Wildlife Terrestrial Habitat

Goal: Maintain the abundance and distribution of habitats, especially old-growth forests, to sustain viable populations. Also maintain habitat capability sufficient to produce wildlife populations that support the use of wildlife resources for sport, subsistence, and recreational activities.

Objectives: In addition to objectives included in the Biodiversity Ecosystem section, include a young-growth management program to maintain, prolong, and/or improve understory forage production and to increase future old-growth characteristics in young-growth timber stands for wildlife.

Background: The National Forest Management Act requires that the Forest Service provide for the diversity of plants and animals, based upon the suitability and capability of each National Forest, as a part of meeting overall multiple use objectives (16 USC 1604(g)(3)(B)). This direction requires that fish and wildlife habitat be managed to maintain viable populations of existing native and desired non-native vertebrate species. In order to insure that viable populations will be maintained, habitat must be provided to support, at least, a minimum number of reproductive individuals and that habitat must be well distributed so that those individuals can interact with others (36 CFR 219.3).

MacDonald and Cook (2007) documented that 82 species of mammals and 8 amphibians are known to occur, or have recently occurred, in Southeast Alaska. Over 80 percent of this area is under federal stewardship in the Tongass National Forest (MacDonald and Cook 2007, p. 7). There are an additional 18 species of marine mammals found in Southeast Alaska waters that depend entirely on the ocean environment, and 45 bird species considered casual or accidental visitors to Southeast Alaska. The diversity of wildlife on the Forest provides many opportunities for consumptive and non-consumptive uses including commercial, general, and subsistence hunting; and photographic and viewing actives (USDA 2008c, p. 3-219).

Figure 1. Bald Eagle on Prince of Wales Island, AK (photo A. Gallo)

Wildlife Question 1: Are populations and habitat trends for Management Indicator Species (MIS) consistent with expectations? Are these trends tied to changes in habitat conditions or other factors? If they are tied to habitat conditions, is there a direct relationship with forest management, climate change or other factors? Terrestrial MIS include red squirrel, black bear, brown bear, marten, river otter, Sitka black-tailed deer, mountain goat, gray wolf, Vancouver Canada goose, bald eagle, red-breasted sapsucker, Hairy woodpecker, and brown creeper.

The 1982 regulations to implement the National Forest Management Act require that Management Indicator Species (MIS) be identified as part of each forest plan. MIS serve multiple functions in forest planning: 1) MIS establish explicit Forest Plan objectives for fish and wildlife habitat, 2) MIS facilitate analysis of Forest Plan alternatives, and 3) MIS provide a means to monitor the effect of forest plan implementation. Much of the direction for MIS is outlined in CFR 219.19, together with direction for ecosystem diversity and species diversity. As such, MIS represents one part of a broader fabric of biodiversity and species management.

The 13 MIS species identified for the Tongass National Forest are primarily associated with the spruce and hemlock forests of Southeast Alaska that represent 98 percent of the productive old-growth (POG) forests of the Tongass. POG habitat provides essentially all of the highly important habitats and the preponderances of the moderately important habitat for most of the MIS. However, some species use a variety of different habitat but rely on prey species associated with old-growth (e.g. wolves and their prey the Sitka black-tailed deer).

Evaluation Criteria

Determine whether habitat changes and population trends for MIS are consistent with expectations. Important habitats and data sources for each MIS are in Table 1 below.

Table 1. A summary of important habitat as described by the size density (SD) model and population data sources for Tongass management indicator species (MIS).

MIS	Important Habitats	Population Data Sources
Alexander Archipelago Wolf (*Canis lupus ligoni*)	POG - provides habitat for prey	ADFG sealing records, research, reports, and trapper questionnaire.
American Marten (*Martes americana*)	High value POG - intercepts snow, provides cover and habitat for prey.	ADFG sealing records, reports, research and trapper questionnaire.
Bald Eagle (*Haliaeetus leucocephalus*)	High value POG near shorelines - provides nesting and perching habitat	BBS and CBC
Black Bear (*Ursus americanus*)	POG and salmon streams.	ADFG sealing records, reports, and research.
Brown Bear (*Ursus arctos*)	POG and salmon streams.	ADFG sealing records, reports, research and hunter survey.
Brown Creeper (*Certhia americana)*	Large tree POG (SD67)	ALMS, BBS, and CBC
Hairy Woodpecker (*Picoides villosus*)	POG with snags and dying trees	ALMS, BBS, and CBC
Mountain Goat (*Oreamnos americanus*)	POG - intercepts snow and provides cover	ADFG hunter survey and reports
Red-breasted Sapsucker (*Sphyrapicus ruber*)	Low volume POG (SD4) and snags	ALMS, BBS, and CBC
Red Squirrel (*Tamiasciurus hudsonicus)*	POG - Cone producing trees	Observations at ALMS stations
River Otter (*Lutra canadensis*)	POG - adjacent to shoreline/streams	ADFG sealing records and trapper questionnaire
Sitka Black-tailed Deer (*Odocoileus hemionus sitkensis*)	POG - low elevation, intercepts snow, provides cover	ADFG/TNF deer pellet count transects, subsistence harvest reports, and ADFG hunter surveys.
Vancouver Canada Goose (*Branta canadensis*)	Wetlands and forested wetlands	BBS and CBC

Abbreviations:

ADFG = Alaska Department of Fish and Game

ALMS = Alaska landbird monitoring system

BBS = Breeding bird survey

CBC = Christmas bird count

POG = Productive old-growth

POW = Prince of Wales Island

SD = Size Density Model Codes

TNF = Tongass National Forest

Figure 2. Brown Bear, *Ursos arctos*

Management and Harvest Reports –These are the Alaska Department of Fish and Game's (ADFG) annual reports of the trends in hunted and trapped wildlife species in Alaska. ADFG biologists make estimates of population trends based on a combination of factors including conversations with trappers, hunters, pilots, and other biologists; anecdotal reports, incidental observations by ADFG staff, harvest data, hunter and trappers questionnaires, sealing information, and suspected prey availability. Quantitative methods are used for deer and in some cases brown bear and wolves.

ADFG Sealing Records - The Convention on International Trade in Endangered Species (CITES) program in Alaska, requires that certain furbearers (e.g. wolves, marten, river otter, black bear, and brown bear), taken by any means and for any purpose, be sealed by an authorized representative. The exception is brown bears that are taken under a subsistence permit and taken in, and not removed from, a subsistence area do not need to be sealed. Sealing involves tagging the hide with an identification number issued by the U.S. Fish and Wildlife Service (USFWS). This allows the USFWS to track the international trade of CITES species and ensure that they were taken within state specified management regulations.

For each sealed animal, the ADFG collects information about the take such as the location where the animal was killed and the amount of time they spent hunting/trapping the animal. If one assumes that fewer days are required to harvest an animal when hunting/trapping a more dense population then days/animal may be an index of the population. This assumption becomes invalid if hunters do not take the first animal they have opportunity to. In addition, the lack of data from unsuccessful hunts/trapping seasons may limit the utility of these data.

Hunter/Trapper Questionnaires - ADFG also administers statewide hunter and trapper questionnaires and publishes these data annually. Hunters and trappers are asked whether they believe the species population has remained the same, increased, or decreased compared to the year before. Brown bear hunters provide more detailed information on their hunt including the number of days they hunted and whether they were successful or not. This provides more accurate data on hunter effort compared to the sealing data. Although, one must still assume that hunters take the first available animal.

Figure 3. Brown Creeper, *Certhia Americana* (photo Gwen Baluss)

Bird Surveys - The Alaska Landbird Monitoring Survey (ALMS), Breeding Bird Survey (BBS), and Christmas Bird Count (CBC) data will be analyzed every 5 years to assess population trends for management indicator bird species. Because migratory birds are far ranging species that require a diversity of habitat for foraging, breeding, and wintering, population trends are generally detected at larger observational scales than those traditionally used to manage lands.

ALMS - The ALMS is administered by the U.S. Geological Survey (USGS) in Anchorage, Alaska and is designed to monitor long-term trends in breeding populations of landbirds (and other bird species) within all ecoregions of Alaska. Variable circular point counts are used to survey bird species by sight and sound. The sampling design employs a 10-km by 10-km sampling grid laid over the entire state of Alaska. From this grid, survey blocks are chosen randomly within each ecoregion and federal land management unit. Each block contains 25 survey points. This randomized off-road grid design is intended to eliminate biases inherent in roadside surveys such as the Breeding Bird Survey.

BBS - The BBS is also administered by USGS staff from the Patuxent Wildlife Research Center in Maryland. The BBS is designed to provide a continent-wide perspective of population change in breeding birds. The survey produces an index of relative abundance rather than a complete count of breeding bird populations. The data analyses assume that fluctuations in these indices of abundance are representative of the population as a whole. BBS routes are 24.5 miles long, with a total of fifty stops located at 0.5 mile intervals along the route. The Tongass completes approximately fifteen routes per year. It is thought that a minimum of 14 routes, with 10 years of surveys each, are needed to conduct a meaningful trend analysis of BBS data.

USFWS Bald Eagle Surveys - USFWS has been conducting aerial surveys of bald eagles in Southeast Alaska since 1967. Surveys are conducted on 30 randomly selected plots that are surveyed at 5-year intervals during the breeding season. These surveys provide a reasonably accurate and precise estimate of the population and are effective for monitoring trends.

USFWS Waterfowl Surveys - The USFWS censuses waterfowl, including Vancouver Canada geese, in Southeast Alaska. These generally take 5 years to complete. All saltwater shorelines are surveyed once in summer and in winter (Jack Hodges pers. comm.). One-fifth of the total saltwater shoreline is surveyed per year. USFWS conducts surveys by air and uses results from surveys conducted by boat to correct their estimate. Three correction surveys are conducted by boat in the summer and winter.

Figure 4. Doe called into a muskeg, Prince of Wales Island.

Deer Pellet Group Surveys - Estimating Sitka black-tailed deer population abundance in Southeast Alaska is difficult because much of the landscape is densely vegetated; therefore, estimation techniques based on seeing the animals do not work well here. For this reason, ADFG uses fecal pellet counts as an index for deer population abundance. The assumption is that changes in the density of pellet groups reflect changes in the population. It is also assumed that a difference in these indices between areas reflects differences in the size of the respective populations. The ADFG report that the pellet data "are useful in looking at long-term trends and should detect population changes over a period of several years" (Person and Titus 2002). The data are collected cooperatively between the Tongass National Forest and ADFG. Counts are conducted along permanent transects that are surveyed no more than once

per year. Routes are not run every year and routes located in areas that receive high hunting pressure, or areas where there is concern for the population are prioritized. Pellet group datasets date back to the early 1980s. For a more detailed description of the sampling designs and field methods used see Kirchhoff and Pitcher (1988).

Monitoring Results

Population and habitat trends of MIS are not included in this report. These analyses are scheduled to be completed every 5-years after implementation of the Forest Plan. The following describes recent reports and work contributing towards monitoring MIS.

MIS Populations

Management and Harvest Reports - We summarize these reports for hunted and trapped MIS (brown bear, black bear, mountain goat, wolf, deer, river otter, and marten) in Table 2 below.

Table 2. Summary of population status information from the most recent (as of March 16, 2011) available Alaska Department of Fish and Game (ADFG) management and harvest reports (reports acquired from http://www.adfg.alaska.gov/index.cfm?adfg=librarycollections.wildlifemanagement). Harvest reports reviewed for Game Management Units (GMUs) 1 (Southeast Alaska, Dixon Entrance to Cape Fairweather), 2 (Prince of Wales and adjacent Islands), 3 (Petersburg, Wrangell and adjacent islands), 4 (Admiralty Baranof, Chichagof, and adjacent islands), and 5 (Yakutat : Cape Fairweather to Icy Bay, Eastern Gulf Coast).

Management Report of Survey & Inventory	GMU 1	GMU 2	GMU 3	GMU 4	GMU 5
Brown bear - 1 July 2006-30 June 2008 (ADFG 2009)	A quantitative population estimates for the Bradfield Canal and Unuk River area is 50 bears (95% CI 31-115) and for Berner's Bay is 60 (95% CI 46.5-96.4). Quantitative data are not available for the rest of this unit. Other data[1] indicate that populations are stable.	Brown bears are not present.	Quantitative population data are not available. Other data indicate the population is stable at low levels.	The population was estimated at 4155 bears in the 2007 ADFG Management and Harvest Report. More recent quantitative population data are not available. Other data indicate the population is stable.	Quantitative population data are not available. Other data indicate no change in populations.
Black bear - 1 July 2004-30 June 2007 (ADFG 2008)	Precise population estimates are not available. Estimated a density of 1.3 to 1.5 bear per mi^2.	Precise population estimates are not available. Estimated a density of 1.5 bear per mi^2.	Precise population estimates are not available. Estimated a density of 1.5 bear per mi^2.	Black bears are not present.	Precise population estimates are not available. Estimated a density of 1.4 bear per mi^2.

[1] Examples of other data include but are not limited to hunter surveys; trapper questionnaires, sealing records, and field observations

Management Report of Survey & Inventory	GMU 1	GMU 2	GMU 3	GMU 4	GMU 5
Wolf - 1 July 2005-30 June 2008 (ADFG 2009)	Quantitative population data are not available. Other data indicate that populations may be stable or increasing in some subunits (1C).	Quantitative population data are not available. Other data indicate that populations may be stable.	Quantitative population data are not available. ADFG does not believe populations are declining.	Wolves are not present.	Quantitative population data are not available. Other data indicate that populations may be stable.
Deer - 1 July 2008-30 June 2010 (ADFG 2011)	Based on pellet-group surveys and other data, populations are stable at moderate-to-low levels in subunits 1A and 1B. Populations in Unit 1C may be lower than the management target, but increasing.	Based on pellet-group surveys and other data, populations are stable to increasing.	Based on pellet-group surveys and other data, populations are declining and are below carrying capacity.	Based on pellet-group surveys and other data, populations may be stable or increasing.	Quantitative population data are not available. Based on hunter questionnaires, populations are stable at low levels and may be increasing.
Mountain goat - 1 July 2007-30 June 2009 (ADFG 2010)	Based on quantitative population data (for some areas), populations are generally stable and productivity is high to moderate with localized variations (Cleveland Peninsula).	Mountain goats are not present.	Mountain goats are not present.	Based on quantitative population data, population may have declined slightly.	Based on quantitative population data, populations are generally stable with localized areas of persistently low population (Nunatak Bench) and declines (east of Harlequin Lake).

Management Report of Survey & Inventory	GMU 1	GMU 2	GMU 3	GMU 4	GMU 5
Furbearers - 1 July 2006-30 June 2009 (ADFG 2010)	Quantitative population data are not available. Other data suggest that most furbearers (such as marten and otter) are abundant or common and populations are stable. The male to female sex ratio of trapped otters in Unit 1A is low and will be monitored.	Quantitative population data are not available. Other data suggest that most furbearers (such as marten and otter) are abundant and populations are stable.	Quantitative population data are not available. Other data suggest that furbearers (such as marten and otter) are common or abundant and populations are stable. The exception is the Kuiu Island marten population, which is low.	Quantitative population data are not available. Other data suggest that furbearer populations, such as marten and otter, are healthy. Trends were not reported.	Quantitative population data are not available. Other data suggest that furbearers, such as marten and otter, are common and their populations are stable.

[1] Examples of other data include but are not limited to hunter surveys; trapper questionnaires, sealing records, and field observations

ALMS - This was the ninth year of implementing this landbird monitoring program on the Tongass. Ten survey blocks were planned to be surveyed; three could not be competed due to weather. Data were compiled and sent to the USGS Alaska Science Center for future analysis.

USFWS Bald Eagle Surveys - After the bounty on bald eagles was removed in 1953, the Southeast Alaska bald eagle population steadily increased and then stabilized in 1982. The USFWS estimates the adult population in Southeast Alaska is 13,000 (mean 1982 – 2007; Hodges 2011).

USFWS Waterfowl Surveys – Vancouver Canada Geese - The last waterfowl census in Southeast Alaska was completed by the USFWS in 2002. They counted 4,026 Vancouver Canada geese by air in the summer and 16,194 during the winter. Using a correction factor of 1.96 they estimate the Vancouver Canada goose population in Southeast Alaska to be 7,895 in the summer and 31,758 in the winter.

Work done in the 1960's (reported in Hansen 1962) and by Hupp et al. (2010) indicate the Southeast Alaska Vancouver Canada goose population survival rate is high. In addition, it is well documented that female Vancouver Canada geese do not migrate long distances (as reported in Hansen 1962, Ratti et al. 1978, Ratti and Timm 1979, Hupp et al. 2010). Hupp et al. (2010) found that 98% of radio-tracked breeding female, and 83% of non-breeding female, Vancouver Canada geese in Southeast Alaska did not migrate long distances (≤30 km). Therefore; unlike other Pacific Flyway goose populations, Southeast Alaska Vancouver Canada geese are not subject to high winter mortality in Washington and Oregon.

Non-invasive Wolf Population Estimation Technique –The ADFG, University of Alaska Fairbanks (UAF), and Tongass are collaborating to test the feasibility of using DNA sampling as a low cost means for estimating wolf populations. Sampling protocols are being developed and tested that can be adapted for different landscape scales and for various levels of rigor. Use of feces as the source for DNA was investigated in 2010 and 2011 and was found infeasible because the feces are difficult to locate. Use of hair collected from hair snares is now being tested. This project will continue through 2014 and will result in final reports on the study design, data collection, and data analysis and publication of results.

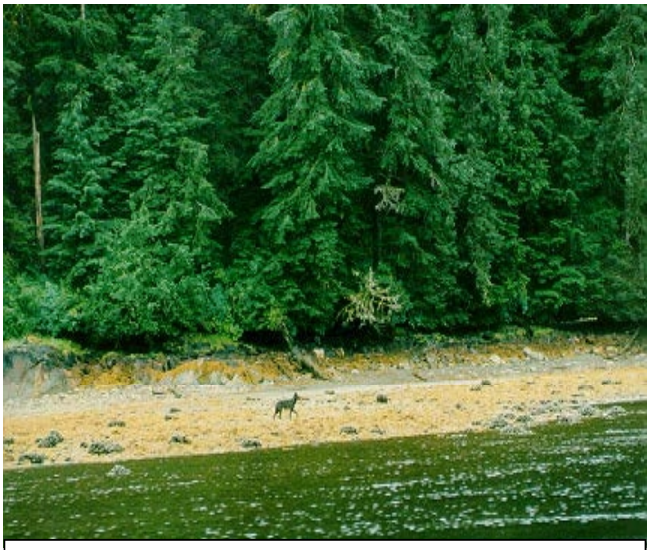

Figure 5. A lone wolf moves along the shore.

Wolf Mortality Risk Assessment – The Tongass and the ADFG recently collaborated on a spatial analysis of wolf harvest on Prince of Wales Island to determine correlates of mortality due to trapping and hunting (Person and Logan submitted). Identifying the number and spatial extent of areas with high levels of harvest will provide insight into wolf population viability. Moreover, it is useful to model the potential effect of future road closures on harvest rates to determine to what extent those actions likely will reduce risks of overharvest. In this analysis we examined effects of roads, distances to centers of

population, and habitat composition on average rates of harvest of wolves within the 32 wildlife analysis areas (WAA) that constitute game management unit (GMU) 2; Prince of Wales and adjacent small islands. In addition, these same variables were analyzed for their relationship with a WAA's risk of unsustainable harvest (annual harvest rate ≥3 wolves/ 300 km2 for ≥5 years between 1985 and 2009) and pack depletion (annual harvest rate ≥7 wolves/300 km2 for ≥2 years between 1985 and 2009). Rates of harvest were based on sealing records from 1985-2009. The analysis indicates harvest was highest between 1985 and 1999 (average annual rate = 75.7 (SD = 31.9) wolves) and substantially lower between 2000 and 2009 (average annual rate = 48.5 (SD = 21.1) wolves). Based on harvest between 1985 and 2009, 19 WAAs were at risk of unsustainable harvest and 16 were at risk of pack depletion. Although average harvest rates generally increased with increased density of roads ($r = 0.47$; $P = 0.02$), road density was not part of the final models that best explained variability in wolf harvest rates in the area. In contrast, final models suggested the density of roads and mountainous terrain were positively associated with risk of unsustainable harvest and the prevalence of muskeg habitat and non-development lands reduced this risk. Proportion of WAAs composed of non-development lands also reduced the risk of pack depletion and proportion of WAAs composed of non-federal lands (mostly clearcuts) and road density increased that risk. No significant predictors of harvest rate, unsustainable harvest, or pack depletion was found for the WAAs in the smaller islands adjacent Prince of Wales Island. Based on the analysis here, it is predicted that Tongass road closures intended to be completed by 2015 will have a moderate influence on harvest rates and risks of unsustainable harvest and pack depletion. The authors recommend that Prince of Wales Island be considered a separate regulatory unit from the adjacent islands because of its accessibility by roads and because those roads link all the principle population centers of the GMU.

Deer Pellet Group Surveys – The results for Southeast Alaska are summarized in Table 2 above.

Deer Pellet DNA Analyses

Pellet DNA Mark-recapture Population Estimation Technique - There are many factors that may confound the use of fecal counts as an indicator of deer populations including: seasonal and weather-related variability that influences persistence of pellets in the environment, defecation rates, and detectability of pellets in different habitats (Brinkman et al. 2010a). Therefore, ADFG, the Tongass, and the UAF are collaborating on studies of using DNA extracted from feces, combined with mark-recapture survey techniques, for estimating Sitka black-tailed deer abundance. This work was initially conducted on Prince of Wales Island because of the concern over the size of the deer population and the resulting conflicts between the sport and subsistence user communities. DNA extracted from the surface of fecal pellets, in combination with microsatellite markers, was used to identify individual deer. Genotyping of individual deer proved relatively successful (87%) and sampling along deer-trails enabled a high pellet group encounter rate; thus estimates of deer abundance were made with moderate precision (±20%; Brinkman et al. 2011). Results of this work have since been published by Brinkman et al. (2011) and have been used by the ADFG to develop guidance on designing Sitka black-tailed deer population trend monitoring programs in Southeast Alaska (Brinkman et al. 2010b).

While showing promise, the methods developed by Brinkman et al. (2011) rely on surveying transects several times within a single year and, therefore; are very time consuming, expensive, and impractical for large scale monitoring. In addition, the methods are limited in their use for

estimating deer density because transects are located irregularly with regard to spacing and density. Therefore, work continues to test modifications of the Brinkman et al. (2011) sampling methods that address these limitations. Various sampling approaches are now being tested that require only a single visit to each transect. The Pavlof watershed on northeast Chichagof Island was chosen for this stage of the study because managers would like to get more information about deer in the area, because deer abundance is adequate, and because housing is available for field crews. Field work for this second phase of the study was conducted in 2010 and 2011 and is scheduled to be completed by July 2012.

Deer Fawn Survivorship – Little is known about fawn recruitment in Southeast Alaska, but it is thought that annual recruitment may be an important measure of population resilience to the effects of habitat degradation (Farmer et al. 2006), predation (Kunkel and Mech 1994), and hunting. In addition, annual recruitment may indicate the nearness of the population to carrying capacity (Person et al. 2001). Although fawn mortality studies have been conducted on Prince of Wales and Heceta Islands, an understanding of whether the mortality is compensatory or additive is necessary to assess the effects of predation of fawns on deer populations. Therefore ADFG, in cooperation with the UAF and the Tongass, are evaluating the level of fawn habitat selection, mortality due to malnutrition, and mortality due to black bear predation. The relationship between predation by black bears to the level of bear activity, habitat composition, and habitat distribution are also being assessed.

The second season of this study was conducted in 2011: 19 adult and yearling female deer were captured and fitted with GPS collars. Of the deer captured in 2011, 18 were fitted with vaginal implant transmitters (VIT). One animal died due to the stress of being captured. Thirteen of the does fitted with a VIT gave birth before their collars dropped off, two lost their VITs prior to giving birth, and 3 others did not give birth before their collars dropped. Twelve fawns were subsequently fitted with GPS collars using the VITs to determine the birth sites. With the capture of other neonate fawns, a total of 54 fawns were fitted with collars in 2011. All captured does were assessed for their body condition using ultrasound measurement of rump fat and loin muscle. All fawns were weighed and their body size and condition were measured. In addition, habitat and landscape variables were measured at 21 birth sites.

Of the 54 neonate fawns collared in 2011, 30 died by July 1. Two were killed by eagles and the rest were preyed on by black bears. Of the 45 fawns GPS-collared in 2010, 15 were killed by black bears and 1 died due to premature birth. As of May 2011, 1 fawn was depredated by a wolf, another by a black bear, and another was killed by an unknown predator. Another drowned in a severe storm and another was hit by a car. This left 12 remaining alive. Habitat and landscape variables were measured, and predator transects were conducted, at 26 sites where fawns had been killed by bears. Of the collared does, 2 have died thus far. One was killed by a black bear and another died from caused related to malnutrition during late winter. As of May 2011, 12 GPS collars released from adult does that were captured in 2010 (a total of 18). These data will be analyzed this winter to determine their habitat use. Collars placed on does in 2011 are scheduled to release in July, 2012. Over 500 locations have been collected from fawns collared in 2010 and these data will also be analyzed the winter of 2011-2012. In 2012, the ADFG will continue to fit pre-parturition does with GPS collars and VITs, neonate fawns with GPS collars, and will continue the collection of location and habitat data. Data analysis will continue with the intent to complete the study by July 2013.

ISLES Medium and Large Mammal Salvage – Marten and Black Bear - The University of New Mexico, in partnership with the Museum of Southwestern Biology, and in cooperation with the Forest Service and various Alaska agencies, continues to lead the "Investigations of Southeast Landscapes Including Endemic Species" or the ISLES project. This project continues the effort started in 1991 to inventory small mammals to analyze the distribution, taxonomy, status, and genetic variability of potentially endemic mammals in Southeast Alaska. As part of the inventory, ISLES salvages medium and large mammal carcasses (including marten and black bear) from cooperating trappers and hunters. All specimens collected are identified using DNA techniques, vouchered, and the information is entered into Arctos http://arctos.database.museum/home.cfm), an online database of museum specimen data. Carcass salvage has so far been focused on the Prince of Wales Archipelago (PWA). Initial analyses of sequenced DNA data from several of the marten specimens obtained from Dall Island in 2010 suggest the co-occurrence of Pacific marten, *Martes caurina*, and American marten, *M. americana*, on this never-before-sampled outer island. Attempts to obtain additional specimens are being sought in 2011 to help shed further light on this discovery. Arrangements have been made with a local trapper to secure marten specimens from Sukkwan Island during the 2011-2012 trapping season and efforts are underway to make similar arrangements for marten trapped on Heceta, Dall, and Sumez Island as well. Prior to this finding, *M. caurina* was known only from Admiralty and Kuiu islands in the Alexander Archipelago and considered endemic taxa on neighboring Queen Charlotte Islands in British Columbia (MacDonald and Cook 2007, Dawson 2008).

Figure 6. Black bear sow and two cubs, *Ursus americanus* (photo Anan Interp. Staff, TNF).

Other furbearer and big game specimens are being obtained through the University of Alaska, Sitka and the Hoonah Ranger District.

The Status of Martens (*Martes caurina*) on Admiralty Island Following a Severe Decline in Small Mammal Prey Availability in 2007

Mountain Goat Population Monitoring and Survey Technique Development – The ADFG is developing techniques for estimating mountain goat population size. The Tongass became a cooperator on this project in 2009 specifically to investigate sources of mountain goat aerial survey bias and to develop statistical and field techniques needed to accurately estimate population size during routine monitoring surveys.

Figure 7. Mountain goat, *Oreamnos americanus,* population on KMRD

This investigation involves conducting aerial surveys in areas known to have radio-marked goats. Population-level goat sighting probability (sightability) is determined by comparing the number of radio-collared goats seen in the area to the total number of radio-collared goats known to be in the area. In addition, data on potential behavioral and environmental factors influencing individual-level sightability is collected.

Between 2007 and 2011, 328 "sightability trials" involving marked mountain goats have been conducted. Statistical analysis of the resulting data suggest that habitat, group size, terrain, and behavior are the most important variables influencing the ease of sighting an individual goat during aerial surveys (White and Pendleton 2011). Given this information, future data collection will be focused on these 4 variables. Mean population-level sightability based on 2011 data is 0.61 (range 0.25-1.00). The most important population level features influencing sighting a mountain goat are aircraft type, time of day, and sky condition.

Additional data are needed to further refine the sightability probabilities as a function of habitat, group size, terrain, and behavior and to incorporate this into population estimation methods. Therefore, additional goats will be fitted with radio-collars in 2012 and aerial surveys will continue.

Mountain Goat Movement Patterns and Population Monitoring on Baranof Island – ADFG and the City and Borough of Sitka have initiated this study to determine possible impacts of hydroelectric development in the Blue and Takatz Lake watersheds (ca. 193 mi2) on mountain goats. Objectives of the study are to determine the area's goat population seasonal movement and habitat selection patterns, survival rate, reproductive success, and population size and composition (White et al. 2011). In addition, the Tongass recently became a partner in the population estimation and aerial survey sighting probability components of the study. To date, a total of 19 goats have been fitted with radio-collars (out of the research goal of 30 animals). Of the 13 animals tested for contagious ecthyma, one tested positive. This is a comparable incidence to other populations in Southeast Alaska (n=4) that were tested in 2010. Tissue samples taken from captured animals, as well as from those harvested via the ADFG registration hunt, indicate the Baranof Island mountain goat population is derived from two sources; goats translocated from Tracy Arm in 1923 and an unknown until now endemic population to the island that may have persisted through the last ice age (Shafer et al. 2011). Preliminary GPS location data indicate that, like other Southeast Alaska goat populations, marked animals migrate seasonally from high elevation in summer to lower elevation in winter. Aerial surveys in the area in 2010 and 2011 indicate mountain goat abundance was higher on the west side of the study area compared to the east, kids comprised 18.4% of the population (comparable to

mainland populations), and there was considerable spatial variation in kid production. Work planned in 2012 includes capturing and fitting 6 additional mountain goats with collars, downloading spatial data from 9 more collars, determine the reproductive success of the 6 female mountain goats with collars, investigate over-winter mortalities, and conduct aerial population estimation and composition surveys.

MIS Habitat

Conservation Strategy – Changes in non-development land use designations (LUDs) on the Tongass are reviewed yearly. There were no changes to non-development LUD boundaries on the Tongass in FY 2011. The Forest Plan contains a comprehensive conservation strategy using a system of Old-growth LUDs designed to provide old-growth habitats in combination with other non-development LUDs to maintain viable populations of native and desired non-native fish and wildlife species and subspecies that may be associated with old-growth forests (USDA 2008b, p. 3-174 through 3-175). This strategy, which includes wildlife Forest Plan standards and guidelines for the matrix, was developed to maintain species viability.

Productive Old-growth Habitat (POG) - Changes to POG habitat and effects to the viability of wildlife species, including MIS, is described in the Biodiversity section. The 1766 acres of productive old growth (estimated in GIS) were harvested across 3 Biogeographic provinces in FY2011 (See Table 1 and 2 in the Biodiversity Ecosystem Section 10).

Young-Growth Management - In FY 2011, approximately 327 acres of young-growth were thinned specifically to improve wildlife habitat and an estimated 222 acres were thinned for riparian habitat restoration. Thinning is a tool used to manage young growth stands to accelerate growth and develop a mature forest structure. After clearcut harvesting, rapid establishment and regeneration of conifers, shrubs and herbaceous plants are expected. For the first 15-25 years after clearcutting, these young-growth stands provide a greater understory plant biomass than old-growth stands. However, an increase in snow accumulation due to reduced cover makes them less useful as winter habitat for some wildlife species, including deer. After 20-30 years, the forest canopy closes and enters the stem exclusion stage (Alaback 1982). Canopy closure can last up to 100 years or longer and eliminates most herbs and shrubs (Alaback 1982). The stands that subsequently develop are even-aged. Thinning reduces the standing stock of trees to a level that encourages better growing conditions through increased light and reduced competition for light, growing space and nutrients within the stand. This benefits wildlife by diversifying the structure and increasing the understory vegetation of the residual stand.

Correlating the Size-Density Model with Habitat of Selected Wildlife Species – The Tongass has contracted Northern Ecologic L.L.C. to evaluate the correlation between productive old-growth classes mapped using the Tongass Size-Density Model (SDM; Caouette and DeGayner 2005) and the habitats of selected wildlife species in Southeast Alaska. The SDM is a predictive forest-mapping model that better differentiates old-growth forest types than timber volume and therefore, will likely improve analyses of forest management related to wildlife habitat. Although components of the model have been used in landscape-level studies involving habitat for Sitka black-tailed deer and black bear (DeGayner et al. 2005; Doerr et al. 2005), a habitat capability model for Sitka black-tailed deer, and for analysis of the habitat of MIS, the correlations between SDM landscape classes and wildlife habitat have not been analyzed. At a minimum, models will be developed for goshawk and bald eagle nesting habitat and marten habitat. These species were selected because there is knowledge of their habitats, some animal

location data is available, and because of their importance to management of the Forest. Work on this project is expected to continue into 2013.

Effectiveness Monitoring for the Response of Marten and Their Prey to Young-Growth Thinning - Surveys were initiated in 2010 by the University of Wyoming, in cooperation with the Tongass, to evaluate small mammal responses to thinning in conjunction with the Tongass-Wide Young-Growth Studies (TWYGS) and the response of marten to the resulting small mammal abundance. This study will assess vegetation and structural features of young-growth that influence small mammal abundance. This is relevant to marten, which rely on small mammals as prey. Study objectives include 1) assessing which TWYGS treatments enhance the abundance of small mammals, 2) determining the habitat variables the populations respond to, and 3) the response of marten to small mammal abundance. Responses to thinning treatments and un-thinned young-growth stands and adjacent old-growth habitat are being assessed (Ben-David et al. 2010). For further details of the study and results from the 2011 field season see Biodiversity Question 4.

Evaluation of Results

New information does not support any changes to the Forest Plan at this time. Population and habitat trends are currently consistent with Forest Plan expectations. There have been no changes to the spatial distribution, size, and composition of old-growth or other non-development LUDs in FY2011. Forest Plan standards and guidelines maintain POG habitats in non-development LUDs and within the matrix in development LUDs (that include portions of the Tongass open to consideration for potential timber harvest). Habitat retained in beach, estuary and riparian buffers is important to many MIS species especially the bald eagle, brown bear, black bear, deer, goshawk, marten, and river otter. In addition, thinning activities have the potential to improve wildlife habitat.

The reduction in POG habitat in development LUDs has been less than projected in the Forest Plan. Since the adoption of the 1997 Forest Plan, total volume harvested has averaged 84 million board feet (MMBF) annually, only 32 percent of the annual average Allowable Sale Quantity of 267 MMBF. The 2008 Forest Plan ROD (USDA 2008a, p. 20) states that there is no expectation that timber will be harvested at a continuous rate of 267 MMBF over the next planning cycle of 15 years (reference the Biodiversity Ecosystem section). Even if development occurs at maximum allowable levels for 100 years, the implementation of the Forest Plan would result in a moderate to very high degree of assurance that there would still be sufficient habitat to support long-term viability of wildlife species. This is because the conservation strategy provides a good to very good distribution of high quality old-growth reserves over the long term (USDA 2008a, p. 47).

Action Plan

- Continue to assess population status for MIS. Data sources will be reviewed at least every five years to assess trends in populations and habitats changes for MIS.
- Continue to monitor changes to the conservation strategy and POG habitat to assess effects to the population viability of MIS.
- Continue to monitor the implementation of young-growth treatments.
- Determine if methodologies for assessing MIS population trends can be improved.

- Continue contracts and agreements that contribute towards the refinement of monitoring protocols for MIS.

Figure 8. Sitka black tailed deer, *Odocoileus hemionus sitkensis* (photo ADFG)

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File Code: 1920
Date: March 13, 2012

Dear Reader,

The Tongass National Forest website contains the 2011 Tongass National Forest Monitoring and Evaluation Report. An annual written summary of Forest-wide monitoring programs is specified in Chapter 6 of the Tongass Land and Resource Management Plan (Forest Plan). This report summarizes specific monitoring that was completed during Fiscal Year 2011.

The Forest Plan identifies management direction for the Tongass in terms of goals, objectives, and standards and guidelines—based on the underlying assumptions of statute, policy, theory, data, technology, and public needs and desires. Monitoring involves gathering data and information and observing the results of management activities as a basis for the periodic evaluation of the Forest Plan. Evaluation is a process for interpreting monitoring data and information to determine whether changes in management direction are needed. The Forest Plan incorporates three types of monitoring and evaluation approaches: implementation, effectiveness, and validation.

The monitoring protocols used for the 2011 Monitoring and Evaluation Report reflect the Record of Decision for the 2008 Forest Plan. Protocols continue to evolve as managers receive more information. The Forest monitoring plan was written to monitor impacts to old-growth forests at the highest timber harvest level allowed by the Forest Plan. However, timber harvest since Forest Plan implementation has been significantly below the allowable sale quantity. The Forest is in transition to lower harvest levels and impacts are well within the thresholds outlined by the Forest Plan. Most of the monitoring described in this report reflects an overview of annual data collection, monitoring pilots, and protocol development. Potential changes to the Forest Plan and monitoring plan will be evaluated following a more comprehensive review after the fifth year of monitoring in 2013.

If you have questions or comments about this report, please contact Carol Seitz Warmuth at the Ketchikan Forest Supervisor's Office, (907) 228-6341.

Sincerely,

FORREST COLE
Forest Supervisor

Enclosure