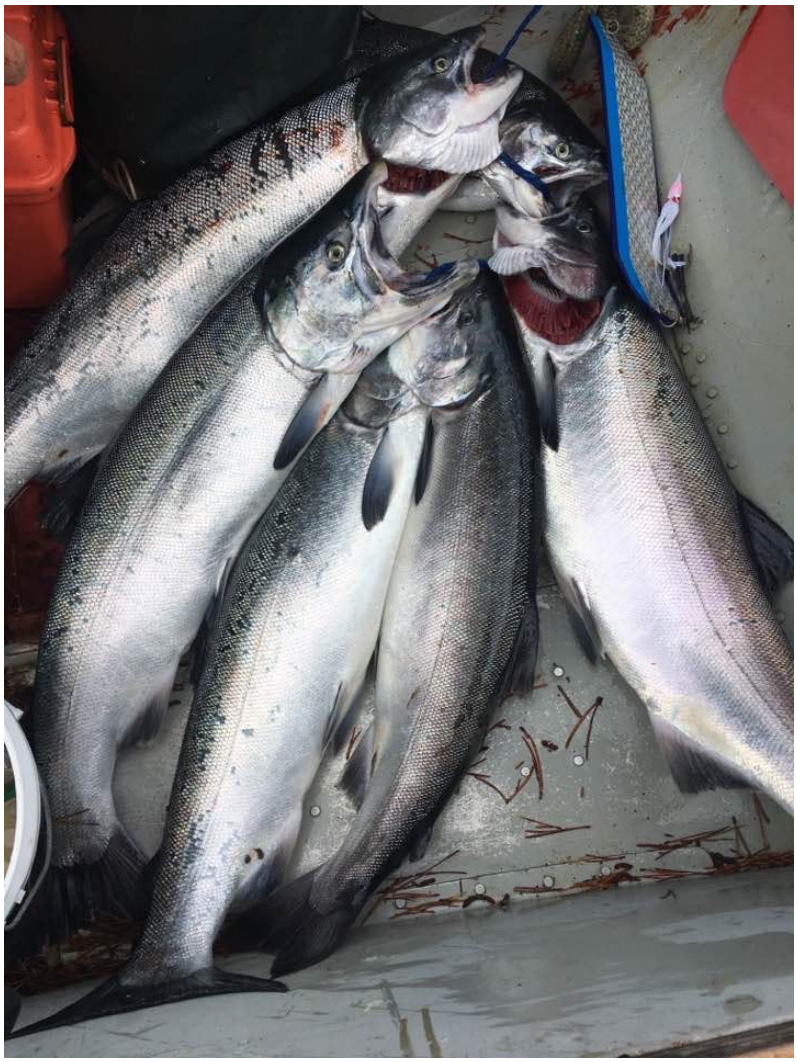
United States Department of Agriculture

Subsistence and Other Harvest (Non-Commercial) Resource Assessment

Tongass National Forest Plan Revision



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Subsistence and Non-Commercial Harvest Draft Resource Assessment

Tongass National Forest Plan Revision

Forest Service, Alaska Region

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Introduction

This assessment report will first discuss subsistence as defined in Title VIII of the Alaska National Lands Interest Conservation Act (ANILCA) and implemented through the Federal Subsistence Management Program on the Tongass National Forest. Federally qualified subsistence users for fish and wildlife on the Tongass National Forest are all residents of southeast Alaska and Yakutat except for residents of the Ketchikan non-rural area and Juneau. Discussion of other non-commercial harvest, which includes sport hunting and fishing, personal use, and state subsistence harvest managed under the Alaska Department of Fish and Game (ADF&G) regulations will follow. Harvest and management of marine mammals, waterfowl and marine fish species are not managed by the USDA Forest Service and not specifically addressed in this section. However, these resources are an important resource for many Alaskans including some Federally qualified subsistence users.

The Tongass National Forest provides fish, wildlife, and other resources harvested by residents and non-residents each year for sport, personal use, subsistence, cultural and traditional uses. Harvest regulations vary by land designation, jurisdiction, and residency. Non-commercial uses of resources are managed primarily under ADF&G, U.S. Fish and Wildlife Service (USFWS), National Oceanic and Atmospheric Administration (NOAA), and Federal Subsistence Management regulations. The USDA Forest Service manages the Tongass National Forest to sustain resources for multiple uses. However, under ANILCA Title VIII the non-wasteful subsistence uses of fish and wildlife and other renewable resources by rural residents of Alaska are given priority over all other consumptive uses of all such resources.

The third section will describe general fish, wildlife, and plant harvest conditions and trends. The last section discusses species-specific conditions and trends for the major species and groups harvested on the Tongass.

Federal Subsistence Management Program

ANILCA Title VIII defines "subsistence uses" as "the customary and traditional uses **by rural Alaska residents** of wild, renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of nonedible byproducts of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal or family consumption; and for customary trade." (ANILCA 1980, Title VIII, Sec. 803) (emphasis added).

Under delegated authority from the Secretaries of the Interior and Agriculture, the Federal Subsistence Board manages the take of fish and wildlife on federal public lands and waters in Alaska. This assessment will refer to the subsistence harvest of fish and wildlife by rural Alaskans on federal public lands and waters as "federal subsistence."

In its findings for Title VIII, Congress identified the continuation of the opportunity for subsistence uses by rural Alaska residents, including both Natives and non-Natives, as essential to the physical, economic, traditional, and social or cultural existence (Section 801), among other things. The statement of congressional policy in Title VIII further instructs that nonwasteful subsistence uses be prioritized on the public lands in Alaska (section 802(2)), and that the public lands be managed to cause the least adverse impact to rural residents who depend on the resources from such lands, consistent with sound management practices and the conservation of healthy populations of fish and wildlife (section 802(1).

Section 802 also states that the purpose of Title VIII is "to provide the opportunity for rural residents engaged in a subsistence way of life to do so[.]"

Several ANILCA Title VIII sections cover uses on National Forest System lands:

- Establishes the rural subsistence priority by prioritizing the taking on public lands of fish and wildlife for nonwasteful subsistence uses over the taking on such lands for other purposes (Section 804).
- Explains how to allocate resources when restrictions on subsistence uses become necessary (Section 804).
- Establishes administration of subsistence uses throughout Alaska through measures such as regional advisory councils (Section 805).
- Sets requirements for land use decisions on federal lands to evaluate effects to subsistence, minimize adverse impacts upon subsistence uses and resources, and hold hearings for any Environmental Impact Statement (EIS) that could substantially affect subsistence uses and resources (Section 810).
- Requires that the Secretary of Agriculture ensure that rural residents engaged in subsistence uses shall have reasonable access to subsistence resources on public lands (Section 811).
- Confirms the Secretaries' closure authority for nonsubsistence users, while also clarifying that there shall be no unnecessary closures to nonsubsistence users (Section 815).
- Defines when there can be restrictions on subsistence uses (Section 816).

The Forest Service Region 10 Handbook 2090.23 provides further direction for the Forest Service to implement federal subsistence requirements from ANILCA related to land management decisions and National Environmental Policy (NEPA) requirements for those decisions.

The purpose of this assessment is not to define the value of subsistence for every person. Subsistence in the broader sense is deeply personal. It can mean something different to every person. This assessment will address how the Tongass National Forest currently seeks to maintain abundance and distribution of wild resources, as well as reasonable access to those resources by federally qualified rural residents and identify conditions that hamper use of these resources. This assessment will also demonstrate our commitment to recognizing the traditional and cultural practices by rural residents in southeast Alaska.

The goal of this assessment section is to identify all important values related to subsistence, including other non-commercial harvest of wild resources (sport, State subsistence and Personal use), food security, caloric contribution, economic impact, and social and cultural traditions. This assessment will focus on Tongass National Forest management that supports healthy ecosystems and provides opportunities for the harvest of subsistence resources and access to these resources for Federally qualified subsistence users for the continuation of subsistence as mandated in Title VIII of ANILCA. It will also highlight the unique importance of wild resources in sustaining long-established subsistence ways of life in Alaska.

For many Alaskans, harvest of wild resources is a part of the fabric of society that is necessary for maintaining cultural identity (Langdon 2011). The value and definition of subsistence is beyond the economic value and analysis of how much food and calories from wild harvested resources provide people and communities. The Tlingit in Southeast Alaska, and many other indigenous and rural Alaskan communities, regard subsistence as much more than the acts of harvesting, preparing, and eating the food required for nourishment (Thornton 2008). As Thornton (2008: 117) notes, the Tlingit "regard

subsistence as an intricate and profound set of relationships with particular geographic settings where their social groups have dwelled historically. For them subsistence is *haa Kusteeyí*, 'our way of living', 'real being,' and 'enriching existence,' and not just 'the minimum (food, etc.) necessary to support life.'" Anthropological studies also illustrate the cultural importance of reciprocity and sharing of subsistence resources within the community, as sharing of subsistence resources and knowledge promotes sociality and future harvest success, while preventing potential wastage when subsistence resources are harvested in abundance (Langdon and Worl 1981, Langdon 2021).

While harvest occurs on most land ownerships, the Tongass National Forest manages about 80% of the land in the Southeast Alaska panhandle, and many communities are encompassed by these National Forest System lands. Therefore, most harvest, and access to harvest in Southeast Alaska occurs on the federal public lands and waters of the Tongass, or in adjacent marine waters.

Many species of fish, wildlife, and plants are harvested for subsistence purposes. The most commonly harvested wild foods in Southeast Alaska are salmon and other fish, deer, and berries (Sill and Koster 2017). Wood products, such as cedar, and other non-food uses are also very important for shelter, fuel, handicrafts, transportation and cultural uses. The important foods and materials, and the social and cultural structures around subsistence ways of life are different depending on local resources, landforms, marine interface and traditions.

Alaska faces unique food security challenges because of its remoteness, high costs of transportation, limited agricultural production, and high reliance on imported food (Fall and Kostick, 2018). Wild food harvest in the Southeast Alaska Region makes up roughly 17% of daily caloric requirements, and 121% of the daily protein recommendations, averaged across all residents (Fall and Kostick, 2018). Beyond food, wild resources are harvested for firewood, building materials, cultural purposes, art, clothing and other uses.

During public engagement, many people brought up the importance of federal subsistence harvest. The overall summary of comments received are that subsistence uses, should be prioritized by the forest plan. Cultural and historic/traditional resources includes protecting, respecting, and integrating Traditional Ecological Knowledge (TEK). Commenters were concerned about giving location information for cultural resources, as well as for harvest areas because of the possibility that cultural resources might be damaged and harvested resources might be overharvested (USDA 2024, Summaries of public feedback). Thus, this assessment will not go into detail about specific locations of harvest, or even specific community uses.

Current Subsistence Management

The existing Forest Plan direction on subsistence generally summarizes the requirements in the Alaska National Interest Lands Conservation Act of 1980 (ANILCA), and direction in the Region 10 Subsistence Management and Use Handbook (Forest Service Handbook 2090.23). This includes general guidance to consider subsistence users' physical, cultural, and spiritual needs in project planning, coordination with subsistence users, providing for access, and facilitation necessary for subsistence users. It also directs the Forest to maintain reasonable access to subsistence resources, and abundance and distribution of subsistence resources necessary to meet subsistence user needs.

The existing plan does not identify different subsistence ways of life, cultures and traditions, subsistence resources, or access requirements, or provide specific harvest management goals by community or

resource. Additionally, it does not contain goals or objectives beyond meeting ANILCA requirements for federal subsistence and does not contain standards and guidelines specific to the Tongass National Forest. There is little direction in the existing plan on how best to ensure that the management of the Tongass National Forest prioritizes subsistence uses, as well as for other uses of fish, wildlife, and plant resources.

Other Non-Commercial Uses of Wild Resources

Federally qualified subsistence users may utilize multiple regulatory structures managed by multiple agencies (e.g. ADF&G, NOAA, USFWS) in addition to the Federal Subsistence Management Program to fulfill their subsistence needs. For this reason, non-commercial harvest (e.g., State subsistence, sport, and State Personal use) of wild resources may be critically important to Federally qualified subsistence users in some circumstances.

State Subsistence & Personal Use

ADF&G manages fish and wildlife populations throughout Alaska including on the federal public lands of the Tongass National Forest. Under ANILCA, the taking of fish and wildlife on federal public lands, such as the Tongass, is governed by state law unless such state law is preempted by federal law. In Alaska, state law and ANILCA establish subsistence as the priority use of fish and wildlife and subsistence is managed under both federal and state subsistence harvest regulations. Federal subsistence regulations apply to rural Alaskan residents on federal lands and waters under Title VIII of ANILCA. State subsistence regulations apply to all Alaska residents, meaning that rural residents do not have a priority under the state regulations. ADF&G manages a state subsistence program for all Alaska residents by identifying subsistence and non-subsistence areas. State subsistence hunting and fishing is not authorized in non-subsistence areas but may be open to Personal use harvest for Alaska residents, offering more liberal harvest limits and or methods and means than sport regulations in these areas. Many Federally qualified subsistence users also participate in state subsistence and Personal use harvest to meet their harvest needs.

Sport Harvest

Sport harvest of fish, wildlife, and shellfish is managed by ADF&G throughout Alaska, including on federal public lands such as the Tongass National Forest. Sport regulations apply to Alaska residents and non-residents but may differ based on residency. Sport harvest is managed through state hunting, trapping, and fishing licenses, registration hunts and draw hunts. Many Federally qualified subsistence users participate in state sport harvest to help meet their harvest needs, as well.

Gathering

Gathering of non-fish and wildlife resources such as mushrooms, edible plants, spruce tips, cedar bark, and berries is common on the Tongass National Forest; however, non-commercial use of these resources is not regulated by state or federal agencies on the forest.

Wild Resources – Status and Trends

This section discusses drivers and stressors on the Tongass National Forest that can affect subsistence uses of fish and wildlife resources, as well as other non-commercial uses. The status and trends of fish and wildlife populations and other natural resources affect subsistence and other non-commercial uses to varying degrees.

There is not a singular culture in Southeast Alaska, but a multitude of traditions linked to different communities. These "uses" are parts of localized traditions of wild food production, tied to specific places by ecology, community, culture, and economy," (Wolfe, 2004). While not each specific area or type of customary and traditional subsistence way of life is discussed in this assessment, we will illustrate with some location-specific examples of resource use.

Subsistence harvest usually occurs in traditional use areas accessible to nearby community residents. These traditional and established harvest areas may be locations adjacent to a community or seasonal camps in more remote locations. Areas are often used by people who have lived in an area over generations, or millennia in the case of indigenous people. Some traditional use areas move around based on year-to-year conditions. Therefore, these same harvest locations may not be used every year, and continuous use is not a requirement.

Successful harvest depends on high-quality habitat that is capable of supporting sufficient fish and wildlife populations, and that is within safe and reliable travel distance from each community. This includes maintaining high quality spawning or rearing habitat for fish and wildlife, respectively. In many cases, access for hunting, fishing, or gathering in Southeast Alaska is by small boats with limited capability to travel long distances in rough water. Therefore, good hunting and fishing areas near a community, with protected anchorages and sheltered sea passages, are necessary for sustainable harvest practices.

The graphs below compare percentages of commercial, sport, state Personal use and subsistence food harvest across Alaska, volume of subsistence food harvest across Alaska and within Southeast Alaska, and categories of food resources used in Southeast Alaska. Figures 1 through 4 were produced by ADF&G and the term "subsistence" includes both state and federal subsistence harvest statistics. Non-commercial users, i.e., both rural and non-rural Alaska residents harvesting in a state non-subsistence area, are classified as "Personal use" under state regulations.

Figure 3 and Figure 4 show that salmon is the largest single type of food harvested by residents of Southeast Alaska. Other wild renewable resources, including fish, deer, moose, and berries remain major staples for many Southeast Alaska residents too. Other species, such as kelp and other seaweed, bird eggs, birds, shellfish, and land mammals are also commonly harvested, though hundreds of species are used by people for food and materials.

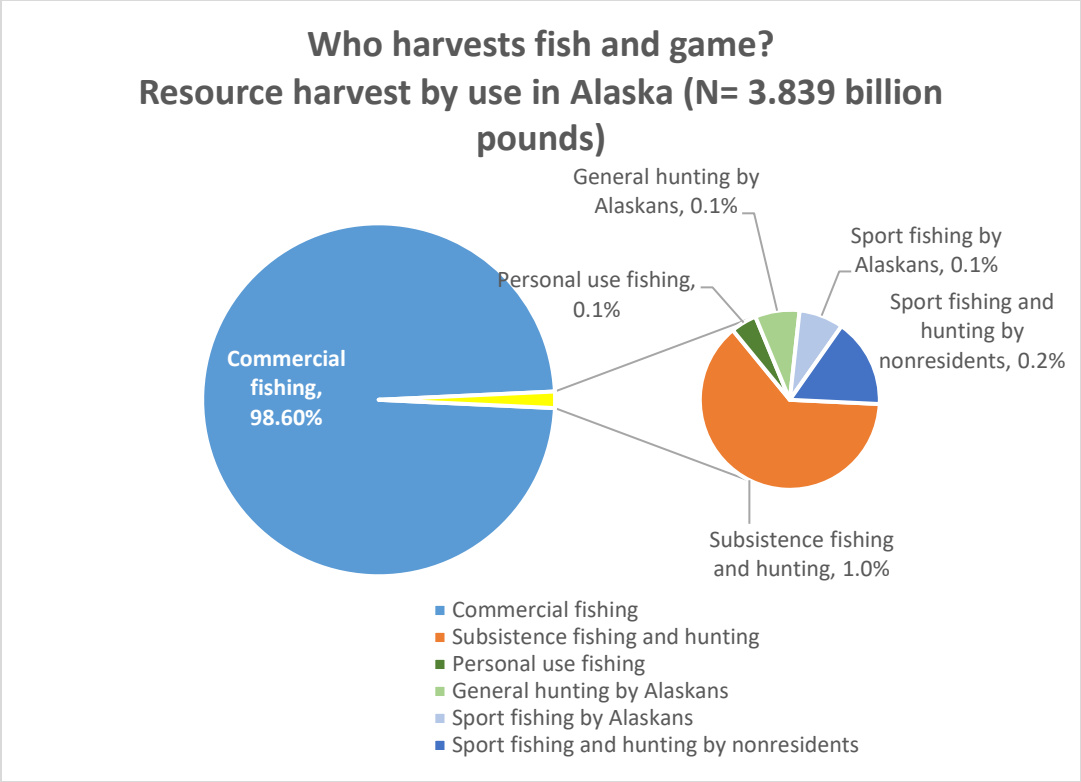

Figure 1. Fish and game harvest in Alaska, showing percent, by weight of harvest used for commercial, personal, subsistence and sport. From Division of Subsistence, Alaska Department of Fish and Game, 2018. It shows that commercial fishing is by far the largest use of wild resources across the State.

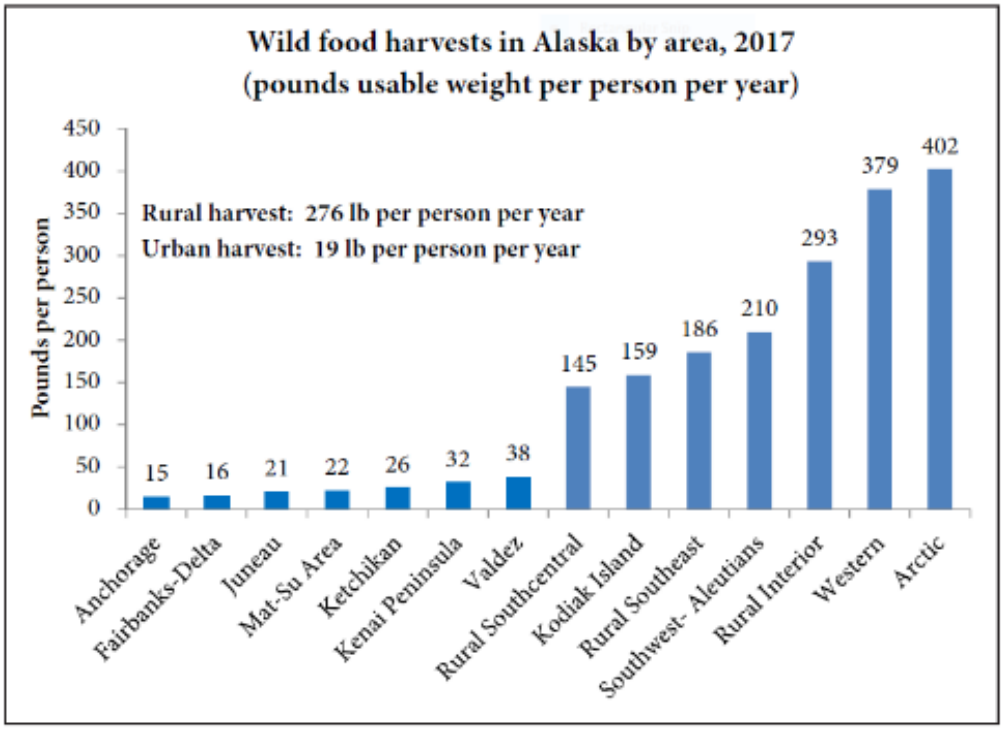

Figure 2. Wild food harvest in Alaska by area, from 2017, for personal use only. From Division of Subsistence, Alaska Department of Fish and Game, 2018. This graph shows that Rural Southeast Alaskans used, on average, a little less than 200 pounds of wild food, per capita, in 2017.

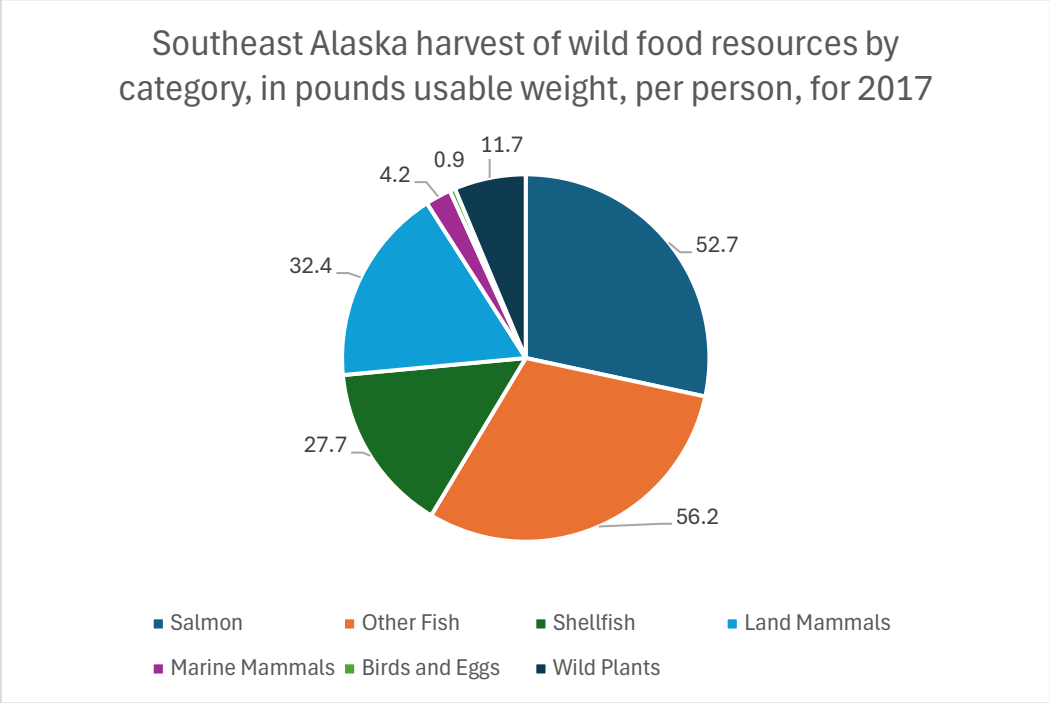

Figure 3. Harvest of wild food resources by category, pounds per capita, 2017. From Alaska Department of Fish and Game Division of Subsistence, 2018.

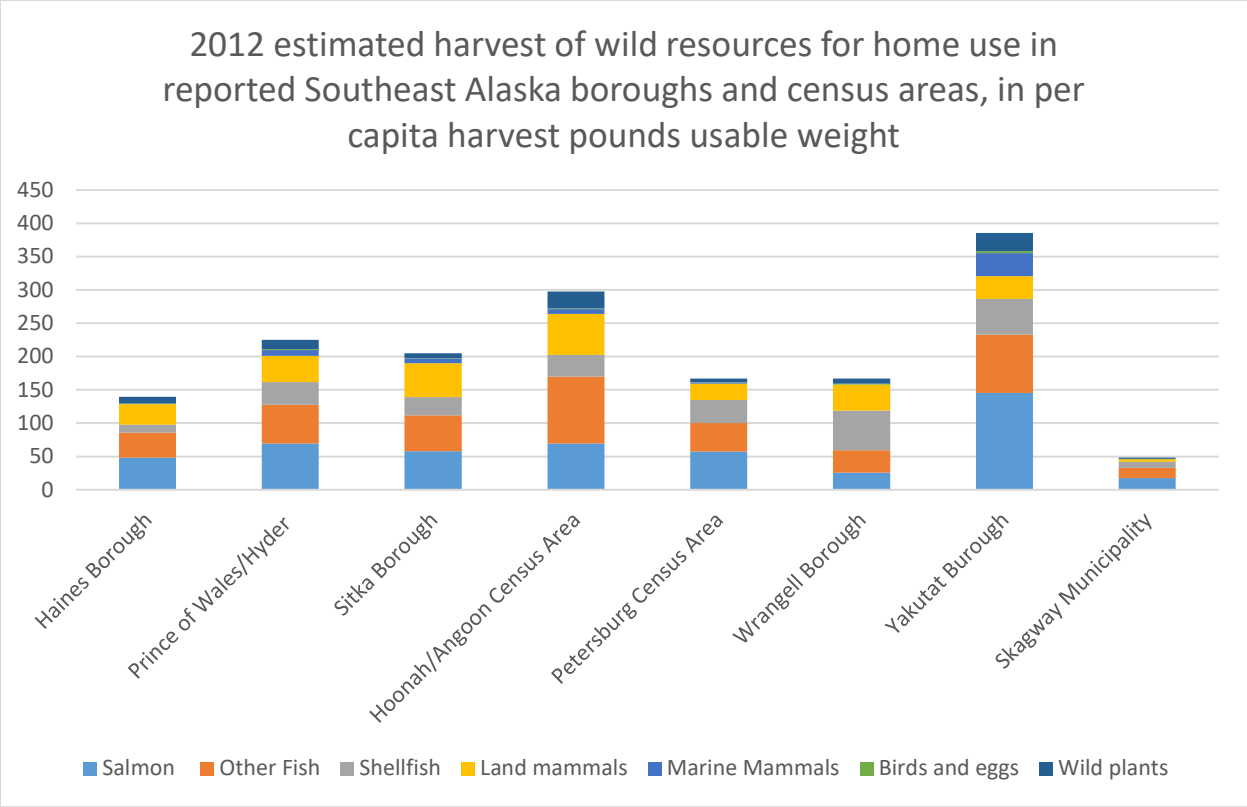

Figure 4. Harvest by community and resource, for select Southeast Alaska boroughs, from 2012. Adapted from Fall, 2016.

Overall, the Tongass National Forest continues to provide for most harvested resources and uses within a healthy, intact and natural ecosystem. Specific species harvested and long-term sustainability is highly variable by year, location, resource, and community, especially in light of climate change and effects resulting from an increased human population in recent years. The population of Alaska has increased by 69% from 229,000 in 1960 to 734,406 in 2023. In contrast, the total US population only increased by 48% since 1960. Currently there are about 71,000 residents living in the Southeast Alaska economic region, in which approximately 26,000 qualify as rural residents under federal subsistence regulations; approximately 45,000 are urban residents living in Juneau and Ketchikan. The increased human population, while not necessarily reflecting population of Southeast Alaska, creates more conflicts and competition for resources, including from increased tourism, sport fishing and hunting, and other commercial food consumption,

There are, however, many populations of fish and wildlife or subsistence activities that are less viable than in the past. While most salmon systems on the Tongass are considered to have stable populations, some individual stocks have suffered from declining productivity, which may lead to localized harvest restrictions (Munro 2023, Conrad and Thynes 2024). In particular, Chinook Salmon stocks throughout the Tongass have declined, with four individual stocks listed as Stocks of Concern by ADF&G. Chinook salmon have experienced major declines in population and body size, and other salmon have declined or shifted location or timing of spawning (Kovach et al. 2014; Roadless Rule Subsistence Hearing transcripts 2019; Schoen et al. 2023). Shellfish are showing greater prevalence of toxins related to climate change and warmer ocean waters (Central Council of the Tlingit & Haida Indian Tribes of Alaska 2021, Lefebvre et al. 2022), though clams have always been avoided during warmer seasons (Newton and Moss 2009). Many beach foods have been impacted by warming water temperatures, or other climate-related impacts (Alcantar 2024, Spurkland & Iken 2011, Wyllie de Echeverria & Thornton 2019). Deer harvest

has declined in some Game Management Units (GMU) on the Tongass National Forest recently, and many users have reported shifts in productive harvest locations or greater effort for each deer harvested. In some areas, deer populations and harvest have remained relatively stable, however. Declines in deer harvest do not directly translate to declining deer populations in all cases. Harvest levels may decline due to reductions in access, reduced ability to spot deer in dense young growth stands and reduced or shifting hunter participation. Deer populations are difficult to estimate with accuracy on the Tongass due to dense vegetation. Deer pellet surveys were used in the Southeast region from 1981 to 2019 to monitor deer population trends and document substantial changes in deer density in specific watersheds but have since been discontinued due to their inaccuracy (McCoy 2017; Hasbrouck 2023).

As reported in Reid et al. (2022), Alaska Native Elders identified the top five threats to salmon as aquaculture, climate change, contaminants, industrial development, and infectious disease, with local variation in importance of each threat. Here, we will discuss these, as well as impacts from timber harvest, recreation, and competition from commercial and sport fishers. While we did not assess conditions and trends for habitat, populations, and harvest patterns for all harvested species, we will discuss conditions and trends for the most commonly used species later in this assessment.

Different publications estimate that less than 50 to over 350 pounds per year of wild food is harvested in Southeast communities. At a value of four to eight dollars per pound, that equates to a value of $200 to $2,800 per person per year in some communities (Mazza and Kruger 2010). ADF&G estimated that rural Southeast Alaskans harvested about 5 million pounds of wild resources for food in the mid-2010s. The replacement cost for these foods would be 20-40 million dollars per year for all rural Southeast Alaska Residents (ADF&G 2019). Although the economic value is important, the significance of wild food harvest far exceeds the economic value. “Sharing with relatives, friends, elders and people in need, and in community events, is a key cultural value in many communities. Families work together to harvest and process wild foods. Essential skills and traditional knowledge are taught across generations. Participants in these activities learn key values, including non-wasteful and efficient harvesting, and respect for the fish and wildlife upon which their ways of life depend,” (ADF&G 2019).

Subsistence harvest in Southeast Alaska as a region or by community are collected by ADF&G and the Forest Service, but not from each community or on an annual basis. A 2016 article reported that harvest of wild resources by rural residents in Southeast Alaska increased slightly between 1986 and 2012, from 85.5 to 90.8 kg per person (188 to 200 pounds per person) (Fall 2016).

While recent overall harvest pounds may not be changing, some species are not as plentiful and users have reported increasing problems with accessing subsistence resources in recent decades. The ability to live a subsistence way of life has become more difficult because of other competing uses. See the “Tongass as an Indigenous Place” section for detailed information about past subsistence ways of life and how they have changed.

The rest of this assessment will focus on some of the factors that can affect subsistence harvest, and some of the conditions, trends, and management of specific key harvested species.

Wild Resource Harvest Drivers and Stressors

There are multiple ways that subsistence and other non-commercial harvest of subsistence resources have been affected. The key impacts are described below.

Ecosystem alteration through vegetation harvest or forest thinning

Sitka black-tailed deer are most often cited as being directly affected by timber harvest. Deer are also by far the most hunted big game animal in Southeast Alaska. The importance of deer for subsistence varies throughout the region due to access to alternative resources and the abundance of deer on the landscape. Harvest also occurs in various habitat types such as alpine, timber, muskegs, and marine shoreline, depending on the time of year and harvester access. In interviews with hunters on Prince of Wales Island, Brinkman (2009) found that muskegs were the most popular habitat to hunt, followed by clearcuts, then alpine areas. The common factor in these areas is open terrain with high visibility. Although recent clear cuts were a preferred place to hunt, they have negative longer-term impacts to deer habitat (Farmer & Kirchhoff 2007). Clear cuts or even-age timber harvest affects deer by first reducing the quality of habitat, especially during harsh winters with increased snow depth. Clearcutting can result in relatively quick regeneration of abundant forage for deer (Hasbrouck 2023). However, this forage is not accessible during periods of deep snow (Hasbrouck 2023). Furthermore, a regenerating forest enters a stem-exclusion stage after about 25 years of regrowth, where the evergreen canopy closes, shading out understory forage vegetation (Alaback 1982; Crotteau et al. 2020; Farmer & Kirchhoff 2007, Hasbrouck 2023). Thinning second growth forests can improve habitat conditions for deer (Crotteau et al. 2020). Successful treatments will increase light transmission through the overstory canopy and thereby enhance quality and quantity of forage for deer in the short-term, increase connectivity between seasonal habitats and forage resources, and accelerate old-growth conditions which improve deep snow winter habitat in the long-term. Deer are discussed in more detail in the species-specific section of this assessment.

Past timber harvest practices have led to negative effects to anadromous fish and other aquatic species, leading to erosion or changes in runoff large enough to impact water quality, stream substrate, or water flows (Grant et al. 2008). Depending on timber harvest practices and environmental factors within the stand, changes can occur through soil disturbance from equipment, loss of soil holding capacity from roots, and from erosion if roads are not maintained properly near water (Moore et. al 2024). Removal of large trees can also reduce large wood debris input into streams, which reduces salmon habitat suitability (Murphy and Koski 1989). These areas are relatively few across the entire Forest (See *Watershed Assessment*). Presence of roads can affect salmon movement if culverts are not providing proper fish passage. The Tongass has been working on stream improvement projects to replace culverts and increase large wood in streams. Watersheds with degraded condition on the Tongass mainly resulted from timber harvest and road building prior to 1990. The Tongass Timber Reform Act (TTRA, 1990) and subsequent Forest Plans (1997, 2008, 2016) greatly increased protection measures for watershed condition and aquatic habitat. The TTRA requires a minimum 100-foot no-cut buffer along all Class I streams and all Class II streams that flow directly into a Class I stream. The Tongass Forest Plan places additional riparian buffers on streams depending on process group and extent of riparian soils and vegetation. Additionally, Class III streams are given a slope-break buffer. All stream buffers require additional consideration for wind firmness in high wind risk areas. This riparian management approach effectively addresses fundamental ecological principals to maintain and restore riparian and aquatic ecosystem diversity (Paustian 2004). Protecting riparian function reduces the potential impacts of climate change. See the *Watershed Condition and Water Resources Assessment* for more information about stream restoration trends.

Alaska Natives use red and yellow cedar for traditional and cultural purposes such as for totem poles, canoes, and housing, while wood and bark are used for art and ceremonial objects. For totem poles and canoes, cedar trees must be old, large, and slow growing to produce tight growth rings and clear boles (mainstem of the tree). Such trees take 450 years to grow (Johnson and Cerveny, 2022). A more detailed discussion of cedar species and their uses, as well as threats, is included in the *Tongass as an Indigenous*

Place assessment. Permitting requirements, climate change effects, commercial timber harvest and lack of long-term planning to sustain road accessible old growth areas for future generations affect continued access to cultural trees. Community discussions brought forward ideas for protecting cultural trees including, "engaging local artisans in forest planning, selecting and delivering specific trees to roads as part of ongoing timber sales, allowing bark removal prior to forest-timber sales, simplifying the tree-acquisition permit process, and setting aside cultural forest groves to sustain trees seven generations into the future," (Johnson et al. 2021).

In Alaska National Forests, "Bona fide settlers, miners, residents, and prospectors for minerals in Alaska may take green or dried timber from the National Forests in Alaska free of charge for personal use but not for sale. Permits will be required for green saw timber. Other material may be taken without permit. The amount of material granted to any one person in 1 year shall not exceed 10,000 board feet of saw timber and 25 cords of wood, or an equivalent volume in other forms. Persons obtaining materials shall, on demand, forward to the supervisor a statement of the quantity taken and the location from which it was removed," (36 CFR §223.10). Timber harvest and road access can also affect peoples' ability to collect personal use wood by increasing access through new road construction or decreasing localized availability. The effects of timber harvest on free use wood depends on its intended use. Much of the personal use wood is harvested for firewood which can be accessed more easily through the construction of logging roads. However, residents also harvest free-use wood for milling into wood products. The availability of desirable timber for milling may be limited in localized areas by commercial timber harvest. The perceived or actual regulatory burden of obtaining free use wood can also affect access. The regulations for free use personal wood can be confusing and not interpreted the same by all users and Forest Service staff.

As discussed in the species-specific section of this assessment, timber harvest can increase or decrease the growth of plants harvested for subsistence such as mushrooms, berries, and devil's club. Some of these species thrive within clearcuts, for example, with increased light. Others require shade, or cool microclimates that can be negatively impacted by timber harvest (Alaback 1984, Kerns et al 2003). Considering effects to fish, wildlife, and gathered species is an important part of minimizing negative effects to wild resource harvest in all Tongass projects and when developing the revised Forest Plan.

Roads and Road Access

Roads can impact subsistence harvest in multiple ways. Anadromous fish can be impeded by culverts or other road crossings that impede fish passage, by blocking or degrading their upstream or downstream movements. Montgomery (1994) found that drainage concentration from ridgetop roads caused both landsliding and integration of the channel and road networks. Road drainage concentration increased the effective length of the channel network and strongly influenced the distribution of erosional processes in Southeast Alaska. Kahklen and Hartsog (1999) found that road induced erosion was highly variable on the Tongass. The density and location of roads within a watershed and degree of road maintenance are variables that influence the effect of roads on anadromous fish habitat. Roads have the potential to reduce water quality or affect stream substrate. The existing land management plan contains direction to protect streams from road effects, and the Tongass is replacing culverts to improve fish passage. Roads can also fragment habitat, though most places on the Tongass have very low road density and there are likely few effects from habitat fragmentation due to roads. Prince of Wales Island has a higher road density than anywhere else on the Tongass, which does affect harvest methods and some species' behaviors. Roads provide access for hunting, which improves subsistence users' ability to harvest animals, but has also led

to increased sport hunting, overharvest or increased illegal harvest in some areas (Person and Russel 2018).

In the Roadless subsistence hearings, there were differing views about roads and how they impact subsistence, illustrating how roads can play both a beneficial and detrimental role for subsistence users. Many objections to repealing Inventoried Roadless Area status were based on the expected timber harvest or mining impacts, not from the roads themselves. Multiple people mentioned that road building for timber harvest was usually not helpful for increased access, since the roads are only temporary and blocked off after harvest done, so only the negative impacts remain, and none of the positive. Others mentioned the benefit of roads, and better maintained roads, to access harvested resources. Speakers mentioned that maintaining roads for vehicle access in harvest use areas provides greater access to resources, distributes harvesters, and may reduce overall competition between users. Generally, new roads are often not desired, but maintenance of existing roads is seen as necessary for access to wild resources. Communities can identify which roads are the highest priority for harvest activities (Subsistence hearing transcripts, Computer Matrix, LLC 2019).

The Southeast Alaska Subsistence Regional Advisory Council was active during the Roadless Rule process, and their position on roads was that they are generally detrimental to deer and deer habitat, fish and fish habit, and subsistence uses. They consider roads, along with timber harvest, as one of the major factors in deer population declines on Prince of Wales Island (GMU 2) (Southeast Alaska Subsistence Regional Advisory Council, 2020, letters on pages 17-57).

Based on the public input and knowledge of on-the-ground concerns, access for subsistence users and other harvesters can be complicated and there is no one agreed-upon position by all users. In accordance with Section 811 of ANILCA "the Secretary shall ensure that rural residents engaged in subsistence uses shall have reasonable access to subsistence resources on the public lands." ANILCA contains unique access provision that protect access for subsistence and other purposes, notwithstanding other laws like the Wilderness Act. See Sec. 811(b) and Sec. 1110(a). Access restrictions are rare in Alaska. The Federal Subsistence Management Program regulations generally allow for use of vehicles (helicopters are prohibited) save that the vehicle cannot be moving and that it cannot be used to drive, herd, or molest wildlife. Otherwise, "any method" not prohibited in the Federal Subsistence Management Program regulation or other federal law is allowed. Specifically, section 811(b) states that notwithstanding any other law, the Secretary "shall permit on the public lands appropriate use for subsistence purposes of snowmobiles, motorboats, and other means of surface transportation traditionally employed for such purposes by local residents, subject to reasonable regulation." Section 1110(a) provides that the Secretary shall permit, on conservation system units (including designated Wilderness and Wild and Scenic Rivers) the use of snowmachines (during periods of adequate snow cover, or frozen river conditions in the case of wild and scenic rivers), motorboats, airplanes, and nonmotorized surface transportation methods for traditional activities.

However, regulations restricting means of access on the Tongass may be implemented as reasonable regulations to address specific concerns such as public safety or conservation so long as they are consistent with ANILCA. The Forest Plan will not supersede or direct Federal Subsistence Board actions. The Regional Forester has a seat on the Federal Subsistence Board, understands concerns by users, and how actions may affect users, which is important for framing future management by the Tongass National Forest.

Other Access

Access to subsistence harvest areas within the Tongass National Forest is often by boat or on foot since there are few roads in many Southeast Alaskan communities. Many marine resources are necessarily accessed via boat. Marine access facilities, boat ramps, docks, or anchorages, are valuable assets for providing access to harvest areas. However, improvements can also cause conflict between subsistence users and other harvesters, by increasing competition for access to traditionally used areas. There can be competition between subsistence users and sport users, for water access to prime hunting locations (Risdahl, personal communication) and, therefore, improvements in traditional hunting areas are not always wanted by subsistence users as it increases conflicts and competition with other users. Charter fishing use has displaced subsistence users, causing subsistence users to move to different areas (Southeast Alaska Subsistence Regional Advisory Council 2020). Tongass National Forest managers have little direct jurisdiction over water or boating uses, other than permitting or maintaining docks or other marine access facilities located on land within the National Forest boundaries.

Indirectly, the continuance of customary and traditional uses of cabins and related structures both within and outside of Wilderness Areas is important for maintaining reasonable access to subsistence resources. "ANILCA cabins" and public use cabins are both important to provide shelter for overnight harvest activities. There are about 100 "ANILCA cabins" on National Forest Lands in Alaska that are under the authority of ANILCA Section 1303 and Forest Service Handbook 2709.11, Chapters 40 and 50. There are about 160 public use cabins and shelters available for use by reservation. Continued use of these cabins and other facilities is essential to support customary and traditional harvest activities.

Recreation and Tourism

Recreation and tourism can adversely affect subsistence harvested resources, and also adversely affect access. Local harvesters have expressed concern that exhaust emissions and gray water dumping from cruise ships contaminates marine resources and terrestrial wildlife, and that a high volume of nature tours can have localized effects on wildlife distribution and habitats. Visitors engaged in kayaking, boat tours, wildlife viewing, or other recreational activities often access traditionally important areas used for subsistence fishing, berry picking, or hunting, displacing subsistence harvesters (Cerveny 2005).

Cerveny (2005) reported that community members in Haines, Craig, and Hoonah described changes in access to their harvest from tourism, mainly through charter fishing activity causing shifts of harvest patterns for salmon and halibut. In Alaska, the number of anglers participating in charter fishing increased threefold from 1984 to 2019, with the number of resident anglers remaining steady over the same time period (Fowler and Chapell 2021). Guided and non-guided sport anglers compete with subsistence and Personal use harvesters for the most productive harvest areas. Conflict between these uses negatively affects subsistence and other traditional fishing harvest and can result in residents fishing in less desirable areas.

Mountain goats can be affected by aircraft use, changing their behavioral patterns, and do not habituate to the disturbance over time (Goldstein et al. 2005). The existing land management plan (pp. 91-02) contains requirements to avoid mountain goat kidding areas and maintain a 1,500-foot vertical or horizonal clearance from traditional summer and kidding habitats whenever feasible (2016 plan, chapter 4). The effects of helicopters are relevant to management decisions about recreational, commercial, and administrative activities by the Forest Service itself.

The tourism industry is expected to continue growing throughout Southeast Alaska, increasing pressure on resources and increasing user conflicts. Maintaining the federally mandated subsistence priority, and overall harvest success, requires considering the various effects of recreation and tourism in different communities, which are well understood by the residents of those local communities.

Climate Change

Climate change can affect wild harvested resources and access by subsistence users to those resources in many ways, starting with changes in ecosystem function. The *Climate Change Vulnerability* Assessment explains the current future predicted effects to air and water temperature, precipitation, snowmelt, and streamflow (Halofsky, DRAFT). Stream flows are already showing changes in timing due to reduced snowpack and increased rain. Ocean warming in the Gulf of Alaska began to show novel impacts in 2014, shifting foraging conditions and spatial distribution of salmon (Halofsky, DRAFT). Predicted effects to salmon and other anadromous and marine fish populations or health are not certain and may not all be negative. However, they have and will continue to shift harvest patterns, where subsistence users will need to change location or timing of fish harvest. Consideration of changing migration patterns and timing will be necessary when planning restoration or other management on streams to ensure the timing does not impact populations or harvest activities.

While sea level rise is not occurring across most of Southeast Alaska, both sea level rise and land level rise could affect shorelines and beach foods. Isostatic rebound is the rising of land when large amounts of ice melt and remove its weight. In the southern portion of Southeast Alaska, such as near Metlakatla and Ketchikan, sea level is expected to rise about half a meter over the next eighty years. In the northern portion, near Yakutat and Klukwan, the land is expected to rise over two meters relative to sea level, which would lead to a relative sea level drop of about two meters (Johnson et al. 2019). Changing shorelines affect beach foods such as plants, shellfish and seaweed, and eelgrass ecosystems (Johnson and Kruger, 2019). While some ecosystems will shift with sea level, others may not. Hunting and gathering locations may continue to shift, or habitats may be lost altogether.

In marine environments, increased algal blooms are likely with warming oceans, leading to a higher prevalence of toxins in shellfish and affecting sustainability of shellfish harvest and other marine animals (Sill and Koster 2017).

There have been and will continue to be changing migration and distribution patterns for wildlife and changing distribution of plants. While the coastal temperate rainforest is predicted to show resiliency to climate change, without wholesale ecosystem change, subsistence harvested resources will likely require a change in harvest location, depending on the abundance and accessibility to game, fish, and plants. Consideration of these changes, informed by local knowledge of climate change effects, can help Tongass National Forest management maximize the ability to retain the customary and traditional subsistence ways of life.

Social and Economic Impacts

Many of the impacts to subsistence and other kinds of harvest are related to wider cultural and economic shifts. Rural residents cite increased cost of fuel and equipment, scarcity of jobs allowing families to remain in rural areas, time available to harvest, and other factors. While these factors are not under the control of the Tongass National Forest, consideration of these factors could help inform management that supports resilience of the subsistence way of life.

Competition with Commercial Harvest and Other Uses

The Tongass National Forest is managed for multiple uses. Competition for wild resources is a major concern among all user group. The taking on federal public lands and waters of fish and wildlife for nonwasteful subsistence uses is accorded priority over the taking on such lands of fish and wildlife for other purposes. Many competing uses occur outside federal jurisdiction which may affect uses of wild resources on the Tongass, however, their effects cannot be managed through the forest plan or the Federal Subsistence Board process (e.g., commercial, marine guided harvest and tourism off the forest). Subsistence users face competition with commercial and non-commercial harvest and also face competition with non-consumptive uses on and around the Tongass (e.g. tourism, wildlife viewing). This section identifies existing and potential competition between wild resource user groups.

Competition with Commercial Harvest

The Federal Subsistence Board has limited jurisdiction over commercial fishing, such as on the Makhnati Island submerged lands, though the Tongass National Forest plays a vital role in the production of wild salmon stocks through protection and restoration of spawning and rearing habitat. About 75% of the salmon caught in southeast Alaska commercial salmon fisheries originate in Tongass National Forest streams, with the remainder resulting from hatchery production (Johnson et. Al 2019). These salmon have an annual ex-vessel value of approximately $50 million to $150 million, depending on the abundance and market value each year (Johnson et. al 2019).

The Federal Subsistence Board has regulatory authority over some marine areas, including Makhnati Island area in Sitka Sound; and roughly 160 parcels of submerged lands within the boundaries of the Tongass National Forest. The submerged lands parcels came under the jurisdiction of the Federal Subsistence Board when the Final Rule for the Subsistence Management Regulations for Public Lands in Alaska—Applicability and Scope; Tongass National Forest Submerged Lands (83 FR 23813) was published in the Federal Register and became effective April 3, 2024, under Agriculture 36 CFR 242 and Interior 50 CFR 100. These areas are expressly open to subsistence uses.

Most of the documented commercial competition concerns are related to salmon harvest. While charter fishing has increased over the past few decades, commercial harvest of salmon in Southeast Alaska has been relatively steady over the past 30 years. Annual harvest varies greatly, but the average across all years since the early 1990s remains at about 180 million salmon of all species in Alaska as a whole. Southeast Alaska salmon subsistence fisheries follow a similar pattern, though the proportion of subsistence fish caught in Southeast Alaska has generally declined over the past 40 years. By number of fish, most of the commercial harvest (around 90%) is wild pink salmon. Commercial harvest generally occurs in saltwater before salmon reach the terminal areas typically used by subsistence harvesters, such as the mouths of streams. Harvest of salmon in commercial mixed stock fisheries can reduce the number of salmon returning to small river systems important to subsistence harvesters. For example, commercial purse seine fisheries targeting Pink Salmon in northern Chatham Strait also harvest Sockeye Salmon bound for traditional subsistence fishing locations like Kanalku Bay, Basket Bay, and Sitkoh Lake (Bednarski et. al 2014). This may reduce the number of fish available for subsistence users and reduce the productivity of the individual stocks they depend on.

Beyond salmon, commercial harvest of other marine resources has caused subsistence harvesters to change locations or led to reduced success. An example of how subsistence use was considered in commercial harvest regulations is the herring spawn in Sitka Sound. Subsistence harvesters were concerned that the commercial sac roe herring fishery was negatively affecting subsistence harvest

success. The area was determined to be a customary and traditional use area by the Alaska Board of Fisheries in 1989. Between 2012 and 2018, a series of decisions closed portions of Sitka Sound to the commercial sac roe fishery, so that a core area was available only to subsistence harvesters (Sill and Lemons 2021). Commercial harvest of Eulachon in District 1 contributed to a decline in Eulachon numbers returning to the Unuk River. The fishery collapsed in 2005 and did not open again until 2021, with a limited harvest limit for federal subsistence (5 gallons per household per year).

Competition With Other Uses

Sport harvest (guided and unguided fishing, hunting, transporters)

An emerging issue throughout the Tongass is the increasing number of "unguided" non-resident harvesters. These are typically fishermen or hunters who sport fish or hunt without the services of a guide but rent boats or use transport services to access resources. While the extent of the unguided harvesting industry is unclear, subsistence users have reported increasing competition with unguided harvesters. In most cases, the primary issue is not direct competition for resources, but rather the disruption of subsistence activities by the influx of unguided users. These disruptions are often highly localized, such as when unguided anglers congregate in fishing areas important to rural communities and compete for space, or when hunting transporters drop clients off at locations used by subsistence hunters, forcing local hunters to move elsewhere. Subsistence users have also reported competition concerns related to resident sport fishers and hunters.

The difference in reporting requirements between guided and unguided non-resident users contribute to difficulties in assessing the extent and specifics of competition and conflict between unguided and subsistence users. Charter boat operators are required to complete detailed logbooks documenting their fishing areas and catch (5 AAC 75.076), but no such requirement exists for unguided anglers. Similarly, hunting guides using National Forest lands must obtain special use permits detailing the number of clients, areas, and times permitted for use, while transporters have little or no restriction on dropping clients off on state-owned tidelands.

The lack of specific information on the extent of competition between unguided harvesters and subsistence users complicates efforts to address any conflicts that may occur. Identifying the areas and circumstances where subsistence users are in competition or conflict with unguided harvesters is the first step needed to mitigate any issues that arise. As many of these conflicts occur in marine waters outside the jurisdiction of the Tongass, they may be beyond the scope of the Forest Plan. However, a better understanding of the issue will be crucial in addressing any conflicts that can be addressed in the Plan.

Tourism (wildlife viewing, guided recreation)

Harvest activities often occur in areas of high abundance, which are also desirable locations to conduct tourism activities. The Tongass hosts several types of tourism that compete with subsistence uses of the land in a variety of ways. Vessel-based wildlife viewing and scenic tours tend to move from place to place seeking out protected anchorages for visitors to stop and explore wildlife. Many of those locations can overlap with hunting and fishing efforts. Additionally, established wildlife viewing and recreation sites or facilities prohibit hunting activities, in order to provide a safe and welcoming environment for visitors. The presence of vessels, planes, and on-the-ground explorers and the added noise that is often associated with such operations interrupts normal animal behavior, which can drive deer, bears, and other prey species farther into the forest resulting in reduced efficiency and accessibility for hunters. Fishing activities are often interrupted by accessibility issues that result from large and small vessel or kayak

utilization of the marine space in which harvesters would deploy large nets to efficiently harvest salmon. These outcomes not only inconvenience harvesters but often result in increased time and distance traveled from their home community which confers drastic increases in fuel costs and risk. Other outdoor recreational activities can also impact harvest activities. Hiking, photography, and camping are a few examples of such activities that when conducted during hunting and fishing seasons can impact animal behavior and reduce success and efficiency of harvest.

Regulations

The laws and regulations for federal subsistence, state subsistence and Personal use on federally managed lands in Alaska are complicated and can be confusing to users. There are State of Alaska regulations, federal regulations, and different decision makers based on the agency and in-season manager. The Federal Subsistence Board regulates federal subsistence activities on federally managed lands and waters. The Federal Subsistence Board is made up of the Directors of the DOI federal land management agencies in Alaska, including the U.S. Fish and Wildlife Service, National Park Service, Bureau of Land Management and Bureau of Indian Affairs, and the USDA Forest Service's Regional Forester; plus, the Chair and two public members with direct subsistence experience in rural Alaska, which are selected by the Secretaries of Interior and Agriculture. An additional three Tribally nominated public members will be added to the Board, as approved in October 2024, though they have not yet been selected or joined the board as of December 2024. This would bring the number of Board members to 11. The Board is informed by a State Liaison and the Chairman of each of the 10 Subsistence Regional Advisory Councils.

Other recent changes to the Federal Subsistence Management Program, include moving the Office of Subsistence Management out of the U.S. Fish and Wildlife Service and under the Department of Interior Assistant Secretary, Office of Policy, Management and Budget.

The Alaska Region Subsistence Program represents a unique Forest Service role in wildlife and fisheries management. Normally, the Forest Service role is confined to habitat management, with state managers conducting fish and wildlife population surveys and inventory and harvest management. In Alaska, the Forest Service has a substantial role and workload in developing harvest regulations for subsistence use of wildlife and fish on all federal lands and waters and enforcing subsistence regulations on national forest lands (USDA Forest Service 2010).

The District Rangers of the Tongass National Forest have been delegated authority by the Federal Subsistence Board to take in-season management actions. Delegation of Authority was given to District Rangers to take immediate action, outside of the Federal Subsistence Board cycle, to ensure continued viability of a particular fish or wildlife population, to ensure continued subsistence use, or for reasons of public safety. These actions, termed temporary or emergency special actions, can restrict use of fish and wildlife by both Federally qualified subsistence users and non-subsistence users (i.e., sport, state subsistence, and State Personal use). These actions may also be deferred to the Federal Subsistence Board to take action.

Related to the regulatory framework for subsistence, competition within and among communities of Federally qualified subsistence users may increase over time or when fish or wildlife populations decline. When this happens, the Federal Subsistence Board determines which communities have the greatest direct dependence (ANILCA Section 804) and grants those with the greatest need a priority for harvest.

Hunting, trapping, and fishing regulations are complex and often confusing to harvesters. The Alaska Department of Fish and Game website lists five different agencies to contact for information about subsistence hunting and fishing, depending on whether the information is related to sea otters, polar bears and walrus; versus seals, sea lions and whales; halibut; hunting for waterfowl; versus subsistence on Federally managed lands and waters.

Increased use of local knowledge and coordination with local communities for all types of projects that have any potential to affect harvest is a consideration for improving sustainability of Tongass National Forest management.

While this assessment will not cover all aspects of regulations, the Forest Service has a large role in sustainable management of wild resources, in terms of managing resources sustainably, protecting access to subsistence harvest, working with other agencies, tribes and communities to ensure the subsistence way of life can continue, and using local traditional ecological knowledge to help inform management.

Species of Special Interest for Harvest on the Tongass National Forest

This section goes into more detail about a few of the most widely used species on the Tongass National Forest. A multitude of species are used by people for food, fiber, art, medicine, or other cultural uses. This section briefly describes some of the main habitat requirements for selected species, general life cycles, and some of the management activities or other factors that can affect habitat or populations. It also discusses how these wild resources are used by people. It will include a detailed account of each species and a brief discussion of those factors most relevant to management undertaken by the Tongass National Forest. These species-specific descriptions include ecological and habitat requirements, to provide context about habitat, and not always within the framework of how they are used for subsistence and other non-commercial harvest.

Salmon

Salmon are an important anadromous fish that depends on streams and rivers within the Tongass National Forest. Other fish, including halibut, herring, trout, eulachon, and shellfish are also important for human uses in and adjacent to the Tongass National Forest, but are not described in detail in this section. This section focuses on salmon both because of their widespread importance to users throughout the Forest, and because they can be particularly affected by land use activities due to their freshwater residency and life history.

Contribution of use to cultural, social and economic sustainability

The importance of salmon to the economy, ecology and culture of Southeast Alaska is immeasurable. The Tongass National Forest supports all five species of Pacific salmon: chinook, coho, chum, pink, and sockeye. While salmon are important across Alaska, the Southeast region supports a greater abundance of salmon than any other region of Alaska (Clark & Thiessen-Bock 2019).

Changes in the abundance and stability of salmon populations have cascading effects on communities and fisheries in the region. Salmon that spawn and rear in Tongass National Forest watersheds support commercial, sport, personal-use, and subsistence fisheries that are critical to community well-being and local economies. A 2010 estimate suggest that about 1 in 10 jobs are directly linked to salmon fisheries in

Southeast Alaska (TCW Economics 2010 . Furthermore, there are 33 federally designated subsistence communities in the region, which often acquire all their annual protein requirements from wild foods—especially salmon (Fall and Kostick 2018).

While this assessment focuses on subsistence and other non-commercial uses, we also include some information here about commercial and recreational uses of salmon, to provide context and highlight the importance of salmon for the economy and culture of all Southeast Alaskans.

The Tongass National Forest supports a large proportion of salmon harvest in the region. For example, from 2007 to 2016 it was estimated that 75% of commercially harvested salmon in Southeast Alaska were derived from or supported for some aspect of their life cycle by Tongass National Forest watersheds. These fish were estimated to have an annual dockside value of ~$68 million (Johnson et al. 2019).

Salmon are a keystone species for many Tongass National Forest ecosystems, both in an ecological and cultural sense. An ecological keystone species has a disproportionate effect on the structure and functioning of an ecosystem relative to its abundance. Cultural Keystone Species have been described as "culturally salient species that shape in a major way the cultural identity of a people, as reflected in the fundamental roles these species have in diet, materials, medicine, and/or spiritual practices" (Garibaldi and Turner 2004).

Salmon are ecological keystone species because they transfer marine-derived nutrients into the terrestrial and freshwater ecosystems, and many terrestrial and freshwater species and ecological processes are inextricably connected to salmon (Willson and Halupka 1995). Over 50 animal species directly depend on salmon on the Tongass. Salmon-derived nitrogen has been found over ¼ mile away from salmon streams, indirectly feeding vegetation as well as animals.

For Alaska Natives, salmon are the major wild food source and have been at the heart of survival and cultural practices for thousands of years. See the "*Tongass as an Indigenous Place*" assessment for a detailed discussion of the cultural and ecological importance of salmon to the Tlingit, Haida and Tsimshian people whose homeland is Southeast Alaska. Alaska Natives developed a cultural system interconnected with fisheries for social cohesion, identity, cross-generational learning, and a strong subsistence economy. Salmon remain key to subsistence uses and other harvest, and maintaining high-quality aquatic habitat and healthy salmon populations was identified as a major concern and focus by public, tribal representatives and agencies in public participation for this Plan Revision as well as previous engagement efforts. Sockeye salmon the species of salmon used by far the most for non-commercial fishers in Southeast Alaska, with pink salmon the most abundant and commercially harvested.

Commercial fisheries have been a part of the Alaskan economy for generations, shaping cultural structures, cultural and community identity, and are part of the market economy. While the non-commercial and commercial fisheries can sometimes be in conflict, they are also intertwined and the same individuals may participate in both commercial and subsistence or other personal use fisheries. Therefore, the economic value is tied in with social and cultural stability, as well as economic stability.

The number of fish caught in and the marine waters adjacent to the Tongass National Forest, in the Southeast Alaska and Yakutat commercial fisheries, is shown in Figure 8 below. Commercial harvest, including salmon of hatchery origin, has ranged from less than 20 million, to over 100 million over the past 40 years, for all salmon species. The economic value of salmon can be calculated in many ways. The overall economic value of salmon in Southeast Alaska is difficult to obtain. While commercial dockside value is reported annually, that does not account for the full economic value of salmon to the Region. One

report, by Trout Unlimited, found that the total economic output associated with commercial, sport, and personal use and subsistence fisheries, including hatchery operations, in Southeast Alaska was estimated at $986.1 million in 2017 (TCW Economics 2010). Research into the monetary value of salmon produced on the Tongass National Forest estimated the dockside value of all Pacific Salmon originating on the Tongass National Forest from 2007-2016 to range from $50 million to $150 million, with an average value of about $69 million. Pink salmon had by far the greatest value during that time.

Sport fisheries also comprise significant contributions to communities and local economies across Southeast Alaska. In 2023, ADFG estimated 519,000 angler-days fished across the region, with Juneau, Prince of Wales, Ketchikan, Sitka and Yakutat survey districts reporting the highest ranked fishing effort. Freshwater harvest for all salmon species topped 59,000 fish and saltwater harvest tallied 451, 076 fish retained by an estimated 155, 584 anglers, a peak angler estimate for the 2014-2023 reporting period. (Alaska Department of Fish and Game 2024). Updated economic analyses of the impacts of sport fisheries are needed across the region.

Habitat Trend and Occurrence

Within the Tongass National Forest, about 12,900 miles of anadromous fish bearing rivers and streams and about 182,400 acres of lakes and ponds have been estimated to support and produce wild salmon. However, these numbers often change as new habitat emerges or is identified and as population surveys occur; so, these estimates often increase. All salmon species, and the other anadromous fish species on the Tongass, including steelhead, Dolly Varden, eulachon, and some cutthroat trout, spawn in freshwater, and spend varying life stages in salt water. The different salmon species have different and often distinct habitat needs, and spend different amounts of time, from months to years, before migrating into the marine environment, and varied number of years in the marine environment. Therefore, while there are some similar habitat requirements and threats, there are also threats specific to a particular species.

Salmon start their lives as eggs freshwater stream gravels or lakeshore margins, moving to the estuaries in their early life stages, living in marine ecosystems for 1-5 years, and finally returning to their natal freshwater habitats at the end of their lives, where they die after spawning, and deliver vital marine-derived nutrients to the water and adjacent forests.

All Pacific salmon need cold, moderate- to fast-moving freshwater, at sufficient depths to spawn and migrate to and from their stream of origin. In systems with lakes, some salmon species can rear for one or more years in the lakes, particularly coho and sockeye. Some species and individual populations spawn in lakes, while others spawn miles upstream from the ocean, and others spawn at the mouth or lower sections of rivers. All species in Alaska migrate into salt water to mature. Because their lifecycle spans many different aquatic habitats, conditions in streams, rivers, lakes and the marine environment can affect their survival and fitness.

Chinook salmon have the most limited range of the salmon species on the Tongass National Forest. Because they are a larger species, they often select for larger spawning gravel and therefore larger rivers. Most runs in Southeast Alaska are found in mainland rivers with headwaters in Canda. There are more than 85 identified stocks of Chinook in Southeast Alaska (Halupka et al 2000). Many of these populations are small, with only three rivers (Stikine, Taku and Alsek River systems) supporting runs greater than 10,000 fish, and nine others receiving runs greater than 1,500 fish (Pahlke 2010). The King Salmon River, Wheeler Creek and Greens Creek on Admiralty Island are the only wild stocks found in island drainages (Armstrong and Hermans 2004, Guthrie III and Wilmot 2004).

Sockeye salmon are associated with watersheds where lakes are present, and are generally found in fewer systems than coho, chum, and pink salmon. Sockeye are highly used in subsistence and personal use fisheries. Sockeye abundance has been variable due to a variety of factors including shifts in freshwater and marine conditions and interception in mixed-stock fisheries.

Coho salmon are among the most widely distributed salmon across Southeast Alaska and are important contributions to both recreational, sport and commercial fisheries. As juveniles, coho salmon are highly migratory, utilizing diverse habitats throughout the year, and rearing in small, first-order tributaries to large, forested floodplains and side-channels. Coho most frequently encounter habitat stressors from past forest management activities and roads and are considered a 'design species' for in-stream restoration in historically disturbed watersheds as well fish passage improvement projects at road/stream crossings.

In general, most streams that do not have natural or anthropogenic physical barriers support at least one species of salmon (Armstrong et al. 2016). Due to the diverse life histories and broad geographic distribution of all species of salmon across Southeast Alaska, Forest Service land management activities have the potential to maintain, increase, or negatively impact salmon distribution and abundance at a variety of scales.

Population status and trends

Salmon are the largest single wild harvested resource used by rural residents of Southeast Alaska, with all other fish combined making up about the same harvested weight. For Alaska Natives, salmon are the major wild food source and have been at the heart of survival and cultural practices for thousands of years. See the *Tongass as an Indigenous Place* Assessment for a detailed discussion of the cultural and ecological importance of salmon to the Tlingit, Haida, and Tsimshian people whose homeland is Southeast Alaska. Alaka Natives developed a cultural system interconnected with fisheries for social cohesion, identify, cross-generational learning, and a strong subsistence economy. They remain key to subsistence uses and other harvest, and maintenance of salmon streams and populations are identified as a major concern and focus by public, tribal representatives, and agencies in public participation for this Plan Revision, as well as previous engagement efforts.

The importance of salmon to a wide variety of users has led to a robust framework of assessment and monitoring of the status of salmon populations in the Tongass. The primary agency responsible for monitoring and assessment is ADF&G, though other agencies, tribes, and other organizations play an important role. These organizations collect, share, and analyze data on salmon populations throughout the forest. In turn, those data are used to inform management decisions such as the length of fishing seasons, or fishing restrictions to protect weak stocks.

The most common metric used for the health of salmon stocks is escapement, or the number of salmon that survive and return to freshwater to spawn. The sheer number of spawning streams in the Tongass precludes monitoring each stream individually, so managers typically concentrate data collection efforts on major systems or use smaller systems as indicators of wider regional trends. The escapement can be measured using a variety of tools, such as weirs, mark-recapture projects, spawning grounds surveys, or aerial surveys. Weirs provide the most accurate escapement data, but are expensive to operate, while spawning grounds and aerial surveys can be used over wider areas or to monitor more systems. For example, aerial surveys are used to monitor Pink Salmon escapements in over 700 streams across southeast Alaska (Piston and Heinl 2021).

Another metric used to assess the health of salmon stocks is fishery performance, or the number of salmon caught in fisheries. Fishery performance is especially crucial for in-season management of salmon fisheries, as it provides information during the fishing season, when managers can use it to adjust management while fisheries are occurring. Typically, managers use the catch per unit effort, such as the number of salmon caught per boat, as a measure of salmon abundance. Fishery performance measures can be used on a range of time and geographical scales. For example, commercial fisheries managers may monitor the number of fish per boat caught during a commercial opening lasting a single day to assess run strength over a wide area, while subsistence fisheries managers often use the number of fish caught per harvester at a particular stream over number of years to monitor a run in a single stream.

Many salmon stocks in southeast Alaska have established escapement goals, which reflect the number of spawning salmon needed to provide a salmon population that can support a sustainable fishery. Escapement goals are calculated using historical salmon escapements and the resulting number of returning adult salmon (Munro 2023). These goals are developed by ADF&G and approved by the Board of Fish. Currently, there are escapement goals for 11 Chinook Salmon stocks, 8 Chum Salmon stocks, 13 Coho Salmon stocks, 12 Sockeye Salmon stocks, and 3 Pink Salmon stocks in southeast Alaska. While most of these goals are for an individual system, several are for aggregate spawning populations in a region. For example, the escapement goal for Southern Southeast Subregion Pink Salmon includes 366 index streams throughout the islands and mainland of southern southeast Alaska, which are monitored as a unit (Piston and Heinl 2021).

In general, salmon populations throughout the Tongass are quite healthy, though subject to considerable annual and geographical variations. For example, of the 12 Sockeye Salmon stocks with escapement goals, 9 met or exceeded their goals in 2023 (Table 1). The notable exception is Chinook Salmon, which have experienced poor productivity throughout the region in recent years. Chinook Salmon spawn in a limited number of river systems, most of which are large transboundary watersheds. These populations are intensively monitored, and fisheries on Alaska-origin stocks have been severely curtailed as a conservation measure.

Table 1. 2023 Escapement estimates and escapement goals for southeast Alaska Sockeye Salmon stocks (from ADF&G 2024).

Stock	Goal Type[1]	Estimated Escapement or Index	Escapement Goal Range	Comment	Enumeration Method
Hugh Smith Lake	OEG	1,689	8,000–18,000	Below Goal	Weir Count
McDonald Lake	SEG	74,900	55,000–120,000		Expanded Foot Survey
Stikine—mainstem	SEG	TBD	20,000–40,000	In Progress	Run Reconstruction
Stikine—Tahltan	BEG	38,000	18,000–30,000	Above Goal	Weir Count
Speel Lake	SEG	3,556	4,000–9,000	Below Goal	Weir Count
Taku—in-river	SEG	123,000	40,000–75,000	Above Goal	Mark-recapture
Redoubt Lake	OEG	153,406	7,000–25,000	Above Goal	Weir Count
Chilkoot Lake	SEG	67,674	38,000–86,000		Weir Count
Chilkat Lake	BEG	128,002	70,000–150,000		Weir/Sonar Count
Situk River	BEG	127,873	30,000–70,000	Above Goal	Weir Count
Klukshu River	BEG	14,118	7,500–11,000	Above Goal	Weir Count
East Alsek River	BEG	19,300	9,000–24,000	Above Goal	Peak Aerial Survey

[1] Goal types include optimal (OEG), sustainable (SEG), and biological (BEG) escapement goals.

Status and trends in subsistence use of salmon

Subsistence fisheries typically occur at the mouths of streams, or in freshwater. Beach seines and gillnets are usually used in stream mouths, while dipnets are commonly used in freshwater. Sockeye Salmon are by far the preferred species for most harvesters, composing approximately 85% of the fish harvested. Since the number of Sockeye Salmon streams is limited compared to other species of salmon, communities tend to use a limited number of fishing sites that are accessible without extensive travel.

The majority of subsistence fishing is conducted under State regulations, using household subsistence permits. Federal permits may be used in Federal waters, which includes most freshwater in the Tongass. Under the State system, household possession and annual limits are set for individual salmon streams, though a household can fish at multiple streams. State subsistence permits are available to all Alaska residents regardless of residence community. Federal permits generally use the same harvest limits as State permits, but only rural residents are eligible for Federal permits.

Salmon harvest and effort must be reported at the end of the fishing season under the terms of both State and Federal permits. The reported harvest is used to monitor the health of stocks used for subsistence, as a declining harvest could signal problems with a particular stock. Self-reporting of harvest is mandatory under both state and federal regulations. However, harvest is often under unreported and therefore total harvest numbers should be considered a minimum. While the degree of underreporting cannot be determined, one 2001 study reported that, "based on the number of radio-tagged deer and documented and anecdotal accounts of found deer remains, unreported harvest or illegal harvest is estimated to be 100 percent of reported deer harvest in unit 2," (Porter 2001). Failing to report harvest on a state subsistence permit means that a person is not eligible for a subsistence permit for that activity for the following year under state regulations. Failure to report may confound monitoring efforts in areas with substantial unreported harvest, but in general, harvest data is the most useful tool available to monitor the status of individual stocks.

While salmon stocks have generally been healthy, effort and harvest in subsistence salmon fisheries has been slowly declining. The State of Alaska reports the number of state subsistence salmon permits it issues, and the reported catch from those permits. While these data do not represent Federally qualified subsistence users, they still useful for illustrating salmon harvest trends. Using data collected by the State of Alaska, between 1985 and 2004, an average of 3,480 household permits were issued each year. The average number of Sockeye Salmon reported to the State of Alaska harvested during that same time period was 40,233 per year. From 2005 to 2016, the average number of State of Alaska issued subsistence salmon permits fell to 3,146, with a harvest of 35,354 Sockeye Salmon per year (Conrad and Thynes 2024, Figure 5). The reasons for this decline are varied and complex, and include declining populations in rural communities, as well as loss of capacity and equipment to engage in harvesting activities (boats, nets, etc.)

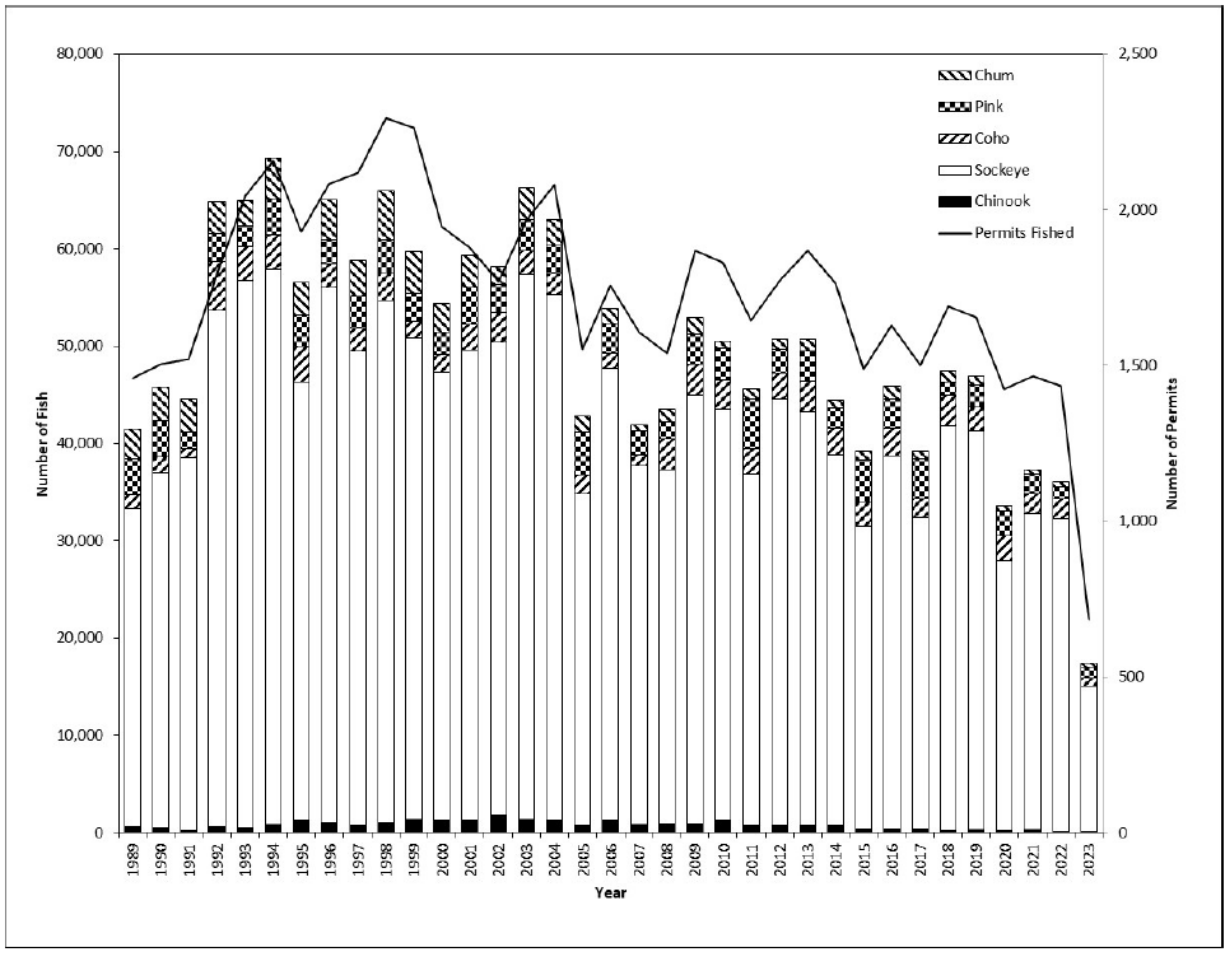

Figure 5. Number of salmon harvested by species and number of permits fished in the Southeast Alaska State subsistence and personal use fisheries, 1989-2023. (from Conrad and Thynes, 2024).

While reported harvest data from household fishing permits is invaluable for fisheries management, it doesn't tell the whole story of subsistence use of salmon. Additional information about harvest, use, and sharing of salmon and other resources has been collected using household surveys conducted by ADF&G and other researchers. Data from these surveys can be used to better assess the role that subsistence use of salmon plays in households and communities. The ADF&G Community Subsistence Information System (CSIS) is the central hub for information collected by the ADF&G Division of Subsistence. Data from the CSIS, as well as from other agencies, can play a crucial role in informing Forest Plan development.

Information gaps in subsistence salmon fisheries

The escapement data currently collected is adequate for fisheries managers to monitor broad trends in salmon populations, as well as the health of some key individual stocks used by subsistence harvesters. However, many subsistence communities depend on a limited portfolio of individual salmon stocks that receive little or no monitoring. Future monitoring efforts should identify and prioritize these unmonitored stocks so that future effort can be focused where it can provide the most-needed information.

Tongass National Forest Management Related to Salmon and Other Anadromous Fish

The existing Tongass National Forest plan provides protections for salmon and other anadromous and resident fish habitat throughout the plan. Anadromous fish have long been a focus for resource protection and restoration, and much of the modern era of existing forest and land management has maintained aquatic and riparian habitat quality.

Until the 1990 Tongass Reform Act (H.R. 987 1990), timber harvest occurred in riparian areas, on alluvial fans, and within beach fringes. Effects of these timber harvest practices included reduced large woody input to streams essential for maintaining riffles and pools, straightening of channels, and changes in substrate size if harvest disturbed soils and increased fine sediment in streams. Timber harvest within 300 feet of anadromous fish streams has generally not occurred on Forest System lands since 1992 (Flitcroft et al. 2022). Legacy effects do remain, however, with harvests in riparian areas having remaining impacts on instream large wood, pool frequency, pool depth, and stream width, though these differences were modest (Flitcroft et al. 2022). Monitoring has shown that riparian and aquatic protections in the current Forest Plan are generally successful at maintaining or improving anadromous and other aquatic habitat (Tongass National Forest 2020-2021 Biennial Monitoring Evaluation Report, Flitcroft et al. 2022).

Roads can affect salmon habitat by reducing or eliminating anadromous fish access to upstream habitat if fish cannot pass through a road-stream crossing such as a culvert. The Tongass National Forest maintains approximately 5,000 miles of forest roads with 3,728 known road/stream crossings with fish present. Of these, approximately 32% crossings are classified as partial or full fish passage barriers on Class I (anadromous) fish streams and Class II (resident) streams. Between 1998 and 2023, the Tongass re-installed, retrofitted, or removed approximately 679 crossings that partially or wholly impeded fish passage. These new road/stream crossings improved access to over 192 miles of upstream fish habitat and ongoing programs of work are planned to remediate remaining high priority barriers to fish passage (Tongass National Forest 2021-2023 Biennial Monitoring Evaluation Report (draft)).

Roads can also increase fine sediment introduction into water bodies if they are located near those streams, occur in high densities in a watershed, or are initiation points for landslides that deposit in a valley floor stream. The Watershed Condition and Water Resources assessment includes more discussion of impacts on roads and timber harvest to water quality and geomorphology.

The Tongass National Forest has been conducting stream restoration projects, including adding large wood to streams that had reduced habitat conditions, and replacing culverts that hinder fish passage for nearly three decades. Recent fish habitat restoration initiatives have occurred in conjunction with adjacent landowners, communities, NGO's and Native Alaskan tribes, and continuing of these collaborative efforts has been a key component of the Southeast Alaska Sustainability Strategy. Community engagement will likely be increasingly important in designing projects that address the entire length of a stream, best responds to local knowledge and increases local workforce capacity to conduct anadromous fish habitat restoration where it is needed most.

While much of the aquatic resource monitoring and habitat restoration has historically focused on past forest and road management activities, large scale mining is a significant economic industry occurring on the Tongass National Forest and has potential for further exploration and expansion.

Mining by-products such as tailing and waste rock storage have the potential to have direct negative effects to water quality in anadromous fish-bearing streams. Mines authorized by the USFS have active biotic and abiotic monitoring programs required by the State of Alaska and the Forest Service. Therefore,

water quality issues and associated impacts to biota are identified and have required mitigation. Monitoring has shown some increases in metal concentrations in sediment and fish downstream of mining activities, relative to areas without known mining, though most monitoring shows compliance with standards (Kanouse and Fritz 2020, Lindgren and King 2023). The Forest Service is increasing its capacity to actively engage with State of Alaska and industry to refine monitoring programs and identify remaining risks to water quality and fish.

Deer

Contribution of use to cultural, social and economic sustainability

Sitka black-tailed deer are food source for humans and predators in southeast Alaska and strongly influence region-wide cultural, social, economic, and ecological systems (Bennetsen 2020). They are considered an ecological keystone species because their effects on the landscape. When they are removed from the ecosystem, vegetation and even soil can change, (Cobb 2014). Their availability also affects populations of predators (wolves, black bear, and brown bear), including humans, who rely on them for food (Schoen and Kirchhoff 2007).

Deer are the most extensively harvested big-game species for both subsistence and sport hunters in Southeast Alaska, and replacing deer meat with store-bought foods during times of harvest difficulty can represent a substantial cost for southeast community households, particularly lower income households (Brinkman et al. 2009). Increasing per capita harvest of deer and demand for deer in southeast communities has been correlated with declining median household incomes and rising poverty rates (Mazza 2003 in Brinkman et al. 2009).

Habitat and Occurrence

Deer rely on structurally complex tree canopies that both intercept snow and provide accessible understory vegetation for forage during heavy snow accumulation. Important landscape characteristics include habitat connectivity, especially for seasonal movements between alpine and low-elevation forests, and areas with sufficient cover and forage for winter survival (Tongass National Forest 2020).

Sitka black-tailed deer are dependent on the availability and accessibility of diverse habitats during different seasons of the year. A diverse, productive mix of habitat types (alpine, old growth, muskeg, riparian, beach fringe, etc.) are essential for populations to be sustained. Certain activities can alter the availability, abundance, and accessibility of needed habitats and therefore must be managed to ensure that proper habitat function for deer exists across landscapes and across seasons. In some areas of the Forest with extensive past even-age timber harvest activities, deep snow winter habitat for deer is currently limited by dense, closed-canopy young growth that is unfavorable for understory plant development and snow interception.

Sitka black-tailed deer spend the winter and early spring at low elevation on steep slopes where there is less snow accumulation, and old-growth forests provide snow-intercept and foraging opportunities. Fawning occurs in late May and early June as vegetation greens-up, providing abundant forage to meet energetic needs of lactating does. Some deer migrate and follow the greening vegetation up to alpine for the summer, while others remain at lower elevations. The breeding season, or rut, occurs from late October through late November, peaking around mid-November (ADF&G 2009). Wolves, bears, and

humans are the primary predators present, and their activities may reduce deer populations or increase the time needed for deer populations to recover after severe winters.

Conditions and Trends of Species and Uses

As shown in Figure 6 below, deer harvests have fluctuated, but with no overall trend, in the past few decades. Game Management Unit 2, which is Prince of Wales Island, is often cited as an area with declining deer populations and harvest. The extensive clearcut logging that has taken place on POW has significantly altered deer habitats, with corresponding impacts on local deer populations, hunting opportunities, and hunting competition (Brinkman et al. 2009, 2011). Harvest numbers rose in the early 2000s and have declined in the past several years.

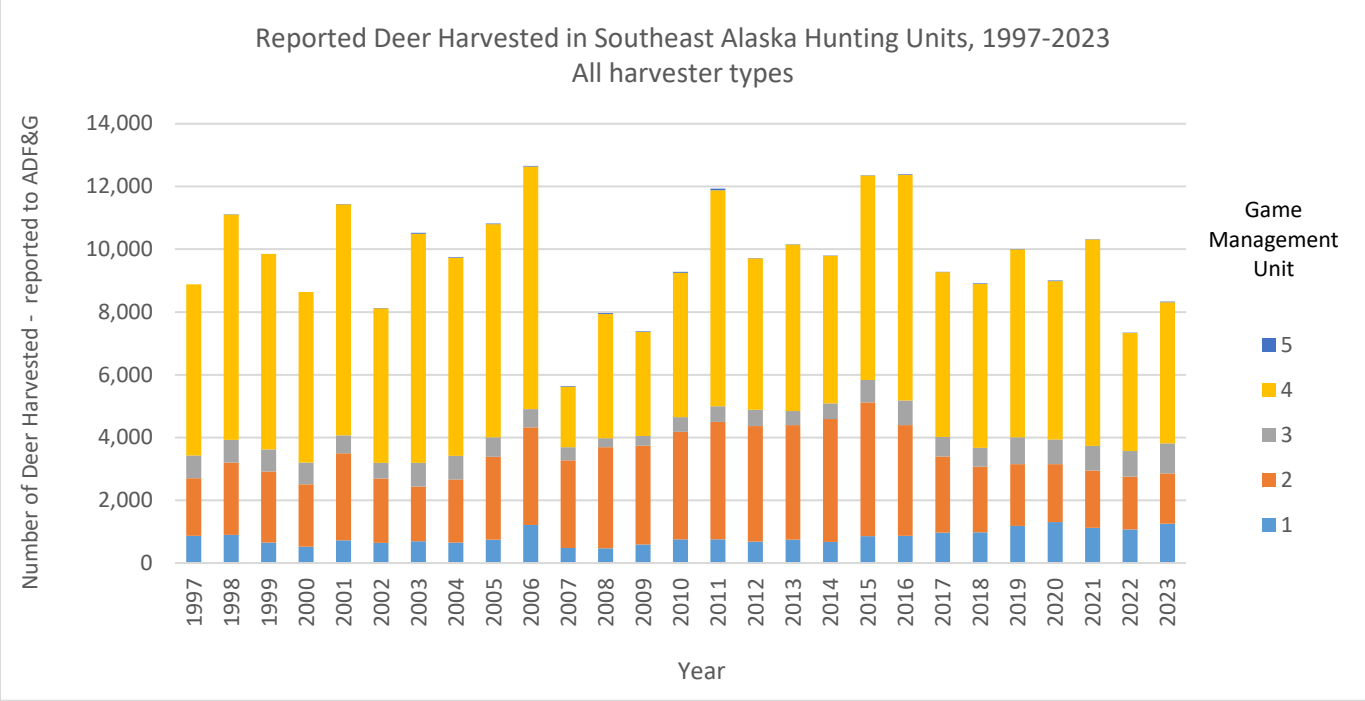

Figure 6. Reported deer harvest in Southeast Alaska Hunting Units, 1997-2023. This includes both subsistence users and other personal use hunters. Data from Alaska Department of Fish and Game 2024.

Observations from Alaska Natives about changing deer harvest due to climate change and other factors were recorded by de Echeverria and Thorton (2019). They state that with the less snow accumulation in many Southeast Alaskan communities, deer migrate higher into the hills and mountains, making them less accessible to hunters. Warming temperatures also affect the quality of meat and the amount of winter body fat gained and can increase disease prevalence. The effect of climate change on deer populations is not well understood. Nevertheless, harvest season regulations can become out of sync with deer abundance; thus, making them unavailable to hunters.

Tongass National Forest Management Related to Deer Habitat

Effects from past timber harvest activities, especially on Prince of Wales Island, is an often-cited factor responsible for reduced deer numbers observed by residents over the past decades. Clear cutting reduces important thermal cover for deer and therefore winter forage, which is believed to be population limiting

in this region and therefore negatively affects deer populations (Bennetsen 2020, Brinkman 2009). Habitat models show a decline in deer habitat in this area, mainly due to timber harvest.

The Tongass National Forest young-growth management strategy includes specific guidelines for stands with a wildlife management objective to minimize impacts to specific representative species, including deer, other land mammals, and bird habitats. Though young-growth forests typically lack several key habitat characteristics present in old growth forests integral to some wildlife species, thinning and other treatments can be done in ways that improve many of these characteristics for old-growth associated wildlife in short and long terms. Short-term benefits may include increased understory vegetation and structural and plant species diversity, while long-term benefits include expedited development of old-growth conditions (Bennetsen 2020). In general, thinning stands that had previous even-aged harvest have been found to improve habitat and abundance of most wildlife species.

Local conditions and culture can affect the type of timber management that could be most beneficial or minimize impacts to subsistence uses. In other words, timber management actions to improve wildlife habitat will be different in different places, based on species and local conditions. In Petersburg, for example, small shelter cuts (removing most trees but retaining some shade and seed source trees, leaving a relatively even age stand), are used to improve moose habitat, which is the main big game in that area. But on Prince of Wales, where deer are the key big game species, small shelter cuts are not helpful for improving big game habitat.

Regulatory actions under Title VIII of ANILCA are also used as a management tool on the Tongass, although wildlife is also managed by the state through state hunting regulations that apply to non-subsistence users. As an example of management under Title VIII, the Federal Subsistence Board has taken numerous actions in Game Management Unit (GMU 2) to continue the subsistence uses of deer or for conservation purposes. These actions have ranged from closures to non-Federally qualified users at the beginning of the season, adding extra time at the end of the season to allow Federally qualified subsistence users an additional opportunity to harvest deer, and limiting the number of deer harvested by non-Federally qualified users. As another example, the Board enacted closures on other parts of the forest after severe winters to allow for deer populations to recover, most notably in the Central Tongass after the severe winters of 2007-2009.

Wolf predation is an issue brought up by some deer hunters as a major driver of reduced numbers, especially on Prince of Wales Island. The Alexander Archipelago wolf is a generalist but predominantly preys on deer. This wolf subspecies is a species of concern, though it was found not to be warranted for Federal listing in 2023. Managing wolf populations is often one of the considerations for deer management and vice versa. Wildlife management activities on Federal public lands other than the subsistence take and use of fish and wildlife, such as predator control and habitat management, are the responsibility of and remain within the authority of the individual land management agencies. Federal Subsistence Program regulations have not been interpreted as extending to predator management.

Gathering

Plants are a vital part of a traditional subsistence way of life, relating to food security, food sovereignty, relationship building, and culture. “Haa At<u>x</u>aayu Haa <u>K</u>usteeyi<u>x</u> Sitee” means ‘Our Food is Our Way of Life’ in Tlingit and speaks to the strong ties between plants and the Tlingit people. As the Forest Plan revision continues, the Forest Service will need to continue to work closely with Southeast Alaska Tribes

to ensure the new plan addresses the importance of plants integral to the traditional subsistence ways of life, such as those used for traditional foods, medicines, and rituals.

The Tongass National Forest is recognized for being a biologically rich area with diverse ecosystem types. Within the various habitats found on the forest, opportunities for gathering a variety of fruits, bark, roots, mushrooms, and plants exists. The Forest manages the commercial use of plants as special forest products via a permitting process. Most personal use of special forest products is not tracked. However, permits for research, educational, or demonstration purposes are typically entered into the permit system. Tongass management does not track the amount of use or species used for personal use.

Special forest products are defined as products derived from biological resources that are used for personal, educational, commercial, and scientific use. Special forest product resources include but are not limited to mushrooms, boughs, Christmas trees, bark, roots, ferns, moss, burls, berries, cones, conks, herbs, and wildflowers; excluding saw-timber, pulpwood, cull logs, small round-wood, house logs, utility poles, minerals, animals, animal parts, rocks, water, and soil (USFS 2006). Special forest products that are used for personal needs (not sold commercially) may include artwork, crafts, dyes, floral arrangements, syrups, teas, flavorings, seed collection, edible and medicinal fungi, and edible and medicinal plants, scientific research, and educational examples. Special forest products and non-timber forest products (NTFPs), an internationally recognized acronym, can be used interchangeably; however, SFP will be used in this document. Those plants gathered for commercial sales under a special forest product permit can be sold at a variety of markets, including but not limited to local, portable retail, local wholesale, tourism and recreational, commodity, and internet markets (USFS 2006). While permittees may generally not sell or exchange special forest products material harvested or gathered under free use, customary trade and barter, as defined in section 803 of ANILCA, is permitted for rural residents of Alaska. Forest Service Handbook 2409.18, Chapter 80, §§ 82.3, 87.51.

Special forest product permits typically have limitations on harvest areas, particularly those near recreational areas or roadways, to ensure that personal use of berries is not impacted by commercial uses. On the Sitka Ranger District, the Sitka Tribe of Alaska's (STA) Kayaaní Commission has been working to prepare a special forest products guidance; this guidance is intended to be used on the Sitka Ranger District, and includes guidance on appropriate manners of gathering various species, portions of the species used, and areas that should be excluded from commercial harvest.

Berries

Contribution of use to enjoyment, social and economic sustainability, and culture

Berries are recognized to be an important source of traditional food for local Tribes, being one of the main sources of sugar for the Tlingit before contact with Euro-Americans (USFS 2006). Many community members also partake in gathering berries to eat or preserve, making jams, jellies, syrups, and other food items. Berries gathered within the boundary of the Forest may be used for commercial sales. Wild berry products may be a significant source of income to many people, and according to interviews conducted by the Pacific Northwest Research Station, the majority of gatherers are women (2006).

Habitat and Occurrence

Berry species that are gathered can be separated by habitat types – those found in forested areas, open meadows and beaches, and muskegs.

Forest Berries

Forest species include but are not limited to blueberries (*Vaccinium ovalifolium, V. alaskaense*), red huckleberry (*Vaccinium parviflorum*), salmonberry (*Rubus spectabilis*), thimbleberry (*Rubus parvifolius*), salal (*Gaultheria shallon*), and currant and gooseberry species (*Ribes*).

Wetland Berries

Species in this habitat type include strawberry (*Fragaria chiloensis*), nagoonberry (*Rubus arcticus*), bog blueberry (*Vaccinium uliginosum*), dwarf blueberry (*Vaccinium caespitosum*), crowberry (*Empetrum nigrum*), cloudberry (*Rubus chamaemorus*), lowbush cranberry (*Vaccinium oxycoccos),* and lingonberry (*Vaccinium vitis-idaea)*.

Conditions and trends of species and associated uses

Of the commonly requested species for special forest product permits, none are considered at-risk based on Global and State rankings (NatureServe 2024). All are either considered secure with a very low risk of extinction or collapse, or have no ranking.

Since 2000, the Forest has administered eight commercial use special forest product permits for berries (NRM TIM 2024). Species that are commonly requested for commercial non-forest products include: blueberry, red huckleberry, bog cranberry, and salmonberry. Access has not been a barrier to gathering berries on the Forest; however, any future road closures could cause barriers to accessing gathering locations.

Stressors

Forest Ecosystems

Climate change may impact berry species found in forested ecosystems, with warmer and drier conditions at lower elevations and latitudes impacting the overall growth of plants. Climate change may also alter the distribution of vegetative species. For more information how climate change may impact vegetation growth in forested ecosystems, see the Terrestrial Ecosystems Assessment.

Wetlands

Climate change is the main stressor to this ecosystem; specifically, warming temperatures and changes to precipitation patterns may lead to changes in overall vegetation species composition (USFS, Draft). Climate change may also have varying impacts to different species in wetlands. For example, under climate change scenarios, cloudberry may benefit from increased temperatures as it may delay leaf senescence, thus allowing for more photosynthetic resources to be stored in plant roots to be used in the following year; an increase in precipitation in the form of snow to coastal regions may make more areas suitable for growth; and an increase in winter wind may decrease snowpack protections resulting in reduced berry production (Alaska Berry Futures).

Mushrooms

Contribution to enjoyment, social and economic sustainability, and culture

Mushrooms are popular wild edible foods, and some mushrooms may be used in dyeing fiber for art and creating artwork. Species gathered include, but are not limited to, chanterelles (*Cantharellus* species, *Cratellus* species), hedgehogs (*Hydnum* species), reishi and artist's conk (*Ganoderma* species), chicken of the woods (*Laetiporus conifericola*), boletes (*Boletus* species), polypores (*Fomitopsis* and *Phaeolus* species), and morels (*Morchella* species). Mushrooms may be commercially harvested under a non-timber forest products permit; personal use of mushrooms is not tracked by the Forest.

Habitat and Occurrence

A majority of the mushrooms that are gathered for food, medicinal, cultural, or artistic uses are found growing in forested ecosystems. Species distribution varies across mature forests and recently disturbed forests, with some species only occurring in disturbed areas, where others prefer intact habitats.

Conditions, species trends, and uses

Of the commonly gathered species, none are considered at-risk.

Since 2000, the Forest has administered ten commercial special forest product permits and three personal use special forest product permits with the majority of commercial permits being administered in the last ten years. Trends in administered permits show a gradual/slight increase in the number being requested (TIM 2024). In recent years, there has been a general increase in interest around the use of mushrooms as a food source, for medicinal uses in teas and tinctures, and for commercial consumption in restaurants and food production.

Reduction in vegetation management may present a challenge to gathering certain edible mushrooms that prefer disturbed sites. Changes in climate may impact the availability of mushrooms, as mushrooms yields are highly variable depending on precipitation amounts and timing of precipitation (USDA Climate Hub 2024).

Other Wild Plants

Contributions to enjoyment, economic sustainability, and culture

Several plant species found growing within the boundaries of the Forest are culturally important as traditional foods and medicinal resources. As mentioned above, wild plants are also used commercially and may be requested for special forest products (SFP) permits.

Devil's club *(Oplopanax horridus*), the only member of the ginseng family growing in Alaska, has been considered a "cure-all" and has numerous applications. "It was generally used for arthritis, colds/flu, constipation, cuts/scrapes, infections/inflammation, measles, menstrual problems, pneumonia, stomach trouble, tuberculosis, and venereal disease. ... Devil's club is also an important spiritual plant, used to treat spiritual disease and stress, as administered by a shaman" (Areas of Tribal Importance Assessment, DRAFT). The early leaves of devil's club are also an early spring food source.

In addition to devil's club, there are a number of other plant species that may be used as medicine, food , or in cultural ceremonies. The Forest Service will need to continue to work with local Tribes to identify those plant species and manage them for sustainability.

Habitat and Occurrence

Devil's club occurs in riparian habitats, most often in the forest understory.

Other plant species may occur across a variety of habitats, including beaches and meadows, forested habitats, wetlands, and subalpine and alpine environments.

Conditions, species trends, and uses

Devil's club is considered globally secure with a very low risk of extinction or collapse due to a very extensive range, abundant populations or occurrences, and little to no concern from declines or threats, and is not ranked by the state (NatureServe 2024). Climate change may impact species found in forested ecosystems, with warmer and drier conditions at lower elevations and latitudes leading to changes in environmental factors that impact overall growth of plants. Climate change may also alter the distribution of species. For more information how climate change may impact vegetation growth in forested ecosystems, see the Terrestrial Ecosystems and the Drivers, Stressors, and Climate Change assessment sections.

Since 2000, the Forest has administered 16 commercial permits for foliage, other plant parts, and non-conventional special forest products (NRM TIM 2024), with five of those permits being for Devil's club. All five SFP permits for devil's club were purchased by the same user in 2017, 2018, 2019, 2020, and 2023 on the Hoonah Ranger District, and the process to administer the permit involved local Tribal notification. In addition to the 16 commercial SFP, four personal use SFP permits have been administered since 2000. Commercial SFP permits have increased in frequency since 2000, as well as amounts of plant material requested (NRM TIM 2024).

Seaweed

Seaweeds are macroalgae and are found in the nearshore subtidal and intertidal areas along varied coastlines. They are not considered true plants as they lack structures such as roots, stems, and leaves that provide nutrients and water in true plants. Seaweeds instead have holdfasts that attach the algae to substrates, like rocks; a stipe that produce food and extend the algae towards the surface; and fronds, bladelets, or sporophylls that primarily produce food and reproductive tissue; and may sometimes have bulbs or gas-filled sacs that keep the algae floating in the water column or on the surface.

Contribution to enjoyment, and economic sustainability

Seaweeds are important to nearshore ecosystems as refuge for many invertebrates and fishes and contribute important organics to ecosystems. Seaweed is also an important traditional food due to its high nutritional value, containing large amounts of Vitamins A and C, calcium, and iron (USFS 2005). Primary species harvested include black seaweed (*Porphyra* species), ribbon seaweed (*Palmaria),* bull kelp (*Nereocystis luetkeana*), and giant kelp (*Macrocystis pyrifera*).

Seaweed has been a source of food and materials for centuries, and most recently seaweed farming has gained popularity. Seaweed farming has possibilities for commercialization, food security, and climate change mitigation (USDA 2024). In addition to being a food source, seaweeds absorb more greenhouse gases from the water than eelgrass, mangroves, and salt marsh plants and, thus, can help combat local impacts of ocean acidification. As well as absorbing greenhouse gases from the water, seaweeds absorb nitrogen and phosphorus, which in large quantities lead to harmful algal blooms (NOAA 2024).

Alaska has over five hundred species of seaweed. Some kelp species gathered, harvested in the wild, or farmed, include sugar kelp (*Saccarina latissima*), bull kelp*,* and ribbon kelp *(Alaria marginata).* While the marine environment is not managed by the US Forest Service (USFS), management direction and activities conducted on USFS land impact the health and availability of resources present in coastal and marine environments.

Habitat and Occurrence

Bull kelp: This annual species grows on rocks from the low intertidal to subtidal zone and prefers semi-exposed habitats or high current areas. Offshores bull kelp beds can persist for many years.

Giant kelp: This perennial species forms beds in the extreme low intertidal to subtidal areas of semi-exposed habitats.

Ribbon kelp: This annual species is found on rocks in the mid to low intertidal zone from semi-protected to exposed currents. This species needs sufficient current to grow.

Sugar kelp: This perennial species attaches to rocks in the low intertidal to subtidal zone and prefers protected to semi-protected habitats.

Black seaweeds: Black seaweeds are annual species found in the mid- to low intertidal zones in areas with high wave action.

Ribbon seaweeds: Ribbon seaweeds grow in the lower intertidal zones from sheltered bays to exposed rocks.

Conditions, trends, and uses

Seaweeds do not have conservation rankings like plant or animal species. The International Union for Conservation of Nature (IUCN) has developed a Seaweed Specialist Group that aims to work on conservation assessments for all 112 kelp species, but as of 2023 that work had not been initiated yet.

The ADF&G Division of Commercial Fisheries oversees both wild kelp harvesting and kelp farming. In 2020, ADFG considered kelp farming to be in its infancy with four farms in operation. As of 2024, there are 69 producers permitted by the state for kelp production (ADFG). In the past six years, the amount of aquatic algae biomass harvested from aquatic farming has increased from 19,590 pounds in 2017 to 383,693 pounds in 2023.

Drivers and Stressors

A 2023 comparison study found that areas with longer observations of otter occupation had greater increases in kelp extent. The study findings suggest that as otters continue to expand their range in Southeast Alaska, kelp ecosystems are also likely to expand, barring other climatic or trophic disturbances (Hollarsmith 2023).

Although seaweeds are known to be vulnerable to physical and chemical changes in the marine environment, the impacts of climate change in seaweed-dominated ecosystems remains unclear (Harley et al., 2012). While the impacts remain uncertain, a 2023 study found that climate change may lead to a change is species distribution for seaweed, with giant kelp expanding as it is a thermally tolerant species (Hollarsmith et al., 2023).

Ocean acidification, a direct result of increased carbon dioxide levels, poses a threat to kelp forests in Alaska; the overall change in ocean chemistry impacting the overall system. Acidification may harm the reproductive stages of kelp, and affect the abundance and diversity of species, such as crustaceans and mollusks, that form the foundation of the kelp forest ecosystem. The struggle of crustaceans and mollusks

can lead to reduced biodiversity and altered food webs, in turn putting the health and stability of kelp forests at risk (NOAA, 2020).

Conifers (Cultural Trees)

Nine conifer species grow on the Forest, with Alaska yellow cedar (*Callitropsis nootkatensis),* western red cedar (*Thuja plicata),* western hemlock (*Tsuga heterophylla*), mountain hemlock (*Tsuga mertensiana*), Sitka spruce (*Picea sitchensis*), and shorepine (*Picea contorta*) being the most common species. Other less common species include subalpine fir (*Abies lasiocarpa*), Pacific silver fir (*Abies amabilis*), and Pacific yew (*Taxus brevifolius*). Most of the conifer species are used in traditional and cultural practices, including the production of tools, bentwood boxes, baskets, rope, hats, fishing line, housing, and canoes; these conifers were also used in traditional medicine and in subsistence (see *The Tongass as an Indigenous Place Assesssment*). Of special importance for cultural use are Alaska yellow cedar and western red cedar, as these trees are vital to the traditional way of life.

Contribution of use to enjoyment, social, and economic sustainability

Cedar

"Cedar can be seen as especially important for cultural uses, and are intertwined with the traditional way of life, sustaining both the material, medicinal, and spiritual needs of Alaska Native communities on the Tongass," (*The Tongass as an Indigenous Place* Assessment). Alaska yellow cedar and western red cedar are revered for their multitude of uses, durability, and spiritual significance.

Western red cedar's straight grain and resistance to rot is preferred for canoes, poles, and other structures as it can withstand the harsh maritime climate. Alaska yellow cedar has many similarities to western red cedar but differs in its durability and is typically smaller in size. Monument trees, or trees that are suitable to be used for totems or canoes, are rare on the landscape due to the desired characteristics, including having long, clear trunks and being free of rot, knots, branches, or other defects.

The commercial harvest of cedar also provides a source of employment and labor income across Southeast Alaska. (Timber Suitability Assessment). Commercial products made from red cedar include roofing, siding, and decking material, while Alaska yellow cedar may be used for boats, utility poles, flooring, framing, marine decking and more (Tongass FEIS 2016).

Sitka Spruce

Sitka spruce, while a major component of timber harvest, is also recognized for its use in traditional tool making, and medicinal properties. Sitka spruce wood is valued for its high strength to weight radio and is used in making commercial products such as dimensional lumber, piano sound boards, guitar faces, oars, planking, and specialty items for custom-made or traditional boats (Griffith, 1992).

Pacific Yew

Pacific yew is not typically part of large-scale timber harvest but is principally used for the production of non-timber forest products. Pacific yew is recognized for its fine-grained wood and material strength and was traditionally used to make bows and other tools. The sapwood of yew is light yellow and thin, while the heartwood is a bright orange or rose red and can be used to make tool handles, and canoe paddles among other uses, but has little commercial importance. (Tirmenstein 1990). Pacific yew is also recognized for its medicinal properties. The bark of Pacific yew contains the chemical compound taxol, which has been found to inhibit the growth of various types of cancer cells and is used in chemotherapy for breast, ovarian, lung, and other cancers (Tirmenstein 1990). This chemical is now partially synthesized in a laboratory setting using yew cell cultures to produce taxol (Becker 1999).

Habitat and occurrence

Alaska Yellow Cedar

In southeast Alaska, yellow cedar is widely distributed throughout the region, typically growing at higher elevations in the southern half of the Forest and at lower elevations in the northern half (Halofsky et al., DRAFT). In mixed forests yellow cedar can be found growing in soils with better drainage. Yellow cedar is abundant on wet, poorly drained sites near bogs and peatlands.

Western Red Cedar

Western red cedar grows from sea level to 3,000 feet ranging from the southern tip of Southeast Alaska to its northern range limit near Petersburg, Alaska. It commonly occurs as a dominant or co-dominant tree on low-elevation moist sites. Western red cedar grows in the full rain of soil drainage classes, although they typically occur in soils that are somewhat poorly to well drained. Poorer drainage allows red cedar to compete with other conifers (DeMeo 1992).

Sitka Spruce

Sitka spruce occurs from southeast Alaska north to the head of the Lynn Canal at Skagway, Glacier Bay, and Yakutat Bay, and west to the Kenai Peninsula. Sitka spruce grows from sea level to about 3,000 feet in the coastal mountains, primarily growing below 1,500 feet. Sitka spruce is typically found in areas with soil disturbance, such as in riparian zones where streams and rivers deposit nutrient rich soil in flood events, beach zones, or areas with moderate to well drained soil ((DeMeo 1992).

Pacific Yew

Pacific yew grows in a variety of cool and moist shaded habitats in coastal lowlands and mountains. It is at its northern limit of its range in southeast Alaska; only occurring on the southern end of Prince of Wales and near Ketchikan on Revillagigedo Island and the Misty Fjords National Monument Wilderness. In southeast Alaska, yews are typically found within 500 feet of saltwater. Yews are often found growing in the understory of open mixed conifer and hemlock – red cedar forests, on poorly drained soils. It often occurs in canyon bottoms, on moist forested flats near streams, and scattered at various upland sites (Tirmenstein 1990).

In 1976, a 705-acre Research Natural Area was established to represent a small island ecosystem containing the norther limit of Pacific yew.

Conditions and trends of species and associated use

Alaska Yellow Cedar

Alaska yellow cedar is considered globally secure and in the state of Alaska (NatureServe 2024). Past old-growth harvest of Alaska yellow cedar has reduced the availability of monument trees. In a recent ten year period, Alaska yellow cedar made up 2379.6 MBF of volume in 2013 timber sales to 115.4 MBF in 2023 (Forest Management Reports and Accomplishments 2024). Trees that regenerate in young growth stands lack the size, grain, and other desired characteristics that make them suitable for totem poles and canoes. In addition to commercial harvest, Alaska yellow cedar may be requested for free use, personal use, firewood, and special forest products permits.

In addition to industrial logging practices, climate change may affect the presence of the species on the Tongass. As temperatures warm, and snowpack decreases as winter precipitation shifts from snow rain, Alaska yellow cedars' thin, shallow root structure is more vulnerable to the freeze-thaw cycles; this leads to an increase in yellow cedar die-off, known as yellow-cedar decline. Spring freezing injury is triggered by the freezing of shallow roots due to the lack of insulating snow. Under current climate change projections, the elevational range of Alaska yellow cedar is predicted to expand into higher elevations.

Projected increases in growing season temperatures and annual precipitation may alter the performance of existing populations.

Western Red Cedar

Western redcedar is considered secure globally and apparently secure in Alaska (NatureServe, 2024). Similarly to Alaska yellow cedar, past industrial old-growth harvest has reduced the availability of monument trees on the landscape. Western redcedar made up 2,474.6 MBF of volume in 2013, to 688.5 MBF of volume in 2023 (Forest Management Reports and Accomplishments, 2024). In addition to commercial harvest, western redcedar may be requested for free use, personal use, firewood, and special forest products permits

Climate change may alter the latitudinal range of western redcedar, with models predicting a substantial expansion of suitable habitat for western redcedar in coastal Alaska areas. Like Alaska yellow cedar, projected increases in growing season temperatures and annual precipitation may alter the performance of existing populations.

Sitka Spruce

Sitka spruce is considered globally secure and has no conservation ranking in the state of Alaska (NatureServe 2024). Climate change models predict a decrease in the diameter, growth, and recruitment, and an increase in mortality of Sitka spruce (Ma 2019).

Pacific Yew

Pacific yew is considered globally secure, and vulnerable in the state of Alaska (NatureServe 2024). Studies addressing impacts of climate change on Pacific yew in Alaska are not available. However, climate change may impact Pacific yew in Alaska as winter precipitation shifts from snow to rain (Drivers, Stressors, and Climate Change Assessment) because yew is mildly tolerant of frost, but a layer of snow is needed to protect the tree's roots from freezing. Climate change may also alter the range of Pacific yew. For more information on how climate change may impact vegetation growth in forested ecosystems, see the Terrestrial Ecosystems and the Drivers, Stressors, and Climate Change assessment sections.

Other Species and types of Uses

The wildlife, fish, and plant species mentioned above only include those that have the largest reported uses, and for which Tongass management is emphasized. There are many other species that are harvested or otherwise used by the public, including many types of marine mammals, fish, shellfish, birds, and plants. Bears are one species associated with Alaska and the Tongass, which were not discussed here. Bears are hunted, though they are not identified as a species that is harvested heavily. Bear viewing and other wildlife viewing is discussed in the Recreation and Tourism assessment, as a recreational activity.

Uncertainties and data gaps

Subsistence users have always, and will continue to, move around to gather wild resources based on environmental factors, patterns of animal movement, social and economic considerations, and other factors. These changes may necessitate adaptive management to ensure subsistence resources continue to be available to Federally qualified subsistence users, as well as for other non-commercial uses, because Federally qualified subsistence users also participate in these harvests to help meet their subsistence needs.

It is difficult to make one conclusion about impacts to subsistence ways of life and subsistence harvest or management approaches. Regions contain different resources. Individuals and communities have different cultural practices and different needs related to their subsistence way of life. Differences are nuanced and not always apparent to managers. Therefore, the Tongass National Forest Land Management Plan needs to include flexible direction to sustain subsistence resources and the subsistence way of life as mandated in Title VIII of ANILCA. Management of lands also need to focus on sustainable habitat and resource abundance to meet the needs of Federally qualified subsistence users, increase or maintain productive harvest areas to reduce competition among user groups, and maintain or increase access for subsistence harvesters.

Executive Summary—Key Takeaways

- Subsistence harvest of animals and plants for customary and traditional purposes is of critical importance to rural Alaska residents in Southeast Alaska.
- Some of the most common subsistence harvested wild resources are salmon, other fish, deer, and berries. However, hundreds of species are hunted, fished or gathered, and cedar trees and medicinal plants have special cultural importance for Alaska Natives.
- There is not one subsistence way of life. In Title VIII, Congress recognized the importance of the continuation of the opportunity for subsistence uses by rural residents of Alaska, including both Natives and non-Natives. Subsistence cultural practices and traditions vary by family, community, and tribal affiliation. Subsistence harvest of wild resources is important to many and provides critical food and calories, reduces the need for store bought food and associated costs, connects people to the land and nature, and provides resources used for clothing, homes, transportation, medicine, and art.
- Maintaining the subsistence way of life is important to the physical, economic, traditional, and social existence of rural Alaska residents (Section 801). Without it, language, culture, and traditions may disappear.
- Rural residents who use wild resources are a valuable source of information about local customs and changing conditions. The Federal Subsistence Program has a long history of relying on traditional ecological knowledge. Considering or incorporating traditional ecological knowledge can be an important component for making resource management decisions.
- Rural communities have traditional use areas for different resources. Changes to human population, tourism industry, outdoor recreation, changing technology, timber harvest, and environmental factors may affect their use.
- The Tongass National Forest is managed for multiple uses. Under section 804, subsistence uses by rural Alaska residents have priority over all other consumptive uses. However, some competing uses occur outside federal jurisdiction and their effects cannot be managed through the forest plan (e.g., commercial, guided use, and tourism off the national forest).
- The management of the Tongass National Forest can affect subsistence harvest and harvested resources in a variety of ways, including:
    - Maintaining or improving ecosystem and subsistence habitats for fish, wildlife, and plants.

- Providing access to subsistence use areas and traditional and cultural activities through permitting and maintenance of roads, water access facilities, cabins and camps.
- Permitting or restricting other activities that may affect subsistence resources, such as infrastructure development, recreational activities, outfitters and guides, and tourism.
- Working with the Southeast Alaska Subsistence Regional Advisory Council and Federal Subsistence Board to implement the federal subsistence priority and making appropriate in-season management decisions in times of resource scarcity or abundance.

- Ecosystem protection is critical for sustaining subsistence and other harvest. However, ecosystem protection alone is not sufficient to ensure sustainability of some subsistence resources since sustainability also depends on social, economic, and access issues.
- Impediments to subsistence and other harvest include lack of access, or difficult access to subsistence resources; changes in resource availability due to climate change; vegetation management that disrupts habitat or hunting; competition with recreational or commercial uses; effects from the tourism industry, including pollution; and disruption of hunting and gathering activities from increased use of the forest.
- The existing plan requires consideration of subsistence uses in project planning, sustaining subsistence resources and the subsistence way of life.
- The existing Tongass Forest Plan does not provide clear direction regarding subsistence uses by local communities or specific areas important for harvest.
- Wild fish, wildlife, and plant resources are managed by multiple agencies with sometimes overlapping jurisdiction.
- Complicated regulations and overlapping jurisdictions can make navigating the regulatory process for subsistence harvest of resources difficult and confusing for the public to understand.

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