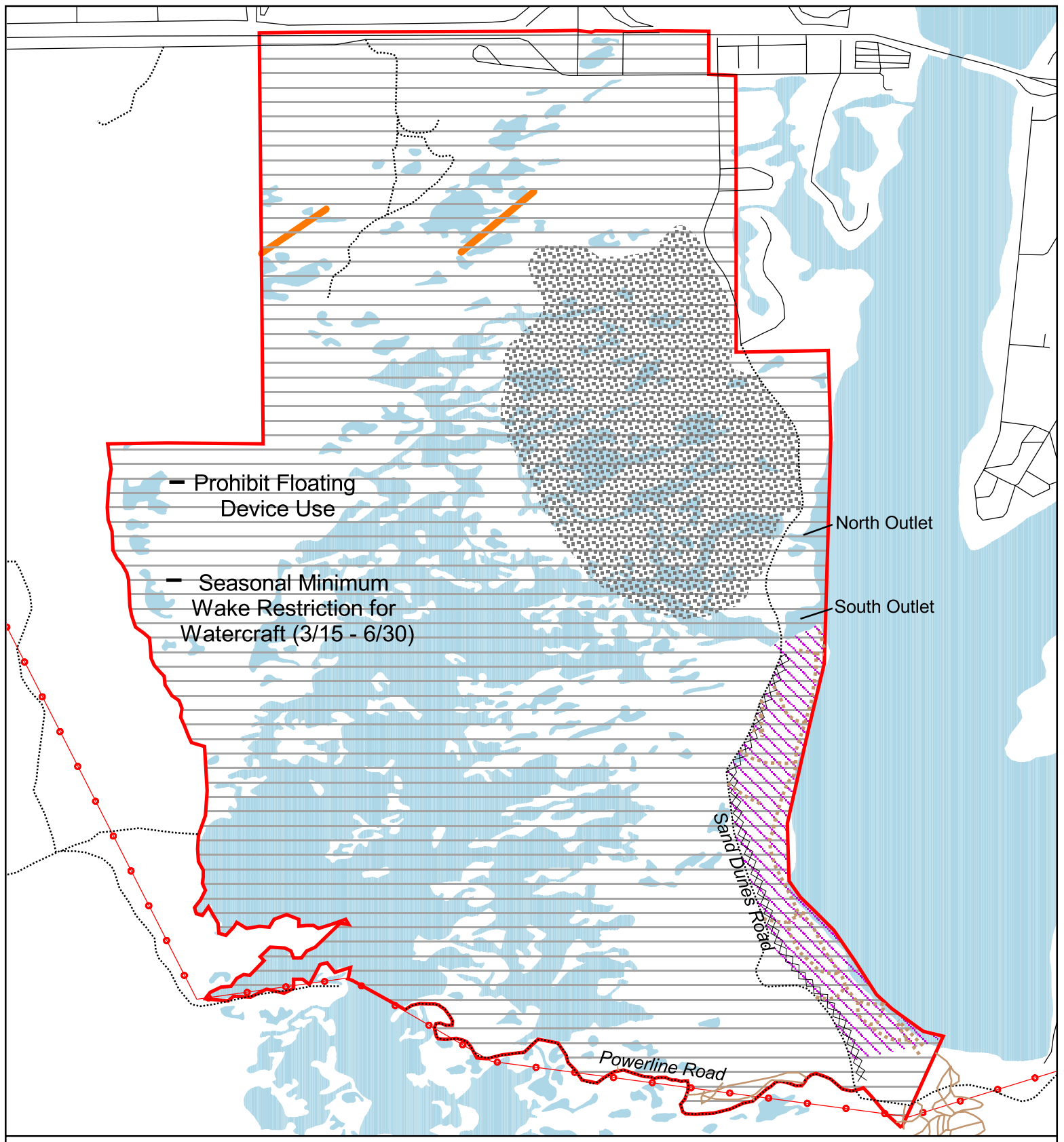
- Provide managed access, turnouts, signs, and/or interpretive trails and displays to enhance "Watchable Wildlife" viewing opportunities.

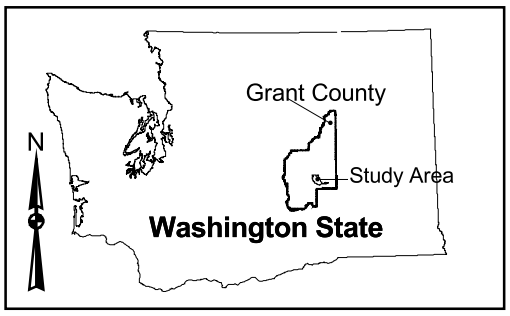
- Develop a half-mile loop trail beginning at the North Outlet parking lot. The trail would traverse through shrub-steppe, wetland, and riparian habitats. Wetland crossings would likely involve boardwalk construction.

- Designate and keep the eastern portion (about one mile) of Powerline Road "open seasonally" to motor vehicle travel/ORV use.

- Interpretive materials and signs would be used to describe habitat relationships for waterfowl, shorebirds, waders, songbirds and fur-bearers. The site would be convenient to Moses Lake residents and provide valuable recreation and education opportunities for tourists, local citizens, and school districts.

- Seasonally restrict motorized water craft to low-speed/minimum wake operation in the HMA from March 15 through June 30. This action is designed to enhance wildlife nesting and breeding success for grebes, waterfowl, and other shorebirds.





Upper Crab Creek Arm
Designated Dispersed Camping Areas
Powerline
Dikes
Fence
ORV Trail
Closed ORV Trail
Transportation
Primary
Gravel
Closed
Watchable Wildlife Areas
Dispersed Camping
Seasonally Closed (3/15 - 6/30)

Upper Crab Creek Arm Habitat Management Area

Potholes Reservoir Resource Management Plan

0.25 0 0.25 Miles

Figure 5.1-7

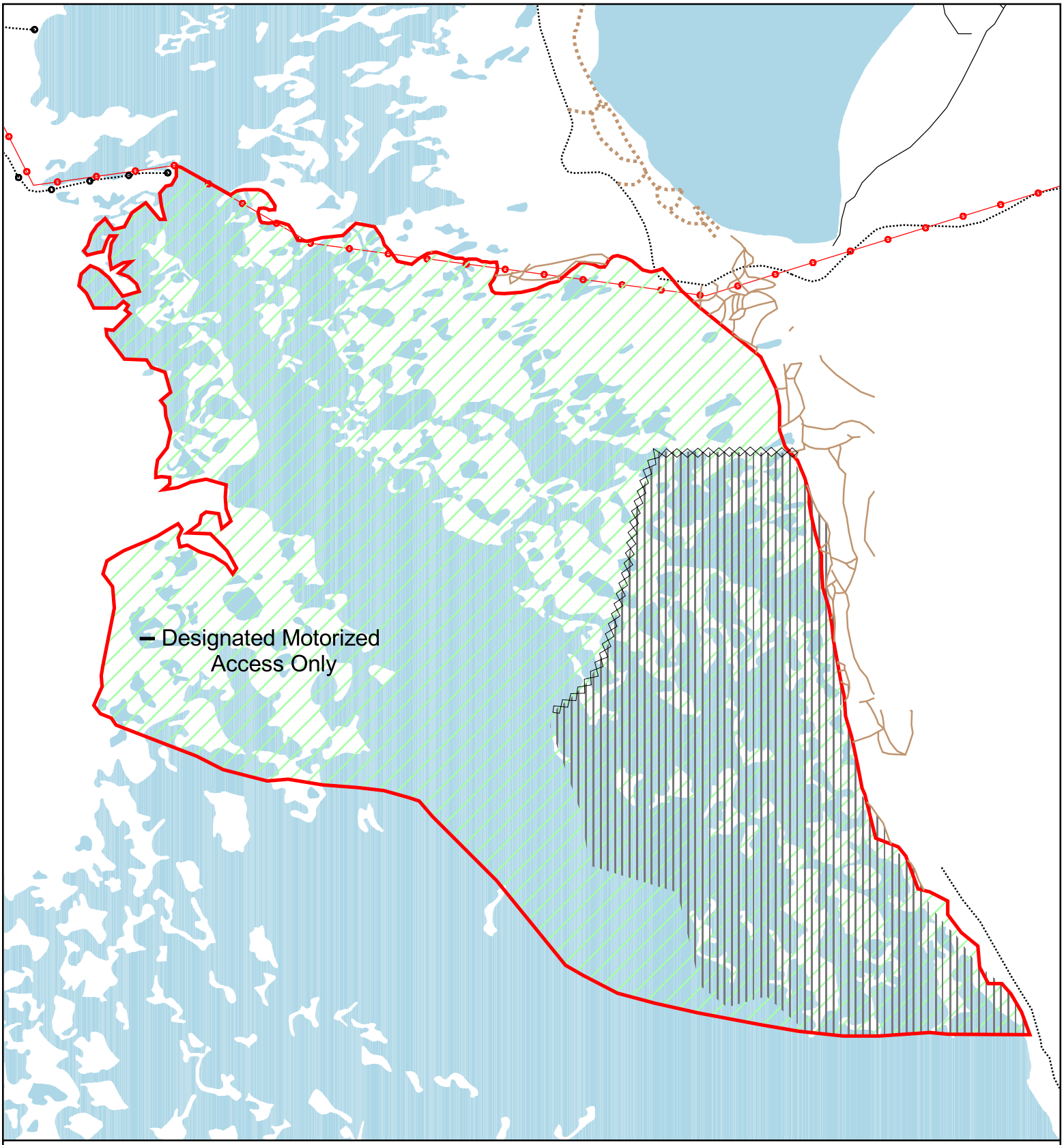
5.1.7 Lower Crab Creek Arm

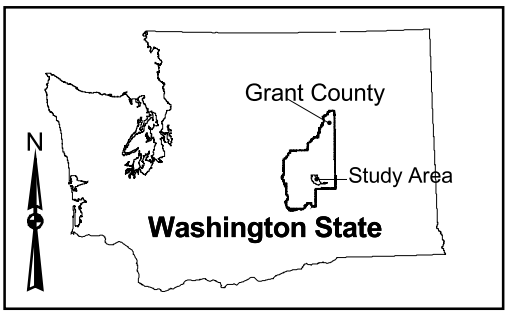
See Figure 5.1-8 "Lower Crab Creek Arm Management Area."

The Lower Crab Creek Arm management area consists of approximately 2,442 acres located directly south of the Upper Crab Creek Arm LMA. As with the Upper Crab Creek Arm LMA, there are relatively high quality tree willow, shrub willow, bulrush and cattail emergent stands. Canada geese nest in the area; flocks of white pelicans are found in late summer and fall; beaver lodges provide key habitat structures; and bald eagles have been observed roosting on a sand dune island along the southern edge of the LMA. The northen leopard frog is abundant as well. Human activity in the LMA has led WDFW biologists to speculate that grebes and great blue have moved away from the area. The shrub-steppe habitat has been impacted by ORVs and grazing pressures, with rabbit brush and/or cheatgrass dominating in places. Russian knapweed is found at some sites, and Canada thistle is found in patches associated with moist areas near roads.

Key Management Actions

- Open year-round to dispersed camping.
- Close 919 acres to motor vehicle travel/ORV use. Rehabilitation efforts will be initiated in severely damaged areas.
- Keep eastern portion of Powerline Road seasonally open to motor vehicle travel/ORV use.
- The WDFW would locate and develop from one of the closed trails, an interpretive walkway to illustrate habitat restoration efforts in the LMA.
- The WDFW and Grant County land use agreement to manage the ORV area would be modified to include only the lands in the Eastern Dunes LMU and the south half of T18N, R28E, S10 (approximately 320 acres). The western portion of Powerline Road would be closed, and motorized vehicle and ORV use would be eliminated in some of the existing ORV areas (540 acres in the Lower Crab Creek Arm LMA).





Lower Crab Creek Arm
Powerline
Fence
ORV Trail
Closed ORV Trail

Dispersed Camping

Open Year Round

Transportation

Primary
Gravel
Closed
Watchable Wildlife Interpretive Vehicle Route

ORV Use Area Seasonally Open (7/1 - 10/1)

Lower Crab Creek Arm Management Area

Potholes Reservoir Resource Management Plan

0.3 0 0.3 Miles

Figure 5.1-8

5.1.8 Dunes/Sand Islands

See Figure 5.1-9 "Dunes/Sand Islands Management Area."

The Dunes/Sand Islands management area is the largest of the 16 LMAs identified at Potholes Reservoir and consists of approximately 9,811 acres (both land and water). The numerous sand dune islands and their vegetated shorelines provide forage, resting places, and cover for fish and for a variety of wildlife species. Most of the islands are sparsely vegetated with grasses, weedy, annual herbs, and some shrubs. The habitat on some islands is heavily impacted by campers and boaters. Gulls and terns use some of these islands for nesting. Migrating waterfowl concentrate here, and Canada geese nest on the islands. Warm water fish habitat is present here and bald eagles perch on these islands to forage during winter.

Key Management Actions

- Open year-round to dispersed camping. (Note: At the discretion of the WDFW, specific islands may be seasonally closed with signs to minimize human disturbance to nesting birds, wildlife, and/or improve vegetative restoration efforts).

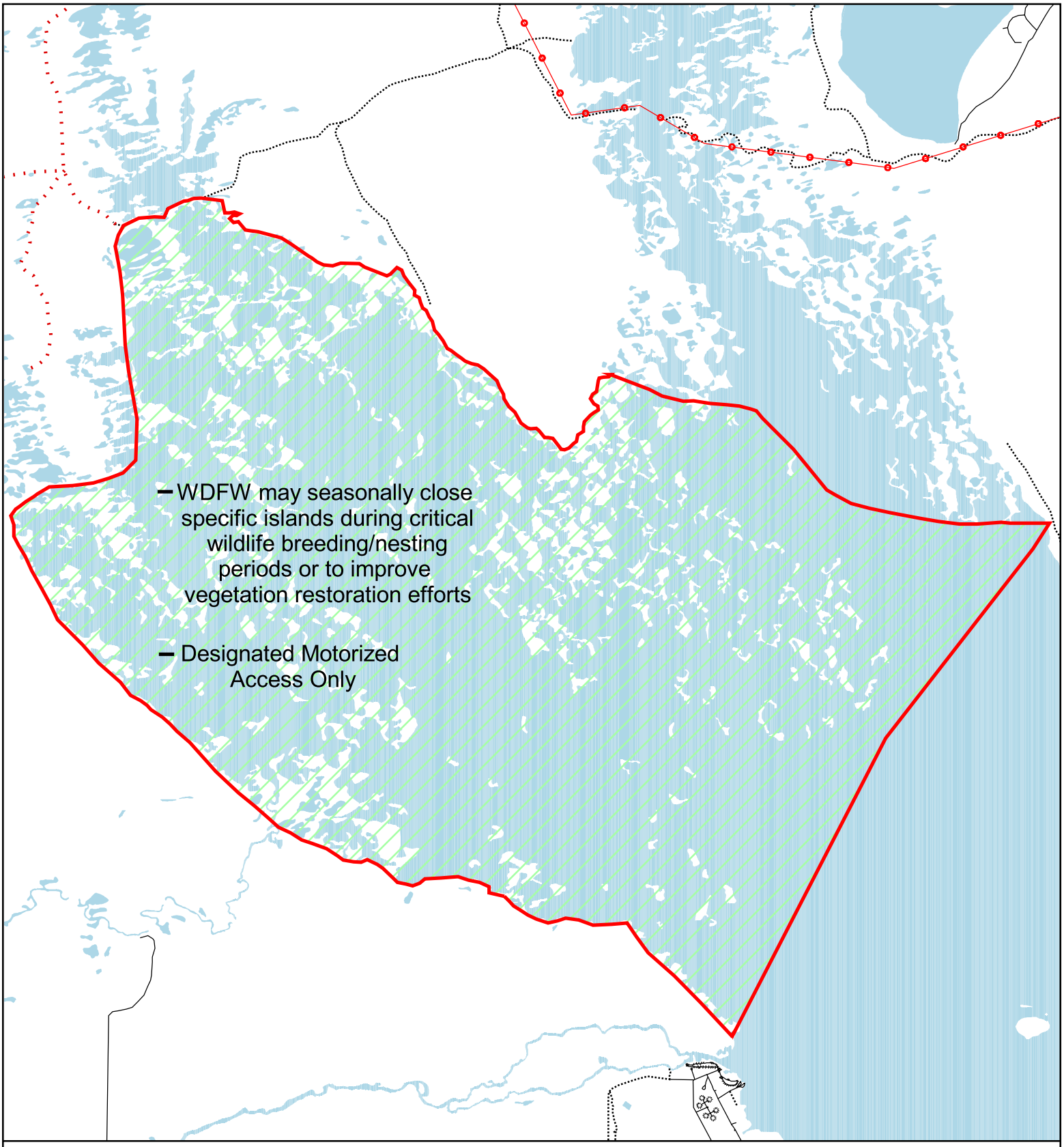
5.1.9 Eastern Bluffs

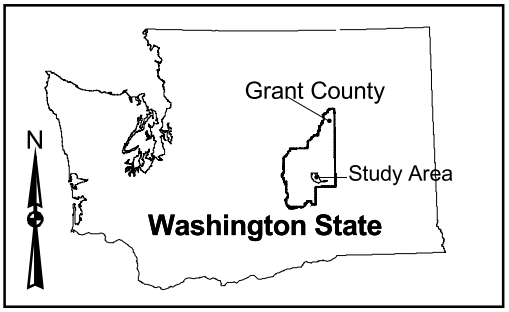
See Figure 5.1-10 “Eastern Bluffs Management Area.”

The Eastern Bluffs management area consists of approximately 128 acres located along the northeastern shoreline of Potholes Reservoir. This shrub steppe also has limited wildlife habitat value and is sparsely vegetated, with the dominating plants being rabbitbrush and cheatgrass. Numerous trails from vehicles dissect the area.

Key Management Actions

- Close to dispersed camping.
- Close to motor vehicle travel/ORV use.
- Install road gates to prevent motor vehicle entry.
- Post management regulations at “D.5 SE Road" entrance.





Dunes/Sand Islands

Powerline

Dispersed Camping

Open Year Round

Transportation

Primary

Gravel

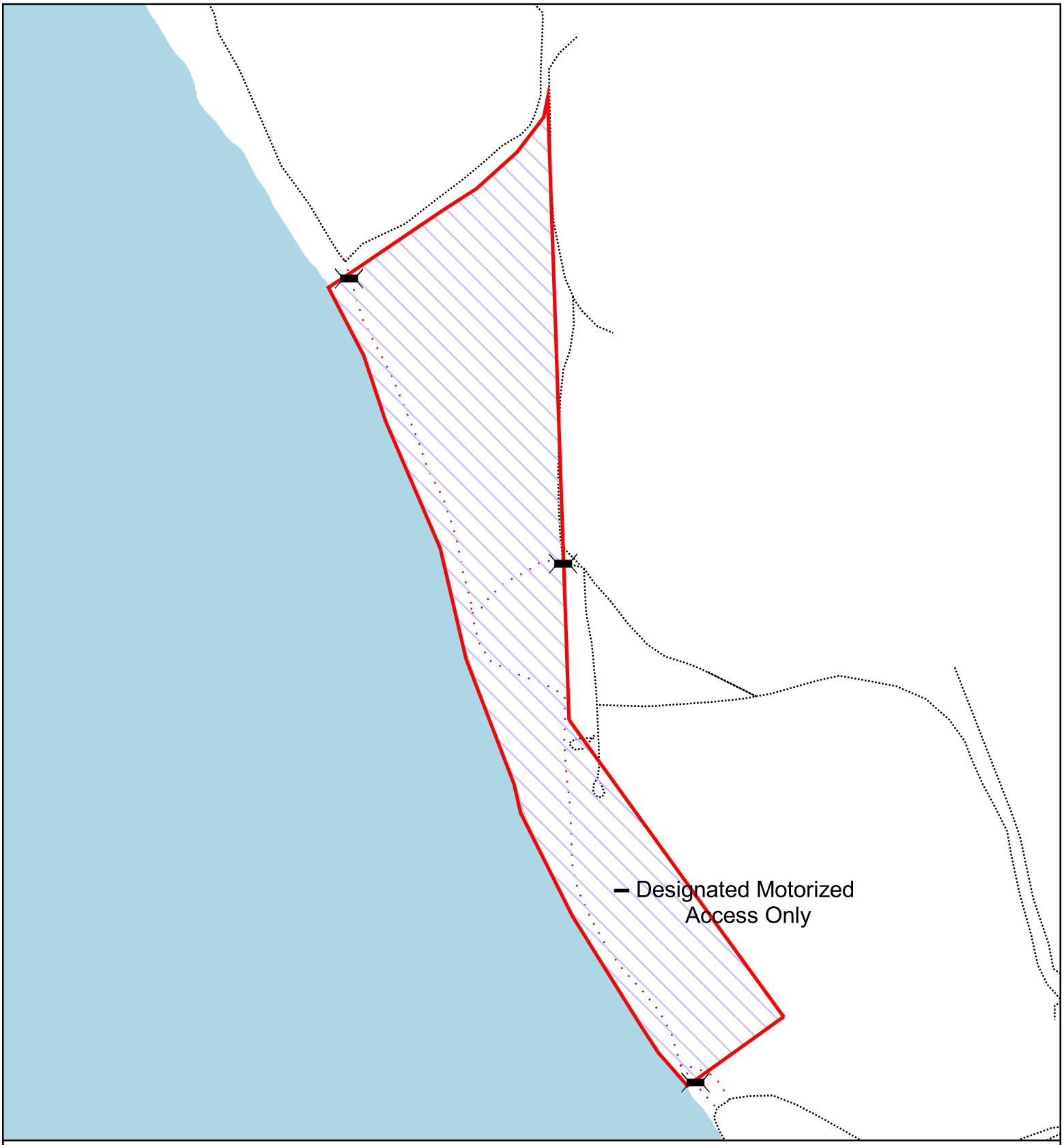
Closed

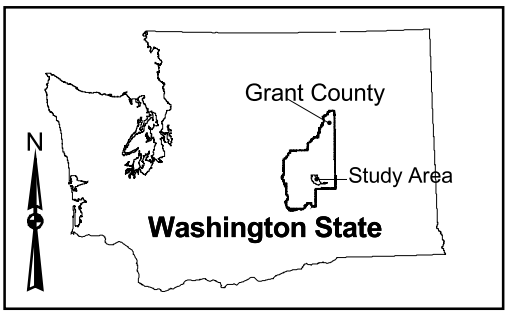
Dunes/Sand Islands Management Area

Potholes Reservoir Resource Management Plan

0.5 0 0.5 1 Miles

Figure 5.1-9





Eastern Bluffs

Gates

Dispersed Camping

Closed Year Round

Transportation

Primary

Gravel

Closed

Eastern Bluffs Management Area

Potholes Reservoir
Resource Management Plan

0.15 0 0.15 Miles

Figure 5.1-10

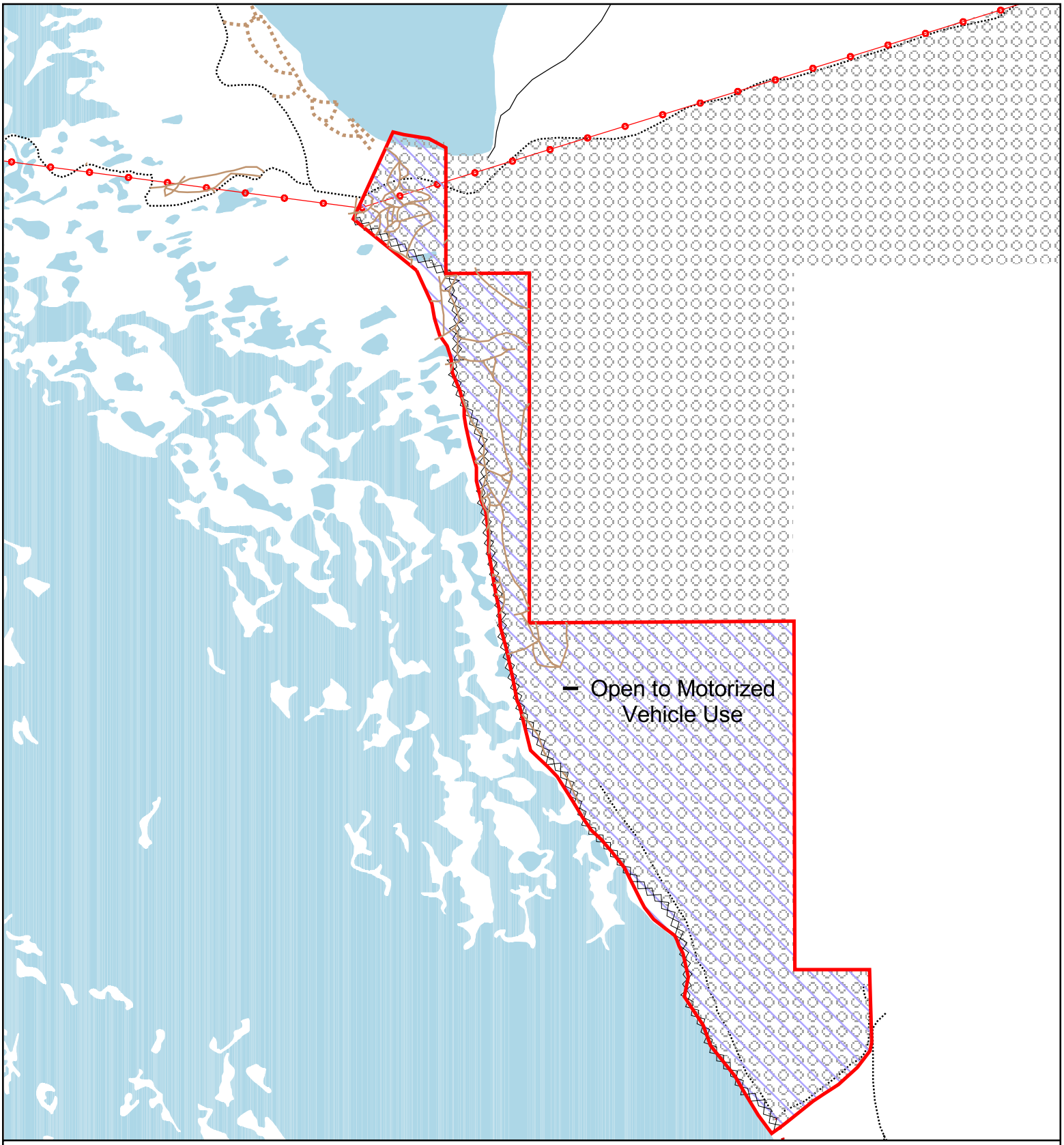
5.1.10 Eastern Dunes

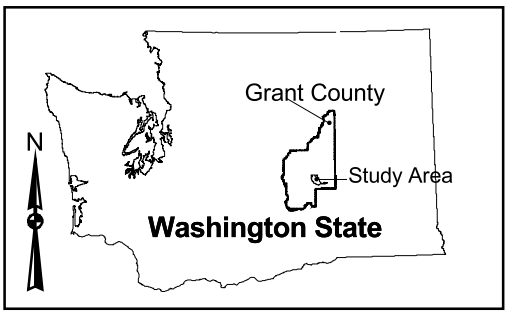
See Figure 5.1-11 "Eastern Dunes Management Area."

The Eastern Dunes management area consists of approximately 660 acres located south of Sand Dune Road along the northeast boundary of Potholes Reservoir. The LMA represents the majority of permissible ORV use where shrub steppe is heavily impacted by human activity. In year-round ORV use areas, vegetation is very sparse, providing very limited wildlife habitat. Where shrubs are found in the sand dunes, gray and green rabbitbrush are dominant shrub rather than sagebrush. Cheatgrass and needle and thread are the dominant grasses. The wetlands are dominated by cattails where birds, such as red-winged blackbirds, nest. Wetlands that are heavily used by ORVs are lacking vegetation at their perimeters.

Key Management Actions

- Close to dispersed camping.
- Open to motor vehicle travel/ORV use year-round.
- Fence west boundary to control indiscriminate ORV entry into Lower Crab Creek Arm.
- The WDFW and Grant County land use agreement to manage the ORV area would be modified to include only the lands in the Eastern Dunes management area and the south half of T18N, R28E, S10 (approximately 320 acres). The western portion of Powerline Road would be closed and motorized vehicle and ORV use would be eliminated in some of the existing ORV areas (540 acres in the Lower Crab Creek Arm LMA).





Eastern Dunes
Powerline
Fence
ORV Use Area Open Year-Round

Dispersed Camping

Closed Year Round

Transportation

Primary
Gravel
Closed

Eastern Dunes Management Unit

Potholes Reservoir Resource Management Area

0.3 0 0.3 Miles

Figure 5.1-11

5.1.11 O'Sullivan Site

Until O'Sullivan Site - North is formally developed by the SPRC as a unit of Potholes State Park, the O'Sullivan Beach and Perch Point area would be managed for day use recreation only (i.e., fishing, hiking, picnicking, wildlife observation, etc.). A fenced parking area with walk-in access portals would be provided off Perch Point Road, and human sanitation needs would be met via portable toilets on a seasonal basis. Trash would be managed under a "pack-in/pack-out" policy or with centrally located trash receptacles at the discretion of the SPRC. During this interim period, dispersed camping opportunities would remain available in the southern portions of O'Sullivan Site.

The habitat value of this site is similar to that of the Eastern Dunes and Corridor as it has similar terrain and is heavily used by recreationists. A rocky bay at the site provides some protected waterfowl habitat used by diving ducks and fish-eating birds. The bay is also an important spawning area for smallmouth bass. Human disturbance in this area may limit predation success of fish-eating birds.

O'Sullivan Site - North

See Figure 5.1-12 "O'Sullivan Site - North Management Area."

The O'Sullivan Site - North management area consists of approximately 129 acres located along the eastern boundary of Potholes Reservoir. The LMA provides open beach with good panoramic view to the reservoir.

Expanding the Potholes State Park to formally include this area would relieve much of the pressure imposed upon the other existing recreation access points (see Figure 5.1-13 "Concept Plan for O'Sullivan Site North"). The development of facilities at the original O'Sullivan Site (also referred to as Medicare Beach and Perch Point) will provide better service to users and better access to recreation opportunities.

Key Management Actions

- Close to dispersed camping.

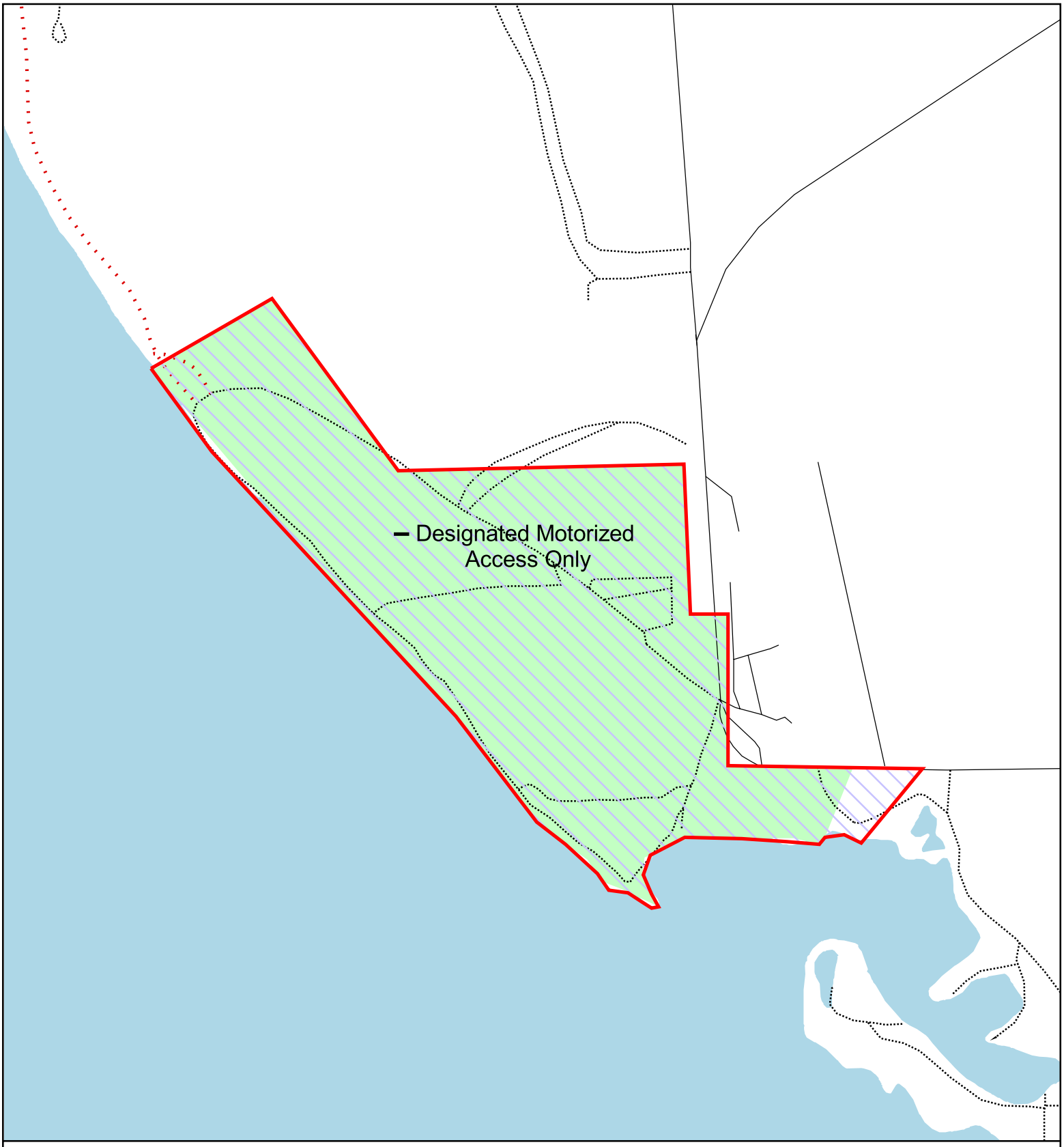
- Develop as unit of Potholes State Park. Until developed:
  - S provide seasonal toilets;
  - S fence parking area; and
  - S designate as day use only.

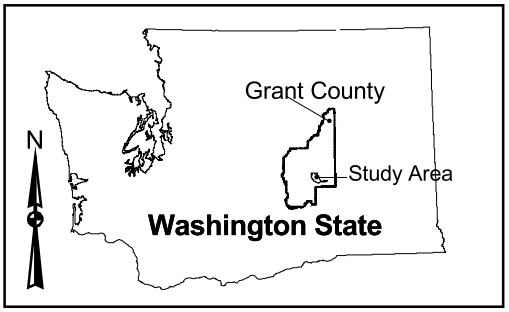
- Phased SPRC facilities and amenities for the O'Sullivan Site-North include:

  - a two- to four-lane concrete boat ramp with courtesy docks. The feasibility of developing seasonal (mid-May and mid-September) disabled fishing access in areas near courtesy docks would be evaluated.

  - 100 spaces for vehicles and trailer parking;

  - restroom facilities;





O'Sullivan Site - North

Developed Recreation Area

Dispersed Camping

Closed Year Round
to be developed as a
unit of Potholes State Park

Transportation

Primary

Gravel

Closed

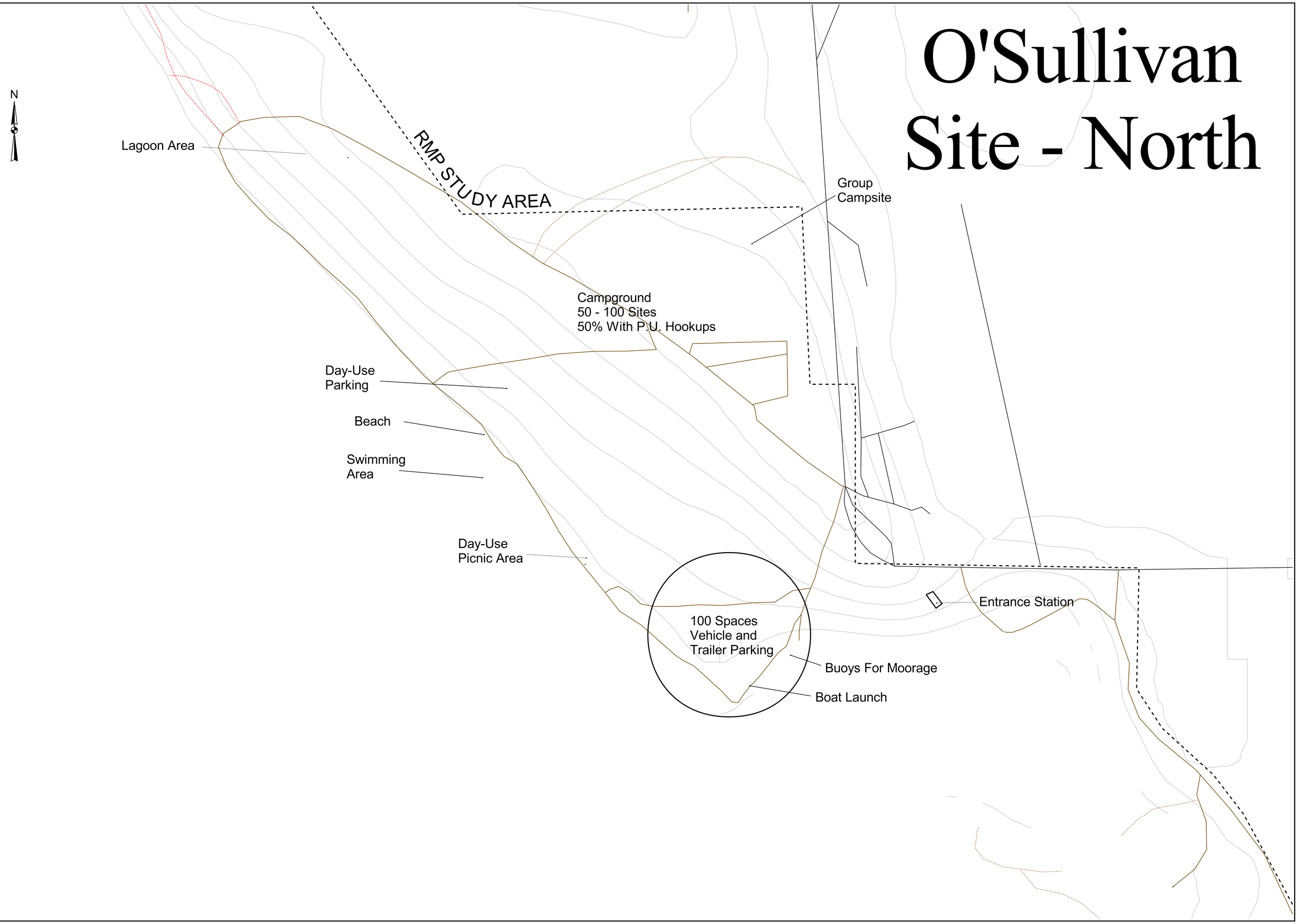
O'Sullivan Site - North Management Area

Potholes Reservoir
Resource Management Plan

0.15 0 0.15 Miles

Figure 5.1-12

O'Sullivan Site - North



Concept Plan For O'Sullivan Site - North Figure 5.1-13

- buoys for boat moorage;
- boater safety signage;
- fish cleaning station;
- day use beach, and swimming area;
- campground (50-100 campsites, approximately 50% to include RV utility hookups);
- group campground;
- day use picnic area (includes parking and restroom facility);
- non-motorized trail system including ADA accessible fishing turnouts;
- access road upgrades - an upgrade to Road 5 SE off of Road "M" SE would be required to accommodate increased traffic to the area and to safely provide access to this heavily used site. (It should be noted that in its present state, this area is already heavily impacted with peak holiday traffic and camping/day use cause overcrowding conflict.)
- centralized trash receptacles and collection;
- sewage treatment lagoons;
- entrance station;
- park residence and maintenance shop;
- provide for the periodic dredging and removal of sediments deposited at the base of public boat launches; and
- convert vacant land currently used for dispersed, waterfront recreation activities, to a developed recreation area managed by the SPRC.

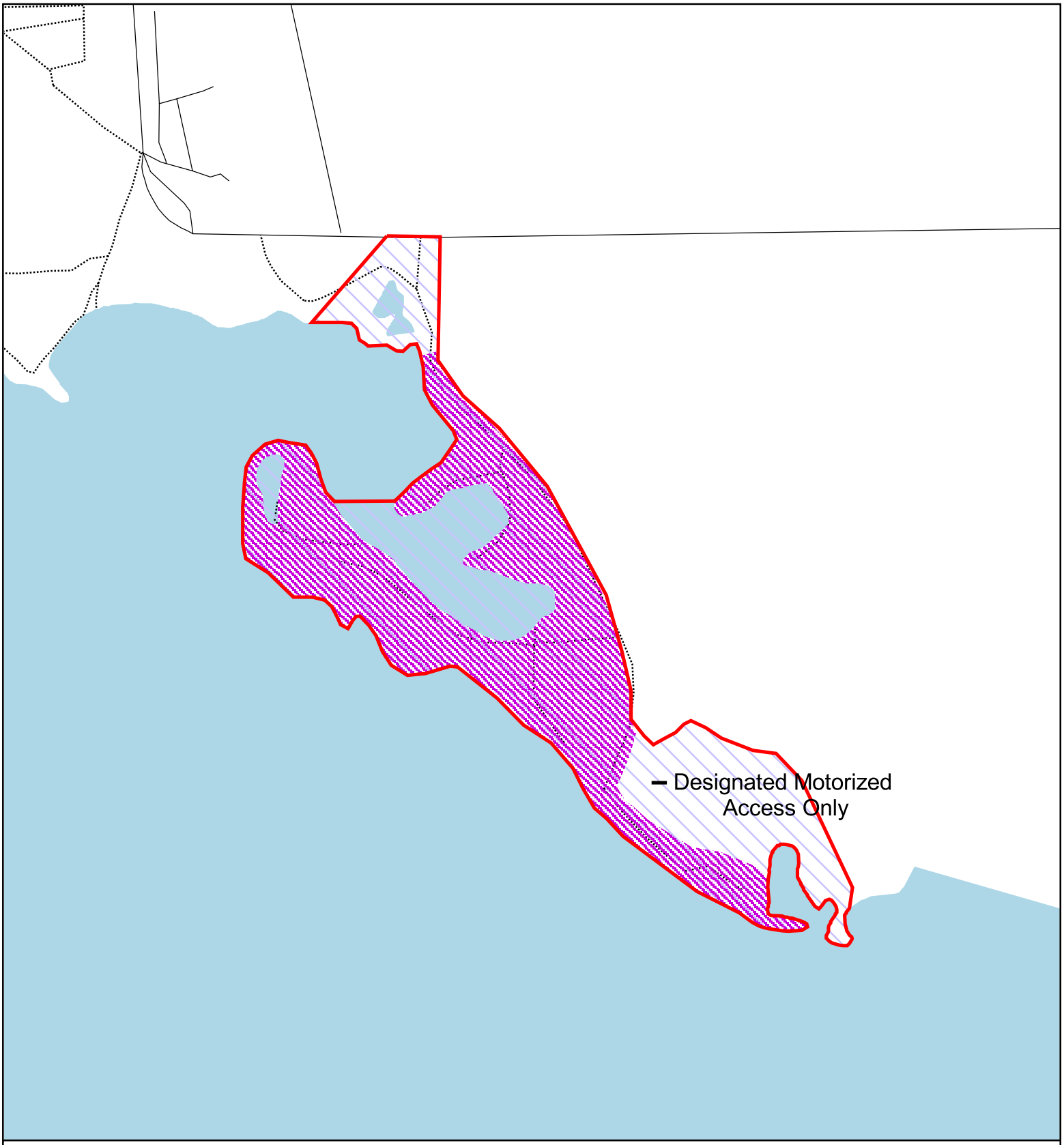
O'Sullivan Site - South

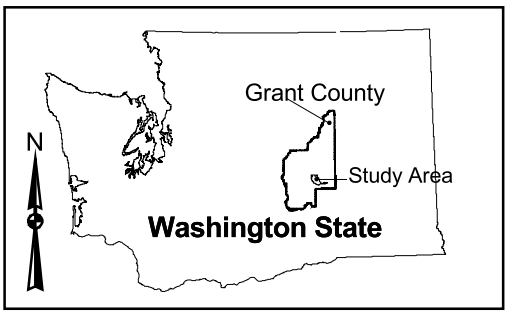
See Figure 5.1-14 "O'Sullivan Site -South Management Area."

The O'Sullivan Site - South management area consists of approximately 76 acres located along the eastern boundary of Potholes Reservoir and extends directly south from the O'Sullivan Site -North LMA (described in the previous subsection).

Key Management Actions

- Designate and manage as dispersed camping area until O'Sullivan Site - North is developed as unit of Potholes State Park.





O'Sullivan Site - South

Designated Dispersed Camping Areas untill O'Sullivan Site - North is developed as a unit of Potholes State Park

Dispersed Camping

Closed Year Round

Transportation

Primary

Gravel

Closed

O'Sullivan Site - South Management Area

Potholes Reservoir Resource Management Plan

0.08 0 0.08 0.16 Miles

Figure 5.1-14

5.1.12 East Lind Coulee Arm

See Figure 5.1-15 "East Lind Coulee Arm Management Area."

The East Lind Coulee Arm management area consists of approximately 1,255 acres located along the north and south shores of the Potholes Reservoir eastern extent. The shrub steppe and shoreline habitats here are similar to those found in the West Lind Coulee Arm LMA. However, this section of the Lind Coulee Arm has a higher concentration of waterfowl in fall, winter, and spring and more shorebirds in the late summer and fall. Mink are also very abundant in this area. Reed canary dominates some emergent wetlands along this stretch.`

Key Management Actions

- Close to dispersed camping except at designated sites.
- Develop the northern area of the East Lind Coulee Arm as a "Watchable Wildlife" area.
- Continue the 1.5-mile seasonal road closure from October 1- January 1.
- Improvements to existing boat launch with courtesy docks added. (The present boat launch near Road "M" SE becomes inoperable during late season low reservoir levels).
- Evaluate the feasibility of developing disabled fishing access in areas near courtesy docks (for use between mid-May and mid-September).

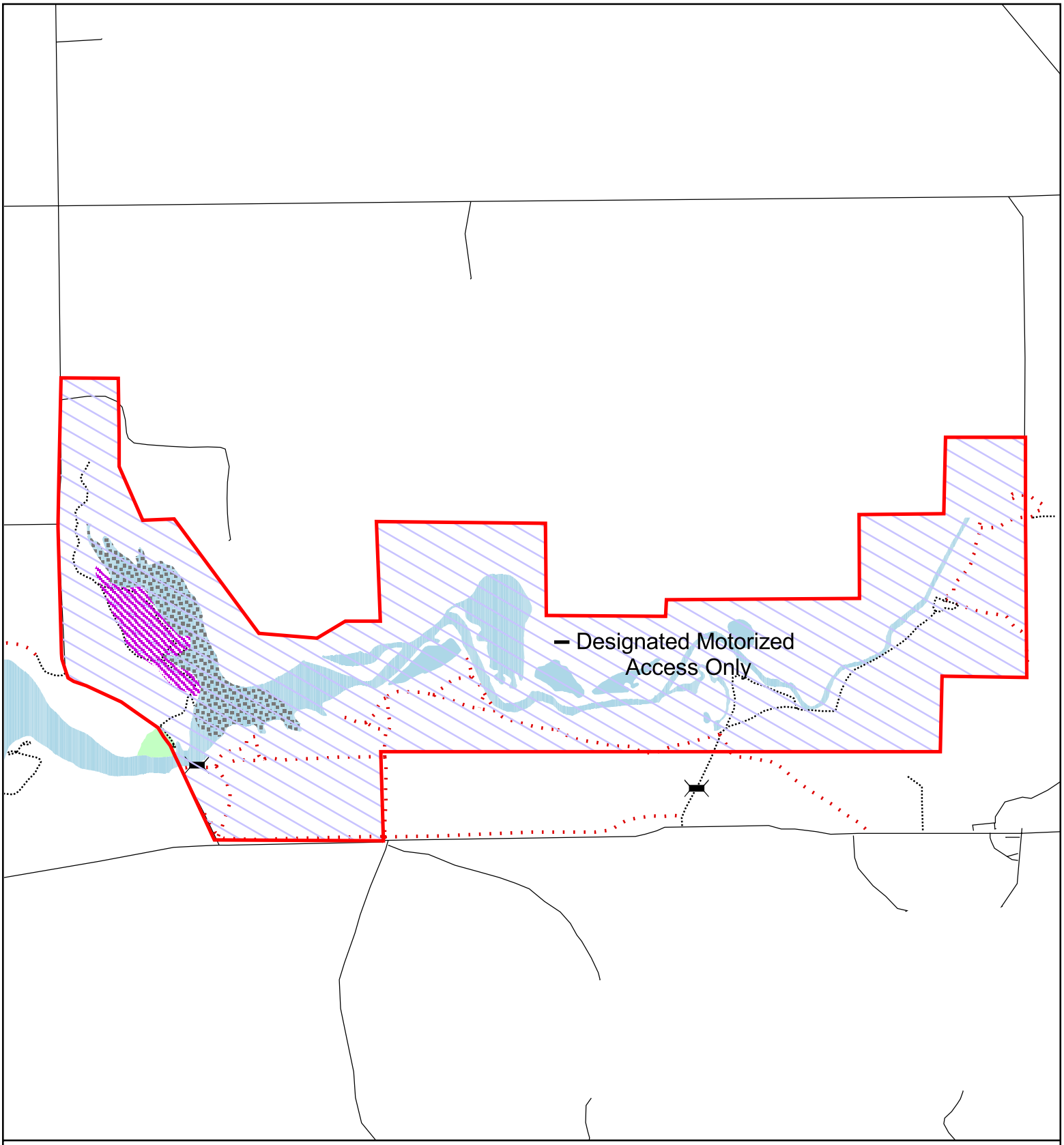
5.1.13 West Lind Coulee Arm

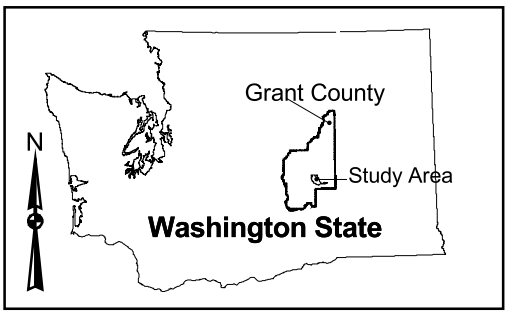
See Figure 5.1-16 "West Lind Coulee Arm Management Area."

The West Lind Coulee Arm management area consists of approximately 986 acres connecting East Lind Coulee Arm LMA to the main reservoir. The shrub steppe habitat closest to Lind Coulee is relatively good quality, with bunchgrasses, sagebrush, spiny hopsage, and bitterbrush dominating. However, further away from the coulee, the habitat is dominated by cheatgrass. Much of the shoreline is lined by shrub willows, which provide cover and foraging areas for fish and beaver habitat. Some small cliffs are present along the shores with potential habitat for snakes and raptors. The silt loam substrate found here provides burrowing opportunities for Washington ground squirrels and possibly marmots.

Key Management Actions

- Close to dispersed camping except at designated sites.
- Designate and manage seven dispersed camping areas.
- Provide seasonal toilets in high-use areas.
- Allow camping at Glen Williams and Road "M" Boat Launch sites.
- Provide courtesy docks at Glen Williams Boat Launch.
- Provide for the periodic dredging and removal of sediments deposited at the base of public boat launches, Glen Williams Boat Launch, West Lind Coulee Boat Launch, and Road "M" Boat Launch.





East Lind Coulee Arm

Developed Recreation Area

Watchable Wildlife Areas

Designated Dispersed Camping Areas

Gates

Transportation

Primary

Gravel

Closed

Dispersed Camping

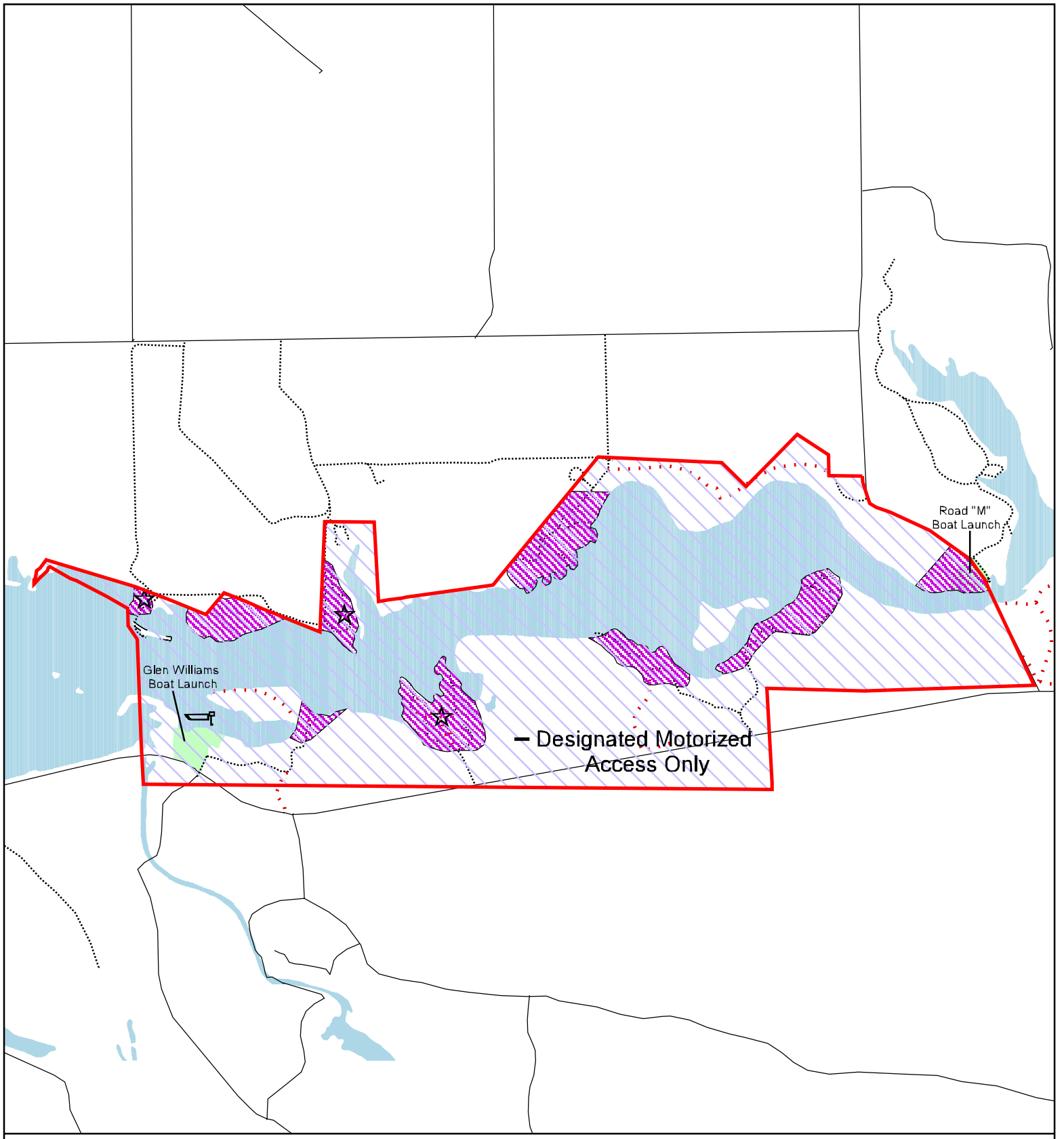
Closed Year Round

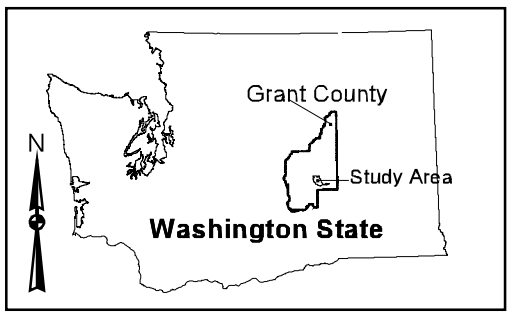
East Lind Coulee Arm Management Area

Potholes Reservoir Resource Management Plan

0.25 0 0.25 Miles

Figure 5.1-15





West Lind Coulee Arm

Designated Dispersed Camping Areas

Developed Recreation Area

Seasonal Toilets

Courtesy Dock

Transportation

Primary

Gravel

Closed

Dispersed Camping

Closed Year Round

West Lind Coulee Arm Management Area

Potholes Reservoir Resource Management Plan

0.25 0 0.25 Miles

Figure 5.1-16

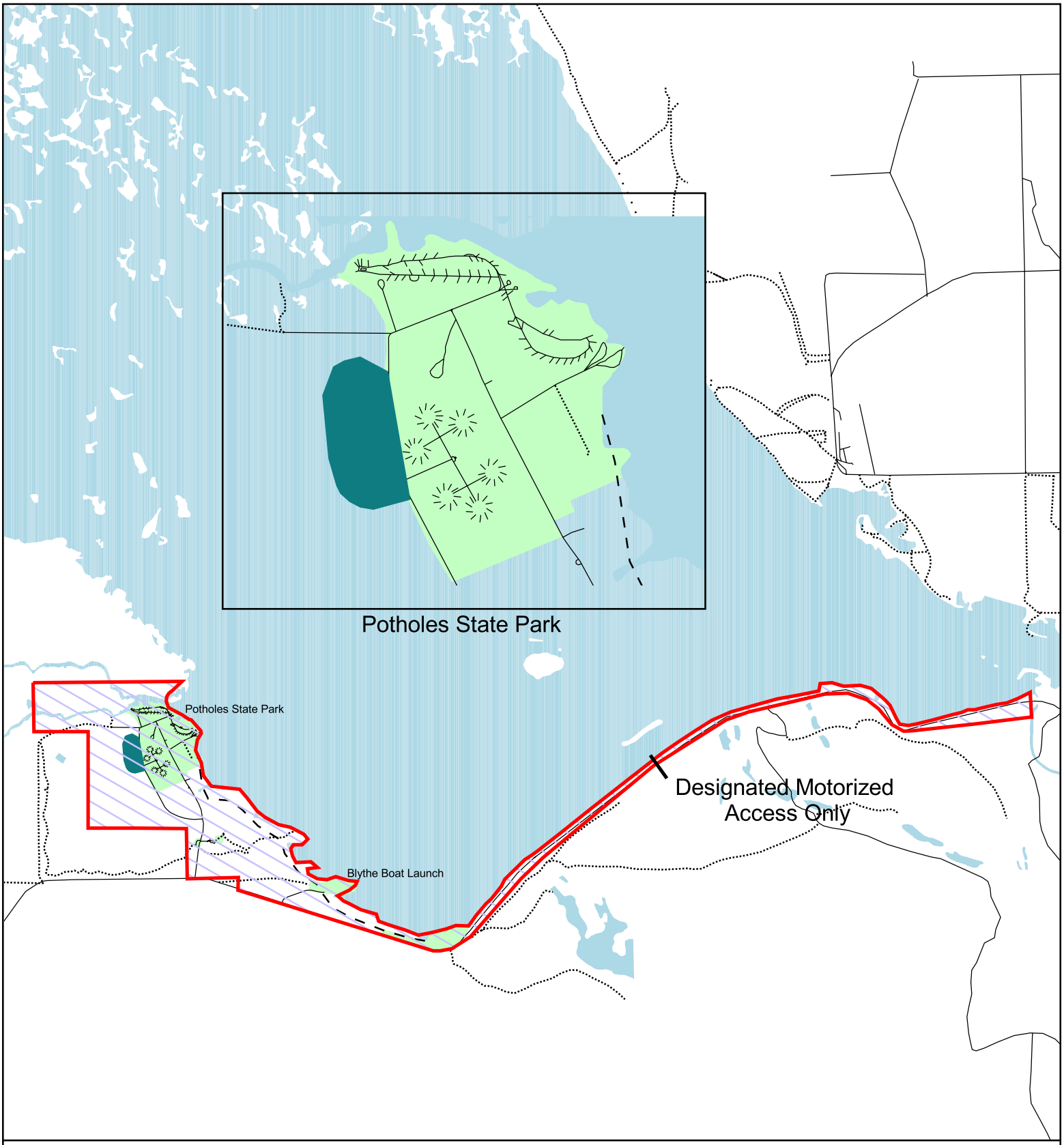
5.1.14 Developed Corridor

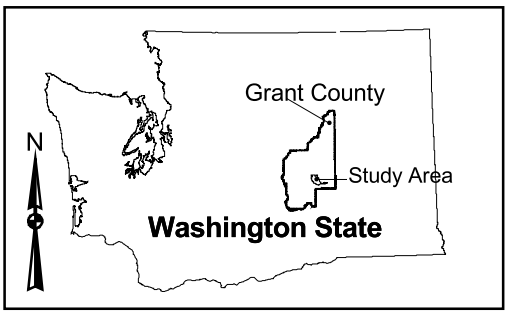
See Figure 5.1-17 "Developed Corridor Management Area."

The Developed Corridor management area consists of approximately 629 acres located along the southwest corner of the Potholes Reservoir. The LMA is largely comprised of the Potholes State Park. The habitat value at developed sites is relatively low, with invasive weeds dominating some access sites. However, the shoreline in this corridor is dominated by shrub willows and the habitat potential of these areas is high. Russian olive thickets are in some of the moister low areas of Potholes State Park and the Blythe Boat Launch Site. These thickets provide habitat and winter food for pheasants, perches, food, and nesting sites for birds such as magpies and ravens, and cover for deer.

Key Management Actions

- Close to dispersed camping except at designated sites.
- Develop an asphalt-surfaced bike/pedestrian trail between Potholes State Park and O'Sullivan Dam.
- Allow camping at Blythe Boat Launch.
- Surface or improve the cartop boat launch at Blythe and assess the feasibility of reconstruction to improve low water access.
- Provide for the periodic dredging and removal of sediments deposited at the base of public boat launches and Blythe Boat Launch.
- Pursue the cooperative development of an "Environmental Education Center" within or near the Developed Corridor.
- Develop a trailhead at O'Sullivan Dam to provide a multi-use trail connecting Potholes State Park to the O'Sullivan sites. Interpretive signs would be posted along the trail describing some of the natural attractions and history of the reservoir and surrounding area. Visitor trails would be developed at Potholes State Park, and along O'Sullivan Beach to connect high-use areas to the reservoir (water level).
- Develop additional facilities south of Potholes State Park to provide better service to users and better access to recreation opportunities. To compensate for prohibiting overnight camping in portions of the Developed Corridor (i.e., Blythe Boat Launch and O'Sullivan Site Areas), Potholes State Park would be expanded west of its current location with additional camping areas and facilities to be developed.
- A two- to four-lane boat ramp and courtesy docks would be installed near Potholes State Park and would be supported by adequate parking, restroom facilities, garbage collection, boater safety signage, and designated trail access to the reservoir.
- A swimming beach would be developed outside the boat launch area near the Potholes State Park. The feasibility of developing disabled fishing access in areas near courtesy docks would be evaluated (for use between mid-May and mid-September).





Developed Corridor
Campground Expansion Area
Developed Recreation Area

Dispersed Camping

Closed Year Round

Transportation

Primary
Gravel
Closed
Bike/Pedestrian Trail

Developed Corridor Management Area

Potholes Reservoir Resource Management Plan

0.4 0 0.4 0.8 Miles

Figure 5.1-17

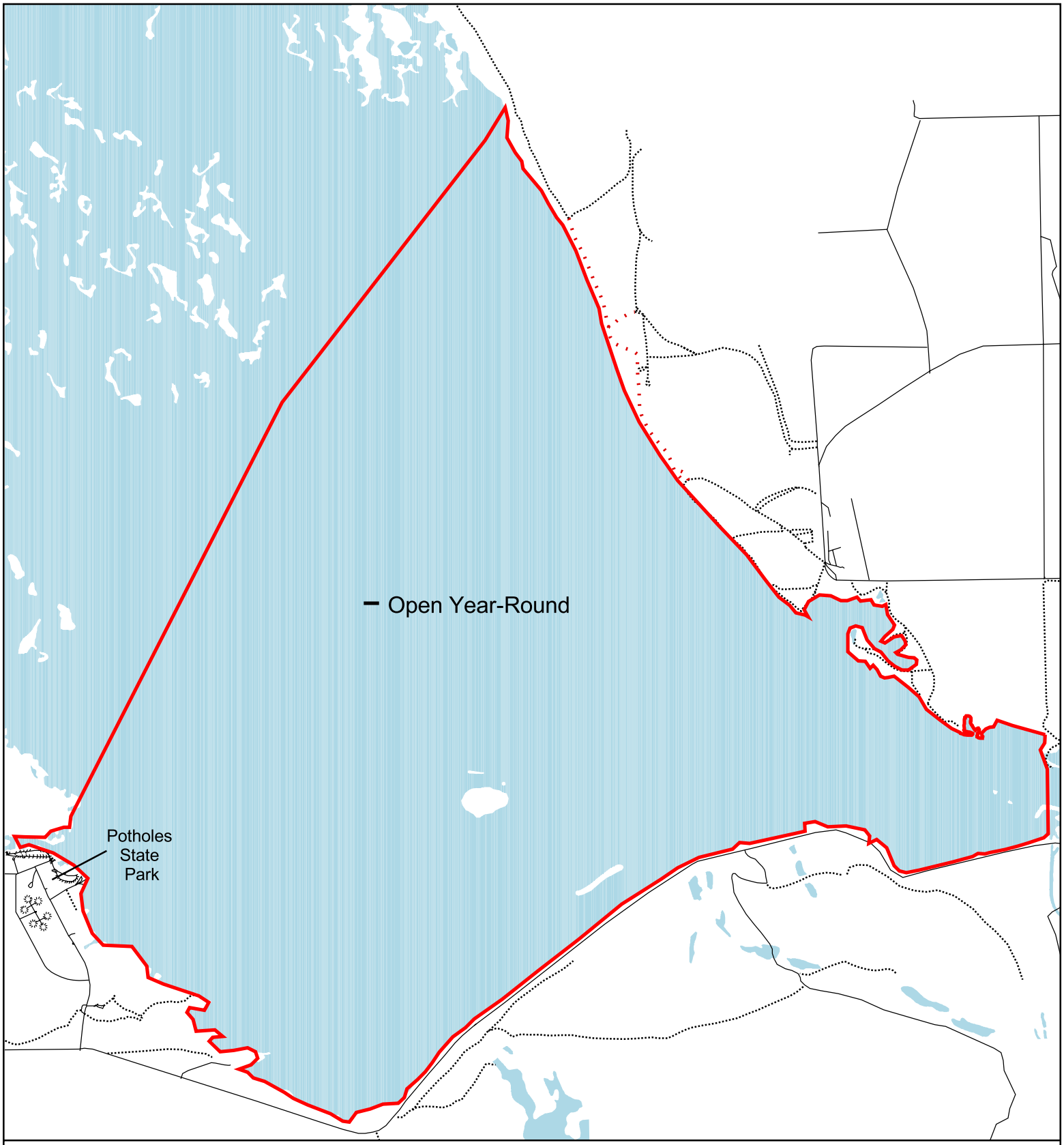
5.1.15 Main Reservoir

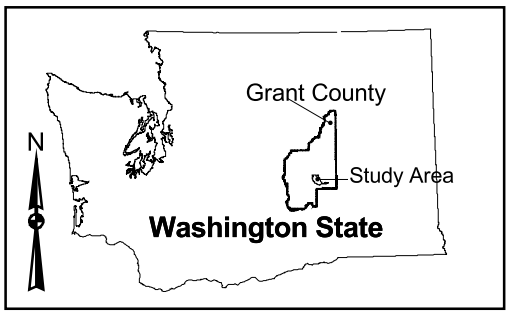
See Figure 5.1-18 "Main Reservoir Management Area."

The Main Reservoir management area consists of approximately 5,435 acres and represents the deepest, open water portion of Potholes Reservoir. Consequently, the main reservoir is made up mostly of open water habitat with only a few islands and the main reservoir shoreline areas. The area provides shallow and deep water habitats for fish and is an important place for the warm-water fishery. Water smartweed and pondweeds are important forage plants for waterfowl and muskrats. Bald eagles and common loons utilize this LMA for winter foraging. Waterfowl concentrations are found here during migration periods.

Key Management Actions

No special management is recommended for this LMA.





Main Reservoir

Transportation

Primary

Gravel

Closed

Main Reservoir Management Area

Potholes Reservoir Resource Management Plan

0.4 0 0.4 Miles

Figure 5.1-18

CHAPTER 6
MONITORING

A monitoring strategy is outlined, and, where applicable, a time-frame or phase-in period to complete the action has been determined. Indicators and standards for measuring outcomes of the recommendations are presented in Table 6-1.

Critical to managing reservoir resources and making decisions toward the *desired future condition* of Potholes Reservoir, is the need for a continuing source of current information about the condition of resources, and an ongoing understanding of public desires and needs. The planning process initiated with this RMP is the beginning of long-term monitoring of reservoir resources that would provide decision-makers, planners, and managers with the data needed to make informed decisions to protect reservoir resources and provide recreation opportunities for the enjoyment of future generations. Further, long-term monitoring would provide planners and decision-makers with greater insight and understanding between the reservoir (and its resources) and the communities of which the reservoir is an integral part, and how these relationships can change over time.

The success or failure of any long-term monitoring effort is dependent as much on good program design as it is on precise and accurate field observations. Many monitoring programs have failed as a result of inadequate record keeping. It is essential that a well thought-out monitoring plan be in place before data collection begins. All indicators should be included in the plan even if funding is pending, or uncertain. It is much more difficult to incorporate new indicators into an existing plan than to simply delete the analysis of indicators never measured.

The person(s) initiating a long-term monitoring program must assume that they will not be available for consultation ten, five, or even two years in the future. Written methodologies for data collection must be developed in detail, in a clear and understandable manner (video taping the methodologies can be very useful). All forms, maps, and other records must document the time and precise sample location. Sampling locations should be assigned discrete names that cannot be confused with other locations. These locations should all be recorded on a master map, a copy of which is stored with the data records (preferably in a Geographic Information System).

Table 6-1
Indicators and Standards

Indicators	Standards	Data Source	Instructions for Collecting/Monitoring
Resource Condition			
WATER QUALITY			
1) <u>Indicators</u> dissolved oxygen mercury lead phosphates nitrates arsenic coliform (total) pH range	• Should not exceed state or federal water quality standards for these indicators relative to wildlife/ aesthetic or recreational use	• Washington Division of Water Quality • Washington Department of Health	a) collect water quality data from designated sites b) tabulate data and compare to standards
2) Increases in algae blooms and fish kills	• State and Federal Water Quality Standards	• field observation by park staff or other reliable sources	a) document observed incidences
3) instream flows	• minimum instream flows for each stream based on current and ongoing assessments	• U.S. Geological Survey • USDI Bureau of Reclamation	a) collect flow data from agencies b) tabulate data and compare to minimum flows c) evaluate trends of several years

Table 6-1
Indicators and Standards

Indicators	Standards	Data Source	Instructions for Collecting/Monitoring
4) evidence of erosion (e.g., gullies, rills) and stream bank condition	• Should not exceed state or federal water quality standards	• field observation by park staff • Washington Division of Wildlife Resources • USDA Natural Resources Conservation Service	a) document observed occurrences b) evaluate vegetation trend study plots (see vegetation section)
5) turbidity (level of sediment load)	• State and Federal Water Quality Standards	• field observation by park staff • Washington Division of Water Quality	a) document any occurrences of turbid (cloudy) flows observed in stream or spring b) collect data for total suspended solids c) investigate source of turbidity if occurrences persist or are frequent d) report continuing problems to Washington Division of Water Quality

Table 6-1
Indicators and Standards

Indicators	Standards	Data Source	Instructions for Collecting/Monitoring
SOILS			
1) evidence of slumping, slope failure, or landslide	• Based on regular visual observation	• field observation by park staff • USDA Natural Resource Conservation Service	a) document/map observed occurrences b) correlate with patterns of use c) evaluate hazard potential and notify Washington State Department of Ecology
WILDLIFE HABITAT			
1) loss of designated habitat	• percentage of high value habitat per management unit loss. Not to exceed decisions from the ROD	• Washington Division of Wildlife Resources	a) collect data on population trends and vegetation trends
VEGETATION			
1) density of oak type	• percentage of habitat in oak-sage and oak-grass types determined by Washington Division of Wildlife Resources	• Washington Division of Wildlife Resources	a) collect data from vegetation trend study plots b) tabulate data and compare with standard
2) riparian condition	• no more than 25% classified as poor condition	• field observation by park staff	a) document occurrences and trends b) correlate with patterns of use

Table 6-1
Indicators and Standards

Indicators	Standards	Data Source	Instructions for Collecting/Monitoring
RANGE			
1) range condition and forage value	• Standards outlined in Chapter 4 of this RMP	• USDA Natural Resource Conservation Service • Washington Division of Wildlife Resources	a) collect range condition and forage value data (before and after livestock grazing) b) evaluate AUMs available and compare standard c) evaluate range management strategy
AIR QUALITY			
1) complaints about dust on roads, trails and other recreation areas	• number of complaints per year	• documented by park staff • Washington Division of Air Quality	a) document complaints b) evaluate annually c) report problems to Washington State Department of WDOE
NOISE			
1) complaints about noise caused by other visitors or from any source	• number of complaints per year	• documented by park staff	a) document complaints b) evaluate annually c) report problems to WDOE

Table 6-1
Indicators and Standards

Indicators	Standards	Data Source	Instructions for Collecting/Monitoring
USER SATISFACTION			
RECREATION FACILITIES			
1) number of times per season that campgrounds, day use areas, or other facilities are full	• no more than 75 percent full per year	• field observation by park staff • recreation user survey	a) document observed or reported occurrences b) report with park use information to SPRC
2) adequacy of facilities 3) frequency of complaints	• no more than 20% increase over the preceding year or change in major type of complaint <5% over preceding year	• recreation user survey • park records	a) evaluate survey response b) tabulate data and compare with standards c) report options to meet standards to SPRC
TRAILS			
1) frequency of complaints regarding trail conditions	• adequacy of trails	• recreation user survey • trail user groups	a) evaluate survey response b) contact user groups to identify user issues c) tabulate data and compare with standard d) adjust trail designations and/or evaluate potential of new trails to meet public needs/desires

Table 6-1
Indicators and Standards

Indicators	Standards	Data Source	Instructions for Collecting/Monitoring
ACCESS			
1) adequacy of road access to/from and in the park	Adequate to safely meet park and user needs	• recreation user survey • recreation groups and organizations • agency personnel, Grant County Sheriff, and WA State Police	a) evaluate survey response b) coordinate with Washington Department of Transportation and Grant County on road planning
RECREATION OPPORTUNITIES			
1) increase in frequency of requests --group use --camping --events	Diversity of recreation opportunities	• recreation user survey • reservation system • trails user group and other recreation organizations • tourism information • park staff	a) contact recreation user groups to identify needs/desires b) evaluate survey response c) identify any desired opportunities that park could, but currently does not, provide

Table 6-1
Indicators and Standards

Indicators	Standards	Data Source	Instructions for Collecting/Monitoring
USER CONFLICTS			
1) conflicts between users participating in same activity 2) conflicts between users participating in different activities	• frequency and severity of complaints in comparison to initial user survey data	• incidents reported to managing agencies • recreation user survey	a) document occurrences b) tabulate total number of occurrences c) compare with standard d) determine if problem can be corrected with information (i.e., signs to promote user coordination/cooperation
SITE/FACILITY CONDITION			
RECREATION FACILITIES			
1) percent of bare ground acceptable 2) photo or video comparison of structures	• no more than 10% increase in bare ground	• field observation by managing agency personnel • staff photos/video	a) document and compare with standard b) investigate cause (e.g., overuse, lack of water) and evaluate potential solutions c) report options to meet standards

Table 6-1
Indicators and Standards

Indicators	Standards	Data Source	Instructions for Collecting/Monitoring
3) evidence of inadequate maintenance or overuse during the primary use period(s) • trash/litter present • damaged structures • erosion • presence of noxious weeds	• no more than 10 pieces of litter visible from any point on site • no more than one damaged structure per site • no noxious weeds	• field observations by park staff • recreation user survey • water records	a) conduct inventory of site/facility conditions b) evaluate survey response c) tabulate data and compare with standards and maintenance levels d) determine if increased maintenance would solve problem
TRAILS			
1) miles of trail by type (e.g., hiking, biking, ORV, equestrian, multi-use) 2) evidence of severe deterioration 3) evidence of hazards (e.g., rockfall or deadfall) 4) frequency of accidents per season 5) evidence of short-cutting or erosion	• as outlined in this RMP for the particular resource	• field observations by park staff • GIS database • trail users groups	a) contact trail user groups and discuss needs/desires b) evaluate survey response c) evaluate trail use and designations d) adjust trail designations and/or evaluate potential of new trails to meet public needs/desires e) report option to the SPRC

Table 6-1
Indicators and Standards

Indicators	Standards	Data Source	Instructions for Collecting/Monitoring
ACCESS			
1) adequacy of road condition and level of maintenance 2) full parking at trailheads	• standard should reflect and not exceed desired access & recreation use opportunity setting (i.e., Recreation Opportunity Spectrum) • use road access as a recreation management tool	• field observed by park staff • Washington Department of Transportation • Grant County Highway Department • staff counts on random day 7 a.m. and 6 p.m.	a) evaluate survey response b) compare with current levels of maintenance (from highway departments) c) consider ROS in evaluating changes (i.e., upgrades) to roads d) coordinate with WDOT and Grant County on maintenance and road planning e) report potential changes in access to SPRC

CHAPTER 7
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APPENDIX A

DRAFT
FISH AND WILDLIFE COORDINATION ACT REPORT
FOR THE
BUREAU OF RECLAMATION'S
POTHOLES RESERVOIR RESOURCE MANAGEMENT PLAN

PREPARED BY

U.S. FISH AND WILDLIFE SERVICE
UPPER COLUMBIA RIVER BASIN SUB-OFFICE
EPHRATA, WASHINGTON

PREPARED FOR

U. S. BUREAU OF RECLAMATION
COLUMBIA IRRIGATION PROJECT
EPHRATA, WASHINGTON

April 2000

Introduction

Potholes Reservoir was developed by the Bureau of Reclamation (Reclamation) as a collection basin for irrigation return flows within the Columbia Basin Irrigation Project (CBIP). Water from Potholes Reservoir is then used for the southern portion of the CBIP. Reclamation must manage Potholes Reservoir to meet irrigation commitments, assure public safety, and protect property. Aside from those constraints, they have considerable flexibility in managing for a variety of other important resources, such as fish and wildlife and their habitats, cultural resources, recreational activities, education, etc. Currently, Reclamation has leased management of the majority of project lands to the Washington Department of Fish and Wildlife (WDFW), Washington State Parks and Recreation Commission (WSPRC), and Grant County Sheriff's Department. Reclamation is proposing to complete a Resource Management Plan (RMP) for Potholes Reservoir to guide future management efforts.

This draft Fish and Wildlife Coordination Act Report (CAR) is provided to Reclamation to assist with the development of the Potholes Reservoir RMP and environmental impact analysis. It has been prepared by the U.S. Fish and Wildlife Service (Service) under the authority of and in accordance with provisions of the Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). This draft CAR, once it has been finalized, will constitute the report of the Service and the Department of the Interior pursuant to section 2 (b) of the FWCA, on the proposed Potholes Reservoir RMP.

The information for this draft CAR came from previous studies and resources such as the Service's March, 2000 Planning Aid Report on Habitat Evaluation Procedures at the Potholes Reservoir study area, Washington State GAP Analysis (Cassidy et al. 1997); Washington Department of Fish and Wildlife's (WDFW) Wildlife Heritage Database; the Breeding Bird Survey database, information on the area in our files; several site visits and surveys; maps; aerial photos; and conversations with personnel with Reclamation, WDFW, and the Dames and Moore consulting firm.

Study Area

Our study area included the land owned by Reclamation at the Potholes Reservoir near Moses Lake, Washington. The study area is within Daubenmire's (1988) original *Artemesia-Agropyron* zone, which is the driest zone in the state (Franklin and Dyrness 1973). This region of steppe and shrub-steppe vegetation includes most of central and southeastern Washington state where bunchgrass and sagebrush communities were historically dominant. Before construction of Potholes Reservoir vegetation of the Potholes area was arranged in zones along a moisture gradient (Harris 1954). These zones from dry to wet were: 1) no vegetation on high, dry, shifting sand dunes; 2) *Psoralea* sp. on the windward faces of lower shifting dunes with sand dock and willows on the leeward faces; 3) rabbitbrush, sagebrush, spiny hopsage, cheatgrass, Indian ricegrass and alkali cordgrass on semi-stable sand dunes 3)

saltgrass-Nevada clubrush meadows; 4) Baltic rush-sedge meadows; 5) bulrush-cattail; and 6) submerged aquatic plants. Permanent and temporary potholes (800-1,000), flooded flats, creeks fed by spring fed potholes, and extensive areas of marshlands covered the area (Harris 1954). Overgrazing in the early part of the century resulted in the destruction of native plant cover and the formation of a broad area of active sand dunes (Zook 1978). Fire also likely impacted the native shrub-steppe habitat. Due to the arid climate and sandy soils, recovery of native vegetative communities is slow. Additionally, Franklin and Dyrness (1973) indicate that the uplands here are fragile and susceptible to invader plant establishment on disturbed sites. The competition by these invaders, many of which are non-native, further hampers recovery of native communities.

The habitat within the study area was heavily influenced by the creation of Potholes Reservoir behind O'Sullivan Dam, which was built about 50 years ago. The shallow water table behind the reservoir created many wetlands within an arid landscape dominated by shifting sand dunes, while also destroying most of the existing wetlands by submerging them under the reservoir.

Various recreational activities associated with the development of Potholes Reservoir and opening up associated lands to public use, has impacted habitats. Fishing, hunting, off-road vehicle (ORV) use, boating, camping, and wildlife observation appear to be popular activities within the study area. By 1980, recommendations to limit boats and fishing in some areas were being made by Washington Department of Game (WDG) biologists (Friesz 1980, Zook 1980), in order to protect nesting birds and wintering waterfowl. WDFW (1997) found that ORV use within the study area was increasing and had caused significant detrimental impacts to wildlife within the study area. ORV use is allowed in the northeast portion of the study area and is managed within zones. ORV use is allowed year-round in the Green Zone (about 700 acres), is restricted to the period July 1 to October 1 in the Yellow Zone (about 1,500 acres), and is closed year-round in the Red Zone. While the majority of the ORV use occurred within the Green and Yellow zones, they also noted impacts from ORV use in the Red Zone. The impacts from ORV use to habitats was evident when looking at percent cover of bare ground which was progressively more when going from the control site with 23 % bare ground, to the Red Zone with 31 %, to the Yellow Zone with 41 % and finally to the Green Zone which had 64 %. The percent cover of cryptogams on the soil surface was also linear with 11 % at the Green Zone up to 55 % at the control site. Cryptogams are layers of algae and lichen that form a crust on undisturbed ground. The removal of vegetation and cryptogams, as has occurred with ORV use, causes increased soil temperatures, alters the natural dune profile and allows weeds to invade and spread (WDFW 1997).

Aside from ORV use, other dispersed recreational activities have impacted habitat as well. For example, "informal" roads leading to popular fishing spots, undeveloped boat launching areas, camping sites, etc., have removed a certain amount of habitat. Their disturbance has also allowed various weeds to proliferate along the edges of the roads and into adjacent habitats. Camping and parking areas have caused similar losses. Habitat has been impacted to some degree by trash which is sometimes left at dispersed sites. Activities at dispersed sites increase the risk of fires, which could burn large areas of native habitat.

Shrub-steppe - Much of the surrounding area has been converted to irrigated agriculture, with development and expansion of local communities also changing and eliminating historic habitat. The remaining shrub-steppe habitat has been grazed, heavily at times, which has reduced the quality for various wildlife species. The original overstory in the uplands was dominated by big sagebrush, but has been largely replaced by green and gray rabbitbrush. Grasses are now mainly cheatgrass, needle and thread, Indian ricegrass, and some wheatgrasses. Big sagebrush and bunchgrasses are now generally found in isolated pockets, with larger areas present in the North Potholes Reserve.

Unfortunately, shrub-steppe habitat throughout the Columbia Basin has suffered significant degradation from conversion to agriculture, overgrazing and other factors (Dobler et al. 1996). This has helped reduce distributions and populations of several wildlife species, causing many to receive special designations from WDFW and the Service because of their rarity. In addition, the GAP analysis of Washington State (Cassidy et al. 1997) found that the largest gap in the protection of biodiversity in Washington is in the shrub-steppe zone.

Grasslands - The grasslands in the study area occur as relatively small pockets scattered throughout the study area. They are comprised primarily of cheat grass, native bunchgrasses, and a variety of other forbs. These grasslands are most likely the result of past fires or other disturbances which occurred in shrub-steppe habitats.

Wetlands - Many of the wetlands in the study area are lined by willow, cattail, and bulrush and are vegetated with various annuals as water levels recede throughout the year. Most wetlands now lack submerged aquatic vegetation due to carp. Carp destroy rooted aquatic vegetation and cause turbidity by roiling the water (USFWS 1980). Emergent vegetation at some wetlands is limited due to the extreme water fluctuation in the reservoir (Zook 1978). Wetlands within the Green Zone are sparse because this zone is higher and set back further from the reservoir than the Yellow and Red zones. The Yellow Zone has many wetlands and is more densely vegetated than the Green Zone. Most wetland

perimeters are vegetated, although some lack vegetation due to extensive ORV use. Wetlands in the Red Zone often support stands of willow and dense perimeters of bulrush and cattails.

Riparian areas - Riparian areas are estimated to provide less than one percent of the land base in the Pacific Northwest yet support the greatest diversity and abundance of wildlife that exist in the arid portions of the region (USFWS 1990). WDFW (1995) states that about 90 percent of Washington's land-based vertebrate species use riparian habitat for essential life activities. They point out that the high wildlife value of these areas is derived from the structural complexity of vegetation, connectivity with other ecosystems, high edge-to-area ratio, abundant food, water and a moist and mild microclimate. Unfortunately, quality riparian habitat has become relatively rare in the Columbia Basin due to arid conditions and land use activities such as grazing, conversion to cropland, and the inundation of lands by reservoirs. Since the inundation by Potholes Reservoir, willow and black cottonwood areas have developed along the margin of the reservoir, on some islands, and in some of the many wetlands which developed after it was constructed and the Columbia Basin Irrigation Project began. Riparian shrub communities are more common than riparian forest, which occur mainly in North Potholes Reserve. Russian olive is also a component of the overstory in some of the riparian areas and is increasing. While it does provide cover for some species, its propensity to take over native habitats, which it has done in some areas of the study area, is not desirable for most wildlife species. Native willow communities are preferred over Russian olive for several reasons (Brown 1990, USFWS 1997).

Islands - There are numerous islands in Potholes Reservoir and their numbers fluctuate depending on the reservoir water level. Because of the fluctuating water levels, the majority of these sand islands are mostly bare of vegetation. Aside from providing habitat for some wildlife species, they are also used for recreational activities; including, fishing, hunting, camping, and picnicking.

Noxious weeds - Noxious weeds are a common problem in the study area and generally invade and occupy sites that have been previously disturbed by fire, livestock grazing, ORV use, and/or dispersed camping. In Washington, a weed is any plant species that is not native to the state. Weeds typically interfere with the maintenance of healthy and diverse ecosystems. Consequently, weed control is an integral part of resource management as non-natives can displace native plant species and are often of lower forage value to wildlife and difficult to extirpate once established. Other wildlife requisites, such as cover and nesting habitat, are also affected by the replacement of native plants by weedy species.

Cheatgrass, one of the most common weeds found in the study area, has invaded many areas where native perennials have been overused and/or eliminated. There is little evidence that cheatgrass will relinquish a site once occupied due to its highly competitive ability. Other common noxious weeds include knapweeds (*Centaurea* sp.), Canada thistle (*Cirsium arvense*), kochia (*Kochia scoparia)*, Russian thistle (*Salsola kali*), and purple loosestrife (*Lythrum salicaria*). The proliferation of these undesirable plants is managed through the implementation of an integrated weed management program between Reclamation, the State of Washington, and the Noxious Weed Control Board of Grant County.

Description of the Project

Information on Reclamation's proposed RMP alternatives was obtained from a January, 2000 draft copy of the Alternatives chapter of the RMP draft Environmental Impact Statement. Currently, Reclamation has three alternatives to address the goals and objectives agreed to for a Potholes Reservoir RMP. These include the Preservation/Enhancement Alternative (Alt. A), the Recreational Development Alternative (Alt. B) and the Conservation Alternative (Alt. C). In addition, the "No-action" Alternative includes the actions and developments likely to occur in the absence of adopting and implementing a RMP for Potholes Reservoir. Many of these actions are either required to meet existing Reclamation or federal law, policy, or regulations; state or local regulations; or are authorized by existing management plans or state policies in effect at Potholes Reservoir. These actions are common to all of the alternatives. A sampling of some of these actions include:

- no motorized land vehicle access to North Potholes Reserve
- use sign and other education tools and other methods to control spread of weeds
- continue to maintain a baseline for reservoir water quality data
- work with user groups to encourage cleanup activities
- coordinate ORV management strategy with WDFW to provide a mechanism to minimize damage to wildlife and habitat
- investigate fee-for-use as a potential source of funds for maintenance and improvement of recreational facilities, for waste disposal services, and/or to pay for management and enforcement activities
- develop agreements with mosquito control agencies to define allowable activities on federal lands

In addition, there were numerous management actions proposed that were common to each of the RMP action alternatives (A, B, and C), some of which include:

- various soil conservation and erosion control measures
- based on study results, develop and implement effective fisheries management strategies, such as: preventing inadvertent introductions to Columbia National Wildlife Refuge and Crab Creek; protecting and adding desirable habitat features; promoting underutilized fisheries; maintain certain areas as carp-free waters; developing management approaches, if necessary to control bird predation on Potholes Reservoir fisheries
- protect and enhance bald eagle wintering habitat
- based on study results, develop and implement effective management strategies to perpetuate wildlife diversity, such as: establishing rules to control disturbance factors to protect sensitive habitats and vulnerable wildlife populations; protecting and enhancing desirable habitat features; promote and maintain large populations of key species (e.g. waterfowl, beaver, colonial nesting birds); develop interpretive trails and sites to expand watchable wildlife opportunities
- revegetate closed roads, trails and other disturbed areas with native vegetation
- develop sampling programs to determine any problems with water quality, sediment quality or contaminants in fish
- monitor impacts at dispersed recreational use areas and modify management if needed
- establish a near-shore no-wake zone in appropriate areas of the Reservoir
- locate and describe cultural resource sites in a Cultural Resources Management Plan
- develop agreements with appropriate parties to provide protection and suppression services for wildfires

Preservation/Enhancement Alternative (Alt. A) - This alternative seeks to protect and enhance natural resources while allowing uses that do not have a significant effect on the natural resources. The number of developed recreation areas and facilities would remain essentially unchanged. More of the secondary road network would be closed to motorized travel which means fewer dispersed recreation areas would remain accessible by motor vehicle compared to the other alternatives. Dispersed, unregulated camping on most of the RMP lands would be prohibited. Land use activities would be focused and managed within environmentally suitable areas to reduce resource impacts and disturbances. ORV management within the study area would be discontinued by permanently closing the Yellow Zone and the portion of the Green Zone, located on Reclamation property. The Grant County ORV Park would encompass nearly 1,300 acres outside of the study area. Wildlife habitats in the Green and Yellow zones would be restored. Mosquito control spraying would be eliminated with this alternative.

Recreational Development Alternative (Alt. B) - This alternative seeks to emphasize the development of the recreational potential of Potholes Reservoir while minimizing the impact on natural resources. It includes the highest number of developed and primitive recreation facilities and sites. ORV opportunities would be expanded by allowing ORV riding along several designated trails leading to the western shore of Moses Lake. Also, a major portion of the currently closed Red Zone would become open seasonally to ORV use. Similar to the other action alternatives, land use activities would be focused and managed within environmentally suitable areas to reduce resource impacts and disturbances. A vegetation management plan would be developed which preserves some areas of undisturbed areas will allowing further development of recreation. While grazing would be strictly used for management of annual grasses with Alt. A and Alt. C, with Alt. B, the grazing program would be increased as a means of generating income. This alternative includes expansion of the existing State Park or development of a new one at the O'Sullivan site.

Conservation Alternative (Alt. C) - This alternative is Reclamation's preferred alternative. It seeks to balance the management agencies' and public's long-term vision for Potholes Reservoir recognizing the need to protect the natural and cultural environment while supporting the overall recreational interests of visitors. By combining elements and features from Alt. A and Alt. B, Reclamation believes Alt. C best satisfies the RMP goals and objectives.

A mix of developed recreation areas and "designated" dispersed camping areas would be provided to accommodate the demand for recreation facilities and sites, and to direct use to specific areas environmentally suited for public use. ORV use restrictions are proposed to improve wildlife habitat, wildlife populations, sand dune integrity, and vegetative cover. This would be accomplished by permanently closing the Yellow Zone and continuing to close the Red Zone to ORV use. This alternative includes expansion of the existing State Park or development of a new one at the O'Sullivan site. Mosquito control spraying would be restricted to the State Park. Additional protection to wildlife and their habitats would occur through restoration of habitats in the Yellow Zone; seasonal restrictions on watercraft operation at West Arm, Sand Islands, and East Lind Coulee Arm; increasing the red zone to include additional riparian/wetland areas; developing a vegetation management plan which preserves some areas of undisturbed areas while allowing continuing recreational use; and, mitigation of unregulated random camping at Sand Islands.

Fish and Wildlife Resources without the Project

Waterfowl - Potholes Reservoir is an important waterfowl hunting area within Washington as there are large numbers of Canada geese and mallards present in the fall and winter. The North Potholes

Reserve is an important molting area for waterfowl. Also, there is good quality nesting habitat for several duck species within the study area. Unfortunately, the presence of carp within many of the wetlands has limited waterfowl production, as well as constrained successful reproduction by various other marsh and water birds. Aside from destroying rooted aquatic vegetation and causing turbidity by roiling the water, they eat aquatic insects (USFWS 1980). Up to an eight-fold increase in waterfowl use and production was predicted by the Service with the elimination of carp. As early as 1964, WDG tried to control carp by constructing the Job Corps Dike to isolate the northern end of the reservoir, which was carp free, from the rest of the reservoir. By 1980, carp made-up 90% of the fish standing crop. WDG proposed isolating ponds from the reservoir with earthen dikes and then killing carp with rotenone (WDG 1980). Neither of these projects was successful in eliminating or even limiting carp.

Neotropical Migratory Birds - Neotropical migratory birds (NTMB) are species which breed in the United States and Canada and then migrate south to Mexico, Central or South America or the Caribbean to spend the winter. They do not include waterfowl, shorebirds, or herons and egrets, even though some species in these groups also winter south of the Mexico-United States border. There is widespread concern about the future of NTMB (Andelman and Stock 1994), since many of these species have experienced large population declines due to habitat destruction on the breeding grounds, wintering areas and along migration routes.

There were fifty-five birds listed as NTMB species which were observed during the Service's study, or otherwise documented within the study area. These include such species as flycatchers, warblers, vireos, buntings, various sparrows, blackbirds, and some raptors. In addition to riparian/wetland habitats, which is important for two-thirds of the NTMB within the study area, shrub-steppe habitat is also important to several species. Numbers of sage sparrows and sage thrashers have declined with the drastic reductions in required shrub-steppe habitat. The sage sparrow and sage thrasher are both State candidate species for listing as threatened or endangered and are both found within the study area where there is probable breeding evidence for both.

Colonial nesting birds - California gulls, ring-billed gulls, Forster's terns, and Caspian terns are colonial nesters which use some of the sand islands. Western and Clark's grebes are also colonial nesters which nest in emergent vegetation surrounding some of the islands and shoreline of the West Arm and the Crab Creek area. Great blue herons, black-crowned night-herons, great egrets, and double-crested cormorants nest in large numbers in riparian trees and shrubs in the North Potholes Reserve area. The American white pelican is another colonial nester which can be found in the study area. It uses Potholes Reservoir, particularly the West Arm area, during spring and fall migration. In addition,

non-breeders are sometimes found here during the summer months. The American white pelican is listed as an endangered species by WDFW.

Mammals - Mule deer are common on the study area, particularly in the North Potholes Reserve and the western boundary area. Large numbers are found in the winter in the good quality shrub-steppe just within and west of the study area. Beaver are found throughout the study area, with highest numbers in the northern portions. Other mammals in the study area include muskrat, mink, striped skunk, raccoon, coyote, badger, Nuttall's cottontail, black-tailed jackrabbit, long-tailed weasel, porcupine, Washington ground squirrel, and various small mammals.

Listed threatened and endangered species -

Bald eagle - Suitable habitat for bald eagles (*Haliaeetus leucocephalus*) includes those areas that are close to water and provide a substantial food base such as along rivers containing anadromous fish, good populations of resident fish, abundant waterfowl or mammal populations. Bald eagles are often found along the shores of reservoirs and rivers. Territory size and configuration are influenced by availability of perch trees, quality of foraging habitat and distance of nests from water supporting adequate food supplies.

Bald eagles usually nest in the same territories each year and often use the same nests repeatedly (Anthony and Isaacs 1989). Nest trees typically provide an unobstructed view of an associated water body and are often situated in prominent locations. Snags, and trees with exposed lateral limbs or those with dead tops often occur in nesting territories and are used as roosts, perch sites or access points to and from the nest.

Bald eagle winter habitat is mostly associated with areas of open, ice-free water where fish are available and/or waterfowl congregate (Stalmaster 1987). Additionally, eagles may be scattered throughout upland areas feeding on ungulate carrion, game birds, and rabbits (Swenson et al. 1981). The majority of the bald eagles wintering in central and eastern Washington are migrants (Fielder 1992). Some move relatively short distances to lower elevations or inland for food sources. Most eagles that breed in the Pacific Recovery Area winter in the vicinity of their nests. Within the study area, bald eagles are most common during the winter period of late October through March, depending on ice conditions. These birds commonly perch and roost in the North Potholes Reserve and on Peninsula South. There is no documented evidence of nesting in or near the study area. Because bald eagle numbers have improved significantly nationwide since it was listed, the Service proposed to de-list it and a final ruling will be made later this year.

Ute ladies'-tresses - This perennial orchid was listed as threatened in 1992. It was discovered in southeastern Idaho in 1996 along the upper Snake River and in 1997 in northern Washington. Ute ladies'-tresses (*Spiranthes diluvialis*) is typically found in wetland and riparian areas, including spring habitats, mesic to wet meadows, river meanders, and floodplains. There are no records for this species in the study area, although some appropriate habitat is present. There is a relatively narrow window for identifying this species when blooming (August to September). This species may be adversely affected by habitat modifications associated with livestock grazing, vegetation removal, excavation, construction activities, stream channelization, and other actions that alter hydrology or vegetative cover.

Candidate species -

Washington ground squirrel - Washington ground squirrels (*Spermophilus washingtoni*) are found in steppe and open shrub-steppe, where it prefers deep, loose soil for digging burrows. They primarily occur in arid, low elevation steppe grasslands that are relatively undisturbed. The largest concentrations of these ground squirrels are found in central Columbia Basin. It was documented still present within the southeast portion of the study area in 1999. Food items include a variety of forbs, grasses and some insects. Loss of habitat and isolation of colonies have been primary factors resulting in reduced populations. In addition, localized population reductions have occurred from shooting.

Other species of concern

Black tern - Black terns (*Chlidonias niger*) are small terns which eat primarily insects and can occur statewide, in or near wetlands and sloughs. They usually nest in small loose colonies in marshy wetlands in June. They construct flimsy nests of emergent vegetation that are often floating and are easily destroyed by wind or changing water levels. While they would most commonly be found moving through the area during migration, there are a few records of nesting black terns near the project area along the Frenchmen Hills and Winchester wasteways.

Columbia spotted frog - Columbia spotted frogs (*Rana pretiosa*) are medium-sized frogs and are found in or near perennial water bodies such as springs, ponds, warmwater marshes, overflow wetlands and bogs with non-woody wetland vegetation. They breed and lay eggs in warm, shallow margins of ponds, lakes, marshes or temporary pools. They are found in most of eastern Washington and have been observed in the project area. Some of the suspected reasons for their decline include wetland loss and degradation and the introduction of bullfrogs and nonnative fish species into spotted frog habitat.

Ferruginous hawk - This large hawk prefers open plains and brushy, open country and avoids forested areas. Ferruginous hawks (*Buteo regalis*) nest in trees along streams, bluffs, rock piles and artificial structures. They feed primarily on ground squirrels, rabbits and other small mammals. There is a confirmed nest site within three miles of the southern study area boundary.

Fringed myotis - Fringed myotis (*Myotis thysanodes*) is a bat which is associated with arid forest, desert, and arid grassland, especially near riparian areas. It roosts in caves, mines, rock crevices, and buildings.

Gray cryptantha - Gray cryptantha (*Cryptantha leucophaea*) is a regional endemic which has been found within the study area. It is a perennial member of the Borage family and has white flowers. It is basically restricted to sand dunes that have not completely stabilized and major threats include ORV use and increased weed invasions (WNHP and BLM 1999).

Loggerhead shrike - Loggerhead shrikes (*Lanius ludovicianus* are robin-sized birds which will feed on anything they can subdue. They often feed on insects, but will take small birds, mammals and reptiles. Preferred habitat includes shrub-steppe and any semi-open area with shrubs, fences, powerlines or small trees for perches. They nest in trees or shrubs having dense foliage and are very shrubby, bushy and/or thorny. They have been documented nesting in the study area.

Long-eared myotis - The long-eared myotis (*Myotis evotis*) is more of a forest dweller which roosts in trees, buildings, and rock crevices. It forages over and around trees, and near water courses in arid regions.

Northern leopard frog - The northern leopard frog (*Rana pipiens*) has been found within the study area. Aside from the Pend Oreille River drainage, and areas along Crab Creek north of Moses Lake, it is only found in and near the study area. Within the study area it has been found in wetlands along Crab Creek and within the North Potholes Reserve. This species was recently listed as endangered by WDFW. It is not yet known what impacts mosquito control activities in the area have on this species; however, there is the potential that non-target insect species, which may be prey for this frog, are also affected.

Northern sagebrush lizard - The northern sagebrush lizard (*Sceloporus graciousus graciousus*) is primarily a shrub-steppe dweller, but also uses bouldered regions and forested slopes. They are typically a ground lizard and rarely climb into shrubs. They prefer fine gravel soils, but also occur on

sandy or rocky soil. They require rock crevices, mammal holes or similar cover for refuge. There are records of them within the study area.

Olive-sided flycatcher - The olive-sided flycatcher (*Contopus borealis*) seems to prefer mixed and broken forests with wooded streams and some wetland. The diet consists entirely of flying insects which they search for from high snags and perches. They would most likely be found in the study area during migration, where they would be uncommon.

Pale Townsend's big-eared bat - The Pale Townsend's big-eared bat (*Plecotus townsendii pallescens*) occurs in a variety of habitats from grasslands to forested areas. . It roosts in trees, building, and caves. It is one of the few bats in Washington which forages more in upland areas than in over water or in riparian habitat (Johnson and Cassidy 1997).

Peregrine falcon - Preferred habitat of peregrine falcons (*Falco peregrinus*) is open country with rocky cliffs for nesting, nearby rivers and lakes, and a significant prey base. Nest sites are usually fairly small ledges on cliff faces. Cliffs and bluffs used for nesting average about 150 feet tall. Waterfowl usually make up the bulk of the prey, but peregrines take virtually all bird species of smaller size. Peregrines nesting in eastern Washington appear to winter near their nest sites or move to lower areas with a more abundant winter prey base. There are a few peregrines sited in the area each year and they are most likely migrants. Because of significant increases in peregrine numbers, they were removed from the threatened and endangered species list in August, 1999.

Potholes meadow vole - Little is know about the Potholes meadow vole (*Microtus pennsylvanicus kincaidi*) which has been found in and around Moses Lake and Potholes Reservoir as well as one other location in northeast Washington. Its' requirements are probably similar to other meadow vole subspecies. Meadow voles prefer moist meadows and other wetlands and areas along streams, ponds, and small lakes. Their diet is comprised of forbs and grasses.

Small-footed myotis - The small-footed myotis (*Myotis ciliolabrum*) occurs in open, arid areas and commonly forages around cliffs, rock outcrops, and dry canyons (Johnson and Cassidy 1997). It roosts in cavities in cliffs, vertical banks, the ground, talus slopes, and under rocks. There is one record of this species which is either in or within a few miles of the study area.

Western burrowing owl - The western burrowing owl (*Athene cunicularia hypugea*) is generally found in open, broken or flat areas, including shrub-steppe and agricultural areas. An opportunistic feeder, it preys primarily on insects and small mammals, but also birds, fishes and amphibians, when

available. They use ground squirrel or other mammal burrows for shelter and nesting. They commonly nest in small colonies and have been documented nesting in the project area. The primary reason for the decline of burrowing owls has been habitat loss due to burrowing mammal control activities. Heavy ground surface disturbances, such as grazing and ORV activity, which reduces burrow availability, may be a management problem for burrowing owls within the study area.

Western sage grouse - The western sage grouse (*Centrocercus urophasianus phaios*) is a large grouse that inhabits the shrub-steppe and meadow steppe regions of eastern Washington (Hays et al. 1998). Suitable sage grouse habitat is typically sagebrush/bunchgrass stands having medium to high canopy cover with a diverse understory. They use sagebrush year round for food and cover, with a high forb use in summer. The drastic reduction in numbers and distribution of sage grouse in Washington is attributed primarily to loss and degradation of habitat (Hays et al. 1998). They are now listed by WDFW as a threatened species. Although there are no known recent documented records of sage grouse within the study area, they were known to use the potholes area south of Moses Lake before the area was flooded by O'Sullivan Dam (Yocom 1952).

Yuma myotis - Yuma myotis (*Myotis yumanensis*) is a bat that occurs in forested areas, forest edge, and open areas such as arid grasslands. It is more closely associated with open water than any other Washington bat (Johnson and Cassidy 1997). It roosts in caves, trees, and buildings. There is one record of this species which is either within the study area or within a few miles of the boundary.

HEP results - To gather baseline information and to better understand potential impacts from various recreation activities within the study area, a Habitat Evaluation Procedures (HEP) analysis on Potholes Reservoir was conducted in 1999 (USFWS 2000). While Service biologists collected the data, ran the models, and interpreted the results, personnel with Reclamation and WDFW were instrumental members of the HEP team, especially in the important planning stages.

HEP is a species-based habitat analysis procedure. The procedure assesses the value of the habitat for certain selected species over the life of the project. The species evaluated are selected either to represent entire groups of species (for example, mallards may be used to represent dabbling ducks) or because of some special value they have in the area (for example, popular game birds). For this project, criteria for species selection included use of representative cover types, ecological importance, sensitivity to human and habitat disturbance, and availability of adequate HSI models.

Once species are selected, models which describe a range of habitat values for that species are written or existing ones are selected. The models are based on published research on a particular species, as

well as input from experts on the species. These models generally relate certain aspects of the habitat, such as percent ground cover or height of vegetation, to the value of the habitat for the species. The measurement of a variable which may be important to a particular species (for example, height of shrubs) is scored on a scale from 0.0 to 1.0, with 0.0 being of no value and 1.0 being of highest value. The score for that variable is termed a suitability index (SI). An equation is then used which relates the variables in some manner. For example, if the first variable (V1) is deemed two times as important as the second variable (V2) by the literature and experts, then the equation in the model may appear as $2(V_1) + V_2$. The results of these equations are as habitat suitability indices (HSI) and may change over time as the habitat changes.

One of the goals of the HEP analysis was to determine impacts from recreational use on wildlife/vegetative communities; however, those impacts may be partially masked by the condition of the land before recreational impacts began occurring (USFWS, 2000). For example, all areas were heavily grazed in the early part of the century, which resulted in the destruction of native plant cover and the formation of extensive areas of active dunes (Zook 1978). Fire also likely impacted the native shrub-steppe habitat. Due to the arid climate and sandy soils, recovery of native vegetative communities is slow. Additionally, Franklin and Dyrness (1973) indicate that the uplands here are fragile and susceptible to invader plant establishment on disturbed sites. The competition by these invaders, many of which are also non-native, further hampers recovery of native communities.

Comparing areas within the study area which receive regular and heavy ORV use (i.e., the Green Zone) with control sites and other areas within the study area (WDFW 1997, USFWS 2000), it is clear that ORV use negatively impacts wildlife and their habitats. Along with lower Habitat Suitability Indices (HSIs), these areas also have: a lower percentage of cover of vegetation and cryptogams; higher percentage of weeds (including designated noxious weeds) in the plant communities; and lower numbers and diversity of breeding birds.

The Service's HEP study did not show definitively that dispersed recreation (aside from ORV use) had reduced habitat quality for the evaluation species. At the Lind Coulee site, which receives considerable dispersed recreational use, lower habitat quality was noted for three species when compared with the adjacent control site; however, habitat quality was slightly lower at the control site for two other species. At the Job Corps Dike, which receives more moderate use, the habitat quality was the same when compared with an adjacent control area, except for the yellow warbler, which had slightly poorer quality habitat in the control area. While habitat was not found to have been significantly impacted by some dispersed recreation activities for the evaluation species we looked at, we still believe that impacts occur in other ways. For example, human activities could interrupt important wildlife

behaviors; delay nesting or cause nest abandonment with some birds; result in accidental or purposeful (illegal collecting or shooting) harm or death for some species; and increase risk of accidental fire, which could result in long-term devastation to an area in this arid environment. The importance of human disturbance to wildlife within the study area was highlighted by WDFW (1997), especially for breeding birds.

The Washington Department of Fish and Wildlife, in the summer of 1999, completed a HEP analysis on the Desert Habitat Management Unit (HMU). The Desert HMU is immediately west of and adjacent to Potholes Reservoir and encompasses the same upland and wetland cover types with the exception of the Potholes Reservoir itself and the interior islands there. The Desert HMU has not been open to ORV use and has not been grazed by livestock in over 30 years. A comparison of the two sites shows that the Desert HMU has less exotic vegetation, more overall shrub cover, and a greater percentage of that shrub cover which is sagebrush (WDFW 1999). Comparing the Desert HMU and Potholes Reservoir study areas indicates that it would likely take many years without disturbance for the habitat at Potholes (particularly, upland habitat) to recover, and it may require active restoration.

In the future, (i.e. with selection of the No-action Alternative) we would anticipate that recreational use at Potholes Reservoir would continue to increase. This would likely cause at least minor adverse impacts to wildlife and their habitats, depending on how the use is monitored and controlled. Dispersed recreation and indiscriminate motorized travel on the area would likely increase. Depending on the time of year and the habitat impacted, this could have significant adverse impacts to wildlife. For example, increased dispersed camping in and near riparian forest and riparian shrublands would further disturb nesting birds, including NTMB and use of the trees and shrubs as thermal cover for deer and other animals. Additional indiscriminate motorized travel would cause habitat loss as well as disturbance to wildlife. Increased dispersed recreation would further increase risks of accidental fire in the area and allow weeds to continue to proliferate, especially in shrub-steppe and grassland areas.

As discussed earlier, grazing impacts from livestock have occurred in the study area in the past. Impacts are primarily from over-grazing and trampling of vegetation and compaction of soils. Aside from direct loss of habitat, this has also facilitated proliferation of weeds. While a grazing management plan is in place, it does not appear to be allowing adequate restoration of native plant communities.

Impacts to wildlife and their habitats could occur in the future from various developments. For example, there is a proposal to expand the existing State Park recreation facilities or develop a new one on the east shore of the reservoir. The Service's HEP study showed that habitat quality at the new proposed site was lowest of any of the surveyed areas, which may indicate this is a suitable site to

minimize adverse impacts to many wildlife species. However, the impact of the placement of this facility in this location should also be examined to see if increased visitation and use would adversely impact adjacent areas. We did not evaluate the potential expansion area at the existing State Park; however, we are aware that some quality shrub-steppe habitat would be removed or otherwise adversely impacted. The Service should be contacted for additional consultation/coordination if plans for the State Park to expand or for a new one to be developed are brought forward.

We anticipate that some situations may improve in the future with the No-action Alternative, simply as a result of the process of RMP development. This process has highlighted some deficiencies that have existed for a number of years due to unfamiliarity with the problem or lack of funding or staffing to address it. For example, this process has revealed some agricultural encroachment on Reclamation lands, which when rectified, may result in wildlife habitat being restored. The recent identification of Washington ground squirrels on the study site near dispersed recreation sites should help shape future management of that area. Finally, through this process, important natural and cultural resources have been highlighted, their values discussed, and some limiting factors identified, which should help guide future management, regardless of whether or not an RMP is implemented.

Fish and Wildlife Resources with the Project

Within the three RMP alternatives, there are a wide variety of actions that are proposed. A few of these are unique to a particular alternative, but most are common to at least one other alternative. Also, there are several actions which are common to all the alternatives. This CAR initially evaluates some of the potential impacts, adverse and beneficial, from common actions within several categories and then describes some of the potential impacts from actions specific to a particular alternative(s).

Recreation - Establishment of a near-shore no-wake zone in certain areas would reduce wave disturbance to nesting western and Clark's grebes, waterfowl, and other water birds, as well as spawning fish. It would also help maintain and perhaps improve development of wetland vegetation along the reservoir shoreline.

Impacts at dispersed recreational sites would be monitored and use and management approaches will be modified if impacts become unacceptable. This should help minimize adverse impacts from increased recreation pressure in the future.

Motorized land vehicle access (outside ORV areas) would be restricted to designated roads and parking areas only. That restriction, along with planned signage, should minimize some of the adverse

impacts associated with these roads as discussed earlier (weeds, fire potential, disturbance to wildlife, etc.).

Fish and Wildlife Management - Bald eagle wintering habitat would be protected and enhanced in the North Potholes and Peninsula South management areas, which would benefit this threatened species.

The number of carp-free ponds would be increased at West Arm and Crab Creek Arm management areas. This would benefit northern leopard frogs, waterfowl reproduction, and several other marsh and waterbirds.

Additional fishery management strategies would be developed and implemented based on study results. These strategies all appeared reasonable, at least superficially. Since the potential strategies listed were not split out by alternative, we assume they may occur regardless of the alternative selected. Therefore, we did not evaluate their potential impacts since that would not aid in determining differences between the alternatives based on potential impacts.

Likewise, there were several potential wildlife management strategies listed which may be implemented in the future based on study results. Again, we did not evaluate them since they were not split out by alternative and an evaluation of them would not have helped determine differences between alternatives.

Vegetation - Roads, trails and other disturbed areas where access is not allowed would be revegetated with native vegetation. This would discourage illegal use of the areas, help restore native wildlife habitats, as well as slow the spread of weeds in the study area.

Water quality - The proposed water quality and sediment quality monitoring programs should help determine potential problems that could affect fish and wildlife resources in the future. The routine testing of fish flesh for certain contaminants would further help identify and address potential problems in the future.

Preservation Alternative (Alt. A) - We find that the actions associated with the Preservation Alternative would likely result in fewer adverse impacts and more benefits to fish and wildlife resources than the other alternatives. In many cases, the actions associated with it goes much further in protecting wildlife and associated habitat than the actions in the other alternatives. For example, where Alt. B allows non-motorized boats and floating devices year round in the North Potholes Reserve, and Alt. C allows them only from July 15 to October 1, Alt. A does not allow them at all. In several cases, the actions in Alt. A and Alt. C are the same or similar and are more protective of wildlife and habitat than Alt. B. For

example, Alt. B would result in increased grazing in the North Potholes Reserve to generate income, Alt. A and Alt. C would restrict it to use for management of annual grasses only. This more restrictive grazing management would facilitate restoration of native plant communities, rather than allowing increased impacts from over-grazing.

A management action with significant beneficial effects is the prohibition of all ORVs from Reclamation lands. Tied with this is restoration and revegetation of wildlife habitats for the green and yellow zones. This is an important component due to the degraded condition of these areas. This would allow for reduction in weeds, increase in coverage of cryptogams, and a decrease in percentage of bare ground. Also, improvements in habitat quality for many species of wildlife should be realized, since the HEP study showed most of the evaluation species there had lower HSIs than the control site, particularly for the Green Zone (USFWS 2000). Aside from the eventual restoration of over 2,000 acres of wildlife habitat, eliminating some major disturbance factors to existing wildlife would benefit those species immediately. Also, the rare plant, gray cryptantha, may be able to inhabit some of the restored areas in the future, perhaps helping keep it from being listed as threatened or endangered in the future.. Totally eliminating ORV use should also significantly reduce illegal use outside of the designated zones and roads. This may benefit nesting waterfowl, NTMB, and even northern leopard frogs, whose potential habitat can be degraded by illegal ORV use (R. Friesz, WDFW, wildlife biologist, personal communication). It would further reduce the potential for accidental fires.

In several management areas, dispersed and unregulated camping, and motorized vehicle access would be eliminated under Alt. A. This would further give an opportunity for native plant communities to become restored and benefit associated wildlife species depending on that habitat. It would also reduce disturbance factors for some wildlife species, and should reduce the risk of accidental fires.

In the West Arm, Crab Creek Arm (north of the power line) and East Lind Coulee Arm management areas, personal watercraft and power boats would be prohibited, rather than simply restricted to certain times or speeds as with Alt. B and Alt. C. While they all should improve conditions for spawning fish and nesting birds, such as grebes and waterfowl, Alt. A reduces the potential for disturbance factors outside of the primary nesting season. Additionally, it should be an action that is easier to enforce and potentially less confusing to the public.

Each of the three alternatives would result in development of vegetation management plans. Alt. A would preserve areas of undisturbed native vegetation, while Alt. C. would preserve areas of native vegetation, while allowing continuing recreational uses, and Alt. B. would allow for further development of recreation as well as preserve some undisturbed areas. While Alt. A and Alt. C may result in similar

acreages of preserved areas, by eliminating or reducing recreational use, Alt. A, does more in promoting long-term protection of the preserved area and reduction in disturbance to wildlife. This may serve to reverse, at least more locally, the declining trend of shrub-steppe habitat and associated species.

Mosquito control spraying would be prohibited on Reclamation lands which would eliminate any potential impacts to non-target insects. These insects may be important prey species for waterfowl, NTMB, northern leopard frog, and other fish and wildlife species.

Recreational Alternative (Alt. B) - This alternative expands the recreation potential and range of developed recreation opportunities at Potholes Reservoir. Of the three action alternatives and the No-action Alternative, it would result in the most adverse impacts to fish and wildlife resources. However, since public use would generally be discouraged or controlled in areas with environmental sensitivities or specific resource constraints, it does not ignore important resource issues. Furthermore, some of the actions proposed with this alternative would benefit fish and wildlife resources more than with No-action Alternative.

A source of significant impact from Alt. B. would be the opening of a major portion of the Red Zone to seasonal ORV use. Of the three ORV zones, the Red Zone receives the least disturbance and has the lowest amount of bare ground, highest percent cover of cryptogams, and lowest percent cover of weeds. As described earlier, ORV use within the study area has been shown to severely degrade native vegetation and adversely affect wildlife through disturbance. Increasing the area of legal ORV use, would likely increase illegal use on adjacent lands, as currently happens regularly.

Alt. B. includes the development of several new primitive campsites, to minimize dispersed, unregulated camping. This development could destroy existing habitats directly and lead to additional disturbance to wildlife at these new locations. As recreational demands continue to increase over time, current dispersed camping areas would be fully used, along with the new sites, with a net negative impact on habitat and wildlife. Adverse impacts to habitat and wildlife from dispersed camping would be at least partially offset by plans to develop management strategies to mitigate its' adverse environmental effects. Alt. B also includes expanding State Park managed lands with construction of additional camping areas and associated facilities near the existing State Park or at the O'Sullivan Site. As discussed earlier, HEP results at the O'Sullivan site revealed the lowest habitat quality of all sites evaluated, which indicates this site may be suitable for development. Unfortunately, we did not evaluate the habitat at the proposed expansion area near the current State Park and there is some apparently good quality

shrub-steppe habitat present there and in the vicinity that could be impacted. Development of either site would result in adverse impacts to habitat and associated wildlife species.

Increasing the grazing program to increase income, as proposed with Alt. B, could result in severe degradation of over 7,400 acres of Reclamation lands. As mentioned earlier, one of the major impacts to plan communities and habitat in the study area were from over-grazing nearly 100 years ago. While recovery of plant communities has occurred in some areas, it is very slow. Facilitating additional over-grazing through this alternative would cause long-term significant impacts to habitat and associated wildlife.

There are several actions under Alt. B which include developing new boat ramps or improving existing ones. This would likely result in more people using those areas, which would lead to further reduction in wildlife habitat from additional parking needed, and development of more dispersed camping sites. Again, disturbance from increased activities would further serve to adversely impact wildlife populations.

Unlike Alt. A and Alt. C, fisheries in the North Potholes management area would be managed using the same regulations as elsewhere on the reservoir. This eliminates the opportunity to provide additional protection to this sensitive area and would likely allow increased disturbance to wildlife present.

Finally, there are some seasonal no wake restrictions for certain management areas which would benefit nesting waterfowl, western and Clark's grebes, and various other marsh and waterbirds.

Conservation Alternative (Alt. C) - This alternative provides for future recreation development, controlled access and dispersed camping, a smaller area for ORV use, and the preservation and enhancement of natural and cultural resources. We find that this alternative would provide many more benefits to fish and wildlife and their habitats than adverse impacts. Also, while it would not result in as many benefits as implementing Alt. A, it has much more to offer for protection and enhancement of fish, wildlife and their habitats than either Alt. B or the No-action Alternative. In fact, where several of the proposed actions are very similar or the same between only Alt. A and Alt. C, there were fewer actions which were similar or the same between only Alt. B. and Alt. C.

As with Alt. A, a major benefit associated with Alt. C would be closing a significant amount of area to ORV use. With this alternative, the Yellow Zone would be permanently closed to ORV use. This would eliminate the major activity currently degrading vegetation communities in the Yellow Zone, which totals over 1,400 acres. Also, there would be active restoration/revegetation of wildlife habitats

under this alternative. This should allow for reduction of weeds, increase in coverage of cryptogams, and a decrease in percentage of bare ground. Improvements in habitat quality for many species of wildlife should also be realized as the HEP study showed that most of the evaluation species had lower HSIs here than within the control site (USFWS 2000). The disturbance factors related to ORV activities in this area, as shown by WDFW (1997), would be virtually eliminated. This would benefit nesting waterfowl, NTMB, and possibly the northern leopard frog. Furthermore, gray cryptantha may be able to inhabit some of the restored areas in the future.

With Alt. C, dispersed camping would be permanently or seasonally closed in the majority of the management areas. However, in most of the management areas, some of the currently used dispersed sites would be designated as open sites. Many of the dispersed sites to be closed would be those located in sensitive areas based on habitat or species presence. While this strategy would continue to allow camping and associated activities throughout much of the project lands, the net effect would be reduced impacts from that currently occurring. It further serves to limit growth in dispersed camping in the future as demand increases. Alt. C also includes expanding State Park managed lands with construction of additional camping areas and associated facilities near the existing State Park or at the O'Sullivan Site. As discussed above, HEP results at the O'Sullivan site revealed the lowest habitat quality of all sites evaluated, which indicates this site may be suitable for development. Unfortunately, we did not evaluate the habitat at the proposed expansion area near the current State Park and there apparently is some good quality shrub-steppe habitat present there and in the vicinity that could be impacted. Development of either site would result in adverse impacts to habitat and associated wildlife species

This alternative includes more restrictions on use of personal watercraft or motorized boats than either Alt. B or the No-action Alternative, although not as many as Alt. A. These restrictions should improve conditions for western and Clark's grebes, waterfowl, and other marsh and water birds, during the nesting season. Also, Alt. C does not include as many boat launch developments or improvements as are included with Alt. B. Developing and improving boat launches would likely result in more people using those areas, which would lead to further reduction in wildlife habitat from additional parking needed, and more dispersed recreational use in the vicinity. Again, disturbance from increased activities would further serve to adversely impact wildlife populations. Adverse impacts would be more than with Alt. A and less than with Alt. B.

As mentioned above, Alt. C includes a vegetation management plan and preservation of undisturbed native vegetation while allowing continued recreational uses. This preservation should help wildlife using that area along with adjacent habitats. Continued recreational uses would result in continuing

disturbance to some wildlife species as well as keep the risk of accidental fires higher. As with Alt. A, Alt. C maintains a strict grazing program for the management of annual grasses only. This management plan should facilitate restoration of native plant communities in areas currently grazed.

With Alt. C, mosquito control spraying would be limited to the State Park. This would limit the potential impacts to non-target insects on the majority of Reclamation lands. These insects may be important prey species for waterfowl, NTMB, northern leopard frog, and other fish and wildlife species.

Mitigation Recommendations

Mitigation for adverse impacts from implementing actions within the three alternatives could eliminate or significantly reduce adverse impacts, or otherwise compensate for the losses. Although more limited, even Alt. A could result in some potential adverse impacts which need to be mitigated.

- Mitigation actions for some adverse impacts could include restoration of native vegetation in various portions of the project area. For example, because of the slow recovery of plant communities from disturbance in this area, more active efforts may be needed in areas set aside for preservation. Restoration efforts under mitigation should be tied to monitoring and success criteria. That is, if initial restoration actions fall short of goals, additional actions would be necessary.

- Aside from simply revegetating closed roads, trails and other disturbed areas, efforts could be made to attempt to restore native plant "communities", which is much more difficult, especially in this area.

- More aggressive weed control plans, above and beyond simply noxious weed control measures, should benefit native plant communities.

- The development of new campgrounds, boat launches, interpretive trails, etc. should take place in areas which minimize adverse impacts to fish and wildlife. That may mean using existing developed and dispersed sites whenever possible, even if these areas are not the most aesthetically-pleasing sites.

- Provide funding for additional law enforcement in the study area would help ensure various rules and regulations designed to protect habitat and fish and wildlife resources are being followed.

Measures aimed at protecting and enhancing certain species could take place under this RMP as mitigation. Some of these measures could include:

- special signage, seasonal road closures, firearms or shooting restrictions, and some vegetation management are measures which may improve conditions for Washington ground squirrels near Lind Coulee
- bald eagles roosts and regular perch sites could be protected with access restrictions
- with ongoing research, management measures to protect and enhance northern leopard frog habitat may become known
- current locations of gray cryptantha could be identified and measures used to protect habitat components
- interpretive information could be developed to educate the public on the valuable and unique habitats and associated unique species present and measures being employed to protect them
- because reproductive success for a large number of western and Clark's grebes appears to be low at Potholes Reservoir, and is likely due in part to recreational activities, Reclamation should fund a study which addresses these two species' ecology and potential impacts of recreation on them at Potholes Reservoir

Additional Recommendations

- In several areas, there is reference to monitoring for response of habitat and fish and wildlife to certain management actions and strategies and that if warranted, making needed changes. It is important to ensure that monitoring protocols and schedules are clearly established, as well as standards for determining when management changes should be developed.

- Some of the actions proposed under the various alternatives, such as development of additional State Park lands and the construction of various developments, should receive additional review and evaluation from the Service in the future, pursuant to the Fish and Wildlife Coordination Act.

- The placement of Watchable Wildlife trails and sites needs to carefully consider the tradeoffs of getting people close to certain wildlife species to be able to appreciate them and degrading their habitat or otherwise disturbing them.

- The RMP should allow for adaptive management. As new information becomes available from other research, monitoring, etc., management strategies and policies should accommodate this. For example, seasonal closures are used for several actions for the three alternatives and these dates may need to be refined in the future as research continues or as monitoring shows that impacts are occurring outside of the restricted window.

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APPENDIX B
HISTORIC VEGETATION AND HEP STUDY

HEP STUDY

This Planning Aid Report (report) addresses the quality of some specific areas of wildlife habitat on lands owned by the Bureau of Reclamation (Reclamation) at Potholes Reservoir near Moses Lake, Washington. This report fulfills the requirements of fiscal years 1999 and 2000 scopes-of- work between the U.S. Fish and Wildlife Service (Service) and Reclamation. It has been prepared under the authority of the Fish and Wildlife Coordination Act (Act) (48 Stat. 401, as amended; 16 USC 661 et seq.). However, this report does not meet the requirements of Section 2(b) of the Act as a Coordination Act Report.

In the fall of 1998, Reclamation contracted with the Service to conduct a Habitat Evaluation Procedures (HEP) analysis on Potholes Reservoir. HEP is a species-based habitat analysis procedure. This report includes the results of that HEP analysis and will be used by Reclamation in completion of their Resource Management Plan (RMP) and Environmental Impact Analysis. The goals of the analysis were to: 1) acquire baseline data on current habitat conditions, 2) determine impacts from recreational use on wildlife/vegetative communities, 3) project habitat changes from the RMP alternative actions based on the Potholes HEP analysis, and 4) make management recommendations. This report will address the first and second goals. The third and fourth goals will be addressed in the Coordination Act Report that will be prepared by the Service based on this HEP report. The objective of the HEP was to quantify and describe current wildlife habitat conditions on Special Areas of Concern (SAC) and on adjacent control sites. SACs are those areas that are under consideration by Reclamation for management changes in the RMP alternatives and include:

Off Road Vehicle (ORV) areas:

green:	open to ORV use year-round
yellow:	open to ORV use from July 1 to October 1
red:	closed to ORV use year-round

Job Corps Dike
Proposed State Park site
Lind Coulee arm
Interior islands

STUDY AREA

Our study area included the land owned by Reclamation at the Potholes Reservoir near Moses Lake, Washington. The habitat within this area was heavily influenced by the creation of Potholes Reservoir behind O'Sullivan Dam, which was built about 50 years ago. The shallow water table behind the reservoir created many wetlands within an arid landscape dominated by shifting sand dunes, while also destroying most of the existing wetlands by submerging them under the reservoir. The study area is within Daubenmire's (1988) original *Artemesia-Agropyron* zone, which is the driest zone in the state (Franklin and Dyrness 1973).

Physical characteristics vary greatly among the SACs and control sites. The green ORV zone has many large sand dunes that are bare or sparsely vegetated with fragmented patches of upland vegetation in dune troughs, but contains few wetlands. Wetlands are sparse because the green zone is higher and set back further from the reservoir than the yellow and red zones. The yellow ORV zone has many wetlands and is more densely vegetated than the green zone. The yellow zone contains dunes that vary in size and amount of vegetative cover. Most wetland perimeters are vegetated, although some lack vegetation due to extensive ORV use. The yellow zone is bordered on the west by the Crab Creek channel of Potholes Reservoir. The red zone has smaller and more stable dunes. Throughout this area, vegetation is dense and cryptogams are present over the soil surface, and occasionally form a continuous layer. Wetlands in this area support stands of willow and dense perimeters of cattails. The red zone is supposed to be protected from use on the westside of Sand Dunes Road by a fence; however, it is broken and cut in many places. The eastside is unfenced and shows signs of unauthorized ORV use (WDFW 1997).

METHODS

As mentioned, HEP was the primary method used to evaluate and quantify habitat values for the Potholes Reservoir. The procedure assesses the value of the habitat for certain select species over the life of the project. The species evaluated are selected either to represent entire groups of species (for example, mallards may be used to represent dabbling ducks) or because of some special value they have in the area (for example, popular game birds). For this project, criteria for species selection included use of representative cover types, ecological importance, sensitivity to human and habitat disturbance and availability of adequate HSI models (Table 1).

Once species are selected, models which describe a range of habitat values for that species are written or existing ones are found. For this project, published models and those which had been used previously were selected. The models are based on published research on a particular species, as well as input from experts on the species. These models generally relate certain aspects of the habitat, such as percent ground cover or height of vegetation, to the value of the habitat for the species. The models used, the variables measured, and the model equations used can be found in Appendix A. The measurement of a variable which may be important to a particular species (for example, height of shrubs) is scored on a scale from 0.0 to 1.0, with 0.0 being of no value and 1.0 being of highest value. The score for that variable is termed a suitability index (SI). An equation is then used which relates the variables in some manner. For example, if the first variable (V1) is deemed two times as important as the second variable (V2) by the literature and experts, then the equation in the model may appear as $2(V_1) + V_2$. The results of these equations are as habitat suitability indices (HSI) and may change over time as the habitat changes. In most models, once the HSI scores are determined for each species, they are multiplied by the number of acres of habitat available to the species to derive a measure which takes into account both the habitat quality and quantity. This unit of measure is called a habitat unit (HU). As an example, five acres of habitat which has an HSI of 0.3 for a species would result in 1.5 HUs for that species. The HUs can then be calculated over time to account for changes in the number of acres of habitat available to a species or by changes in the quality of the available habitat over the life of the project.

Table 1

List of selected evaluation species with justification

Species	Reason For Selection
mule deer (Odocoileus hemionus)	Important big game species
western meadowlark (Sturnella neglecta)	Indicator species for grass/shrub-steppe
western sage grouse (Centrocercus urophasianus)	Indicator species for shrub-steppe
western grebe (Aechmophorus occidentalis)	Indicator species for island nesting birds
mallard (Anas platyrhynchos)	Indicator species for waterfowl habitat associated with backwater/ponded areas
mink (Mustela vison)	Indicator species for riparian forested/scrub-shrub and emergent wetlands
yellow warbler (Dendroica petechia)	Indicator species for scrub-shrub wetlands
beaver (Castor canadensis)	Indicator species for riparian forests

After evaluation species and appropriate models have been selected, the next task is normally cover-typing. This involves separating out the various classes of habitat, based on the species needs. In this case, vegetative cover classes were identified through the use of a GIS cover type map provided by the Dames and Moore consulting firm, as well as by viewing aerial photos. The study site contains a variety of cover type classes as shown in Table 2.

To quantify habitat conditions, transects were used to measure various vegetation characteristics. Vegetative data were collected in July and August of 1999. Although these dates were not ideal for assessing the condition of the habitat for nesting birds, since most nesting in the Potholes occurs much earlier in the spring, it was unavoidable due to Service staffing constraints.

Two biologists with the Service were the core sampling group. Occasionally others assisted with some sampling. A variety of methods were used to sample vegetation, from traditional methods that were recommended in the species' models (for example, Daubenmire grid, Robel pole, line intercept) to ocular estimates for unique situations (for example, when habitat occurred as very narrow strips). We intended to select transect starting points and azimuths randomly, but due to high interspersion of cover types, starting points and azimuths had to be arbitrarily placed to keep each transect within the same cover class. Occasionally, transect azimuths were changed part way through the transect to remain within the target cover class.

Cover types occurring in extremely low proportions were disregarded. For example, the green zone contained less than eight acres of grassland, therefore data was not collected in this cover type.

Table 2
Dominant cover types in the project area

Cover Type	Description
Shrubland	>15% to 25% shrub cover
Dense Shrubland	>25% to 35% shrub cover
Very Dense Shrubland	>35% shrub cover
Riparian Scrub Shrub	hydrophytic shrubs in riparian zone (including Russian olive), a single polygon includes both sides of stream
Riparian Shrub	hydrophytic shrubs in riparian zone (excluding Russian olive), a single polygon includes both sides of stream
Riparian Scrub Forest	>40% canopy cover trees (including Russian olive) in riparian zone, a single polygon includes both sides of stream
Riparian Forest	>40% canopy cover trees (excluding Russian olive) in riparian zone a single polygon includes both sides of stream
Emergent Wetland	dominated by wetland species (cattail, bulrush, spikerush, etc.)
Surface Water	pond, lake, reservoir, wide river (water-body devoid of emergents)
Exposed	sand, ash, mud flat (soil substrate devoid of vegetation)
Island	permanent substrate separated by >20 feet from shore
Urban	residential or industrial

Upland Habitat:

Large homogeneous habitat areas were chosen using GIS cover maps, as well as aerial photos. In most cases, two transects within each cover type were used that totaled 1000 feet each. This is generally considered adequate for a HEP analysis.

A Daubenmire grid (1 x ½ m) was used to assess horizontal cover at 25 foot increments, while a Robel pole was used to measure vertical cover at 50 foot increments along the transect. Four measurements were taken with the Robel pole (one in each direction) at each interval and then averaged and recorded in decimeters. The line intercept method was used to measure shrub cover along the entire transect. Shrub intercept and height were recorded by species using a tape measure and recorded in inches. When transects crossed small inclusions of another cover class (<50 feet), no data were collected.

Because of an oversight, data on the distance to perch sites for the western meadowlark model was not collected in the field. To accommodate for this, the SI for that factor in the model was set at 1.0 for all transects. Although this may give the appearance that meadowlark habitat is in better condition than it likely is, it maintains the ability to compare the other factors in the model among the various SACs and control sites.

Wetland And Riparian Habitat:

In the ORV zones, and their controls, 600' transects were run perpendicular to the waters edge and into the uplands. Because the Potholes Reservoir water level undergoes extreme annual fluctuations "water's edge" was defined as two feet below high pool elevation. That is because that pool elevation is the average on May 31, when most mallard broods have hatched.

Two data collection methods were used to assess wetland and riparian habitat quality. Line intercept was used to assess shrub cover and quality, while the Daubenmire grid was used every 25 feet to record herbaceous cover. Herbaceous cover within the wetland and riparian areas included shrub cover, because of the wetland evaluation species' models. This is contrary to upland cover in which herbaceous cover was comprised of only grasses and forbs.

At least one transect was completed within each cover class per SAC and control site. Since many wetland and riparian transects had less than 50 feet within the cover type, an additional ocular HEP was used to characterize the entire wetland basin being sampled. The ocular measurements helped quantify

the entire wetland, while the traditional methods measured specific points. With fringes of narrow wetlands, inaccurate estimates are more prone to surface using the traditional methods. For most cases with wetlands, the ocular estimated were used since the number of traditional measurements were very low.

The Proposed State Park area does not contain enough wetland or riparian habitat to support mallard or mink populations, therefore only upland transects were run there. The riparian data collection for the Lind Coulee site was ocular along with its control, which was about one mile to the east. Again this was done to minimize sampling errors at these narrow cover types.

The Job Corps Dike and its control area were handled differently from all other sites because of the presence of a riparian forest. To assess this habitat, the beaver model was used and the data collection was ocular. The ocular measurements helped to minimize sampling error due to the sporadic nature of the riparian forest.

Islands:

The western grebe model was selected to assess the island habitat in the Potholes Reservoir; however, no field data were collected on the islands. Motor boat activity during the nesting season would result in an HSI value of zero for this species. Therefore, since there is extensive motorboat activity in and around sheltered bays and emergent wetlands of Potholes Reservoir, there was no need to collect additional data.

Controls:

Control sites were selected for all SACs to assess what their potential HSI would be in the absence of ORV use. Controls were chosen in areas that were located in close proximity to the respective SAC and that also contained similar topography, cover types, and soils. Control areas were not pristine; they have likely been burned and grazed in the past but have not been open to ORV use.

RESULTS

SI values for each model variable for each species is listed in Appendix B. The variable numbers (for example, V_1), correspond with the variable numbers in the evaluation species' models. In some cases, there is a break in the numbering sequence since we did not use all of the variables included in the models. For example, some of the models have variables that are only used if certain habitats or conditions are present. HSIs calculated from the SIs are presented in Table 3. They were first calculated for each transect and then combined with all transects in the same SAC or control site to get the average HSI for that area.

Table 3
HSI values for all SACs and control sites in the Potholes Reservoir study area

Upland Species	**UG**	**UY**	**UR**	**UORVC**	**ULC**	**ULCC**	**USP**	**Islands**
Sage grouse (breeding)	0	0	0	0	0	0	0	
Sage grouse (wintering)	0	0	0	0	0.4	0.5	0.5	
Sage grouse (overall)	0	0	0	0	0	0	0	
Mule deer	0	0	0	0.1	0	0.2	0	
Western meadowlark	0.6	0.6	0.8	0.6	0.8	0.6	0.4	
Western grebe								0
Wetland Species	**WG**	**WY**	**WR**	**WORVC**	**WLC**	**WLCC**	**JCD**	**JCDC**
Mallard (wintering)	0.9	0.9	0.9	0.9	0.9	0.9		
Mallard (nesting)	0.1	0.3	0.4	0.6	0.8	0.7		
Mallard (brooding)	0	0.1	0	0.1	0.1	0.1		
Mallard (overall)	0	0.1	0	0.1	0.1	0.1		
Yellow warbler	0.6	0.6	0.7	1.0			0.9	0.8
Beaver (winter food)	0.3	0.3	0.4	0.3			0.7	0.7
Beaver (water)	0	0.5	0.2	0.2			0.2	0.2
Beaver (overall)	0	0.3	0.2	0.2			0.2	0.2
Mink (water)	0	1.0	0.6	0.6	1.0	1.0		
Mink (cover)	0.7	0.6	0.7	0.9	0.5	0.7		
Mink (overall)	0	0.6	0.6	0.6	0.5	0.7		

UG-upland green ORV UY-upland yellow ORV UR-upland red ORV UORVC-upland ORV control ULC-upland Lind Coulee ULCC-upland Lind Coulee Control USP-upland state park WG-wetland green ORV WY-wetland yellow ORV WR-wetland red ORV WORVC-wetland ORV control WLC-wetland Lind Coulee WLCC-wetland Lind Coulee control JCD-Job Corps Dike JCDC-Job Corps Dike Control

The blanks in Table 3 indicate that species was not modeled for that particular area because of a lack of suitable cover types. As noted in Table 3, there were several HSIs which were zero, indicating suitable habitat was not present in those SACs or control sites for that species, according to the model. Sage grouse HSIs equaled zero in nearly every area. Mule deer HSIs were zero in all areas except the ORV control and Lind Coulee control sites. Most of the meadowlark HSIs were fairly high. While the mallard wintering HSI was high for all areas, the overall HSI was either zero or very low since it is determined by looking at the lowest of the three HSIs (wintering, nesting and brooding). The only HSI of 1.0, indicating optimal habitat conditions, was for yellow warbler at the ORV control site. All of the sites had high yellow warbler HSIs except for the green and yellow zones.

Because of the timing of the data collection, the forb component was likely under-represented in the Daubenmire plots. Since the goal of the HEP is to compare the current condition of the SACs to control areas and the impact of the late season data collection would be the same across all areas, it should not unduly influence the conclusions reached in this study.

DISCUSSION

One of the goals of the HEP analysis was to determine impacts from recreational use on wildlife/vegetative communities. From our field observations and preparation of this report, we believe that such impacts may be partially masked by the condition of the land before recreational impacts began occurring. For example, all areas were heavily grazed in the early part of the century, which resulted in the destruction of native plant cover and the formation of extensive areas of active dunes (Zook 1978). Fire also likely impacted the native shrub-steppe habitat. Due to the arid climate and sandy soils, recovery of native vegetative communities is slow. Additionally, Franklin and Dyrness (1973) indicate that the uplands here are fragile and susceptible to invader plant establishment on disturbed sites. The competition by these invaders, many of which are also non-native, further hampers recovery of native communities.

The Washington Department of Fish and Wildlife, in the summer of 1999, completed a HEP analysis on the Desert Habitat Management Unit (HMU). The Desert HMU is immediately west of and adjacent to Potholes Reservoir and encompasses the same upland and wetland cover types with the exception of the Potholes Reservoir itself and the interior islands there. The Desert HMU has not been open to ORV use and has not been grazed by livestock in over 30 years. A comparison of the two sites (Table 4) shows that the Desert HMU has less exotic vegetation, more overall shrub cover, and a greater percentage of that shrub cover which is sagebrush. Rabbitbrush, much more common in the

Potholes Reservoir study area, increases with disturbance while sagebrush is very slow to recover from disturbance. Sagebrush was an important component of native shrub-steppe habitat in the area (Daubenmire 1988) and is a preferred forage species for mule deer and a required winter forage species of sage grouse. However, it was much less common at the Potholes Reservoir study area than at the Desert HMU. Comparing the Desert HMU and Potholes Reservoir study areas, indicates that it would likely take many years without disturbance for the habitat at Potholes (particularly, upland habitat) to recover, and it may require active restoration.

Table 4
Canopy cover at the Desert HMU and Potholes Reservoir study areas

% total cover that is:	**Desert HMU**	**Potholes Reservoir**
Exotics	22%	66%
Native shrubs	25%	13%
% native shrub cover that is:		
Rabbitbrush	44%	61%
Sagebrush	44%	23%
Bitterbrush	2%	15%
Total # native shrub species*	9	3

*only species with at least 1% canopy cover were counted

However, with wetland communities, restoration of impacted areas can be quicker. This is due to the artificial water sources provided by the creation of Potholes Reservoir and the Columbia Basin Irrigation Project. This difference between wetland and upland habitats can also be seen by comparing HSIs of wetland and upland species. Overall, HSIs are much higher for wetland species than upland ones. This is not to say that recreational impacts have not occurred to wetlands. Wetland communities have been impacted by roads (primarily by informal ones) and through ORV use. Also, several wetlands in the green ORV zone have been virtually denuded of vegetation by recreational activities.

As already mentioned, several of the HSI's ended up being zero. It should be noted that an HSI of zero does not necessarily mean that the species would never be present. It could be that adequate habitat is present adjacent to a project area and the species is able to exist in low numbers within the project area, as long as it has access to the adjacent habitat. Also, it could be that for the particular

area, the model should be adjusted to account for local conditions. Finally, while the species may be present in some capacity, using habitat which has an HSI of zero could result in low or no reproduction.

Overall and breeding sage grouse HSIs were zero for all sites on the study area. The nesting HSIs were also zero for all but the Lind Coulee sites and the State Park site. This is primarily due to very little sagebrush cover on the SACs and control sites. The sites were also low quality habitat for sage grouse due to a high percentage of herbaceous cover and a high percentage of the cover being exotic vegetation. While it was understood that there were no sage grouse on the study area before the model was selected, it was assumed the model would still be a good representative for several other shrub-steppe species. However, the relatively high threshold of sagebrush cover needed was problematic for this study area using this model.

Additionally, the mule deer HSIs were zero in all but two sites, although they are present in the study area. The low habitat quality present appears to be a reflection of low canopy cover of preferred winter forage species (such as sagebrush, bitterbrush, and rose) and lack of taller shrubs for cover. The two sites which had higher than zero HSIs, were ORV control and Lind Coulee control. This may indicate that recreational activities likely impact mule deer habitat, or at least prevent it from recovering.

The meadowlark HSIs were all fairly high, which could partially be due to having to assign a SI score of 1.0 to V_4 (distance to perch) for each site due to the previously mentioned oversight in data collection.

The wintering HSI for mallard was rated as very high, which can be evidenced by the heavy hunting pressure for waterfowl present at Potholes Reservoir into December. However, nesting and brooding HSIs habitat quality was generally very poor, especially in the green and red ORV zones. The main limiting factor to mallard nesting appears to be human disturbance. The yellow ORV zone had slightly higher HSIs than the green or red zones, probably due to the influence of more water and faster recovery from impacts. Nesting HSIs were higher at the control sites than the ORV zones because of better nesting cover. This helps show that ORV and other recreational activities have probably either reduced the quality of mallard nesting cover or at least prevented it from improving over time. The low HSIs for brood rearing were mostly due to the presence of carp which impact water quality and decrease habitat quality for aquatic invertebrates.

Yellow warbler HSIs were fairly good to optimal throughout the study area. This is due in part to their preference for wetland shrubs, such as willows, which can grow fairly quickly, as long as germination and moisture conditions are adequate. The ORV zones had slightly lower yellow warbler HSIs than

other sites, possibly due to impacts from ORV use and other recreational activities. In addition, the lower HSI in the green ORV zone may also be due to most wetlands there not having hydrology as long during any given year, compared with red and yellow zones. While the yellow warbler HSI for the green zone was 0.6, it must be noted that wetland shrub habitat was uncommon here, due in part to frequent disturbance from ORVs and other recreational activities. It should be noted that recreational activities at the Job Corps Dike do not appear to have impacted yellow warbler habitat, as it was slightly higher there than at the adjacent control site, and was higher than the three ORV zones.

As could be expected, beaver winter food HSIs were highest in the areas with the riparian forest. However, they do use areas without larger trees, and in fact the yellow ORV zone had a slightly higher HSI than the other sites, though it has few trees. The green zone had an overall HSI of 0.0 which was the result of water not being present long enough throughout the year. It appears that recreational activities at the Job Corps Dike have not adversely impacted beaver habitat as the individual and overall HSIs were the same here as at the control site.

Mink habitat is generally good across the sites sampled, but would be improved by higher shrub canopy cover in the wetlands. The exception is the green zone which had an overall HSI for mink of 0.0. Again, this was due to water not being present here enough through the year. Mink habitat was lower quality at the Lind Coulee site than the adjacent control site. Lower values here for mink, as well as for sage grouse wintering and mule deer habitat, may indicate that recreational activities such as dispersed camping have reduced habitat quality or prevented its' recovery. However, this speculation is confounded by the fact that HSIs for western meadowlark and mallard nesting were slightly higher here than at the control site.

The HSI for western grebes for the islands was zero, while western grebes are definitely present at Potholes Reservoir. Motorboat and personal water-craft activity in and around sheltered bays and emergent wetlands during the April to July nesting season caused the HSI to be zero. This could help answer why western grebe reproduction appears to be poor at Potholes Reservoir. Based on the HEP model used, grebe nesting is also limited due to the extreme water level fluctuations within the reservoir during the nesting season.

The habitat quality at the State Park site indicates it was in poorer condition than the other sites measured, except regarding sage grouse wintering habitat. Placement of this type of facility should take into consideration the habitat quality affected. The impact of the placement of this facility in this location should also be examined to see if increased visitation and use would adversely impact adjacent areas.

While there were limitations to this HEP study as mentioned earlier (such as, timing of data collection, omission of a meadowlark variable, and use of the sage grouse model which resulted in minimal data), useful data was obtained. This report established some baseline information on habitat quality at Potholes Reservoir. This information showed that habitat quality in the Potholes Reservoir study area is generally poor to moderate. Also, it appears that recreational activities, especially ORV use, have lowered habitat quality, or at least prevented it from recovering from previous conditions. Previous land-uses, such as over-grazing, coupled with an arid climate and sandy soils, resulted in lower habitat quality in the study area before recreation activities began. Additional information on current and historic habitat conditions at Potholes Reservoir, the impact of current and historic management, and recommendations for future management will be presented in the Coordination Act Report which will shortly follow-up this report.

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DRAFT HISTORIC VEGETATION STUDY

INTRODUCTION

This study is an attempt to address impact from various recreational uses on vegetation cover types at Potholes Reservoir. A study was completed using two vegetation cover type maps to compare the historic or reference vegetation of certain portions of the study area with the vegetation that is currently there. Specifically, the vegetation types in the ORV park and a control area were delineated before and after the establishment of the ORV park. Other areas were also compared to address the issue of dispersed camping impacts in combination with the HEP study.

The following question was to be addressed by this study (compare historic or reference cover types and present cover types at the ORV park).

Question 1. How much wildlife and habitat benefit would be derived from restricting ORV use compared to how much additional impact would occur if additional lands were open to ORV use?

The remaining questions were to be addressed by this study in tandem with the HEP study conducted by USFWS.

Question 2. How much wildlife and habitat impact would occur from developing a new campground or directing recreation activities to specific "designated" use areas?

Question 3. How much wildlife and habitat benefit would be derived from restricting personal watercraft and motorboat use to certain parts of the reservoir?

Question 4. How much wildlife and habitat benefit would be derived from limiting dispersed camping to certain reservoir areas?

METHODS

Aerial photographs were obtained from the Reclamation. The most recent photos available were taken April 28, 1994 and cover the entire study area. They are infrared, 1:12,000 scale photos. For the historic vegetation map, there was no single set of photos with coverage of all of the study area. Two sets were used--one from June 29, 1971 and the other from September 9, 1964. Both sets are black and white and range in scale from 1 : 3500 to 1 : 5000.

The historic vegetation map covers 6220 acres in portions of the following management zones: Dunes/Sand Islands, Eastern Bluffs and Dunes, Upper and Lower Crab Creek Arm, North Potholes Reserve, O'Sullivan Site, Peninsula North and South, and the Upper West Arm. Complete coverage is available for the red and yellow zones, the ORV control area, the Job Corps Dike North and South, and the proposed state park area (O'Sullivan site), while only about half of the green zone has coverage.

Vegetation cover types were delineated from the photos using photo interpretation and ground observation. Table 1 lists the cover types that were used and their definitions; the cover types were designated by the Reclamation. The polygons (vegetation cover types) delineated from the aerial photos were then digitized into the GIS database for Potholes Reservoir RMP. Two maps were generated in this way--current and reference or historic. The current vegetation map was spot checked in the field to verify its accuracy; the reference vegetation map was checked against the original drawing. Corrections are reflected in the final maps.

Acreages were then calculated from the GIS database for all cover types on the historic vegetation map and the corresponding area on the existing vegetation map.

Comparisons between the historic and current vegetation include only those areas covered on both GIS maps. Comparisons were made between overall acreages, and between specific points throughout the covered area. Also, the ORV control area and the green and yellow zones for both current and historic conditions were compared against each other.

RESULTS

Table 1 shows the existing vegetation mapped from the 1994 photos. Table 2 shows the reference vegetation mapped from 1964 and 1971 photos. Acreages of the cover types the entire study area and specifically for the zones of the ORV park, including the ORV control area, and the proposed state park are shown in Table 2.

There are at least four differences that immediately stand out when comparing either the maps or the acreages. The first is the finer level of detail shown in the reference vegetation map. There are numerous small polygons (<5 acres) in that map, which show the vegetation as a detailed, complex array. The existing vegetation map has larger polygons, which forms a relatively uniform pattern in the vegetation cover types.

Other differences are created by the effects the water level has on cover type acreages and distribution. There are 2392 acres of water shown on the existing vegetation map compared to only 853 acres on the reference vegetation map. The amount of wetland emergent vegetation is very different--1177 acres historically and 241 acres currently. Also, the mud flats that had only recently been exposed by receding water in photos taken in June of 1964 were classified as the exposed cover type. Polygons of the exposed cover type that are adjacent to water are rare in the existing vegetation map.

The patterns of wetland vegetation on both maps are different, which is related to the above (the water level difference). In the reference vegetation map, existing wetland vegetation that is not covered by water is classified as riparian shrub and riparian forest, but the pattern is very different than what is shown on the existing map. The west piece of the study area (Job Corps Dike area) is almost entirely riparian forest on the existing map, while the corresponding area of reference vegetation is riparian shrub. Wetland emergent is also shown in that area on the reference map, but is assumed that this would be covered with water at full pool. Finally, in the Upper Crab Creek Arm, the riparian shrub reference vegetation is clearly shown as riparian forest on the existing vegetation map.

Finally, the pattern of shrub grass and shrubland cover types differs. Most of the existing upland ORV control area is classified as shrubland, whereas this area of reference vegetation is classified as shrub grass. This is also seen in the existing green zone where there are only two cover types shown, while the reference map shows large areas of shrub grass in addition to shrub and exposed.

There are other, less obvious differences. The total acreage of reference wetland vegetation cover types (including water and excluding exposed) is 2623 acres compared to the existing 3495 acres, a

"gain" of about 875 acres. There is a difference that somewhat corresponds in the number of upland cover types acres: 2929 (reference) and 2403 (existing), a "loss" of about 525 acres.

The amount of existing grassland (183 acres) is similar to the historic amount (211 acres). But, comparing the distribution of grassland polygons between the two maps points out how the maps differ spatially. The existing vegetation map shows grasslands to be scattered throughout the east side of the yellow zone and in an near the O'Sullivan site. The reference vegetation map shows large patches of grasslands in the ORV control area and southward and in the area north of the red zone. The existing vegetation map shows grassland in many places where wetland emergent and exposed were mapped for the reference map.

The percent cover of shrubs in the study area has increased dramatically since 1964; areas classified as shrub grass are now shrubland, and areas classified as grassland are now shrub grass or shrubland or even dense shrubland. There was much more grassland historically.

The definition of the exposed cover type includes sand (dunes) and mud flats (Table 1). The reference vegetation map has exposed in two areas--where water had (apparently) receded recently in the yellow and red zones and on bare, presumably active sand dunes in the southern part of the ORV Control area and in the red, yellow, and green zones. A total of 577 acres was mapped as this cover type. The existing vegetation map has 292 acres of exposed. For the most part, it is restricted to the southern part of the ORV control area and in the green zone, all of which is in the uplands as bare sand dunes.

<u>Results relevant to Question 1.</u> *Uplands*. In the green zone there is more area that is exposed now than there was historically. This is easily seen in Section 21. The numbers are clear: 92 acres historically and 179 acres in 1994. There is no corresponding change in the ORV control area between current and historic; in fact, there is roughly the same amount of exposed cover type (21 acres historically, 17 acres in 1994) now than before. There was a dramatic increase in vegetation cover in red zone: 93 acres of exposed historically and 9 acres currently. There was a similar change in the yellow zone: 259 acres of exposed historically and 16 acres currently. Almost all of the exposed polygons on the reference vegetation map are exposed wetland areas. Comparing the two maps shows grassland, wetland emergent, and water on the existing vegetation map in place of the exposed areas on the reference vegetation map.

<u>Results relevant to Question 1.</u> *Wetlands*. In the ORV control area, there is currently more area designated as wetland than on the historic map (380 acres, 241 acres). Also, across the entire study area, most of the wetlands that were classified as riparian shrub are now classified as riparian forest.

The decrease in wetland emergent from past to present is probably because the wetland emergent was underwater when the photo was taken in 1994. Some wetland emergent areas now have shrubs and trees. Comparing the green zone of the past with the present shows that the wetlands are about the same. There was more riparian forest in the green zone historically, which is different than all of the other areas.

Results relevant to Question 2. The cover types at the O'Sullivan site currently appear to be similar to those in the past. There has been no outstanding change. Regarding the second half of this question--directing recreation activities to specific areas--this study does not, in itself, provide enough information to produce an answer this question.

Results relevant to Question 3. The vegetation maps indicate an overall increase in the number of acres of wetlands in the study area (2623 acres to 3495 acres when water is included). The amount of riparian shrub and riparian forest changed from 593 acres to 862 acres.

Results relevant to Question 4. No data derived from this study alone can answer this question.

DISCUSSION

The limitations and specific problems with this study are detailed in Appendix A. For the most part, the problems are due to the quality of the 1964 and 1971 photos. There is difficulty in comparing the photo interpreted results of data that is derived from such different sources. When analyzing the results of this study, it is important to realize that correlation does not show causation. The vegetation maps can only show change over time; they do not show the cause of change. Change can only be inferred. However, there is direct evidence of ORV vegetation damage throughout the personal observation of biologists. Similarly, the community composition of the vegetation in the yellow and green zones includes a high number of weeds, including designated noxious weeds. The plant communities in the ORV park are composed of disturbance-oriented species, whereas, the communities in similar areas in the ORV Control area are composed primarily of native species. Also, the vast network of roads and trails in the yellow and red zone does not appear on the reference vegetation map. This is a highly fragmented landscape that correlates well with ORV use.

With regards to specific results listed above, the reference vegetation map was drawn from larger scale photos and it was possible to differentiate smaller polygons. For the existing vegetation map, small

polygons were "lumped" into adjacent cover types. Since a minimum mapping unit was not specified, the photo interpreter had more freedom in making determinations.

It is difficult to quantify the impacts to wetlands since there is such a disparity between the water level of the current and historic maps. However, it is reasonable to assume that the wetland emergent and exposed areas adjacent to the wetlands would be underwater at the full pool level of the 1994 photos. Very little, if any, of the mud flats classified as exposed would have remained unvegetated; later in the year they would have been classified as wetland emergent. At full pool there is very little exposed cover type adjacent to water.

The differing pattern in woody wetland vegetation is difficult to analyze. The apparent conversion of large tracts of riparian shrub to riparian forest, in the Job Corps Dike area, for example, may be a product of photo interpretation technique. Or, trees may have colonized the area.

The same reason can be used to explain the increase in wetland cover type area in general and the decrease in upland cover type area.

Differentiating between the shrub grass and shrub cover types is difficult. This may account for the acreage difference of these cover types. Polygon size and the patchiness of vegetation are factors in determining cover types, particularly when the difference is an arbitrary cut off. The shrub grass cover type is defined as having 5-15% shrub cover; the shrub cover type has 16-25% shrub cover. The disparity in acreages could simply be a result of the notoriously problematic nature of estimating percent plant cover. It is a well-documented fact that this method cannot give a precise vegetation measurement (Barbour et al. 1999), but it can provide an overall picture. If these two types are lumped together, the acreage is still very different but it is closer (2663 acres historically versus 2010 acres currently).

To discuss changes in the amount and distribution of the exposed cover type, it must be understood that this cover type represents two areas that have different edaphic characteristics and may support different types of vegetation. The areas include recently exposed mud flats and upland sand dunes. The mud flats that were "exposed" after the water receded most likely had not yet been colonized by wetland emergent plants when the photos were taken. Or, the old photos were not clear enough to make that distinction. In any event, these areas are underwater on the existing vegetation map. This partly accounts for the overall decrease in exposed cover type acreage (577 acres to 292 acres).

Question 1. *Uplands*. There is more exposed area in the green zone now than in the past (179 acres now from 92 acres historically), all of which is and was upland sand dunes. The green zone is the only portion of the study area that clearly shows an increase in exposed area. Although the results are not as strong as one would think they would be after observing this area, they do show that shrubland habitats in the area are being converted to bare, active sand dunes. In the red and yellow zones, the amount of exposed cover type decreased dramatically (352 acres to 25 acres). This decrease is the result of the higher water level as discussed above. However, when comparing only the upland exposed areas, it appears that these areas are now colonized by shrubs. Not only is the green zone being denuded, shrub cover is not increasing as it is in other parts of the study area.

Question 1. *Wetlands*. There is no clear picture of the changes in wetland vegetation cover types and how those changes are related to impacts.

Question 2. The development of a campground is a high impact project, in terms of ground disturbance. The area will be completely changed. However, the current conditions of the area are poor to extremely poor. The area is already receiving a lot of use; in addition, there is significant erosion from the roads, shoreline, and the overall loss of vegetation. The vegetation in the area is dominated by cheatgrass (*Bromus tectorum*) with patches of gray rabbitbrush (*Chrysothamnus nauseosus*), and a few patches of remnant big sagebrush / Sandbergs bluegrass (*Artemisia tridentata / Poa secunda*). Also, crested wheatgrass (*Agropyron desertorum*) has been seeded in a portion of the area. Basically, the area is dominated by exotic, invasive species typically found in arid, disturbed environments of the region. With the exception of last community, it appears that the area has been reclaimed (naturally except for the seeded crested wheatgrass) from a range fire or from agricultural use. Without a long-term restoration commitment, which would be expensive, this area will not return to valuable wildlife habitat with its current level of use. Campground development of this area would be an excellent use of the land. Presumably, this action would draw users that otherwise use dispersed camping thereby reducing that impact to the Potholes study area in general.

Question 3. It is unclear why the amount of woody wetland vegetation increased in the study area. It could be due to mapping error. Or, woody vegetation may have colonized more wetland area. The impact to these wetlands from motorboat use is unknown.

Question 4. Even though there is no data derived from this study alone to definitively answer this question, it is reasonable to assume that the disturbance caused by dispersed camping can be somewhat ameliorated by concentrating the use to certain areas. Dispersed camping impacts to vegetation are weed introduction, increased fire hazard, and disturbance of vegetation itself and to soils.

Also, dispersed camping "spots are eventually converted from native vegetation to weedy areas dominated by fire-prone species.

REFERENCES

Barbour, M. G., J. H. Burk, W. D. Pitts, F. S. Gilliam, M. W. Schwartz. 1999. *Terrestrial Plant Ecology*, Third Edition. Addison Wesley Longman, Inc. Menlo Park, California.

Franklin, F. T. & C. T. Dyrness. 1973. *Natural Vegetation of Oregon and Washington*. Forest Service, U.S. Department of Agriculture. Portland, Oregon.

Table 1
Cover Types Used in the Reference Vegetation Study

Cover Type	Code	Description
Agriculture	AG	various grain or hay crops including mowed forbland
Grassland	G	< 5% shrub (ex. Cheatgrass, blubunch wheatgrass)
Shrub Grass	SG	> 5% to 15 % shrub cover
Shrubland	S	> 15% to 25 % shrub cover
Dense Shrubland	DS	> 25% to 35 % shrub cover
Very Dense Shrubland	VDS	> 35% shrub cover
Riparian Shrub	RS	hydrophilic shrubs in riparian zone, a single polygon should include both sides of the stream
Riparian Forest	RF	> 40% canopy cover trees in riparian zone, a single polygon should include both sides of the stream
Emergent Wetland	WE	dominated by wetland species
Surface Water	W	pond, lake, reservoir, wide river
Exposed	E	sand, ash, mud flat
Urban	U	residential or industrial

Table 2
Reference Vegetation Study Area Acreages

Cover Type	**Reference Acreage**	**Existing Acreage**
Water	853	2392
Wetland Emergent	1177	241
Riparian Shrub	516	409
Riparian Forest	77	453
Wetland Total	2623	3495
Grassland	211	183
Shrub Grass	1568	433
Shrubland	1095	1577
Dense Shrubland	55	175
Very Dense Shrubland	<1	35
Upland Total	2929	2403
Exposed	577	292
Other	89	30
Total	**6218**	**6220**
ORV Control Area		
Water	29	253
Wetland Emergent	169	12
Riparian Shrub	41	10
Riparian Forest	2	105
Wetland Total	241	380
Grassland	78	0
Shrub Grass	435	186
Shrubland	236	403
Dense Shrubland	19	44

Table 2
Reference Vegetation Study Area Acreages

Cover Type	**Reference Acreage**	**Existing Acreage**
Very Dense Shrubland	0	0
Upland Total	768	633
Exposed	21	17
Other	1	1
Total	**1031**	**1031**
Red Zone		
Water	6	2
Wetland Emergent	27	63
Riparian Shrub	8	0
Riparian Forest	1	47
Wetland Total	42	112
Grassland	2	4
Shrub Grass	129	36
Shrubland	158	186
Dense Shrubland	8	50
Very Dense Shrubland	0	35
Upland Total	297	311
Exposed	93	9
Other	0	<1
Total	**432**	**432**
Yellow Zone		
Water	276	731

Table 2
Reference Vegetation Study Area Acreages

Cover Type	**Reference Acreage**	**Existing Acreage**
Wetland Emergent	266	94
Riparian Shrub	289	333
Riparian Forest	43	30
Wetland Total	874	1188
Grassland	2	73
Shrub Grass	164	37
Shrubland	121	111
Dense Shrubland	6	1
Very Dense Shrubland	<1	0
Upland Total	293	222
Exposed	259	16
Other	0	0
Total	**1426**	**1426**
Green Zone		
Water	2	0
Wetland Emergent	1	6
Riparian Shrub	<1	7
Riparian Forest	6	7
Wetland Total	9	20
Grassland	6	0
Shrub Grass	152	53
Shrubland	281	303
Dense Shrubland	9	<1
Very Dense Shrubland	<1	0

Table 2
Reference Vegetation Study Area Acreages

Cover Type	Reference Acreage	Existing Acreage
Upland Total	448	356
Exposed	92	179
Other	0	0
Total	**549**	**555**

Appendix A
Problems Encountered During Data Analysis

Photo interpretation and photo quality

- Photo interpretation of the current and historic cover types were done by two different people. It is notoriously difficult to estimate percent plant cover accurately and consistently among different people (Barbour et al. 1999).

- The photos from 1964 and 1971 are much larger in scale and therefore show more detail, which is reflected in the map. There was more "lumping" done for the existing vegetation map.

- The photos are of a different type: black and white versus infrared.

- The 1971 and 1964 photos were of fairly poor quality (out of focus, over-exposed). This probably led to an overestimation of grassland and exposed cover types because of the difficulty in recognizing shrubs and the difficulty in differentiating between bare, reflected soil conditions (exposed) and shrub grass cover type (only 5% shrub cover needed).

- The old photos did not have enough overlap to compensate for curve distortion. Some adjacent photos had no overlap.

- The 1994 photos may not reflect the existing condition, particularly in the ORV park, because they are nearly six years old.

Land area

- There is a discrepancy in the amount of land area that is covered by the three sets of photos. The new photos were taken during high water conditions (March 28, 1994) while the old photos were taken at mid-level (June 29, 1971) and low water (September 9, 1964) conditions. As stated above, there was not have enough overlap to compensate for curve distortion in the old photos, some boundaries do not match up (Moses Lake shoreline, for example).

- Due to a lack of control points on the some of the sections of the historic photos, the set of photos had to be treated as one image that was registered to the existing coordinate system. The image was rotated around a central point to fit it into the map. This introduced a minimum 30% error at the margins of the image (the study area boundaries). For example, the boundary along Moses Lake was clipped by a few hundred meters to ensure that the same number of acres were used in the comparisons.

Cover typing

- It is difficult to differentiate upland types from wetland types. Since the difference between these types depends on plant species composition and it is often difficult to determine this from a photo, often the interpreter must make assumptions. Usually the proximity to water is the deciding factor.

- It is particularly difficult to differentiate between grassland, exposed, and wetland emergent cover types. Late in the season, exposed areas that have been under water will support vegetation, sometimes dense and lush wetland plant communities; hence these will be classified as wetland emergent. But, early in the season, before the plants have an opportunity to grow, the same areas will be classified as exposed (such as exposed mud flats). Comparing the amount of wetland emergent and exposed areas between different water levels may not provide an accurate assessment of changes over time.

- It is difficult to differentiate the riparian shrub cover type from the riparian forest cover type since it is determined by the height of woody species.

- Designations based on percent plant cover are arbitrary with regards to actual plant communities. For example, the same plant communities occur in the dense shrubland, shrubland, and shrub grass cover types.

- Most importantly, the *quality* of the habitat is not a factor in determining the appropriate cover type. We can compare the number of acres of shrubland in 1964 compared to the number of acres of shrubland in 1994, but this does not tell us about changes in the quality of the habitat or its elements. For example, a rabbitbrush shrubland community has far less wildlife value than a big sagebrush community of the same cover type.

APPENDIX C
ENVIRONMENTAL COMMITMENTS

In addition to the management actions described as part of the alternatives, the following mitigation actions are considered to be commitments being made by the Bureau of Reclamation.

Air

- The Reclamation would require air quality control measures in construction specifications for any proposed development actions under all the alternatives.

Soils

- During construction planting grasses, forbs, trees and shrubs or placement of riprap, sand bags, jute, sod, erosion mats, bale dikes, mulch, or excelsior blankets would decrease erosion.
- Clearing schedules would be arranged to minimize the practical exposure of soils.
- Final erosion control and site restoration measures would be initiated as soon as an area is no longer needed for construction, stockpiling, or access.
- Short-term effects such as increased land or shoreline erosion in or near recreation sites would be minimized by adhering to Best Management Practices (BMPs) during construction.

Water Quality

- Expand the reservoir water quality and sediment sampling program. Review the need for routine testing of fish flesh for concentrations of contaminates for pesticides and heavy metals, and minimize chemical mosquito control methods.

Vegetation

- The use of native species or non-invasive species is recommended for revegetation efforts to maximize the potential to restore revegetated areas to high quality habitat
- Construction specifications would require contractors to preserve the natural landscape and prevent any unnecessary destruction, scarring, or defacing of the natural surroundings in the work vicinity.

- Critical environmental areas (i.e., stream corridors, wetlands, riparian areas, Ute ladies'-tresses orchid and gray cryptantha habitat, and steep slopes) would not be used for construction equipment or material storage or stockpiling; construction staging or maintenance; or temporary access roads.
- Upon the completion of construction, any land disturbed but not permanently occupied by new facilities would be graded to provide proper drainage and blend with the natural contours of the land, covered with topsoil stripped from construction areas, and revegetated with plants native to the area and beneficial to wildlife.
- The final recommended composition of plant species, seeding rates, and planting dates would be determined in consultation with the WDFW and USFWS (where applicable or appropriate). .
- Uplands would be revegetated to the native vegetative community appropriate for the site's soil type, topographic position, and elevation.

Wildlife

- Efforts will be made to attempt to restore native plant "communities".
- More aggressive weed control plans, above and beyond simply noxious weed control measures, should benefit native plant communities.
- The development of new campgrounds, boat launches, interpretive trails, etc. should take place in areas which minimize adverse impacts to fish and wildlife.
- Special signage, seasonal road closures, firearms or shooting restrictions, and some vegetation management are measures which may improve conditions for Washington ground squirrels near Lind Coulee
- Bald eagles roosts and regular perch sites could be protected with access restrictions.
- Interpretive information could be developed to educate the public on the valuable and unique habitats and associated unique species present and measures being employed to protect them.

Fish

- Prior to any construction or bank stabilization projects, site-specific erosion and sediment control measures would be identified and incorporated into the project's construction specifications, reducing sediment delivery to the reservoir.

- Construction sites would be revegetated and riparian areas near shorelines would be planted with trees and shrubs to provide shade and habitat for fish and near-shore wildlife.

- Projects built below the reservoir high water line would be timed for construction to occur when the reservoir pool is at its lowest elevation to avoid damage to fish spawning and rearing habitat caused by the release of sediment into the reservoir or increases in turbidity.
- Short-term effects such as increased shoreline erosion in or near construction sites would be minimized by adhering to Best Management Practices (BMPs) during project construction.
- During final layout and site design, measures to minimize asphalt surface runoff and the potential for pollutants (e.g., oil) entering the reservoir would also be identified and incorporated into the design.
- Herbicides used for the control of Eurasian water milfoil and purple loosestrife would be selected for their low toxicity to aquatic wildlife and fish.

TES Species

- In consultation with the USFWS, mitigation measures would be developed to minimize adverse impacts where appropriate, to special status species and habitats regardless of the alternative selected.

Cultural

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- All identified cultural resources are recorded and mapped to professional standards.
- Whenever possible, cultural resources will be avoided during project implementation.
- Conduct Class III surveys and prepare a Cultural Resource Management Plan (CRMP).
- Coordinate with Native Americans with interests at Potholes Reservoir to prepare the CRMP and manage cultural resources.

Monitoring

Mitigation actions for some adverse impacts could include restoration of native vegetation in various portions of the project area. Restoration efforts under mitigation should be tied to monitoring and success criteria. That is, if initial restoration actions fall short of goals, additional actions would be necessary. Monitoring plans will be incorporated into the mitigation measure to look at effectiveness of the measure and adaptive management to pursue.