MENDENHALL WETLANDS
STATE GAME REFUGE
MANAGEMENT PLAN

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Prepared by the Divisions of
Habitat and Wildlife Conservation

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ACKNOWLEDGMENTS

The Mendenhall Wetlands State Game Refuge Draft Management Plan has been prepared by the Alaska Department of Fish and Game (ADF&G) biologists Debra Clausen and Janet Hall Schempf (Habitat Division) and Bruce Dinneford (Division of Wildlife Conservation) with special assistance from clerical staff Ann Wilkinson and technical support from Frances Inoue.

The plan has been developed with the aid of an inter-agency planning team composed of representatives from state, federal and local agencies with jurisdiction over the refuge. The planning team has participated in the plan's development from its initiation. Planning team members who participated in development of the plan are as follows: Nate Johnson, Alaska Department of Transportation and Public Facilities; Rita Romans and Elizaveta Shadura, Alaska Department of Natural Resources; Ron Flinn and Gene Rehfield, Alaska Department of Environmental Conservation; Gary Gunstrom, ADF&G Commercial Fisheries Division; Ron Josephson, ADF&G Fisheries Rehabilitation, Enhancement, and Development Division; Murray Walsh and Ira Winograd, City and Borough of Juneau; Paul Bowers, City and Borough of Juneau (Airport); Duane Peterson, National Marine Fisheries Service; Rich Seagrave, U. S. Coast Guard; and Nevin Holmberg, U. S. Fish and Wildlife Service. Mike Bethers, ADF&G Sport Fisheries Division, and Rob Bosworth, ADF&G Subsistence Division, were also named to the planning team.

Rick Reed, ADF&G Habitat Division Regional Supervisor, contributed significant time and expertise in the development of this plan. Linda Kruger, ADNR Division of Parks and Outdoor Recreation, also participated in the earlier phases of the planning process.

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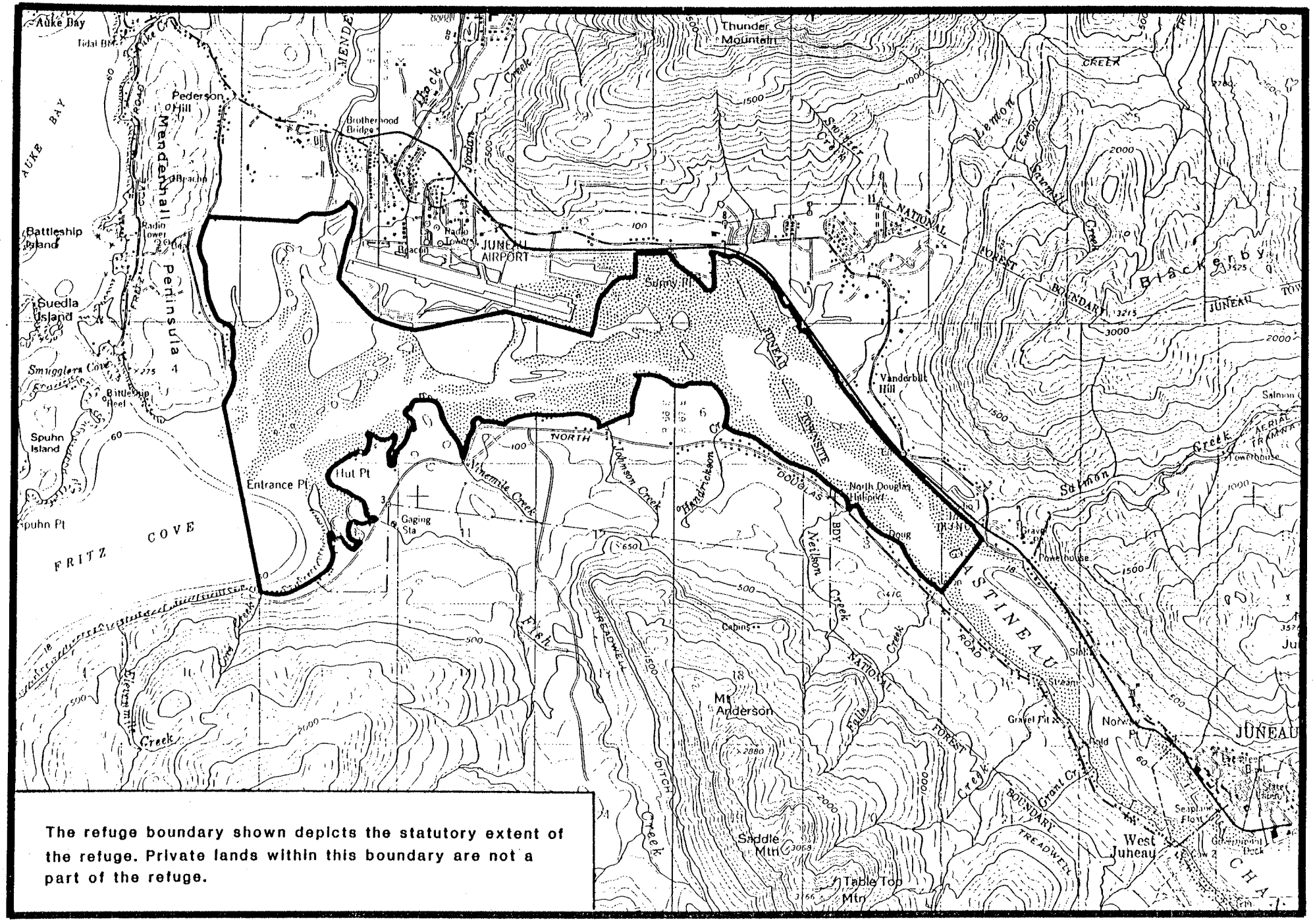


The refuge boundary shown depicts the statutory extent of the refuge. Private lands within this boundary are not a part of the refuge.

MENDENHALL WETLANDS STATE GAME REFUGE

INTRODUCTION

Mendenhall Wetlands State Game Refuge, extending along Juneau's Gastineau Channel from Salmon Creek to Mendenhall Peninsula, was established by the Alaska Legislature in 1976 to protect natural habitat and game populations, especially waterfowl, as well as to provide recreation.

The purpose of the Mendenhall Wetlands State Game Refuge Management Plan is to provide consistent long-range guidance to the Alaska Departments of Fish and Game and Natural Resources and other agencies involved in managing the refuge.

The Mendenhall Wetlands State Game Refuge encompasses approximately 3,800 acres and is best known for the Canada geese, ducks, and bald eagles that use the intertidal habitats. (For complete refuge and background resource information see Appendix). The refuge is also enjoyed year-round by residents and visitors alike for seasonal activities such as wildlife viewing, waterfowl hunting, fishing, boating, horseback riding, and general sightseeing. Mendenhall Wetlands is the most popular area for public recreation in the Juneau area. In addition, development around the perimeter has continued to occur as the city of Juneau has grown and evolved. In order to evaluate the compatibility of both recreational uses and perimeter development with the protection of fish and wildlife, their habitats, and public use of the refuge, the Alaska Department of Fish and Game has undertaken a comprehensive refuge management planning process to produce this plan.

The plan presents management goals for the refuge and its resources and identifies policies to be used in determining whether proposed activities within the refuge are compatible with the protection of fish and wildlife, their habitats, and public use of the refuge. The plan will be formally reviewed and, if appropriate, updated every ten years. Public participation will be solicited during the update process. The plan affects state lands only, not private or municipal lands. The plan does not address hunting or fishing regulations which are the authority of the Boards of Fish and Game.

This document is the result of a public planning process led by the Alaska Department of Fish and Game. The plan has been developed by the planning team representing state, federal, and municipal agencies including: the Alaska Departments Environmental Conservation, Fish and Game, Natural Resources, and Transportation and Public Facilities; the National Marine Fisheries Service; the United States Coast Guard; the United States Fish and Wildlife Service; and the City and Borough of Juneau.

At the outset of the public planning process a public meeting was held in Juneau to explain the planning process and solicit citizens' issues, interests, and concerns for the refuge. The meeting results were used by the planning team to identify a list of issues to be addressed in the plan. At the same time resource information on refuge fish and wildlife populations and their habitats, other natural resources, existing land use, and land ownership was being collected and synthesized. This information, presented in both map and narrative form, comprises the plan's Resource Inventory.

Management goals and policies for the refuge were developed by the planning team to address the identified issues. All policies were developed with

consideration of their ability to meet the management goals. In addition, other statutory constraints including the public trust doctrine, which applies to tide and submerged lands, were considered. The draft plan went out for public review.

Based on comments received during the public review process, final policies were developed. The goals and policies were then adopted by the Commissioner (5 AAC 95.520).

The plan is implemented by the Alaska Department of Fish and Game in several ways. A Special Areas Permit is required for any habitat altering activity, including any construction work, in a designated State Game Refuge (5 AAC 95). A Special Areas Permit application form can be obtained from any Alaska Department of Fish and Game office and should be submitted to the Habitat Division Regional Office in Douglas. The Habitat Division will review all proposed activities for consistency with the goals and policies outlined in this plan. Activities will be approved, conditioned or denied based on the direction provided in this plan as well as state laws and regulations.

Future refuge management activities of the Alaska Department of Fish and Game will also be directed by this plan. Research programs, public use facilities, and other department projects will be consistent with the goals and policies presented in this plan.

Other state, federal, and local agencies have management responsibilities on refuge lands as well. This plan does not in any way alter other state, federal or local authorities and requirements on refuge lands. Any use, lease or disposal of resources on state land in the refuge requires Alaska Department of Natural Resources authorization. Activities affecting air or water quality require authorization from the Alaska Department of Environmental Conservation. The United States Army Corps of Engineers (COE) evaluates applications of the United States Department of the Army permits for discharging dredged and fill material in waters of the United States including wetlands. Federal and state agencies, including the United States Fish and Wildlife Service and National Marine Fisheries Service, along with local governments, review proposals for COE permits, pursuant to the Fish and Wildlife Coordination Act (16 USC 661-666 et.seq.). United States Coast Guard approval is required for certain kinds of work in navigable waters. The U.S. Fish and Wildlife Service also has authority under the Bald Eagle Act (16 USC 668-668d), the Migratory Bird Treaty Act, as amended (16 USC 701-718h), and the Department of Transportation Act (49 USC 1653(f)), among others. The City and Borough of Juneau reviews and comments on all permit proposals within the coastal zone, including the Mendenhall Wetlands State Game Refuge.

STATUTES

Alaska statutes which pertain specifically to the establishment and management of Mendenhall Wetlands State Game Refuge are as follows:

Sec. 16.20.020. Purpose. The purpose of this chapter is to protect and preserve the natural habitat and game population in certain designated areas of the state.

Sec. 16.20.034. Mendenhall Wetlands State Game Refuge. (a) The following state-owned land, including tide and submerged land and excluding privately-owned land, is established as the Mendenhall Wetlands State Game Refuge: Beginning at U.S.C.G.S. Triangulation Station "Salmon" located on the northeastern shore of Douglas Island, lying within the City and Borough of Juneau, First Judicial District, State of Alaska; thence northeasterly across Gastineau Channel approximately .5 miles to U.S.C.G.S. Triangulation Station "Creek," said station being on the shore of Gastineau Channel, 200 feet south of Salmon Creek; thence trend northerly to the intersection of Egan Drive and Salmon Creek; thence trend northwesterly immediately adjacent to but not upon or within the designated right-of-way of Egan Drive approximately 2.7 miles to the intersection with the easterly boundary of Sunny Point Park Subdivision, recorded as Plat No. 333; thence southerly along said boundary; thence along said right-of-way line to the intersection with the 22.7 foot extreme high tide line; thence southerly and westerly on said 22.7 foot extreme high tide line, abutting said Sunny Point Park Subdivision, U.S. Survey 2475, Sunny Point Subdivision (Plat No. 307), and Egan Drive approximately one mile to the easterly line of the accreted property to the U.S. Survey No 1568; thence southerly and westerly, along the boundary of said accreted property approximately .4 miles to Corner No. 14 of Alaska Tidelands Survey No. 716; thence southerly and westerly along the west meander line of U.S. Survey No. 716, approximately 2.6 miles to Corner No. 4 of said Tidelands Survey; thence northerly along the west meander line of U.S. Survey No. 1742, approximately 790 feet to the northwesterly corner of Juneau Airport property (Corner No. AP-4 of survey dated June 1969); thence northwesterly approximately 440 feet to the southerly meander line of U.S. Survey No. 1919; thence southerly and westerly, along the southerly meanders of U.S. Surveys No. 1919 and No. 1042 (as accreted), approximately .5 miles to the intersection with the south line of U.S. Survey No 2136; thence westerly, along said south line, approximately .6 miles to the intersection with the 22.7 foot extreme high tide line; thence southerly, along said line approximately 1.4 miles to U.S.C.G.S. Triangulation Station "Glacier" on the southerly tip of Mendenhall Peninsula; thence in a southerly direction across Gastineau Channel approximately 1.3 miles to the mouth of Cove Creek; thence in a general easterly direction along the 22.7 foot extreme high tide line of Douglas Island approximately 9 miles to U.S.C.G.S. Triangulation Station "Salmon," the true point of beginning.

(b) The state may not acquire by eminent domain privately-owned land within or abutting state-owned land described in (a) of this section for inclusion in the Mendenhall Wetlands State Game Refuge but may acquire privately owned land by purchase, exchange or otherwise for inclusion in the Mendenhall Wetlands State Game Refuge.

(c) Leases, permits, and applications for leases or permits in effect or submitted by January 1, 1976 are not affected by the provisions of this

section. Renewals of leases or permits after January 1, 1976 are subject to this section.

(d) Egress and ingress across state land to and from private property within or abutting the land described in (a) of this section shall be allowed through access corridors established through agreement between the department and the private property owners affected.

(e) Except within that portion of the Mendenhall Wetlands State Game Refuge commonly known as the Twin Lakes area, the boundaries of which shall be established by the department after consultation with the City and Borough of Juneau, the taking of game is expressly permitted within the land described in (a) of this section if consistent with the management plan adopted by the department and conducted under regulations adopted by the board.

(f) Recreational activity is expressly permitted within the land described in (a) of this section if consistent with the management plan adopted by the department and conducted under regulations adopted by the board.

(g) Management of the surface and subsurface estate is the responsibility of the Department of Natural Resources. Any actions by the Department of Natural Resources which affect the habitat shall be in conformity with a plan proposed and adopted by the Department of Fish and Game, after reasonable public hearings, and following consultation with the City and Borough of Juneau. The plan shall be revised annually, if necessary and appropriate, under the same procedures followed for initial adoption.

(h) An activity or use may not occur under (a) of this section in a manner which creates a hazard to aircraft. Gravel extraction is not considered an incompatible activity on or abutting state-owned land described in (a) of this section and is subject to provisions of the management plan. Except for those ponds, lakes or other bodies of water adjacent to the airport that are required to be maintained by the City and Borough of Juneau as a seaplane basin under certification for the Juneau Municipal Airport granted by the Federal Aviation Agency, if requested by the City and Borough of Juneau the Departments of Fish and Game and Natural Resources shall assist in filling the ponds, lakes or other bodies of water adjacent to the existing airport runway to eliminate them as sites attractive to waterfowl.

(i) The management plan adopted under (g) of this section shall include provisions under which the City and Borough of Juneau may acquire land, by sale, exchange or otherwise, for purposes of expanding the Juneau Municipal Airport, establishing additional transportation corridors, including water corridors, and establishing publicly-owned and operated docking facilities, and these uses are considered preferential under Article VIII of the state constitution but subject to the requirements for plan specification and approval under AS 16.20.060. A deed, contract of sale, lease, or other instrument evidencing disposition by the Department of Natural Resources of land under this subsection shall include, among other terms, the condition that the land is restricted to use for airport expansion, establishing additional transportation corridors, including water corridors, and establishing publicly-owned and operated docking facilities.

(j) Notwithstanding the provision of (d)-(i) of this section, if the City and Borough of Juneau demonstrates to the Departments of Natural Resources and

Fish and Game, jointly, that there is a superior public need for or use of the land to its use as a state game refuge, after public hearing and a finding by the departments supporting the determination that such a need or use exists or is required, the use shall be permitted. A final administrative order, ruling or determination by the departments adverse to the petition of the City and Borough of Juneau is subject to judicial review under AS 44.62.560-44.62.570.

(k) Nothing in this section prevents the City and Borough of Juneau from exercising its land selection rights to state land within its boundaries under applicable law, providing the selection is by local ordinance.

GOALS

Activities which occur within the Mendenhall Wetlands State Game Refuge will reflect the following goals in accordance with the purpose for which the refuge was established (AS 16.20.020). All management decisions in the Mendenhall Wetlands State Game Refuge, whether affecting activities undertaken by the department, other agencies, or the public, will be in accordance with these goals.

I. Fish and Wildlife Populations and Their Habitat - Manage the refuge to maintain and enhance fish and wildlife populations and their habitat. Minimize the degradation and loss of habitat values due to habitat fragmentation. Recognize cumulative impacts when considering effects of small incremental developments and actions affecting refuge resources.

A. Wildlife

1. Protect important wildlife habitat including water quality.

2. Minimize harmful disturbance to wildlife, especially to nesting, rearing, staging, and wintering waterfowl.

3. Maintain, protect, and, where appropriate, enhance the quality and quantity of nesting, rearing, staging, and wintering habitat for resident and migrant waterfowl.

4. Protect bald eagle nesting, perching, and roosting habitat including the maintenance of windfirm boundaries around large old trees.

5. Protect endangered species habitat (e.g., peregrine falcon and humpback whale).

6. Minimize harmful disturbance to endangered species (peregrine falcon and humpback whale).

B. Fish

1. Protect water quality and circulation patterns to maintain fish habitats.

2. Maintain refuge water quality sufficient for the growth and propagation of fish, shellfish, and other aquatic life in fresh, estuarine, and marine waters.

3. Maintain refuge water quality sufficient for harvesting for human consumption of raw mollusks or other raw aquatic life.

4. Maintain and, where necessary, improve the hydrologic integrity of the refuge.

II. Public Use - Manage the refuge to maintain and enhance public use of fish, wildlife, and refuge lands.

A. Maintain public access to and within the refuge consistent with the goals of this management plan.

B. Maintain opportunities for hunting waterfowl and fishing within the refuge.

C. Maintain opportunities to recreate in the refuge consistent with the goals of this management plan.

D. Maintain opportunities for viewing, photography, education, and study of fish and wildlife.

E. Provide information about the refuge to the public.

Explanation of Terms

Minimize: To reduce harmful effects to a level which does not have a significant adverse impact on fish or wildlife populations or their habitats within the refuge or significantly reduce public opportunity for successful harvest and/or non-consumptive use of fish and wildlife.

Harmful Disturbance: Activities which displace animals from their natural habitat or interrupt their seasonal activities at a frequency or duration which causes significant impact to refuge fish and/or wildlife populations. Harmful disturbance does not refer to the legal harvest of fish and/or wildlife.

POLICIES

The policies provided in this plan will be used to guide decisions on management activities and Special Area Permits in the refuge.

Hunting, Fishing, Wildlife Viewing

Maintain and, where appropriate, improve opportunities for hunting, fishing, and wildlife viewing. Develop and implement an effective public information program about hunting, fishing, and wildlife viewing rules and regulations.

Recreational Use

Maintain and, where appropriate, improve opportunities for recreational use of the refuge consistent with the statutes which established Mendenhall Wetlands State Game Refuge and the goals and policies of this plan.

Information/Education

Develop an information/education program for the refuge which will inform the public about refuge values, rules, and recreational opportunities through signs, bulletin boards, brochures, mail-outs, news releases, community presentations, litter clean-up, interpretive trails, and other appropriate means.

Public Access

Encourage continuing public use of and, as appropriate, develop the following public access points: 1) Mendenhall Peninsula, 2) Engineer's Cut-off Road, 3) Industrial Boulevard, 4) Airport Dike, 5) Sunny Point Drive, 6) Switzer Creek, 7) Refuge Viewing Platform, 8) Twin Lakes, 9) Salmon Creek, 10) Ninemile Creek Road, 11) Ninemile Creek, 12) Fish Creek, and 13) North Douglas Boat Ramp. As appropriate, plan for and develop additional public access points where consistent with management plan goals and policies. Manage public access to the refuge in a manner which will maintain refuge resources and values.

Motorized Vehicles

To ensure the protection of sensitive habitats and avoid harmful disturbance to fish and wildlife, the department will not issue general permits for the off-road use of wheeled, tracked or other ground-effect motorized vehicles within the refuge. The department will, it its discretion, issue an individual Special Area Permit under 5 AAC 95 for the off-road use of a wheeled, tracked, or other ground-effect motorized vehicle if the use is consistent with the goals and policies of this management plan and fulfills a demonstrable need for which there is no feasible alternative. An individual Special Area Permit will not be issued for recreational use of off-road motorized vehicles within the refuge.

Habitat Restoration and Enhancement

Evaluate and, as appropriate, implement wildlife or fish habitat restoration and enhancement projects. Give specific attention to restoration of disturbed habitat, enhancement of anadromous fish habitat, and enhancement of waterfowl habitat. Waterfowl enhancement projects will be sited and designed to avoid conflict with airport air traffic patterns.

Water Quality

Water quality of marine and estuarine environments in the refuge shall meet or exceed water quality standards for: a) growth and propagation of fish, shellfish, other aquatic life and wildlife; and b) harvesting for consumption of raw mollusks or other raw aquatic life. Cumulative effects of waste discharge shall be considered when determining appropriate activities within the refuge and must meet the above specified standards. Discharge of treated waste products may only be allowed within the refuge when there is a demonstrable need for which there is no feasible off-refuge alternative.

Aquaculture/Mariculture

Aquaculture and mariculture activities may be allowed which maintain or enhance refuge resources and values consistent with management goals and policies.

Land Acquisition

Purchase or trade to acquire private lands or conservation easements within the refuge from willing sellers as time and funding permit. Donation of lands for addition to the refuge will also be considered.

Boats, Float Houses, and Mooring Buoys

Long-term boat anchorage (14 days or longer), intertidal boat maintenance, and float house moorage is not allowed within the refuge. Traversing of rooted vegetation in airboats and hovercraft is prohibited. Mooring buoys are not allowed within the refuge except as allowed under the "Access for Adjacent Landowners" policy.

Access for Adjacent Landowners

Adjacent landowners will be permitted access across refuge lands on a case by case basis in a manner consistent with refuge statutes and regulations and the goals and policies of this management plan.

Transportation Corridor

The City and Borough of Juneau may acquire land for a public transportation corridor, including a water corridor, only after the following have been

demonstrated: 1) that there is a significant public need for the corridor which cannot reasonably be met off-refuge; 2) that the use of refuge lands are avoided or minimized to the maximum extent feasible including use of subsurface or elevated, no-fill corridor options where feasible; 3) that public access to the refuge is maintained; and 4) that all unavoidable impacts to the refuge and to refuge resources are fully mitigated through restoration, replacement and/or other compensation. It is not the intent of this policy to prevent the maintenance of the Gastineau navigational channel.

New private, exclusive use transportation corridors will not be authorized within the refuge.

Airport Expansion

Current projected airport expansion will not involve refuge lands; however, the City and Borough of Juneau may acquire refuge lands for airport expansion only after the City and Borough of Juneau demonstrates the following: 1) that there is a significant public need for the expansion which cannot reasonably be met off-refuge or through use of alternative transportation modes and technologies; 2) that the use of refuge lands are avoided or minimized to the maximum extent feasible; 3) that all impacts to the refuge and to refuge resources are fully mitigated through restoration and/or replacement; and 4) that the airport expansion project will not create a hazardous attraction for waterfowl.

Public Docking Facility

The City and Borough of Juneau may acquire land for use as a publicly owned and operated docking facility only if there is a significant public need for which there is no feasible off-refuge alternative and impacts to the refuge and to refuge resources are fully mitigated. Any such site shall avoid dredging and filling for construction and maintenance to the maximum extent feasible.

Structures

Allow new permanent structures within the refuge only for the purpose of habitat maintenance and enhancement, public use and enjoyment of the refuge, or essential navigational and avigational aids. Allow new temporary structures only when there is a demonstrable public need for which there is no feasible off-refuge alternative. All structures must be consistent with refuge statutes and regulations and the goals and policies of this management plan. Regarding authorization for structures for access to adjacent private lands see the "Access for Adjacent Landowners" policy.

Shoreline Alteration

Do not allow alteration of the natural refuge shoreline through dredging or filling except for maintaining the Gastineau navigational channel or for maintaining, restoring, or enhancing refuge habitat. Dredging and filling

activity must be consistent with refuge statutes and regulations and the goals and policies of this management plan.

Grazing

With the exception of incidental grazing of animals while being ridden across the refuge, the grazing of domestic or feral animals within the refuge is prohibited.

Material Extraction

Do not allow material extraction (gravel removal) within the refuge unless for purposes of maintenance or enhancement of refuge habitat. All gravel extraction activities must be consistent with refuge statutes and the goals and policies of this management plan.

Mining

Do not allow mineral leasing within the refuge. Recommend closure of the refuge to new locatable mineral entry and closure of tide and submerged lands within the refuge to issuance of offshore prospecting permits.

Utility and Pipeline Easements

A new utility or pipeline may be allowed to cross the refuge where there is no feasible off-refuge alternative, using an existing corridor wherever possible, consistent with refuge statutes and the goals and policies of this management plan. Any easement issued within the refuge will be non-exclusive use only. A permitted utility line or pipeline will be buried where feasible and the corridor surface will be returned to pre-project conditions. In order to minimize bird strike problems, aerial powerlines will be avoided to the maximum extent feasible. Easements for new sewer outfalls may only be allowed within the refuge when there is a demonstrable need for which there is no feasible off-refuge alternative. Easements for existing sewer outfalls will be allowed where consistent with the goals and policies of this management plan.

Other Uses

To protect refuge habitat and fish and wildlife populations the department may allow by permit only those activities compatible with the purposes for which the refuge was established, terms and standards of 5 AAC 95, and the goals and policies of this plan. Any activity which is not compatible with the purpose for which the refuge was established, terms and standards of 5 AAC 95, and the goals and policies of this plan will not be allowed.

Explanation of Terms

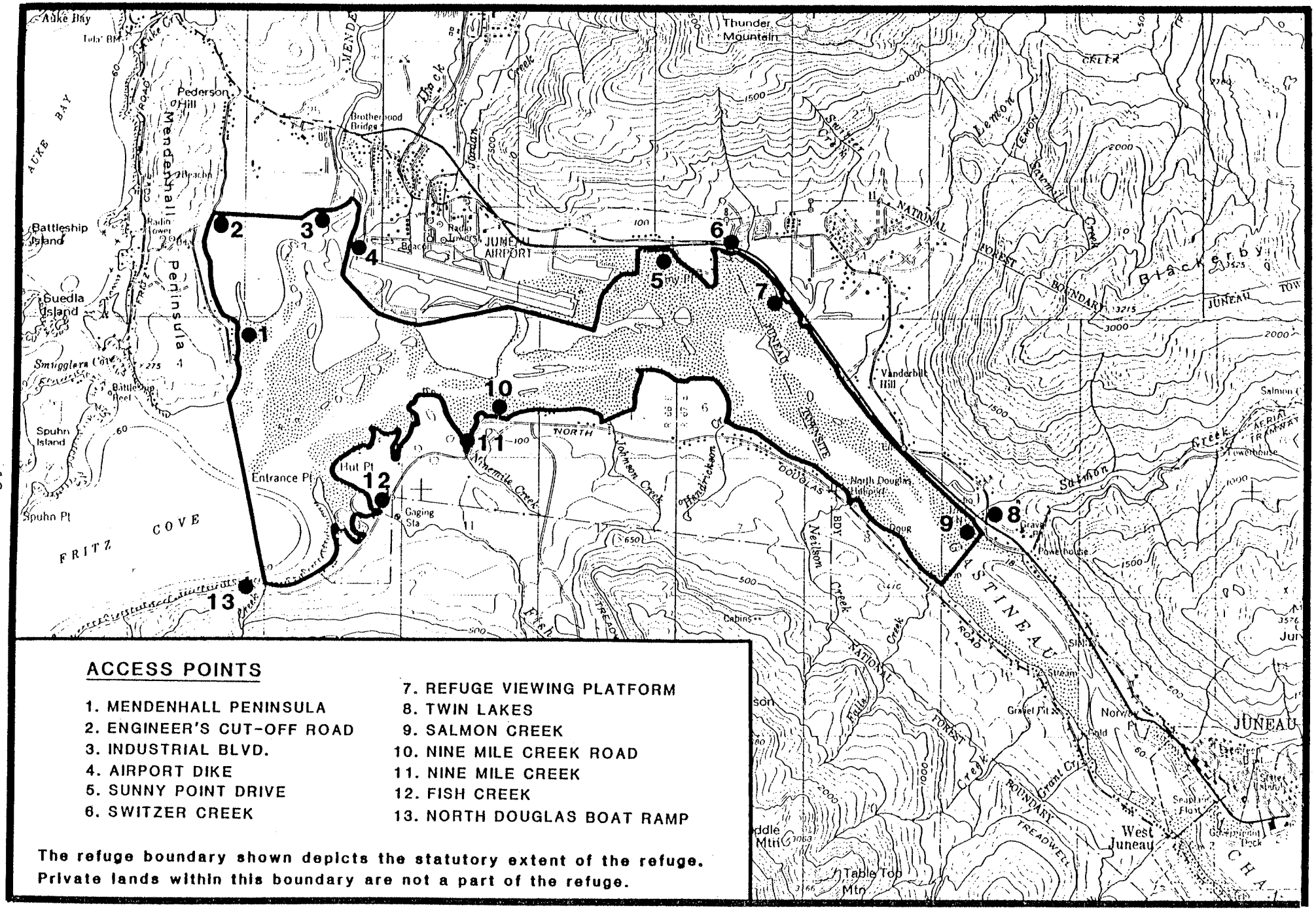
Feasible: capable of being done.

Reasonable: within the bounds of common sense.

Significant public need: required or necessary for the good of the community.

Temporary: one year or less duration.

Transportation corridor: a designated passageway on land and/or water over which people and goods are conveyed.



ACCESS POINTS

1. MENDENHALL PENINSULA
2. ENGINEER'S CUT-OFF ROAD
3. INDUSTRIAL BLVD.
4. AIRPORT DIKE
5. SUNNY POINT DRIVE
6. SWITZER CREEK
7. REFUGE VIEWING PLATFORM
8. TWIN LAKES
9. SALMON CREEK
10. NINE MILE CREEK ROAD
11. NINE MILE CREEK
12. FISH CREEK
13. NORTH DOUGLAS BOAT RAMP

The refuge boundary shown depicts the statutory extent of the refuge. Private lands within this boundary are not a part of the refuge.

MENDENHALL WETLANDS STATE GAME REFUGE

REGULATIONS

5 AAC 95.520 MENDENHALL WETLANDS STATE GAME REFUGE MANAGEMENT PLAN. The goals and policies of the Mendenhall Wetlands State Game Refuge Management Plan dated March 1990 are adopted by reference. The plan presents management goals and policies for the refuge and its resources that the department will use in determining whether proposed activities on the refuge are compatible with the protection of fish and wildlife, their habitats, and public use of the refuge. Under 5 AAC 95.420, a special area permit is required for certain activities occurring in a designated state game refuge. The department will review each special area permit application for consistency with the goals and policies adopted by reference in this section. A special area permit issued for Mendenhall Wetlands State Game Refuge will be approved, conditioned, or denied based on the criteria set out in those goals and policies, and on the standards contained elsewhere in 5 AAC 95. (Eff. 8/5/90, Register #115 Oct 90)

Authority: AS 16.05.020
AS 16.05.050
AS 16.20.020
AS 16.20.034
AS 16.20.060

EDITOR'S NOTE: Copies of the Mendenhall Wetlands State Game Refuge Management Plan are available at the Douglas office of the Department of Fish and Game, Island Center Building, P.O. Box 20, Douglas, Alaska 99824.

IMPLEMENTATION

The Mendenhall Wetlands State Game Refuge Management Plan will be implemented by the Alaska Department of Fish and Game through its day to day on-the-ground management activities, through its annual budgeting process, and through Special Area Permits issued for land use activities within the refuge.

Special Area Permits. A Special Area Permit is required for any habitat altering activity, including construction work, in Mendenhall Wetlands State Game Refuge. A Special Area Permit application form can be obtained from any Alaska Department of Fish and Game office and should be submitted to the Habitat Division's regional office in Juneau (5 AAC 95).

Fish and Wildlife Protection. State fish and wildlife protection officers patrol the Mendenhall Wetlands State Game Refuge and provide on-the-ground enforcement of harvest regulations, refuge regulations, and permit requirements.

Operational Management Plan. Subsequent to the adoption of this plan, the Alaska Department of Fish and Game will proceed to develop an operational management plan for the refuge. This operational management plan will detail implementation of the policies adopted in this plan and will provide details on the projects, their schedules, staffing requirements, and budgets necessary for management of the refuge. Among the projects to be discussed will be development of a litter clean-up program.

Habitat Enhancement Projects. Refuge habitat enhancement projects will be developed in accordance with the goals and policies of this management plan through a public decision making process.

Water Quality Improvement Program. Alaska Departments of Fish and Game and Environmental Conservation staff will continue to monitor water quality on the refuge. Where water quality is out of compliance with state water quality standards and the water quality policy of this plan and sources of the problem are identified, Fish and Game and Environmental Conservation staff will work with the responsible individuals to resolve the water quality problem.

Refuge User Education. In an effort to reduce refuge user conflicts and improve a wide spectrum of recreational opportunities within the refuge, education of refuge users regarding safe hunting practices, non-harassment of wildlife, courtesy to adjacent landowners, and anti-litter messages will be pursued through the refuge information/education program.

Airport Dike Access. The Alaska Department of Fish and Game will continue to work with City and Borough of Juneau Airport management to maintain public use and enjoyment of the Airport Dike in accordance with the public access policy of this plan.

Citizen's Advisory Committee. Subsequent to the implementation of this plan, the department will establish a citizen's advisory committee to advise the department on issues relating to the protection and management of the refuge.

Other Agencies' Actions. It is anticipated that this document will also be used by other state, federal, and local decision makers in planning for and making decisions under their respective statutory authorities regarding lands within Mendenhall Wetlands State Game Refuge.

APPENDIX

MENDENHALL WETLANDS STATE GAME REFUGE
RESOURCE INVENTORY

RESOURCE INVENTORY
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INTRODUCTION

As its name implies, the Mendenhall Wetlands State Game Refuge (MWSGR) is comprised mostly of wetland habitats, dominated by a sedge meadow plant community. Above the estuarine zone, beach rye grass and upland marsh vegetation blend into spruce hemlock forest.

Located between Douglas Island and the mainland at Juneau in northern southeast Alaska, the 3,764 acre refuge stretches along nine miles of the Gastineau Channel and is accessed via the Egan Expressway, Sunny Point Road, North Douglas Highway, Fritz Cove Road, Mendenhall Peninsula Road, and the Juneau International Airport. This channel, formed originally by glacial activity and later modified by isostatic rebound, is today fed by silt-laden water from Mendenhall and Lemon Glaciers, as well as numerous smaller clear water systems, notably Falls, Fish, Jordan, Switzer, and Salmon creeks.

HISTORY

Prior to the creation of the State Game Refuge on the Mendenhall Wetlands by the 1976 Alaska State Legislature, the general area played a part in the development of the Juneau area. Captain George Vancouver's party charted Douglas Island and Gastineau Channel in 1794, but other white men had evidently been in the area, as local natives had blunderbusses and muskets. Vancouver's journals mention ice blocking the passage through Gastineau Channel.

European fur traders visited the area from at least 1799 through the 1860s; trading was apparently carried on with the Auk tribe who lived along and gathered natural resources from the wetlands.

In 1879, naturalist John Muir and Presbyterian minister S. Hall Young travelled through "the flats" as the area has often been called throughout its history. Muir noted the Mendenhall Glacier was in the "...first stages of decadence...." and observed the mineralization of the mainland shore. This latter fact was borne out in the following year when Juneau's "founding fathers," Richard Harris and Joe Juneau, discovered gold in the Silverbow basin. The city of Juneau was founded in 1900 and mining was active in the area through 1944. While mining may not have had much of a direct impact on what today are refuge lands, in the early teens one miner reported finding gold in the "Mendenhall Mud Flats." This turned out to be a practical joke but resulted in a stampede to the intertidal area by miners looking for the salted lode.

Impacts on the intertidal areas followed the growing population associated with development of the area. The

Northwest Trading Company steamer "Favorite" carried passengers from Sitka to Fritz Cove, then passengers crossed the Mendenhall River Bar via "...big dugout canoes." In 1911 the Salmon Creek dam and two power houses were built by the Alaska Gastineau Channel Mining Company. The AJ mine was known to have dumped rock from its operation onto the tidal flats in 1922; 3/4 million tons of rock were extended 500 feet into Gastineau Channel east of the refuge boundary.

In 1924 and 1925, marten, mink, and fox farming was conducted on what is today refuge property. And in 1926 the Mendenhall River was bridged. In the late teens and early 1920s, Thomas Knudsen had a dairy at the present site of the Juneau Municipal Airport. This operation was taken over by the Kendlers in 1922 (the same year that four navigation lights were installed to mark the Mendenhall Bar) and operated until 1965. The year 1934 marked the first use of Joe Kendler's fields as a runway and around 1936 the United States Army used the fields for this purpose.

In 1938/39 part of this farm was sold to Pan American Airways for use as an airfield, which was in turn enlarged by the Army in 1940/41. After the city of Juneau obtained the airport property, the runway was eventually extended to 8,468 feet in length. Although airport construction destroyed salt marsh habitat, ponds dredged during the project created loafing habitat for waterfowl.

In 1937 Harris boat harbor was dredged, and in 1941 the U. S. Navy submarine port was constructed. Quonset huts for housing personnel were erected at Duck Creek. The Golden North Salmon Derby, which began in 1938, has relied in part on fish originating from streams which drain into the wetlands.

Wetlands adjacent to Duck Creek were drained for agricultural purposes in 1940. As Joe Kendler stated, "Only land that produces giant timber...will make good farm land." In 1941 the bid was awarded for airport construction; two million cubic yards of material were moved during this project. One attitude expressed at that time was: "Another happy consequence...was that the wildlife moved deeper into the woods, and no longer bothered us or endangered our cattle."

In the early 1940s the Juneau Gun Club was first located at Salmon Creek and then moved to Mendenhall River at the present day site of the float plane pond. In the fall of 1944, federal game wardens found an estimated 20,000 waterfowl dead at this site from lead poisoning. This area, located at the floatplane pond, was closed and $70,000 in public funds were spent in rehabilitation.

In 1959/60, $750,000 was spent by the Army Corps of Engineers dredging a navigational channel between Gastineau

Channel and Fritz Cove/Stephens Passage. By 1971, the channel had silted in and a "...natural equilibrium between deposition and erosion..." had been re-established, and the wetlands were again navigable only at high tide by small craft, similar to 90 years earlier. The sand islands created by the dredging are now sparsely vegetated with alder, cottonwood, willow, and young spruce bordered by thick mats of beach rye. Dredging associated with the construction of the Egan Expressway was also conducted in the 1970s. General recognition of the importance of the Mendenhall Wetlands began in 1965 (it is interesting to note that in 1913 the Juneau Commercial Club, forerunner of the Chamber of Commerce, had as its keynote address a speech entitled "Redemption of the Tide Flats"). Public concern fully matured in the mid-to-late 1960s in relation to two subjects; 1) the first consideration of a land management plan for the area, and 2) the routing of the Egan Expressway across the flats. In addition to above mentioned habitat loss, acreage has also been lost due to gravel extraction. Garbage and sewage disposal have also impacted the wetlands.

When AS 16.20.034 was passed in 1976, the primary values of the refuge were recognized as fish and wildlife habitat and the associated human uses of these resources. Alaska Statutes, Title 16 (Sec. 16.20.020) states "The purpose...is to protect and preserve the natural habitat and game populations in certain designated areas of the state." Section 16.20.034(e and f), which addresses the Mendenhall Refuge, states that within most of the refuge "...the taking of game is expressly permitted..." and "Recreational activity is expressly permitted...."

PHYSICAL ENVIRONMENT

Climate

The mean annual temperature at the NOAA Weather Service station at the Juneau Airport is 40.0 degrees F (mean maximum = 46.6, mean minimum = 33.3). The record high temperature was 90 degrees F in July 1975, while the record low was minus 22 degrees F in January 1972. Temperature variations are generally not extreme due to the ameliorating influence of the local marine conditions. The average rainfall is 53 inches and snowfall, measured October through April, averages 106 inches. October, the wettest month, has received over 15 inches of rain, while the driest month, April, has received as little as 1/4 inch. Record monthly snow deposition has been over 86 inches (February).

Soils

Soils that were mapped by 1970 include tidal flats and gravelly beaches. A BeA type (very gravelly sands, 0-3

percent slope) was also found to be quite prevalent. Silt and fine sand are predominant materials of the tidal flats.

Mites (Acarina) and springtails (Collembola) are the most abundant soil organisms in MWSGR soils.

Geology/Glaciation

Thousands of years ago glaciers carved out the series of islands, channels, and fiords of southeast Alaska. These dynamic forces played a large part in creating Gastineau Channel and the Mendenhall Wetlands. The glacial ice grinds bedrock into fine sediment which is carried to the flats by way of Mendenhall River and Lemon Creek; these materials contribute to the wetlands soil used by intertidal vegetation. The combination of this deposition and isostatic rebound (i.e., the gradual up-lifting of the wetlands once relieved from the weight of the ice) is commonly referred to as accretion. In time, these processes could virtually eliminate these wetlands. The possibility of rising sea levels is another on-going process which has potential to affect refuge habitats.

The Mendenhall Wetlands Game Refuge lies geologically within the Gastineau Channel Formation which is composed of three primary layers of heterogeneous glaciomarine deposits of late Pleistocene and early Holocene age. These deposits contain pebbles and larger broken rock dispersed through a fine-grained matrix of predominantly silt and sand.

Of the three deposits, the oldest is a gray to dark-bluish gray, stone-rich layer that is a till-like mixture of broken rock within a generally compact and massive fine-grained matrix. Cobbles and boulders, some as large as ten feet across, are scattered through the deposit. Shells of marine mollusks, barnacles, and foraminifera are common.

The second and younger dark bluish-gray gravel-rich layer is closely packed angular to subangular pebble sized fragments in a sandy matrix. This layer is low in silt and clay particles.

The youngest layer differs from the others in that plant remains are common in some exposures, the layer is less dense, and thin laminations in the deposit are widespread.

All three layers of the Gastineau Channel Formation are typically overlain by a thin but widespread blanket of reddish organic beach gravel. The presence and the thickness of the beach gravel depends on the local depositional environment and subsequent exposure to erosion.

There is no information as to the specific minerals of mining interest within the refuge; however, in southeast Alaska several minerals have historically been sought on

beaches along bays and fiords. These minerals include magnetite, iron, and barite and, at certain places, gold, garnet sand, and rare earth minerals. In Juneau, gold naturally deposited or contained in old gold mine tailings may be of interest.

Hydrology

Gastineau Channel is subject to daily tidal action, which displays a diurnal inequality. That is, of the two high tides within a 24 hour period, one generally exceeds the other by several feet; the same is true of the two low tides. The mean tidal range is 14.0 feet, while the diurnal range (from mean higher high water to mean lower low water) is 16.6 feet. The extreme tidal range is about 26.5 feet.

Fresh water from Mendenhall River, Lemon Creek, Fish Creek, and others, as well as rainfall, maintain water levels in ponds on the refuge. The Mendenhall River has averaged flows of 1,100 cubic feet per second over 21 years, with a record maximum flow of 17,000 cfs and a record minimum of 19 cfs. Fish Creek has averaged (20 years) 78 cfs, with record maximum and minimum flows of 2,120 and 10, respectively. Lemon Creek's 4-year average is 214 cfs, with 608 and 7 cfs the maximum and minimum records, respectively.

BIOLOGICAL RESOURCES

Vegetation

Mendenhall River silt, sand, and gravel formed the delta of the Mendenhall Wetlands, the upper part of which was an extensive grassland, now largely occupied by the airport, businesses, houses, and a four lane highway. From the supra-tidal grassland to the bare mud of the sub-tidal area the vegetative habitats can best be described in terms of plant communities and major physical features. Little vascular vegetation occurs below the 10-foot tide level because of prolonged saltwater inundation. Mats of algae and kelp (Fucus) occur on the otherwise bare mudflats and rocks exposed at low tide.

Watson (1979) conducted a survey of wetland vegetation communities on the refuge. Although now dated due to rapid successional changes, the information is presented in this inventory as a point of reference.

The following communities were documented:

Sedge meadow. This community is the most extensive on the refuge occuring between the 10 and 20 foot elevation on wet, silty to silty-sandy soils. The sedge Carex Lyngbyaei (the most dominant sedge), C. aquatilis, C. kelloggii, and C. pluriflora are found in colonies across the meadows. Solid

stands of sedge are found in areas of frequent inundation. Other plants in this community include Eleocharis acicularis, Puccinellia nutkaensis, (bordering sloughs); Triglochin maritimum, Potentilla anserina (at slightly higher elevations); and at areas of minimal saltwater some grasses were found (Deschampsia, Calamagrostis, and Agrostis sp.).

Plantago-Glaux-Carex. This community can withstand as much saltwater as the sedge meadow type, but occurs on sandier soils. The species in this community include P. maritima juncoides, G. maritima and Carex sp.

Beach-rye. This community occurs on sandy soils at higher elevations. Beach rye (Elymus Arenarius mollis), the dominant plant, offers both wind protection and soil stabilization due to coarse culms, dense growth, and thick root stalks. Other species then invade places such as the sand islands and include willow, alder, and Sitka spruce (Salix and Alnus sp. and Picea sitchensis). Additional plants in such locations include Achillea lanulosa, Epilobium angustifolium, Fragaria chiloensis, Honckenya sp., Lathyrus maritimus, Lupinus nootkatensis, Rubus arcticus, and Senecio pseudo-Arnica.

Spruce-hemlock forest. This community is found on rock outcroppings on the refuge which reach elevations of 60 feet. The spruce and hemlock (Tsuga heterophllya) comprise the overstory for a wide variety of shrubs and forbs. This community surrounds most of the refuge.

Upland marsh/transition. This community lies between sedge meadow and spruce-hemlock forest and is characterized by slight saltwater influence and high plant species diversity. Species composition includes Alnus, Carex, Ranunculus and Salix sp., Angelica lucida, Aquilegia formosa, Caltha palustris, Equisetum arvense, Eriophorum russeolum, Heracleum lanatum, Lingusticum scoticum, Populus balsamifera, Potentilla Egedii grandis, and Sanguisorba stipulata.

Shallow pond. This community is dominated by ponds between several inches to over two feet in depth. Pond borders support Puccinellia nutkaensis/sedge meadow. Aquatic plants include Hippuris vulgaris, Potamogeton filiformis, and Ruppia sp.

Deep pond. This type is man made (only one, at Fish Creek, is actually within refuge boundaries) and supports some freshwater aquatics.

Other habitat types include mudflats, rocky shoreline, and open saltwater, but include little in the way of vegetation.

In time, as more silt is deposited from the glacial rivers and isostatic rebound causes refuge lands to rise, a change from the dominant intertidal habitat types to supratidal conditions may occur. Thus the value of the refuge may gradually shift away from waterfowl to species more dependant on upland habitat types.

A complete list of plant species known to occur on the refuge is included as Table I.

Amphibians

The only amphibian that occurs within the boundaries of the Mendenhall Refuge is the western toad (Bufo boreas).

Birds

At least 227 species of birds have been observed within and adjacent to the Mendenhall Wetlands State Game Refuge (Table II) (M. Pete Isleib, pers. comm.). Spring migrations peak in April and May and, by June, most waterfowl and shorebirds that stopped to feed have moved on to more northern breeding grounds.

Arctic terns nest on dredge spoil islands in Gastineau Channel near the airport. Few waterfowl and shorebirds nest on the refuge. Most summer visitors, notably non-breeding waterfowl, concentrate in feeding and loafing areas. Species found to be common summer residents include the mallard, bald eagle, spotted sandpiper, mew gull, glaucous-winged gull, arctic tern, marbled murrelet, rufous hummingbird, tree swallow, barn swallow, northwestern crow, ruby-crowned kinglet, orange-crowned warbler, yellow warbler, and Savannah, song, and Lincoln's sparrows.

After the breeding season, the refuge supports birds travelling south to winter habitats. Shorebirds, feeding on mollusks and other invertebrates, begin arriving in late July. Ducks and geese begin to arrive in late August, feeding on seeds from sedges, grasses, and other plants.

While the refuge is one of the few major concentration areas for water birds in Southeast Alaska, most of this concentration occurs in the winter. Ten of the 20 most abundant birds in the area are waterfowl, with surf scoters having the greatest average abundance of all species. Other abundant species include gulls and crows, followed by shorebirds and bald eagles. Mallards are the most common dabbling duck. Most of the world's population of Vancouver Canada geese remains in southeast Alaska year round, with 500 to 1,000 utilizing the refuge in winter. As reported in "Bird Use of the Mendenhall Wetlands in Juneau, Alaska," (1988) "The Mendenhall Wetlands may possess unique characteristics that make them particularly attractive to Vancouver Canada geese. Among 70 large, wetland/tideflat

areas surveyed for geese in northern southeast Alaska in March, more geese were found on the Mendenhall Wetlands than on all but one other location. This emphasizes the regional importance of the Mendenhall Wetlands to Vancouver Canada geese." Mallards, Barrow's goldeneyes, buffleheads, and common mergansers are other waterfowl species commonly found wintering on the refuge. Other common winter residents include the bald eagle, rock sandpiper, glaucous-winged gull, marbled murrelet, northwestern crow, dark-eyed junco, and the common redpoll.

Avian Habitats and Use of Refuge Habitats

A recently completed study, "Bird Use of the Mendenhall Wetlands" (USFWS, 1988), identifies high goose use of wetlands and tideflats between Lemon Creek and the eastern end of the airport and from the floatplane basin to the Mendenhall Peninsula. High mallard use was also found within the same area. Bufflehead were found on waters of the refuge throughout. Scaup favored the floatplane basin, and loons and grebes occurred in greatest numbers along Douglas Island shoreline just east of the North Douglas Boat Ramp. High numbers of gulls and diving ducks were found between Salmon Creek and Lemon Creek and in the Mendenhall Peninsula/Fritz Cove area. "Bird Use of the Mendenhall Wetlands in Juneau, Alaska" provides an excellent survey of bird use on the refuge and is recommended as the latest, most definitive work on the subject.

The following information is taken from Watson, 1979 and is useful in correlating bird use with various habitat types.

Sedge Meadow. This community is heavily used by waterbirds at various tidal stages. Dabbling ducks, Canada geese, and shorebirds concentrate feeding efforts here at the tideline, and by 3/4 incoming tide Carex, Puccinellia, and Eleocharis are fed upon. Migrating raptors, plovers, pipits, and longspurs also use these habitats for feeding.

The high marsh areas of the sedge meadow community are used by common snipe for nesting, especially in saturated soils. The northwestern crow, American robin, Savannah sparrow, Lincoln's sparrow, song sparrow, and red-winged blackbird also use these areas.

Plantago-Glaux-Carex. Vancouver Canada geese graze on Plantago in April through June. Additionally, snow geese and white-fronted geese graze and rest in this community during spring migration.

Beach-rye. Birds are provided protection from the wind and rising tide on the sand islands covered with Elymus. Birds using this community include the American kestrel, northern harrier, several species of sandpipers, the short-eared owl, American robin, water pipit, and Savannah sparrow.

Sparrows, arctic terns, and semi-palmated plovers use the islands for nesting sites. Arctic terns are also known to nest on sandy banks along the airport runway.

Spruce-hemlock forest. This community is used for nesting by bald eagles. Such sites also offer perch locations for eagles, crows, and ravens. Species found on the spruce islands include rufous hummingbird, Stellar's jay, several species of thrushes and warblers, and other representatives of the passerines.

Upland marsh/transition. Avian occupants of this mixed habitat type include a variety of species found in other communities. High insect concentrations are found here, fed upon by birds nesting in adjacent habitats. Birds present include great blue heron, yellowlegs, dowitcher, common snipe, warblers (yellow, Wilson's, orange-crowned, and yellow-rumped), sparrows (Savannah, Lincoln's, and song) red-winged blackbird, northwestern crow, and American Robin.

Shallow ponds. Small pools support aquatic plants (primarily Ruppia sp.) and fish which provide food for various bird species, including herons, arctic terns, kingfishers, dabbling ducks, and shorebirds. Ducks and geese will use such ponds for loafing and feeding.

Deep pond. Diving ducks and mergansers use the Fish Creek pond heavily during migration. Vancouver Canada geese will use the pond for loafing and preening sites.

Rock. Rocky areas which are sometimes inundated by salt water are used by eagles, crows, and ravens for resting and as vantage points for watching for prey along shore or in the water. Shorebirds and harlequin ducks commonly use rocky areas at high tides for loafing sites.

Mudflats. Mouths of sloughs and freshwater sources are often-used feeding sites for migrating shorebirds and waterfowl. Fritz Cove is a high-use area for water birds. The Lemon Creek and Salmon Creek areas are also concentration areas for feeding waterbirds. Other species that use the mudflats include gulls and terns. Dabbling ducks feed along the edge of incoming tides.

Open saltwater. Low tides of Gastineau Channel attract diving ducks and sea birds. Goldeneyes, scoters, and buffleheads are common waterfowl, while loons, grebes, marbled murrelets, and pigeon guillemots are representative sea birds. As noted above, Fritz Cove and the mouth of Salmon Creek attract large numbers of birds year round, probably due to an abundance of rich food resources.

Mammals

The location of the Mendenhall Refuge, being virtually surrounded by the community of Juneau, precludes it from being outstanding large terrestrial mammal habitat. However, some species do occur here that are either occasional visitors or are able to live in close proximity to man.

The two largest land mammals that occur on the wetlands, the Sitka black-tailed deer and the black bear, fall into the category of occasional visitors. Deer winter close to saltwater, especially in years with deep snow. Some does may fawn in the coniferous beach fringe adjacent to or within refuge boundaries.

Shortly after leaving their dens, black bears often prefer to move to intertidal grassflats where vegetation provides nourishment. Because major highways must be crossed from either north Douglas Island or the Juneau mainland, these forays from the surrounding mountains are likely of short duration.

Furbearing species on the refuge include muskrat, land otter, mink, and short-tailed weasel. Little is known about the abundance of these species. The muskrat, otter, and mink are associated with freshwater aquatic habitats, feeding on vegetation (the primary food of the muskrat), invertebrates, and fish. Mink travel along streams and sloughs, feeding on fish, invertebrates and small rodents. Otter and mink also frequent shoreline and intertidal habitats in search of food.

Other terrestrial mammals known to occur in the area are the snowshoe hare, red squirrel, deer mouse, porcupine, hoary marmot, little brown bat, long-tailed vole, and masked shrew. Hares occupy brushy areas, feeding on grasses and twigs, buds, and leaves of willow and spruce. Red squirrels occur in groves of spruce where they feed on seeds and nest in the trees. The brown bat roosts in hollow trees and feeds on insects during night hours. The vole feeds on grasses, bulbs, and small twig bark in brushy streambank areas and shrews feed on insects.

The only common marine mammal documented within refuge boundaries is the harbor seal. Seals may occasionally use the sand islands as haulouts and forage on benthic invertebrates and finfish found in the area. Northern sea lions and humpback whales occur infrequently within the refuge boundaries as well. Humpback whales have been sighted feeding in Fritz Cove.

Fish

Marine and anadromous fish are found within the boundaries of the refuge, while freshwater and anadromous species are found in waterways that flow into the estuary. Table III records some of the representative species known to occur within the refuge.

Five species of salmon, two species of trout, and two species of char are found within the refuge and in freshwater systems draining into the refuge as well. Life history stages of spawning, feeding, egg to fry incubation, rearing, and migration to and from salt water habitats occur on the refuge.

Seventeen freshwater systems flow into the refuge. Following is a description of these systems and their fish resources.

Casa Del Sol Creek (Pederson Hill Creek) This stream originates on Pederson Ridge and enters saltwater in Fritz Cove. In the intertidal wetlands portion (over one mile long) this stream averages 3-5 feet wide and 1-3 feet deep. This meandering system is clear with the brownish tint of a muskeg drainage.

Coho salmon, cutthroat trout, Dolly Varden char, and coast range sculpin are found here, with starry flounders and staghorn sculpins rearing in the lengthy intertidal area. The meanders, pools, and overhanging grass banks of the wetlands provide excellent rearing habitat.

Mendenhall River This largest system entering MWSGR, which is glacially occluded, flows five miles from Mendenhall Lake to Fritz Cove. Major tributaries include Montana and Duck creeks.

Because of high human populations in the valley, the Mendenhall River has received considerable alteration. Gravel has been mined along several of the river bars and near the river's mouth. In some areas, banks of the river have been stabilized with rip-rap to control erosion. Domestic sewage, residential runoff, and industrial wastes have been introduced into the river.

Populations of coho, pink, chum, and sockeye salmon, Dolly Varden char, cutthroat, and rainbow/steelhead trout are found in the Mendenhall. Eulachon are found in the lower river in the spring. Up to 15,000 salmon and 30,000 Dolly Varden use the Mendenhall for a migration route annually. The upper Mendenhall River provides cohos with spawning gravel and a significant amount of rearing habitat for coho juveniles is found throughout its length. Mendenhall Lake is thought to be an important wintering area for Dolly Varden char.

Duck Creek This system flows into the Mendenhall River directly upstream from the Juneau International Airport. Duck Creek measures 5-15 feet wide and 1/2 foot to 2 feet deep. The creek is characterized by an orange color caused by the extraction of the streambed's gravel, which exposed iron deposits then affected by an iron-fixing bacteria.

Fish species present include pink, chum, and coho salmon, Dolly Varden char, and cutthroat trout. Escapements as high as 10,000 chum salmon were recorded for this system. Coho salmon, brook trout, and rainbow trout have been stocked in this system over the years.

Due to developments in the Mendenhall Valley, Duck Creek has been subjected to severe habitat degradation; however, viable populations of fish still exist in the system.

Jordan Creek This creek runs about three miles through the eastern Mendenhall Valley and enters Gastineau Channel via a culvert under the Juneau International Airport's runway. This spring fed creek measures 5-50 feet in width and 4 inches to 3 feet deep. A pool/riffle complex throughout the length of Jordan Creek provides good spawning and rearing habitat.

Coho, chum, and pink salmon, Dolly Varden char, and cutthroat trout occur naturally, and brook trout have been stocked in the system. Escapements of over 300 coho salmon have been recorded in recent years.

West Creek This small stream flows from Heintzleman Ridge/ Thunder Mountain and enters Gastineau Channel east of Sunny Point. Four feet wide and 1/2 foot deep, this stream drains about one square mile. Two major highway crossings and residential developments have reduced the quality of the stream.

Pink and coho salmon and Dolly Varden char are located in this stream. Pinks spawn intertidally, but habitat for rearing species is limited. A long intertidal area is used by juvenile estuarine and pelagic species.

East Creek This small stream flows from Heintzleman Ridge and through Switzer Creek Trailer Court before entering Gastineau Channel east of Sunny Point. The clear water averages 5 feet wide and 2-8 inches in depth.

Populations of coho and pink salmon and Dolly Varden char occupy the stream. The long intertidal area provides not only pink salmon spawning gravel but an excellent nursery area for anadromous and pelagic species. Coho spawn in limited upstream locations, but the overall rearing potential is low.

Switzer Creek This 2-15 foot wide creek enters Gastineau Channel east of Sunny Point and has depths up to 2-1/2 feet. A gravel streambed predominates, with an intertidal zone that is 1/2 mile long. The entire length of the system has excellent rearing habitat. Pinks and chums spawn lower in the system while cohos spawn above Glacier Highway.

Two major highway crossings towards the mouth, subdivision runoff, and a logging operation have introduced sediment into the channel of Switzer Creek.

Switzer Creek has populations of coho, pink, and chum salmon, Dolly Varden char, and cutthroat trout. Staghorn sculpin and starry flounder occupy the intertidal area. Over 1,000 Dolly Varden and escapements of about 400 salmon have been documented here.

Lemon Creek Lemon Creek flows through a major industrial/residential area, draining a 25-square-mile watershed. The glacial colored water (except in winter, spring, and mornings in summer when it flows clear) measures 30-50 feet wide and 1-3 feet deep. The streambed is primarily gravel. Gravel was extracted from the bed of Lemon Creek for many years.

Pink, chum, and coho salmon, and Dolly Varden char occur in this system. Over 1,500 spawning salmon have been recorded in the system in recent years and provide an important food source for bald eagles.

Vanderbilt Creek This small creek enters the channel just east of Lemon Creek into a 1/2-mile-long intertidal area. The clear, brownish tinted water ranges from 4-8 feet wide and 1/2-4 feet deep. A large gravel pit and two industrial areas have introduced sediment into the system, reducing spawning and rearing values.

Dolly Varden char and pink, chum, and coho salmon occur in the stream. Escapements of over 50 salmon have been recorded recently.

Salmon Creek This stream drains a 9-square-mile watershed and enters Gastineau Channel at the northeastern corner of the refuge. A barrier falls to fish movement is found 1/8 mile above tidewater. The clear water stream in this area is 30 feet wide and 1-1/2 feet deep. While good spawning habitat occurs in the lower stream, pools needed for optimal rearing conditions are absent.

Salmon Creek has been impacted by gravel removal below the highway in the early 1970s, bridge construction from Glacier Highway, and Egan Drive construction projects. Fluctuations in streamflow have been caused by the reservoir's draw for power generation needs.

Coho, pink, and chum salmon, Dolly Varden char, and brook trout occur in this stream. A salmon hatchery was operated on the lower stream for a few years, and as a result, escapements as high as 27,000 pink, 15,000 chum, and 2,600 coho have been documented in recent years. A new hatchery, using water from Salmon Creek, is being constructed at the Alaska Electric Light and Power Tailrace.

Falls Creek This system is 5 to 12 feet wide, 6 to 12 inches deep and enters Gastineau Channel at mile 3.5 on the North Douglas Highway. The clear water contains Dolly Varden char and cutthroat trout. Most spawning/rearing areas are between the highway and tidewater.

Neilson Creek North Douglas Highway crosses this creek at mile 3.3, where the system measures 5-12 feet wide. The water is clear (slightly tinted) and flows over a gravel/bedrock substrate.

Small populations of coho and pink salmon and Dolly Varden char occur here. Fish habitat values are low due to the steep gradient and a lack of pools and cover.

Hendrickson Creek This stream enters Gastineau Channel from about 5.5 mile North Douglas Highway. It is 4-5 feet wide with pools up to 2 feet deep, the water clear with a brownish tint.

Coho, pink, and chum salmon, anadromous Dolly Varden char, and resident cutthroat occur in this creek. Most spawning habitat is between the highway and the intertidal zone, while rearing areas occur throughout the creek.

Johnson Creek Johnson Creek crosses the North Douglas Highway at about mile 6.5, measures 5-8 feet wide, and has pools to 2 feet deep. The clear water flows for its lower 1-1/4 mile through grasslands adjacent to Gastineau channel. The long intertidal area and the balance of the area below the highway crossing are excellent spawning grounds. The intertidal zone also provides good rearing habitat due to many pools and undercut banks.

Stocks of coho, pink and chum salmon, cutthroat trout, and Dolly Varden char are documented in this stream. Records of several hundred spawning salmon have been made for the stream.

Nine-Mile Creek Nine-Mile Creek on North Douglas Island is about 3 feet wide at the highway and has pools 12 inches deep. The clear, brown tinted water flows over gravel in the upper stretches with mud and silt dominating the lower reaches. The lower 1/2 mile flows through grassy meadows which provide excellent rearing cover. The long intertidal zone provides excellent rearing areas for juvenile marine

species and emigrating salmonids. The upper intertidal area provides the bulk of the stream's spawning areas.

Coho and chum salmon, Dolly Varden char, and cutthroat trout occur in this system in small numbers.

Fish Creek The Fish Creek watershed on Douglas Island, some 14 square miles, is the third largest drainage entering MWSGR. The clear water has numerous good pools for two and one-half miles above tidewater. Spawning habitat is excellent in the lower 1/4 mile and good for another two and one-quarter miles upstream.

Coho, pink, and chum salmon, Dolly Varden char, and cutthroat trout occupy this stream. Escapements as high as 28,000 pink, 5,400 chum, and 50 coho have been recorded for Fish Creek. This stream is a favorite for local anglers and supports the largest natural stock fishery in the area.

A portion of the intertidal zone was filled during North Douglas Highway construction in the early 1970s. Construction of the Eaglecrest Road (1974-76) saw the introduction of sediment into the system, some of which likely found its way to the flats. Since 1985, an old gravel pond at the mouth of the stream has been used as a release site for hatchery-reared king and coho salmon smolts.

Cove Creek Cove Creek enters Fritz Cove at mile 9.4 on the North Douglas Highway at the southwest corner of the Mendenhall Refuge. The stream has a steep gradient and a barrier falls to fish movement is found at tidewater. Resident fish may be present above the falls, but this system has not been surveyed due to its small size and steep gradient.

Marine Invertebrates

Many marine invertebrates are found in various habitats within Mendenhall Wetlands State Game Refuge. A list of some of the representative invertebrate fauna is included as Table V.

HUMAN USE OF FISH AND WILDLIFE

Mendenhall Wetlands State Game Refuge is popular for many human uses, including waterfowl hunting, sport fishing, personal use crabbing, boating, wildlife viewing and photography, wetland studies, and hiking. Each year the school district conducts "Seaweek" activities and classes on the refuge. A U.S. Fish and Wildlife Service (USFWS) study documented the dike trail adjacent to the float plane pond receiving the highest amount of recreational use of the refuge. It has been suggested that the Mendenhall Refuge

may be the most heavily used non-consumptive recreational use area in southeast Alaska.

Following is a summation of some of the uses of the refuge.

Waterfowl Hunting

Waterfowl hunting is specifically mentioned in the legislation creating the Mendenhall refuge as a human use that is to be maintained and is the only hunting allowed on the refuge. Although surrounded by the communities of Auke Bay, Douglas, and Juneau, a considerable amount of recreational duck and goose hunting takes place within refuge boundaries. An average of four percent of both the statewide hunting effort and the duck harvest takes place on the refuge. An estimated 25 percent of all southeast Alaska duck hunter days are spent on the refuge and 25 percent of all ducks harvested in southeast Alaska come from the Mendenhall flats. Canada geese may be displaced from the refuge by hunting pressure.

The following figures, from ADF&G Survey and Inventory Reports, describe waterfowl hunting on Mendenhall wetlands:

Year	Hunter Days		Duck Harvest		Goose Harvest	
	#	(%)*	#	(%)	#	(%)
1971	2813	(6.3)	3010	(3.6)	113	(1.0)
1972	5600	(9.4)	4585	(5.0)	671	(6.0)
1973	2720	(4.7)	2238	(2.5)	74	(0.4)
1974	4346	(8.1)	3447	(4.8)	133	(1.0)
1975	2851	(5.0)	3864	(4.4)	280	(1.5)
1976	1871	(2.8)	3163	(3.1)	130	(0.9)
1977	no data		4290	(4.1)	no data	
1978	"	"		(4.2)	"	"
1979	"	"		(5.5)		(7.7)
1980	"	"	7882	(8.2)	313	(2.4)
1981	"	"	no data		no data	
1982	"	"	"	"	"	"
1983	2127	(2.8)	3832	(3.1)	367	(2.5)
1984	1977	(2.6)	1829	(1.8)	61	(0.4)
1985	2175	(4.1)	3265	(4.1)	90	(1.0)

*(% of statewide harvest)

Trapping

Trapping is prohibited within 1/4 mile of both the Egan Expressway and the North Douglas Highway. Thus, trapping is illegal within almost the entire Mendenhall Wetlands State Game Refuge. No records are known of historic trapping on the refuge

Fishing

No commercial or subsistence fisheries occur within the refuge boundaries, but a personal use fishery for tanner, king, and dungeness crab exists in Fritz Cove. Also, some limited clamming occurs within MWSGR. Recent regulations stipulate that residents of Juneau do not qualify as subsistence users. Sport fishing for salmonids and halibut takes place on the refuge.

Wildlife Viewing/Photography

The most common human activities (as determined by one study in the float plane pond area) were walking (often with dogs), running, and wildlife viewing. This study estimated 17,158 "people use events" (one person using the area for any recreational pursuit for any portion of one day) annually.

OTHER ACTIVITIES ON THE REFUGE

Boating

Boating, fishing, hunting, etc., being activities that generally last longer than other pursuits, were found (in the USFWS study) to provide 4,555 people use events annually. Sailing, sailboarding, access for sport and commercial fishing vessels to and from harbors and fishing grounds, and even limited water skiing and windsurfing take place on the refuge. The use of power boats launched from outside refuge boundaries is the only authorized public use of motorized vehicles within the refuge.

Hiking

The refuge is bordered by the Egan Expressway on the north and the North Douglas Highway on the south. While maintained trails do not exist on MWSGR, some of the upland areas and many of the upper high tide areas provide excellent locations for walking. Access to the refuge includes: 1) Mendenhall Peninsula, 2) the end of Engineer's Cutoff Road, 3) Industrial Boulevard, 4) the airport dike, 5) Sunny Point Drive, 6) Switzer Creek, 7) the refuge viewing platform at mile 6 Egan Expressway, 8) Twin Lakes, 9) Salmon Creek at mile 3 Egan Expressway, 10) Nine Mile Creek Road, 11) Nine Mile Creek, 12) Fish Creek at 8.5 mile North Douglas Highway, and 13) Cove Creek at 9.5 mile North Douglas Highway. There is also access potential at Johnson Creek; however, off-road parking is not currently available.

Grazing

While grazing of domestic livestock is not addressed in the enabling legislation, several horses are kept by local

residents adjacent to the refuge. These animals are at times turned free without the required permit from the state to roam and subsequently enter the refuge and graze on grasses and forbs.

Marine Navigation

Gastineau Channel provides an important transportation link for both sport and commercial fishing vessels from downtown Juneau and Douglas harbors to Stephens Passage to the east and Auke Bay/Tee Harbor anchorages and Lynn Canal to the west. The U. S. Coast Guard maintains a series of navigational aids to assist local mariners in navigating the channel, which is passable to most small craft and mid-size commercial vessels at a 14-foot or higher tide.

Material Extraction

Several areas within the refuge boundaries have been sources of gravel extraction. Gravel has been mined from Fish Creek and the Mendenhall River for road, runway, and other construction projects.

Lemon Creek currently has a logging operation at the upper portion of the watershed. This may be introducing silt and other contaminants into the estuarine areas of the refuge as well as affecting streamflows.

Utilities

Alaska Electric Light and Power Company operates a hydroelectric station which draws its power from the Salmon Creek dam. This facility is located off refuge lands, and permits require minimum stream flows to prevent adverse effects during periods of low natural flows.

Airport/Highways

The Mendenhall wetlands comprised approximately 6,000 acres prior to developments such as airport construction, road building, and residential expansion. While no highways actually cross refuge lands, North Douglas Highway, Glacier Highway, and Egan Expressway have all had impacts on the wetlands. Each project reduced the amount of land available for wildlife habitat, while construction of these roads has introduced inorganic materials onto the flats.

The construction of the Juneau International Airport also reduced wetlands acreage. Ponds created by dredging for the float plane pond increased loafing areas for waterfowl in an area that airport officials now feel may conflict with aircraft safety.

Land Status and Aquisition

All lands within the Mendenhall Wetlands State Game Refuge, except for City/Borough of Juneau lands or approved accretion claims, are owned by the State of Alaska. The Department of Natural Resources maintains management authority of water and the surface/subsurface resources, while the Department of Fish and Game is responsible for managing the fish and wildlife resources, their habitats, and human use of the refuge.

INFORMATION NEEDS

Because of the relative small size of this refuge and its proximity to a population center, occurance of many bird and mammal species are generally well documented on the refuge. However, very little fish and marine invertebrate information has been documented and very little is known about ecological relationships. Information on the following topics could assist in better understanding the Mendenhall Refuge.

Waterfowl

- Determination of the role of hunting and other human disturbance in displacement of Vancouver Canada geese and other waterfowl from the refuge.
- Delineation of duck breeding habitat and evaluation of the practicality of enhancing it.
- Investigation of food habits of waterfowl on the refuge.
- Investigation of waterfowl enhancement opportunities on the refuge.
- Analysis of lead shot ingestion rates in mallards and pintails.

Other birds

- Census of the Arctic tern breeding colony.

Furbearers

- Population estimate of furbearing species on the refuge.

Fish

- Determine importance of refuge to feeding and rearing salmonids and other species including sticklebacks, sculpins, and sand lance.

Marine Invertebrates

° Inventory marine invertebrate species found within the refuge.

Human Use

° Determine impacts of domestic animals (i.e., dogs and cats) on wildlife species.

Water Quality

° Determine water quality on the refuge and identify any problems.

Table I. MENDENHALL WETLANDS STATE GAME REFUGE
PROVISIONAL PLANT LIST
taken from Watson (1979)

FAMILY AND SPECIES REPRESENTED

Algae
- Fucus sp.

Arrow grass
- Seaside arrow grass (Triglochin maritima)

Birch
- Sitka alder (Alnus crispa)
- Red alder (Alnus oregana)

Buckwheat
- Garden dock (Rumex longifolius)
- Sheep sorrel (Rumex acetosella)

Aster
- Achillea lanulosa
- Arctic daisy (Chrysanthemum arcticum)
- Dandelion (Taraxacum officinale)
- Northern Yarrow (Achillea borealis)
- Ox-eye daisy (Chrysanthemum leucanthemum)
- Pineapple weed (Matricaria matricarioides)
- Senecio pseudo-Arnica

Crowfoot
- Ranunculus cymbalaria
- Ranunculus occidentalis
- Yellow marsh-marigold (Caltha palustris)
- Western columbine (Aquilegia formosa)

Ditchgrass
- Ruppia sp.

Evening primrose
- Fireweed (Epilobium angustifolium)
- Northern willow-herb (Epilobium adenocaulon)

Figwort
- Indian paintbrush (Castilleja unalaschcensis)
- Yellow rattle (Rhinanthus minor)

Gentian
- Star gentian (Lomatogonium rotatum)

Goosefoot
- Gmelin saltweed (Atriplex gmelini)

Grasses
- Beach rye (*Elymus arenarius mollis*)
- Bent grass (*Agrostis* sp.)
- *Deschampsia* sp.
- *Hordeum brachyantherum*
- Pacific alkaligrass (*Puccinellia nutkaenis*)
- Reed bent grass (*Calamagrostis* sp.)
- Squirreltail grass (*Hordeum jubatum*)
- Timothy (*Phleum pratense*)

Horsetail
- Meadow horsetail (*Equisetum arvense*)

Madder
- Cleavers (*Galium aparine*)

Mustard
- Scurvy grass (*Cochlearia officinalis*)
- *Thlaspi arcticum*

Parsley
- *Angelica genuflexa*
- *Angelica lucida*
- Beach Lovage (*Ligusticum scoticum*)
- Cow parsnip (*Heracleum lanatum*)
- Hemlock parsley (*Conioselinum chinense*)
- Poison hemlock (*Cicuta douglasii*)

Pea
- Beach pea (*Lathyrus maritimus*)
- Nootka lupine (*Lupinus nootkatensis*)
- White clover (*Trifolium repens*)

Pine
- Sitka spruce (*Picea sitchensis*)
- Western hemlock (*Tsuga heterophylla*)

Pink
- Larger mouse-ear chickweed (*Cerastium fontanum*)
- Low chickweed (*Stellaria humifusa*)
- Sand spurry (*Spergularia canadensis*)
- Seabeach sandwort (*Honckenya peploides*)

Plaintain
- Common plaintain (*Plantago major*)
- Goose-tongue (*Plantago maritima juncoides*)

Potamogeton
- Filiform pondweed (*Potamogeton filiformis*)

Primrose
- Sea milkwort (*Glaux maritima*)
- Pretty shooting star (*Dodecatheon pulchellum*)

Rose

- Beach strawberry (*Fragaria chiloensis*)
- Common silverweed (*Potentilla anserina*)
- Mountain ash (*Sorbus* sp.)
- Nagoon berry (*Rubus arcticus*)
- Pacific silverweed (*Potentilla egedii grandis*)
- Sitka burnet (*Sanguisorba stipulata*)
- Large-leaved avens (*Geum macrophyllum*)

Rush

- *Juncus arcticus*

Saxifrage

- Northern grass-of-Parnassus (*Parnassia palustris*)

Sedge

- *Carex kelloggii*
- *Carex lenticularis*
- Lyngbye sedge (*Carex lyngbyaei*)
- Many-flowered sedge (*Carex pluriflora*)
- Needle spikerush (*Eleocharis acicularis*)
- Russet cottongrass (*Eriophorum russeolum*)
- Water sedge (*Carex aquatilis*)

Water milfoil

- Common marestail (*Hippurus vulgaris*)

Willow

- Black cottonwood (*Populus balsamifera*)
- *Salix Barclayi*
- *Salix sitchensis*
- *Salix* sp.

Table II. MENDENHALL WETLANDS STATE GAME REFUGE
PROVISIONAL BIRD LIST
(pers. comm. Pete Islieb and Bob Armstrong)

Loons: Gaviidae
- Red-throated loon (Gavia stellata)
- Pacific loon (Gavia pacifica)
- Common loon (Gavia immer)
- Yellow-billed loon (Gavia adamsii)

Grebes: Podicipedidae
- Horned grebe (Podiceps auritus)
- Red-necked grebe (Podiceps grisegena)
- Western grebe (Aechmophorus occidentalis)

Petrels: Hydrobatidae
- Fork-tailed storm petrel (Oceanodroma furcata)

Cormorants: Phalacrocoracidae
- Double-crested cormorant (Phalacrocorax auritus)
- Pelagic cormorant (Phalacrocorax pelagicus)

Herons: Ardeidae
- Great blue heron (Ardea herodias)
- Snowy egret (Egretta thula)
- Green-backed heron (Butorides striatus)
- Black-crowned night heron (Nycticorax nycticorax)

Ducks, geese, swans: Anatidae
- Tundra swan (Cygnus columbianus)
- Trumpeter swan (Cygnus buccinator)
- Greater white-fronted goose (Anser albifrons)
- Snow Goose (Chen caerulescens)
- Emperor goose (Chen canagica)
- Brant (Branta bernicla)
- Vancouver Canada goose (Branta canadensis fulva)
- Cackling Canada goose (Branta canadensis minima)
- Lesser Canada goose (Branta canadensis parvipes)
- Wood duck (Aix sponsa)
- Green-winged teal (Anas crecca)
- Mallard (Anas platyrhynchos)
- Northern pintail (Anas acuta)
- Blue-winged teal (Anas discors)
- Cinnamon teal (Anas cyanoptera)
- Northern shoveler (Anas clypeata)
- Gadwall (Anas strepera)
- Eurasian wigeon (Anas penelope)
- American wigeon (Anas americana)
- Canvasback (Aythya valisineria)
- Redhead (Aythya americana)
- Ring-necked duck (Aythya collaris)
- Greater scaup (Aythya marila)
- Lesser scaup (Aythya affinis)
- King eider (Somateria spectabilis)

Steller's eider (Polysticta stelleri)
Harlequin duck (Histrionicus histrionicus)
Oldsquaw (Clangula hyemalis)
Black scoter (Melanitta nigra)
Surf scoter (Melanitta perspicillata)
White-winged scoter (Melanitta fusca)
Common goldeneye (Bucephala clangula)
Barrow's goldeneye (Bucephala islandica)
Bufflehead (Bucephala albeola)
Hooded merganser (Lophodytes cucullatus)
Common merganser (Mergus merganser)
Red-breasted merganser (Mergus serrator)

Hawks, eagles, harriers: Accipitridae
Osprey (Pandion haliaetus)
Bald eagle (Haliaeetus leucocephalus)
Northern harrier (Circus cyaneus)
Sharp-shinned hawk (Accipiter striatus)
Northern goshawk (Accipiter gentilis)
Red-tailed hawk (Buteo jamaicensis)
Rough-legged hawk (Buteo lagopus)
Golden eagle (Aquila chrysaetos)

Falcons: Falconidae
American kestrel (Falco sparverius)
Merlin (Falco columbarius)
Peregrine falcon (Falco peregrinus)
Gyrfalcon (Falco rusticolus)

Grouse, ptarmigan: Phasianidae
Blue grouse (Dendragapus obscurus)
Rock ptarmigan (Lagopus mutus)

Coots: Rallidae
Yellow rail (Coturnicops noveboracensis)
Sora (Porzana carolina)
American coot (Fulica americana)

Cranes: Gruidae
Sandhill crane (Grus canadensis)

Plovers: Charadriidae
Black-bellied plover (Pluvialis squatarola)
Lesser golden plover (Pluvialis dominica)
Semipalmated plover (Charadrius semipalmatus)
Killdeer (Charadrius vociferus)

Oystercatchers: Haematopodidae
Black oystercatcher (Haematopus bachmani)

Sandpipers: Scolopacidae
Greater yellowlegs (Tringa melanoleucus)
Lesser yellowlegs (Tringa flavipes)
Solitary sandpiper (Tringa solitaria)
Wandering tattler (Heteroscelus incanum)

Spotted sandpiper (Actitis macularia)
Upland sandpiper (Bartramia longicauda)
Whimbrel (Numenius phaeopus)
Hudsonian godwit (Limosa haemastica)
Bar-tailed godwit (Limosa lapponica)
Marbled godwit (Limosa fedoa)
Ruddy turnstone (Arenaria interpres)
Black turnstone (Arenaria melanocephala)
Surfbird (Aphriza virgata)
Red Knot (Calidris canutus)
Sanderling (Calidris alba)
Semipalmated sandpiper (Calidris pusilla)
Western sandpiper (Calidris mauri)
Least sandpiper (Calidris minutilla)
Baird's sandpiper (Calidris bairdii)
Pectoral sandpiper (Calidris melanotos)
Sharp-tailed sandpiper (Calidris acuminata)
Rock sandpiper (Calidris ptilocnemis)
Dunlin (Calidris alpina)
Short-billed dowitcher (Limnodromus griseus)
Long-billed dowitcher (Limnodromus scolopaceus)
Common snipe (Gallinago gallinago)
Wilson's phalarope (Phalaropus tricolor)
Red-necked phalarope (Phalaropus fulicaria)

Gulls, terns: Laridae
Parasitic jaeger (Stercorarius parasiticus)
Bonaparte's gull (Larus philadelphia)
Mew gull (Larus canus)
Ring-billed gull (Larus delawarensis)
California gull (Larus californicus)
Herring gull (Larus argentatus)
Thayer's gull (Larus thayeri)
Glaucous-winged gull (Larus glaucescens)
Glaucous gull (Larus hyperboreus)
Black-legged kittiwake (Rissa tridactyla)
Caspian tern (Sterna caspia)
Arctic tern (Sterna paradisaea)

Alcids: Alcidae
Common murre (Uria aalge)
Pigeon guillemot (Cepphus columba)
Marbled murrelet (Brachyramphus marmoratus)
Kittlitz's murrelet (Brachyramphus brevirostris)
Ancient murrelet (Synthliboramphus antiquus)

Pigeons, doves: Columbidae
Rock dove (Columba livia)
Mourning dove (Zenaida macroura)

Owls: Strigidae
Western screech owl (Otus kennicottii)
Great horned owl (Bubo virginianus)
Snowy owl (Nyctea scandiaca)
Northern hawk owl (Surnia ulula)

Northern pygmy owl (Glaucidium gnoma)
Barred owl (Strix varia)
Short-eared owl (Asio flammeus)
Northern saw-whet owl (Aegolius acadicus)

Nighthawk: Caprimulgidae
Common nighthawk (Chordeiles minor)

Swifts: Apodidae
Black swift (Cypseloides niger)
Vaux's swift (Chaetura vauxi)

Hummingbirds: Trochilidae
Anna's hummingbird (Calypte anna)
Calliope hummingbird (Stellula calliope)
Rufous hummingbird (Selasphorus rufus)

Kingfishers: Alcedinidae
Belted kingfisher (Ceryle alcyon)

Woodpeckers: Picidae
Red-breasted sapsucker (Sphyrapicus ruber)
Downy woodpecker (Picoides pubescens)
Hairy woodpecker (Picoides villosus)
Three-toed woodpecker (Picoides tridactylus)
Black-backed woodpecker (Picoides arcticus)
Northern flicker (Colaptes auratus)

Tyrant Flycatchers: Tyrannidae
Olive-sided flycatcher (Contopus borealis)
Western wood-pewee (Contopus sordidulus)
Alder flycatcher (Empidonax alnorum)
Willow flycatcher (Empidonax traillii)
Least flycatcher (Empidonax minimus)
Hammond's flycatcher (Empidonax hammondii)
Say's phoebe (Sayornis saya)
Western kingbird (Tyrannus verticalis)
Western flycatcher (Empidonax difficilis)
Eastern kingbird (Tyrannus tyrannus)

Larks: Alaudidae
Horned lark (Eremophila alpestris)

Swallows: Hirundinidae
Tree swallow (Tachycineta bicolor)
Violet-green swallow (Tachycineta thalassina)
Northern rough-winged swallow (Stelgidopteryx serripennis)
Bank swallow (Riparia riparia)
Cliff swallow (Hirundo pyrrhonota)
Barn swallow (Hirundo rustica)

Jays, crows: Corvidae
Steller's jay (Cyanocitta stelleri)
Black-billed magpie (Pica pica)

Northwestern crow (Corvus caurinus)
Common raven (Corvus corax)

Chickadees: Paridae
Black-capped chickadee (Parus atricapillus)
Chestnut-backed chickadee (Parus rufescens)

Nuthatches: Sittidae
Red-breasted nuthatch (Sitta canadensis)

Creepers: Certhiidae
Brown creeper (Certhia americana)

Wrens: Troglodytidae
Winter wren (Troglodytes troglodytes)

Dippers: Cinclidae
American dipper (Cinclus mexicanus)

Kinglets, thrushes: Muscicapidae
Golden-crowned kinglet (Regulus satrapa)
Ruby-crowned kinglet (Regulus calendula)
Mountain bluebird (Sialia currucoides)
Townsend's solitaire (Myadestes townsendi)
Gray-cheeked thrush (Catharus minimus)
Swainson's thrush (Catharus ustulatus)
Hermit thrush (Catharus guttatus)
American robin (Turdus migratorius)
Varied thrush (Ixoreus naevius)

Mimic-thrushes: Mimidae
Northern mockingbird (Mimus polyglottos)

Pipits: Motacillidae
Water pipit (Anthus spinoletta)

Waxwings: Bombycillidae
Bohemian waxwing (Bombycilla garrulus)
Cedar waxwing (Bombycilla cedrorum)

Shrikes: Laniidae
Northern shrike (Lanius excubitor)

Starlings: Sturnidae
European starling (Sturnus vulgaris)

Vireos: Vireonidae
Warbling vireo (Vireo gilvus)

Warblers, sparrows, etc.: Emberizidae
Tennessee warbler (Vermivora peregrina)
Orange-crowned warbler (Vermivora celata)
Yellow warbler (Dendroica petechia)
Magnolia warbler (Dendroica magnolia)
Yellow-rumped warbler (Dendroica coronata)

Townsend's warbler (Dendroica townsendi)
Hermit warbler (Dendroica occidentalis)
Palm warbler (Dendroica palmarum)
Blackpoll warbler (Dendroica striata)
American redstart (Setophaga ruticilla)
Northern waterthrush (Seiurus noveboracensis)
Wilson's warbler (Wilsonia pusilla)
Western tanager (Piranga ludoviciana)
American tree sparrow (Spizella arborea)
Chipping sparrow (Spizella passerina)
Savannah sparrow (Passerculus sandwichensis)
Fox sparrow (Passerella iliaca)
Song sparrow (Melospiza melodia)
Lincoln's sparrow (Melospiza lincolnii)
White-throated sparrow (Zonotrichia albicollis)
Golden-crowned sparrow (Zonotrichia atricapilla)
White-crowned sparrow (Zonotrichia leucophrys)
Harris' sparrow (Zonotrichia querula)
Dark-eyed junco (Junco hyemalis)
Lapland longspur (Calcarius lapponicus)
Smith's longspur (Calcarius pictus)
Snow bunting (Plectrophenax nivalis)
Brown-headed cowbird (Molothrus ater)
Red-winged blackbird (Agelaius phoeniceus)
Rusty blackbird (Euphagus carolinus)
Western meadowlark (Sturnella neglecta)

Buntings, grosbeaks: Fringillidae
Brambling (Fringilla montifringilla)
Rosy finch (Leucosticte arctoa)
Purple finch (Carpodacus purpureus)
Cassin's finch (Carpodacus cassinii)
Red crossbill (Loxia curvirostra)
Pine grosbeak (Pinicola enucleator)
White-winged crossbill (Loxia leucoptera)
Common redpoll (Carduelis flammea)
Hoary redpoll (Carduelis hornemanni)
Pine siskin (Carduelis pinus)
American goldfinch (Carduelis tristis)

Table III. MENDENHALL WETLANDS STATE GAME REFUGE
PROVISIONAL MAMMAL LIST

Shrews: Insectivora
Masked shrew (Sorex cinereus)

Bats: Chiroptera
Little brown bat (Myotis lucifugus)

Hares: Lagomorpha
Snowshoe hare (Lepus americanus)

Mice, voles, squirrels, marmots: Rodentia
Hoary marmot (Marmota caligata)
Red squirrel (Tamiasciurus hudsonicus)
Deer mouse (Peromyscus maniculatus)
Long-tailed vole (Microtus longicaudus)
Muskrat (Onodatra zibethicus)
Porcupine (Erethizon dorsatum)

Whales: Cetacea
Minke whale (Balaenoptera acutorostrata)
Humpback whale (Megaptera nodosa)

Bear, weasels, otter: Carnivora
Black bear (Ursus americanus)
Short-tailed weasel (Mustela erminea)
Mink (Mustela vison)
River otter (Lutra canadensis)

Seals, sea lions: Pinnipedia
Harbor seal (Phoca vitulina)
Northern sea lion (Eumetopias jubatus)

Deer: Artiodactyla
Sitka black-tailed deer (Odocoileus hemionus sitkensis)

Table IV. MENDENHALL WETLANDS STATE GAME REFUGE PROVISIONAL FINFISH LIST OF REPRESENTATIVE SPECIES

Common Name	Genus/Species
Rock sole	*Lepidopsetta bilineata*
Yellowfin sole	*Limanda aspera*
Flathead sole	*Hippoglossoides elassodon*
Starry flounder	*Platichtys stellatus*
Pacific staghorn sculpin	*Leptocottus armatus*
Prickly (coast range) sculpin	*Cottus asper*
Sculpins	*Myoxocephalus* spp.
Sculpin	*Oligocottus* sp.
Sculpins	*Blepsias* spp.
Buffalo scuplin	*Enophrys bison*
Spinyhead sculpin	*Dasycottus setiger*
Kelp greenling	*Hexagrammos decagrammus*
Whitespotted greenling	*Hexagrammos stelleri*
Walleye pollock	*Theragra chalcogramma*
Pacific cod	*Gadus macrocephalus*
Crescent gunnel	*Pholis laeta*
Arctic shanny	*Stichaeus punctatus*
Snake prickleback	*Lumpenus saggita*
Wolf-eel	*Anarrhichthys ocellatus*
Pacific spiny lumpsucker	*Eumicrotremis orbis*
Marbled snailfish	*Liparis dennyi*
Sturgeon poacher	*Agonus acipenserinus*
King salmon	*Oncorhynchus tshawytscha*
Chum salmon	*Oncorhynchus keta*
Coho salmon	*Oncorhynchus kisutch*
Pink salmon	*Oncorhynchus gorbuscha*
Sockeye salmon	*Oncorhynchus nerka*
Dolly Varden char	*Salvelinus malma*
Cutthroat trout	*Oncorhynchus clarki*
Rainbow trout/steelhead	*Oncorhynchus mykiss*
Searchers	*Bathymaster* spp.
Pacific herring	*Clupea pallasii*
Longnose skate	*Raja rhina*
Pacific halibut	*Hippoglossus stenolepis*
Sandlance	*Ammodytes hexapterus*
Sand fish	*Trichodon trichodon*
Capelin	*Mallotus villosus*
Threespine stickleback	*Gasterosteus aculeatus*

Table V. MENDENHALL WETLANDS STATE GAME REFUGE
PROVISIONAL MARINE INVERTEBRATE LIST
OF REPRESENTATIVE SPECIES

Common Name	Genus/Species
Snowflake sea star	Crossaster papposus
Sunflower sea star	Pycnopodia helianthoides
Mottled sea star	Evasterias troschellii
Sun starfish	Solaster endeca
Stimpson's sea star	Solaster stimpsoni
Dawson's sea star	Solaster dawsoni
Cushion sea star	Pteraster tesselatus
	Orthasterias koehleri
	Pteraster tesselatus
	Gephyreaster sp.
Pacific henricia	Henricia leviuscula
Blood sea star	Henricia sanguinolenta
Daisy brittle star	Ophiopholis aculeata
Six armed sea star	Leptasterias epichlora
Green sea urchin	Strongylocentrotus droebachiensis
Sea cucumber	Parastichopus sp.
Stiff-footed sea cucumber	Eupentacta quinquesemita
Orange sea cucumber	Cucumaria miniata
	Obelia sp.
	Sarsia sp.
	Melicertum sp.
	Allopora sp.
Frilled anemone	Metridium senile
Buried sea anemone	Anthopleura artemisia
Northern red anemone	Urticina crassicornis
Anemone	Harenactis sp.
Anemones	Clytia spp.
Jellyfishes	Aurelia spp.
Jellyfish	Cyanea capillata
Hydromedusa	Aequorea
Gurney's sea pen	Ptilosarcus gurneyi
Red tube worm	Serpula vermicularis
Banded feather duster	Sabella crassicornis
Phoronid worm	Phoronopsis harmeri
Giant feather duster	Eudistylia polymorpha
Comb jelly	Bolinopsis sp.
Barnacles	Balanus spp. & Semibalanus
Hair crab	Telmessus cheiragonus
Lyre crab	Hyas lyratus
King crab	Paralithodes camtschatica
Tanner crab	Chionoecetes bairdi
Dungeness crab	Cancer magister
Decorator crab	Oregonia gracilis
Crabs	Hapalogaster spp.
Anomuran crab	Rhinolithodes wosnessenskii
Coon-strip shrimp	Pandalus danae
Humpy shrimp	Pandalus goniurus
Bent-backed shrimp	Lebbeus grandimanus

Bent-backed shrimps	Lebbeus spp.
Bent-backed shrimps	Eualus spp.
Bent-backed shrimps	Heptacarpus
Bent-backed shrimps	Spirontocaris spp.
Sand shrimps	Crangon spp.
Sand shrimps	Argis spp.
Opossum shrimps	Neomysis spp.
Tunicate	Halocynthia sp.
Tunicate	Styela sp.
Squid	Rossia pacifica
Octopus	Octopus dofleini
Mollusca	Clione limacina
Nudibranch	Dendronotus rufus
Nudibranch	Dirona aurantia
Nudibranch	Cadlina sp.
Nudibranch	Coryphella sp.
Nudibranch	Crassicornis
Ringed doris	Diaulula sandiegensis
White king doris	Onchidoris odhneri
Monterey doris	Onchidoris montereyensis
Rough-mantled seaslug	Onchidoris bilamellata
Shag rug nudibranch	Aeolidia papillosa
Scallop	Chlamys hastata
Scallop	Chlamys rubida
Truncated mya	Mya truncata
Soft shell mya	Mya arenaria
Nuttall's cockle	Clinocardium nuttallii
Gaper clam	Tresus capax
Blue mussel	Mytilus edulis
Mussel	Modiolus sp.
Northwest neptune	Neptunea lyrata
Pribilof whelk	Neptunea pribiloffensis
Lyre whelk	Buccinum plectrum
Whelks	Nucella
Hairy triton	Fusitriton oregonensis
Amphissa	Amphissa sp.
Hairy shell	Trichotropis sp.
Limpets	Notoacmea, Collisella
Costate top	Calliostoma ligatum
Lined chiton	Tonicella lineata
Lined chiton	Tonicella insignis
Giant chiton	Cryptochiton stelleri
Chitons	Mopalia sp.
Veiled chiton	Placiphorella velata
Lampshell	Laqueus vancouverensis
Lampshell	Terebratulina sp.
Butter clam	Saxidomus giganteus
Crumb of bread sponge	Halichondria panicea
Clam worm	Nereis vexillosa
Cone worm	Pectinaria sp.
Sand worm	Nephtys sp.
Spoon worms	Echiurus alaskensis
Peanut worms	Sipunculus sp.
Mud worms	Polydora sp.
Fragile worm	Lumbrineris sp.

File dogwinkle	*Nucella lima*
Frilled dogwinkle	*Nucella lamellosa*
Tube worm	*Spirorbis* sp.
Curly terebellid worm	*Thelepus crispus*
Baltic macoma	*Macoma balthica*
Bent-nosed macoma	*Macoma nasuta*
White macoma	*Macoma inquinata*
Little neck clam	*Protothaca staminea*
Jordan's colus	*Colus jordani*
Arctic moon snail	*Natica clausa*
Sitka periwinkle	*Littorina sitkana*
Euphausiids	*Thysanoessa* spp.
Euphausiid	*Euphausia pacifica*
Bryozoan	*Membranipora serrilamella*
Hermit crab	*Elassochirus tenuimanus*
Hermit crab	*Pagurus hirsutiusculus*

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