in any of the Forest-wide Standards and Guidelines (page 2-14), the Forest Plan, specifically Mineral Management Area Prescription (page 3-93), or the Monitoring and Evaluation Section. We recommend that sampling parameters for such monitoring be identified in these sections. Monitoring should determine how well Standards and Guidelines and management prescriptions are working and/or are being adhered to, in order to provide timely feedback to the Forest Supervisor.

Much of the CNF lands are open to entry under the General Mining Law of 1872. Given the current national interest in natural gas production, the potential for further exploration in the CNF may increase. Today's technology such as 2- and 3-D seismic techniques, can locate product more efficiently than past practices. If mineral resource quantity is sufficient, development will most likely follow. Due to security concerns, public use is typically limited or restricted in these areas. In addition to the short-term impacts associated with exploration, once resources are located, long-term impacts generally associated with infrastructure development (i.e., facilities, pipelines, roads, utilities, lodging, etc) will surely follow. We recommend that the Final EIS detail what measures must be in place to ensure compliance with the Forest Plan and how those measures will be used to protect the environment should mineral or oil and gas exploration or development occur.

The direct, secondary, and cumulative effects of exploration and production of mineral resources on soil, water, fisheries, and recreation can have a significant effect, especially if contaminants are present. Forest-wide Standards and Guidelines should be developed to address minimizing impacts and establish criteria which are measurable and enforceable. The Final EIS should identify threshold levels used to establish impact; define measures that will be employed to reduce impacts; establish frequency of monitoring; include a cumulative effects analysis to determine the effects of concentrating mining activities and other recreational activities all within the same watershed; and include a time frame for which decontamination of past sites will be accomplished. Additionally, if restoration is a criteria used to lessen past impacts, then components and levels of acceptable restoration should be addressed in the Final EIS and identified in the forest-wide Standards and Guidelines.

Utility Corridors and Communication Towers (see also pages 3-96 through 3-98) Literature documenting bird mortalities from collisions with utility structures and from electrocutions is extensive, and dates back to 1876 when Coues (1876) reported horned larks colliding with rural telegraph wires. Herbert et al. (1995) provide a comprehensive review of 468 articles documenting avian collisions and electrocution mortalities with human-made structures from 1876 to 1992. Over 80 species of birds, representing 13 orders have been documented as victims of wire strikes or electrocutions in the United States (Thompson 1978).

Several factors influence the frequency of avian collisions with lines, wires, towers and poles. Weather (wind, rain) and reduced visibility (fog) may cause birds to fly lower than normal and strike wires and power lines. High bird mortalities (in the thousands) from collisions with towers have been reported during storms or inclement weather patterns (Baird 1964, Benning 1978, Carter and Parnell 1976, Kibbe 1976). The placement of power lines and towers near migration routes, or across staging areas, lakes and wetlands increases the probability of power line strikes by migrating waterfowl (Anderson 1978, Malcolm 1982) and songbirds (Caldwell and Wallace

1966). When large flocks pass these structures during migration at lower altitudes because of poor visibility, it can be especially lethal and lead to higher mortalities.

Young birds and fledglings collide with power lines more often than adults. Brown et al. (1987) reported that juvenile sandhill cranes collided with power lines significantly more often than adults. Lingle (1987) determined the principal known cause of death for wild fledged whooping cranes was collision with power lines. Large, less maneuverable birds with high wing loading are more vulnerable and likely to collide with wires because they have little opportunity to divert from these structures in time. Trumpeter swans (Banko 1960, Weaver and St. Ores 1974) mute swans (Harrison 1963, Wilmore 1974), and sandhill cranes (Nesbitt and Gilbert 1976, Tacha et al. 1978, Wheeler 1966) have been documented colliding with power lines in the United States and England.

It has been estimated that between 70 to 90 percent of all raptor mortalities along electric distribution lines are eagles (Olendorff et al. 1981). Documented losses of raptors to electrocutions in 1972 and 1973 totaled 281, of which 250 were golden eagles (Boeker and Nicker son 1975). Harness (1997) reported that eagles (748 out of 1,450) were the most commonly reported species of raptors electrocuted from raptor mortality records collected between 1986 and 1996 in the western United States. Due to body size, some raptors are more susceptible to electrocutions than others. Age and experience is a significant factor in raptor electrocutions. Smith and Nelson (1976) found that 98% of electrocuted eagles in 1975 were inexperienced birds. Young eagles are inexperienced at take-offs and landings, and less adept at maneuvering than adults.

Another contributing factor to higher electrocution rates among raptors is their hunting behavior, which can favor the use of power poles as hunting perches and thereby increase their association with power line structures. A perching pole provides considerable elevation above the surrounding terrain widening the range of vision, and providing easy take-offs and landings (Boeker and Nickerson 1975). While large raptors are often the victims, smaller raptors such as great horned owls (Brady 1969, Kenai NWR data), peregrine falcons (Monk 1982), merlins (Olson and Olson 1980) and ospreys (Dunstan 1968, Kenai NWR data) are also prone to electrocutions and power line collisions. Harness (1997) reported red-tailed hawks and great horned owls were the most commonly reported hawk and owl species electrocuted from 1986-1996 in the western United States.

At least four proposed electronic sites shown around Turnagain Arm on the map "Repeaters (Existing and Potential)" occur along the fall migration route of waterfowl, cranes and swans from the Kenai Peninsula. Quimby (1972) recorded 75 species of birds using the Chickaloon River Flats. The area is an important staging area for waterfowl in the fall, and to a lesser extent in the spring. Quimby (1972) also found Canada geese, mallards, pintails, green-winged teal, gadwalls, American widgeons, shovelers, and sandhill cranes breeding on the Chickaloon Flats. Shorebirds have also been identified using the Flats in summer and fall (Eldridge and Robertson 1995). Trumpeter swans and most waterfowl leaving the Chickaloon Flats fly east along Turnagain arm before crossing the Kenai Mountains near Portage Pass south to PWS in the CNF.

The electronic sites proposed for development should be coordinated with FWS before site selection is finalized. Standards within the Forest Plan need to be developed to address a course of action which will be followed to minimize the potential hazards and mortalities to waterfowl, bald eagles (refer to MOU), goshawks, other raptors, and landbirds (see discussion above relating to impacts of powerlines and communication towers to wildlife) to electronic towers. Tower placement should not occur near migration routes, or across staging areas, lakes or wetlands. These structures can be especially lethal to large flocks passing them at lower altitudes during migration because of poor visibility, and lead to higher mortalities. Waterfowl migration routes within the vicinity of proposed electronic sites should be identified in coordination with FWS.

Page 4-4, Paragraph 2 We agree with the need to monitor population trends of indicator species.

Modeling (see also pages 4-16 through 4-17) In the section on Wildlife Topics in chapter 4 of the Forest Plan, item 3, Modeling, does not acknowledge the existence of a cumulative effects model for brown bears already developed by the IBBST (Suring et al.1998). This model, when applied to nearly 1.23 million acres managed by the CNF in the northeastern Kenai Peninsula, demonstrated that habitat effectiveness for brown bears over a large portion of the Kenai Peninsula (i.e. within the CNF) "has been reduced by more than 70% as a result of disturbance and mortality associated with human facilities and activities." The results and management implications of this model need to be incorporated into the Final EIS, and the preferred land management categories and prescriptions adjusted accordingly to address reducing these current impacts and minimizing future impacts on brown bears.

The brief mention of this model on page 3-192 of the Draft EIS fails to acknowledge the importance of the implications for the management of the CNF on the Kenai Peninsula and although this model is being refined and updated with new information, it is unlikely the new information will significantly change the conclusions of the modeling exercise--that increasing human development and disturbance are detrimental to maintaining a viable population of brown bears on the Kenai Peninsula. The USFS noted that the brown bear on the Kenai Peninsula meets the criteria used to classify the grizzly bear in the lower 48 states as threatened (Draft EIS, page 3-192). This further emphasizes the need to consider this model and revise the land management prescriptions to provide greater protection for brown bears on the CNF.

Appendix A (page A-4) PWS (Wilderness Values) mentions specifically accommodating mineral opportunities in areas with favorable mineral potential, including Knight Island (area designated on accompanying map includes the eastern shore from Bay of Isles south to Marsha Bay). It should be noted that sea otter populations in and around Knight Island (specifically northern Knight Island) have yet to recover from impacts of the *Exxon Valdez* Oil Spill. Although the habitat along the outer coast in this specific mineral resource area may not be optimal for sea otters, the Bay of Isles provides comparatively good habitat for sea otters along the eastern coast of Knight Island (J. Bodkin, USGS, pers. comm.). This information should be noted in the event that mineral resources are pursued in this area, and the possibility that the Bay of Isles could be considered as a potential access area.

Page E-3, Table E-2 To help identify locations of future potential electronic sites, we recommend adding the site name to the table.

GENERAL COMMENTS
DRAFT ENVIRONMENTAL IMPACT STATEMENT

Ecosystem management We suggest the Final EIS place more emphasis on the 1992 Ecological Systems Management policy (see pages 1-4,1-5), and be particularly sensitive to the land status and management mandates of other agencies adjacent to the CNF boundaries. There is little to no mention within the Draft EIS of how the CNF, in conjunction with other land management agencies, will implement ecosystem management on the Kenai Peninsula. The CNF is treated as a distinct and separate unit with little recognition or regard of how its management fits into the larger landscape, especially on the geographically isolated Kenai Peninsula.

The adjacent Kenai NWR forms a common boundary with the CNF of over 60 miles. Consequently, there needs to be recognition and management recommendations within the Final EIS for how future management of the CNF in conjunction with the Kenai NWR can jointly promote wildlife diversity on the Kenai Peninsula, thereby effecting true ecosystem management The FWS recommends the following characteristics along the Kenai NWR-CNF 60+ mile boundary be acknowledged, emphasized, and addressed in the Final EIS:

1) That approximately 50% (about 30 miles) of the common Kenai NWR-CNF boundary includes Congressionally mandated Wilderness within the Kenai NWR.

1a - That approximately 60% (about 18 miles) of this common Kenai NWR-CNF Wilderness boundary includes the Russian River drainage, which is an area that is extremely important to Kenai Peninsula brown bears feeding on salmon carcasses along the Russian River, Lower and Upper Russian Lakes, Goat Creek and unnamed creeks within the CNF at the southern end of Upper Russian Lake. The Russian River drainage is also important because it supports the Russian River sockeye salmon spawning and rearing habitat/streams/lakes, as well as spawning and rearing habitat for rainbow trout, silver salmon and other fish species. This watershed is also critically important to significant recreational and commercial fisheries, and a major factor in the local economy.

1b. That approximately 40% (about 12 miles) of this common Kenai NWR-CNF Wilderness boundary includes the Mystery Creek Wilderness Unit within the Kenai NWR, which includes important habitat for brown bears, wolverine, wolves, lynx, moose, caribou, Dall sheep and other species of wildlife.

2. That approximately 50% (about 30 miles) of the remaining Kenai NWR-CNF common boundary includes a Minimal Management Zone protecting the Chickaloon River watershed within the Kenai NWR. Minimal management zones within the Kenai NWR are recommended for wilderness designation and the Chickaloon River watershed is a highly important area for staging and migrating waterfowl, waterbirds, shorebirds, beluga whales, harbor seals, and four species of salmon.

3. That the indistinct and unmarked boundaries between the Kenai NWR-CNF could facilitate CNF-authorized human motorized or nonmotorized vehicular access to occur on

adjacent Kenai NWR Wilderness or Minimal Management Zones, where these uses are not authorized and are not compatible with Kenai NWR purposes.

The Wrangell-St. Elias National Park and Preserve (WRST) and Kenai Fjord National Park (KEFJ) also share common boundaries with the CNF. For your information and use in further discussion of impacts and ecosystem management opportunities, we have identified, below, National Park Service (NPS) management practices and those proposed for the adjacent CNF.

Preferred Alternative – The preferred alternative for the Forest Plan includes category 1 management area prescriptions adjacent to WRST and a combination of category 2 and 3 management prescriptions adjacent to the northern boundary of KEFJ. The portion of WRST adjacent to CNF is a designated Wilderness and is managed according to the provisions of the Wilderness Act. The preferred alternatives category 1 management prescription of ANILCA 501(b) recommended Wilderness complements NPS management of the boundary area.

With the exception of the Exit Glacier Developed Area, KEFJ manages the Resurrection River boundary area as a wilderness study area. The category 2 prescriptions (backcountry winter motorized and brown bear core area) would be considered reasonable for the Resurrection River Boundary Area. As per USFS management guidelines, NPS concurs that utility systems should be discouraged in Units K260 and K262, which are designated as brown bear core area. The category 3 management prescription (Fish, Wildlife, & Recreation) would be reasonable for the Exit Glacier Road Corridor. The Resurrection River clearly defines the political boundary between agencies. However, a cooperative management strategy under one prescription (category 1) may help both agencies meet common recreational/ecological objectives along this riparian zone boundary.

Alternatives E and F: The NPS supports forest lands adjacent to KEFJ being zoned as wilderness as proposed under Alternatives E and F. Category 1 prescriptions would complement NPS management of the boundary area. Specific concerns related to potential impacts on KEFJ park resources and visitor experiences that might be allowed under less restrictive prescriptions in other alternatives include:

1. Logging beetle killed trees/new or temporary roads/helicopter use along road and river corridor;
2. Prescribed or natural fire-suppression tactics/smoke management;
3. Viewshed from park, logging/clearcutting/burn scars;
4. Helicopter corridors for heli-skiing operations; and
5. Motorized use away from road or trails (winter & summer).

Affected Environment/Environmental Consequences The Draft EIS provides an in-depth analysis of management alternatives, the environment, and potential impacts each alternative will have on resources within CNF. However, combining the "Affected environment" and

"Environmental consequences" sections into one chapter has resulted in this information being unorganized and difficult to understand. We suggest that separation of these two chapters would help organize the information into a more reader-friendly format. We also recommend that the rationale for decisions resulting in resource tradeoffs should be more fully documented in the Final EIS, so that potential impacts and relative risks may be more thoroughly understood.

Landscape The Chugach-St. Elias Ecoregion is dominated by ice, snow, and rock. The Copper River Delta, PWS, and Kenai Peninsula are three distinct geographic areas within this ecoregion. The Draft EIS states that because of the ecoregion's large scale, it would not be affected by any management activities under any of the Forest Plan alternatives. On page 3-42, it states the Kenai Peninsula and Copper River Delta are currently undergoing responses to large-scale environmental conditions that have changed vegetation succession patterns or stand conditions. The Kenai Peninsula has historically received the highest levels of disturbance, both natural and human-caused. Past and ongoing management activities have mostly occurred in lower elevation areas, which has fragmented valleys and wildlife travel corridors. Disturbances on the Kenai Peninsula account for a loss of approximately 37% and 28% mixed hardwood/softwood and hemlock-spruce cover types, respectively (Table 3-15). Although management intensity varies by alternative, it becomes apparent that future Forest Plan management activities will continue to concentrated at lower elevations, where past and ongoing management disturbances are having the greatest present effects. Cumulatively, this may have a significant affect upon the ecoregion. We believe lower elevation habitat within the Chugach-St. Elias Ecoregion will be affected by most management activities. We suggest that the Final EIS further evaluate and address cumulative, direct, and secondary impacts.

Biodiversity We suggest the Final EIS consider the role of the CNF in conserving biodiversity on the Kenai Peninsula. By focusing management categories and prescriptions on small watersheds, we believe the Draft EIS loses sight of the larger, important functions the CNF performs in maintaining wildlife populations and biological diversity on the Kenai Peninsula. Therefore, we recommend that the Final EIS place more emphasis on that portion of the CNF within the Kenai Peninsula, because from a wildlife conservation viewpoint, the Kenai Peninsula is ecologically distinct from the other areas within the CNF for the following reasons:

1. Some fish and wildlife populations on the Kenai Peninsula are apparently geographically and perhaps genetically isolated from populations of the same species inhabiting mainland Alaska and other administrative/ecological regions within the CNF. Because comparative (between Kenai Peninsula and mainland Alaska) genetic studies are lacking for many mammalian species on the Kenai Peninsula, it cannot be safely assumed that free interchange between such population are still occurring, especially considering the level of human development and roads/highways valleys connecting the Kenai Peninsula to mainland Alaska.

2. Because of this geographic isolation, and based on current telemetry studies, there appears to be minimal or no genetic interchange among some wildlife populations on the Kenai Peninsula and mainland Alaska. Some examples given include brown bears, lynx, and wolves-- species that are currently classified as threatened or endangered in the continental United States because of isolation and habitat fragmentation, destruction, development and

disturbance. Little is also known about the population dynamics, immigration and emigration of wolverines on the Kenai Peninsula including the CNF.

3. Those portions of the CNF within the Kenai Peninsula, therefore, play an extremely critical role in the conservation of wildlife, especially resident mammalian species with limited mobility and hence ability to discover and successfully cross the narrow land connection between the Kenai Peninsula and mainland Alaska. This geographic "bottleneck" greatly reduces, and for some species may actually prevent, genetic interchange among certain Alaskan wildlife populations. The importance of this narrow geographic area within the CNF in creating a barrier to wildlife movements will increase in the future as human development, roads, etc. increase, especially in the valley bottoms. The fact that it took wolves over 50 years to naturally recolonize the Kenai Peninsula from mainland Alaska after being extirpated on the Kenai Peninsula in the early 1900's and the fact that caribou never naturally recolonized, and had to be reintroduced to, the Kenai Peninsula after being extirpated in the early 1900's attests to the great difficultly some wildlife population have in immigrating to the Kenai Peninsula from mainland Alaska.

4. The future of certain species, especially wide-ranging carnivores on the Kenai Peninsula, may depend on how lands within the CNF on the Kenai Peninsula are managed today and in the future. Large carnivores will be particularly vulnerable to future habitat disruption and human development and disturbance on the Kenai Peninsula because of their large spatial requirements, (sometimes exceeding hundreds of square kilometer per individual), their dispersed and highly fluctuating food sources, and their movement across administrative boundaries (Kenai NWR, CNF, KEFJ, etc.). The functions of the CNF in sustaining these important Kenai Peninsula wildlife populations are at least two-fold: 1) to provide relatively disturbance free and unobstructed wildlife travel corridors in valleys within the CNF in order to permit the free-ranging movement of immigrant and emigrating wildlife between the western Kenai Peninsula lowlands and eastern mountainous regions of the Kenai Peninsula to mainland Alaska, and 2) to minimize the impacts of human disturbance and development in areas of the Kenai Peninsula that are known to be especially important to wildlife or which are adjacent to other areas on the Kenai Peninsula mandated to conserve fish and wildlife populations and habitats in their natural diversity.

Otherwise, certain Kenai Peninsula wildlife populations may become even further isolated from mainland Alaska populations and may eventually be considered for listing as threatened or endangered populations. The Kenai Peninsula brown bear was recognized as a population of special concern by the state of Alaska in 1998. Other potential or future candidates may include wolverine, lynx, or wolves, as suitable habitats shrinks, areas become developed, and road access and human disturbance increases on the rapidly growing Kenai Peninsula.

A major topic in the Biodiversity section is fragmentation. We recommend that fragmentation be reduced by managing lands along the Kenai NWR boundaries using the same land management plan as the Refuge (category 1 -wilderness designation). By limiting motorized access, forest restoration efforts, and human disturbance from the Kenai NWR eastern boundary west to the Seward highway, the CNF can maintain larger tracts of undisturbed land for wildlife breeding, refugia, and foraging, especially for species with large ranges of movement (brown bear, wolves,

wolverine). Reducing fragmentation increases population viability, and reduces the probability of species extinction.

Brown Bears Telemetry studies by the IBBST have demonstrated that some brown bears using the Kenai NWR routinely utilize the CNF north of the Kenai River for combined feeding and denning purposes. Of special importance is the Russian River drainage, where brown bears feed on spawning sockeye salmon both on the CNF and Kenai NWR sides of the Russian River valley. The proposed management of forest cover for brown bears of approximately 750 feet from both sides of anadromous streams (pages 2-12 and 2-13 *in* CNF - Proposed Revised Forest Plan) appears to be inadequate to provide cover for brown bears, based on recent findings of the IBBST which suggest that the average distance of brown bears from streams was approximately 1.2 miles. We recommend that the width of the proposed forest cover corridor for brown bears be expanded beyond the current 750 feet.

Wolves In the Final EIS, we suggest the section on the gray wolf (p. 3-195 and 3-196) acknowledge and report implications of the research, monitoring, and findings on wolves on the Kenai Peninsula from 1976 to the present. The Final EIS needs to acknowledge that the original Kenai Peninsula wolf populations were extirpated by human activities in the early 1900s; that human harvest had once regulated (1976-1981), and continues to have the potential to regulate, the numbers of wolves on the Kenai Peninsula; that wolves on the Kenai Peninsula have been exposed to and are susceptible to diseases and parasites from domestic dogs; that the estimated densities of wolves in the CNF (8 wolves/1000 km^2 or 8 wolves/386 mi^2) is much lower than on the western lowlands (16 wolves/1000 km^2 or 16 wolves/386 mi^2) of the Kenai Peninsula; and that the estimated wolf population on the CNF on the Kenai Peninsula in Game Management Unit (GMU) 7 was estimated at only 53 wolves (Peterson et al. 1984).

The implications for managing for wolves on the CNF are that: 1) there are relatively few wolves on the Kenai Peninsula portion of the CNF; 2) the density of wolves on the Kenai Peninsula portion of the CNF is low, perhaps 50% lower, relative to wolf densities on the western side of the Kenai Peninsula; 3) human activities have been demonstrated to have the capability to limit wolf numbers on the Kenai Peninsula through trapping and hunting; 4) most wolf movements and habitat use on the CNF are probably confined to valley bottoms and slopes in the winter where moose are overwintering and that this makes wolves within the CNF even more susceptible to harvest because of the high degree of human access into valleys via trails, maintained roads and highway, logging roads, etc.; and 5) wolves within the CNF are probably more susceptible to other forms of human disturbance and activities (diseases/parasites of domestic dogs, road kills, illegal shooting, etc.) in the Kenai Peninsula portion of the CNF because of their movement and habitat use in valleys where human activities are the highest.

The CNF boundary overlaps the territories of at least three wolf packs (see attached map). The Big Indian Creek Pack is the wolf pack that would probably be most affected by any land management change other than Designated Wilderness, or high protection status, since they use the Big and Little Indian Creek drainages, and much of the northern portion of the Kenai mountains (Kenai NWR unpublished data). Evidence from radiotelemetry data show previous use of the area bordering the northeastern boundary of the Kenai NWR and western boundary of the CNF by the Skilak and Mountain wolf packs (Jozwiak 1997, appendices attached). Studies

have shown that wolves need large tracts of undisturbed roadless habitat to find prey and sustain a viable population. An increase in road density is believed responsible for the demise of wolves in Wisconsin where wolves failed to survive when road densities exceeded 0.93 mile/mi^2 (Theil 1985). Other studies (Jensen et al. 1986, Mech et al. 1988) generally agreed that wolf packs did not persist where road density exceeded approximately 0.6 km/km^2 (Thurber et al. 1994). Although wolves are capable of crossing Refuge roads that are intensively used by the public (Skilak /Skilak Loop Wolf Pack - Figure 1 attachment), the incidence of wolf/vehicle collisions, and legal/illegal hunting and trapping harvest is significantly higher for these wolves than for wolves that live in remote areas with few or no roads (i.e., Point Possession Wolf Pack).

We believe that in order to reduce the human influence on wolves within the Kenai Peninsula portion of the CNF, management prescriptions should attempt to minimize utility corridors, which provide human access into the remaining wolf habitat. Another strategy to maintain a viable population of wolves on the CNF is to reduce or eliminate wolf harvest in road accessible areas on the Kenai Peninsula, as suggested for the Copper River wolves (page 3-196).

Lynx In the Final EIS, we suggest the section on lynx (p. 3-196) acknowledge and report implications of the recent research, monitoring, and findings on the Kenai Peninsula (1982-1995). Some of these findings were: 1) lynx are highly susceptible and vulnerable to human harvest, particularly by trapping due to the high degree of access; 2) that because of high accessability on the Kenai Peninsula, there were few natural refugia where lynx could escape from the impacts of humans; and 3) lynx have been, and can be, over-exploited on the Kenai Peninsula under conditions of high lynx pelt prices and easy human access into lynx habitat.

Because the principle prey of lynx are snowshoe hares, and snowshoe hares require forested habitat, preferably in an early to mid-successional stage, the amount of snowshoe hare habitat, and thus lynx habitat, is severely restricted on the Kenai Peninsula portion of the CNF. This needs to be emphasized in the Final EIS because most of the habitats within the CNF on the Kenai Peninsula are non-forested, the limited forested areas within the CNF on the Kenai Peninsula are limited to valley bottoms and slopes, most of these forests are mature forests which provide only poor quality habitat for snowshoe hares and hence lynx, and most of these forested valley bottoms are already dominated by highways, roads, utility corridors, residences, etc. which makes lynx that attempt to utilize them extremely susceptible to human impacts (legal and illegal harvest, road kills, etc.). Based on this knowledge, and in reference to the first sentence in the lynx section (page 3-196) lynx are probably not common within the Kenai Peninsula portion of the CNF and are probably very uncommon in those forested portions of the CNF dominated by mature spruce and hemlock forest east of Kenai Lake.

The actual distribution of adult resident lynx on the CNF on the Kenai Peninsula is therefore probably very limited and confined to only a few valleys (Kenai River, Russian River, Quartz Creek, Resurrection Creek) in the western portion of the CNF.

The lynx has recently been classified as a threatened species in the continental United States and most of the remaining lynx habitat in the western continental United States occurs on USFS lands. We recommend the actions taken by the USFS to conserve lynx in the lower 48 also be discussed, considered, and implemented in the Final EIS because of the similarities between lynx

habitat and issues on the Kenai Peninsula portion of the CNF and in the western continental United States.

Wolverine The section on wolverines (pages 3-200 and 3-201) approximately acknowledges that wolverines are extremely rare on the Kenai Peninsula portion of the CNF with estimated densities of only 5.2 wolverines/1000 km^2 (or 5.2 wolverine/386 mi^2). Wolverines are very susceptible to trapping and on the Kenai Peninsula may be a unique genetic population. These points and other human impacts on the wolverine populations within the CNF on the Kenai Peninsula should be expanded upon in the Final EIS. There may be only as many, or even fewer wolverine on the Kenai Peninsula portion of the CNF as there are brown bears. However, little is mentioned in the Draft EIS about how the preferred alternative with its prescriptions will protect wolverines.

The lack of information in the Draft EIS concerning wolves, lynx and wolverine emphasizes how little is known about these species on the CNF on the Kenai Peninsula, including their population sizes, densities, population trends, sources of mortality and condition of habitats. If the role of science is to be a critical component in alternative development (page 2-13), then monitoring and evaluation is a quality control process for implementing the Forest Plan (page 4-1 *in* CNF Forest Plan). Consequently, a more detailed monitoring process needs to be addressed in the Forest Plan and Final EIS. Without basic information and subsequent monitoring for brown bears, wolves, lynx, wolverine and other species on the CNF, the effectiveness of the implementation cannot be evaluated.

Trumpeter swan The fall migration of trumpeter swans on the Kenai Peninsula should be discussed. Trumpeter swans breed on the Kenai Peninsula, and utilize the Chickaloon Flats, among other areas, as staging areas in preparation for fall migration (Bailey et al.1988). Bailey et al. (1988) reported that fall migratory movements of radio marked trumpeter swans which nested or remained on the Kenai Peninsula in summer moved in a northeast direction west of the Kenai Mountains to the Chickaloon Flats where they abruptly turned east up the Turnagain Arm of Cook Inlet before crossing the Kenai Mountains near Portage Pass south to PWS on the CNF. Most waterfowl probably follow a similar route from Chickaloon along the coast of Turnagain Arm to Portage on their fall migration (Eldridge pers. comm.). We believe the impacts of potential utility corridors (such as electrocutions from power lines and collisions with communication/electronic towers) along swan, crane and waterfowl migration routes should be addressed and evaluated in the Final EIS.

Marbled murrelet The Draft EIS states that recent surveys suggest marbled murrelets are numerous and widespread throughout coastal waters of Alaska. However, on page 3-197, the Draft EIS states that population trends for marbled murrelet within the CNF are generally downward for the long-term, with a 67% decline since surveys were done in 1972 and 1973. This latter statement supports recent FWS surveys and preliminary analysis that there appears to be a decline in both PWS marbled murrelet population and the density of juveniles at sea. FWS believes the marbled murrelet population peaked in 1993 at 159,000 individuals, and has steadily declined since (population count in 1996 showed the marbled murrelet population at 82,000; at 53,000 in 1998; and at 54,000 in 2000. The murrelet productivity index is based on juvenile densities at sea (in late July through August) and their ratio to adults. These surveys were done

from 1994-1999 (excluding 1996). New analysis of the data indicates that juveniles had a significant negative trend during those years, which parallels the trend in adult numbers (pers com. K. Kuletz).

The Draft EIS states on page 3-258 that most recreation and tourism occurs in valleys with roads and trails, and along shorelines and concentrated uses in these areas are expected. Under the Preferred Alternative, total recreation visits are expected to be 7.2 million per year. Over a 10-year period of this Forest Plan, that equates to 72 million visits. Demand for services will most likely increase. Both highway and campground construction, including picnic areas, parking lots, and visitor centers could present threats to the marbled murrelet through loss of habitat, nest disturbance, and/or increasing potential predation from corvids associated with human activities. A better understanding of USFS activities and effects, as they relate to this species, is essential to ensure its long-term viability.

Adult mortality from both natural causes and human activities occurs in the marine environment. Marbled murrelets are adversely affected by oil and other pollutant spills. Although these spills undoubtedly harm the marbled murrelet prey base, their principal adverse affect is the death of the bird in the area of the event. Smaller incidents of oil discharge, such as cleaning bilge pumps, can cumulatively result in mortality of the birds. Net fisheries can lead to significant increases in mortality to adults, subadults, and juveniles. During a 1990-91 FWS marine mammal survey, an estimated 300-1000 marbled murrelets were recorded as being taken by nets (pers. com. K. Kuletz). We recommend the Final EIS should more thoroughly assess the short- and long-term direct, secondary, and cumulative affects on marbled murrelet populations as a result of increased recreational activities in PWS.

The Draft EIS states habitat is of sufficient quality, distribution, and abundance to allow the species to maintain breeding populations. However, the CNF Plan does not provide any standards or guidelines that prevent the loss of occupied nesting habitat, for minimizing the loss of unoccupied but suitable habitat, and decreasing the time for development of new suitable habitat. The need to maintain high quality marbled murrelet terrestrial habitat is essential. Management recommendations for the marbled murrelet need to address two different biological time frames: 1) aspects of its life history and demographic trends, and 2) the length of time required to develop the majority of new nesting habitat or improve current forest habitat conditions. Short-term actions should address the current population declines and long-term actions should address the long time-frame required to cultivate or enhance mature forest habitat conditions.

The FWS suggests that the USFS establish Standards that maintain large blocks of suitable habitat; maintain and enhance buffer habitat; and decrease risks of loss of habitat due to fire and wind throw. For long-term actions, we suggest increasing the amount, quality and distribution of suitable nesting habitat; and increase the stand size of suitable habitat to provide more interior forest conditions. Other strategies may include protecting currently unsuitable habitat to allow it to become suitable (i.e., recruitment areas), reducing fragmentation; providing replacement habitat for currently suitable nesting habitat lost to disturbance events and habitat lost to both timber harvest and previous disturbance events (mitigation). These steps are key to long-term survivability of this species and should be addressed in the Final EIS.

Northern Goshawk Northern goshawks are long-lived birds that have a low reproductive rate and occur in low densities. Reynolds (1989) found goshawks generally select mature or old-growth coniferous or deciduous forest with dense canopies, on gentle slopes, at lower elevation for nesting and foraging. Goshawks generally remain in the same area throughout the year, however, they may extend their area if prey abundance is low. Prey availability can influence nesting success and productivity.

Hall (1984) found that goshawks build large nests which are situated below the canopy of the nest tree. Literature suggest goshawks may maintain up to three or four alternative nests, which may be used in alternative years. Studies indicate goshawks may use the same nest for multiple years or build new nests in the same or different stand, or repair an old nest. Alternate nests may be loosely clustered within a single stand or widely separate in different stands (Beebe 1974, McGowan 1975, Woodbridge and Detrich 1994). Reynolds (1983) indicated goshawk home ranges may be between 5,000 to 8,000 acres. However, literature suggest that in fragmented forests, home ranges may extend up to 17,000 acres.

Studies suggest that habitat structure changes may have a direct and indirect impact on goshawk populations. Predation on nestlings is influenced by the forest structure immediately around the nest and in the landscape. Forest structure influences thermal cover, which is directly tied to energy budgets and productivity as well as the abundance and accessibility of prey. Reynolds et al. (1992) suggest focusing on desired forest conditions and links between forest structure and prey availability. Studies in Southeast Alaska suggested beach fringe (first 1,000 feet from shoreline), for example, may also be important to goshawks since the ecological interface between the marine and terrestrial environment likely supports a greater diversity or abundance of goshawk prey species.

Most experts agree that a long-term objective should be to manage or maintain suitable habitat at the landscape scale. Goodman (1987) suggests that any management that reduces habitat quality to near minimum conditions will substantially increase the probability of extinction resulting from chance environmental events or catastrophes. Habitat change also could influence adult and juvenile survival rates by changing the vulnerability of goshawks to predation or interactions with competitors. Reserves of protected habitat distributed across the landscape may be one way to ensure suitable habitat for goshawks.

The Draft EIS indicates that of the three geographic regions, PWS possesses about 354,582 acres of old growth forest, followed by Copper River Delta with 24,700 acres, and the Kenai Peninsula at 17,365 acres. The Forest-wide Guidelines suggest that an active nest will be protected, but after 2 years if it is no longer "active," protection measures for the site may be removed. The Draft EIS further states that the overall risk to northern goshawks is considered low for all alternatives and the likelihood of forest management activities affecting the viability of northern goshawks is low because the forest-wide Standards and Guidelines will protect nest sites.

It is unclear what evaluation criteria was used in the Draft EIS or what risk factors were included in this assessment. According to the Draft EIS, most forest multiple use management activities will be concentrated in the valley bottoms where most of the forested habitat also occurs. The concentration of activities in lower elevation habitats may have a significant influence on the

surrounding landscape. Management activities, other than timber harvest, can influence the abundance of principal goshawk prey species. For example, forest roads remove vegetation, initiate secondary succession, and affect vegetation in plant communities along roadways and in adjacent stands. These competing activities may impact old growth forest thus reducing even further, the extent and amount of this limited habitat.

Furthermore, the we point out that there are no standards for goshawk nest protection, only guidelines. Guidelines are an advisable course of action that "may be followed," but are optional. It is unclear how such guidelines, if they are optional, will adequately protect the individual species or maintain a viable, well-distributed population throughout the CNF. We believe specific goshawk nest site management guidelines are unsatisfactory because their success as a conservation strategy is dependent upon locating goshawk nests, which has proven to be difficult. We encourage the USFS to develop a habitat management strategy to maintain long-term, well-distributed goshawk populations. The Final EIS and Standards and Guidelines should address this issue in more detail.

Queen Charlotte Goshawk Over the last decade the Queen Charlotte Goshawk (*A. g. laingi*) has received much attention. The Queen Charlotte Goshawk is believed to breed primarily in Southeast Alaska, but may extend as far north as PWS in Southcentral Alaska (Jones 1981). At this time it is unknown if the Queen Charlotte goshawk occurs in PWS. We encourage the USFS to conduct further research to determine if the Queen Charlotte Goshawk range does extends to the PWS area.

Black Bears We believe that more discussion of black bears and impacts to them should be incorporated into the Final EIS.

Fisheries The Draft EIS states that several past gravel operations have been used to create ponds for fisheries enhancement (page 3-38). Heavy equipment, vehicles, and other machinery are typically staged in or around such areas. Equipment can contribute to incremental releases of hydrocarbons through chronic or passive leaks or as a result of line breaks. Such releases could potentially contribute to surface and ground water contamination and may adversely affect fish and other aquatic resources. It is unclear from this assessment if the USFS conducted chemical analyses to determine if contaminants were present before fish were allowed to enter the reclaimed area, and what measures will be required for future "ponds." Most importantly, the USFS should detail how successful such activities have been, and should develop definable, measurable forest-wide Standards and Guidelines and management prescriptions to address such practices and ensure that fishery goals are met, or where they are not, to provide for subsequent modifications to better meet these goals. This will ensure forest-wide consistency with implementation and ensure water quality, and fish and macroinvertebrate populations are adequately protected.

Implementation of Best Management Practices (BMPs) for road construction and other forest activities may not ensure that the Alaska Water Quality standards will be met. A report to Congress, Anadromous Fish Habitat Assessment (1995), concluded that BMPs employed across the Tongass National Forest were inconsistently applied and failed to adequately protect water quality and fish habitat. The Draft EIS did not indicate if BMPs have been closely reviewed and

what measures have been employed to ensure they are correctly and consistently applied across the CNF. We suggest the Final EIS correct this oversight and include in the discussion: techniques utilized, areas represented, attributes being monitored and resulting trends.

The Draft EIS, on page 3-92, states fish habitat standards and guidelines are based in part on the stream class. There are approximately 3,277 miles of class I streams, 1,435 miles class II, and 4,000 miles of Class III streams. We recommend additional protective measures be required for Class II, Class III, and Class IV streams in order to minimize downstream water quality and aquatic habitats impacts. Headwater areas can greatly influence downstream fish habitat capabilities. The lack of buffers on class II, III, and IV streams, as well as unclassified channels, is a significant problem that can adversely affect fish habitat through the loss of a long-term supply of large woody debris, and changes in energy sources and nutrients that can degrade downstream fish habitats. We recommend the Final EIS include adequate buffer measures to protect Class II, Class III, and Class IV streams. In addition, we believe lakes, regardless of their size, deserve full riparian protection to maintain water quality standards.

Subtidal/estuaries/wetlands There are approximately 2,219,497 acres of subtidal, deepwater estuarine, and marine wetlands (i.e., PWS and Turnagain Arm) within the CNF legislative boundaries. The USFS states it does not generally manage these wetlands. While in many cases there has been an understanding to agree to disagree on ownership of submerged lands between federal land management agencies and the State of Alaska (State), the 1992 Memorandum of Understanding developed between the State and the USFS established that the State would manage from the current mean high tideline seaward. It is our understanding that the Turnagain Arm and Chickaloon Bay tidelands are within the CNF. In 1980, ANILCA transferred the Indian Creek area and the eastern portion of the Chickaloon estuary of the CNF to the Kenai NWR. These areas and the remainder of the Chickaloon estuary were later recommended for Wilderness designation by the Refuge's Comprehensive Conservation Plan, primarily to protect its outstanding wildlife values. The CNF lands transferred in 1980, and the subsequent Wilderness proposal included lands down to the mean high water.

The mud flats and intertidal area remaining in CNF between the Refuge lands from mean high water upland and the historical CNF boundary at low water are critical wildlife habitat that are essential for migratory bird feeding and resting and to upland wildlife that feed and travel along the intertidal areas. The Chickaloon Bay portion of these shared resource values were formally recognized by Kenai NWR, CNF, Alaska Departments of Fish and Game, and Alaska Department of Natural Resources (ADNR) in a 1972 Memorandum of Understanding (MOU). It appears consistent with the 1972 MOU and recent CNF-ADNR MOU to include within the final alternative an appropriate color coded/numbered management unit for these forest tidelands. An additional 6 miles of intertidal estuary within CNF from Burnt Island to ½ mile east of Johnson Creek along Turnagain Arm is also directly adjacent to the Refuge Wilderness proposal and was not originally included in the MOU lands. These lands should be provided the same level of protection as those lands defined under the MOU and identified and evaluated in the Final EIS. We recommend that all of the Chickaloon Bay tidelands be prescribed the most protective management prescription possible to protect this extremely valuable resource.

A Supreme Court decision (U.S. vs Alaska), in 1997, concluded that federal withdrawals or proclamations were adequate to demonstrate federal intent to retain submerged lands, provided the submerged lands were required to fulfill federal management purposes. The USFS is encouraged to provide oversight to ensure measures are in place so that long-term viability of subtidal, deep estuarine, and marine habitats within the CNF boundaries are not compromised. A multi-agency task force may be a vehicle in which to establish parameters for evaluating activities and for monitoring impacts. We believe that if these areas are not adequately protected over time, viability of these aquatic ecosystems may be severely compromised.

Effects of Snowmobiles (also includes jet ski and all-terrain vehicles) Snowmobiles are currently equipped with two stroke engines. These engines discharge up to one third of their fuel unburned into the environment. In a notice filed this year by the Environmental Protection Agency, it estimated snowmobiles and all-terrain vehicles produce 1.1 million tons of hydrocarbons a year, or 15 percent of all that is emitted from mobile sources, including cars, trucks, airplanes, locomotives and lawnmowers. Furthermore, by 2010, that share is expected to increase to 19 percent. According to engine data from the California Air Resources Board, one hour of two-stroke engine use produces more smog-forming pollution than a modern car creates in one year (CARB Data). Concerns with such discharges are associated with the effect of toxic emissions on air and water quality and direct discharge into the environment.

Studies confirm that water quality and the marine ecosystem can be affected by toxins released by snowmobiles. Ingersoll and associates (1997) found air pollution around trail heads and snowmobile corridors, that often run along rivers and streams, can increase the acidic and toxic concentrations of nitrogen, sulfate and hydrocarbon compounds in snow. The elevated levels of NOx can contribute to acid rain and acid snow. This release of pollutants may have far reaching consequences for surrounding watersheds. Particulate matter emissions from snowmobiles may be another concern as it relates to human health (i.e., respiratory problems).

Snowmobiles contribute to direct and indirect wildlife impacts. Direct impacts include harassment, chasing, and killing of wildlife. During winter, when energy expenditure is extremely important to an animal's survival, an additional stressor such as being chased, or even the noise produced by snowmobiles, can affect an animal's energy balance. Indirect impacts include disruption in population dynamics, movement and distribution patterns, and habitat use. Wildlife that take advantage of snowmobile groomed trails are at a tremendous advantage over those that do not, which can have a significant effect on predator-prey relationships. Brown bears, wolves, bald eagles, and lynx have been found to be adversely impacted by snowmobiles (NPS 1990).

Schmid (1972) found compaction on off-road trails had serious adverse impacts on small mammals living beneath the snow. Their habitat can be compacted by the grooming of trails or by creating a packed trail on ungroomed trail. Compaction can result in habitat fragmentation and induce suffocation and death of small mammals. Snow compaction can also affect vegetation productivity and growth, organic matter decomposition, humus formation, and microbial activity, by decreasing soil temperature and slowing snow melt (Aecium 1980; Keddy et al. 1979). On the Kenai Peninsula, for example, it is not uncommon to see traces of snowmobile trails long after most snow has melted each spring.

Snowmobiles also disrupt the peace and quiet valued by many non-motorized users. Studies conducted at Voyageurs National Park documented that a single snowmobile could be detected from a distance of 400-600 feet depending on the terrain (flat, rolling) and noise from five snowmobiles could be detected at a distance of 800-1,000 feet (Mestre Greve Assoc 1992). Another significant issue is the injury and death caused by snowmobile-triggered avalanches. This may be the result of increase in snowmobile power, and advancements in technology that allow snowmobilers to travel to previously inaccessible avalanche-prone terrain.

The Draft EIS acknowledges adverse effects from snowmobiles, but states they are generally limited to areas of access. Further, it states that adverse impacts can include vegetation damage, and soil compaction when used during times of inadequate depth of snow. We recommend the Final EIS discuss potential impacts to air and water quality, wildlife, and human health. Since most of the proposed snowmobile activity identified under the Preferred Alternative would take place on the Kenai Peninsula, we believe the Final EIS should address the direct and cumulative affects this activity would have on this area. Furthermore, the Final EIS should reexamine the potential direct and cumulative impacts caused by snowmobile use in the CNF, specifically on the Kenai Peninsula, and establish appropriate standards and guidelines to monitor these effects.

Water Quality Page 3-27, Surface Water Quality; and Page 3-29, Groundwater Sections: we concur with Draft EIS statements that water pollutants, such as petroleum and other lubricants, as well as hardrock mining acid drainage, can be of concern. USFS audits have found elevated levels of trace and heavy metals (mercury) in several old hard rock mines. In view of this information, the Final EIS should explain the conclusion included here that past management activities have not adversely affected groundwater. The Final EIS should include the type and level of analysis the USFS has conducted to date, including the number of surface and groundwater sites sampled and trends. According to the Draft EIS, the number or level of mining operations will not vary by alternative. Because most past mining operations have been concentrated on the Kenai Peninsula and most likely, this trend will continue, diluted by appearing to apply on a Forest-wide scale. The Final EIS should address this issue in detail.

Best Management Practices (BMPs) We recommend the Final EIS discuss how well, or to what extent, BMPs are being implemented across the CNF and to what extent they are effective in protecting waterbodies. The Draft EIS lacks meaningful discussion of results from past and ongoing annual BMP Monitoring Reports. It is unclear in the analysis if BMPs are consistently applied CNF-wide and what the BMP effectiveness monitoring results are to date.

SPECIFIC COMMENTS
DRAFT ENVIRONMENTAL IMPACT STATEMENT

Page 2-9, line 263 This summary of the Brown Bear Core Management Area prescription, ". . .to maintain landscapes and their associated ecological processes to provide habitat for brown bears..." does not seem to coincide with the more detailed description of this prescription in the Forest Plan. The detailed version allows human developments for the purpose of reducing bear/human interactions, when those very developments could result in increased bear/human interactions. We suggest the two versions be reconciled.

Page 2-15 and 2-16, Table 2-4 and Figure 2-2 The information summarized in this table and figure is inaccurate/misleading because it appears to be based on categorizing land status in a manner inconsistent with the definitions provided for Categories 1-5. As a result, we believe this table and figure gives the reader the false impression that the preferred alternative largely advocates land management which will result in little human influence to wildlife and other natural resources. For example, in the Brown Bear Core Management Areas prescription, identified as category 2, the following would be permitted: managed vegetation, campgrounds, roads, trails, large groups (up to 100 people), high concentration of users, developed sites, motorized use, minor tourism developments, hardened campsites, historic structures, cabins (both existing and new), utility corridors, power generation facilities, power transmission lines, administrative facilities, and geophysical prospecting. According to Table 2-4, many, if not all, of these activities are more appropriately classified as Category 4 or 5. If other category 2 prescriptions in the document are proposed to allow similar intensive human uses, then it would be expected that the preferred alternative could turn the CNF into a heavily impacted area more accurately described as a Category 4 or 5 region, where conservation of fish and wildlife could become increasingly problematic. It appears that the descriptions of the "low human impact" categories (i.e., category 2) allow for a great deal of impacts, yet the "high human influence" categories (i.e., category 4 and 5) do not provide for mitigation or lessening any of the impacts to wildlife. In summary, (a) wilderness is the prescription that is clearly "wildlife friendly," and (b) the definition standards appear to be inconsistently applied, resulting in a misrepresentation of impacts associated with the preferred alternative. We recommend this be corrected.

Page 3-17, line 462-463 The Preferred Alternative is grouped with those alternatives that would provide for the most new trail construction. Most trails would be constructed on the Kenai Peninsula. We recommend that any new trails be located away from high use brown bear areas and other sensitive habitats. Trails should be located in the high country and not along anadromous fish streams with thick riparian cover. A policy for closing trails (on a temporary basis) when bear use is high should be discussed in the Final EIS.

Page 3-17, Table 3-5 Under the preferred column, we suggest summer trails and non-motorized acres be separated.

Page 3-19, Cumulative Effects Section The Draft EIS states that soil disturbance from the construction of camp and cabin sites would be insignificant when compared to roads and trails, and that these proposals have not been included in the analysis. The purpose of cumulative effects analysis is to assess all potential impacts, including activity impacts that individually are

small, but collectively can be significant. As the demand for recreational cabins and campsites increases, soil productivity will decrease and/or be lost. The Final EIS should reflect this.

Page 3-26, Lines 724-729 The CNF is subdivided into 94 watershed associations. These watersheds range in size from about 30-240 square miles, and are about the size of 5th level watersheds under the Natural Resources Conservation Service (NRCS) national program. According to NRCS, a 5th level sub-watershed ranges from 3,000-40,000 acres. NRCS also indicated that initially its Hydrologic Unit Code (HUC) was not implemented in Alaska because the cost in time and money was extremely high. However, according to NRCS, all federal agencies are now required to do their planning based on hydrologic units. In addition, NRCS indicated that the USFS system, at the present, may not meet the national guidelines established (pers. comm. H. Cook, NRCS). We believe this issue needs further discussion in the Final EIS.

Page 3-38, Lines 1240-1242 Placer miners are required in some cases to use settling ponds, and to rehabilitate and revegetate mined areas. We suggest the Final EIS describe the level of compliance the USFS has obtained from placer miners to date and describe how management Standards and Guidelines could be revised in the future to ensure measures are being monitored and standards are being met so as to mitigate adverse impacts.

Page 3-63, Line 666, Table 3-21 The Final EIS should include information on how each species was rated for use in the species diversity matrix; for example, how was a species ranked as 0, 1, 2 or 3, and what were the criteria for that ranking.

Page 3-65, Table 3-22 For clarification, we suggest footnotes be added in the table and correlated with the text at the bottom of the table.

Page 3-67, Lines 721-722 We request that a reference be identified in the Final EIS to validate the statement, "alterations from timber sales or other forest management activities are temporary." We believe some alterations may not be temporary; the disturbance or interaction with other biotic or abiotic factors can cause an entirely different forest stand to develop in its place (i.e., Mystery Creek mechanical crushing in the 1970's regenerated more spruce than the preferred broadleaf species, since browsing intensity on birch saplings by moose was high).

Page 3-83, Line 1151 Other general effects of fragmentation which we suggest adding to the Final EIS include an increase in generalist species which are more resilient in patchy habitats. Also, edges can have negative consequences for wildlife by modifying distribution and dispersal of wildlife, and by increasing incidence of nest predation and parasitism.

Page 3-84, Line 1229 Road construction would lead to an increase in human access. We suggest expanding this discussion in the Final EIS because increased use may cause diverse and persistent ecological effects. Roads and trails increase access and increase the efficiency of natural resource exploitation. Roads open up areas to increased illegal poaching and legal hunting, and have been shown to reduce population sizes of many species including brown bears, Canada lynx, wolves, and black bears. Roads also increase both legal and illegal fishing in streams and lakes. Other obvious and sometimes subtle ecological effects are discussed by Trombulak and Frissell (2000).

Page 3-86, Figure 3-10 Individual species are not identified and the Y-axis is not marked. The Final EIS should clarify whether the Y-axis relates to species richness and whether species richness is based on the percent of the category 1, 2, 3, 4, or 5 prescription.

Page 3-142, Line 3334 Since road construction can also lead to introduction of invasive species (e.g., weeds, northern pike, etc), we suggest this be added to the discussion in the Final EIS.

Page 3-184, Line 4109 The Final EIS should clarify whether the use of a "viability analysis" is in reference to a "population viability analysis." If so, then a minimum viable population (MVP) should also be defined. A generally regarded definition of MVP is the smallest discrete population having a 99% chance of remaining extant (alive) for 1,000 years despite the effects of demographic, environmental, genetic and catastrophic events (M. Shaffer. 1981. Bioscience).

Page 3-188, Table 3-45: Management Indicator, Sensitive, and Species of Special Interest We recommend switching marbled murrelet to the "TES" column. It is a seabird unique in its upland habitat and the most abundant summer breeding seabird in PWS. The population appears to be in decline in PWS, and marbled murrelet is a listed species in Washington, Oregon, and California. In addition, the murrelet is dependent on old-growth forests for nesting.

To ensure that management indicator, sensitive, and species of special interest within the CNF are adequately represented through use of USFS evaluation species models, we recommend adding the following species to this table: Kittlitz's murrelet, Tule greater white-fronted goose, a shorebird species that utilizes significant intertidal habitats within CNF (e.g., surfbird, western sandpiper, dunlin), and sea otters; and evaluating them in the Final EIS.

Kittlitz's murrelets nest on the ground on or near mountain tops in unvegetated scree fields and sometimes in cliff faces, particularly near glaciers and in previously glaciated areas. These birds forage in the summer near tidewater glaciers and glacial stream outflows. PWS and Kenai Fjords are key breeding areas. The species is presumed to winter over the open ocean; however, little is known about their winter range. We are concerned about Kittlitz's murrelet because of its patchy distribution, rare status (approximately 20,000 or less world-wide), and downward population trends. The population has declined in PWS by approximately 95% since the 1970s, including declines since 1989 (Kuletz pers. comm. 2000). Threats to the bird's survival include global warming, oil spills, gillnet fishing bycatch, and potential boat disturbances within their summer foraging areas around tidewater glaciers. Because they are strongly associated with tidewater glaciers, there is potential for impact or disturbance from tourism, because most tour cruises visit these same glaciers. The species was formerly classified as a, "Species of Special Concern" by the FWS. However, this classification no longer exists under the Endangered Species Act (Day et al. 1999). We recommend adding Kittlitz's murrelet to the "TES" section.

The Tule greater white-fronted goose is one of the rarest waterfowl in North America, with a population of less than 8,000 birds. A major portion of the species' population stages in a restricted wetland complex adjacent to the Gandil River, which is used heavily by moose hunters. The Bering Coal Fields, where coal extraction may occur, are located approximately 20 kilometers upstream from the birds' Gandil staging area (Ely 2000). We recommend adding the Tule greater White-fronted goose to your "TES" list.

In addition, a shorebird species such as the surfbird, dunlin, or western sandpiper that represents habitat use of significant shorebird intertidal feeding and migration areas occurring in areas like

We also believe that sea otters should be included as a species of special interest because of their presence throughout PWS; their status as a "recovering," but not yet fully recovered species relative to the EVOS; and the fact that sea otters are a subsistence-harvested species. Sea otters occupy the nearshore intertidal areas, which results in them having a relatively high potential for interaction with related recreational activities and shoreline development. In addition, a paragraph should be included on sea otters in Chapter 3, as for the other species of special interest.

Furthermore, we recommend Northern Montague Island and Copper River Delta be included as management indicator species locales and that brown bear should be switched to the SSI column.

Page 3-190, Table 3-47 The additional "TES" species identified in our comment, above, about Table 3-45 should also be included in this table. Habitat associations and relative importance for Kittlitz's murrelet include moss-lichen (for rocky slopes above tree line) = low, Tidal Estuarine = moderate/high, Alpine = high, and sheltered inshore waters = high. We recommend changing the following habitat importance for wolf in Forested (denning habitat) and scrub (increased abundance of prey) from "moderate" to "high." We also recommend adding "moderate" for habitat importance in riparian areas for trumpeter swans. Also, remove black oystercatcher from "tidal/estuarine," and change Townsend's warbler in "riparian" to low and in "scrub" to low.

Page 3-191, Management Indicator Species As stated in comments above, about Table 3-45, we recommend adding an indicator shorebird species such as the surfbird, dunlin, or western sandpiper that represents habitat use of significant shorebird intertidal feeding and migration areas within the CNF. Also, on line 4299 insert "breeding" between abundant and species.

Page 3-195, line 4483 A citation should be included with the estimate of high density (0.1 adult wolf per mile squared), which is stated as being at a saturation point.

Page 3-196, Line 4532 Since marbled murrelets are much larger in mass than robins, this sentence should be changed to read "The marbled murrelet is a small alcid that weighs approximately 230 grams."

Page, 3-197, Lines 4546-4556 We believe this paragraph needs to be updated in the Final EIS. Lines 4546-4551 should be deleted and replaced with: "The most recent surveys (1998 and 2000) show the marbled murrelet PWS population at ~ 53,000 birds. After a 1993 peak of 159,000, marbled murrelets have declined. Population estimates were ~ 300,000 in 1972, ~107,000 in 1989, 106,000 in 1991, 159,000 in 1993, 82,000 in 1996, 53,000 in 1998, and 54,000 in 2000. Surveys of juveniles at sea also indicate a decline since 1994, parallel to total population estimates (Kuletz 2000)."

We recommend removing "cyclic" which proceeds "changes in marine food . . ." in line 4552 because the FWS does not know definitively if the food sources are truly cyclic. In line 4553 remove "likely" preceding . . . "their primary nesting habitat."