

# Errata for 2005 Pack Creek Zoological Area Landscape Assessment

Changes shown in **bold** font

## Page 1 - Management Direction

The Alaska National Interest Lands Conservation Act of 1980 (ANILCA) designated the wilderness portion of the National Monument as the *Admiralty Island National Monument Wilderness* (ANILCA, Section 703(a)(1)). The wilderness was renamed *Kootznoowoo Wilderness* through the Tongass Timber Reform Act of 1990 (TTRA Section 703(c)(2)).

## Page 5 – Emphasis 3

The statement “*no regulations currently exist for the Assessment Area*” should instead read “**no temporary camp facilities are permitted in the assessment area as decided in the Admiralty Island National Monument Wilderness Management Direction for 1986.**”

## Page 12 – Wilderness and Recreation Resources – Introduction, last sentence

There are **5.8 million acres** of designated Wilderness in the Alaska Region.

## Page 12 – The Wilderness Act

The Wilderness Act **prohibits** (not “*generally discourages*”) the use of motorized vehicles within congressionally designated wilderness areas (Wilderness Act, Section 4 (c)).

## Page 12 – ANILCA

Exceptions to the Wilderness Act include only the use of airplanes, motorboats, snowmachines (during periods of adequate snowcover) for traditional activities (ANILCA Section 1110(a)). The use of any other mechanized transport that might be considered an aircraft, like a **helicopter, is prohibited.**



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# Pack Creek Zoological Area Landscape Assessment



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# INTRODUCTION

## *Purpose*

This landscape assessment is an important tool for Forest Plan implementation. First, the assessment evaluates the broad direction specified in the Forest Plan for Admiralty Island National Monument, including a description of desired conditions. Next, it considers the current condition of the Pack Creek Zoological Area (the Assessment Area) and identifies factors that have contributed to change over time. This description focuses on topics identified as particularly relevant for future management of the area. Finally, it concludes with a list of recommendations for potential projects intended to implement the Forest Plan. These projects are intended to move the Assessment Area toward the desired condition specified for the area and/or address important issues.

The assessment is also important for District-level program management. The assessment not only identifies potential projects, but it also includes information intended to assist the decision-maker in prioritizing those projects. The Admiralty National Monument will also use this assessment to develop a Zoological Area Plan as described in the Forest Plan (USDA 1997a, p. 3-56).

## *Location and Description*

This landscape assessment is limited to analysis of the Pack Creek Zoological Area and tidal and submerged lands at Pack Creek. The Assessment Area is located in northern Seymour Canal on Admiralty Island, approximately 25 air miles from Juneau, Alaska (see Map 1 in Appendix A). The area includes the Pack Creek, Swan Creek, and Windfall Creek Watersheds and Swan and Windfall Islands. It covers approximately 66,000 acres.

## *Management Direction*

In 1978, through a Presidential Proclamation, Jimmy Carter designated Admiralty Island a National Monument for the scientific purpose of preserving intact a unique coastal island ecosystem. With the passage of the Alaska National Interest Lands Conservation Act (ANILCA) on December 2, 1980, Congress established the Kootznoowoo Wilderness, which comprises the majority of the land area on Admiralty Island. The Assessment Area, which is located entirely within the 956,155 acre Kootznoowoo Wilderness, is managed by the Forest Service in accordance with the Wilderness Act of 1964, the 1978 Presidential Proclamation, and the unique provisions for management of Wilderness Areas in Alaska created by ANILCA.

The Wilderness Act of 1964, Section 2(c), defined Wilderness as:

an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain...an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has

outstanding opportunities for solitude or a primitive and unconfined type of recreation...

The Act also established the National Wilderness Preservation System, a system of protected lands identified as Wilderness Areas intended to ensure an enduring resource of Wilderness in this nation and to ensure that at least some lands would be preserved and protected in their natural condition.

The Tongass Land and Resource Management Plan Revision Final Environmental Impact Statement (Forest Plan FEIS) recognized Pack Creek for its unique population of brown bears (USDA 1997b). The area has historically been used for the purpose of bear viewing. The bears have become habituated to the presence of humans and can regularly be seen during the spring and summer months. Based on these characteristics, the Forest Plan FEIS recommended the area for allocation to the Wilderness National Monument Special Interest Area Land Use Designation and established a name for it: Pack Creek Zoological Area. That recommendation was consistent with agency directives for management of areas containing unique zoological characteristics (FSM 2360—Special Interest Areas).

General direction for management of the Assessment Area is found in the Tongass National Forest Land and Resource Management Plan (Forest Plan). The area is managed in accordance with the Wilderness National Monument and Special Interest Area Land Use Designations (LUDs). The Management Prescriptions section of the Forest Plan (Chapter 3) lists the goals and objectives associated with these LUDs. The goals for managing Wilderness National Monument land (USDA 1997a, p. 3-23) include:

- maintaining an enduring wilderness resource while providing for appropriate public access and uses;
- protecting and perpetuating natural biophysical and ecological conditions and processes;
- providing a high degree of remoteness from the sights and sounds of humans; and
- providing opportunities for solitude and primitive recreation activities.

The goal for managing Special Interest Areas is to “provide for the inventory, maintenance, interpretation, and protection of the existing characteristics and attributes of areas with unique cultural, geological, botanical, zoological, recreational, scenic, or other special features” (USDA 1997a, p. 3-56). Efforts to achieve this goal, however, must be consistent with existing direction for Wilderness management.

## ***Partnerships***

Marine shorelines of the coastal forests of Southeast Alaska have been the focus of human attention for centuries. The near-shore marine environment and the shoreline forests and beaches are influenced by humans to a much larger extent than upland areas further from the beach. The Forest Service possesses management responsibility for National Forest lands. These lands include not only the forested uplands but also the freshwater streams and the portions of the coastal zone above the mean high tide. The State of Alaska possesses management responsibility for land below the mean high tide line. In the Stan Price Wildlife

Sanctuary at Pack Creek, these lands are managed by the Alaska Department of Fish and Game. In the remainder of the Assessment Area, they are managed by the Alaska Department of Natural Resources. This assessment applies primarily to National Forest lands. However, the assessment also applies to tidal and submerged lands at Pack Creek.

State and federal agencies that share management responsibilities at the shoreline often have differing goals that sometimes result in divergent management policies. Yet some wildlife species have large home ranges that cross a variety of management jurisdictions and, therefore, require cooperative management. Bears, for example, make use of multiple habitats between the shoreline and alpine areas. Management of the Pack Creek Bear Viewing area is a good example of cooperation between the Forest Service and the Alaska Department of Fish and Game for achievement of shared goals such as protection of bears, interpretation of natural resources, and protection of wilderness values.

A variety of partners provide valuable assistance in managing the Assessment Area by helping to gather resource information, delivering educational programs, and providing guiding services to forest visitors. A number of our key partners are described below.

Southeast Alaska Wilderness Exploration, Analysis and Discovery (SEAWEAD) is a small, non-profit group of naturalists, scientists and educators whose mission is to provide information about Southeast Alaska's wildlife and habitats in support of resource management and public education. The organization completed a series of studies in 2004 that have yielded valuable bear habitat information for the Assessment Area.

Discovery Southeast is another private, non-profit, partner. The organization provides educational information and activities with an aim "to strengthen and enrich the bond between Southeast Alaskans and their natural home." Discovery Southeast offers teacher training expeditions to the Pack Creek Zoological Area. This activity is sponsored by the Forest Service, Alaska Discovery and the Alaska Department of Fish and Game.

Our outfitter/guide partners provide recreational services to forest visitors. The Forest Service issues special use permits to such partners so that they may bring clients to the forest and provide them with a variety of recreation experiences afforded by the forest.

### ***Emphasis Items***

Three topic areas that are particularly relevant for management of the Pack Creek Zoological Area have been identified. These topics, which are described below, were used to focus the assessment. They were derived from public and agency comments received over the past few years.

***Emphasis 1***—Bears need access to critical resources in areas where humans have the potential to displace them.

Protecting brown bears (*Ursus arctos*) is a primary purpose of the Pack Creek Zoological Area and of the Alaska Department of Fish and Game sanctuary at Pack Creek. Bears have been protected from hunting by the Alaska Board of Game since 1935 at Pack Creek and throughout the remainder of the Assessment Area since 1984. However, hunting is not the



only human activity that can affect bears. The Interagency Unit 4 Brown Bear Management Team expressed their concern with bear/human interactions in sensitive habitats in this way:

Particular areas and types of habitats have an attraction for both bears and humans. Estuaries and anadromous fish streams are the most prominent of these. Bears depend on them primarily as a source of foods and humans frequent them for many types of recreation. The team recognized that these “Human/Bear High Use Zones” may require additional management attention to ensure continued access by bears to these key habitats, and that human/bear interactions are not detrimental to either species. (ADF&G 2000).

***Emphasis 2***—Wilderness experiences of visitors and residents are impacted by the increasing popularity of bear viewing as well as other plane and boat traffic. Appropriate commercial outfitter and guide services should be provided as needed.

The Assessment Area is part of the remote Kootznoowoo Wilderness and is expected to be less crowded than areas closer to communities. Managers strive to protect outstanding opportunities for solitude where they exist. The Assessment Area offers visitors opportunities for varying degrees of interaction with other people. Swan Cove affords visitors the greatest opportunity for solitude. Pack Creek offers the greatest opportunity for interaction with other visitors and agency staff. Windfall Harbor offers opportunities for solitude/interaction somewhere between the other two areas.

The Forest Service manages visitor use on the uplands but does not regulate saltwater, tideland, or air activities. However, the Forest Service can seek cooperation from commercial operators. Voluntary air tour guidelines initiated in 1999, for example, helped limit air traffic congestion and mitigate crowding from competing air tour operators.

The PCZA is in a remote location and is difficult for many people to reach without the help of qualified outfitter/guides. The Wilderness Act allows for commercial outfitter/guide activity within Wilderness Areas to the extent they are dependent on the Wilderness for the experience they provide. A balance between guided clients and independent residents or travelers is required. Outfitter/guides offer valuable interpretive and logistical services to visitors, and they can be held accountable for their actions around bears. However, they also have the ability to crowd out others with their larger group sizes and/or frequent visits.

***Emphasis 3***—In accordance with the Wilderness Act and other laws, natural conditions and cultural resources must be preserved and protected. Evidence of use by people should be minimized.

The Wilderness Act directs federal agencies responsible for managing Wilderness Areas to protect and manage them in order to preserve natural conditions. These conditions include not only clean water and air, but also the lack of invasive plants or animals, protections for rare or sensitive species, and the natural behavior of wildlife. Yet bears have been affected by habituation to people, and invasive plants have been found in isolated areas. The Wilderness Act also defines wilderness as an area “without permanent improvements or human habitation” and “where man himself is a visitor who does not remain.” Tent platforms or gear storage areas for the taking of fish and game or other structures could be allowed under

ANILCA, but they are subject to reasonable regulation. No regulations currently exist for the Assessment Area, and crab pot storage is evident at several sites. Historic and prehistoric resources must also be identified and protected.

## DESIRED CONDITIONS

As mentioned previously, a goal of landscape assessments is to facilitate Forest Plan implementation. The Forest Plan includes a general description of the desired conditions for each LUD. It is through examining these desired conditions and comparing them against site-specific existing conditions that we may identify projects that will implement the Forest Plan. The following description of desired conditions for land within the Wilderness National Monument and Special Interest Area LUDs is taken directly from Chapter 3 of the Forest Plan.

### ***Wilderness National Monument LUD***

The purposes of National Monument designation are fulfilled by protecting and learning more about the special resources they contain. Appropriate research is encouraged and supported within the constraints of wilderness designation, and contributes to both the purposes of the Wilderness National Monuments and improved management of other forest lands. Appropriate interpretive and educational efforts allow the public to better understand the resources of these special areas and to appreciate how these areas fit into the local, regional, and even global context of geology, ecology, and human history.

The Wilderness portions of Admiralty Island and Misty Fjords National Monuments are characterized by extensive, unmodified natural environments. Ecological processes and natural conditions are not measurably affected by past or current human uses or activities. Users have the opportunity to experience independence, closeness to nature, solitude and remoteness, and may pursue activities requiring self-reliance, challenge and risk. Motorized and mechanized use is limited to the minimum needed for the administration of wilderness, access to state and private lands, subsistence uses, and for public access and other uses specifically allowed by ANILCA.

### ***Special Interest Area LUD***

All Special Interest Areas on the Tongass National Forest are characterized by generally unmodified environments in which unique natural features are preserved. They remain largely undisturbed by human uses or activities, except for localized interpretive purposes and, in some cases, recreation developments, and provide quality opportunities for public study, use, and enjoyment. Each is an example of one or more cultural, geological, botanical, zoological, paleontological, or other special features unique within the Tongass. Zoological Areas contain unique or significant animals, animal groups, or animal communities, habitat, location, life history, ecology, environment, rarity or other features.

# CURRENT CONDITIONS

## Social Characteristics

### *Heritage Resources and Past Human Use*

There are considerable gaps in the archaeological record of Southeast Alaska and Admiralty Island. Little is known of the earliest human habitation in Southeast Alaska, and few archaeological sites have been discovered and excavated to develop cultural chronologies. Chronologies that have been developed are broad characterizations of traditions. This assessment employs categories developed by Arndt et al. (1987): early prehistoric, later prehistoric, and historic periods.

#### **Early Prehistoric Period (10,000 to 5,000 BP<sup>1</sup>)**

The earliest evidence of human occupation in Southeast Alaska is a site on Prince of Wales Island dated approximately 9800 BP (Dixon et al 1997). Other sites dated to the early prehistoric period include the Hidden Falls site on Baranof Island (Davis 1989), dating from 9500 to 10,180 BP, and a site on the southern end of the Chilkat Peninsula dating from approximately 8000 BP (Ackerman 1968). Evidence of human use in the vicinity of the Pack Creek Zoological Area does not occur until the end of the Later Prehistoric Period. However, some broad generalizations regarding cultural development can be extrapolated from other places in Southeast Alaska.

#### **Later Prehistoric Period (5000 BP to Contact)**

The Later Prehistoric Period, also referred to as the Groundstone Tradition, is characterized by a change in lithic technology from flaked tools to ground stone tools. Sites dating to this period often include shell midden deposits, bone technology, burials sites, and indications of the presence of larger settlements (winter villages) and fortifications. More sites, artifacts, and features remain today that better define settlement patterns, economies, and trade.

There are several sites dating to the Later Prehistoric Period along the west coast of Admiralty Island. They include village sites, burials, shell middens, and fish weirs. Sites on the east coast of Admiralty Island have not been dated, resulting in a considerable data gap regarding past human use of the Assessment Area.

#### **Historic period (1740 to present)**

Seymour Canal lies within the traditional territory of the Auk Tlingit. Auk territory is generally regarded as extending from Berners Bay on the mainland south to Juneau and including north and west Douglas Island. Additionally, the Auk people claim the northern part of Admiralty Island, the Mansfield Peninsula, Oliver Inlet, and Seymour Canal. Their territory is bounded to the southeast by the Taku people, to the south by the Kake people and to the west by the Angoon people (Sealaska Heritage Foundation 1998). Informants report that Oliver Inlet and Seymour Canal belonged to the L'eneidi for trapping, fishing, and hunting. Oliver Inlet is called Deishu Aak'w (Sealaska Heritage Foundation 1998, p. 40). Jimmy Watson, a Wooshkeetan, was recorded to be living at Windfall Harbor in 1946, which

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<sup>1</sup> BP stands for "years before present."

has a Tlingit place name Chicknuk (Chichnax) (Tcitenax) (Sealaska 1998, p. 117). In 1946 Alexander Stevens reported hunting and trapping activity in the Seymour Canal area but no permanent camps. However, he did report a village at Pleasant Bay and an abandoned saltery dating to 1928 (Sealaska 1998, p. 119).

Europeans and Tlingit came into direct contact on Admiralty Island in 1794 when Lieutenant Whidbey (of Vancouver's expedition) circumnavigated the Island on the H.M.S. "Discovery" and "Chatham." The British crew first put ashore at the northern end of the Island at Point Retreat, as they had encountered canoe loads of Auk Tlingit who did not want them to proceed or land (Roderick 1982). In August the expedition continued explorations around Admiralty Island noting "five Indians, who were very shy" in Seymour Canal (Roderick 1982, p. 5).

A one-half mile portage connects Oliver Inlet and Seymour Canal. It has been reported that skids were placed across the portage to facilitate canoe hauling (Roderick 1982). This short portage connects Juneau to Frederick Sound by way of Seymour Canal, thereby allowing marine travelers to avoid the more challenging conditions present in Stephens Passage.

### **Industrial Development**

Canneries were established in Southeast Alaska beginning in 1878, and the industry rapidly expanded until the 1920s. In 1903, a salmon saltery based out of Oakland, California began operating at Mole Harbor in Seymour Canal just south of the Assessment Area. The following year, the saltery moved further south in Seymour Canal to Pleasant Bay. A conflict developed between the saltery and the people who "long resided thereabouts in Pleasant Bay and depended on the availability of the salmon," for the local people felt the saltery was "practically barricading" the stream (Roderick 1982, p. 109). The saltery ceased operations in 1908.

As the region's canning industry developed, logging increased for pilings and fuelwood. Logging began in 1868 at Windfall Harbor and in 1880 at Pack Creek. However, it was not extensive until the need for fish trap pilings expanded. Canneries were located south of Seymour Canal in Gambier and Pybus Bays. The Glass Peninsula also provided 100 million board feet of hemlock in 1925 to the Alaska Pulp and Paper Company in Port Snettisham, the first pulp mill in Alaska.

During the 1880s, mines were being developed on the mainland from Windham Bay to Berners Bay. Within the Assessment Area a small amount of mining occurred between Swan Cove and Windfall Harbor in the early 1900s. While Admiralty Island missed the majority of mineral development, many people employed in the mining industry in Juneau, Douglas and Treadwell traveled to Admiralty Island to hunt deer, bear, and fowl. The island became a hunter's paradise and afforded wood when sources closer to Juneau were depleted.

Fur farming (especially blue fox) started in Southeast Alaska in the early 1900s. A review of the Special Use Permit database indicates that several fur farms were permitted within the vicinity of the Assessment Area. Tiedeman Island, Bug Island, and Windfall Island all had permitted farms for fox, muskrat, and marten during the 1920s and 1930s. Permits also allowed for use "somewhere on the shore of Seymour Canal" to be used as a base (USDA n.d.).

**Table 1. Special Use Permit Information for Fur Farm sites in or near the Assessment Area**

Permit Holder	Special Use Permit Location	Size of Area Permitted	Permitted Purpose	Dates of Operation	Additional Information
H. J. Maycock	Windfall Island	unknown	muskrat farm	1922 to 1924	revoked for non-compliance
H. J. Maycock	Tiedman Island	53 acres	muskrat farm	1922 to 1926	transferred to grazing permit
Martin Otterstad and Harry Hend	Windfall Island	196 acres	unknown	1924 to 1926	none
Fred C. Howard	Tiedeman Island and the shore of Seymour Canal	200 acres	unknown	1928 to 1930	abandoned
Frank Mason	Bug Island	250 acres	unknown	1929 to 1930	abandoned

**The Civilian Conservation Corps**

The Civilian Conservation Corps (CCC) developed out of the Great Depression and Franklin D. Roosevelt’s “New Deal,” a series of public works programs intended to ease under-employment. Congress created the CCC by passing the Emergency Conservation Work Act in 1931. Rural conservation and forestry projects provided relief by putting people to work preserving or developing natural resources. Although various New Deal programs existed, the CCC was considered one of the most successful.

In the Alaska Territory, the CCC program was administered by the USDA Forest Service (Mobley 1993). Enrollees were generally middle-aged and employment was normally seasonal. Loggers or Forest Service retirees often served as foremen (Rakestraw 1994). By the end of 1934 the Forest Service in Alaska employed 325 CCC members, 130 of which were assigned to the Admiralty Island Division based in Juneau. Two years later, enrollment increased to 1,037 with 245 men in the Admiralty Island Division. CCC activities in Alaska included construction of air strips, houses, wells, cabins, trails, roads, bridges, shooting ranges, fences, floats, docks, dams, and hatcheries. The CCC also participated in fire and flood control, demolition, communications, sanitation, totem pole restoration, and archaeology projects. On Admiralty Island, the CCC established recreational trails and shelters. It constructed the Big Shaheen Lodge along a new canoe route, and developed a trail from Windfall Harbor to Hasselborg Lake with shelters at each end of the trail (Mobley 1993). A bear observatory at Pack Creek was built in 1934 (Rakestraw 1994). A second bear observatory may have been constructed at Pack Creek as shown on the USGS Topographic Quadrangle SIT D-1 and reported by Dean Williams (Williams 1988 and USGS 1951), but its location has never been confirmed.

**Figure 1. Pack Creek Observatory**



Source: Admiralty National Monument (file photo, October 1977). Note: This tower collapsed during the winter of 1991-1992 and has since been replaced.

### **Recreation and Conservation**

Following World War II, increasing numbers of people began to visit Admiralty Island for hunting, fishing, and photography. Increased visitation was facilitated by airplanes and outboard motors. Bear hunting for sport increased in the late 1920s, and the arrival of cameras popularized recreational photography. When Forest Service employee Jack Thayer was killed by a bear in 1929 near Eliza Harbor, the Juneau newspaper called for exterminating all bears on the island. John Holzworth and Allen Hasselborg photographed and studied Admiralty's bears from 1927 to 1930, leading to publication of Holzworth's *The Wild Grizzlies of Alaska* in 1930. This book suggested that the bears might be in danger of extinction and spurred development of a pro-conservation sentiment and "Save the Bears Movement."

As Deputy Forest Supervisor in 1932, B.F. Heintzleman tried to strike a balance by proposing a bear management plan for Admiralty Island (Rakestraw 1994). In 1934, the Forest Service, Alaska Game Commission, and Bureau of Biological Survey agreed to the plan and created two bear refuges on Admiralty Island (60 square miles in the vicinity of Thayer Mountains and 21 square miles around Pack Creek with bear observation platforms in each). This plan also called for the establishment of public service sites, a system of trails, portages, and shelter cabins. The public service sites included a trail terminal at the head of Windfall Harbor and a trail "from the beach of Seymour Canal to a point on Pack Creek for the use of those wishing to observe bears and an observation blind to be constructed on the creek" (USDA 1934).

In an effort to protect Admiralty Island's forest, bears, and its geological, ecological, and archeological features, proposals to make Admiralty Island a National Park or Monument continued into the late 1930s (Rakestraw, 1994). These efforts failed, but the movement was revived again during the 1970s with the rise of the environmental movement. President Carter designated the island a National Monument on December 1, 1978.

### **Heritage Surveys and Sites in the Assessment Area**

Federica de Laguna completed anthropological investigations on Admiralty Island from 1949 to 1950 (de Laguna 1960). While she identified many archaeological sites, none were within the Assessment Area. The Alaska Native Claims Settlement Act (ANCSA) allowed Sealaska Corporation to select sites with historic and cemetery values from public lands, but the preliminary survey completed by Sealaska Corporation in 1973 found no sites within or near the Pack Creek Zoological Area that fit their criteria.

Eight cultural resource surveys were conducted in west Seymour Canal between 1983 and 2004 (see Appendix B), but they were neither systematic nor comprehensive. Most of the surveys were conducted in conjunction with trail, cabin, special use permit, crab pot storage, or recreation projects proposed by the Forest Service. These surveys located five archeological or heritage sites in the Assessment Area (Table 2) as well as two sites outside the area.

**Table 2. Archaeological Sites within the Vicinity of the Landscape Assessment Area**

Site Number	Year Identified and Investigator(s)	Site Type	Site Age	National Register Eligibility
SIT-0139	Located by Stan Price and surveyed in 1983 by M. L. Moss and J. M. Erlandson	Pack Creek Garden	prehistoric	not evaluated
SIT-0269	Located in 1983 by M. L. Moss and J. M. Erlandson	Shell Midden	prehistoric	not evaluated
SIT-0270	Located in 1983 by M. L. Moss and J. M. Erlandson	Shell Midden	prehistoric	not evaluated
SIT-0371	Identified by C. Mobley in 1995	CCC shelter at Windfall Harbor	1930s	Listed on National Register of Historic Places
JUN-748	Located in 1998 by K. Brown	Shell Midden	prehistoric	not evaluated

Site SIT-0371, a CCC shelter, is listed on the National Register of Historic Places. As such, it is afforded additional federal protection. The Forest Service must be proactive in ensuring its preservation. None of the other identified sites have been evaluated for listing in the National Register of Historic Places.

Prehistoric sites are usually found through field survey and inventory. An exception to this is the Pack Creek Garden site (SIT-139), which Stan Price uncovered while clearing land for a garden. Price, known as “the bear man of Admiralty” for his conservation work with brown bears (Irish 1991), moved his wannigan (i.e., float house) to Seymour Canal as early as 1956 to pursue mining claims. Price constructed four buildings in the area and cleared two garden plots by 1973. While uncovering one garden site, he found prehistoric stone tools. The Pack Creek Garden site corroborates the traditional use claimed on an application for a Native Allotment (AA-8309) by Agnes Keller. Ms. Keller was born in 1909 and claims that the area was used by her mother and grandfather. The Pack Creek Garden site area should be tested for the presence of cultural material to determine whether it is eligible for listing on the National Register of Historic Places.

Shell middens dominate the inventory of prehistoric sites in Southeast Alaska. Middens are buried trash deposits that have been preserved by acidic soils. They are comprised largely of discarded shells but sometimes contain bits of charcoal, fire cracked rock, bone, and stone artifacts. These materials provide indication of past land use and ecology. Middens in the Assessment Area, while not well documented, appear to be relatively small and are indicative of use by small groups of people on a temporary basis. These may have been families engaging in seasonal harvest. Midden sites are typically eligible for inclusion on the National Register of Historic Places under Criterion D of 36 CFR Part 60 which authorizes the Secretary of the Interior to maintain a National Register of significant sites in American history. Such sites are valuable because of their potential to convey important information about the history or prehistory of an area and because they often include material suitable for radiocarbon dating. The three known prehistoric shell midden sites within the Assessment Area should be evaluated to determine whether they are eligible for listing on the National Register of Historic Places.



The majority of the Assessment Area has not been surveyed for heritage resources. It contains several areas with a high probability for significant archaeological discoveries. The deep coves and tidal flats of Windfall Harbor are almost certain to contain prehistoric cultural material. Swan Island and Windfall Island are also very likely to contain cultural resources. Historic sites that are known to be present in the Assessment Area but have yet to be recorded include trapping and hunting cabins, mining sites, CCC trails, and historic fur farms.

## ***Wilderness and Recreation Resources***

### **Introduction**

Wilderness means many things to people depending on their own experiences. They water our communities; they house our rare animals and plants; they protect our historic structures and the cultural values of our pioneer spirit. Wildernesses have scientific value as living laboratories and reservoirs of biological diversity. They are beautiful places where we seek recreation and refuge from our busy, connected lives. Even if we never go to the wilderness, we take comfort in knowing it is there. Few places on earth offer such extensive unaltered natural environments as the 7.8 million acres of Wilderness within Alaska's National Forests.

The Assessment Area, which is located entirely within the Kootznoowoo Wilderness, is a place that offers opportunities for sightseeing, wildlife viewing, boating, kayaking, camping, and deer hunting. Recreation use is concentrated in three areas: at Pack Creek, in Windfall Harbor, and in the Swan Cove area. This section describes wilderness-based recreation management in the Assessment Area, some of the primary recreational activities for which the area is used, and the extent of recreational use.

### **Recreation Management: The Wilderness Act, ANILCA, and the Forest Plan**

Recreation management in the Assessment Area is guided by the Forest Plan and is consistent with the Wilderness Act of 1964 and ANILCA.

*The Wilderness Act*—The Wilderness Act generally discourages use of motorized vehicles within congressionally designated Wilderness Areas:

Except as necessary to meet the minimum requirements for the administration of the area for the purpose of this Act (including measures required in emergencies involving the health and safety of persons within the area), there shall be no temporary road, no use of motor vehicles, motorized equipment or motorboats, no landing of aircraft, no other form of mechanical transport, and no structure or installation within any such area. (Section 4(c)).

*ANILCA*—The Wilderness Act allows for the continuation of aircraft and motorboat use established prior to the Act. However, Alaskan Wildernesses are unique in that they are subject to the provisions of ANILCA. ANILCA allows for the use of motorboats, airplanes, and non-motorized surface transportation methods for traditional activities [ANILCA 1110(a)] or subsistence [ANILCA 811]. The Forest Service definition of “traditional activities” includes, but is not limited to, recreation activities that generally occurred in the

area at the time of designation. These include activities such as sport fishing and hunting, boating, camping, picnicking, hiking, exploring, sightseeing, and nature and wildlife viewing. Except for motorboats and snowmachines, other forms of motor vehicles and equipment such as off-highway vehicles, motorcycles, and all-terrain-vehicles are not allowed.

ANILCA also allows for the use and construction of cabins directly related to the administration of the unit or area or necessary to provide for a continuation of an ongoing activity or use otherwise allowed within the area where the permit applicant has no reasonable alternative site [ANILCA 1303(b)]. This provides for conditional continuation and limited transfer of personal-use cabins that existed prior to the passage of ANILCA and which have a special use permit, such as the three cabins on Swan Island and one in Swan Cove. It also allows construction of new cabins to administer the area. However, construction of new cabins for private recreation use is not allowed.

ANILCA also provides for the continuation, maintenance, and replacement of existing public use cabins and construction of new cabins and shelters necessary for the protection of public health and safety [ANILCA 1315(c) and (d)]. This provision allows for the continued maintenance of the Windfall Harbor shelter.

Certain facilities and equipment directly and necessarily related to the taking of fish and wildlife are allowed in Alaskan Wilderness Areas under ANILCA [ANILCA 1316]. Examples include temporary facilities such as campsites, tent platforms, and shelters. Except as allowed for the taking of fish and wildlife, neither ANILCA nor the Wilderness Act allow the use of motorized equipment within Wilderness in support of recreation activities, except minor equipment such as camp stoves or GPS units.

*The Forest Plan: Recreation Opportunity Spectrum (ROS)*—The Recreation Opportunity Spectrum (ROS) is a management system that describes the differing recreation experience opportunities to be expected on National Forests. ROS classes range from primitive (no facilities and little contact with other people) to urban (highly developed and providing much social interaction). ROS classes should reflect the type of experience visitors can expect and the management strategies that provide for them. In a Wilderness Area, these strategies emphasize protecting opportunities on the primitive end of the spectrum. (USDA 1997a, p. 3-34). The Forest Plan prescribes two ROS classes for the Assessment Area (Map 3):

***Primitive***—This ROS class applies to the uplands of the Assessment Area. Reaching these areas requires long walks in areas where there are no trails. Such areas contain no facilities, and no more than two other groups are seen per day. On-site regimentation and controls are very rare with minimal signing. There are no (or infrequent) sights and sounds of human activity.

***Semi-Primitive Motorized***—This ROS class applies to the shoreline of the Assessment Area (to a distance of approximately one mile inland). It also includes all of Swan and Windfall Islands. The Forest Plan describes these settings as regularly having distant sights and sounds of human activity but rarely having them nearby. They are generally within a 30 minute walk of infrequently traveled waterways or small aircraft access points. On-site regimentation and controls are few and consist primarily of informational signs. People should expect to encounter no more than

five other parties per day, and no other parties should be visible from camps during 80 percent of the primary use season. Impacts resulting from visitor use are rare and not long-lasting.

These ROS classes were mapped in 1982, adopted in the 1986 Admiralty Plan and also the 1997 Forest Plan. The Semi-Primitive Motorized class was established along the shoreline because of the relatively high amount of plane and boat traffic that could be seen overhead or nearby. With the exception of the Pack Creek area, social encounters in the Assessment Area in the Semi-Primitive Motorized class are rare. The actual experience people have in this area more closely resembles the experience described in the Primitive ROS class. The number of groups estimated to use National Forest lands in Swan Cove and Windfall Harbor combined (but not including Pack Creek) is less than one per day on average. In addition, there are no facilities in Swan Cove and only one shelter in Windfall Harbor. Pack Creek visitor experiences more closely match the Semi-Primitive category, with encounters of four groups per day being a common occurrence.

The Forest Plan directs managers to “update existing ROS inventories as a part of specific project planning and implementation, and whenever project activities cause a change in recreation setting conditions significant enough to reclassify the affected area” (USDA 1997a, p. 4-35). This has not been done for the Assessment Area; the original 1986 designations are still used.

A recent decision by the Forest Service to limit guided groups on the northern end of the Tongass National Forest responds to a similar desire to protect opportunities for solitude while providing for appropriate experiences (USDA 2004a). The number of group days<sup>2</sup> this decision will allow in bays around Admiralty Island and elsewhere is useful for rough comparisons to the Assessment Area (Table 3).

If a theoretical total of 180 groups of commercial visitors are allowed to use the PCZA annually, that would be equivalent to the allowed use of the remainder of Seymour Canal (200 groups), and it would be more use than allowed in areas such as Gambier Bay, Tracy Arm, or Berners Bay, areas that are much larger in size.

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<sup>2</sup> A group day is one group of people spending any part of a day ashore on the National Forest.

**Table 3. Comparisons to Shoreline EIS Select Areas**

Shoreline EIS (select areas)			Capacity <sup>1</sup>		Commercial Allocation <sup>2</sup>		Actual Use 2004
Use Area	Name	Miles of shoreline	Groups-at-one-time allowed	Total groups allowed (summer)	Number of guided group days (summer)	Percent of guided group days (summer)	Number of guided group days (summer)
01-04A	Berners Bay	260	10	1060	75	7	n/a
01-05D	Tracy Arm	157	12	1272	100	8	n/a
01-05E	Fords Terror	22	3	318	25	8	n/a
04-06A	Pybus Bay	124	3	351	100	28	n/a
04-07	Gambier Bay	133	6	702	150	21	n/a
04-09	Seymour Canal	174	10	1170	200	17	n/a
<b>PCZA Comparison</b>							
n/a	Windfall Harbor and Swan Cove combined	38	3 <sup>3</sup>	306 <sup>3</sup>	80 <sup>3</sup>	26 <sup>3</sup>	44
n/a	Pack Creek only	2	4	408	100	25	91
n/a	PCZA total	40	7	714	180	25	135

Source: USDA 2004a

<sup>1</sup> The capacities listed for Use Areas in the Shoreline EIS decision represent the total number of groups that can use the area at any given time and the total number of visitors allowed in an area (seasonal differences in visitation limits exist).

<sup>2</sup> Commercial allocation is the maximum number of guided group days that are authorized in the area.

<sup>3</sup> Windfall and Swan do not yet have a designated capacity. These capacity values are shown as a starting point for discussion, although actual use in 2004 averaged less than 0.4 group days for guided groups (102 day summer season divided by 44 group days guided use). The Assessment Area has established capacities only for Pack Creek, but these capacities are expressed as visits of individuals not groups. The 24 visit capacity of Pack Creek averages about 4 groups per calendar day (about one guided group per day during the 102 day summer season).

The capacity of recreation use in remote settings is a subjective decision. The Shoreline EIS relied on the Land Use Designations and ROS classes of the Forest Plan as well as potential access points and anchorages (USDA 2004a, p. 1-2). The goal of the decision is to protect forest resources and opportunities for quality recreation experiences while still providing access to them. Ultimately, capacity is determined through an adaptive process that takes into account the needs of different forest users and seeks to balance their differing perspectives.

### Scenery

The scenery of the Assessment Area varies from the large sedge meadows of Windfall Harbor and Pack Creek, to the vast mudflats of Swan Cove, to the crowns of surrounding peaks exceeding 4000 feet in elevation. The transition from tideland to alpine occurs over just a few miles in most places. Dense groves of hemlock and spruce layered thickly with berries and shrubs and interspersed with bog provide challenging terrain. Only deer hunters and a few experienced hikers ever venture far from the beaches or tidal meadows. The only maintained trail in the Assessment Area is through one mile of forest to the Pack Creek observation tower. For these reasons, the scenery is most commonly viewed from the air by floatplane, from the water by boat or kayak, and from the land near the high tide mark.

The Forest Plan specifies that the Retention visual quality objective (VQO) must be

applied to any activities within Admiralty National Monument that have the potential to affect the visual character of the landscape (USDA 1997a, F-1). The Retention VQO guidelines indicate that design activities should not be evident to the casual observer. The Forest Plan did not identify any visual priority travel routes for the Wilderness Area since Wilderness is to be managed under the Retention VQO.

**Figure 2. Pack Creek in Foreground and Winter Harbor in Background**



### **Boating and Kayaking**

Boaters find good anchorage in Windfall Harbor. The Coast Pilot 8 advises boaters to “enter the harbor southeast of Windfall Island and anchor anywhere in 15 to 17 fathoms, sticky bottom, preferably near the SE shore.” Because the harbor is 24 miles from Stephens Passage and there is no detailed nautical mapping of the area, few boaters make this long side trip. Most visitors who make it to the harbor do so because they also plan to stop at Pack Creek. Rangers regularly observe larger yachts in the harbor. Boaters rarely anchor in Swan Cove because of extensive shallow areas and reefs.

Outside of Windfall Harbor and Pack Creek there is little comfort for boaters. The Coast Pilot offers the following advice:

Seymour Canal has its entrance W of Point Hugh (57°34.5' N., 133°49.0'W.), 15.5 miles N of The Brothers. It extends in a NW direction into Admiralty Island for about 38 miles, with an average width of about 3 miles. The survey of the canal is old and incomplete, and dangers exist in addition to those shown on the chart, especially near the shores. The upper part of the canal (chart 17300), to a distance of about 21 miles from its head, is filled with islands, ledges, and rocks.....Vessels transiting the canal N of Tiedeman Island should use caution and local knowledge. (NOAA 2004)

Kayaking grew in popularity during the 1990s but has since leveled off. Most kayakers in the Assessment Area are clients of Alaska Discovery, a tour company that rents kayaks and provides guided adventures. A few independent kayakers also stop in the area while on paddle trips through north Seymour Canal or between Juneau and Angoon or to points as far south as Seattle. Some visit Pack Creek during their stay, while others seek more solitude in Windfall Harbor or Swan Cove. A non-profit education organization called Discovery Southeast offers annual kayaking expeditions for teachers each June.

### **Hunting, Trapping, and Angling**

Pack Creek has been closed to bear hunting since 1935 in order to protect the bears. Bear hunting has been prohibited in Windfall Harbor, Swan Cove, and Swan Island since 1984, thereby closing all of the Assessment Area bear hunting. These closures are intended to protect Pack Creek bears who wander throughout the PCZA. The entire Assessment Area remains open to deer hunting. Some deer hunting takes place from four private cabins on

nearby Swan Island and in Swan Cove, while the remaining hunters use boats or primitive camps. The Fish and Wildlife section of this document contains additional information regarding deer hunting in the Assessment Area.

Trapping for marten, otter, and mink is allowed within the Assessment Area between December and February. The level of interest and participation in trapping has been low in recent years primarily due to difficult winter access and low fur prices.

Sport fishing in the Assessment Area currently occurs at very low levels. Few people visit the area specifically to fish. Sport fishing from shore is minimal. Respondents to ADF&G Freshwater Sport Fish surveys reported no use of the Assessment Area between 1977 and 2003 (ADF&G 2005a). The State of Alaska does not allow fishing at the Pack Creek Bear Viewing Area, and the Forest Service discourages people from fishing throughout the remainder of the Assessment Area in order to limit negative encounters between anglers and bears. Guide permits issued by the Forest Service have not allowed sport fishing in the Assessment Area since 1994.

### **Camping**

Camping is allowed in most of the Assessment Area outside the Pack Creek Bear Viewing Area, where it has been banned since 1988 to prevent bear problems in camps (Appendix C). Ten campsites exist within the area, but most camping takes place on Windfall Island or Staunch Point near Pack Creek (Map 2 – Appendix A). Use is further influenced by the Pack Creek brochure, which contains the only map of campsites in the area and displays the location of only five of the ten campsites. A shelter in Windfall Harbor is occasionally used for camping, but its use is discouraged to protect both campers and the bears that graze nearby. Encounters with bears are fairly common near the shelter.

All campsites are primitive, consisting of a flattened tent area and perhaps a fire ring. Campers are expected to minimize their impacts by following Leave-No-Trace practices (Leave No Trace, Inc. 2002). Campsite inventories from 2002 show that Assessment Area campsites are much larger and exhibit slightly more impact than the average camp on Admiralty Island (Table 4). This indicates either consistent use over many years or heavy use by some. This is especially true for three sites near Pack Creek (Win-3, 4, 10) and on two sites at Swan Cove (Swn-6, 10). Sites in Mitchell Bay near Angoon that have also received consistent, long term use by campers are similarly rated, while other Admiralty Island sites have been less heavily impacted.

**Table 4. Pack Creek Zoological Area Campsite Conditions in 2002**

Map Reference Number	Location	Summary Condition Rating (3=worst)	Useable Site Size (sq. m.)	Barren Core size (sq. m.)	Number of Trees with Damaged Branches	Number of Informal Trails	Trash Rating (5=worst)
Win-1	Windfall Island	2	100	85	3	6	0
Win-2	Windfall Island	1	150	0	20	0	0
Win-3	Windfall Island	3	230	175	1	8	1
Win-4	Windfall Island	3	320	285	37	2	1
Win-6	Windfall Harbor	2	70	49	6	3	0
Win-10	Staunch Point	2	130	90	6	3	1
Swn-2	Swan Island S	1	30	18	0	1	1
Swn-3	Swan Island SW	1	15	10	1	2	0
Swn-6	Swan Point	2	320	200	17	5	1
Swn-10	Swan Cove	3	250	200	15	2	1
<b>Assessment Area Averages</b>		<b>2.1</b>	<b>162</b>	<b>111</b>	<b>11</b>	<b>3.2</b>	<b>0.6</b>
<b>Mitchell Bay Averages</b>		2.1	135	81	7	3.3	1.8
<b>Admiralty Island Averages</b>		1.6	85	30	7	1.5	0.9

The campsite at Staunch Point (Win-10) near Pack Creek likely received the most use of any Assessment Area campsite in 2004 (21 nights and 211 visits). Outfitter/guides (i.e., Alaska Discovery and Discovery Southeast) have used Staunch Point as a base camp for the past several years and in 2004 accounted for 19 nights of use (178 visits). Despite this level of use, the site does not show large amounts of impact because guides bring their own toilet, concentrate tents in a small area, make no campfires, and follow Leave-No-Trace practices.

The campsite on the southwest corner of Windfall Island (Win-4) is the most heavily impacted site. The site was used consistently between 1985 and 1995 by researchers studying Pack Creek bears. It continues to be used intermittently by kayakers and others since it is one of the five campsites identified on the Pack Creek brochure. The soil at the center of the site is often poorly drained, and better sites are available nearby.

The campsite at Swan Point is also shown on the Pack Creek brochure and is popular with deer hunters. Kayak guides once used it consistently. It remains open to camping, but its use is discouraged since there have been multiple instances of bears pilfering camping equipment there. In fact, encounters with bears are believed to be likely at all campsites on the west shores of Windfall Harbor and Swan Cove. Bears use these shores as travel routes between critical habitats, and managers have expressed increased concern about allowing camping at the Win-9, Win-6, Swn-6, Swn-8, and Swn-10 campsites.

### **Outfitter/Guide Services**

Outfitting and guiding services are allowable under the Wilderness Act “to the extent necessary for activities which are proper for realizing the recreational or other wilderness purposes” of the area [Section 4(d)(6)]. Permissible guided activities must be wilderness-dependent. Permit applications for guided recreational activities that could take place in other wildland locations may be denied. The Forest Plan requires demonstrated need for a guided recreation service prior to permitting. Examples of guiding services generally

authorized in the Assessment Area include wildlife viewing, kayaking, and remote nature tours. All commercial outfitting and guiding services, even those conducted by non-profit organizations, require a special use permit.

A number of outfitter/guides offer services within the Assessment Area. They account for about half of all visits (see Table 5). These are described below.

**Alaska Discovery**—Alaska Discovery, the outfitter/guide service responsible for bringing the largest number of visitors to the Assessment Area, offers natural history tours for groups of up to ten clients. Clients are flown from Juneau to a kayak cache on Windfall Island, and then they paddle the short crossing to Pack Creek for the day. Sometimes day trips to Windfall Harbor are conducted instead. Alaska Discovery also offers overnight camping and paddling tours to Windfall Harbor and Pack Creek from a campsite at Staunch Point. The company also rents kayaks to independent travelers from their cache on Windfall Island.

**Alaska Fly ‘N Fish Charters**—Alaska Fly ‘N Fish Charters offers single day flight tours and wildlife safaris to Windfall Harbor, Pack Creek, and occasionally to Swan Cove. The pilot usually accompanies up to five clients ashore for two to four hours while mooring the Cessna 206 floatplane.

**Dolphin Charters**—Dolphin Charters conducts eight to ten day motor yacht tours to many destinations across Southeast Alaska aboard the 50 foot MV Delphinus. They are permitted to bring up to ten clients to Windfall Harbor and Pack Creek, but group sizes typically range between six and eight people.

**All Aboard Yacht Charters**—All Aboard Yacht Charters also conducts eight-day motor yacht tours from the 87 foot MV Discovery. Their mid-season trips, based out of Juneau, circumnavigate Admiralty Island. They guide up to ten clients ashore per trip and often anchor in Windfall Harbor prior to visiting Pack Creek.

**Figure 3. Kayaking in the Assessment Area**



**Table 5. Visits to the Assessment Area in Two Sample Years<sup>1</sup>**

Area	1999 Visits		2004 Visits		Average Visits		
	Guided	Unguided	Guided	Unguided	Guided	Unguided	Total
Pack Creek only	637	661	605	660	621	661	1282
Windfall Harbor & Swan Cove combined	252	134	153	96	203	115	318
<b>Total</b>	<b>889</b>	<b>795</b>	<b>758</b>	<b>756</b>	<b>824</b>	<b>776</b>	<b>1600</b>

<sup>1</sup>Only includes visits ashore on the National Forest, not use of the tidelands or saltwater. See Appendix D for definitions of visits and other terms.



### Recreation Use at Pack Creek

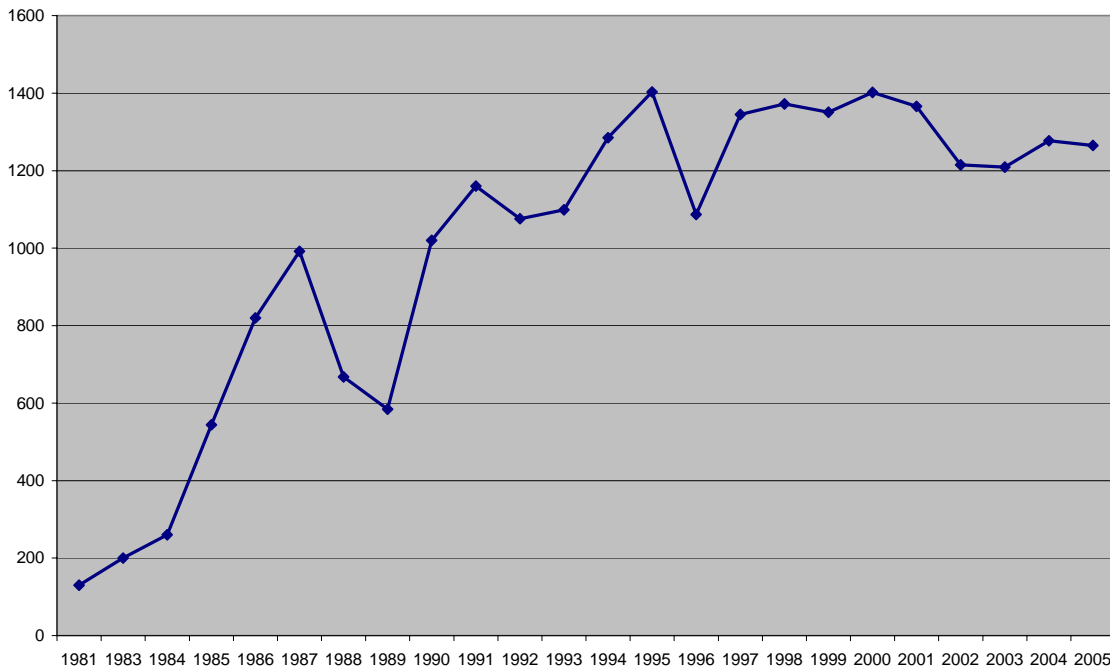
*History of Use*—In 1934, the CCC constructed a mile-long trail to a tree stand overlooking Pack Creek. The next year, Pack Creek became a bear viewing area when the Territorial Game Commission closed the drainage to bear hunting. The annual number of visitors was likely low during this time, perhaps in the dozens. Even in 1981, researchers tallied only 130 visits during the season.

With the 1978 Presidential Proclamation declaring Admiralty Island a National Monument and the 1980 passage of ANILCA establishing the Kootznoowoo Wilderness came increased media attention. This was accompanied by a rising popularity of wildlife viewing in Alaska and a global interest in ecotourism. Use at Pack Creek soared after 1984 with the arrival of exploration tour boats and commercial guides, and a surging interest in sea kayaking. Guided recreation use accounted for 75 percent of the 544 visitors to Pack Creek in 1985.

**Figure 4. Habituated Bear near Visitors on a Viewing Spit at Pack Creek**



**Figure 5. Pack Creek Visits (1981 to 2005)**



#### **Important Pack Creek Milestones**

- 1934-5: Tower and trail constructed; Territorial Commission closed Pack Creek to bear hunting
- 1950s: S. Price began residency and later became a local hero: “the bear man.”
- 1981: Research on bear-human interactions began by K. Post and S. Warner
- 1983: Research continued focusing on human and bear movement, activity, and interaction; researchers notice bears being fed human foods.
- 1984: Bear hunting closure expanded to Swan Cove and Windfall Harbor.
- 1987: Bears being regularly displaced and stressed by 992 visitors; voluntary restrictions and education by rangers partially helps.
- 1988: Restrictions on food, movements, and visit times enforced by USFS & ADF&G staff.
- 1989: Capacity of 24 people/day established for peak season (7/10 – 8/25); guides limited to 50% of total.
- 1990-91: Stan Price dies and State of Alaska establishes Stan Price State Wildlife Sanctuary at Pack Creek.
- 1992: Implemented restricted permit system; limited guided visits to 552 during peak season.
- 1993: Prospectus chose 6 guides; permit fee of \$10 for permits reserved in advance; 223 potential visitors turned away due to limits.
- 1995: Fagens end a ten year study of bear play.
- 1997: \$36 permit fee.
- 1999: \$50 permit fee pays 50 percent of agency costs to manage.

Stan Price, a homesteader who lived at Pack Creek from about 1950 until his death in 1990, was a local folk hero known for his unusually tolerant attitude toward his brown bear neighbors. Juneau residents and independent travelers in those years wanted to see the “bear man” as much as they wanted to see bears. Stan promoted the idea that bears need not be feared; in a televised interview in 1988 he remarked “they make great pets.” Stan tried hard to undo the fearsome reputation that grizzlies carry, but by 1987 the number of visitors to Pack Creek grew to almost 1000, and his message was having some inadvertent consequences. Rangers noticed visitors feeding bears, displacing bears from critical habitat, and interfering with preferred bear travel paths. In response to being fed, one bear began charging people and was sprayed multiple times with pepper deterrent.

The Alaska Department of Fish and Game and the Forest Service noticed problems developing over several years and by 1987 were ready to act. They formed a partnership and established the Pack Creek Cooperative Management Area, which includes the National Forest uplands and the state’s tidal lands. In June of 1988, after an environmental analysis that included extensive public involvement, the first rules of bear watching were instituted (USDA 1988). Use of a food cache was required; designated viewing locations were enforced in conjunction with areas closed to human travel; visitor hours were limited (9 am to 9 pm); and a permit system was instituted. This alleviated most of the impacts to bears, but there was still no regulation of the number of allowable visitors. Bear viewing

involved large crowds on some days (over 16 people at a time in one spot), and managers wondered about the effect this was having on bears and the quality of the recreational experience provided by the area.

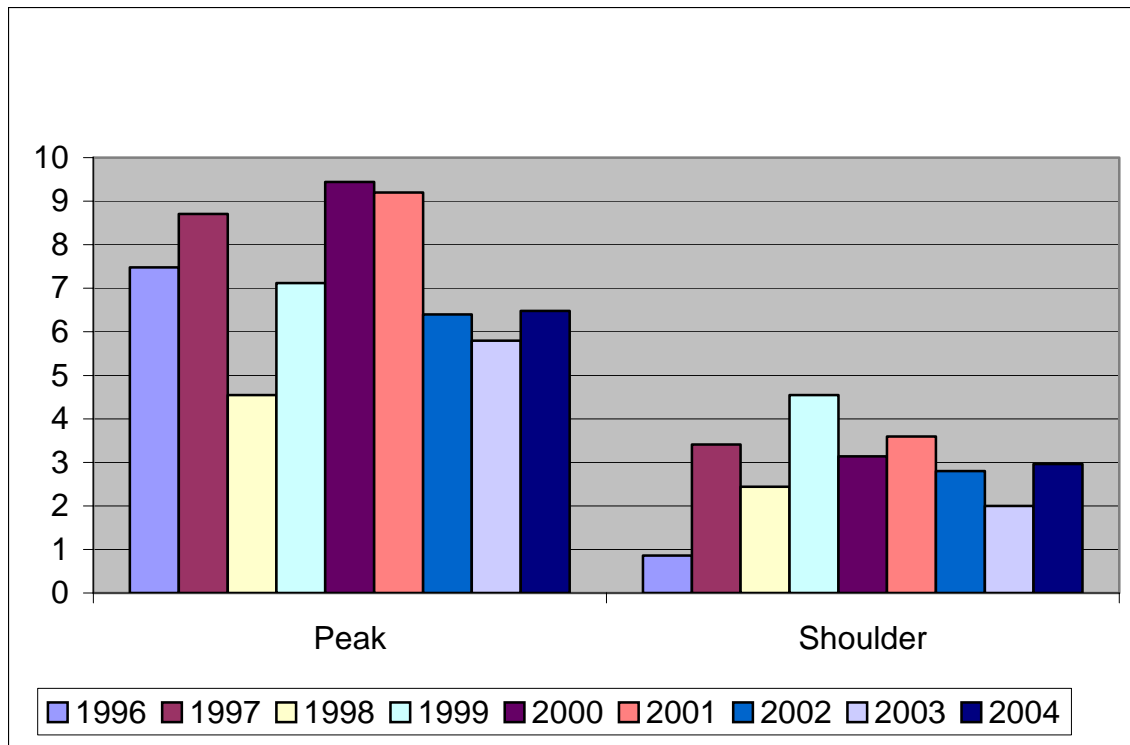
Another environmental analysis resulted in the April 1989 decision to establish a capacity of 24 persons (visits) per day during the peak season (which was then July 10 to August 25), with commercially guided groups receiving up to 50 percent of the total (USDA 1989). The commercial allocation was divided among guides based on the mode of transport used to access Pack Creek. Guides using boats received 35 percent of the commercial allocation; kayak guides received 45 percent; and floatplane guides were allocated 20 percent. These allocations were phased in over a five year period.

In 1991, the State of Alaska legislature declared the tidelands around Pack Creek a Wildlife Sanctuary in memory of Stan Price. This designation increased the Alaska Department of Fish and Game's role in management of the area.

Another decision in 1992 described the permit reservation system for unguided Pack Creek visitors and the competitive bid prospectus to be used for guides (USDA 1992). The prospectus was issued in 1993, and six guided companies were issued permits to provide services beginning in 1994 when overall use was 1285 visits (46 percent guided). The prospectus limited the growth of commercial guide services despite many requests for new or expanded permits during this high growth period of Alaskan tourism. A new prospectus was scheduled for 1997 but is awaiting the completion of policy for local, resident, and historic preferences for guided services (ANILCA Section 1307).

*Current Use*—Stability and refinement of management techniques used by agencies and guides at Pack Creek have been achieved. The permit system effectively limits use. Guides schedule their trips up to a year in advance, and fees of up to \$50 per adult for peak season permits help agencies offset management costs. The bears have benefited from consistent and benign human presence, and use is closely monitored by guides and agency field staff. Feedback to the agencies in recent years has been largely positive. Surveys conducted by mail in 1997 and at Pack Creek in 2001 revealed high satisfaction with the bear viewing experience, and comments solicited for recent planning efforts have supported the status quo.

**Figure 6. Average Number of Bears Seen at Pack Creek**



The amount of use allocated to guide services at Pack Creek has changed only slightly since the first prospectus awards in 1993. Alaska Discovery has continually been allocated the largest share of Pack Creek visits and has averaged nearly half of the total use since 1996 (Table 6). Alaska Fly 'N Fish Charters has averaged about a third of the total allocation. The remainder of the Pack Creek allocation has been used by All Aboard Yacht Charters and Dolphin Charters.

**Table 6. Number of Guided Visits Permitted for Pack Creek 1996 to 2004**

Pack Creek Guides	1996	1997	1998	1999	2000	2001	2002	2003	2004	Average Allocation
Alaska Discovery	289	303	328	316	372	338	271	278	338	48%
Fly'n Fish Charters	133	223	193	183	253	262	221	261	191	33%
Dolphin Charters	34	32	44	47	62	56	44	44	48	7%
All Aboard Yacht Charters	0	28	10	29	41	28	29	29	28	4%
Wilderness Swift <sup>1</sup>	80	101	76	19	0	0	0	0	0	5%
Thayer Lake Lodge <sup>2</sup>	28	36	29	43	38	38	11	13	0	4%
<b>Total</b>	<b>564</b>	<b>723</b>	<b>680</b>	<b>637</b>	<b>766</b>	<b>722</b>	<b>576</b>	<b>625</b>	<b>605</b>	<b>100%</b>

<sup>1</sup>Wilderness Swift Charters went out of business in 2000.

<sup>2</sup>Thayer Lake Lodge dropped their Pack Creek and Windfall Harbor visits in 2004.

Some guides would like to bring more clients to Pack Creek but are limited by the rules of the prospectus. Also, guides must “fully utilize their allocations or unused portions will be allocated to the public” (USDA 1993, p. 4). There are no allowances for transferring unused visits between guides and no way to authorize new guide companies to begin operations (except during the shoulder season). These factors, combined with recent drops in the independent tourism market, have limited growth in commercial tourism at Pack Creek.

### Recreation Use at Windfall Harbor

*History of Use*—Windfall Harbor recreation use likely began with the construction of an Adirondack style log shelter in 1934 and a trail that once followed the inland path of the creek south to another shelter on the north shore of Hasselborg Lake. The trail was abandoned long ago and there is little evidence of it now, but the shelter continues to attract some attention from boaters and guided groups that visit the south estuary. Originally, the shelter was likely at the upper edge of the tidal zone, but rising beaches have allowed a 60 foot wide meadow to form between the shelter and the upper tidal zone.

Wildlife viewing, especially for bears, has been the major summer attraction for many years. The bear watching season begins in late May, peaks in July and August, and extends to early September. Visitors often paddle, camp, or boat while watching for wildlife. Unlike Pack Creek, there is no regular ranger presence at Windfall Harbor. Commercial guided use involving wildlife viewing increased in Windfall Harbor in the 1990s as greater restrictions were placed on such use at Pack Creek.

*Current Use*—In the late 1980s, a flight service from Juneau began offering tours at Windfall Harbor. Float planes would land on the water near shore, and visitors would use the tidelands to view bears. These tours were offered daily in 1999 and were contributing to a sense of crowding that caused tension between the float plane parties, the parties operating on the uplands under a Forest Service permit, and unguided users who preferred more solitude in Windfall Harbor. Flight tour operators agreed to voluntary flight restrictions (Appendix E) in 1999 that helped pilots avoid displacing bears and bear watchers. At the same time, the Forest Service limited the growth of guided services in Windfall Harbor (in the area south of Sections 19 and 20 [Sitka D-1]). Commercial use was limited to outfitter/guides who reported use on their 1998 Actual Use Reports. Use levels were to be limited to the level authorized in 1999 until an environmental assessment for the zoological area is completed. Unguided boaters and paddlers continue to visit Windfall Harbor, but their use has remained unrestricted and fairly stable, comprising up to 40 percent of the total use of lower Windfall Harbor (Table 7).

**Table 7. Recreation Use at South Windfall Harbor (1999 and 2004)**

Year	Unguided Visits		Guided Visits		Total Visits
	<i>Ashore</i>	<i>Tidelands/Saltwater</i>	<i>Ashore</i>	<i>Tidelands/Saltwater</i>	
1999	118	42	247	100	507
2004	93	62	143	112	410

Some independent boaters venture above the high tide line (27 visits ashore in 2004), but most feel uncomfortable walking in bear habitat and prefer to watch for bears through binoculars from their boats. The favorite anchoring point is near the mouth of the creek at the south end of Windfall Harbor. Rangers observed just 16 visits by kayakers in 2004, and only 12 of them went ashore (there were an additional 33 visits by two groups that camped at Staunch Point but did not paddle further into Windfall Harbor). Additional bear watchers arrive by floatplane, but their numbers vary widely depending on the marketing of Juneau flight services.

The historic Windfall Harbor shelter is now used primarily as a storage area for food or gear or to temporarily escape the rain while watching bears at the nearby estuary. Occasionally someone will camp near the shelter, although heavy bear traffic makes this inadvisable. Thick salmonberry grows in abundance at the shelter site, but it is regularly cleared to make the shelter more visible and to preserve its structural integrity.

Guide services operating under Forest Service permit often visit Windfall Harbor in conjunction with, or as an alternative to, a visit to Pack Creek. Their total number of clients ashore in Windfall Harbor have averaged about 200 since 1998 (Table 8), and have

**Figure 7. Windfall Harbor**



Note: The shelter is just to the right of the south estuary of Windfall Harbor (at the top of the photo).

declined in the past few years after peaking in 2000. This trend is similar to Pack Creek and likely results from Forest Service restrictions on numbers of guided clients that began in 1999, and the downturn in independent tourism in Alaska after 2000.

**Table 8. Actual Guided Clients Ashore at Windfall Harbor (1998 to 2004)**

Guide Service	1998	1999	2000	2001	2002	2003	2004	Average	Guided Visitors Authorized (1999)
Alaska Discovery	100	116	101	91	94	100	25	90	100
All Aboard Charters	8	0	5	0	0	0	8	3	8
Discovery Southeast	0	0	21	20	21	0	30	13	0
Dolphin Charters	12	46	20	29	5	30	21	23	46
Fly N' Fish Charters	44	48	55	39	47	49	49	47	50
Thayer Lake Lodge	8	11	15	27	2	0	0	9	30
Other	14	26	32	13	0	0	10	14	15
<b>Total Clients Ashore<sup>1</sup></b>	<b>186</b>	<b>247</b>	<b>249</b>	<b>219</b>	<b>169</b>	<b>179</b>	<b>143</b>	<b>199</b>	<b>249</b>

<sup>1</sup>Ashore on National Forest lands in the restricted zone of south Windfall Harbor. The number does not include the guide as part of the total.

Alaska Fly 'N Fish Charters guide service has conducted regular and consistent tours to Windfall Harbor, averaging 47 clients per year ashore. Most of their use is during the peak season of July and August when Pack Creek visits are limited. In the last six years they averaged 15 trips per year with 2 hours ashore at the south estuary and middle creek. They reported an average of 2 bear sightings per trip during that time. They generally saw few other recreational visitors ashore or anchored nearby (Table 9).

**Table 9. Alaska Fly 'N Fish Charters Trips to South Windfall Harbor**

Year	Annual Trips	Annual Clients	Groups Seen Annually	Average Groups Seen/Trip	Bears Seen Annually	Average Bears Seen/Trip
1999	17	48	9	0.5	35	2.1
2000	15	55	5	0.3	30	2.0
2001	10	39	3	0.3	18	1.8
2002	16	47	8	0.5	37	2.3
2003	16	49	7	0.4	23	1.4
2004	15	49	4	0.3	23	1.5
<b>Average</b>	<b>15</b>	<b>48</b>	<b>6</b>	<b>0.4</b>	<b>28</b>	<b>1.9</b>

Alaska Discovery has averaged 90 clients per year since 1998 but reported only 25 clients ashore in south Windfall Harbor during 2004 (91 additional clients paddled along the shoreline in 2004 looking for bears or they went ashore only at their Staunch Point campsite where the number of guided groups is not limited).

Alaska Discovery also reported the numbers of bears and other recreational groups seen, but only during six of their trips in 2001 (Table 10).

**Table 10. A Sample of Alaska Discovery Trips to South Windfall Harbor (2001)**

Year	Number of Trips	Number of Clients <sup>1</sup>	Number of Groups Seen	Average Number of Groups Seen	Number of Bears Seen	Average Number of Bears Seen
2001	6	36	3	0.5	17	2.8

<sup>1</sup>The number of trips and clients is not the total brought to Windfall by Alaska Discovery in 2001.

This data can be compared to Pack Creek where the number of groups seen averages about 4 per day and the number of bears seen over a nine year period by all visitors has averaged about 7 per day. There are fewer habituated bears and a better opportunity for solitude at Windfall Harbor than Pack Creek. Guides tend to sell trips to Windfall Harbor more for the wilderness experience the area offers than the number of bears likely to be seen.

### Recreation Use at Swan Cove

The northern section of Swan Cove is protected by vast shallow areas that become mudflats at low tide and make navigation by boat or kayak difficult. The reefs are uncharted and few recreational boaters venture in very far. These features pose logistical challenges to would-be users, including outfitter/guides. Nevertheless, the area does experience use. Campsites such as Swn-6 and Swn-10 show recent signs of use, and a few groups of kayakers have been known to camp there. Also, Discovery Southeast offers kayaking expeditions for teachers into Windfall Harbor and Swan Cove in June. They have been the primary guide service in Swan Cove in recent years (Table 11).

**Table 11. Actual Guided Clients Ashore at Swan Cove (1998 to 2004)**

Guide Service	1998	1999	2000	2001	2002	2003	2004	Average
Discovery Southeast	0	0	14	20	14	0	10	8
Fly N' Fish Charters	0	5	0	7	9	4	0	4
Other	22	0	3	0	0	0	0	4
<b>Total Clients Ashore<sup>1</sup></b>	<b>22</b>	<b>5</b>	<b>17</b>	<b>27</b>	<b>23</b>	<b>4</b>	<b>10</b>	<b>15</b>

<sup>1</sup>The number does not include the guide as part of the total.

There are three private cabins on Swan Island and one private cabin near the point that separates Swan Cove from King Salmon Bay. The cabins were constructed in the 1960s under a special use permit and are largely used by deer hunters from Juneau between October and December.

Bear hunting has not been allowed in Swan Cove since 1984. The Alaska Board of Game has considered several proposals to allow bear hunting in the area again, but all were rejected after significant public opposition. The Board is currently considering a bear hunt in Swan Cove and is expected to decide at its November 2006 meeting. The Forest Service has consistently supported the bear hunting prohibition in order to protect Pack Creek bears whose home range includes Swan Cove and Windfall Harbor.

**Figure 8. Vast Mud Flats in Swan Cove**



# Ecological Characteristics

## *Ecological Subsections*

Nowacki, et al. (2001) have categorized areas of Southeast Alaska according to their ecological characteristics. Most of the Assessment Area, with the exception of Swan Cove and Swan Island, has been categorized as part of the North Admiralty Complex:

The highlands of north Admiralty Island are composed of an assortment of rock types of various ages. Metamorphic schistose rock is most common. This most rugged part of Admiralty Island consists of a series of narrow ridges and mountains separated by steep U-shaped valleys. Two small glacial remnants are located northwest of Hasselborg Lake. High gradient and contained streams spill across its steep, rough surface. Alluvial fans, located along mountain bases, are more common here than elsewhere on Admiralty Island. Parent material is predominantly colluvium and residuum and soils are often shallow and rocky. Alpine and subalpine barrens, meadows, and brushfields make up a substantial portion of this subsection. Forests draping the lower slopes are often riddled with brushy landslide and avalanche chutes. Wetlands cover only 10 percent of the land (Nowacki et al. 2000, p. 100).

The northwest corner of Swan Cove and all of Swan Island have been categorized as part of the Stephens Passage Glaciomarine Terraces:

Massive continental glaciers descended through Lynn Canal, Icy Strait, Chatham Strait, and Stephens Passage, severely eroding adjacent surfaces along the way. After their retreat, marine flooding of low-lying areas covered surfaces with fine-textured glaciomarine sediments. Tectonics and isostatic rebound have since raised these surfaces out of the sea, forming terraces that grade into scoured hills and mountain slopes. These glaciomarine terraces are rimmed by estuaries and salt marshes along the coast and are blanketed by alluvial and colluvial deposits along mountainsides. Most surfaces have low permeability because of their fine texture and gentle slope. Organic soils underlie these wet surfaces and support vast wetland complexes of mixed conifer and lodgepole pine forests interspersed with open, shrubby bogs. Scoured surfaces with thin glaciomarine and till deposits are often covered with organics and possess wetlands oriented in the direction of glacial scrape. More productive hemlock and hemlock-spruce forests occur on better-drained mountain slopes, hilltops, and along incised streams and beachfronts. Swift, high gradient streams incise mountain slopes. Upon reaching terraces, stream channels change to moderate gradient, floodplain, and palustrine types (Nowacki et al 2000, p. 248).

## *The Freshwater Aquatic Environment*

Tongass National Forest streams have been classified based on segments called channel types. Channel types define the physical characteristics of streams and provide key information on fish productivity. Channel types consider stream features such as substrate, gradient, large woody debris, side slope characteristics, and riparian vegetation.



**Table 12. Lengths (in feet) and Types of Assessment Area Stream Channels**

Channel Types & Lengths	Creek Names								TOTAL
	Bear Bones	Middle	Pack	Slide Lake	South Swan	Swan Cove	Swan Point	Windfall	
ES2	670	0	0	0	869	1233	0	0	2772
ES3	0	0	0	0	0	0	455	0	455
ES4	0	1136	2057	1289	0	0	0	1747	6229
FP4	0	927	0	674	0	4022	0	12,267	17,890
FP5	0	0	3191	0	0	0	0	0	3191
FP5m	0	0	2355	0	0	0	0	0	2355
HC1	0	0	0	2062	0	0	0	0	2062
HC3	3634	0	0	0	0	0	3066	0	6700
HC4	0	0	0	0	0	0	2584	0	2584
LC2	0	0	9799	0	0	0	0	0	9799
MC2	0	2777	0	1875	0	0	0	0	4652
MC3	0	5597	0	0	0	0	0	0	5597
MM1	0	0	0	0	4044	0	0	0	4044
MM2	1028	3437	0	0	0	0	0	0	4465
MM2m	0	3871	0	0	0	0	0	0	3871
<b>TOTAL</b>	5332	17,745	17,402	5900	4913	5255	6105	14,014	76,666
<b>Anadromous Length</b>	1120	4751	4924	1089	1670	1063	1309	3753	19,679

Channel types that support high numbers of fish tend to provide a variety of pools and riffles that also contribute to bear success in capturing fish. Fish are found in a greater variety and abundance in large valley bottom flood plains with low gradients.<sup>3</sup> Anadromous streams are those that support fish that spend much of their adult life in the ocean but that return to freshwater streams to spawn (e.g., salmon). The Assessment Area contains eight such streams. The most important anadromous reaches in the Assessment Area generally occur in Flood Plain channel types (FP4-low gradient and FP5-wide low gradient). The streams that produce the highest number of salmon are Windfall Creek and Middle Creek (in Windfall Harbor),<sup>4</sup> Swan Cove Creek, and Pack Creek.

In 2003 and 2004, SEAWEAD naturalists surveyed most of the estuaries of the Assessment Area and the lower reaches of their corresponding streams. Their general descriptions follow.

### **Windfall Harbor Estuary**

The Windfall Harbor (Windfall Creek) estuary area is north facing and fairly protected from wave action. The tidal flat is approximately 160 acres of fine sediment and algal bed. There are two moderate sized salt marshes on the east and west side of the creek (23 and 28 acres respectively). The west side uplands are characterized by gentle slopes, benches, and complex plant community structure. The east side is characterized by steep, often gappy forest with numerous wet seeps.

Alluvial processes in Windfall Creek are limited by close valley walls but channel width exceeds 500 feet at times. Spawning gravels are abundant and the stream gradient is mild in most of the anadromous reach (>2 miles). This watershed is approximately 13 square miles (Christensen et al 2004).

### **Middle Creek Estuary**

The Middle Creek estuary area is east facing and fairly exposed to wave action. It is comprised of an approximately 50-acre tidal flat of angular, coarse, and unconsolidated substrates, and a 20-acre salt marsh. The coarse and angular tidal sediments are poorly suited to rich low marsh growth. The north side of the area receives more sun than the south side but vegetation does not grow particularly early on either side. Uplands are generally steep and dominated by coniferous forest or alder slides.

Alluvial processes in Middle Creek are confined by a steep and narrow valley in all but 1000 feet of the stream. Bed-load appears to be amply fed by slide zones and exposed valley walls but flash flood events likely rearrange spawning habitat on a regular basis. The watershed is approximately 8 square miles (Christensen et al, 2004).

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<sup>3</sup> Refer to the Region 10 Aquatic Habitat Management Handbook (FSH 2090.21 Chapter 10 12.1) for complete descriptions.

<sup>4</sup> Windfall Harbor has three anadromous streams and associated estuarine zones. The estuary at the southern extreme of Windfall Harbor is known locally as “Windfall Creek.” Another, known as “Middle Creek,” is midway on the western shoreline. The third stream is just north of “Middle Creek” and is locally referred to as “Bear Bones Creek.”

### Swan Cove Estuary

The southern part of Swan Cove is part of the North Admiralty Complex Ecological Subsection. The northwest corner of the cove and Swan Island contain more extensive wetlands and are part of the Stevens Passage Glaciomarine Terraces Ecological Subsection. The creek at the far north end of the cove is the only one in the Assessment Area fed by a lake (Slide Lake).

The Swan Cove tidal estuary is comprised of an approximately 1200 acre tidal flat (unconsolidated mud, gravel, cobble and boulder type) and an approximately 35 acre salt marsh. The area is fairly protected from waves. Salt marsh and herbaceous meadows are exposed, contributing to the early growth of vegetation in the spring. Most of the estuary is backed by a 20 foot escarpment lip that merges with extensive gentle slopes and benches. The uplands are gently sloping and dominated by a mosaic of wetland forest, fen and bog. There are two primary anadromous streams draining into the estuary; their shared watershed size is 27 square miles (Christensen et al, 2004).

### Pack Creek Estuary

The Pack Creek estuary is comprised of tidal flat (approximately 400 acres) and salt marsh (20 acres). The north side of the estuary is backed by a 20-foot escarpment lip that merges with moderate slopes and benches. The south side of the estuary is backed by a steep escarpment lip that rises to 35 to 75-foot benches. About half the beaches in the salt marsh face north and the other half face south. The south-facing beaches are somewhat exposed, leading to earlier vegetation growth than on the more protected north-facing beaches. This watershed is approximately 19 square miles (Christensen et al, 2004).

**Table 13. Summary of Focal Watersheds in the Assessment Area**

Watershed Characteristics	Windfall Creek	Middle Creek	Pack Creek	Swan Cove Creek
Watershed size (square miles)	13	8	19	27
Tide flat size (acres)	160	50	400	1200
Salt marsh size (acres)	51	20	20	35

### Watershed Change

A 1996 wetland survey of Pack Creek (Brock 1996, p. 1) explained the small scale effects of watershed change:

The Pack Creek flats lie as a delta at the mouth of a large 12,000+ acre watershed with its headwaters about 9 miles to the west. Elevations in the watershed vary from sea level to 3778 feet. The Pack Creek stream channel starts at about 2000 feet elevation and in the short distance of 7 miles dumps out onto a fan shaped delta at its mouth. This equates to a channel system with an average gradient of 5%. Most of the steeper channels are in the upper portion of the watershed where heavy snow and rain keep the channel sides unstable. This accounts for the large amount of sands and gravels that dominate the delta. An additional source of water is snow avalanche deposits that pile up on the benches and bottom lands and melt quickly in the spring, releasing a large flush of runoff. All these things work in concert to place

the stream channel and associated plant communities in a constant state of change. This is most apparent near the mouth as the channel gradient flattens and you find large amounts of sediments and woody debris. These deposits are very unstable because the channels are constantly moving sideways; this movement makes it productive for fish. Trees that are rooted along the banks continually get undercut, falling into the stream, adding even more woody materials to the stream. Pools and riffles are created resulting in spawning, rearing and feeding habitat for the important salmon resource of Pack Creek (Brock 1996, p.1).

*Lakes*—There are only three lakes in the Assessment area that exceed 5 acres. Two of these are small (29 and 9 acres) alpine cirque lakes at 1600 and 2800 feet elevation. Though these lakes have not been visited, they do not likely contain fish because their outlets are high gradient streams that fish would not be able to negotiate. Slide Lake, a 184-acre lake at the head of Swan Cove, is only at an elevation of 500 feet, but it does not contain anadromous fish. The lake has a fall, and a velocity barrier in the outlet creek prevents anadromous fish from reaching the lake.

## Biological Characteristics

### *Shoreline Vegetation*

#### **Plant Communities**

The most valuable characterizations of vegetation for this assessment focus on the shoreline zone where brown bears and people congregate. Plant communities of the estuarine and anadromous streams of the Assessment Area were mapped and surveyed in 2003 and 2004 by SEAWAAD as part of a study that identified variation in bear habitat quality (Christensen, et al. 2004). The importance of different plant covertypes to bears was judged by the presence of key food resources. The availability of these important plant food resources varies seasonally and thus influences the seasonal use of these various covertypes by bears. Lyngbye's sedge is one of the first plants to green up in the spring and provides one of the first opportunities for bears to replenish energy reserves after hibernation. It is heavily grazed in the early spring. Skunk cabbage and silverweed roots are also heavily used at this time. During the summer season the various berries (salmonberry, blueberry, elderberry, currants, and devil's club berries) provide a significant portion of the bear's diet. In the fall bears heavily utilize the rich herbaceous meadows, digging and feeding on the roots of rice root, lupine, angelica, and cow parsnip.

In the low marsh, for example, higher quality habitat contains a higher abundance of Lyngbye's sedge (higher abundance means rich habitat). Classifications were adapted from *Hotspots: Bird Survey of Mendenhall Wetlands* (Armstrong, et al. 2003) and *The Alaska Vegetation Classification* (Viereck et al. 1992). See Christensen et al. 2004, for covertype definitions.

*Windfall Harbor Covertypes*—Windfall Harbor has three anadromous streams and estuaries. Two of them were recently surveyed for bear habitat qualities including vegetation. Windfall Creek at the southern end of Windfall Harbor has “a complex mix of salt marsh, herbaceous

meadow, bog, fen, and shrub thicket and forest covertypes” (Christensen et al. 2004, p. 16). (Map 4, Appendix A). Bear habitat quality varies considerably from patch to patch.

Lyngbye’s sedge is fairly abundant on both sides of the creek in the low salt marsh. The richest patches occur in wave-protected areas near the margins of the estuary and along tidal sloughs (Map 5). The richest patches of herbaceous meadow occur at the base of the west side alluvial fan and near the creek mouth.

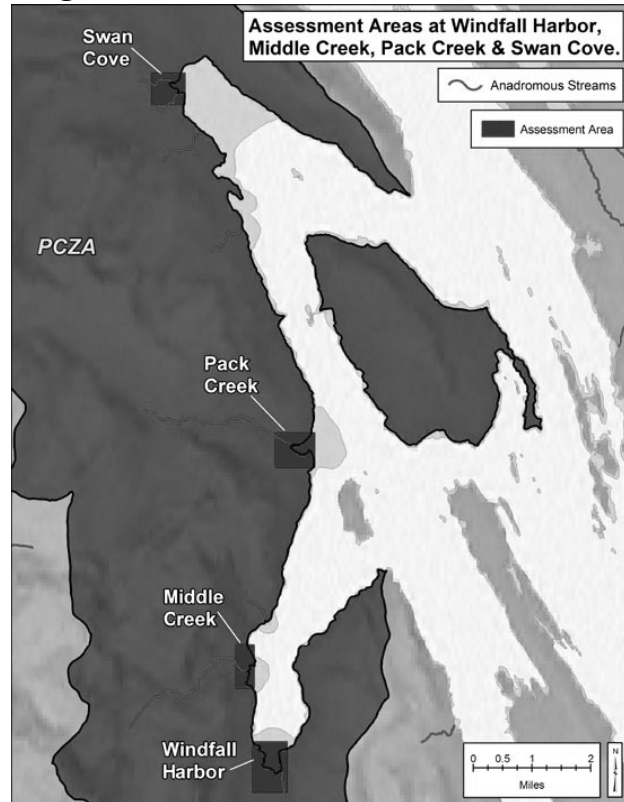
These areas are characterized by important species such as silverweed, plantain, rice root, shooting star, lupine, angelica and cow parsnip. Freshwater marsh (Map 4, type 10) is only important for bears at Windfall Creek where it contains skunk cabbage. Fen, bog, and forest/scrub types are important food sources when they contain berries such as salmonberry, elderberry, blueberry, currant and devil’s club. Some of these covertypes are also important to bears for other uses besides food (see the Wildlife section).

*Middle Creek Covertypes*—Low marsh and high marsh dominate the Middle Creek estuary, while the uplands consist mostly of conifer (Map 6). Plant food richness is generally poor throughout the area (Map 7). Low salt marsh is dominated by Bering’s tufted hairgrass. Only two small patches (less than one acre) of the Lyngbye’s sedge type occur in abandoned stream channels at the extreme northern and southern margins of the estuary. High marsh patches consist mostly of rye grass and hold little food value for brown bears.

Half of the three acres of herbaceous meadow is too wet to support plants that bears prefer. The rich patches occur in well-drained soils near the mouth of the creek and in narrow bands along the forest fringe. They include silverweed, rice root, lupine, angelica, and cow parsnip.

The narrow band of riparian forest that extends upstream approximately 2000 feet is characterized largely by Sitka alder. These thickets do not offer much ground cone forage. Currant, salmonberry, and devil’s club occur along the stream margins. In places, the creek-side shrub thickets have the potential for abundant salmonberry, currant, and devil’s club berry crops. Nearby upland forest types are dominated by mixes of spruce and hemlock and are characterized by fairly low light penetration. The understory is dominated by fool’s huckleberry and unproductive blueberry. Large trees occur sporadically on riparian terraces and surrounding benches.

**Figure 9. SEAWEAD Assessment Areas**



*Pack Creek Covertypes*—A mix of salt marsh, herbaceous meadow, shrub thicket, riparian forest, conifer forest, and wetland forest/scrub covertypes occur at Pack Creek (Map 8). Bear food abundance (richness) varies considerably within the salt marsh but is fairly consistent in the herbaceous meadow and riparian forest (Map 9). Upland forest has relatively rich patches of blueberry and skunk cabbage. Low salt marsh composition varies from nearly pure stands of Lyngbye’s sedge, hairgrass, or beach greens to mixes of all three with silverweed in all transitions. High marshes are dominated by rye grass and hold little food value for brown bears.

Approximately 3 acres of herbaceous meadow occur in the Pack Creek estuary, most of it rich in bear foods such as silverweed, plantain, rice root, lupine, angelica, and cow parsnip. In locations where Stan Price planted gardens, herbaceous meadow mixes with ornamental and garden species (e.g., rhubarb and daffodils).

The extensive riparian forest is comprised of large spruce trees with patchy red alder. The understory is often very dense and is comprised of salmonberry, currant, alder, and elderberry. Salmonberry and currant thickets are particularly rich. Ground cone is abundant in many of the alder thickets. Nearby upland forests have spruce and hemlock with varying degrees of canopy closure. There is an abundance of very large trees (>30” DBH). The gappy patches of forest provide a fairly rich shrub understory comprised of devil’s club, currant, elderberry, and salmonberry. A few patches of wetland forest/scrub occur on level upland areas. These areas appear to be generally poor berry producers but can be an abundant source of skunk cabbage. In slide zones there are large patches of alder/mixed shrub thicket and associated sub-alpine meadow. These areas can be very productive sources of shrub and herbaceous food sources (Christensen et al. 2004).

**Figure 10. Bears Feeding in Rich Lyngbye Sedge**



Source: SEAWEAD

*Swan Cove Covertypes*—The plant community mosaic in the Swan Cove area is a mix of salt marsh, freshwater marsh, herbaceous meadow, bog, fen, shrub thicket, and forest (Map 10). Bear food abundance (richness) is fairly high in all typical food-bearing covertypes (Map 11). Rich Lyngbye’s sedge is abundant throughout the low marsh. The high marsh occurs as a thin and spotty band along most of the Swan Cove beaches and is dominated by rye grass, which is of little value to brown bears. Freshwater marshes near the mouth of the northern creek are dominated by nearly pure stands of Sitka sedge blending with riparian forest understory and rich skunk cabbage patches (Christensen et al. 2004).

Most of the herbaceous meadow is near the mouths of the creeks and is rich in bear food. Some wetter portions have more buttercup and plantain, but drier areas have abundant cow parsnip and angelica. Rice root often occurs in both places. Riparian forest patches are relatively extensive and contain large spruce trees and patchy red alder. The understory in the southern creek is often very dense and comprised of rich salmonberry, currant, blueberry, and elderberry. The north creek has a fairly closed canopy and lacks much understory (Christensen et al. 2004).

**Figure 11. Low Salt Marsh at Pack Creek**



Source: SEAWEAD

Much of the uplands are flat, poorly drained, and are consequently a complex mosaic of conifer forest, wetland conifer/scrub, fen, and bog. Conifer forest is restricted primarily to well drained slopes, riparian corridors and beach areas. Wetland conifer/scrub and shrubby fen patches occur in transition zones between conifer forest and bog/fen complexes. These patches can be extensive and typically provide high blueberry yields. Herbaceous fens often occur on sloping sides of bogs and can provide rich deer cabbage and skunk cabbage patches. Extensive bogs dominate the flattest topographies in the Swan Cove area (Christensen et al. 2004).

**Figure 12. Bog in Swan Cove**



Source: SEAWEAD

### **Summary of Plant Communities Most Important to Bears**

Swan Cove contains the largest amount of high quality vegetation for bears (Table 14). Middle Creek has the most limited supply of rich habitat. High quality bear habitat is defined by more than just plant resources, however. Salmon and clam resources of the anadromous streams and tidal beaches as well as the high value trail and bedding areas near the shoreline are also important considerations when judging habitat quality.

**Table 14. Comparison of High Value Vegetation Communities for Bears**

Location	Survey Area (acres)	High Value Vegetation			
		Acres of Rich Low Marsh Sedge	Acres of Rich Herbaceous Meadow	Total Acres High Value Vegetation	Proportion of Survey Area containing High Value Vegetation
Windfall Creek	281	11	14	25	9%
Middle Creek	137	1	1.5	2.5	2%
Pack Creek	174	6.5	3	9.5	6%
Swan Cove	256	18	13	31	12%
<b>Totals</b>	<b>848</b>	<b>36.5</b>	<b>31.5</b>	<b>68</b>	<b>8%</b>

**Sensitive and Rare Plants**

Twenty-five surveys for sensitive and rare plants were conducted in the Assessment Area between 1992 and 2000 (Anderson 2004). These surveys did not locate any sensitive or rare plants. Four rare plants have been documented on Admiralty Island. These include *Poa leptocoma* in beach fringe and fen, *Carex interior* and *C. lasiocarpa* (a range extension into Southeast Alaska) in fens, and *Mitella nuda* in beach fringe. Near Admiralty Island, in the Chuck River area of Windham Bay, *Eleocharis kamtschatica* was found in the intertidal zone.

Of the 18 species on the Regional Forester’s Sensitive Species List, five have the potential to be in the Assessment Area in habitats near the shoreline (Table 15).

**Table 15. Sensitive Plant Species for which Potential Habitat Exists in the Assessment Area**

Species	Habitat and Distribution	Known From
<i>Botrychium tunux</i> and <i>Botrychium yaaxudakeit</i>	Occur in maritime beach meadows, upper beach meadows, and well-drained open areas.	Yakutat
<i>Hymenophyllum wrightii</i> (Wright filmy fern)	Prefers humid shaded boulders, cliffs, and damp woods. Occurs at the base of trees and rock outcrops or in crevices of tree trunks in coastal areas of Southeast Alaska.	Petersburg, Biorka Island
<i>Isoetes x truncata</i> (Truncate quillwort)	This aquatic grows immersed in shallow water of lakes and ponds	Kodiak and Vancouver Islands
<i>Poa laxiflora</i> (Loose-flowered bluegrass)	Occurs in upper beach meadows, open forests, and low elevation streamside banks.	Hoonah, Port Houghton, Chapin Bay, Windham Bay
<i>Puccinellia kamtschatica</i> (Kamchatka alkali grass)	Prefers wet habitat on the coast and in upper beach meadows. Limited to the southern coast of Alaska from the Aleutian Islands to northern Southeast Alaska.	Holkham Bay

The most critical sensitive plant habitats likely to be impacted by activities in Assessment Area are the low marsh, high marsh, and herbaceous meadows near the shoreline. Of particular concern are the large meadow/marsh complexes at the head of Swan Cove and, especially, Windfall Harbor. The herbaceous meadows are particularly vulnerable to damage from trampling. Those in the areas most likely to be impacted by activities (mostly near the shores) and their probability for sensitive/rare plant habitat are listed in Table 16.



**Table 16. Vegetation Types Known or Likely to be in the Assessment Area**

Vegetation Type	Landscape Location/Features	Sensitive/Rare Plant Habitat probability	Sensitive/Rare Plant Species Likely
Fen (Sedge/Herbaceous fen type)	Steep, seepy meadows, floodplains, and adjacent to beaver ponds where soils are saturated and continually replenished with freshwater.	High	Isoetes x truncata, Poa leptocoma, Carex interior, C. lasiocarpa
Herbaceous Meadow (Cow parsnip – rice root – buttercup type)	Upper beach meadows and along stream terraces, on nutrient rich alluvial soils.	High	Botrychium tunux, B. yaaxudakeit, Poa laxiflora, P. leptocoma, Mitella nuda
Bog (Sphagnum bog type)	At elevations from 4.6-42.1 meters on wet peat	Moderate	Isoetes x truncata
High Marsh (Rye Grass type)	Uppermost tidal zone on sandy substrate.	Moderate	Botrychium tunux, B. yaaxudakeit, P. kamschatica
Low Marsh (Lyngbye’s sedge type)	Intertidal zone along beaches, sloughs and streams.	Moderate	Puccinellia kamschatica, Eleocharis kamschatica
Alder Thicket (Sitka Alder type)	Avalanche paths and on streambanks.	Low	none
Closed Conifer Forest (W. hemlock-Sitka spruce-Blueberry/skunk cabbage type)	Terraces ranging from 9.1-92.1 meters elevation on highly developed soils.	Low	Hymenophyllum wrightii
Gappy Conifer Forest (Sitka spruce-western hemlock-devil’s club type)	Stream terraces, alluvial benches, steep sideslopes.	Low	none
Riparian Forest (Red alder-Sitka spruce/salmonberry mixed forest floodplain type)	Floodplains, stream terraces at 2.1-7.0 meters elevation, on freshly deposited alluvium.	Low	none
Salmonberry Thicket (Salmonberry type)	At the base of avalanche path (3 meters elev.) and on floodplains	Low	none
Sitka Willow (Sitka willow community type)	On floodplains just before stream flows into cove	Low	none
Wetland Forest (Hemlock/Blueberry Bog Periphery Ecotone)	A narrow strip between western hemlock-Sitka spruce/Blueberry/skunk cabbage and Sphagnum bog types – elevation ranges from 21.0-36.9 meters	Moderate	Poa leptocoma

Note: Vegetation type and landscape location from Christensen, et al. 2004

## ***Fish and Wildlife***

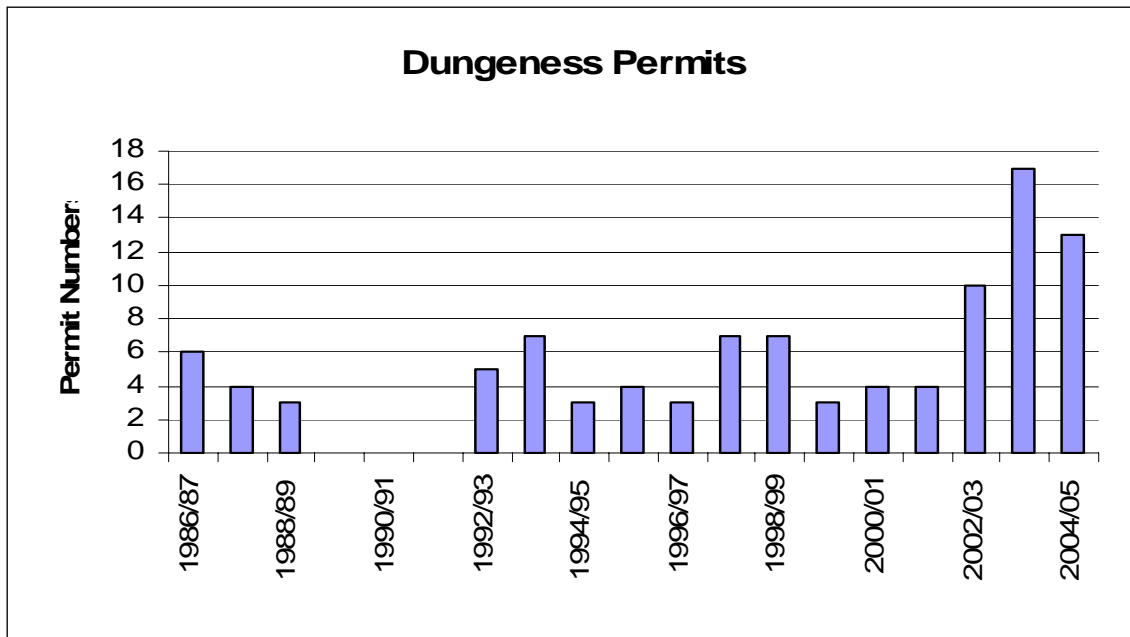
Assessment Area ecotypes include anadromous streams, lakes and ponds, riparian areas, tidal and uplifted marshes, coastal beaches, shrub fields, spruce and hemlock forests, bog and fen muskegs, sub-alpine, and alpine. Combinations of these varied ecotypes provide habitats that support viable populations of mammals, birds, amphibians, fish, and invertebrates. There has not been much land disturbing activity within the area, leaving fish and wildlife habitat in near pristine condition. Due to the high habitat quality within the Assessment Area, most animal populations are considered healthy, although some concern exists about the effects of increased human use on animals and habitats.

### **Marine Invertebrates**

Common marine invertebrates found in the Assessment Area include clams, scallops, mussels, crab, shrimp, and chiton. These invertebrates comprise an essential component of the diets of many birds and animals. Bears are often observed clamming in the tidal flats, and shells are evident in scat. Crows, ravens, gulls, waterfowl, mink, otter, and harbor seals are other species that forage regularly in these intertidal areas.

*Dungeness Crab*—The Alaska Department of Fish and Game (ADF&G) is responsible for managing sport and commercial harvests of marine invertebrate stocks. Dungeness crab is the only marine invertebrate harvested commercially in the Assessment Area. The total number of dungeness permits for sub-districts 111-15 and 111-16, which include Assessment Area near shore waters, is summarized in Figure 13 (ADF&G 2005b).

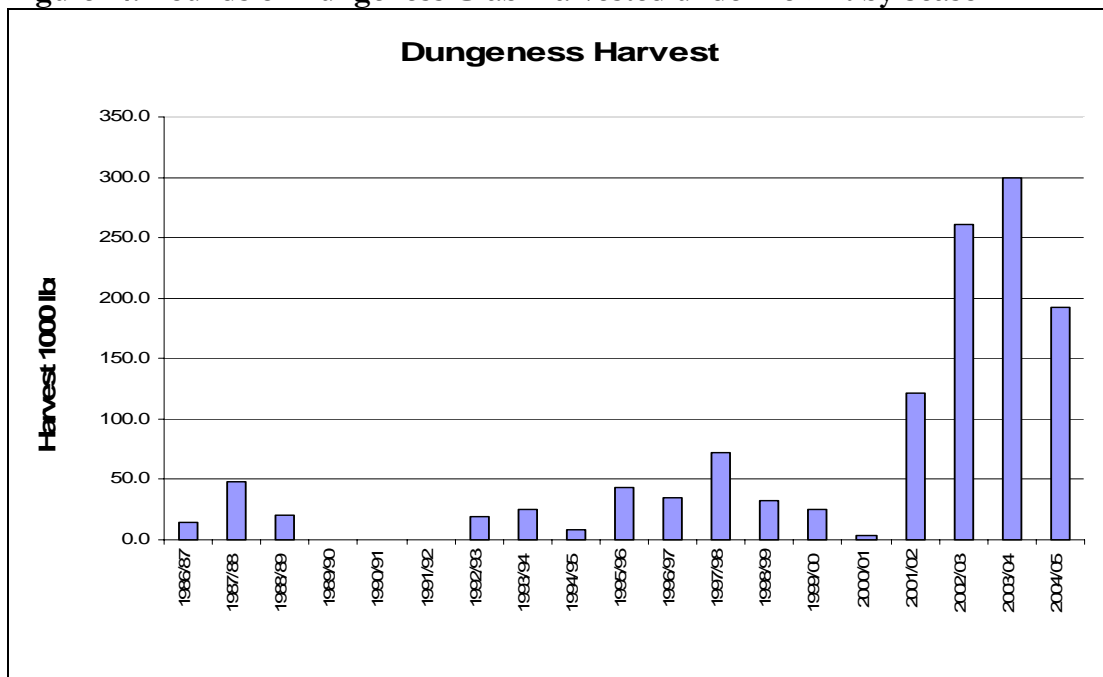
**Figure 13. Number of Dungeness Crab Permits Issued for Sub-Districts 111-15 and 111-16 by Season**



Source: ADF&G

If the number of permits issued for a season is fewer than three, ADF&G considers this data confidential and does not disclose it. This was the case in the 1989/90 through 1991/92 seasons. An average of four Dungeness crab permits per season was issued between 1986 and 2001. For the most recent three seasons the fishing effort has increased with the average number of permits per season increasing to 13. Total pounds of Dungeness crab harvested have also increased as summarized in Figure 14, and the harvest per permit has increased from previous levels of approximately 8,000 to almost 19,000 pounds per permit. Some permit holders store commercial pots on the National Forest land in the Assessment Area, and all of them influence the shoreline zone through their harvest activities.

**Figure 14. Pounds of Dungeness Crab Harvested under Permit by Season**



Source: ADF&G

### Marine Mammals

The saltwater near the Assessment Area provides potential habitat for a number of marine mammals (Table 17). The National Marine Fisheries Service has listed humpback whales as endangered and Steller sea lions as threatened. Humpback whales, as well as Orcas and porpoises, are occasionally observed from the Assessment Area but primarily occur further south and east in Seymour Canal. Visitors arriving by boat most likely observe some of these animals in the course of their travels.

Steller sea lions are present in the area. Their habitat includes marine and terrestrial areas that are used for a variety of purposes. Adults congregate on rookeries for birthing and breeding. Rookeries are generally located on relatively remote islands, often in exposed areas where access by humans and mammalian predators is difficult. Sea lions haul out on suitable beaches or rock outcrops. A small island east of Swan Island is the nearest regularly used sea lion haul out in the vicinity and is not visible from the travel routes most commonly used by visitors to the Assessment Area.

**Table 17. Marine Species near the Assessment Area**

Marine Species	Scientific Name	Status
Humpback Whale	<i>Megaptera novaeangliae</i>	Endangered
Steller Sea Lion	<i>Eumetopias jubatus</i>	Threatened
Harbor Seal	<i>Phoca vitulina</i>	Species of Special Concern
Dall Porpoise	<i>Phocoenoides dalli</i>	not listed
Harbor Porpoise	<i>Phocoena phocoena</i>	not listed
Orca	<i>Orcinus orca</i>	not listed

Harbor seals are the most common marine mammals in the Assessment Area and are listed as a Species of Special Concern by the State of Alaska. Harbor seals haul out of the water periodically to rest, give birth, and nurse their pups, using reefs, beaches, sand and mud bars, and glacial ice. Harbor seals haul out upon shorelines on Cygnet Island in Swan Cove and near Windfall Island in the Assessment Area.

**Table 18. Primary Harbor Seal Haulout Locations for Seymour Canal August 2002**

Site	Latitude	Longitude	8/6	8/10	8/13	8/14	Mean	Max
Beacon Rock	57.6675	-134.024	25	46	0	45	29	46
Dorn I. NW	57.7873	-134.062	8	0	0	0	2	8
King Salmon Bay E	58.0065	-134.244	65	189	0	0	64	189
King Salmon Bay E2	58.011	-134.23		164	37	0	67	164
Mole Harbor	57.6681	-134.036	17	23	35	0	19	35
Rocks N of Shore Finger Cove	57.7449	-134.026	50	67	59	85	65	85
Swan Cove	57.9667	-134.283	75	31	6	33	36	75
Swan I. E	57.9514	-134.202	110	70	577	221	245	577
Tiedeman I. N	57.8911	-134.223		128	0	0	43	128
Tiedeman I. SW	57.7962	-134.151	35	93	125	3	64	125

Source: Withrow 2005.

## Fish

The annual spawning migrations of anadromous fish (such as salmon) are important to the function of many plant and animal communities. Many species of birds, mammals, and fish feed on salmon and their eggs. Brown bears and bald eagles depend on spawning salmon and their carcasses for over-winter survival. Dead salmon are important to the cycling of nutrients within a watershed, providing vital minerals and nutrients for plants, invertebrates, and higher life forms (Wipfli, et al. 2003). Anadromous fish (Appendix G) found within the assessment area include:

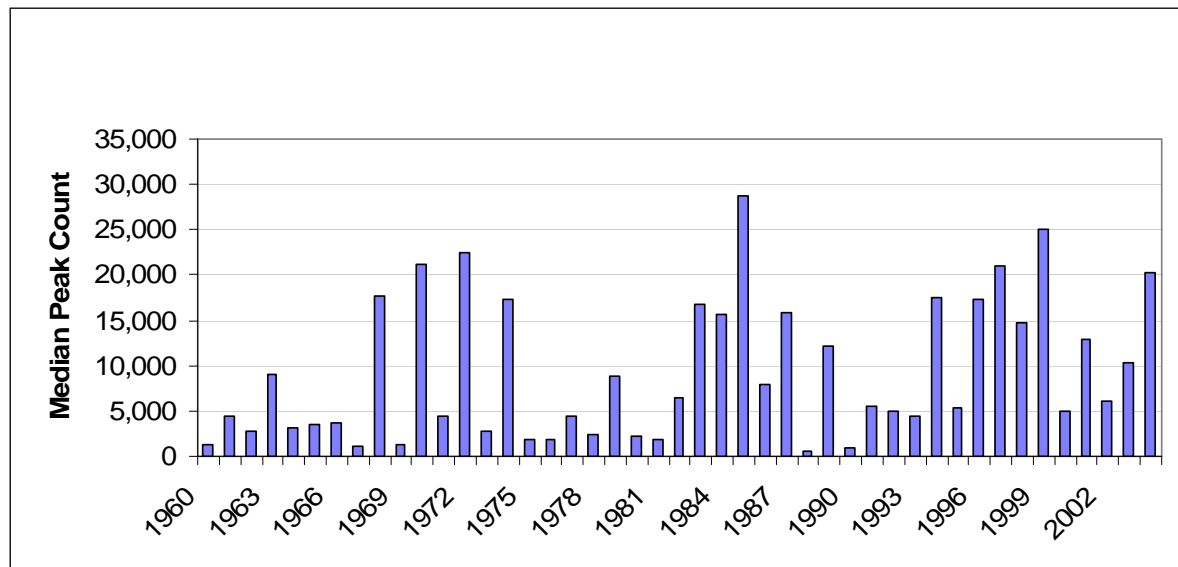
- Pink Salmon (*Onchorhynchus gorbuscha*)
- Chum Salmon (*Onchorhynchus keta*)
- Cutthroat Trout (*Onchorhynchus clarkii*)
- Steelhead Trout (*Onchorhynchus mykiss*)
- Dolly Varden (*Salvelinus malma*)

There are eight anadromous streams in the Assessment Area that provide spawning habitat for pink and chum salmon. Arctic grayling (*Thymallus arcticus*) were stocked in Slide Lake in

1951. Subsequent surveys (completed as recently as 2004) have found only resident Dolly Varden in the lake, and it is doubtful that the grayling population has survived.

*Pink Salmon*—The ADF&G’s Division of Commercial Fisheries uses aerial and foot survey counts collected since 1960 to index the annual escapement of pink salmon in Southeast Alaska (Zadina et al. 2004). From 1960 through 2004, the median peak count of pink salmon in six of the Assessment Area streams with the largest yearly runs<sup>5</sup> varied from 594 to 25,112. Peak escapement counts significantly increased ( $p>0.05$ ) from 1960 to 2004 in Windfall Creek, Middle Creek, and Pack Creek. The median peak count for all six streams also increased significantly from 1960 to 2004 (Figure 15).

**Figure 15. Pink Salmon Escapement Figures (1960 to 2004)**

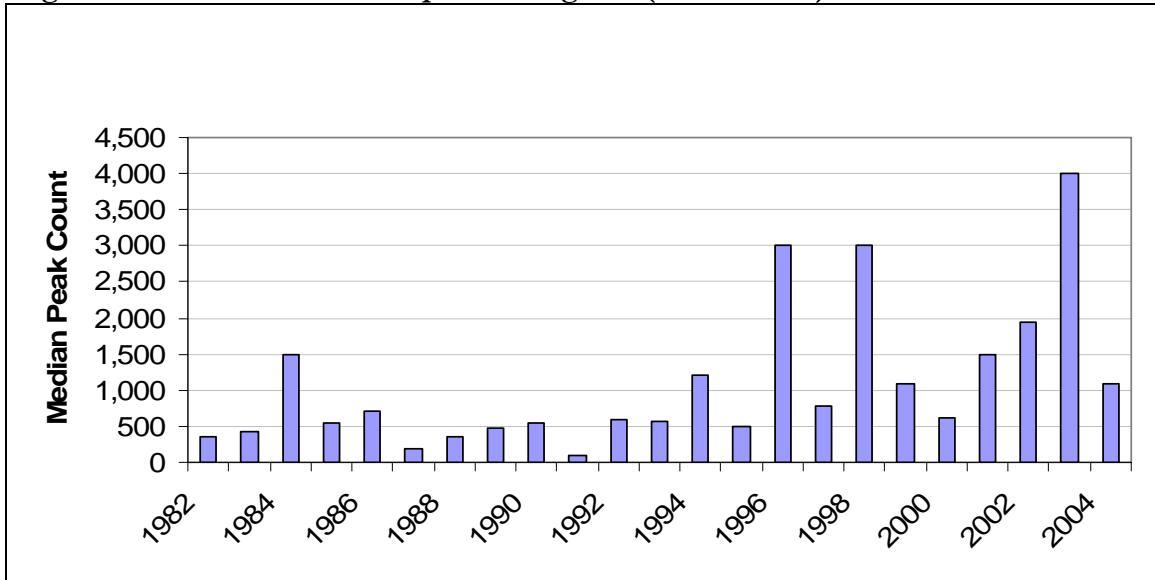


Note: Information concerning the presence of fish species for a particular stream came from the ADFG Anadromous Stream Atlas (2005). Other information sources included administrative studies conducted by the forest service and other state and federal agencies, and comments from resource specialists and the public.

*Chum Salmon*—The ADF&G has also applied aerial and foot survey counts to index the annual escapement of chum salmon in the region (Heinl et al. 2004). Three streams in the Pack Creek area are included in ADF&G’s current chum salmon escapement index (Middle Creek, Pack Creek, and Swan Cove Creek). From 1982 to 2004, there was a significant ( $p>0.05$ ) increase in peak escapement counts of chum salmon in both Middle Creek and Pack Creek (Figure 16).

<sup>5</sup> Surveyed streams are Windfall Harbor Creek, Bear Bones Creek, Middle Creek, Pack Creek, Swan Cove South Creek, and Swan Cove Creek.

Figure 16. Chum Salmon Escapement Figures (1982 to 2004)



Source: ADF&G

### Amphibians

Six species of amphibians occur within Southeast Alaska (MacDonald 2003). They are:

- Rough-skinned Newt (*Taricha granulose*)
- Western Toad (*Bufo boreas*)
- Columbia Spotted Frog (*Rana luteiventris*)
- Wood Frog (*Rana sylvatica*)
- Long-toed Salamander (*Amystoma macrodactylum*)
- Northwestern Salamander (*Ambystoma gracile*)

Only two of these species, rough-skinned newt and western toad, have been documented on Admiralty Island, where distributions are widespread. Toad breeding sites occur within the Assessment Area, and ponds with the largest concentrations of newts discovered on Admiralty occur just outside the boundaries of the Assessment Area. Since these two species often breed in the same ponds, it is presumed that newt breeding sites may also exist within the area. Little is known about the health of these populations as amphibians are generally difficult to repeatedly observe and monitor. Since 2002 a more concerted effort has been made to accumulate and document amphibian sightings on Admiralty, since many populations of western toads have experienced significant declines within the last 20 years (Appendix F).

### Birds

*Threatened, Endangered, and Sensitive Species*—No birds endemic to Admiralty are listed as threatened or endangered by the U.S. Fish and Wildlife Service. Region 10 of the Forest Service has identified five sensitive bird species:

- Trumpeter swan (*Cygnus buccinator*)
- American osprey (*Pandion haliaetus carolinensis*)

- Queen Charlotte goshawk (*Accipiter gentilis laingi*)
- Peale's peregrine falcon (*Falco peregrinus pealei*)
- Dusky Canada goose (*Branta canadensis occidentalis*)

Trumpeter swans commonly winter in Swan Cove and other estuaries of upper Seymour Canal. Osprey, goshawk, and peregrine falcon may be rarely present within the Assessment Area as migrants or resident birds, but no known nesting sites for these species have been documented within the Assessment Area. Dusky Canada geese are not resident of Admiralty Island.

*MIS Species*— The Forest Plan uses the concept of Management Indicator Species (MIS) as a tool to monitor effectiveness of land management practices in maintaining viable populations of wildlife species. Birds listed as MIS in the Forest Plan and known to be present in the area include:

- Vancouver Canada Goose (*Branta canadensis fulva*)
- Bald Eagle (*Haliaeetus leucocephalus*)
- Red-breasted Sapsucker (*Sphyrapicus ruber*)
- Hairy Woodpecker (*Picooides villosus*)
- Brown Creeper (*Certhia americana*)

*Vancouver Canada Goose*— Vancouver Canada geese are distributed throughout the Alexander Archipelago of Southeast Alaska, with an estimated resident population of 10,000 birds in the northern half of Southeast. This population is relatively non-migratory, with the majority of birds moving only locally between nesting, brood rearing, molting, and winter concentration areas. Vancouver Canada geese use wetlands (both forested and non-forested) in the estuary, riparian, and upland areas of the forest. Nesting and brood rearing habitats (estuaries, non-forested wetlands, and certain old-growth forest types) are potentially affected by various Forest management activities. Vancouver Canada geese are highly mobile and are found throughout the islands of Southeast Alaska.

Vancouver geese commonly frequent the Assessment Area, especially the estuarine areas of Windfall Harbor and Swan Cove. The U.S. Geological Survey is studying the winter distribution, survival, diet, habitat use, and physiological condition of Vancouver Canada geese in Southeast Alaska. In July 2004, radio transmitters were implanted in 27 female geese in upper Seymour Canal. Telemetry flights in November 2004 and January 2005 showed they remained in Southeast Alaska for the winter, often within 20 km of their capture site. In 2006 Forest Service personnel will assist with radio telemetry in locating nest sites.

*Bald Eagle*— North America's bald eagle population reaches its highest density in Southeast Alaska. Its nesting habitat is primarily old-growth trees along the coast and within riparian areas. Fifty-three bald eagle nest sites have been identified along the shoreline of the Assessment Area, although not all nests are occupied in any given year. Nesting habitat is primarily old-growth trees within riparian habitat near the coast. The U.S. Fish and Wildlife Service conducts surveys and maintains a database of nest locations used to minimize land management impacts to eagles.

*Red breasted Sapsucker*—The red-breasted sapsucker is found throughout Southeast Alaska during the spring, summer, and early fall seasons, wintering in the coastal portion of its breeding range as far north as Prince of Wales Island. Red-breasted sapsuckers are summer residents that use old-growth forest habitats with snags. They are called primary excavators because they create cavities for other cavity-using wildlife species.

*Hairy Woodpecker*—The hairy woodpecker is considered an uncommon, permanent resident throughout Southeast Alaska. Hairy woodpeckers use old-growth forest habitats with snags and partially dead trees for foraging and nesting. Like the red-breasted sapsucker, hairy woodpeckers are primary cavity excavators for other cavity-using wildlife species.

*Brown Creeper*—The brown creeper is considered an uncommon, permanent resident throughout Southeast Alaska. This species is associated with large old-growth trees and is most closely associated with high volume old-growth.

### **Terrestrial Mammals**

The Assessment Area includes examples of all major habitat types that occur on Admiralty Island; therefore, all resident mammal species present on the island may be expected to occur within the Assessment Area (Table 19). No terrestrial mammals have been listed as threatened, endangered, or sensitive species by the U.S. Fish and Wildlife Service or Region 10 of the Forest Service.

*Muskrats*—Muskrats on Admiralty are known from a single museum specimen housed at the Museum of Vertebrate Zoology in Berkeley, California. This specimen was collected by Allen Hasselborg near his home site at Mole Harbor in 1936. It is possible that this animal may have been released or escaped from early fur farming attempts of that period.

*Wolves*—Wolves (*Canis lupus*) have not been documented on Admiralty Island. There have been a number of convincing wolf sightings on Admiralty in recent years, but no conclusive physical evidence has been collected to confirm these sightings. Person (2001), who studied wolf movement in the Prince of Wales Island complex, found that wolves can swim distances of up to 4 kilometers. Wolves could possibly travel to Admiralty Island from Douglas Island or from the mainland via Grand Island during some periods. If a breeding population should become established on Admiralty Island, significant ecological and social implications could be expected as the prey base is exposed to this major predator.



**Table 19. Terrestrial Mammals Present on Admiralty Island**

Common Name	Scientific Name	Notes
Beaver	<i>Castor canadensis</i>	
Dusky Shrew	<i>Sorex monticolus</i>	
Ermine	<i>Mustela erminea</i>	
Keen's Mouse	<i>Peromyscus keeni</i>	
Little Brown Myotis	<i>Myotis lucifugus</i>	
Long-legged Myotis	<i>Myotis volans</i>	
Long-tailed Vole	<i>Microtus longicaudus</i>	
Meadow Vole	<i>Microtus pennsylvanicus</i>	
Mink	<i>Mustela vison</i>	
Muskrat	<i>Ondatra zibethicus</i>	Only one specimen documented
Sitka Black-tailed Deer	<i>Odocoileus bemonius</i>	Management Indicator Species
Brown Bear	<i>Ursus arctos</i>	Management Indicator Species
Marten	<i>Martes americana caurina</i>	Management Indicator Species
Red Squirrel	<i>Tamiasciurus hudsonicus</i>	Management Indicator Species (not native on Admiralty Island)
River Otter	<i>Lontra canadensis</i>	Management Indicator Species

Source: (MacDonald and Cook 1999)

### Terrestrial Mammal MIS

Five mammal species that occur in the Assessment Area (Sitka black-tailed deer, red squirrel, marten, river otter, and brown bear) have been identified as MIS.

*Deer*— Sitka black-tailed deer are indigenous to the coastal regions of Southeast Alaska and northwest British Columbia; this subspecies of mule deer occupies the northern-most extreme of black-tailed deer habitat. Deer are strong swimmers, and have occupied almost all islands of the Alexander Archipelago capable of supporting them. On the mainland, deep snow and harsh winters limit populations more than on the islands. Sitka black-tailed deer are the wildlife species receiving the highest sport hunting and subsistence use of all terrestrial species in Southeast Alaska. The State of Alaska and the Federal Subsistence Board are responsible for the numbers of deer allowed to be taken for harvest. Deer hunting generally occurs from August through December and is allowed in the Assessment Area. Hunting effort is primarily associated with the four private special use cabins on Swan Island. Deer hunting harvest statistics are shown in Table 20.

**Table 20. Summary Deer Harvest Information for Wildlife Analysis Area 4146 (Windfall Harbor and Swan Cove Drainages)**

Year	Hunters (Successful Hunters)	Days Hunted	Bucks Harvested	Does Harvested	Total Deer Harvested	Average Deer per Hunter	Average Days per Deer
1996	n/a (20)	n/a	9	23	32	1.5	n/a
1997	14 (10)	19	10	5	14	1	1.3
1998	24 (10)	126	29	10	39	1.6	3.2
1999	54 (19)	217	13	10	23	0.4	9.4
2000	51 (37)	314	51	19	69	1.4	4.5
2001	32 (28)	143	46	13	59	1.8	2.4
2002	14 (4)	48	8	0	8	0.6	5.8
2003	33 (33)	123	38	14	52	1.6	2.4

Source: ADF&G 2005b

*Red Squirrel*—Prior to 1930, red squirrels in Southeast Alaska existed only on the mainland. In 1930 and 1931 they were introduced to Baranof and Chichagof Islands as a potential prey species for the transplanted marten, and today red squirrels are abundant on many of the islands and the mainland. Early biological expeditions to Admiralty Island did not indicate the presence of red squirrels. Evidence suggests that they may have been transplanted to the north end of the island in the late 1940s or early 1950s. Red squirrels have colonized the entire island.

*Marten*—Marten naturally inhabit the mainland of Southeast Alaska, and natural populations occur on Kuiu, Kupreanof, Mitkof, and Revillagigedo Islands. Marten were transplanted to Prince of Wales, Chichagof, and Baranof Islands between 1930 and 1950. Whether these transplants were new introductions or just supplemented existing populations is unknown. Marten in Southeast Alaska have been the subject of several recent investigations related to taxonomic, phylogeographic, and forest management questions (MacDonald and Cook 1996, USDA 1997, Schumacher 1999, Cook and MacDonald 2001, Cook et al. 2001, Flynn and Schumacher 2001, Small et al. 2003, Hanley et al. 2005, and Smith 2005). Studies using modern genetic techniques (Cook et al. 2001, Small et al. 2003) have shown that the marten from Admiralty Island belong to the *Martes americana caurina* clade and exhibit the lowest allele richness of all sampled marten populations studied, indicating pure mtDNA caurina populations. *M. caurina* are only known from Kuiu and Admiralty Islands in Southeast Alaska. *M. americana* are the continental clade occurring on the mainland and islands that have passable narrow ocean channels that have allowed colonization. Marten were intentionally transplanted to Chichagof, Baranof, and Prince of Wales Islands in the mid 1900s by the Alaska Game Commission (Burriss and McKnight 1973). The Admiralty population is considered unlikely to have been founded recently by human introduction due to its unique genetic profile (Stone and Cook 2002).

*River Otter*—River otters are associated with coastal and fresh water aquatic environments and the immediately adjacent (within 100-500 feet) upland habitats. Their distribution is Forest-wide in suitable habitats. Beach characteristics affect the availability of food and cover, and adjacent upland vegetation is also important in providing cover for otters.

*Brown Bear*— Brown bears are present on the mainland and on the islands north of Frederick Sound. They are occasionally reported on Mitkof, Etolin, and Wrangell Islands south of Frederick Sound, but are not found on any of the other islands in Southeast Alaska. Some of the highest brown bear population densities in the world are found within the Tongass.

Brown bears are the primary focus of the Pack Creek Zoological Area and of this assessment. Brown bears are common in the Assessment Area and occupy habitats from beach fringe to alpine. Late summer is a critical period for bears. During that time bears concentrate on low gradient streams to feed on spawning salmon and to build the fat reserves they need to survive the winter. The habitats with the highest values during this season are estuaries and riparian areas.

Because bears gather to feed at the streams, their presence at them is somewhat predictable, and people are drawn to the streams to view them. Human presence is capable of affecting bears with impacts most evident as behavioral alterations and/or displacement from the immediate vicinity. When an animal perceives or senses danger it may react by hiding, fleeing, bluffing aggression, or, in rare instances, attacking. Displacement of bears from preferred salmon fishing sites may have significant biological consequences beyond just behavioral changes. Hilderbrand et al. (1999a, 1999b) have shown that brown bear population density, reproductive rates, body size, and nutrition are directly related to access to salmon availability. Hanley (2005, p.113.) has suggested “some (research) work probably needs to be directed at interactions between tourism and selected wildlife species.” Pack Creek Bear Viewing staff and others have also recognized this need.

In 2000, the Alaska Board of Game convened a diverse group of people with interest in the bears of the Admiralty, Baranof, and Chichagof Islands in Southeast Alaska. This group found that particular areas and types of habitats are attractive to both bears and humans. Estuaries and anadromous fish streams are the most prominent features of such areas. Bears depend on them primarily as a source of foods and humans frequent them for many types of recreation. The team recognized that these Human/Bear High Use Zones may require additional management attention to ensure continued access by bears to these key habitats and that human/bear interactions are not detrimental to either species. (ADF&G 2000).

Research on the effects of recreation on brown bears indicates they can habituate to continuous and predictable human activity (Fagen and Fagen 1994). Either habituated bears are truly unaffected by human intrusion, or they modify their normal behavioral responses and appear to be unaffected. For habituated bears, biological consequences related to tourism may be minor; however, habituation of brown bears to humans may lead to bear mortality and/or human injury or death when not recognized and managed in a proper manner.

*Bears at Pack Creek*—The Pack Creek Bear Viewing Site, where visitor access and activities are strictly controlled and monitored, provides quality recreation opportunities for the public while protecting wildlife. Individual bears at Pack Creek have generally become habituated to the presence of humans in known locations. These bears appear to be thriving as evidenced by the consistently high number of bears seen, the high level of food resource utilization at the site, and the reproductive success of known females that repeatedly return with cubs. Visitors are given interpretive information and rules to follow so they may act in a

predictable manner around the habituated bears. Visitors are also guided by experienced employees or guides who are familiar with individual bears and their behavior. This provides a quality bear-viewing experience in a wilderness setting that is safe for both bears and humans and is often the highlight of a visitor's Alaskan adventure.

As demand for bear viewing opportunities increases, there are times when viewing demand exceeds the daily permitted use authorized at Pack Creek. High levels of use at Pack Creek and the desire by some visitors for a more natural unregulated viewing experience have led some to shift visits to adjacent estuary sites in the Assessment Area that offer bear viewing opportunities, specifically Windfall Harbor and Swan Cove. DNA analysis of hair samples collected from six sites (two each in Windfall Harbor, Pack Creek, and Swan Cove) have identified 14 individual bears and documented their movements between the three drainages (Post 2003). Bears encountered by visitors at Windfall Harbor or Swan Cove may or may not be habituated to the presence of humans, and the access and actions of these visitors are not managed and controlled as at the Pack Creek Bear Viewing Area.

In 2003 and 2004, SEAWEAD partnered with Admiralty National Monument to conduct a study of brown bear habitat use in the Assessment Area (Christensen et al., 2004). The objectives of this study were twofold:

1. Provide detailed information on brown bear habitat and signs of use in important estuarine areas of the Pack Creek Zoological Area; and
2. Discuss site-specific bear habitat values and address management considerations for bear-human interactions in Windfall Harbor and Swan Cove.

As a result of this study, the Forest Service has obtained detailed information and high definition mapping of vegetation and plants that are important food resources for bears (see the Shoreline Vegetation section) and bear sign such as trails, sign trees, "hot feet" trails, and bedding areas. The results of this study will be valuable in directing visitors to viewing sites that have the least impact on the bears. They area summarized below by bear-viewing area.

*Bears at Middle Creek*—Grazing opportunities in the Middle Creek area are fairly poor. Low marsh and herbaceous meadow types in this area have low abundance of preferred food plants. Riparian and upland forest habitats have a low abundance of berries (Map 7, Appendix A). However, both pink and chum salmon spawn in Middle Creek. A barrier falls occurs approximately 3,000 feet from tidewater. The extent of high-quality fishable habitat is approximately 2,000 feet with the majority occurring upstream of the forest edge and below the log jam area.

The majority of bear bedding currently occurs on the north side of the creek and on the gravel bars at the apex of the alluvial fan. Bear trails are concentrated near the stream, but there are also important corridors linking this drainage with others to the north and south (Map 12, Appendix A).

Observations of bears at Middle Creek by staff and guides show consistent use of the estuary during the salmon run by a small number of bears. Some bear viewers enter the estuary from the north side of the creek, while others approach from the south. Occasionally, visitors sit on the bank of the creek in close proximity to fishing bears. Christensen et al. (2004) provide

suggestions for future visitor use management by outlining two possible approaches for management:

1. To emphasize protection of bear access to habitat, discourage human presence ashore at the Middle Creek estuary. Existing and future use could be relocated to the beach on the opposite side of Windfall Harbor (Location A on Map 12). This scenario would provide a long-distance viewing opportunity that would not significantly affect bear use.
2. A compromise between bear and human use of the Middle Creek estuary may be achieved if human use is restricted to the southern side of the Middle Creek estuary (Location B on Map 12). This area offers a broad view of the meadow and creek without placing observers in the immediate vicinity of concentrated trail or bedding areas. This site should be approached from the south end of the estuary (Location C on Map 12) to minimize impacts to important cover areas on the north side of the creek and to reduce the chances of surprise encounters. Travel time to and from the viewing site should be minimized to reduce the potential for disturbing bears. All food should be kept in bear-proof containers or left aboard a secure vessel. Disturbance of some bears would still occur under this scenario because the high-value habitats are restricted to a compact area. Also, bears are more likely to sense human presence, especially via scent on days with a south wind. Allowing human use ashore close to the creek may encourage further encroachments into sensitive bear habitats unless strictly controlled.

*Bears at Windfall Harbor*—The Windfall Creek area in Windfall Harbor contains more bear habitat and greater diversity of resources for bears than Middle Creek (Christensen et al. 2004.) Lyngbye's sedge is fairly abundant on both sides of the creek. Herbaceous grazing opportunities are concentrated near the creek and at the base of the west side alluvial fan. Non-riparian salmonberry and ground cone resources are concentrated at the base of the west side alluvial fan (Maps 4 and 5 in Appendix A). Both pink and chum salmon run in Windfall Creek. A barrier falls occurs approximately two miles upstream. High-quality fishable habitat extends upstream more than a mile from tidewater.

The majority of near-shore bear bedding activity occurs on the steep forested slopes near the eastern edge of the meadow and creek (Appendix A, Map 13). Bear trails are concentrated at the forest edge on the east side of the estuary. Trail concentration is relatively low on the west side of the estuary. The lack of concentrated trails on the west side is likely due in part to repetitive human use of the area (Appendix A, Map 13). Most travel to and from Windfall Harbor by bears probably occurs on the western shore because there is excellent connectivity to alternative feeding sites at Middle Creek and Pack Creek, and there is a distinct lack of resources on the eastern shores.

Human use of the shelter and the estuary meadows has likely influenced long-term patterns of use by bears (e.g., the conspicuous lack of bedding in the large tree forest at the base of the west-side alluvial fan). Most human use of this southern estuary in Windfall Harbor is on the western side of the creek. Commercial guides agreed in 2000 to confine their visits to the western side (near Location B on Map 13) to prevent displacing bears from habitats further up the creek. SEAWEAD has offered two suggestions for future management of visitor use in this area:

1. To emphasize protection of bear access to habitat, discourage human use of the Windfall Harbor estuary and focus a limited amount of use at the existing shelter (Location A on Map 13). This location would provide a long-distance viewing opportunity that would not significantly affect bears in the estuary and along the anadromous stream. The beach on the west side of Windfall Harbor is likely an important travel corridor for bears that travel to and from drainages to the north. Strict emphasis on protection of bear resources argues for limited use of this shoreline, including the shelter, such that the area would be free of human occupation as much as possible.
2. A compromise between bear and human use of the Windfall Harbor estuary may be achieved if guided and non-guided use is restricted to the beach area at the base of the west-side alluvial fan (Location B on Map 13). This area offers a broad view of the meadow and creek without placing observers in the immediate vicinity of the concentrated trail and bedding areas near shore. The viewing site should be approached from the shelter. All food should be left in bear-proof containers in the shelter to reduce the possibility of food conditioning. Travel time to and from the viewing site should be minimized to reduce disturbance to the west-side bear travel corridor. Because of close proximity to important grazing resources, human behavior at the viewing site should be controlled to reduce offensive scents, loud noises, and abrupt movements. Duration of site occupancy might also be restricted. Disturbance of some bears will likely occur under this scenario because of overlapping use on the west-side travel corridor and the occurrence of high-value grazing habitats in close proximity to the viewing site.

As noted above, the western shore of Windfall Harbor between Pack Creek and Windfall Creek (including Middle Creek) is used by bears as a travel corridor between high value habitats at the estuaries, while the eastern shore has no anadromous estuarine habitat and far less evidence of use by bears. Bears are regularly observed walking the western shorelines and are observed along the eastern shoreline only in the pockets of sedge near the south end of the harbor. Evidence of bear trails and bedding areas are most prevalent along the western shoreline. Although field staff has discouraged visitors from camping along the western shoreline, the CCC shelter in south Windfall Harbor (Location A on Map 13) remains a strong attractant for them. The shelter is sometimes heavily overgrown with salmonberry.

*Bears at Swan Cove*—The large tidal flats at Swan Cove make access to bear viewing sites less favorable for day use visitors arriving by boat or floatplane. Tidal fluctuations require lengthy hikes to viewing sites which is often not desirable by clients or guides. Christensen et al. (2004), however, have noted the high quality and abundance of bear habitat in this area

Grazing opportunities in the Swan Cove area are very good. Extensive Lyngbye's sedge and herbaceous meadows are found near the creek mouths. Lyngbye's sedge is also abundant as a narrow band along much of the shoreline on the south side of the cove. These patches are particularly valuable because of their close proximity to high-quality cover. Extensive scrubby forest, fen, and riparian shrub thickets provide an abundance of berry bushes. Both pink and chum salmon run in the two large creeks in the northwestern corner of Swan Cove.

The combined high-quality fishable habitat is approximately 8,000 feet in length, 80 percent of which occurs within 2,000 feet of the beach (Christensen et al. 2004)

Extensive bedding occurs along the escarpment lip above the south and west side beaches, and on the forested peninsula between the two large creeks (Appendix A, Map 14). Bear trails are concentrated along the southern and western beach fringe escarpment lip, and near the high-quality anadromous habitat

Management options identified by SEAWHEAD include access from the northeastern shore to avoid entering the highest quality habitat:

1. To emphasize protection of bear access to habitat, discourage human use of the high-quality habitats in the Swan Cove estuary. For this scenario we suggest a bear viewing location in the vicinity of location A on Map 14. This location is close enough for distance viewing but avoids most of the high-quality resources in the cove. The beach on the north side of Swan Cove would serve as the best access route as this shore is almost devoid of feeding opportunities and concentrated bear sign. All food should be kept in bear-proof containers or left aboard a secure vessel. Prohibiting flight-seeing whenever possible will also serve to reduce disruption of bear access to preferred habitats. Although the viewing location in this scenario does not directly overlap with most of the high-quality food and cover resources in Swan Cove, the intolerant nature of many of the Swan Cove bears may make disturbance difficult to avoid.
2. A compromise between bear and human use of the Swan Cove estuary may be achieved if guided and non-guided use is restricted to the north side of the cove and penetrates no further than location B on Map 14. This area offers a broad view of the meadow and tidal portions of the creeks without placing observers in the immediate vicinity of the concentrated trail and bedding areas. Because of the potential for relatively close proximity to important grazing resources, human behavior should be controlled to reduce offensive scents, loud noises, and abrupt movements. All food should be kept in bear-proof containers or left aboard a secure vessel. Disturbance of intolerant bears will likely occur under this scenario. If human use significantly increases, habituation is likely to occur, while some bears resistant to habituation may abandon the area.

The results of SEAWHEAD's research indicate that Swan Cove contains the highest abundance and "richness" of bear foods of the four study areas. However, Pack Creek has the highest density of bear trails and bedding areas (Table 21). This is perhaps due to higher levels of bear habituation to human presence at Pack Creek that allows increased use of resources by bears (Christensen et al. 2004).

**Table 21. Summary of Bear Use and Resources by Estuary Area**

VARIABLES	ESTUARY AREA			
	Windfall Harbor	Middle Creek	Pack Creek	Swan Cove
Assessment Area (AA) Acres	281	137	174	256
<b>BEAR SIGN</b>				
Miles of bear trail	6.3	4.2	9.3	7.7
Average trail concentration (ft/acre)	118	160	283	159
Concentrated bedding area (>1 bed/1,000ft <sup>2</sup> )(total acres)	18.2	2.5	13.5	19.0
Percent of the AA that is concentrated bedding area	6.5	1.8	7.8	7.4
<b>RESOURCES</b>				
Acres rich low marsh sedge	11	1	6.5	18
Acres rich meadow	14	1.5	3	13
Total length of highly fishable reach (ft)	>4,000	<1,200	<3,000	>5,000

Source: Christensen et al. 2004

### Invasive Species

Invasive plants or animals can significantly alter natural habitats and ecological processes and have severe impacts. Forest Service Chief, Dale Bosworth, has described unwanted invasive species as one of the “four real threats to environmental sustainability” (Bosworth 2003, p. 2). Executive Order 13112 (1999) defines an invasive species as one that is 1) non-native (or alien) to the ecosystem under consideration, and 2) whose introduction causes or is likely to cause economic or environmental harm or harm to human health. In 2004, the Forest Service prepared a National Strategy and Implementation Plan for Invasive Species Management. In 2005 the Chugach and Tongass National Forests completed Invasive Plant Management Plans. An Alaska Region Strategy is currently being prepared for all other species. Prevention, early detection and rapid response are the primary tools used to ensure that any area is not impacted by invasive species (USDA 2004).

*Plants*—Invasive plants do occur on Admiralty Island and have been documented within the Assessment Area at 27 sites. A project is currently being undertaken to rank the invasiveness of non-native plants in Alaska (Weed Ranking Project 2005) and will be used by Forest Service personnel to prioritize treatment priorities. Two species with known invasive tendencies, common plantain (*Plantago major*) and Kentucky bluegrass (*Poa pratensis*), are present on the viewing spit at Pack Creek. Forest Service plant survey crews also recently found black bindweed (*Polygonum convolvulus*) at one site on Swan Island and field mustard (*Brassica rapa*) at 20 locations within the Assessment Area boundaries. Invasive plant control efforts are being conducted in the Assessment Area for common plantain, black bindweed and field mustard. Other non-native plants also occur in the area, especially around the Stan Price abandoned garden plot and home site (e.g., daffodils and rhubarb), but these species do not appear to be invasive.

*Animals*—The red squirrel, which was introduced to Admiralty Island, has now colonized habitat throughout the island. It is endemic to the adjacent mainland, which is similar to Admiralty Island in biota and ecological processes. Red squirrels are known to be a common avian nest predator in Southeast Alaska (Sieving and Willson 1998), and their presence and impact upon other species on Admiralty Island have not been studied. There are no known terrestrial species occurring on Admiralty that do not also coexist with red squirrels on the



mainland, and prey species survival strategies that have evolved on the mainland might be expected to exist on Admiralty. Surely some individual birds have been affected by the introduction of red squirrels, but it has not been shown that the viability of any species has been threatened.

There is concern that Atlantic salmon (*Salmo salar*) may become established in Alaskan streams and negatively impact native salmon stocks. This fish has yet to be observed in Admiralty Island streams, though there may have been some recent marine captures.

# RECOMMENDATIONS

## Potential Wilderness Resource Enhancement Projects

### *Introduction*

In 2005, the Chief of the Forest Service began an effort to improve Wilderness management by the Forest Service. The following elements of the “Ten Year Wilderness Stewardship Challenge” apply to the Assessment Area. Suggestions for projects that could take place in the next five years are provided.

**Successfully treat non-native invasive plants.** (see Fish and Wildlife projects)

**Provide Wilderness and Leave No Trace education.**

- Provide Leave No Trace messages to campers, boaters, paddlers, and bear watchers emphasizing LNT camping practices and wildlife viewing ethics.
- Update the Seymour Canal Bear Viewing Brochure so that it includes LNT messages and maps of recommended campsites to concentrate use where appropriate.
- Outreach to school and youth groups with bear and LNT education, emphasizing positive actions to protect bears and people.
- Change the Pack Creek website to be a sub-part of the Zoological Area web page. Include broader information on the Zoological Area and the Wilderness messages.

**Protect opportunities for solitude or primitive and unconfined recreation.**

- Establish thresholds for the number of groups encountered per day and manage to prevent them from being exceeded. If thresholds are exceeded, further actions would take place to protect solitude. Examples could include scheduling guides to avoid overlapping visits, scheduling permits for unguided parties, or other means.
- Establish monitoring protocols for the Assessment Area that would estimate guided and non-guided use and include in an annual report.

**Complete a recreation site inventory.**

- The recreation inventory of campsites was completed in 2002 and should be updated in 2007.
- Review the inventories to characterize campsite conditions and to recommend actions to improve impacted sites.

**Outfitters and guides model appropriate wilderness practices and incorporate appreciation for wilderness values in their interaction with clients and others. A “needs assessment” is completed prior to the issuance of a prospectus for new operations or for major changes to existing outfitter programs.**

- Develop a training session for guides to assist them with Wilderness interpretation methods (guide operating plans are checked annually to insure they include methods for interpreting Wilderness to their clients).
- Complete “needs assessments” prior to the issuing prospectuses for guided services.

**Prevent degradation of the wilderness resource.**

The Forest Plan goals for the Wilderness National Monument LUD include protecting and perpetuating natural biophysical and ecological conditions and processes. This can be met by some of the actions noted above, as well as the following:

- Protect the critical habitats of brown bear while maintaining human access to most of the Zoological Area adjacent to these habitats. The goal is to protect natural conditions while providing for appropriate human uses. Intentional habituation of bears to people should not occur to the level it has at Pack Creek.

Another goal for the LUD is to provide a high degree of remoteness from the sights or sounds of humans. This can be met by:

- Prohibiting temporary camps for the taking of fish and game from the Assessment Area as was done for the Admiralty Plan.
- Proposing one commercial fishing gear storage site adjacent to the Assessment Area to meet the needs of all crab fishers in the area. North Tiedeman Island is a possible location.
- Continuing to allow a temporary camp for the administrative staff, but striving for the minimum amount of development at the camp, and minimum motorized access to and from the camp.
- Eliminating some primitive campsites that are within sight and sound of each other.

## Potential Heritage Projects

### Introduction

The Forest Plan contains direction pertinent to the management of heritage resources. Goals for the Wilderness National Monument LUD include protecting and studying Tlingit cultural resources and other historical resources. Objectives intended to achieve these goals include inventorying, researching, protecting, and learning more about special resources contained in the area, including heritage resources. Desired conditions for this LUD include helping the public to understand more about the areas resources by providing appropriate interpretation and education efforts.

### **Evaluate Known Sites**

While surveys for heritage resources have been conducted in the project area, they have been neither systematic nor complete. Five historic properties have been identified, but only one of them, the CCC shelter in Windfall Harbor, has been evaluated to determine whether it was eligible for placement on the National Register of Historic Places. It was determined eligible, nominated, and subsequently placed on the Register. The shelter is now afforded a high level of federal protection, and the Forest Service must be vigilant in ensuring its preservation and protection. The remaining four known sites should be evaluated to determine whether they are eligible to be nominated for placement on the National Register of Historic Places.

### **Inventory for Additional Sites and Monitor Existing/Identified Sites**

Erosion, vandalism, destruction, and weathering continue to threaten archaeological and historic resources. The Forest Service should initiate a thorough and systematic inventory of the Assessment Area to identify any additional heritage resources. Heritage resources can only be protected if they are known to exist. Furthermore, significant sites should be monitored for change over time. These efforts will help meet the goals of the Wilderness National Monument LUD.

Some inventory efforts can be accomplished by conducting *Passport in Time* projects. Volunteers can assist in recording, mapping, and dating shell midden, ancient fish traps, and petroglyphs. A stewardship program could be developed to assist in site monitoring efforts. In addition to helping to preserve heritage resources, such projects would also provide volunteers an opportunity to learn more about heritage resources in the Assessment Area.

Admiralty National Monument is developing a Cultural Resource Management Plan for Admiralty Island. The plan will guide inventorying, monitoring, site testing, preservation, and protection of archaeological and historic resources on Admiralty Island and within the Pack Creek Zoological Area.

Monitor a native allotment application (A-001747) for William Jackson (deceased), in Windfall Harbor that was reinstated by Bureau of Land Management (BLM) on August 29, 1997. The most recent documented action is a letter BLM sent to the Central Council of the Tlingit and Haida Tribes on January 19, 2000, giving the heirs of William Jackson 60 days to submit evidence in support of their claim. On January 27, 2005, Bob Perry of BLM confirmed that Central Council had requested a time extension. If heirs are not located, the case could be closed for lack of interest. If heirs are located and case remains open, contact heirs for information on their intentions and the possibility of acquiring title.

### **Research and Education Opportunities**

Develop a partnership with the Juneau School District on projects that will help us understand the area better and help us to educate the public on the resources within the area. Involving students in the archaeological testing and dating of shell middens is an example of one such project.

Compile oral histories of past use (historic and ethnohistoric) of Admiralty Island and Seymour Canal. Doing so will help Admiralty National Monument staff in developing interpretive materials intended to educate the public about the history of the area.

### **Establish Interpretation Program**

Establish an interpretive program for the Assessment Area. The program would include the following:

- on-site interpreters available to relate the history and prehistory of the area, brochures,
- interpretive signs, and
- a self guided interpretive map regarding the history of Seymour Canal, the CCC, and Pack Creek.

### **Rehabilitate and Preserve Heritage Resources**

Locate and reestablish the CCC era trail connecting the CCC shelter in Windfall Harbor and the Hasselborg shelter at the north end of Hasselborg Lake. Both cabins are listed on the National Register of Historic Places.

Rehabilitate both CCC shelters to ensure their preservation. The Hasselborg shelter is surrounded by beaver ponds and continues to deteriorate. It would require major reconstruction. The shelter at Windfall Harbor (SIT-371) is in fair condition. It is behind a thicket of salmonberry bushes that require continual clearing. Custodial and maintenance work has been done at the shelter, such as roof shingles and sill logs being replaced, but it needs regular maintenance, restoration or possibly needs to be moved to better meet the needs of the public

## **Potential Recreation Projects**

### **Establish Visitor Capacities**

In an effort to help protect forest and Wilderness resources while providing for appropriate recreation experiences, Admiralty National Monument should seek to establish visitor capacities (both guided and unguided) for use of the Assessment Area. Prepare a needs assessment for guided services. Provide this landscape assessment to stakeholders for review, and involve them early in the process to formulate alternative scenarios. Alternatives can be evaluated in an Environmental Assessment. A prospectus would be required to implement the portion of the decision that allocates guided services. The prospectus could include all of the Assessment Area.

### **Issue Closure Order**

Issue a closure order for the entire assessment area that includes restrictions on camping, travel, and food brought into the area. Doing so would provide for better protection for both people and bears. Pack Creek is currently closed to these uses but Windfall Harbor and Swan Cove are not.

### **Create a Campsite Brochure**

Create a campsite brochure for Seymour Canal to concentrate currently widespread use of many lightly impacted sites to a small number of strategically located sites that already have a considerable amount of impact. Brochure would also promote LNT practices that prevent creation of new campsites. This would prevent large-scale deterioration of many low use

sites over time. Make these brochures accessible by phone and Internet, through Rangers, at district offices, to guide companies, and to all hunters obtaining permits. Eventually, these concentrated sites will be the predetermined destination for campers as they are in Mitchell Bay. (J. Horn and E. Dallalio 2002)

### **Relocate Shelter**

Consider moving the Windfall Harbor shelter closer to the beach. Doing so would make the shelter more visible, situate it further away from the bear trail at the forest's edge, better protect it from encroachment of thick vegetation around the base and abundant needle accumulation on the roof, and offer improved views of the water and estuary. Consultation with Archaeologists and the State Historic Preservation Officer will take place to insure Heritage Resources are protected.

## **Potential Fish and Wildlife Projects**

### **Introduction**

No large-scale physical modifications to habitats that would impact species or ecological processes are permitted in the Assessment Area. Physical modifications to the environment are kept to a minimum and only allowed for administrative purposes such as trail clearing or facilities maintenance. Future habitat modifications will primarily be associated with recreational use and might include trampling, camping, and the introduction of invasive species or diseases. These habitat impacts have, to date, been minimal and fairly easily mitigated.

Impacts to wildlife will primarily be related to recreational use of the area. Projections for tourism in Southeast Alaska indicate significant increases (Crone 2005). The demand for both guided and unguided opportunities for flight-seeing, wildlife viewing, fishing, hunting, hiking, camping, and photography are expected to result in significant increases in the use of the Tongass National Forest. Minimizing effects of tourism on sensitive species of wildlife is recognized as one of the greatest challenges the Forest has in managing wildlife habitat (Hanley et al., 2005).

Sensitive wildlife habitats that could be impacted by visitor use would include avian nest sites, amphibian breeding ponds, seal and sea lion haulouts, and important bear fishing sites and travel corridors. Human caused impacts to these sites can best be mitigated by restricting or discouraging visitor use of such sites. The specific locations of some of the more sensitive sites at risk from visitor presence (i.e., amphibian breeding ponds) should not be made common public knowledge in order to protect the site.

### **Collect Baseline Data of Habitat Use by Brown Bears**

Hanley et al. point out that “measuring the effects of disturbance (bear shifts in habitat use and dietary intake) in biologically meaningful terms of nutritional consequences require substantial costs and effort, especially in the dense forests of southeastern Alaska” (2005, p. 129). Such a study might also be incompatible with concurrent recreational use of the area. It would also be difficult to quantify what degree habituation played in these biological parameters as bears habituate to human presence at different levels based upon exposure frequency, sex, age, social hierarchy, previous experiences, individual idiosyncrasies, intra-

specific interactions, and other unknown factors. Also, if bears retreat to suitable foraging habitat, there may be no measurable nutritional effects of displacement due to tourism.

Measuring shifts in bear habitat use would be more easily acquired and sufficient for assessing effects and directing management actions. Admiralty Monument staff could build upon the work of Christensen et al. (2004) and devise a monitoring protocol with assistance from the Forestry Sciences Laboratory. Baseline data collected from repeated scat counts over permanent transects would provide information on seasonal habitat use in the Assessment Area. Remote cameras and DNA data collected from hair samples could be incorporated in this work to identify shifts in habitat use that may be associated with visitor-caused displacement.

### **Avoid Impacting Sensitive Wildlife Habitats**

These would include avian nest sites, amphibian breeding ponds, seal and sea lion haulouts, and important bear fishing sites and travel corridors. The brown bear is the species in the Assessment Area most likely to be impacted because viewing this animal is the primary goal of most visitors. These impacts are most evident as behavioral alterations and/or displacement from the immediate vicinity. Devise a permanent strategy whereby impacts to the resource and recreational opportunities may be mitigated.

### **Invasive Species Prevention and Response**

One of the goals of the Wilderness National Monument LUD is to protect and perpetuate natural biophysical and ecological conditions and processes. Invasive species have the capacity to disrupt natural biophysical and ecological conditions and process. While they are not currently problematic within the Assessment Area, the area is not immune to introduction of invasive species. They have been documented at a number of locations within the Assessment Area. Some non-native plants pose little risk of becoming invasive, while others pose a significant threat to the natural biodiversity of the area. While no action may be deemed necessary to control the daffodils, tulips, or Kentucky bluegrass that are remnants of Stan Price's old homestead, other species like common plantain and black bindweed should be aggressively controlled so that they do not spread beyond current infestation sites. Species invasiveness ranking values from the Weed Ranking Project (2005) will be used to prioritize these plants for control actions.

Admiralty National Monument staff must be proactive in efforts to prevent introduction of invasive species. An Invasive Species Strategy and Five Year Management Plan is being prepared for Admiralty National Monument and will be completed in late 2005. This document will provide direction and a course of action for Monument managers to prioritize actions and manage invasive species within the Monument, including the Assessment Area. Management actions will tier to National, Alaska Region, and Tongass invasive plant strategies and will focus on four program elements:

1. Prevention
2. Early detection and rapid response (EDRR)
3. Control and management
4. Rehabilitation and restoration

Prevention measures will include educating visitors and staff about the threats and impacts of invasive species. Access to infested or sensitive areas should be restricted, and measures should be developed to ensure that employees and visitors do not transport organisms or plant propagules to sensitive areas. Early detection and rapid response implies vigilance in surveying and monitoring for invasive species so that introductions are quickly detected. Rapid response control efforts should be implemented before introduced populations increase to the point at which they are expensive and potentially impossible to control. A five year action plan for survey and monitoring should be established to ensure EDRR techniques will be effective. As funding allows, control and management activities should be implemented at priority sites based upon site value, species invasiveness, and likelihood of spread. Tools for the prioritization of sites are available in the Tongass National Forest Invasive Plants Management Plan (2005).

Rehabilitation and restoration should occur at control sites when necessary to establish native plant populations. Native seed stock and cuttings use should be given high priority in order to maintain the natural character of these wilderness landscapes.



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# APPENDIX A—MAPS

Map 1. Vicinity Map

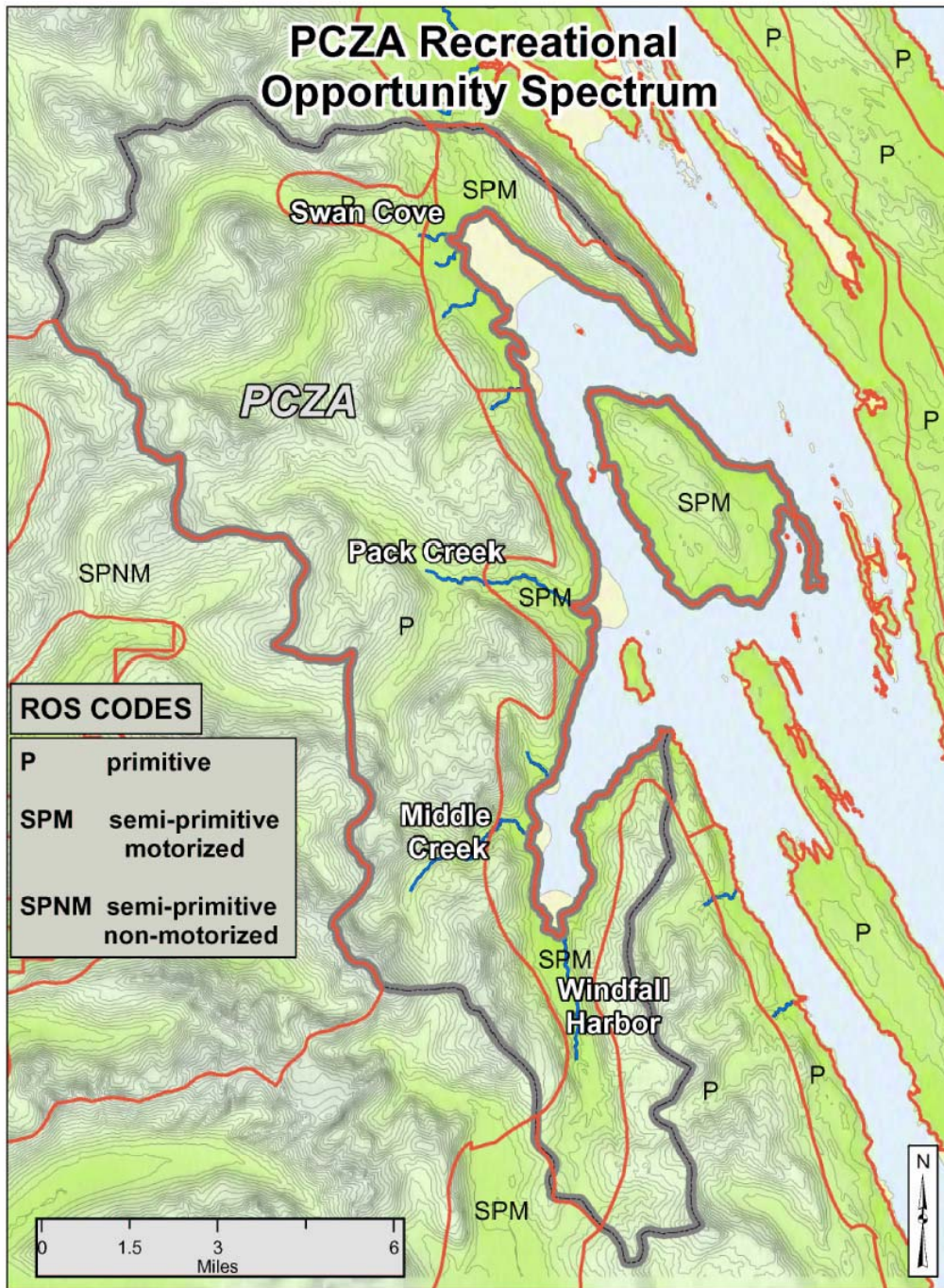


Map 2. PCZA Recreation Use Sites

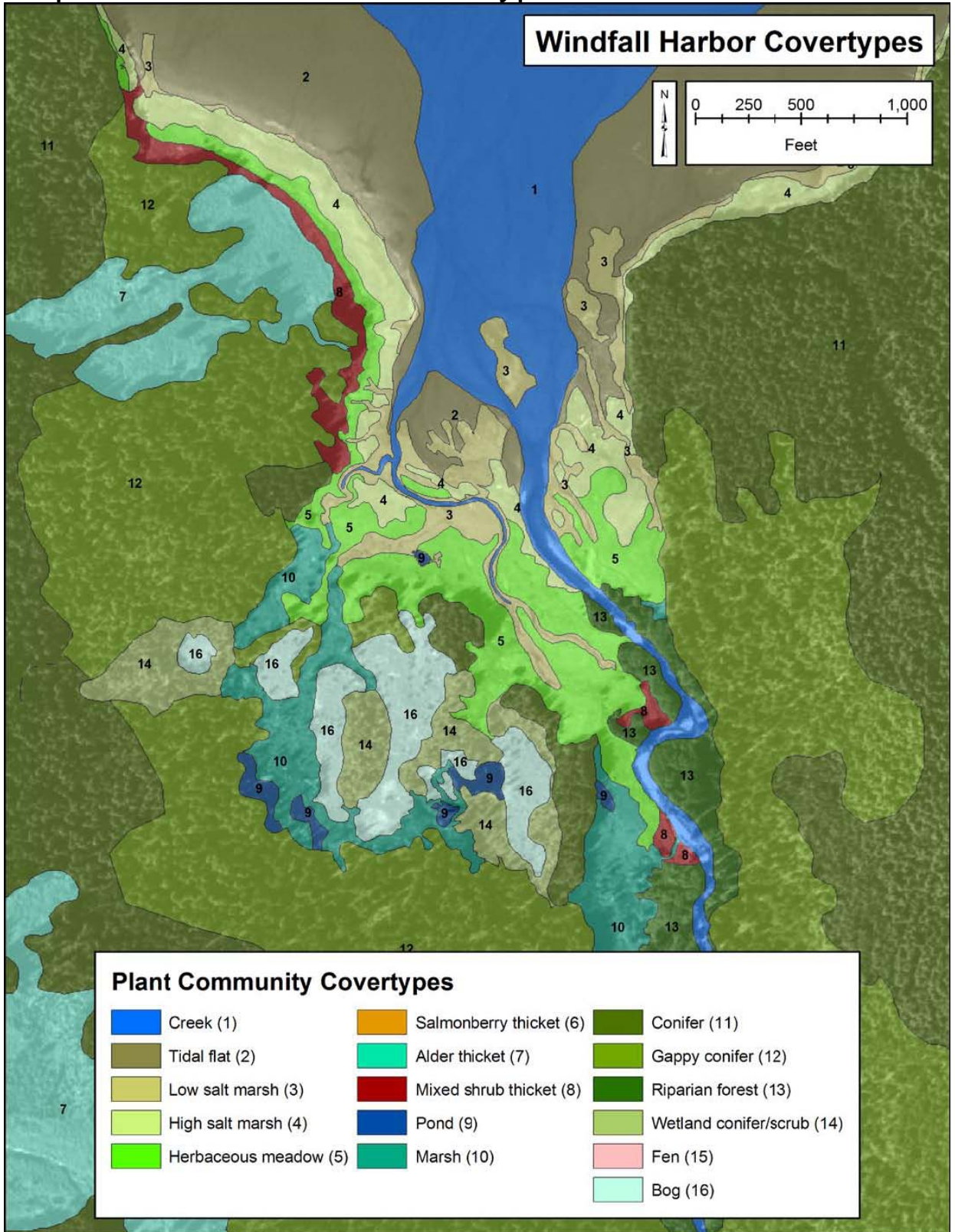




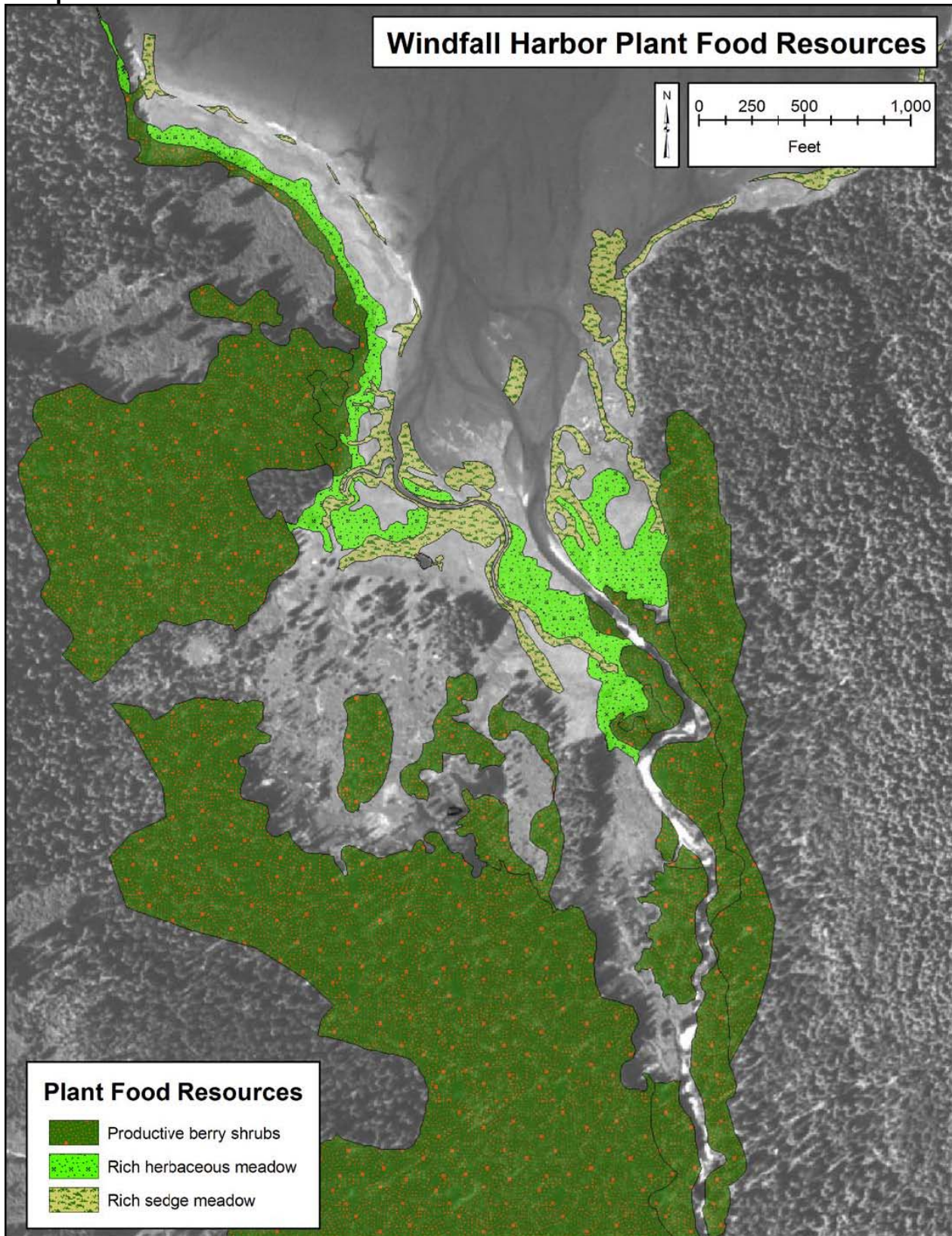
Map 3. PCZA Recreation Opportunity Spectrum Classes



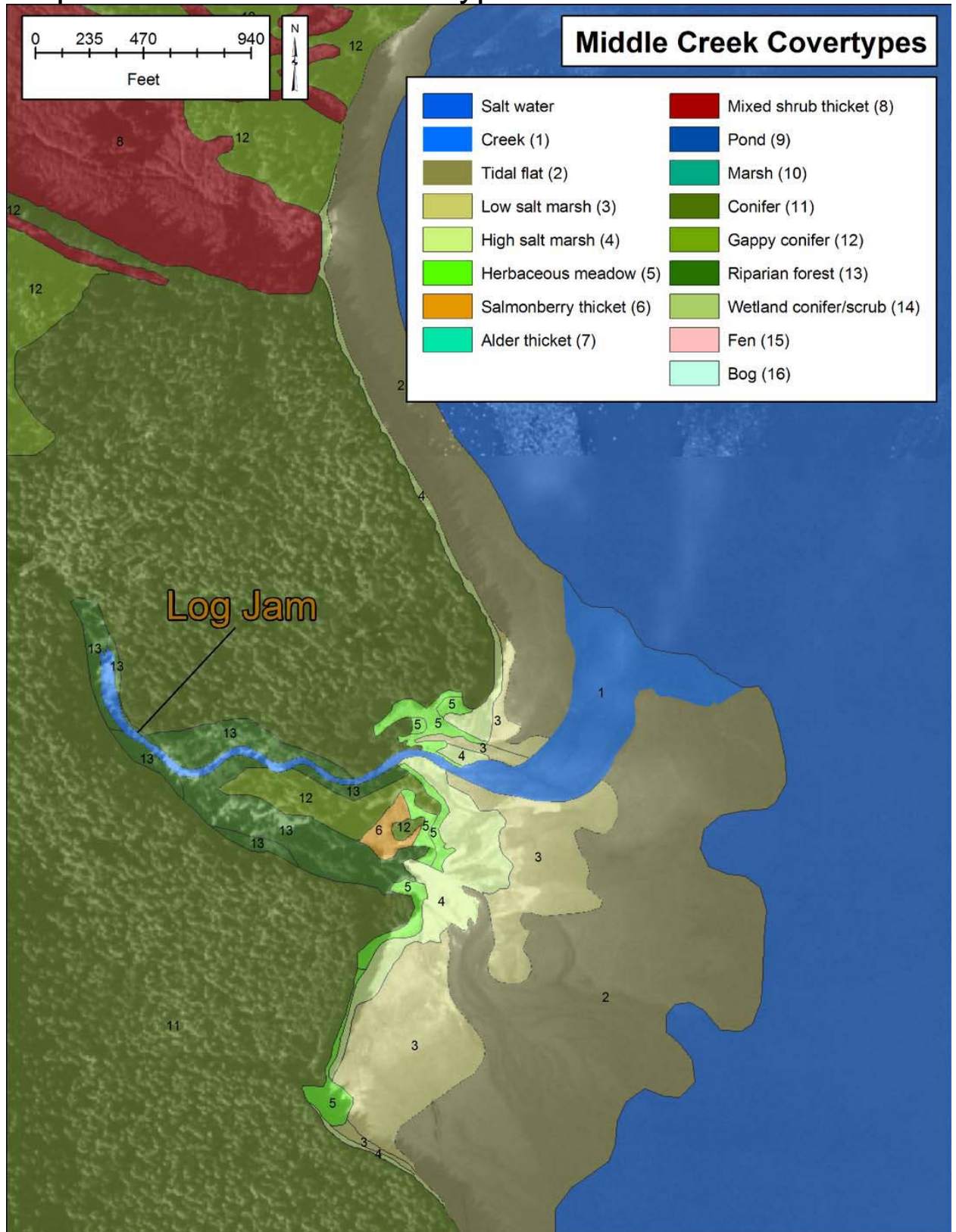
Map 4. Windfall Harbor Covertypes



Map 5. Windfall Harbor Plant Food Resources



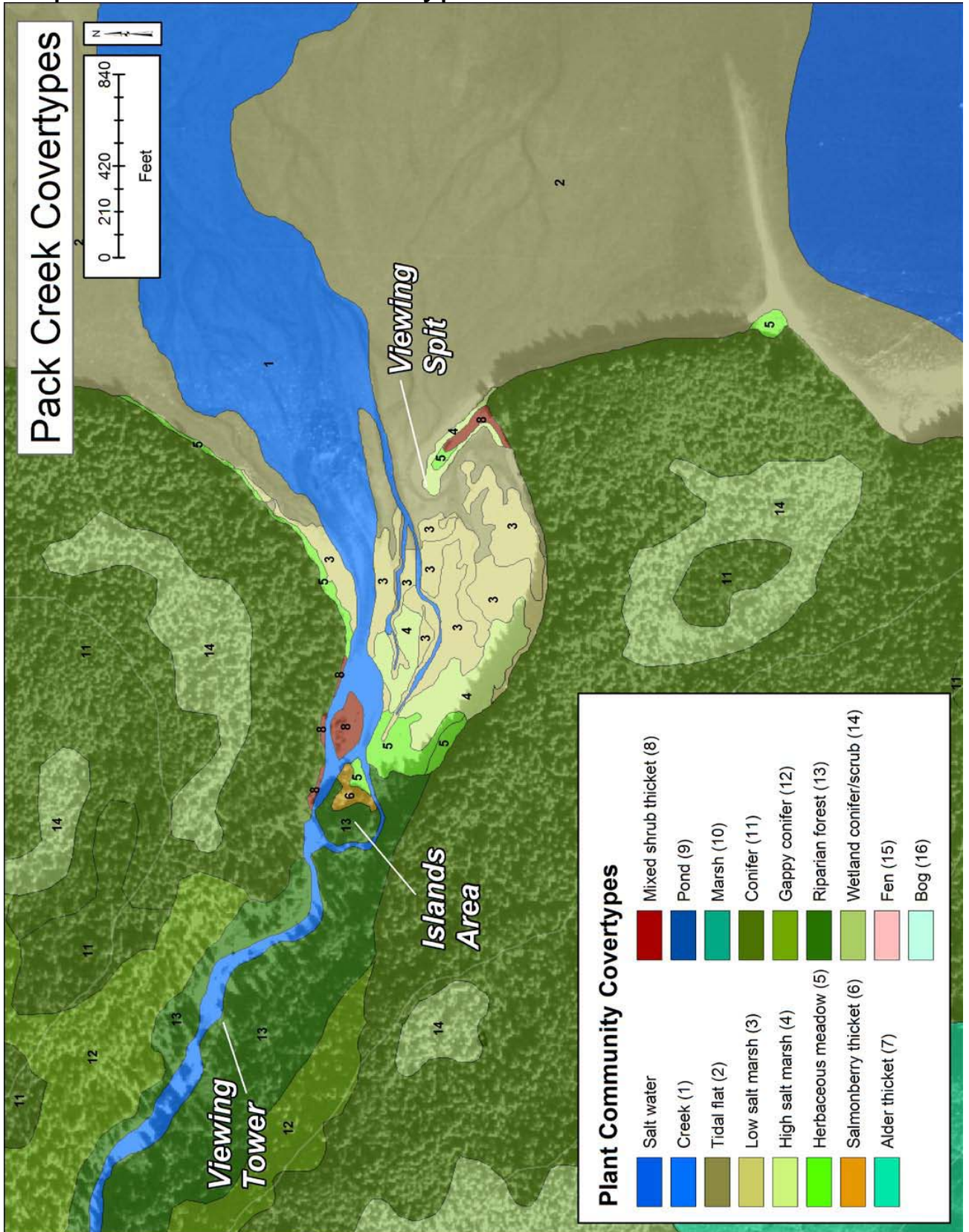
# Map 6. Middle Creek Covertypes



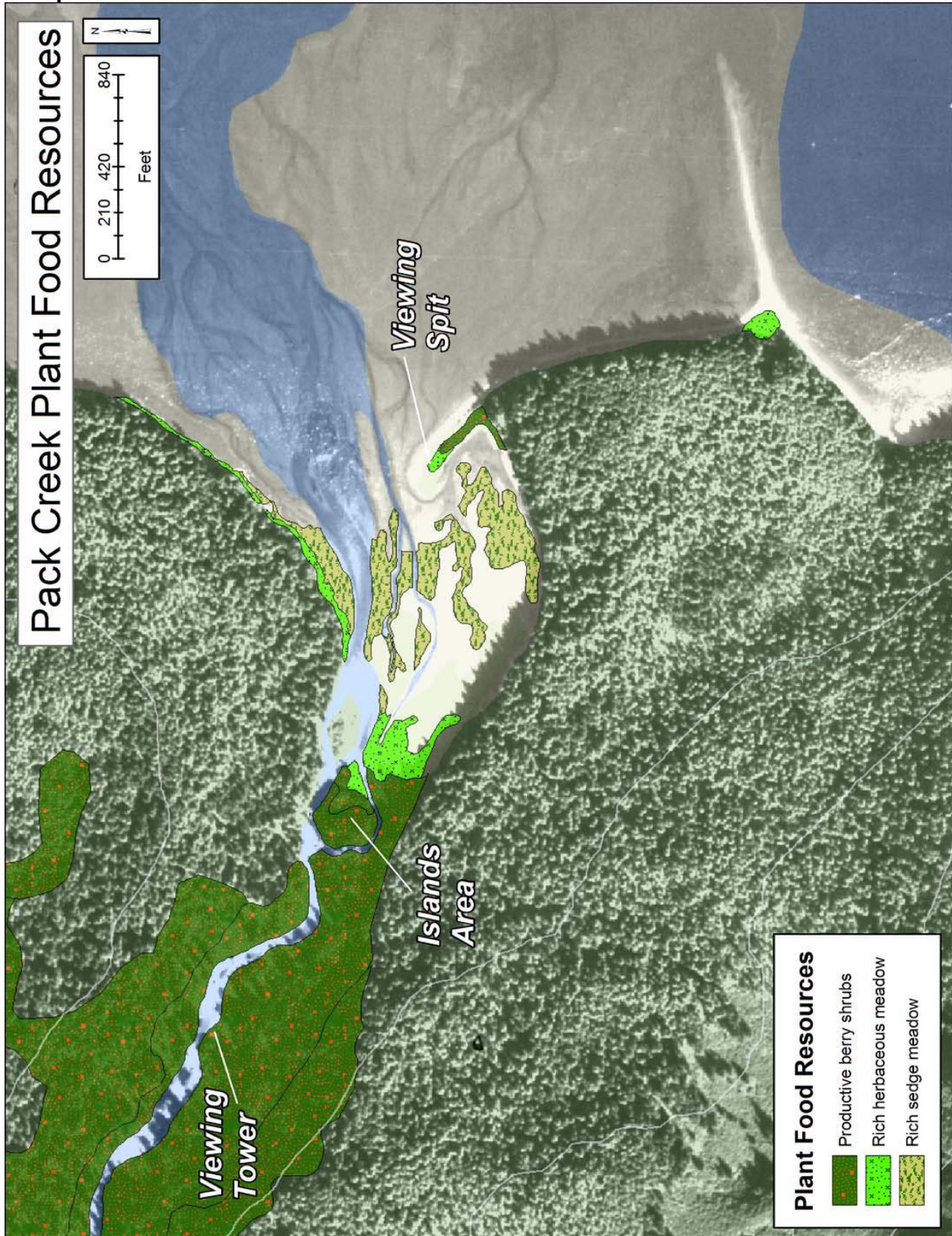
# Map 7. Middle Creek Plant Food Resources



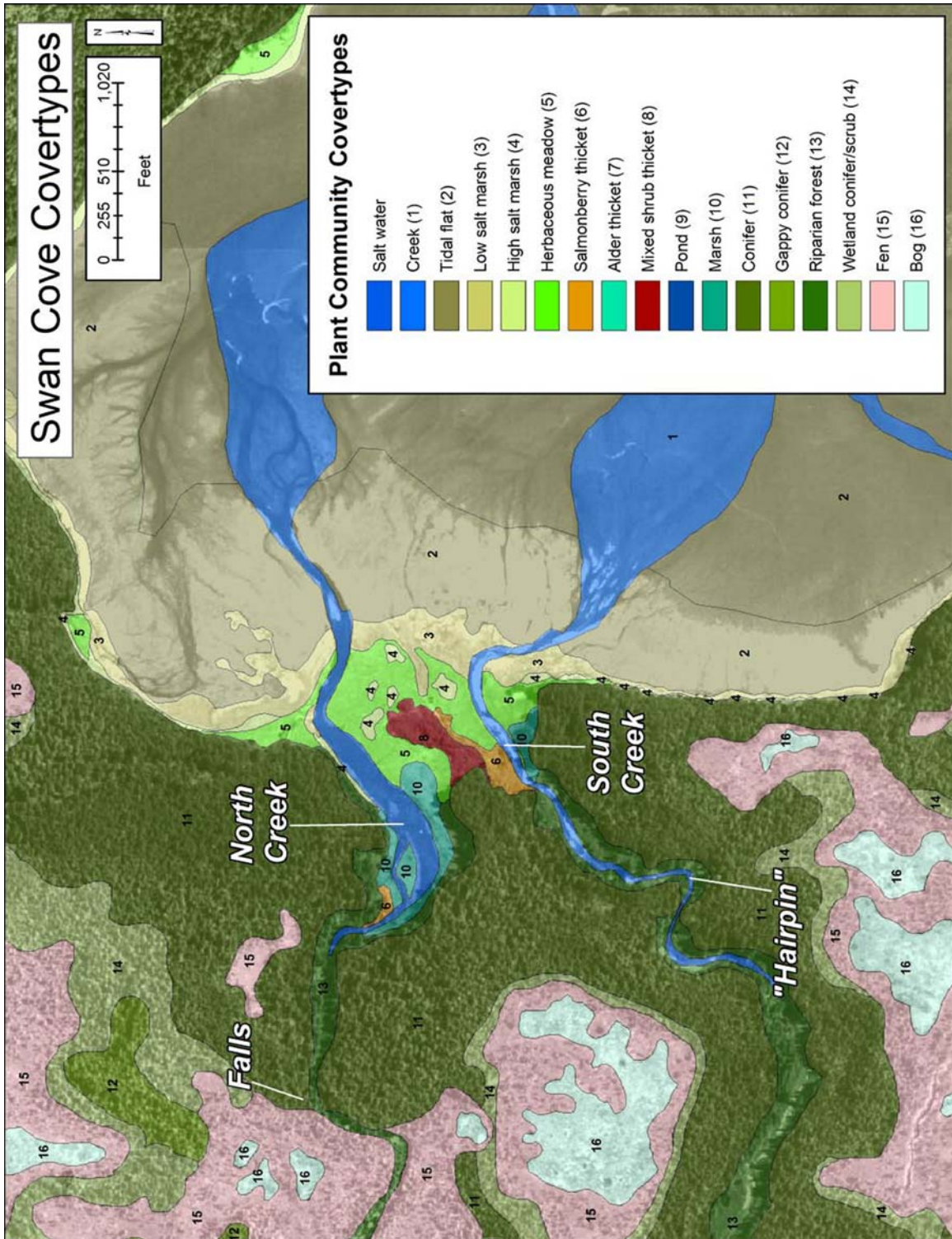
Map 8. Pack Creek Covertypes



Map 9. Pack Creek Plant Food Resources

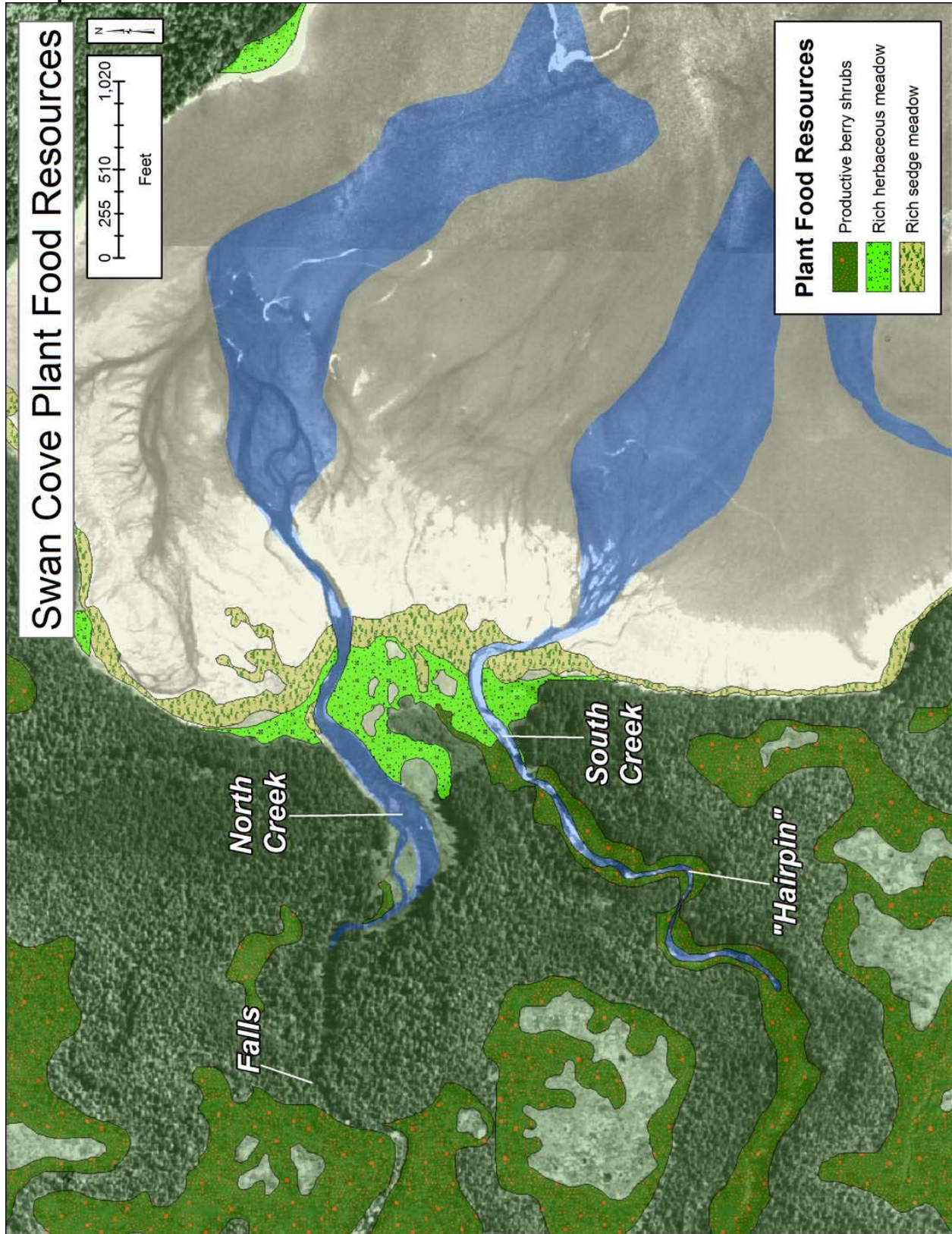


Map 10. Swan Cove Covertypes

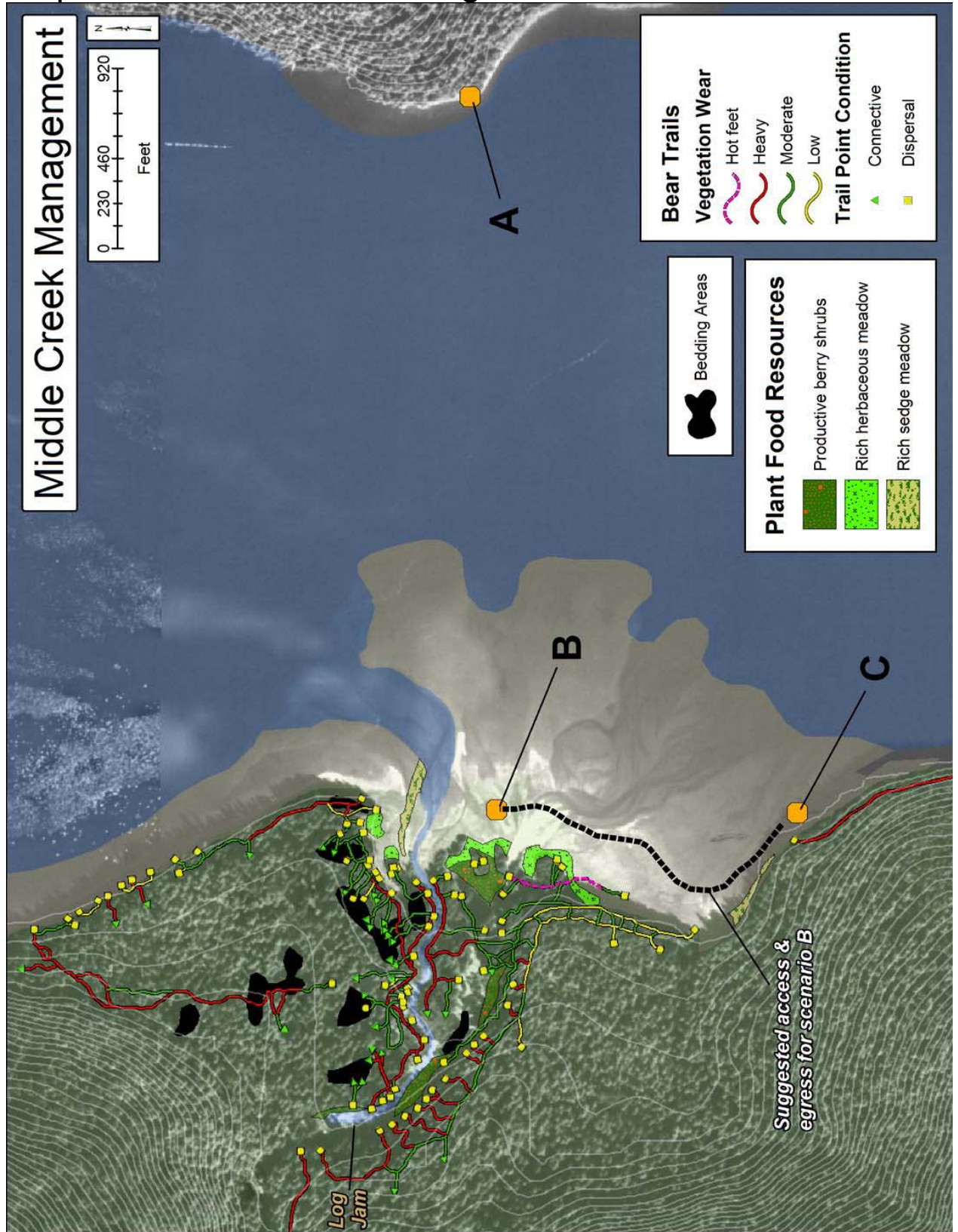




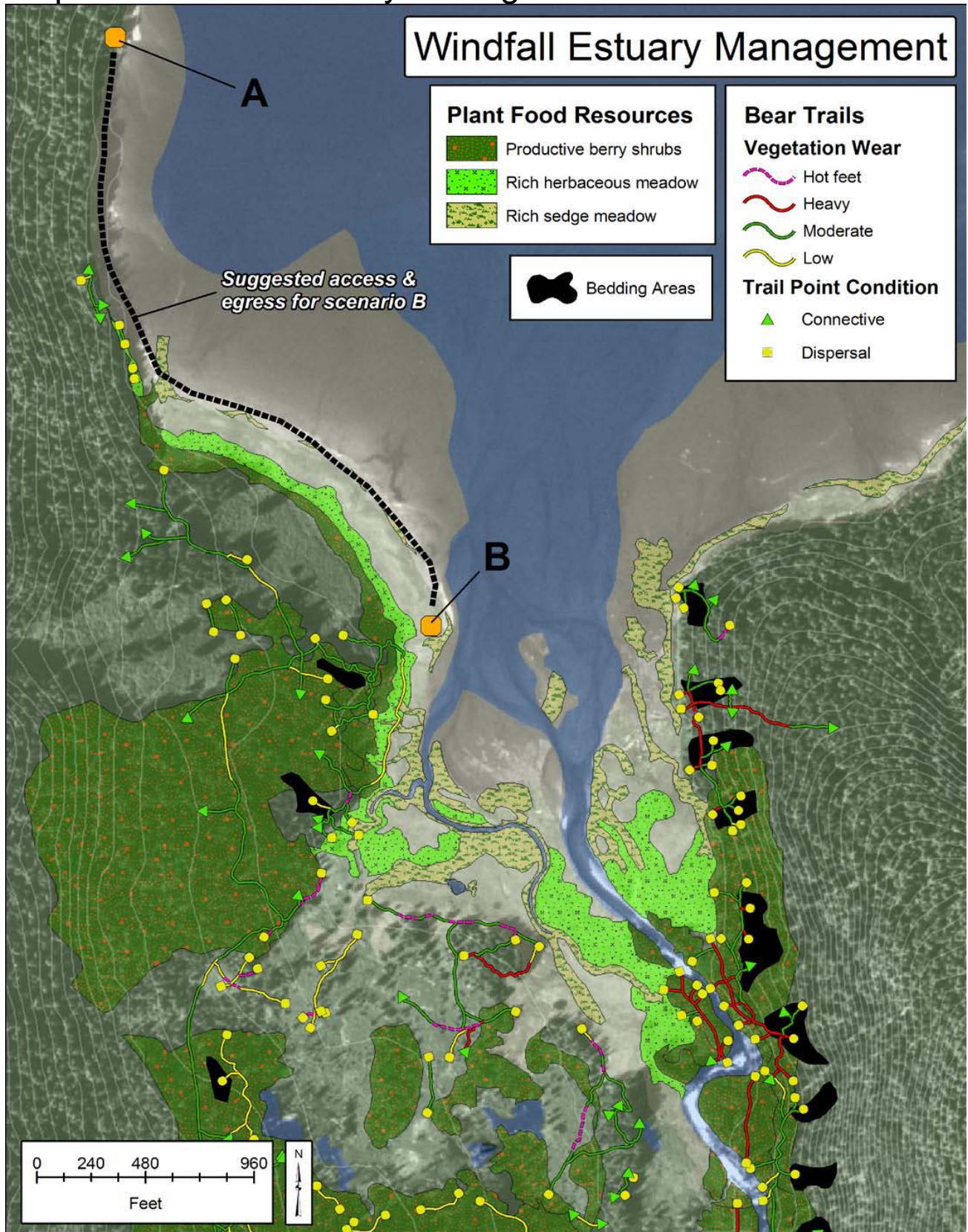
Map 11. Swan Cove Plant Food Resources



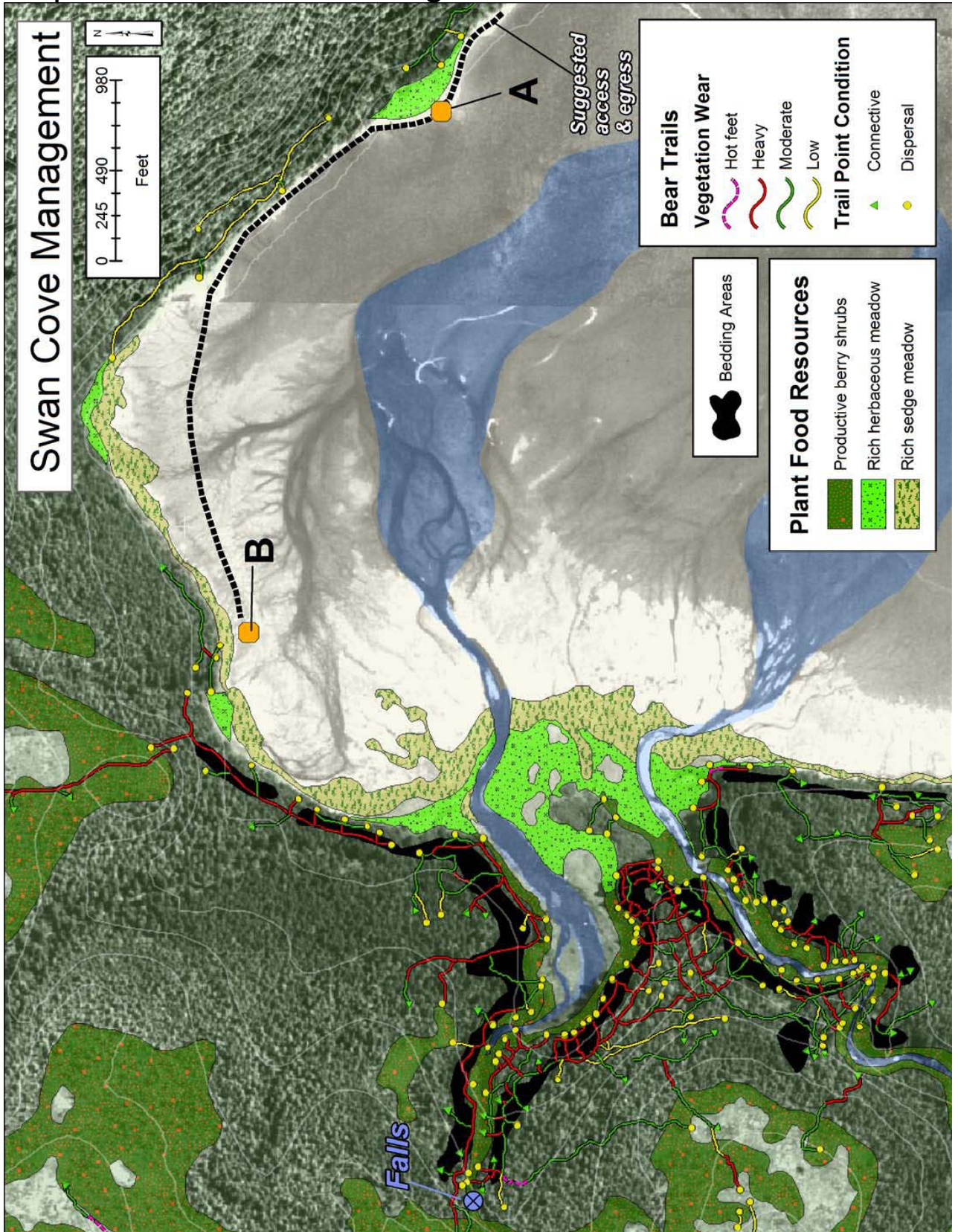
Map 12. Middle Creek Management



Map 13. Windfall Estuary Management



Map 14. Swan Cove Management



## APPENDIX B—PAST CULTURAL SURVEYS

Year of Survey	Location of Survey	Investigator(s)	Sites Documented/ Recommendations
1983	Portions of Windfall Harbor, Windfall Island, Swan Island, Pack Creek, Tiedeman Island	Madonna L. Moss, Jon M. Erlandson	SIT-269, SIT-270, SIT-139 Sites need to be evaluated for significance.
1991	Stan Price Cabin Site (Pack Creek)	Joel Irish	SIT-0139 Site need to be evaluated for significance. If found significant site needs to be protected.
1993	Civilian Conservation Corps Canoe Route	Charles M. Mobley	SIT-371, SIT-374 Sites were nominated and listed on the National Register of Historic Places and need to be protected.
1995 (#95-080)	Not Available	N/A	SIT-371
1996 (#96-103)	Outfitter Guide Special Use Permits Renewal	Karen Iwamoto	Not Available
1998 (#98-040)	Fool Inlet Camp, Seymour Canal Camp, King Salmon Bay Camp	Kathy Brown	JUN-749 Site needs to be evaluated for significance.
1998 (98-046)	Staunch Point Camp, Windfall Island Camp	Kathy Brown	None No additional Heritage concerns
2000 (2000-03-020)	SWN 15, SWN 8, SWN 10, SWN 11, SWN 12, SWN 14, SWN 7, SWN 3, WIN 6	Karen Iwamoto	None No additional Heritage concerns

# APPENDIX C—PACK CREEK CLOSURE ORDER

ADMIRALTY ISLAND NATIONAL MONUMENT  
TONGASS NATIONAL FOREST  
CHATHAM AREA

## ORDER

1. Special Closures
2. National Forest Wilderness
3. Occupancy and Use

Pursuant to Public Law 16 U.S.C., Section 551, Title 36 CFR 261.50 (a) and (b), the following activities are prohibited within the Pack Creek Cooperative Management Area (see attached Map 1) within the Tongass National Forest:

1. All year:
  - a. public use on National Forest lands at Pack Creek covered by the improvements of Stan Price, including his residences, wood sheds, out buildings, miscellaneous buildings and the north garden [36 CFR 261.57 (a)].
  - b. camping [36CFR 261.58 (e)]
2. Between May 1 - September 30, possessing or storing any food or food refuse within the area with the exception of placing such in the designated food cache [36 CFR 261.58 (cc)].
3. Between June 1 - September 10, public use on all National Forest lands from 9 p.m. until 9 a.m. Use is also prohibited between 9 a.m. and 9 p.m. with the exception of the Pack Creek trail and observatory and from the trailhead north past the boat outhaul to the viewing spit, with a permit in possession [36 CFR 261.57 (a)].

The area to be closed is located in Sitka D-1, and includes Sections 5, 6, 7 and 8, T46S, R69E, CRM and consists of the lower Pack Creek drainage.

Pursuant to 36 CFR 261.50 (e), the following persons are exempt from this order:

1. Any Federal, State, or local officer, or member of an organized rescue or firefighting force in the performance of official duty.

Done at \_\_\_\_\_, Alaska, this \_\_\_\_\_ day of \_\_\_\_\_, 1992.

\_\_\_\_\_  
GARY A. MORRISON  
Forest Supervisor, Tongass National Forest, Chatham Area

Violation of these prohibitions is punishable by a fine of not more than \$5000.00 or imprisonment for not more than 6 months or both. Title 16 U.S.C, Section 551

## APPENDIX D—GLOSSARY OF RECREATION TERMS

**National Forest Lands**—National Forest lands include not only the forested uplands but also the freshwater streams and the portions of the coastal zone above the mean high tide. The mean high tide line generally divides the salt dependent sedges such as *Carex spp.* from the salt tolerant grasses such as rye. Management actions suggested in this assessment generally apply to National Forest lands in the Pack Creek Zoological Area. Only at Pack Creek do they also apply to tidal and submerged lands.

**State of Alaska Tidal and Submerged Lands**—State of Alaska tidal and submerged lands include those areas below the mean high tide line. In the Stan Price Wildlife Sanctuary at Pack Creek, these lands are managed by the State Department of Fish and Game. In the remainder of the zoological area outside of Pack Creek, these lands are managed by the Alaska Department of Natural Resources.

**Guides**—Guides are officially called “Outfitter/Guides” or “Commercial Guides” when they hold a special use permit issued by the Forest Service to bring recreating clients to the National Forest. Guides may receive money or other non-monetary compensation from their guests.

**Permits**—Permits are those used to monitor or regulate visitors to the zoological area who come without a guide. They may be self-issued and free or they may be mandatory and cost a fee, as at Pack Creek. They are different from “Special Use Permits,” which are issued only to guides, generally on an annual basis.

**Visits**—Visits are a simple measurement of recreational use defined as one person spending any portion of one day on the National Forest. Whether a person spends 15 minutes or 8 hours on the Forest, it is counted as one visit.

**Group Day**—A group day is one group of people spending any part of a day ashore on the National Forest. The Capacities set for the Shoreline EIS decision are the total number of groups that can use the area during the 117 day summer season, and the Allocation is the maximum number of guided group days that can be authorized.

**Prospectus**—A prospectus is a competitive bid process used to allocate commercial guide visits to the National Forest when the demand exceeds the capacity. Guides submit bids that are evaluated by the Forest Service. Awards are given to a limited number of guides who are then issued a special use permit to deliver their services to clients.

**Recreation Opportunity Spectrum (ROS)**— A system for planning and managing recreation resources that categorizes recreation opportunities into six classes. Each class is defined in terms of the degree to which it satisfies certain recreation experience needs based on the extent to which the natural environment has been modified, the type of facilities provided, the degree of outdoor skills needed to enjoy the area and the relative density of recreation use. There are seven ROS classes ranging from least affected by humans (Primitive) to most affected (Urban). Management actions would vary for the different classes.

# APPENDIX E—VOLUNTARY FLIGHT RESTRICTIONS

File Code: 2300

Date: June 28, 1999

Dear Flight Tour Operator

On June 4 a meeting about flight tours on Admiralty Island was held at the Forest Service Mendenhall Valley office with attendees from Admiralty Island National Monument , ADF&G, and several Juneau area businesses including;

Juneau Area Flight Tour Business Attendees

Alaska Fly 'N Fish Charters, *Butch Laughlin*

Alaska Coastal Airlines, *Pete DeVaris*

Alaska Discovery, *Ken Leghorn*

Alaskan Outback Adventures, *George Campbell*

Alaska Seaplane Services, *Craig Loken*

Available Tours, *Jeff Engelman*

Admiralty National Monument

*Vivian Hoffman*, Ranger

*Ken Post*, Rec/Wilderness Staff

*John Neary*, Wilderness Asst.

ADF&G Div. of Wildlife Con.

*Anne Post*, Biologist

The purpose of the meeting was to discuss wildlife flightseeing tours, especially in Seymour Canal of Admiralty Island. As flightseeing tours seem to be expanding in popularity, most rapidly in Windfall Harbor and Swan Cove, some conflicts over plane noise and continued circling at low altitudes have arisen amongst different air services as well as between the air carriers and ground-based wildlife watchers. These conflicts were discussed from the different perspective of the meeting participants and the following voluntary guidelines were suggested by the air tour operators:

## **Voluntary Air Tour Guidelines** adopted by air tour operators:

- **Enroute Altitudes = Minimum 1200' AGL** (Above Ground Level)  
This would apply when conditions allow while transiting
- **Circling = Minimum 900' AGL** (Hard Deck 800' AGL)  
While viewing wildlife, avoid changes in power or any other kind to which the animal may react. Avoid circling when other wildlife viewers are on the ground who generally wish to see the animal without your plane circling overhead.
- **Horizontal Distance = None acceptable**  
It doesn't matter how far you are horizontally if your minimum altitudes aren't as suggested.
- **Noise Abatement = Practice Courtesies**  
Follow noise abatement courtesies such as taxiing off the beach as far as possible before applying power. Power-off landings, when conditions allow, will help. Changes in power while circling should be avoided. Avoid changing your silhouette or speed in front of an animal on the beach while drifting.



- **Pack Creek Landings and Passes = Avoid the tideflats**  
Maintain 1200' AGL and route along the west shore of Swan Island and east of Windfall Island. When landing, stay toward Windfall Island and taxi over to the food cache area. Do not circle the tideflats as wildlife watchers are almost always on the ground there.
- **Other Issues**  
As cruiseship tourism continues to expand and independent tourists continue to demand bear viewing and other wildlife viewing opportunities, it is recognized that Seymour Canal will receive increased attention by flight tour and ground based tour operators. This is due to its proximity to Juneau, the readily viewed wildlife, and other factors. Being a part of a National Forest Wilderness Area means visitors and residents alike expect an increased sense of solitude, more than they would expect around the immediate Juneau area. While these two issues are sometimes in direct conflict our hope is that through agreement amongst the operators as shown above, much of the conflict can be avoided.

I'm hoping you will also do your part to minimize conflicts by adopting these guidelines. They make good sense from the perspective of all users of this very special wilderness area.

Sincerely,

/s/ Brad Flynn / for

VIVIAN K. HOFFMAN  
Monument Ranger

cc: other air tour operators

2300 air tour guidelines 1999 0623

***I concur with the above voluntary guidelines:***

Signed by:

Alaska Coastal Airlines, *Pete DeVaris*  
Alaska Discovery, *Ken Leghorn*  
Alaska Fly 'N Fish Charters, *Butch Laughlin*  
Alaskan Outback Adv., *George Campbell*  
Alaska Seaplane Services, *Craig Loken*

## APPENDIX F—AMPHIBIANS ON ADMIRALTY ISLAND

Since 2002, a more concerted effort has been made to accumulate and document amphibian sightings on Admiralty in order to monitor population trends of these animals. This has been in response to observations that many populations of western toads are experiencing significant declines throughout their range within the last 20 years. Theories for explaining these declines include: increases in ultraviolet light levels due to a depletion of the ozone layer; climate warming which may result in a loss of insulating snow cover over hibernacula; drying breeding habitat, and increased parasitic fungal infestation; glacial rebound altering wetlands; acid rain; habitat destruction; disease introduction; competing invasive species; and pollution.

Other agencies and organizations have elevated concerns and listings for this animal. The World Conservation Union (IUCN), in a 2004 Global Amphibian Assessment, has Red Listed the western toad as “Near Threatened because the species is probably in significant decline.” In Canada the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) listed the western toad as a “Species of Special Concern” due to widespread and unexplained declines in British Columbia. In 2000 the U.S. National Park Service listed amphibians in general as a “taxonomic group of concern” for Southeast Alaska. The Alaska Department of Fish and Game non-game program recognizes the importance of amphibian conservation and is supporting work to determine the status of western toads. The Alaska Natural Heritage Program has assigned the western toad a rank of G4 (Global status/not rare, long-term concern) and S2? (Subnational/status in Alaska/questionably imperiled). The USGS Amphibian Research and Monitoring Initiative (ARMI) recognizes the importance of monitoring the status of the toad in Alaska and is funding research here. Tongass National Forest Fish and Wildlife personnel have identified amphibian conservation as an emerging issue and have been participating in an interagency effort with ADF&G, USFWS, USFS, USGS, NPS, Denver Zoological Society, and other partners to adapt and test ARMI protocols for monitoring western toads in Southeast Alaska. Admiralty Island has been selected as one of the three pilot study sites for this study; however, these field efforts will not occur within the analysis area.

## **APPENDIX G— BRIEF LIFE HISTORY OVERVIEWS OF COMMON FISH OF THE PCZA**

The lower reaches of larger streams in the Assessment Area, including reaches within the intertidal zone, contain the bulk of spawning habitat for pink and chum salmon. These species typically do not rear in fresh water, but emigrate to salt water shortly after emergence. Pink and chum salmon start their downstream migration soon after emergence. Pink generally return to spawn after spending one winter at sea. Most chum salmon return to spawn after two to four winters at sea. Barriers or breaks in stream gradient that pose little or no problem for other salmonids often impede the upstream migration of pink and chum salmon.

Steelhead trout are listed as present in Windfall Creek. Steelhead often survive the spawning season, return to the ocean, and spawn again. Steelhead spend 2 to 5 years in freshwater before migrating to sea where they will stay 1 to 3 years before reaching sexual maturity and return to freshwater to spawn. In Southeast Alaska adult Steelhead typically spawn in the spring, but fall runs are found in several systems.

Cutthroat trout populations in Southeast Alaska may be classified as either sea-run or resident. Resident fish spend their entire life in fresh water, typically in lakes and streams located above barrier falls which restrict the upstream migration of fish. Sea-run cutthroat migrate to saltwater at the age of 2 or 3 years and over-winter in freshwater lakes. Spawning takes place in the spring from March to June. Though cutthroat are known for being aggressive feeders they are slow growing. It typically takes approximately 4 years to reach a length of 8 inches.

Like cutthroat trout, Dolly Varden are found throughout southeast Alaska and exhibit both sea-run and lake or stream resident life cycles. After their first seaward migration, sea-run Dolly Varden usually spends the rest of their lives wintering in and migrating to and from fresh water. Not all streams within the Assessment Area have been surveyed, but all suitable Class 1 and 2 stream habitats can be assumed to be occupied for the purposes of this analysis. Other fishes commonly present in streams include sculpin and threespine stickleback.