United States
Department of
Agriculture

Forest
Service

Alaska Region

Chugach
National
Forest

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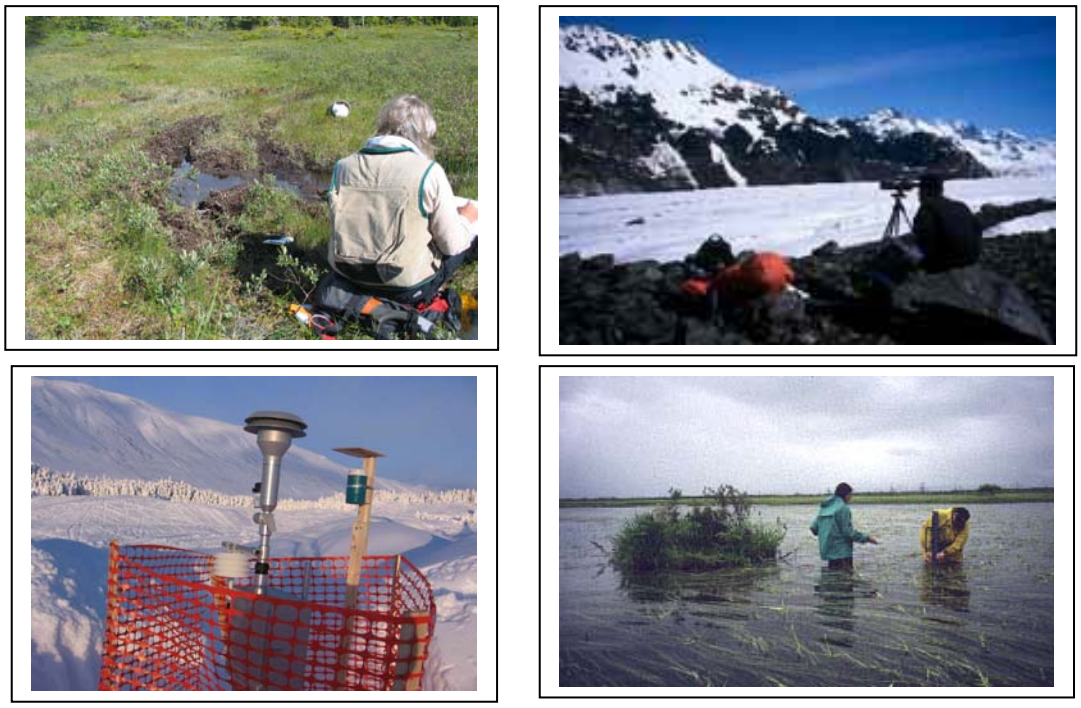
CHUGACH NATIONAL FOREST



Monitoring off-highway vehicle use, goats, air quality, and dusky Canada geese on the Chugach National Forest (clockwise from top left).

Five-year Forest Plan Monitoring and Evaluation Report

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EXECUTIVE SUMMARY

The Forest Plan and subsequent documents established 43 general monitoring questions for the Chugach National Forest. This includes three questions added after the Plan was published, including one left out inadvertently and two added as a result of appeal decisions. A summary of the cumulative results for 5 years of monitoring and evaluation of the Forest Plan are displayed in this report for each question. Some of the questions have not been monitored as scheduled because monitoring protocols were not yet complete or approved, or due to a lack of funding.

The purpose of the Five-year Monitoring and Evaluation report is to: (1) determine if there is a need to change the Forest Plan or the implementation of the Forest Plan as a consequence of the evaluation of the monitoring results; (2) determine if there is a need to change the monitoring questions or protocols to insure that we are getting the results we need to address the issues raised in the monitoring questions and (3) determine the adequacy of the annual reports in meeting their intended purpose and identify modifications to improve their usefulness.

The purpose of this review is to provide a summary of the cumulative results for the five years of monitoring and evaluation of the Forest Plan. This report covers the first five years of Forest Plan implementation and monitoring, beginning with the signing of the Record of Decision on May 31, 2002 and ending in September 30, 2007.

DETERMINATION

I have reviewed this Five-year Forest Plan Monitoring and Evaluation Report for the Chugach National Forest. Under laws and regulations in effect at the time the Forest Plan was revised (May 31, 2002), a forest plan is generally revised every 10 to 15 years, or whenever the Forest Supervisor determines that conditions or demands have changed. There is evidence some of the monitoring questions may need to be revised, and in some instances dropped. The Forest Plan monitoring strategy will require finalization of the remaining monitoring protocols and due diligence regarding execution of the forest plan monitoring program. However, based on the evaluation of the monitoring results described in this document, I am satisfied that the revised Forest Plan is sufficient to guide management of the Forest and have determined that there is no need to change the Plan at this time. Furthermore, I am satisfied that the monitoring questions and protocols are being adequately reviewed and revised to address the critical issues raised during the development of the Forest Plan; and, that the annual monitoring and evaluation reports are designed to meet their intended purpose. This report is approved.

/s/ Nancy Peak _____ 05-11-10

NANCY PEAK Date

Acting Forest Supervisor

INTRODUCTION

This is the five-year monitoring and evaluation report for the Chugach National Forest Revised Land and Resource Management Plan (Forest Plan). The Forest Plan provides guidance for all resource management activities on the Chugach National Forest. It does this in part by establishing Forest-wide goals, objectives, and management direction. The monitoring and evaluation process is used to ensure that Forest Plan direction is being implemented, is effective, and is not causing effects that were not predicted in the Forest Plan's Final Environmental Impact Statement (FEIS). The evaluation process is also used to assess progress in achieving the desired conditions, goals, and objectives, and to verify that assumptions made in the Forest Plan and FEIS are valid.

The Forest's monitoring and evaluation strategy is located in Chapter 5 of the Forest Plan. The strategy outlines the basic elements of the monitoring program, establishes a Monitoring and Evaluation Interdisciplinary Team (MEIT), and defines 40 key monitoring questions. Three questions were added after the Forest Plan was published, resulting in 43 items to be monitored. The three additional questions included one left out inadvertently (monitoring of mountain goat, a management indicator species), and two added as a result of appeal decisions (air quality and summer off-highway vehicle (OHV) use). All Forest Plan monitoring is directed toward answering these 43 general monitoring questions.

The MEIT developed protocols with specific monitoring details for many of the general questions. Some protocols are currently being revised. Until this effort is complete, monitoring efforts may be minimal or non-existent for many items. Protocols are documented in the Monitoring Guide and their revision occurs outside of the forest planning process in order to be responsive to the best available science. A copy of the most current Monitoring Guide can be obtained from the Supervisor's Office.

The Record of Decision (ROD) for the Forest Plan acknowledged a need for obtaining information about the effects of winter snow machine use on ungulates and bears. The Forest regards this as a study to address specific informational needs, not as Forest Plan monitoring; therefore, no information is presented in this document on this subject.

The purpose of this review is to provide a summary of the cumulative results for five years of monitoring and evaluation of the Forest Plan. The results are displayed in this report for each question. Using these results, the objective is to: (1) determine if there is a need to change the Forest Plan or the implementation of the Forest Plan as a consequence of the evaluation of the monitoring results; (2) determine if there is a need to change the monitoring questions or protocols to insure that we are getting the results we need to address the issues raised in the monitoring questions and (3) determine the adequacy of the reports in meeting their intended purpose and identify modifications to improve their usefulness.

MONITORING QUESTIONS AND EVALUATION

A summary and evaluation of the monitoring results for the first five years of Forest Plan implementation for all monitoring questions are included in this report. Some questions have not been monitored according to the schedule in the Forest Plan. Reasons precluding monitoring were: (1) monitoring question under review; (2) monitoring protocol under development; and (3) lack of funding. The Chugach Forest Plan Monitoring and Evaluation Strategy describes the ranking criteria and process used. A copy of the table that summarizes the results is included as Appendix A.

The general monitoring questions are grouped by monitoring purpose or applicable resource category (e.g., soil resources), and are in the same order as presented in Chapter 5 of the Forest Plan. The ranking of the top 30 questions is shown (1 being the most important). The three items that were added after the Plan was published are listed under the "Additional Questions" category.

For each general monitoring question, the frequency (i.e., schedule) of data collection and evaluation are displayed as presented in Chapter 5 of the Forest Plan. The schedules represent expectations under maximum funding levels. In some cases, the collection and evaluation frequencies in the Forest Plan are different than what is shown in the draft Monitoring Guide. Although the schedules in the Monitoring Guide are more appropriate, they have not yet formally replaced the schedules established in the Forest Plan.

A Forest Plan Monitoring and Evaluation Status Table located on page 46 displays the planned and actual monitoring and evaluation by fiscal year from 2003 to 2007 (FY03-FY07).

Compliance with Revised Forest Plan

Are projects being implemented consistent with the Forest Plan direction?

- **Frequency of collection and evaluation:** Once every 5 years / 5th year
- **MEIT Ranking: 4**
- **Status as of FY07:** No monitoring or evaluation occurred while protocol was being developed. Monitoring is scheduled to take place during the summer of 2008.
- **Any need to change Forest Plan or implementation of Plan?** No information available to make determination.
- **Any need to change monitoring protocols or question to be sure we are getting information we want?** Protocol was completed and approved by the Forest Leadership Team (FLT) in FY07.
- **Are the reports adequate or are any modifications needed?** None to review.

Integrated Effectiveness/Validation Monitoring

Are management activities achieving their intended outcomes?

- **Frequency of collection and evaluation:** Annual / 5th year
- **MEIT Ranking: 10**
- **Status as of FY07:** Not monitored (monitoring question being reviewed).
- **Any need to change Forest Plan or implementation of Plan?** No information available to make determination.
- **Any need to change monitoring protocols or question to be sure we are getting information we want?** Monitoring question is being reviewed. At this time no protocol is being developed.
- **Are the reports adequate or are any modifications needed?** None to review.

To what extent is ecosystem composition and structure changing and has forest management influenced these changes? How do these changes compare to the expected range?

- **Frequency of collection and evaluation:** Annual / 5th year
- **MEIT Ranking: 15**
- **Status as of FY07:** The protocol is being finalized and includes two methodologies:

  1) Forest Inventory and Analysis (FIA) grid inventory for Forest-wide and by geographic area interpretations. A subset of the grid is sampled annually by PNW Research. Interpretations of the initial repeat measurement data by the Chugach is projected to occur by the end of FY08.

  2) Analysis of multi-temporal, multi-spectral, satellite imagery for Forest-wide, geographic area, and management prescription category interpretations. Currently an initial pilot application of the methods on the Chugach is under way with assistance from the Remote Sensing Application Center.
- **Any need to change Forest Plan or implementation of Plan?** Initial summary interpretations of the monitoring data will not be available until late 2008. So the information is not presently available to make determination.
- **Any need to change monitoring protocols or question to be sure we are getting information we want?** The Monitoring and Evaluation Interdisciplinary Team (MEIT) interpreted the monitoring question to be “Is Forest Management influencing changes in ecosystem composition and structure outside the expected range of variability?” Refinement and pilot testing of the proposed protocol is ongoing. Anticipated completion is late in calendar year 2008. When the protocol is approved, the monitoring question will be revised in the Forest Plan to reflect MEIT recommendations. Reevaluation of the protocol will occur every 5 years beginning in FY12.

- **Are the reports adequate or are any modifications needed**? None to review.

Soil Resources

What is the level of ground disturbing activity?

- **Frequency of collection and evaluation:** Annual / 5th year
- **MEIT Ranking: 21**
- **Status in FY07:** No monitoring or evaluation has occurred, protocols are being developed. Anticipated completion date is FY08. The protocols will include both implementation and effectiveness monitoring and will address ground disturbing activities including off-highway vehicle use.
- **Any need to change Forest Plan or implementation of Forest Plan?** Summary interpretations are not yet available to make a determination. Initial interpretations are expected in FY09.
- **Any need to change monitoring protocols or question to be sure we are getting information we want?** Monitoring protocols are expected to be approved in FY08. The need to make any changes will be assessed after interpreting the monitoring data using the approved protocols.
- **Are the reports adequate or are any modifications needed?** The existing reports are adequate for the legacy data.

Water Resources

What is the existing water quantity?

- **MEIT Ranking: 30**
- **Status as of FY07:** This question was determined to be a research question and not a Forest Plan monitoring question. As a result of this determination, it was dropped from the monitoring strategy.
- **Any need to change Forest Plan or implementation of Forest Plan?** An amendment of the Forest Plan monitoring strategy is needed to reflect this decision.
- **Any need to change monitoring protocols or question to be sure we are getting information we want?**
- **Are the reports adequate or are any modifications needed?**

Are Best Management Practices (including wetland management) effective in meeting water quality standards?

- **Frequency of collection and evaluation:** As scheduled/ 5th year
- **MEIT Ranking: 26**
- **Status as of FY07:** No monitoring or evaluation has occurred, pilot protocol completed and approved by FLT in November 2007.
- **Any need to change Forest Plan or implementation of Plan?** No information available to make determination.

- **Any need to change monitoring protocols or question to be sure we are getting information we want?** Pilot protocol approved by FLT in November 2007. Protocol may need to be modified in the future in order to conform to the new national Forest Service Best Management Practice monitoring protocol (national protocol is in development, scheduled to be completed in 2009).
- **Are the reports adequate or are any modifications needed?** None to review.

Sensitive and Exotic Plant Species

What is the abundance and distribution of sensitive plants in areas affected by management activities?

- **Frequency of collection and evaluation:** Annual / 5th year
- **MEIT Ranking: 28**
- **Status as of FY07:** Sensitive plant species have been inventoried in project areas, but not monitored or evaluated. The protocol is being developed and includes two methodologies:

  1) Review and verification that biological evaluations (BE) were completed for all projects with potential effects on sensitive plants. If the BEs are completed and proper mitigation measures are followed, then, by inference, there will be a low probability that Forest management activities will contribute to a trend towards federal listing or cause the loss of viability of populations or species. Under this protocol, the proponents of any project listed in the Forest Service corporate Planning, Litigation, and Appeals System (PALS) that has potential effects on sensitive plants but that has not undergone biological evaluation would be notified of the requirement to complete a BE. If the BE is not completed in a timely manner then management action may be invoked.

  2) Sensitive plant population monitoring that included three components: a) sampling known populations of sensitive plants in areas of active management activity, b) collecting species data from the sampled populations following the Forest Service corporate Threatened, Endangered, and Sensitive Plant (TESP) Survey and Element Occurrence methodology, and c) analyzing the data collected using methods documented in Elzinga et al. (1988). Results having the greatest concern to management are those where the calculated P value from the significance test used is less than 0.20. However, the sample size for the sensitive plant population monitoring dataset is presently insufficient for significance testing.
- **Any need to change Forest Plan or implementation of Plan?** The monitoring protocol has not yet been implemented, so no information available to make determination.

- **Any need to change monitoring protocols or question to be sure we are getting information we want?** The MEIT interpreted the monitoring question to be "Are Forest management activities contributing to changes in the abundance and distribution of sensitive plant populations?" Protocol has been through final review and has an anticipated completion date of September 2008. When the protocol is approved, the monitoring question will be revised in the Forest Plan. Reevaluation of the protocol will occur every 5 years beginning in FY12.
- **Are the reports adequate or are any modifications needed?** None to review.

What is the distribution and abundance of exotic plants, particularly in areas affected by management activities?

- **Frequency of collection and evaluation:** Annual / 5th year
- **MEIT Ranking: 27**
- **Status as of FY07:** Exotic (i.e., non-native) plants have been inventoried in many areas across the Forest (Arhangelsky 2007; DeVelice et al. 1999; DeVelice 2003; Duffy 2003) and monitoring of a subset of inventory and treatment sites has occurred (R.L. DeVelice, unpublished data). Summary evaluation of these data shows that most areas of exotic plant occurrence on the Forest are in areas of intensive human-caused disturbance and that the abundance and distribution of exotic plants is increasing. The exotic plant protocol is being finalized and includes six methodologies (in all cases, results having the greatest concern to management are those where the calculated P value from the significance test used is less than 0.20):

  1) Forest Inventory and Analysis (FIA) grid inventory. A subset of the grid is sampled annually by Pacific Northwest (PNW) Research and will provide an overall estimate of invasive plant occurrence in forested areas across the entire Forest (which is about 99% roadless with relatively rare occurrences of invasive plants in the roadless portions to date).

  2) Quarter-mile road surveys (Arhangelsky 2007) every five years will provide repeatable measures of invasive plant occurrences across a portion of the Forest that has been found to have the greatest diversity and concentrations of invasive plants.

  3) Trail surveys (DeVelice 2003) every five years will provide repeatable measures of invasive plant occurrences across a portion of the Forest that has been found to have high diversity and concentrations of invasive plants.

  4) Developed site monitoring (following NRIS Invasives protocol[1]).

[1] http://www.fs.fed.us/emc/nris/products/invasives/index.shtml

5) Exotic plant control project monitoring (following NRIS Invasives protocol).
6) Implementation monitoring using the protocol for the monitoring question which asks “Are projects being implemented consistent with the Forest Plan?”

- **Any need to change Forest Plan or implementation of Plan?** The Forest Plan goal to “reduce areas of current infestation” of exotic plants is not being fully met with using the currently employed manual treatments. Effectiveness of manual treatments in reducing exotic plant populations in 2007 ranged from 15 to 100% with a mean of 72.8±25.1 (n=95). An environmental analysis for use of an integrated pest management approach (including chemical and perhaps thermal methods) for a project on the Glacier Ranger District (RD) is underway to increase treatment effectiveness.
- **Any need to change monitoring protocols or question to be sure we are getting information we want?** The MEIT interpreted the monitoring question to be “Are Forest management activities contributing to changes in the abundance and distribution of invasive plant populations?” The protocol’s anticipated completion date is by the end of FY08. When the protocol is approved, the monitoring question will be revised in the Forest Plan. Reevaluation of the protocol will occur every 5 years beginning in FY12.
- **Are the reports adequate or are any modifications needed?** None to review.

Management Indicator Species

What are the population trends for Management Indicator Species (MIS) and their relationship to habitat? Are MIS truly reflective of all fish and wildlife species on the Forest?

- **MEIT Ranking: not in top 30**
- **Status as of FY07:** The MEIT assigned low priority to this item because: (1) the first component is redundant with the general monitoring questions for specific MIS, and (2) the second component is more appropriate as a research item than a monitoring question. In 2007, the Forest Leadership Team agreed and recommended dropping the question from the monitoring strategy.
- **Any need to change Forest Plan or implementation of Forest Plan?** An amendment of the Forest Plan monitoring strategy is needed to reflect this decision.
- **Any need to change monitoring protocols or question to be sure we are getting information we want?**
- **Are the reports adequate or are any modifications needed?**

Has the Revised Forest Plan direction prevented adverse interactions between bears and humans?

- **Frequency of collection and evaluation:** Annual / 5th year

- **MEIT Ranking: 6**
- **Status as of FY07:** No monitoring or evaluation has occurred, protocol was being developed.
- **Any need to change Forest Plan or implementation of Forest Plan?** No information available to make determination.
- **Any need to change monitoring protocols or question to be sure we are getting information we want?** Protocol was approved by the FLT in January 2008.
- **Are the reports adequate or are any modifications needed?** None to review.

What are the population trends for brown bear and the relationship to habitat?

- **Frequency of collection and evaluation:** Every 3rd year/ 5th year
- **MEIT Ranking: 14**
- **Status as of FY07:** A report was prepared in 2005 describing how brown bears were to be monitored through an Interagency Brown Bear Study Team, but no evaluation has occurred.
- **Any need to change Forest Plan or implementation of Plan?** No information available to make determination.
- **Any need to change monitoring protocols or question to be sure we are getting information we want?** FY07 accomplishment report noted that protocol still needs substantial work. Anticipated completion date has changed from FY07 to FY09.
- **Are the reports adequate or are any modifications needed?** None to review.

What are the population trends for dusky Canada geese and the relationship to habitat?

- **Frequency of collection and evaluation:** Every 3rd year for both
- **MEIT Ranking: 7**
- **Status as of FY07:** Monitoring and evaluation reports prepared in 2004 and 2007.
- **Any need to change Forest Plan or implementation of Plan?** No.
- **Any need to change monitoring protocols or question to be sure we are getting information we want?** FY07 accomplishment report noted that protocol still needs substantial work. Anticipated completion date has changed from FY07 to FY08.
- **Are the reports adequate or are any modifications needed?** Reports are adequate, however the population trend data that is derived from the nesting density estimates needs to be provided in future reports. This information is available from other agencies, but funds need to be provided to analyze that data when available.

Monitoring summary: As the primary land manager for the Copper River Delta, the Forest Service (USFS) is responsible for assessing habitat-related changes in the dusky Canada goose population. In 1993, the USFS began a cooperative project with Alaska Department of Fish and Game (ADF&G) and the U.S. Fish and Wildlife Service (USFWS) to estimate the number of dusky Canada geese, compare ground-based estimates with aerial survey estimates, and describe habitat use. This project relied on ground searches of random plots. These searches have been conducted concurrently with aerial surveys every three years since 1993.

The nest density survey is conducted every three years and provides information for population estimates, nesting densities by habitat and productivity estimates. During the 2003 to 2007 monitoring period, Cordova RD conducted and reported on two dusky Canada goose nest density surveys on the Copper River Delta. This work was reported in the FY04 and FY07 Annual Forest Plan Monitoring Reports. The results in the 2004 and 2007 reports were limited to nesting densities by habitat type sampled.

In 2004, crews searched 45 plots, which is slightly higher than 1998 (37 plots) and 2001 (39 plots). A higher proportion of sparse-density plots were searched in 2004 than in previous years. Eighteen plots (40%) landed in low-density areas, 20 plots (44%) in sparse-density areas, 3 plots (7%) in medium density, and 4 plots (9%) in new marsh. Crews found 36 nests, which is lower than 2001 (48 nests) and 1998 (70 nests). This difference was probably due to the higher proportion of sparse plots searched. Nest density (nests/km2) in medium, low, sparse, and new marsh was 3.7, 12.35, 7.78, and 2.78 respectively. Nest density did not differ among years in medium (df = 2, p = 0.32), low (df = 2, p = 0.55), or sparse (df = 2, p = 0.48) density strata. New marsh had a small sample size and was not analyzed for difference among years.

In 2007, crews searched 50 plots and of these 23 plots were in low-density areas, 21 plots in sparse–density, 4 plots in medium density, and 2 plots in new marsh. A total of 32 nest were found in 2007 and nest density did not differ among years in medium (df =3, p=0.40), low (df =3, p=0.11) and sparse (df =3, p=0.57) density strata.

a) What are the population trends for dusky Canada geese and the relationship to habitat? Nesting density data collected by Cordova RD are used for population estimates by USFWS but the estimates were not provided in the report. Population estimates are derived annually by USFWS for dusky Canada geese and provided to the Pacific Flyway Council. These data could be used to evaluate population trends for dusky Canada geese and their general habitat relationships on the Copper River

Delta. However, CRD did report that nesting densities did not differ among years (2001, 2004 and 2007) in medium (df = 3, p = 0.40), low (df = 3, p = 0.11), or sparse (df = 3, p = 0.57) density strata.

b) Have numbers of dusky Canada geese on the Forest increased, decreased, or remained the same? This information was not provided in the 2004 or 2007 Reports. Determining dusky nesting densities was the purpose of the work conducted in 2004 and 2007. Similar nest searches have been conducted concurrently with aerial surveys in 1993, 1995, 1998, 2001, 2004 and 2007. However, a random sampling design that included several habitat types was initiated in 1998 and was used in subsequent sampling years (2001, 2004 and 2007).

c) What are the characteristics of dusky Canada goose nesting and brood rearing habitat, and have they changed? Nests located in shrub communities contained the highest number of nests. Sweet gale, grass, and moss were the predominant vegetation types at the nest. Average shrub height at the nest was 100 cm with about 40% shrub cover. Nest sites were most commonly located in inter-levee basins and on natural islands. Nesting habitat characteristics were not compared to prior surveys. Brood rearing habitat was not quantified.

In both years, shrub communities (41-100% shrub cover) and grass-forb (10-40% shrub cover) contained the highest number of nests. Sweet gale, grass, and moss were the predominant vegetation types at the nest. Average shrub height at the nest was 85 cm with about 35% shrub cover in 2004. In 2007, average shrub height was 100 cm and shrub cover was 40%. In 2004, nest sites were most commonly located in inter-levee basins and on natural islands.

d) What are the factors that most greatly affect dusky Canada goose nesting and recruitment success? The 1964 earthquake uplifted the Copper River Delta, which created a broad band of low-lying wetlands that was formerly intertidal mudflats. This uplift initially increased goose breeding habitat and caused a population increase, but as vegetation developed and predators began to take residence, the dusky population declined to new lows. Natural succession will continue to increase the tree and shrub components on the Copper River Delta. This will likely reduce wetlands habitat and increase predators. Therefore, natural succession and predation have been identified as the greatest factors affecting dusky Canada goose nesting and recruitment success.

Evaluation summary: Breeding ground surveys offer the most realistic approach to population-based management efforts. Aerial surveys can be used to estimate both population and the number of nests, which can then be combined with nest success data to estimate productivity. Problems

with this method occur, however, due to visibility bias or the definition of a breeding pair. Furthermore, nest success is usually estimated from only one location, which may not be representative of the entire area. To overcome these problems, ground-based nest searches of random plots in conjunction with aerial surveys are needed. This provides a correction factor for the aerial surveys and gives a broader picture of nest success.

Nest surveys on random plots were needed to extrapolate these types of data to the entire breeding population. In addition, the Delta continues to undergo plant community succession accelerated by the 1964 Earthquake and areas of high nest density are likely to change. As the primary land manager for the Delta, the U.S. Forest Service (USFS) needed accurate population estimates and an understanding of nest distribution. These searches have been conducted concurrently with aerial surveys in fiscal years 1993, 1995, 1998, 2001, and 2004.

Interestingly, the medium density plots which produced extremely low nest numbers in 2004 rebounded in 2007 to its average density. However since the sample size was so small in 2004 and 2007 (3 plots and 4 plots) no significant difference in density was detected. Because the sampling design is completely random, and the medium density strata comprises the smallest area on the delta, we may have trouble detecting changes in the medium density strata because this strata will usually have the lowest number of selected plots.

Changes in hydrology have created access issues. In 2001 and 2004 crews were forced to use more alternate plots. The flow from the Copper River that feeds the Pete Dahl slough has shifted, causing less water to run down the Pete Dahl system. In 2007, water levels in Pete Dahl were better than previous years but still low enough that certain areas were inaccessible. Plots that cannot be reached in these areas are dropped and replaced with alternates. Doing so increases the proportion of sparse density plots because they are generally easier to access. In essence the randomness of the survey is being reduced which may create problems when comparing to previous years. One solution is to use helicopters and airplanes to access these areas.

Data collected from this project are used in conjunction with aerial surveys to estimate the dusky Canada goose population. Ground data are used to estimate the number of birds missed in aerial surveys, and thereby improve aerial estimation. Conditions and timing of nest searching in 2007 were excellent, and an accurate assessment of nesting activity was obtained; unlike 2001 when a late snowfall caused a disruption in nesting and a prolonged nesting peak.

***Recommendations of remedial action*:** Continue to monitor so management actions can be taken when necessary to prevent dusky Canada goose from being listed under the Endangered Species Act.

***Actions taken in response to recommendations identified in previous reports**:* Continued to monitor using ground searches on 3-year intervals.

Other Recommendations: Continue to monitor using ground searches on a 3-year interval. Studies to appraise the status of the dusky nesting population began as early as 1952 (Nelson 1952, Olson 1954). In 1964, the ADF&G initiated nest surveys to document habitat use, nest density, and success (Shepherd 1965). They standardized methods and conducted annual nest surveys on high nest density areas from 1982 to 1992 (Campbell and Timm 1983, Campbell 1990, Campbell, Rosenberg, and Rothe 1992). These data provide long-term indices of nest density, fate, and type of depredation, but focus only on higher density areas. Nest surveys on random plots were needed to extrapolate these types of data to the entire breeding population. In addition, the Delta continues to undergo plant community succession accelerated by the 1964 Earthquake (Crow 1968, Potyondy et al. 1975, Kempka et al. 1994, Thilenius 1995, Boggs 2000), and areas of high nest density are likely to shift.

In 1979, ADF&G initiated fixed-wing aerial surveys over part of the Delta to provide an index to the distribution and numbers of nesting geese. The ADF&G survey was continued by the USFWS in 1983 and has been flown annually since then (Conant and Dau 1990, Butler and Eldridge 1991, Eldridge and Platte 1995). In 1986, the survey was refined, intensified, and expanded to include all known or suspected nesting habitats on the Delta (Butler and Eldridge 1991). In addition, fixed-winged surveys were compared to helicopter surveys. These results showed that one-third more geese were counted from the helicopter, but the number of additional birds missed with the helicopter remained unknown. The results suggested that geese were being missed, and in order to get a population estimate, a ground-based correction was needed. Due to the fact that vegetation is changing, this correction factor is repeated every three years.

What are the population trends for moose and the relationship to habitat?

- **Frequency of collection and evaluation:** Annual for both
- **MEIT Ranking: 17**
- **Status as of FY07:** Yearly monitoring of moose on the Copper River Delta is conducted by ADF&G by aerial surveys. The Forest Service conducted moose condition monitoring project from 2000-2003.
- **Any need to change Forest Plan or implementation of Plan?** No.
- **Any need to change monitoring protocols or question to be sure we are getting information we want?** FY07 accomplishment

report noted that protocol still needs substantial work. Anticipated completion date is in FY08.

- **Are the reports adequate or are any modifications needed?** Report is adequate for moose on the Copper River Delta. No other reports have been completed.

Summary of monitoring and evaluation: In 2003, a study documented in the report called *Assessing Carrying Capacity of Moose on the Copper River Delta through Analysis of Body Condition* was done. This study focused on the body condition of moose as it relates to habitat carrying capacity. In collaboration with ADF&G, the Forest Service initiated a study in 2000 to assess the change in body condition of moose over winter on the Copper River Delta. This approach provided an indirect index of the quality and availability of browse that the moose consume.

In 2003, the Forest determined that the current population levels on the Copper River Delta were probably well below carrying capacity, and resources do not seem to be a limiting factor in this area. Further study was recommended to determine body condition over severe winters.

Because moose are a subsistence and hunted species on the Copper River Delta, ADF&G conducts aerial surveys each year to determine number of animals to make available for the hunt and when to close the seasons.

a) Have numbers of moose on the Forest increased, decreased or remained the same? On a Forest-wide basis, the Forest has not undertaken surveys to determine the number of moose and their trends. ADF&G does conduct these types of surveys and this information could be used to determine trends on the Forest.

b) What are the characteristics of moose habitat by season? This information was not available in the Annual Monitoring Reports, but has been quantified for the Copper River Delta and documented by MacCracken, Van Ballenberghe and Peek (1997) in "*Habitat relationships of moose of the Copper River Delta, in coastal south-central Alaska*." Stephenson, Van Ballenberghe, Peek, and MacCracken (2006) further expanded on the topic in their report "*Spatio-temporal constraints on moose habitat and carrying capacity in coastal Alaska: Vegetation Succession and Climate.* " Stephenson (1995) also provided discussion on the topic in "Nutritional ecology of moose and vegetation succession on the Copper River Delta, Alaska", his Ph.D. dissertation.

c) How have Forest activities changed the availability, amount and quality of moose? This information was not available in the Annual Monitoring Reports. However, wildlife enhancement type projects have

occurred on a relatively small scale. Therefore, it is unlikely that these types of activities have significantly changed the availability, amount, and quality of moose on the Forest from 2003 to 2007. Other types of activities such as winter recreational access could influence moose and this relationship is being studied.

What are the population trends for black oystercatchers and the relationship to habitat change?

- **Frequency of collection and evaluation:** 3 years of each 5 year period / 5th year
- **MEIT Ranking: 22**
- **Status as of FY07:** Monitored in FY03, 04, 05 and 06. Reports prepared each year. Protocol is being developed.
- **Any need to change Forest Plan or implementation of Plan?** No.
- **Any need to change monitoring protocols or question to be sure we are getting information we want?** The MEIT reinterpreted general monitoring questions from the Revised Forest Plan when they were not clearly stated as a Forest Plan monitoring question. Based on the information presented for this question in Table 5-1 of the Forest Plan, MEIT rephrased it to "What are the population trends for black oystercatchers and the relationship to habitat *change*? In 2006, it was decided to revise the monitoring question to reflect the MEIT interpretation. When the protocol is approved, the monitoring question will be revised in the Forest Plan to reflect MEIT recommendations. The FY07 accomplishment report noted that the protocol still needed substantial work. Anticipated completion date is FY08.
- **Are the reports adequate or are any modifications needed?** The annual reports that provided the data did not directly answer the monitoring question (before revision in 2007) and often had information that was beyond these questions. Report write-ups should list monitoring questions and only provide monitoring information associated with that question. Other data sources should be included if they are available and if they will provide information to assist with answering the monitoring question. This information may be available from data collected prior to 2003 and data being collected by other agencies.

Monitoring summary and evaluation: Black oystercatchers were identified as a Management Indicator Species (MIS) on the Chugach National Forest to evaluate the effects of management activities on target ecosystems. Black oystercatchers are thought to be ecological indicators for shoreline habitat, and therefore they were used to assess the effects of human activities on shoreline ecosystems.

Glacier and Cordova Ranger Districts both conducted inventories and described nesting habitat for black oystercatchers. Their inventory work has covered most of the Prince William Sound shoreline on National Forest System land. These data have been presented in the Monitoring Reports from 2003 to 2006.

Cordova Ranger District's work has focused on inventorying shorelines in the Eastern Prince William Sound to provide the baseline data for future monitoring of these areas and an understanding of breeding pair territory densities. Further analysis of these data could provide a better understanding of the relationship between breeding pair densities and habitat.

Glacier Ranger District has nesting pair data from shoreline surveys for a known area in Harriman Fiord, Barry Arm, and Western Prince William Sound from 2000 to 2006. In addition, more intensive work in this area from 2004 through 2006 included nest monitoring and productivity, banding, radio-tagging and telemetry, human use censuses, remote video nest monitoring, characterizing nest site and habitat as excerpted from the 2006 report below. Population trends for black oystercatchers and their relationship to habitat can be analyzed from the data for the Harriman Fiord area since they have surveys from the same area since 2000.

Table 1 displays a summary of the shoreline surveys for black oystercatchers conducted from 2003-2006 by the Forest Service. The Eastern Prince William Sound has been surveyed annually from 2003 to 2006 but only Green Island was surveyed more than once during that time period. Other surveys in the eastern Sound from 2000 to 2002 were referred to in the 2003 report, but data were not presented. The data collected for the eastern Sound from 2003-2006 provides baseline data for future monitoring of population trends.

Surveys in Western Prince William Sound included a general survey of this area that covered 430 km in 2004 and three consecutive years of data for 73km of the Harriman Fiord area that provides trend data for a specific shoreline. These data are present below in Table 1. Breeding pairs for the 3 year period were similar and the number of breeding pairs was slightly higher in 2006. The survey data for the western Sound was collected from 1999-2003. Only a partial data set was presented in the 2005 report and

was not in a form that could be used for comparative purposes. However, the original reports may have data that could be used for analyses.

In general, breeding pairs per kilometer in the Sound ranged from 1.9 to 4.4. A standard shoreline habitat classification for each survey was not completed which limits the analysis of breeding pairs to habitat types. A total of 70.1 km of shoreline was surveyed for habitat type using the NOAA Environmental Sensitivity Index (ESI) Map for Harriman Fiord and black oystercatcher breeding pairs. The data for 2004 and 2005 are presented in Figures 1 and 2. It should be noted that these data included re-nesting birds and they do not have a one to one correspondence to nesting density data presented for Harriman Fiord in Table 2. However, for both years gravel beaches received the highest use by nesting pairs.

Using ESI habitat types has the best potential for standardizing data collection with regards to habitat relationships of nesting black oystercatchers. Shoreline habitat for the entire Sound could be calculated as well as the availability of each shoreline habitat type. These data could establish whether birds prefer a particular shoreline habitat for nesting in relation to the availability of that habitat. Also, the breeding pairs per kilometer could be estimated for each shoreline habitat and these relationships could be monitored. It appears that these data exist from the inventory work by the Forest Service in the Sound but further work is needed to create a synthesis of this information.

Table 1 – Summary of black oystercatcher monitoring on the Chugach National Forest

Year	Survey Area	Total kilometers of shoreline surveyed	# of BLOY* breeding pairs	Breeding pairs per kilometer
Eastern Prince William Sound				
2003	Montague Island - Zaikof Pt. to Beach River & San Juan Bay to Jeannie Cove	75 km	30 pairs	1 pair per 2.5 km
2004	Montague Island - San Juan to Hanning Bay (32Km) & Beach River to Log Jam Bay (32km)	64 km	24 pairs	1pair per 2.66 km
2005	Montague Island - Log Jam Bay to Jeannie Cove (10km); Port Chalmers and Green Island (60km)	70 km	16 pairs	1 pair per 4.4 km
2006	Montague island - Hanning Bay to Port Chalmers (48km) & Green Island, Little Green Island and Channel Island (54km)	102 km	64 pairs	1 pair per 1.9 km

Western Prince William Sound				
2004	Western Prince William Sound (includes Harriman Fiord)	430 km	144 pairs	1 pair per 2.9 km
2004	Harriman Fiord area (subset of the above survey)	73 km	25 pairs	1 pair per 2.9 km
2005	Harriman Fiord area	73 km	29 pairs	1 pair per 2.5 km
2006	Harriman Fiord area	73 km	28 pairs	1 pair per 2.6 km

*BLOY = black oystercatcher and one nest converted to 1 breeding pair

Figure 1 – Harriman Fiord shoreline habitat used by nesting black oystercatchers in 2004 (n=35)

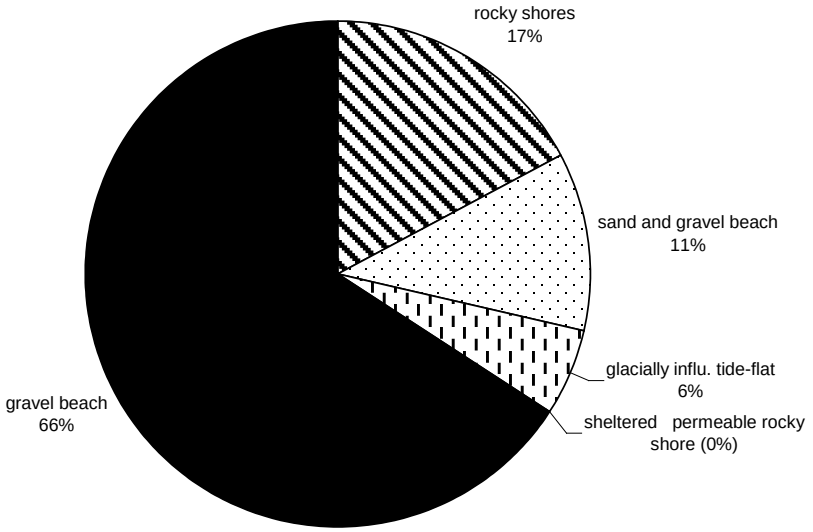
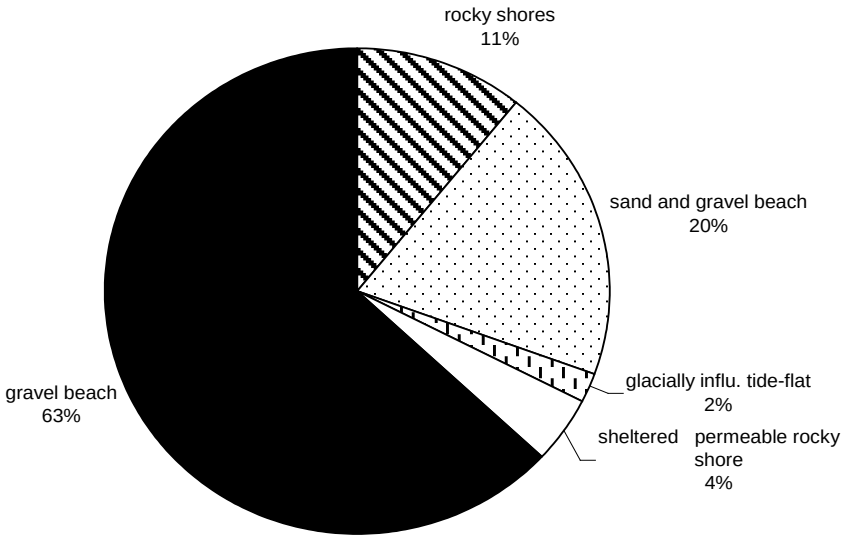


Figure 2 – Harriman Fiord shoreline habitat used by nesting black oystercatchers in 2005 (n=37)



In the 2003 surveys conducted on Montague Island, crews inventoried 30 nest locations with the highest densities in Jeannie Cove and the northeastern shoreline of Montague Island. The habitats recorded for the 30 nests were sand (11), rock or boulder (10), and cobble or pebbles (9). Crews noted that black oystercatchers appeared to nest in all substrates and their distribution was more a factor of food availability, the width of the intertidal zone and near gently sloping intertidal zones. The Annual Report, provided by the Cordova Ranger District, identifies Montague Island as a high nesting density area for black oystercatcher with low recreational use area.

In 2004, crews surveyed 64 km of shoreline on Montague Island and inventoried 24 nest locations with Patton Bay and Hanning Bay having the highest nesting densities. Crews also monitored 27 black oystercatcher territories in the Harriman Fiord area. Nest productivity was low with only 2 nests out of 29 fledging chicks. Depredation and flooding events appeared to be the cause of most nest failures. Glacier Districts 2004 report stated that they intend to summarize the findings from the 144 territories monitored with 17 survey areas in the western Sound in a final report by mid 2005. It is unclear when these data were collected. It is mentioned in the report that other black oystercatcher inventory work was being conducted at Glacier Bay, Kenai Fjords National Parks, and Middleton Island, and these studies could be additional sources of information to assist with evaluating monitoring questions.

In 2005, Montague Island shoreline from Log Jam Bay to Jeannie Cove and shoreline in Port Chalmers was surveyed as well as Green Island. The north side of Green Island had the highest number of nests (7), and a

total of 16 nests were recorded for the entire 70km of surveyed shoreline. Crews noted high nest failure for Green Island and suggested resurveying this area.

In 2005, crews also surveyed 73 km of shoreline and documented 31 black oystercatcher territories in the Harriman Fiord area. All territories occupied in 2004 were re-occupied in 2005 indicating a static population for those two years. Fifteen of the 47 nests monitored successfully hatched 31 chicks, of which 23 were fledged. A total of 70.1 km of shoreline was surveyed for habitat type using the NOAA Environmental Sensitivity Index (ESI) Map. Habitat at Harriman Fiord fell into five ESI categories: 46% sheltered rocky shore, 29% gravel beach, 10.3% sheltered permeable rocky shore, 10.3% salt /brackish water marsh, and 3.5% mixed sand and gravel beach. In 2005, 5 nests were found on rocky shores, 29 on gravel beaches, 2 on sheltered permeable rocky shore, 1 in salt/brackish marsh, and 9 in mixed sand/gravel habitat. In 2004, 6 nests were found on rocky shores, 23 on gravel beaches, 0 on sheltered permeable rocky shore, 2 in salt/brackish marsh, and 4 in mixed sand / gravel habitat. These initial data show that black oystercatchers nest on gravel and mixed sand gravel beaches in a disproportionate ratio to total habitat present in Harriman Fiord. Nearly 20% of nesting occurred in a habitat type that made up just 3.5% of the total habitat present in the Fiord.

Table 2 - Abundance and Productivity of Black Oystercatchers at Harriman Fiord, 2000-2005

Year	Total Birds	Reproductive Pairs	Pairs per km beach	Number hatched nests	Mean chicks/hatched nest
2005	**≥70**	**29**	**0.43**	**15**	**2.0 (n=15)**
2004	**70**	**25**	**0.34**	**2†**	**2.4 (n=2)**
2003	**51**	**11**	**0.18**	**7**	**1.9 (n=7)**
2002	**50**	**19**	**0.33**	**7**	**1.4 (n=5)**
2001	**43**	**18**	**0.32**	**12**	**1.9 (n=10)**
2000	**42**	**15**	**0.30**	**17**	**0.29 - 0.32 (n=6)**

Shaded rows denote directly comparable intensive survey efforts (compared with previous years) at Harriman Fiord

†= Year of high nest failure. Causes: unknown - 52%, suspected river otter depredation - 21%, flooding - 17%, other depredation - 10%

Sources: Brown and Poe 2003, Poe 2003, Brown et al. 2004, 2005 data.

In 2006, crews documented 28 territorial black oystercatcher pairs along 73 km of surveyed shoreline in the Harriman Fiord. The total population of black oystercatchers (breeding pairs and non-breeding birds) that occurred in the area was thought to match or exceed the documented upper range for Harriman Fiord. Thirteen of 40 nests (33%) successfully hatched in 2006 producing 29 chicks of which 15 fledged. Three years of data suggest that there is a high natural variation in productivity between

years at Harriman. It appears that black oystercatchers in Harriman Fiord exhibit high mean clutch size, low hatch success, moderate fledging success, and low reproductive density compared to other areas for which information is available.

In 2006, crews also surveyed 102km; Montague Island shoreline from Hanning Bay to Port Chalmers 48 km, and Green Island, Little Green Island and Channel Island (54 km). They observed 172 black oystercatchers and located 64 oystercatcher nest territories. Much of the surveyed shoreline (50 km) from Hanning Bay to Port Chalmers averaged 0.9 nests/km and this is the highest nesting density recorded by Cordova District. Green Island was surveyed for a second time in as many years and found little change in the number of nesting territories between the two years (11 nesting territories in 2005 vs. 14 in 2006). The dominant substrate within 1m of nests was gravel (54%) and boulders (42%). Beach slope at nest sites averaged 10.7 degrees. These gentle sloping areas characteristic of black oystercatcher nesting areas are also desirable to recreational users (camping, landing boats, beachcombing).

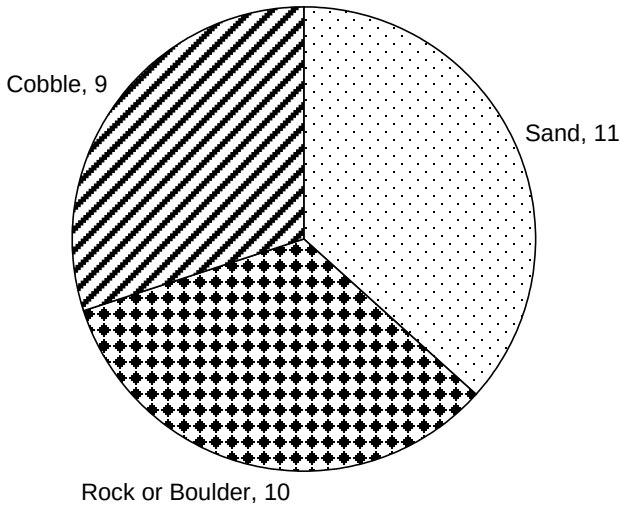
a) Has use of nesting beaches on the Forest increased, decreased, or stayed the same? The number of breeding pairs for the Harriman Fiord area appeared to be consistent for years 2004-2006. This was the only known area that was consistently surveyed on an annual basis. However, some surveys conducted prior to 2003 in the Sound possibly could be used for trend analysis, but these data for the most part were not reported in any of the 2003-06 annual reports. It is not known whether some of the surveys prior to 2003 were conducted with similar protocols and thereby could be used to determine trend in use of nesting beaches by black oystercatchers.

b) What are the specific characteristics of beaches used by black oystercatchers for nesting? The substrate within 1 meter of where black oystercatchers nested was almost evenly split between cobble, sand, and rock/boulder for 30 nests in the eastern Sound (Fig. 3). Dominant substrate measurements indicated they selected nest sites on patches of gravel that occurred within boulder beaches. Black oystercatchers consistently occupied gravel peninsulas where fresh water streams entered salt water. Beach slopes were typically gentle, averaging less than 11% at these sites. There was high variation between nest sites and their distance to fresh water and mussel beds.

The specific habitat characteristics within 1 meter of the nest provide some insight into immediate nesting habitat of black oystercatchers. These nesting habitat data would be more powerful if linked to the NOAA Environmental Sensitivity Index (ESI) Map. By doing so, they could provide better information on what types of beaches black oystercatchers are selecting with regards to amount of habitat that is available for each

habitat type. More than likely a synthesis of this information could be done from the existing data.

Figure 3 - Substrate within 1 meter of black oystercatcher nests in Eastern Prince William Sound (N=30)



c) What amount of overlap is there in the use of beaches by nesting black oystercatchers and recreationists? Recreational use overlap with black oystercatcher use was well documented in Harriman Fiord in 2005 and 2006, but only the 2005 report provided data. A total of 262 people were seen on beaches in Harriman, along with 158 tents. Sixteen groups were within 100 m of a nest, 26 within 200 m, and 41 groups within 300 m. In two cases, camping groups used sites within 30 m of black oystercatcher nests, and these nests failed.

No attempts to document the overlap between recreational users and black oystercatchers has been made for the Eastern Sound. The 2006 Harriman Fiord data that is being analyzed by Oregon State University will provide more information for answering this question.

***Recommendations of remedial action*:** None

***Actions taken in response to recommendations identified in previous reports*:** None

Other Recommendations: Structure the monitoring protocol to answer the specific monitoring questions.

What are the population trends for Dolly Varden char and the relationship to habitat?

- **Frequency of collection and evaluation:** Annual / 5th year
- **MEIT Ranking: 20**

- **Status as of FY07:** Monitored in FY03 and FY04. Protocol being developed. Generally, there is a lack of distribution and abundance data for Dolly Varden char across the Forest. Specifically, larger, more robust populations with multiple age classes would be needed for any evaluation of populations and their response to habitat change. In 2003, fish population surveys were conducted in three drainages of Prince William Sound and the Copper River Delta. Suitable populations of char were found in these drainages, but most reaches are open to anadromous fish. In 2004, ten drainages were sampled for Dolly Varden and only one stream had char above a known barrier. Choosing streams above barriers to anadromous fish passage helps limit population variability introduced from the marine environment when evaluating the effects of implementing the Forest Plan.
- **Any need to change Forest Plan or implementation of Plan?** No.
- **Any need to change monitoring protocols or question to be sure we are getting information we want?** A review is needed to determine if this monitoring question is appropriate given the scope of management, risk to habitat and populations, and our ability to measure change. The Forest Plan is predicted to have a low risk of adversely affecting Dolly Varden char. It states; "The conservation of habitats for Dolly Varden char, which have widespread distribution throughout nearly all suitable freshwater, particularly small freshwater streams and lakes, is provided through the implementation of Forest standards and guidelines. These standards and guidelines are designed to protect key elements of Dolly Varden habitat, such as stream banks, riparian vegetation, and water quality. Implementing the Revised Forest Plan would have a low probability of impacting Dolly Varden char habitat" (ROD, V, B-1, p38). Moreover, approximately 95% of all watersheds have prescriptions that are non-developmental in nature and any effects are likely highly localized and minor (FEIS, 3-113). A general lack of nexus exists between management prescriptions in the Forest Plan with response reaches of stream that hold robust populations of Dolly Varden char. Completion of this monitoring protocol is planned for 2010.
- **Are the reports adequate or are any modifications needed?** The reports are adequate to help determine distributions of Dolly Varden. However, they are pre-cursory in nature and meant to help guide the selection of stream reaches needed to monitor Forest Plan implementation.

Summary of monitoring and evaluation: Generally, there is a lack of distribution and abundance data for Dolly Varden char across the Forest. Specifically, larger, more robust populations with multiple age classes would be needed for any evaluation of populations and their response to habitat change. In 2003, fish population surveys were conducted in three

drainages of Prince William Sound and the Copper River Delta. Suitable populations of char were found in these drainages, but most reaches are open to anadromous fish. In 2004, ten drainages were sampled for Dolly Varden and only one stream had char above a known barrier. Choosing streams above barriers to anadromous fish passage helps limit population variability introduced from the marine environment when evaluating effects of the Forest Plan implementation.

What are the population trends for Coho salmon and the relationship to habitat *change*?

- **Frequency of collection and evaluation:** Annual / 5th year
- **MEIT Ranking: 23**
- **Status as of FY07:** Monitored in 2004. Generally, there is a lack of distribution and especially abundance data for coho salmon across the Forest. Specifically, larger, more robust populations with multiple age classes would be needed for any evaluation of populations and their response to habitat change. Twenty-two drainages were sampled across the Forest to determine population presence/absence and/or structure.
- **Any need to change Forest Plan or implementation of Plan?** No.
- **Any need to change monitoring protocols or question to be sure we are getting information we want?** MEIT interpreted the question to be the relationship of Coho Salmon populations and habitat change. The Forest Plan is predicted to have a low risk of adversely affecting coho salmon. It states: "The likelihood of forest management activities affecting the quantity and quality of coho habitat is low due to the implementation of Forestwide standards and guidelines at the project level and the allowance for fish habitat improvement projects within nearly all management areas on the Chugach (ROD, V, B-1, p38)." Moreover, approximately 95% of all watersheds fall into prescriptions that are non-developmental in nature and any effects are likely highly localized and minor (FEIS, 3-113). There is also a general lack of nexus between management prescriptions in the Forest Plan with response reaches of stream that hold robust populations of coho salmon. A review of this monitoring question is planned for 2010. The FY07 accomplishment report noted that protocol still needs substantial work. Anticipated completion date is 2010.
- **Are the reports adequate or are any modifications needed?** The reports are adequate to help determine distributions of coho salmon. However, they are pre-cursory in nature and meant to help guide the selection of stream reaches needed to monitor Forest Plan implementation.

Species of Special Interest

Is Forest management maintaining favorable conditions for sustaining gray wolves?

- **Frequency of collection and evaluation:** Annual / 5th year
- **MEIT Ranking:** not in top 30
- **Status as of FY07:** No monitoring or evaluation has occurred.
- **Any need to change Forest Plan or implementation of Plan?** No information is available to make a determination.
- **Any need to change monitoring protocols or question to be sure we are getting information we want?** Forest monitoring protocols have not been developed.
- **Are the reports adequate or are any modifications needed?** None to review.

Is Forest management maintaining favorable conditions for sustaining Kenai wolverines?

- **Frequency of collection and evaluation:** Annual / 5th year
- **MEIT Ranking:** not in top 30
- **Status as of FY07:** No monitoring or evaluation has occurred.
- **Any need to change Forest Plan or implementation of Plan?** No information is available to make a determination.
- **Any need to change monitoring protocols or question to be sure we are getting information we want?** Forest monitoring protocols have not been developed.
- **Are the reports adequate or are any modifications needed?** None to review.

Summary of monitoring and evaluation: Monitoring with respect to the Forest Plan has not been done however the Seward Ranger District has conducted some winter aerial surveys. The following summarizes that data.

a) Is Forest management maintaining favorable conditions for sustaining Kenai wolverines? No information is available to make a determination.

b) Have the numbers of wolverines on the Forest increased, decreased, or remained the same? Winter aerial survey work in 2004 quantified the number of wolverines by tracks after snow events. This information provided a minimum count of wolverines on a portion of the Kenai Peninsula that overlapped onto the Forest. These results provided baseline data that could assist with determining the status and trends of wolverines on the Forest.

c) Are Kenai wolverines isolated from mainland populations of wolverines? This question has not been answered in the type of monitoring that has been done to date. It could be answered by conducting DNA analyses of harvested wolverines.

d) What are the limiting factors for wolverines on the Forest? This information was not provided in monitoring reports. However, since wolverine population density and reproductive potential is low relative to other furbearers, it is important for management agencies to closely monitor wolverine populations and those human activities that could adversely affect them. Wolverines seem to prefer foothills and mountainous areas, which usually are lightly developed by humans but are often favored areas for hunting, trapping, snowmachining, and other outdoor activities.

e) How have Forest activities influenced the limiting factors? The effects of winter recreational access and other Forest activities on wolverines are unknown. Data collected from radio-collared wolverines could assist with determining whether Forest activities are limiting factors.

Recommendations of remedial action: None

Actions taken in response to recommendations identified in previous reports: None

Other Recommendations: Wolverine populations and their reproductive potential are relatively lower than any other species on the Forest. Therefore, the Forest should continue work to determine if Forest activities are limiting factors on wolverines.

Is Forest management maintaining favorable conditions for sustaining Townsend warblers?

- **Frequency of collection and evaluation:** every 5th year for both
- **MEIT Ranking:** not in top 30
- **Status as of FY07:** Not funded, no monitoring or evaluation occurred.
- **Any need to change Forest Plan or implementation of Plan?** No information is available to make a determination.
- **Any need to change monitoring protocols or question to be sure we are getting information we want?** Forest monitoring protocols have not been developed.
- **Are the reports adequate or are any modifications needed?** None to review.

Is Forest management maintaining favorable conditions for sustaining northern goshawks?

- **Frequency of collection and evaluation:** Annual/ every 5th year
- **MEIT Ranking:** not in top 30
- **Status as of FY07:** Not funded, no monitoring or evaluation has occurred.

- **Any need to change Forest Plan or implementation of Plan?** No information is available to make a determination.
- **Any need to change monitoring protocols or question to be sure we are getting information we want?** Forest monitoring protocols have not been developed.
- **Are the reports adequate or are any modifications needed?** None to review.

Is Forest management maintaining favorable conditions for sustaining Sitka black-tailed deer?

- **Frequency of collection and evaluation:** Annual/ every 5th year
- **MEIT Ranking:** not in top 30
- **Status as of FY07:** Populations monitored by ADF&G. Not funded by Forest Service, no evaluation has occurred.
- **Any need to change Forest Plan or implementation of Plan?** No information is available to make a determination.
- **Any need to change monitoring protocols or question to be sure we are getting information we want?** Forest monitoring protocols have not been developed.
- **Are the reports adequate or are any modifications needed?** None to review.

Is Forest management maintaining favorable conditions for sustaining the Montague Island marmot?

- **Frequency of collection and evaluation:** once in 5 years / every 5th year (if found to be present, adjustments will be made to schedule)
- **MEIT Ranking:** not in top 30
- **Status as of FY07:** Not funded, no monitoring or evaluation has occurred.
- **Any need to change Forest Plan or implementation of Plan?** No information is available to make a determination.
- **Any need to change monitoring protocols or question to be sure we are getting information we want?** Forest monitoring protocols have not been developed.
- **Are the reports adequate or are any modifications needed?** None to review.

Is Forest management maintaining favorable conditions for sustaining cutthroat trout?

- **Frequency of collection and evaluation:** Annual/ every 5th year
- **MEIT Ranking:** not in top 30
- **Status as of FY07:** monitored in FY03 and FY04.
- **Any need to change Forest Plan or implementation of Plan?** No.
- **Any need to change monitoring protocols or question to be sure we are getting information we want?** A review of this

monitoring question is planned in FY10 to determine the feasibility of monitoring populations and habitat in relation to the risk to these populations from implementing the Forest Plan.

- **Are the reports adequate or are any modifications needed?** The reports are adequate.

Summary of monitoring and evaluation: Monitoring was conducted in 2003 and 2004. Generally, there is a lack of distribution and especially abundance data for cutthroat trout across the Forest. Specifically, larger, more robust populations with multiple age classes are needed for any evaluation of populations and their response to habitat change. Therefore, efforts were focused on distribution and relative abundance in these surveys.

In response, surveys were conducted in 2003 and 2004 in fifteen drainages in western Prince William Sound and two drainages of the Copper River Delta. Cutthroat trout were not observed in any of western Prince William Sound surveys, however, they were observed in both drainages of west Copper River Delta. Size selectivity of sampling gear and other complications with adult salmon made it difficult to determine the population size structure for juvenile fish. Moreover, population estimates were attempted for larger fish in these two drainages that indicated relatively small populations overall. Because of these small population sizes it is questionable if they would be large enough to monitor.

Overall, the results indicate that cutthroat trout are more limited in their distribution and abundance than originally thought. However, cutthroat trout occur entirely within areas having management prescriptions that are not likely to adversely affect populations or habitat.

Threatened, Endangered and Sensitive Animal Species

What are the population trends for trumpeter swans and the relationship to habitat change?

- **Frequency of collection and evaluation**: Annual / every 5th year
- **MEIT Ranking:** not in top 30
- **Status as of FY07:** Monitored in FY03, FY04, FY05, and FY06. Monitoring protocols are being developed.
- **Any need to change Forest Plan or implementation of Plan?** No.
- **Any need to change monitoring protocols or question to be sure we are getting information we want?** The MEIT reinterpreted general monitoring questions from the Revised Forest Plan when they were not clearly stated as a Forest Plan monitoring question. Based on the information presented for this question in Table 5-1 of the Forest Plan, MEIT rephrased it to “What are the population trends for trumpeter swans and the relationship to habitat change?” The question was revised in FY07 from “what are the status and

trends of trumpeter swans?" to reflect the MEIT interpretation. When the protocol is approved, the monitoring question will be revised in the Forest Plan to reflect MEIT recommendations. The anticipated protocol completion date is FY09.

- **Are the reports adequate or are any modifications needed?** The reports are adequate for determining if the number of trumpeter swans have increased, decreased, or remained the same. They are inadequate for determining the characteristics of nesting and brood rearing habitats and if the habitats have changed. They are inadequate for determining what factors most greatly affect trumpeter swan nesting and recruitment success.

Summary of monitoring and evaluation*:* The USFWS monitors trumpeter swans throughout the State of Alaska every 5 years. Biannual surveys are conducted on the Copper River Delta by USFWS with financial assistance from USFS. The Cordova and Seward Ranger Districts have conducted trumpeter swan surveys. Surveys reported the overall number of swans observed and provided observations on young produced. Following is a summary of the report results relevant to the monitoring questions.

a) Have the numbers of trumpeter swans nesting on the Forest increased, decreased or remained the same? On the area surveyed on the Copper River Delta, the trumpeter swan population is above the long term average and from FY03 to FY04, the numbers of swans increased. In May 2004, 940 white swans (adults and sub-adults) were counted, up 3% from the spring of 2003 and 44% above the mean. The forest service has not funded monitoring on the Delta since then; however, surveys have been conducted annually by USFWS since 1968. The lowest population count for the Cordova Ranger District was 500 but reached a high of 1,222 birds in 2001.

The total number of swans observed on the Seward Ranger District in the area surveyed in the spring in 2006 was 29, in 2005 – 34, and spring of 2004 -19. These data suggest that swan numbers have increased on the Seward Ranger District. It is unclear whether the fluctuations in numbers are a result of the timing of the flights.

b) What are the characteristics of trumpeter swan nesting and brood rearing habitat, and have they changed? Swans on Cordova and Seward Ranger Districts appear to be using wetlands, slow-moving channels, and small lakes during the summer breeding season. More specific characteristics of nesting and brood rearing habitat have not been analyzed. It is expected that swan nesting habitat on Cordova and Seward Ranger Districts is similar to other areas used by swans and evaluated

elsewhere. The long term effects of vegetation succession on swan nesting and brooding habitat is an unknown for the Copper River Delta.

c) What are the factors that most greatly affect trumpeter swan nesting and recruitment success? A specific study has not been initiated to evaluate factors that affect trumpeter swan nesting and recruitment. However, the Cordova District along with USFWS has a long term data set for nesting and recruitment on the Copper River Delta. In 2004, a total of 189 cygnets in 59 broods were observed in August, equal to and 5% above the mean, respectively. Nest success, defined as the proportion of occupied nests in May that produced at least one cygnet still alive in August, was 26% below the mean at 0.37.

***Recommendations of remedial action for this monitoring item*:** None.

Actions taken in response to recommendations identified in previous reports: None.

Other Recommendations: None.

Forest Products

Are harvested forestlands restocked?

- **Frequency of collection and evaluation:** Annual sample of selected areas/ annual
- **MEIT Ranking: 29**
- **Status as of FY07:** The protocol was completed and approved in 2007. Harvested forestlands are surveyed according to Regional reforestation certification protocols. No Forest Plan level evaluation has occurred of reforestation stocking surveys. All harvested areas are surveyed to ensure they meet restocking guidelines by year 5. None have been identified as not meeting guidelines.
- **Any need to change Forest Plan or implementation of Plan?** No information is available to make a determination.
- **Any need to change monitoring protocols or question to be sure we are getting information we want?** No.
- **Are the reports adequate or are any modifications needed?** None to review.

Have conditions changed that would affect the suitability of timber production lands?

- **Frequency of collection and evaluation:** every 10 years for both.
- **MEIT Ranking: 25**
- **Status as of FY07:** The protocol was completed and approved in 2007. Not monitored or evaluated.
- **Any need to change Forest Plan or implementation of Plan?** No

- **Any need to change monitoring protocols or question to be sure we are getting information we want?** No. the MEIT first interpreted this question to be "Have lands once identified as unsuitable for timber production been examined to determine if they have become suitable." While the protocols were being developed in 2007, it was determined that the trigger for the analysis and evaluation was a letter from the timber interests requesting a timber sale program (the condition to change). Then lands would be examined to determine if they were suitable. Currently no lands on the Chugach National Forest are classified as suitable for timber production.
- **Are the reports adequate or are any modifications needed?** None required yet.

Minerals

Are mining plans of operations consistent with Revised Forest Plan direction?

- **Frequency of collection and evaluation:** One time collection / every 5th year.
- **MEIT Ranking: 24**
- **Status as of FY07:** Not monitored. In 2007, this item was determined to be an inventory and was dropped from the monitoring strategy. Mining plans of operations are inventoried using the INFRA database for locatable minerals. Numbers and locations of plans of operations vary widely from year to year according to public interest which is often directly reflective of the price of gold and other metals. Current or recently active plans were inventoried and entered into the locatable database during 2008 and reports can be directly generated from the database. Data is to be collected and entered routinely as new plans are submitted, changes to existing plans occur, or with routine administration such as inspections; updates should not be accomplished only on a set periodic basis. Plans of operations are approved consistent with the Standards and Guidelines in the Revised Land and Resource Management Plan and administered to standard by following regulations at 36 CFR 228A and guidance at FSM 2810. The inventory is due to be completed in 2008.
- **Any need to change monitoring protocols or question to be sure we are getting information we want?** Yes, this item needs to be dropped from the Forest Plan monitoring strategy.
- **Are the reports adequate or are any modifications needed?** N/A

Heritage Resources

Are National Register eligible heritage resources being adequately maintained and protected?

- **Frequency of collection and evaluation:** Annual for both

- **MEIT Ranking: 2**
- **Status as of FY07:** No monitoring or evaluation has occurred. Protocol has been through final review, but not yet approved by FLT.
- **Any need to change Forest Plan or implementation of Plan?** Not at this time – Pilot protocol is being implemented in FY08.
- **Any need to change monitoring protocols or question to be sure we are getting information we want?** The anticipated date for approval of protocol is the end of FY09. Although reviewers had approved the initial protocol in FY07, in FY08 comments from the Regional Office were incorporated into the protocol and implemented on a trial basis. The question and protocol implementation will be reviewed in FY09, changes made if necessary, and approved.
- **Are the reports adequate or are any modifications needed?** None to review.

What is the status and condition of heritage resources on the Forest?

- **Frequency of collection and evaluation:** Annual for both
- **MEIT Ranking: 1**
- **Status as of FY07:** No monitoring or evaluation has occurred. Protocol has been through final review, but not approved by FLT.
- **Any need to change Forest Plan or implementation of Plan?** Not at this time – Pilot protocol is being implemented in 2008.
- **Any need to change monitoring protocols or question to be sure we are getting information we want?** Anticipated date for approval of protocol is by the end of 2009. Although reviewers had approved the initial protocol in FY07, in FY08, comments from the Regional Office were incorporated into the protocol and implemented on a trial basis. The question and protocol implementation will be reviewed in FY09, changes made if necessary, and approved.
- **Are the reports adequate or are any modifications needed?** None to review.

Recreation Opportunities, Tourism, Access, and Facilities

What are the characteristics of recreational visitors? What is their pattern of recreational use? What are their perceptions of opportunities and settings?

- **Frequency of collection and evaluation:** Once every 5 years / every 5th year
- **MEIT Ranking: 11**
- **Status as of FY07:** Monitored in FY03 and FY05. Next National Visitor Use Monitoring (NVUM) scheduled for 2008.
- **Any need to change Forest Plan or implementation of Plan?** No.
- **Any need to change monitoring protocols or question to be sure we are getting information we want?** The MEIT suggested changing and the FY08 NVUM survey included additional questions

to improve information collected.

- **Are the reports adequate or are any modifications needed?** The report is produced by NVUM staff and is adequate for our use. Additionally, raw data is available if we want to further analyze.

Is the Revised Forest Plan direction for motorized and non-motorized access working?

- **Frequency of collection and evaluation:** Annual/ every 5th year
- **MEIT Ranking: 9**
- **Status as of FY07:** No monitoring or evaluation has occurred. The protocol is currently being reviewed by Recreation, Lands and Minerals Staff Officer.
- **Any need to change Forest Plan or implementation of Plan?** With completion of the Kenai Winter Access EIS, summer and winter uses are defined. Recent implementation of the new Access Travel Management Rule, for summer off-highway uses, has surfaced several roads not currently in the Forest inventory that need to be added.
- **Any need to change monitoring protocols or question to be sure we are getting information we want?** Anticipated date for approval of protocol is the 2nd quarter, FY09.
- **Are the reports adequate or are any modifications needed?** No report to review.

Are areas of the Forest being managed in accordance with the prescribed Recreation Opportunity Spectrum (ROS) class in Forestwide standards and guidelines?

- **Frequency of collection and evaluation:** Annual/ every 5th year
- **MEIT Ranking:** not in top 30
- **Status as of FY07:** Not funded, no monitoring or evaluation has occurred.
- **Any need to change Forest Plan or implementation of Plan?** No information is available to make a determination.
- **Any need to change monitoring protocols or question to be sure we are getting information we want?** Forest monitoring protocols have not been developed.
- **Are the reports adequate or are any modifications needed?** None to review.

What is the use of developed recreational facilities and how does it compare to capacity?

- **Frequency of collection and evaluation:** Annual for both
- **MEIT Ranking: 12**
- **Status as of FY07:** No monitoring or evaluation has occurred. Protocol being reviewed.

- **Any need to change Forest Plan or implementation of Plan?** No information is available to make a determination.
- **Any need to change monitoring protocols or question to be sure we are getting information we want?** Anticipated date for approval of protocol is 2nd quarter FY09.
- **Are the reports adequate or are any modifications needed?** None to review.

What are the trends in commercial recreation services on the Forest and how does it compare to capacity?

- **Frequency of collection and evaluation:** Annual/ every 5th year
- **MEIT Ranking:** not in top 30
- **Status as of FY07:** No monitoring or evaluation has occurred. Protocol currently being reviewed by Recreation, Lands and Minerals Staff Officer.
- **Any need to change Forest Plan or implementation of Plan?** The area of the Forest currently of most concern, Prince William Sound, is receiving increased emphasis with the PWS Framework, a project to gather information on recreation use, places and patterns as well as information on heritage and wildlife areas. Project will lead to analysis of capacity for commercial and non-commercial allocations in the Sound. Need for change unknown at this time.
- **Any need to change monitoring protocols or question to be sure we are getting information we want?** Anticipated date for approval of protocol is 2nd quarter of FY09.
- **Are the reports adequate or are any modifications needed?** None to review.

Scenic Quality

Are areas of the Forest being managed in accordance with the Scenery Integrity Objectives (SIO) in Forestwide Standards and Guidelines?

- **Frequency of collection and evaluation:** Annual sample of selected areas/ every 5th year
- **MEIT Ranking: 8**
- **Status as of FY07:** No monitoring or evaluation has occurred. FY07 accomplishment report notes that protocol still needs substantial work. Protocol being reviewed by Recreation, Lands and Minerals Staff Officer.
- **Any need to change Forest Plan or implementation of Plan?** No change in Forest Plan needed at this time.
- **Any need to change monitoring protocols or question to be sure we are getting information we want?** Anticipated date for completion of protocol is 2nd quarter of FY09.
- **Are the reports adequate or are any modifications needed?** None to review.

Fire Protection and Fuels Management

What is the pattern of abundance of different fuel types on the Kenai Peninsula?

- **Frequency of collection and evaluation:** Once every 5 years / every 5th year
- **MEIT Ranking: 13**
- **Status as of FY07:** The protocol is being finalized and includes four methodologies applied to the Kenai Peninsula Geographic Area:

  1) Annual review of fire and fuels project records. If more than 20 percent of the management areas or fire/fuels projects fail in meeting goals, objectives, standards, and guidelines, then a subjective evaluation would be triggered on whether or not more follow up (and perhaps management action) is needed. This methodology is being implemented in FY08 and results will be reported at year's end.

  2) Annual review of information in the national NFPORS, FACTS, and INFRA databases on fire and fuels activities. If more than 20 percent of the management areas or fire/fuels projects fail in meeting goals, objectives, standards, and guidelines, then a subjective evaluation would be triggered on whether or not more follow up (and perhaps management action) is needed. This methodology is being implemented in FY08 and results will be reported at years end.

  3) Fire Regime and Condition Class (FRCC)[2] evaluation every five years. FRCC will be mapped using remote sensing and represents the degree of departure of current conditions from reference conditions (areas of FRCC class 3 would be of highest concern to management since they represent the greatest departure from reference conditions).

  4) Fuel Characteristics Classification System (FCCS)[3] evaluation every five years. The fuel bed fire potential of FCCS will be mapped using remote sensing and represents the fuel complex based on potential fire behavior, crown fire, and available fuels.
- **Any need to change Forest Plan or implementation of Plan?** The information is not yet available to make the determination; however the initial results of the monitoring will be available late in FY08.
- **Any need to change monitoring protocols or question to be sure we are getting information we want?** The MEIT interpreted the monitoring question to be "Are human life, property, and facilities

[2] **http://frcc.gov/**

[3] **http://www.fs.fed.us/pnw/fera/fccs/**

being protected from wildland fire hazards?" When the protocol is approved, the monitoring question will be revised in the Forest Plan to reflect MEIT recommendations. A draft protocol exists. The final protocol is anticipated by late 2008. Reevaluation of the protocol will occur every 5 years beginning in FY12.

- **Are the reports adequate or are any modifications needed?** None to review.

Wilderness

Is the wilderness character of the Wilderness Study Area (WSA) and areas recommended for Wilderness being maintained?

- **Frequency of collection and evaluation:** Annual sample of selected areas/ every 5 years
- **MEIT Ranking: 3**
- **Status as of FY07:** Not monitored or evaluated. FY07 accomplishment report notes that protocol still needs substantial work. Currently working with Tongass NF and intend to tier off their wilderness protocol
- **Any need to change Forest Plan or implementation of Plan?** No change in Forest Plan needed at this time.
- **Any need to change monitoring protocols or question to be sure we are getting information we want?** Anticipated date for completion of protocol is unknown at this time.
- **Are the reports adequate or are any modifications needed?** None to review.

Research Natural Areas

Are proposed and established Research Natural Areas (RNA) being maintained in a state unmodified by human activity?

- **Frequency of collection and evaluation:** Once in 10 years / 10th year (Forest Plan); new protocol frequency of data collection and evaluation depends on methodology used.
- **MEIT Ranking: 16**
- **Status as of FY07:** No monitoring or evaluation has occurred. Protocol completed and approved in 2007 and includes two methodologies:

  1) Annual review of information in the corporate FACTS, INFRA, TIM, SUDS, and PALS databases. This review will note if any activities not allowed under the RNA prescription are proposed or occurring within the network. The occurrence of any activity not allowed would require immediate management action to bring the area into compliance. The database review methodology is being implemented in 2008 and results will be reported at years end.
  2) Visitor effects monitoring will occur every five years using methods derived from Cole (1989) and Monz (1998). This monitoring will detect if human caused damage is occurring

within the RNA network. Such changes would then be interpreted in regard to the extent they interfere with the purposes for which the affected RNAs were established (as described in the respective establishment records). The greater the aggregate size of the affected area and the more intense the damage, the greater the likelihood that natural processes could be impacted and that management action is called for.

- **Any need to change Forest Plan or implementation of Plan?** Initial results of this monitoring will not be available until late in FY08 so the information is not presently available to make the determination.
- **Any need to change monitoring protocols or question to be sure we are getting information we want?** The Monitoring and Evaluation Interdisciplinary Team interpreted the monitoring question to be "Are proposed and established Research Natural Areas (RNA) being maintained in a manner consistent with the purposes for which the area was established?" When the protocol is approved, the monitoring question will be revised in the Forest Plan to reflect MEIT recommendations. Reevaluation of the protocol will occur every 5 years beginning in FY12.
- **Are the reports adequate or are any modifications needed?** None to review.

Community Effects

What are the trends in local economies?

- **Frequency of collection and evaluation:** Annual/ every 3 years
- **MEIT Ranking:** Not in top 30
- **Status as of FY07:** Not monitored or evaluated (not funded).
- **Any need to change Forest Plan or implementation of Plan?** No information to make a determination.
- **Any need to change monitoring protocols or question to be sure we are getting information we want?** Not at this time since item has not been funded to date. The monitoring question should be looked at if and when funding becomes available. Forest monitoring protocols have not been developed.
- **Are the reports adequate or are any modifications needed?** None to review.

What are the effects of National Forest management on lands, resources and communities adjacent to the Forest?

- **Frequency of collection and evaluation:** Once every 5 years/ every 5th year
- **MEIT Ranking:** Not in top 30
- **Status as of FY07:** Not monitored or evaluated (not funded)
- **Any need to change Forest Plan or implementation of Plan?** No information to make a determination.

- **Any need to change monitoring protocols or question to be sure we are getting information we want?** Not at this time since item has not been funded to date. The monitoring question should be looked at if and when funding becomes available. Forest monitoring protocols have not been developed.
- **Are the reports adequate or are any modifications needed?** None to review.

Additional Questions

What are the population trends for mountain goat and the relationship to habitat change?

Note: This general question was added to comply with the 1982 planning regulations regarding MIS (36 CFR 219.19), and to meet the intent of the general MIS monitoring question on page 5-8 of the Forest Plan (also listed on page 5 of this report). The mountain goat is an MIS on Chugach National Forest, and therefore, population and habitat trends are subject to monitoring.

- **Frequency of collection and evaluation:** Annual / every 3rd year
- **MEIT Ranking: 19**
- **Status as of FY07:** Monitored in FY03, FY04, FY05, and FY06. FY07 accomplishment report notes that protocol still needs substantial work.
- **Any need to change Forest Plan or implementation of Plan?** Yes. This monitoring question is to be added to the Forest Plan.
- **Any need to change monitoring protocols or question to be sure we are getting information we want?** The MEIT reinterpreted general monitoring questions from the Forest Plan if they were not clearly stated as a Forest Plan monitoring question. Based on the information presented for this question in Table 5-1 of the Forest Plan, MEIT revised it to "What are the population trends for mountain goats and the relationship to habitat ***change***?" In 2007, it was decided to change the monitoring question to reflect MEIT interpretation. Anticipated date for completion of protocol is October 2008. When the protocol is approved, the monitoring question will be added to the Forest Plan to reflect MEIT recommendations.
- **Are the reports adequate or are any modifications needed?** The reports to date are not adequate to determine if forest management is maintaining conditions favorable for sustaining mountain goats, if management is respecting the guidelines for distances between activities and important goat habitat and what the population trends are for mountain goat and the relationship to habitat change. However, a master's thesis soon to be completed will provide sufficient information to address the first two items. The new protocols being developed will also improve our ability to answer the questions about goats.

Summary of monitoring and evaluation: The process being implemented first establishes the populations, locations, and habitat of the mountain goat, and subsequently determines the location of the motorized use and effects on the mountain goat.

Population trends for mountain goats and their relationship to habitat has not been reported by the Forest in Annual Monitoring Reports. It should be noted that this is a two part question. The first step is to conduct population surveys for mountain goats and to conduct these surveys regularly to establish population trend data. To date, surveys have been in the winter and this is not an optimum time of year to survey mountain goats for a total population count. Goats are more visible in the summer and population estimates would be more reliable during this season. ADF&G conducts surveys for goats and possibly these surveys could be used for population trend data. If these data could be used, how these population trend data are related to habitat would need to be determined.

Cordova District reported the number of goats sighted and the number of goat trails detected from winter/spring aerial surveys. These surveys were designed to determine areas of use by goats and then compared to a habitat capability model developed by Suring et al. (1988. *Habitat capability model for mountain goats in Southeast Alaska: Winter Habitat.*) Most goat sightings were within the range of the model. However, since it is difficult to locate and observe goats in the winter it remains unknown if the survey data are representative of the entire population.

Glacier District developed a study to assess the potential bias in predicting goat distribution using only goat locations collected from aerial survey by incorporating goats with radio telemetry collars. After this step is complete they plan to identify habitat variables significant across both datasets and settle on a final model for predicting mountain goat habitat by season. Ongoing work on goats with GPS collars will provide additional data and further our understanding of mountain goat habitat relationships.

In 2006, the Cordova Ranger District surveyed 232 mi^2 for mountain goats on winter range. Twenty-two goats and 17 goat trails were observed, resulting in a density of approximately 0.09 goats and 0.07 tracks per mi^2. All goats were between 700 and 3500 feet in elevation and most were on southerly aspects. Not all seemingly suitable habitats revealed goats or their sign.

The 2006 surveys replicated previous efforts in the same area and will assist trend analysis and will help the Forest identify high goat use areas and proper implementation of the Forest Plan.

Locations of goats and tracks generally agreed with the habitat model currently used to make management decisions. However, absence of goats from predicted habitat suggests that other factors may also influence goat distribution. For this reason, continued mapping of occupied winter range is recommended rather than relying solely on habitat models.

This will allow the Forest to maximize management opportunities while minimizing effects on goat population trends.

a) Is the forest management maintaining favorable conditions for sustaining mountain goats? The Forest has conducted winter surveys to determine the distribution of goats with regard to the impacts of winter recreation. Heli-skiing and flight routes are permitted with conditions to minimize and avoid disturbance of mountain goats. Surveys and habitat models developed by the Forest appear to have provided sufficient management information for maintaining favorable conditions for sustaining mountain goats.

b) Forestwide guidelines have identified specific distances to be maintained between activities and important goat habitat. Is management respecting these guidelines and are they effective? Guidelines, specific survey data and habitat models have been used by management to permit winter recreational activities.

Evaluation: None.

***Recommendations of remedial action*:** None.

Actions taken in response to recommendations identified in previous reports**: None.

Other Recommendations: None.

Are Forest management actions contributing to changes in air quality on the Forest?

Note: This general question was added in response to the Revised Forest Plan appeal decision.

- **Frequency of collection and evaluation:** Once every 3-5 years for both
- **MEIT Ranking: 18**
- **Status as of FY07:** A pilot study was monitored and evaluated in 2007. Pilot protocol was developed in 2006-2007 and approved by the FLT in November 2007.
- **Any need to change Forest Plan or implementation of Plan?** Yes. This monitoring question is to be added to the Forest Plan.
- **Any need to change monitoring protocols or question to be sure we are getting information we want?** Pilot protocol was approved by the FLT in November 2007. Protocol may need to be modified prior to additional monitoring to account for changes in site selection and equipment used, and to further define thresholds.
- **Are the reports adequate or are any modifications needed?** No modifications are needed.

Summary of monitoring and evaluation: An air quality monitoring pilot study was conducted on the Chugach National Forest during the winter of 2006-2007 to address concerns that winter motorized uses on the Forest are impacting air quality. The purpose was to quantify the levels of air pollutants in areas with high levels of winter motorized use on the Chugach National Forest. The air quality monitoring protocol was developed as part of the Forest Plan Monitoring Guide, and the protocol was implemented from January 2007 to May 2007. Technical assistance was provided by the Alaska Dept. of Environmental Conservation. (MacFarlane 2007)

Forest Service personnel from the Supervisor's Office and the Glacier Ranger District measured carbon monoxide and fine particulate concentrations at Turnagain Pass on a total of 8 days during the 2006-07 winter-motorized season. The west side of Turnagain Pass represents one of the most heavily used areas on the Chugach National Forest for winter motorized use. Air quality data were analyzed in relation to weather and use parameters during the sample days, and a report was produced. The complete *"Winter 2007 Air Quality Monitoring Report, Turnagain Pass, Alaska, Chugach National Forest"* prepared by Bill MacFarlane is available at the Forest Supervisor's Office in Anchorage Alaska.

Evaluation: The data show that motorized use at Turnagain Pass resulted in increased levels of carbon monoxide and fine particulates at sites measured near the western parking lot. However, the carbon monoxide and fine particulate data collected on the 8 sample days indicated low potential for violations of the Alaska State air quality standards. Under the present motorized use trends at Turnagain Pass, the likelihood of exceeding the standards as a result of winter motorized use is relatively low. However, as shown on one of the sample days, a moderate potential exists for exceeding the standards when high levels of motorized use occur on cold days with temperature inversions. (MacFarlane 2007)

***Recommendations of remedial action for this monitoring item*:** None.

Other Recommendations: This study was limited in its temporal and spatial scope, but provides an adequate look at the potential that these uses are violating State air quality standards. It is recommended that this type of sampling is repeated every 3 to 5 years to determine future trends and whether violations of air quality standards are occurring. (MacFarlane 2007)

Fine particulates should be measured, as they are the largest concern for violations of the State standards from winter motorized use. From a technical standpoint, the "EBAM" sampler with a battery system performed well for this type of sampling. Carbon monoxide may also be measured.

However, the "PACIII" samplers did not perform well in this environment. If carbon monoxide is measured, alternate sampling equipment may need to be acquired and tested. Chugach National Forest personnel should work with the Alaska Department of Environmental Conservation to conduct this sampling. Sampling should be conducted in high-use areas such as Turnagain Pass, the Lost Lake trailhead, or the Placer River parking areas. Because of the remote nature of these sites and the low potential for exceeding the State air quality standards at this time, it is not feasible to install permanent air quality monitoring equipment. Sampling should focus on cold days with temperature inversions and high levels of use in order to determine the maximum levels of air pollutants that might occur under these conditions. (MacFarlane 2007)

What is the effect of summer OHV use on soils and/or vegetation where OHV use is allowed?

Note: This general question was added in response to the Revised Forest Plan Appeal Decision.

- **Frequency of collection and evaluation:** Not defined
- **MEIT Ranking:** Not in top 30
- **Status as of FY07:** Monitored on Cordova Ranger District in 2006 and 2007.
- **Any need to change Forest Plan or implementation of Plan?** Yes. This monitoring question is to be added to the Forest Plan. Summary interpretations are not yet available to make a determination. Initial interpretations are expected in FY09.
- **Any need to change monitoring protocols or question to be sure we are getting information we want?** The soil resource monitoring protocols are expected to be approved in FY08. The protocols used to address the level of ground disturbing activities will include OHV use. The effect of summer OHV use on soils and vegetation will be included as a subset under that question.
- **Are the reports adequate or are any modifications needed?** The existing reports are adequate for the legacy data.

Summary of monitoring: In 2006 and 2007, the Chugach National Forest monitored off-highway vehicle (OHV) use on portions of Hawkins and Hinchinbrook Islands on the Cordova Ranger District. The 2007 monitoring was based on recommendations in the 2006 monitoring report (Hodges 2006; Meade 2007). The OHV monitoring can be reviewed in the 2007 report prepared by Meade.

The areas monitored are open to OHV use by rural Alaska residents for subsistence purposes (generally for deer hunting from Aug.1 – Dec. 31) in both summer and winter. Areas can be closed if natural resources are significantly impacted by OHV use. For non-subsistence uses, the following restrictions apply- the Anderson Bay area is open to summer

OHV use on designated routes and in all areas for winter use. No routes have been designated at this time. The Canoe Pass area is closed to motorized use.

Five trail systems were surveyed in 2007, covering approximately 10 miles of OHV trail. Trails surveyed were located in Anderson Bay on Hinchinbrook Island and in the Canoe Pass area on Hawkins Island. Detailed trail data, maps, and photos for each system are presented in the 2007 report prepared by Meade.

Summary of evaluation: The 2007 report notes that some OHV damage occurred; that it is relatively minimal given the ratio between damage and trail length, and that damage found in the 2006 survey was not necessarily in the same trail sections as those found in the survey conducted in 2002. The report states that the likely reason for this is that vegetation can hide user-created trails within a few years, and that new damage can occur in a given trail section and year.

The 2007 report concludes: "There are several stream crossing sites where extensive damage has occurred. Mitigation measures such as hardening the surface or rerouting the trail should be implemented as soon as possible at the Canoe Pass sites and possibly at the Boswell Bay site. Alternate routes and other possible mitigation measures should be investigated at lower priority sites in case conditions get worse in the future"(Meade 2007).

***Recommendations for remedial action for this monitoring item*:** Since the Canoe Pass trails are relatively close to Cordova, several private cabins are in the area, and the Canoe Pass inlet provides a sheltered anchorage for boats, these trails probably receive relatively high OHV use. Although large sections of these trails are undamaged, disturbances in some sections of the trail may have become worse since the 2002 surveys. In 2007, recent use was evident on both of these trails.

OHV users on the Canoe Pass trails have tried to minimize damage by placing logs, culverts, boards, or other materials at most of the stream crossings and on some of the steeper slopes. These efforts have probably helped, but haven’t been entirely successful. If continued monitoring shows that damage is increasing, specific stringer or stream crossing sites may need to be closed, alternate routes created, damaged areas restored, or hardened paths created. Placing log stringers or some other material through wetter areas and reseeding bare soil is recommended. Some of the crossings at fish-bearing or Class 3 streams may need immediate restoration work to prevent damage to fish habitat.

Actions to recommendations identified in previous reports: One of the questions to be addressed with this monitoring is the current status of the effects of OHV use in the Anderson Bay area. This area was an area of high concern as it had heavy OHV use that caused resource damage in the past. The low level of resource damage found in the 2006 and 2007 monitoring efforts indicate little or no OHV use is occurring in these areas now. It appears that some of the damaged areas observed in 2002 may have healed themselves.

Other Recommendations: The 2006 surveys provided a good database on the location and extent of soil and vegetation damage caused by OHV use. No invasive plant species were found during the surveys in 2006 or 2007. Invasive plants are often a concern associated with OHV use because seeds or plant parts often stick in the mud on the tires and are transported to new sites.

The main knowledge gap concerns the current use levels and to what degree the damage is accruing over time. It is possible that the use at Anderson Bay is low enough that the disturbed trail sections can heal themselves. In these cases it may not be necessary to restore Level 3 disturbances until we know that continuing use or other factors will not permit natural recovery. At stream crossing sites and areas where damage is increasing, a response may be necessary.

In areas where it is not possible to relocate a trail, trail hardening or structures may be needed. It may be possible to use local native materials, such as logs, to make bridges, corduroy paths, or other structures. For extensively damaged areas, geotextile fabric overlain with gravel, Geoblock®, or other materials may need to be used. The cost of planning, construction, and materials could be substantial if a hardened trail is needed to cover long stretches of wetlands.

Examples of mitigation include limiting use when the ground is not frozen, avoiding use in the wetter areas, or having users agreeing to end trails at designated sites in the back country and continue hunting on foot beyond that point.

STATUS OF FOREST PLAN MONITORING BY FISCAL YEAR

Status of Forest Plan monitoring; frequency of data collection and evaluation.
No = not monitored; OA = monitored by other agencies; P-Dev = protocol being developed; N/A = not applicable. Cells are highlighted in FY evaluation should occur.

#	Monitoring Question (How often data collected)	How often evaluated	FY03	FY04	FY05	FY06	FY07
	Compliance with Revised Forest Plan						
1	Are projects being implemented consistent with the Forest Plan direction? **(5 years)**	Every 5 yrs	N/A	N/A	N/A	No P-Dev	No P-Dev
	Integrated Effectiveness/Validation Monitoring						
2	Are management activities achieving their intended outcomes? **(Annual)**	Every 5 yrs	No – P-Dev	No – P-Dev	No P-Dev	No P-Dev	No – Protocol on hold in 07
3	To what extent is ecosystem composition and structure changing and has forest management influenced these changes? How do these changes compare to the expected range? **(Annual)**	Every 5 years	Yes – Report	Yes - Report	No	No P-Dev	No P-Dev
	Soil Resources						
4	What is the level of ground disturbing activity? **(Annual)**	Every 5 years	Yes Report	No	No	No P-Dev	No P-Dev
	Water Resources						
5	What is the existing water quantity? **(As scheduled)** *In 07, FLT decided this was research, not FP monitoring*	Every 5 years	Yes Report	No	No	No P-Dev	No - *question dropped*
6	Are Best Management Practices (including wetland management) effective in meeting water quality standards? **(As scheduled)**	Every 5 years	No	No	No	No P-Dev	No P-Dev
	Sensitive and Exotic Plant Species						
7	What is the abundance and distribution of sensitive plants in areas affected by management activities? **(Annual)** *As of 2007, done on a project- by-project basis, (TE&S surveys) no forestwide report or evaluation.*	Every 5 years	No	No	No	No P-Dev	No P-Dev

Status of Forest Plan monitoring; frequency of data collection and evaluation. No = not monitored; OA = monitored by other agencies; P-Dev = protocol being developed; N/A = not applicable. Cells are highlighted in FY evaluation should occur.							
#	**Monitoring Question (How often data collected)**	**How often evaluated**	**FY03**	**FY04**	**FY05**	**FY06**	**FY07**
8	What is the distribution and abundance of exotic plants, particularly in areas affected by management activities? **(Annual)** *As of 2007, done on a project- by-project basis, (TE&S surveys) no forest-wide report or evaluation.*	Forest Plan = annual; new protocol = Every 5 years	No	No	No	No P-Dev	No P-Dev
	Management Indicator Species						
9	What are the population trends for Management Indicator Species (MIS) and their relationship to habitat? Are MIS truly reflective of all fish and wildlife species on the Forest? **(not shown)** **In FY06, FLT decided question is redundant with specific MIS monitoring questions*.	not shown	No	No	No	No – Not funded	No - *question dropped*
10	Has the Revised Forest Plan direction prevented adverse interactions between bears and humans? **(Annual)**	Every 5 years				No P - Dev	No P-Dev
11	What are the population trends for brown bear and the relationship to habitat? **(Every 3rd year)**	Every 3 years	N/A	No	Report	Status Report No eval. Monitored by OA	No -OA
12	What are the population trends for dusky Canada geese and the relationship to habitat change? **(Every 3rd year)**	Every 3 years		Report	No	No – OA, no FS funding	Yes (OA + F)
13	What are the population trends for moose and the relationship to habitat? **(Annual)**	Annual			2 Survey Reports	No - OA	No - OA
14	What are the population trends for **black oystercatchers** and the relationship to habitat change? **(3 yrs in each 5 yrs)**	Every 5 years	Yes - Survey & Report	Yes - Report	Yes - Report	Yes, *report did not address Forest Plan question*	No P- Dev

Status of Forest Plan monitoring; frequency of data collection and evaluation.
No = not monitored; OA = monitored by other agencies; P-Dev = protocol being developed; N/A = not applicable. Cells are highlighted in FY evaluation should occur.

#	Monitoring Question (How often data collected)	How often evaluated	FY03	FY04	FY05	FY06	FY07
15	What are the population trends for **Dolly Varden** char and the relationship to habitat? **(Annual)**	Every 5 years	Yes - Report	Yes - Report		No P- Dev	No P- Dev
16	What are the population trends for **coho salmon** and the relationship to habitat? **(Annual)**	Every 5 years	No	Yes Report	No	No P- Dev	No P- Dev
	Species of Special Interest						
17	Is Forest management maintaining favorable conditions for sustaining **gray wolves**? **(Annual)**	Every 5 years	No	No	No	No - Not funded	No - not funded
18	Is Forest management maintaining favorable conditions for sustaining **Kenai wolverines**? **(Annual)**	Every 5 years	No	No	No	No - Not funded	No - not funded
19	Is Forest management maintaining favorable conditions for sustaining **Townsend warblers**? **(Every 5 years)**	Every 5 years	n/a	n/a	n/s	No - Not funded	No - not funded
20	Is forest management maintaining favorable conditions for sustaining **northern goshawks**? **(Annual)**	Every 5 years	No	No	No	No - Not funded	No - not funded
21	Is Forest management maintaining favorable conditions for sustaining **Sitka black-tailed deer**? **(Annual)**	Every 5 years	No	No	No	No- Not funded	No – not funded
22	Is forest management maintaining favorable conditions for sustaining the **Montague Island marmot**? **(Once) If marmots are found, adjustments will be made to the schedule.**	Every 5 years (if found to be present)	No	No	No	No - Not funded	No – not funded
23	Is Forest management maintaining favorable conditions for sustaining **cutthroat trout**? **(Annual)**	Every 5 years	2 Reports	Report	No	No - Not funded	No - not funded

Status of Forest Plan monitoring; frequency of data collection and evaluation.
No = not monitored; OA = monitored by other agencies; P-Dev = protocol being developed; N/A = not applicable. Cells are highlighted in FY evaluation should occur.

#	Monitoring Question (How often data collected)	How often evaluated	FY03	FY04	FY05	FY06	FY07
	Threatened, Endangered and Sensitive Animal Species						
24	What are the population trends for **trumpeter swans** and the relationship to habitat change? **(Annual)**	Every 5 years	Yes - Report	Yes - Report	Yes - Report	Yes on Kenai	No – not funded
	Forest Products						
25	Are harvested forestlands restocked? **(annual of selected areas)**	Every 5 years	No	No	No	No P-Dev	No Protocol approved
26	Have conditions changed that would affect the suitability of timber production lands? **(every 10 years)**	Every 10 years	No	No	No	No P-Dev	No Protocol approved
	Minerals						
27	Are mining plans of operations consistent with Revised Forest Plan direction? **(once)** *In FY07 determined to be an inventory to occur in FY08.*	Every 5 years	No	No	No	No P-Dev	No – inventory so no protocol needed.
	Heritage						
28	Are National Register eligible heritage resources being adequately maintained and protected? **(Annual)**	Annual	No	No	No	No P-Dev	No P-Dev
29	What is the status and condition of heritage resources on the Forest? **(Annual)**	Annual	No	No	No	No P-Dev	No P-Dev
	Recreation Opportunities, Tourism, Access, and Facilities						
30	What are the characteristics of recreational visitors? What is their pattern of recreational use? What are their perceptions of opportunities and settings? **(Once every 5 years)**	Every 5 years	Yes - Survey & Report	No	Report	No	No

Status of Forest Plan monitoring; frequency of data collection and evaluation.
No = not monitored; OA = monitored by other agencies; P-Dev = protocol being developed; N/A = not applicable. Cells are highlighted in FY evaluation should occur.

#	Monitoring Question (How often data collected)	How often evaluated	FY03	FY04	FY05	FY06	FY07
31	Is the Revised Forest Plan direction for motorized and nonmotorized access working? **(Annual)**	Every 5 years	No	No	No	No P-Dev	No Protocol needs FLT approval
32	Are areas of the Forest being managed in accordance with the prescribed Recreation Opportunity Spectrum (ROS) class in Forest-wide standards and guidelines? **(Annual)**	Every 5 years	No	No	No	No – Not funded	No – not funded
33	What is the use of developed recreational facilities and how does it compare to capacity? **(Annual)**	Annual	No	No	No	No P-Dev	No Protocol needs FLT approval
34	What are the trends in commercial recreation services on the Forest and how does it compare to capacity? **(Annual)**	Annual	No	No	No	No P-Dev	No Protocol needs FLT approval
	Scenic Quality						
35	Are areas of the Forest being managed in accordance with the Scenery Integrity Objectives in Forest-wide standards and guidelines? (**annual sample of selected areas)**	Every 5th year	No	No	No	No P-Dev	No P-Dev
	Fire Protection and Fuels Management						
36	What is the pattern of abundance of different fuel types on the Kenai Peninsula? **(Forest Plan = 5 yr; 2008 Protocol = annual)**	Forest Plan = Every 5th yr; New protocol = depends on method-ology	N/A	N/A	N/A	No P-Dev	No P-Dev

Status of Forest Plan monitoring; frequency of data collection and evaluation. No = not monitored; OA = monitored by other agencies; P-Dev = protocol being developed; N/A = not applicable. Cells are highlighted in FY evaluation should occur.							
#	**Monitoring Question (How often data collected)**	**How often evaluated**	**FY03**	**FY04**	**FY05**	**FY06**	**FY07**
			Wilderness				
37	Is the wilderness character of the Wilderness Study Area (WSA) and areas recommended for Wilderness being maintained? **(Annual sample for selected areas**)	Every 5th year	No	No	No	No P-Dev	No P-Dev
			Research Natural Areas				
38	Are proposed and established Research Natural Areas (RNA) being maintained in a state unmodified by human activity? **(Forest Plan = 10 yr; 2007 Protocol = annual)**	Forest Plan = Every 10th yr; New = depends on method-ology	N/A	N/A	N/A	No P-Dev	No, protocol complete
			Community Effects				
39	What are the trends in local economies? **(annual)**	Every 3 years	No	NO	No	No – not funde d	No – not funded
40	What are the effects of National Forest management on lands, resources and communities adjacent to the Forest? **(Once every 5 years)**	Every 5 years	N/A	N/A	N/A	N/A	No – not funded
			Added Questions (Record of Decision)				
41	What are the population trends for mountain goat and the relationship to habitat change?**(Annual)**	Every 3 years	Yes - CRD	Yes - CRD	Yes - CRD	Yes – CRD P - Dev	No P-Dev
			Added Questions (Appeal Decision)				
42	Air Quality - Are Forest management actions contributing to changes in air quality on the Forest? **(once every 3-5 years)**	Once every 3-5 years	No	No	No	No P- Dev	Yes P-Dev

Status of Forest Plan monitoring; frequency of data collection and evaluation. No = not monitored; OA = monitored by other agencies; P-Dev = protocol being developed; N/A = not applicable. Cells are highlighted in FY evaluation should occur.							
#	**Monitoring Question (How often data collected)**	**How often evaluated**	**FY03**	**FY04**	**FY05**	**FY06**	**FY07**
43	OHV Impacts - What is the effect of summer OHV use on soils and/or vegetation where OHV use is allowed? **(not defined)** Recommendation -include as part of level of ground disturbing question.	Not Defined	No	No	No	Yes – on CRD	Yes – on CRD P-Dev as part of #4

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APPENDIX

The top 30 monitoring questions in descending order of the sum of management potential, risks, and uncertainty criteria scores from the MEIT model. The total score and the weighted average values for each of the criteria are also shown.

Monitoring Question	Overall Score (0-1 range)	Management Potential + Risks + Uncertainty (0-0.40 range)	Model Criteria and Weights							
			100%			75%			50%	
			6. Required by Law	1. Evaluates LRMP	2. Management Potential	3. Risks	4. Desired Conditions	5. Uncertainty	8. National Sustainability Priority	9. Regional Emphasis Area
33_heritage_survey	0.72	0.37	0.16	0.16	0.16	0.12	0.03	0.09	0.00	0.00
32_heritage_condition	0.76	0.33	0.16	0.16	0.12	0.12	0.03	0.09	0.04	0.04
42_wsa	0.71	0.31	0.16	0.16	0.16	0.09	0.00	0.06	0.04	0.04
1_plan_consistency	0.66	0.31	0.16	0.16	0.16	0.09	0.03	0.06	0.00	0.00
39_commercial_rec	0.54	0.31	0.00	0.16	0.16	0.06	0.03	0.09	0.00	0.04
10_dlp	0.76	0.30	0.16	0.16	0.12	0.12	0.06	0.06	0.04	0.04
13_dusky_geese	0.76	0.30	0.16	0.16	0.12	0.12	0.06	0.06	0.04	0.04
40_sio	0.68	0.28	0.16	0.16	0.16	0.09	0.00	0.03	0.00	0.08
36_motorized_nonmotorized	0.77	0.27	0.16	0.16	0.12	0.12	0.06	0.03	0.08	0.04
2_intended_outcomes	0.66	0.27	0.16	0.16	0.12	0.09	0.03	0.06	0.04	0.00
35_public_demand	0.54	0.27	0.00	0.16	0.12	0.09	0.03	0.06	0.00	0.08
38_developed_rec	0.60	0.27	0.00	0.16	0.12	0.06	0.09	0.09	0.00	0.08
41_fire_hazard	0.80	0.26	0.16	0.16	0.08	0.12	0.06	0.06	0.08	0.08
12_brown_bear	0.72	0.26	0.16	0.16	0.08	0.12	0.06	0.06	0.04	0.04
3_ecosystem_change	0.76	0.26	0.16	0.16	0.08	0.09	0.06	0.09	0.04	0.08
43_rna	0.61	0.25	0.16	0.16	0.16	0.03	0.00	0.06	0.00	0.04
14_moose	0.70	0.24	0.16	0.16	0.12	0.09	0.06	0.03	0.04	0.04
46_air	0.58	0.22	0.16	0.16	0.16	0.06	0.00	0.00	0.00	0.04
15_mountain_goat	0.64	0.21	0.16	0.16	0.12	0.06	0.03	0.03	0.04	0.04
18_dolly_varden_char	0.64	0.21	0.16	0.16	0.12	0.06	0.03	0.03	0.04	0.04
4_soil	0.64	0.21	0.16	0.16	0.12	0.06	0.03	0.03	0.04	0.04

Monitoring Question	Overall Score (0-1 range)	Management Potential + Risks + Uncertainty (0-0.40 range)	Model Criteria and Weights							
			100%			75%			50%	
			6. Required by Law	1. Evaluates LRMP	2. Management Potential	3. Risks	4. Desired Conditions	5. Uncertainty	8. National Sustainability Priority	9. Regional Emphasis Area
17_black_oystercatcher	0.69	0.20	0.16	0.16	0.08	0.06	0.09	0.06	0.04	0.04
19_coho_salmon	0.63	0.20	0.16	0.16	0.08	0.09	0.03	0.03	0.04	0.04
31_minerals	0.58	0.19	0.16	0.16	0.16	0.03	0.03	0.00	0.04	0.00
29_timber_suitability	0.51	0.19	0.16	0.16	0.16	0.03	0.00	0.00	0.00	0.00
6_bmp	0.61	0.18	0.16	0.16	0.12	0.03	0.03	0.03	0.04	0.04
8_invasive_plants	0.68	0.17	0.16	0.16	0.08	0.06	0.03	0.03	0.08	0.08
7_sensitive_plants	0.52	0.17	0.08	0.16	0.08	0.03	0.03	0.06	0.04	0.04
28_restocking	0.57	0.15	0.16	0.16	0.12	0.03	0.06	0.00	0.00	0.04
5_water	0.51	0.11	0.16	0.16	0.08	0.03	0.00	0.00	0.00	0.08