OPERATIONAL PLAN FOR INTENSIVE MANAGEMENT OF SITKA BLACK-TAILED DEER IN A PORTION OF GAME MANAGEMENT UNIT 3

Prepared by:

DIVISION OF WILDLIFE CONSERVATION

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INTRODUCTION

This operational plan has been prepared by the Alaska Department of Fish and Game (ADF&G) to provide supporting information for the intensive management (IM) plan for Sitka black-tailed deer in a portion of Game Management Unit (GMU 3). The IM plan for Sitka black-tailed deer in a portion of GMU 3 has been submitted to the Alaska Board of Game (BOG) for consideration at its March 2013 meeting. It describes rationale for evidence of limiting factors; choice of indices for evaluating treatment response; and decision frameworks for predation control, habitat enhancement, and prey harvest strategies. The *Intensive Management Protocol* (ADF&G 2011*a*) describes the administrative procedures and the factors and strategies in adaptive management of predator-prey-habitat systems to produce and sustain elevated harvests of caribou, deer, or moose in selected areas of Alaska. The IM plan for Sitka black-tailed deer in a portion of Game Management Unit 3 is being developed based on the recommendation of Petersburg Fish and Game Advisory Committee and at the request of the BOG. The IM plan and this operational plan include information and recommendations from a feasibility assessment (ADF&G 2012) and the recommendations by the BOG following public comment at the January 2013 BOG meeting. **This is an experimental treatment program to evaluate whether (a) wolf control in a small portion of GMU 3 can reallocate a measurable proportion of deer mortality from wolves to humans and (b) whether population estimation techniques for both predators and prey can be refined to measure the effectiveness of the IM actions, and (c) whether 1-2 hired wolf trappers, operating during the established wolf trapping season and using standard trapping techniques, can reduce wolf numbers sufficiently to bring about an increase in the area's deer population.**

BACKGROUND

IM objectives: For the purposes of implementing AS 16.05.255(e) – (g), the Alaska Board of Game (Board) established the deer population and harvest objectives for Unit 3 (Fig. 1) at 15,000 and 900, respectively in 2000 (5 AAC 92.108; Appendix A). The IM population objective (15,000 deer) was developed by assessing the deer habitat carrying capacity within the unit and the local Area Biologist's subjective assessment of where the unit's deer population stood relative to carrying capacity. The IM deer harvest objective was developed using the unit's average estimated annual deer harvest from 1994-1998 plus an additional 10%. Although we do not have a precise way to estimate deer numbers in Unit 3, our deer pellet-group trends suggest we are at a much lower level than 15,000, while our harvest estimates have remained well below the 900 deer threshold established by the BOG in 2000 each year since 2005. Between 1994 and 2005, the estimated Unit 3 deer harvest ranged from 603 to 1,046, and the number of hunters varied from 851 to 1,194. In 2005, the estimated unit-wide harvest began decreasing, a trend that continued until 2009. The estimated unit-wide harvest of 377 deer in 2008 was the lowest reported harvest since 1990 and well below the preceding 10-year average of 813 deer. The estimated harvest increased to 595 in 2009, and then increased again to 673 in 2010 (ADF&G 2011*b*). *Prior to 2011, the department estimated the Unit 3 deer harvest based on a regional questionnaire mailed randomly to 33% of deer harvest ticket holders (ADF&G 2010). Note that the Unit 3 deer harvest estimates and summary statistics cited here for RYs 1997-2010 may differ slightly from those cited in previous Unit 3 Deer Management Reports and the recently completed "Feasibility Assessment for Increasing Sustainable Harvest of Sitka Black-Tailed*

Deer in a Portion of Game Management Unit 3" (ADF&G 2012). Discrepancies between the deer harvest estimates provided in this document and those provided in previously cited documents are the result of a recently completed reanalysis and rectification of Region I deer hunter survey data and annual harvest estimates dating back to RY 1997.

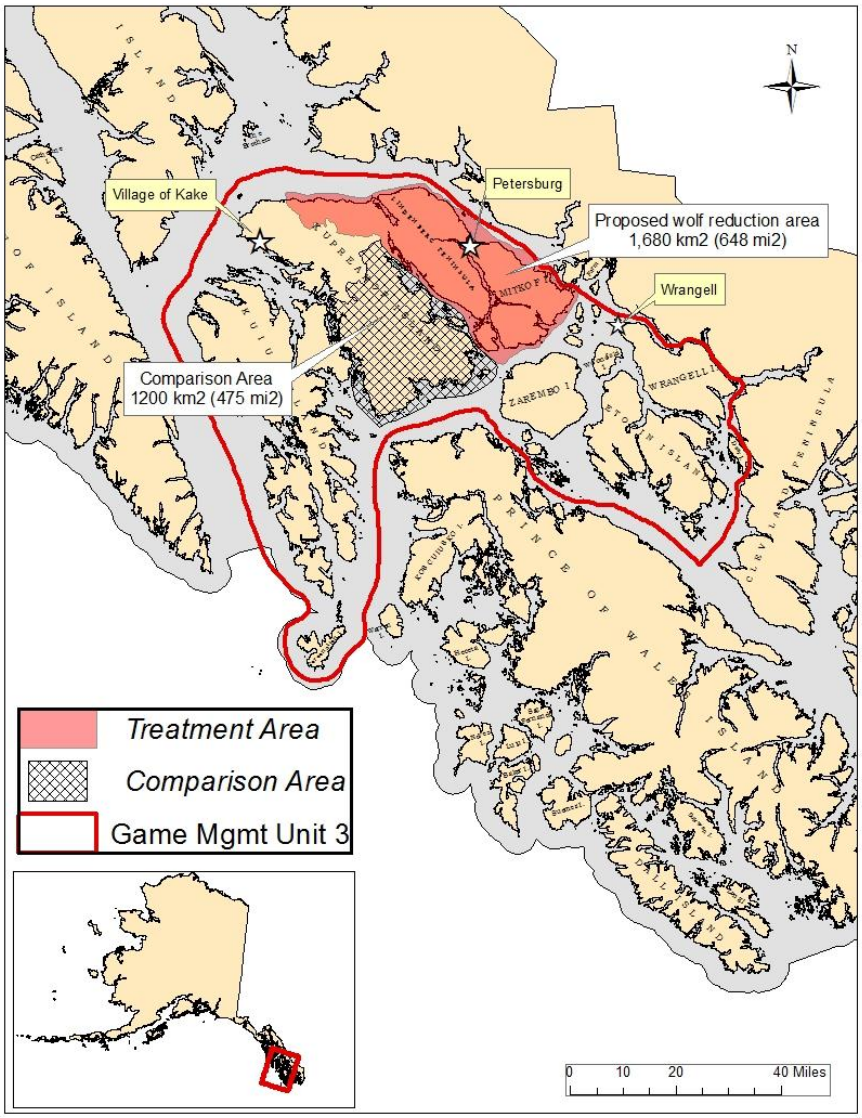

Figure 1. Game Management Unit 3 (3,000 mi^2) and the IM "Treatment" (648 mi^2) and "Comparison" (475 mi^2) areas.

Major predators: Both wolves and black bears are present in Unit 3 and both species are known to prey on deer, however, the respective role each plays in holding Unit 3 deer populations at low levels remains unknown. Therefore, the degree to which removing wolves will enhance the deer population given that bears will not be targeted for removal remains unknown. Data from an ongoing fawn mortality study in neighboring Unit 2 indicates that black bears represent an important source of mortality for deer fawns, though their impacts on deer appear to be largely

limited to the fawn age class. Wolves do not occur in neighboring GMU 4, and the fact that deer populations there are capable of quickly rebounding from winter related die-off's despite high densities of brown bears. Since we have no reason to believe that brown bears are any less predatory on deer fawns than are black bears, this suggests that wolves may play an important role in preventing the recovery of deer populations in GMU 3.

Important management factors: Winter weather is one of the main factors influencing deer numbers in Southeast Alaska. From 2006-2009, the central Alaska panhandle, including Unit 3, experienced 3 consecutive winters with well above average snowfall. During the winter of 2006–2007, the Petersburg and Wrangell areas broke all-time records for snowfall (229 inches for Petersburg and 148 inches for Wrangell) (NOAA 2010). The winter of 2008–2009 also resulted in above average snowpack though not as severe as the 2 preceding winters. Heavy snow winters, such as those experienced during Regulatory Years (RY) 2006-2008, are thought to be primarily responsible for the most recent deer declines, while predation by wolves is suspected of forestalling recovery of the deer population. Unit 3 has also experienced extensive habitat alterations due to clear-cut logging that can exacerbate the effects of severe winters. Clear-cut logging removes productive old growth stands that are important winter habitat for survival of deer. Productive old growth stands are important to deer during heavy snow winters because the dense canopy of large trees serves to intercept snowfall, thereby preventing forage plants from being covered by snow. Such stands also allow deer to move about the landscape without having to expend a great deal of energy. As more forest stands important for deer over-winter survival are removed by logging, deer are forced to winter among smaller remaining stands where they must compete more intensively for available forage while at the same time being made increasingly vulnerable to predation.

In November 2010, the Board extended the wolf hunting season until the end of May to provide more opportunity for black bear hunters to take wolves. This action, however, contributed little to the Unit 3 harvest in RY 2010 (just 2 wolves were harvested during May 2011). However, in RY 2011 the wolf season extension resulted in the harvest of 10 additional wolves, or about 10% of the unit-wide wolf harvest that year.

During the 1960s deer numbers in Unit 3 appeared to be relatively stable. At that time, the deer season in this area spanned August 1-December 15, with a bag limit of four deer. However, in the late 1960s and early 1970s, deer in Unit 3 experienced a series of severe winters that resulted in a significant population decline and led to the adoption of more restrictive seasons and bag limits. Beginning in 1970 Unit 3 was subdivided into two hunt areas (Mitkof Island and the remainder of Unit 3), with the bag limit on Mitkof reduced to 2 antlered deer. By 1973 the season in Unit 3 was reduced to two months with a bag limit of just one antlered deer. Unit 3 was then closed to deer hunting from 1975 through 1979. The area south of Sumner Strait had a limit of 1 antlered deer from 1980 to 1987. The Board increased this limit to 2 antlered deer in 1988. In 1991 a registration permit hunt with a 15–31 October season and a 1 antlered deer bag limit was opened on parts of Mitkof, Kupreanof, Woewodski, and Butterworth islands, where the deer season had been closed since 1975 (16-year closure). The registration permit was replaced with a harvest ticket requirement in 1995. Since that time Unit 3 has been managed with seasons ranging from 2 weeks to 4 months, with a bag limit of 1-2 antlered deer. In spite of this male-

only harvest, the deer population has remained relatively low when compared to neighboring islands, including Prince of Wales, Admiralty, Baranof, and Chichagof islands.

Beginning with the 1993 season, the only part of Unit 3 closed to deer hunting was the area within the Petersburg and Kupreanof city limits. The Board abolished that prohibition in fall 2000. At the fall 2002 meeting, in response to increased pellet-group densities, the Board extended the season length and increased the bag limit for deer on the Lindenberg Peninsula, aligning the deer regulations on all of Kupreanof Island with the majority of Unit 3. However, due to continued low deer numbers, the apparent inability of the deer population to recover after severe winters during the 2006-2009 period, and the concern for additional habitat loss due to logging practices, the department submitted a proposal for the January 2013 Board meeting to shorten the deer hunting season from 4-months to 2-weeks. In addition, the Department also proposed to reduce the bag limit from 2 bucks to 1 buck and to close the nonresident deer hunting season on the Lindenberg Peninsula. The Board unanimously adopted the proposal, which will take effect on July 1, 2013.

Seasons and bag limits for deer on Mitkof Island and in Unit 3 in general are more restrictive than in other island-dominated game management units in the region. Between 1994 and 2005, the estimated Unit 3 deer harvest ranged from 603 to 1,046, (Fig. 2) and the number of hunters varied from 851 to 1,194 (Fig. 3). In 2005, the estimated unit-wide harvest began decreasing, a trend that continued until 2009. The estimated unit-wide harvest of 377 deer in 2008 was the lowest reported harvest since 1990 and well below the preceding 10-year average of 813 deer. In 2009 the estimated harvest increased to 595, and then increased again to 673 in 2010. We believe the observed declines in both pellet-group densities (Appendix B), and estimated hunter harvests reflect actual declines in deer numbers.

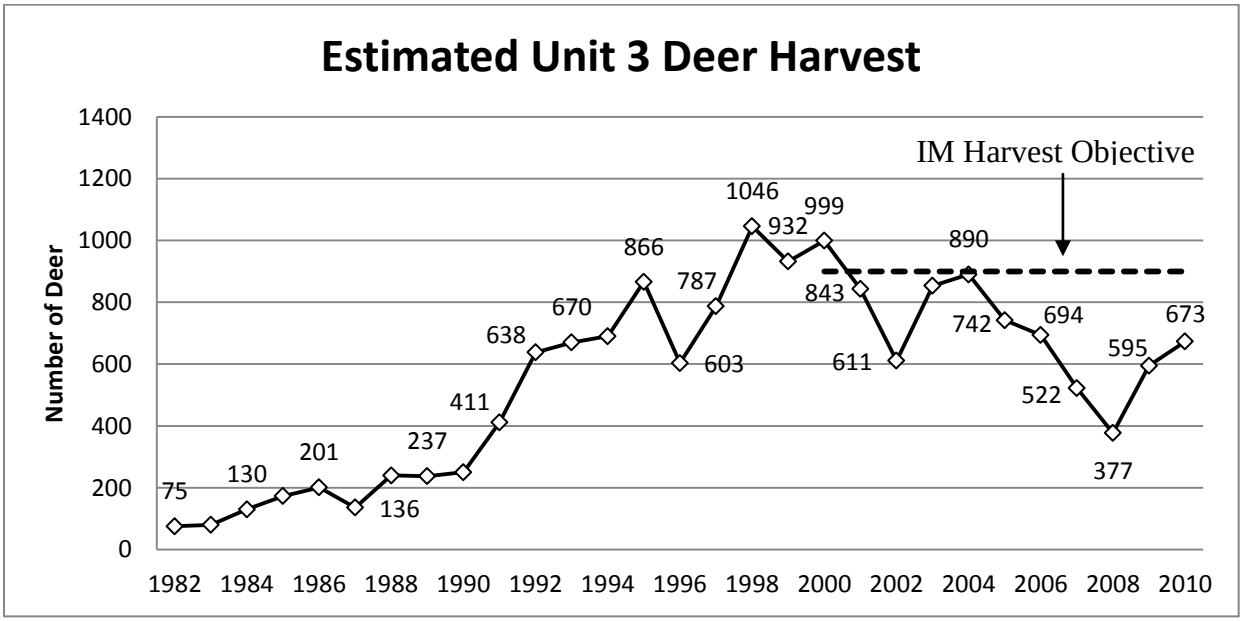

Figure 2. Estimated Unit 3 deer harvest, RY 1982-2010

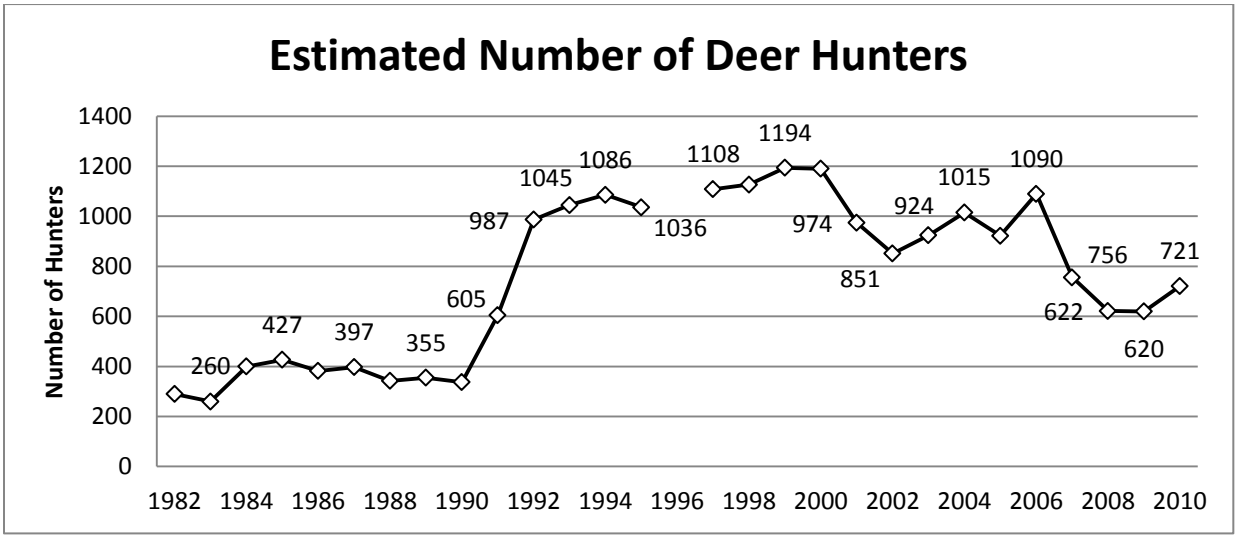

Figure 3. Estimated number of deer hunters in Unit 3, RY 1982-2010

This operational plan describes an experimental approach to adaptive management that will test predation control in a relatively small area on a low density deer population. The intent of this IM program will be to increase deer for harvest using a cost efficient predation control strategy. Evaluation of hunter harvest as a metric for predation control effectiveness will be an important element of this adaptive management program.

The scope of this experimental IM program is limited in its expected impact on the overall Unit 3 wolf and deer populations. It is primarily a reallocation of deer from wolves to humans in a relatively small portion (648 mi^2) of the unit and is not expected to produce a substantially larger deer population or harvest throughout Unit 3 as a whole. Because the community of Petersburg is located within the treatment area, most of the potential benefit of the program will accrue to local residents.

ADAPTIVE MANAGEMENT FRAMEWORK

Adaptive management is designing programs to maximize what can be learned from field experiments for potential application elsewhere, not simply modifying management in light of experience (National Research Council 1997:122). Managers wishing to use the best available information for management decisions or recommendations often need to generate new information for specific field situations (National Research Council 1997:174). Any section of the following framework may be modified as new information comes to light in the study area or the scientific literature. Lack of an anticipated response may require evaluation of additional criteria or a research project to understand which additional factors may be influencing the system and whether they are feasible to manage.

I. TREATMENTS

A. *Predation Control:*

The IM action would involve hiring 1 or 2 experienced wolf trappers to remove wolves (during the established wolf trapping season) from a relatively small portion of Unit 3 in an attempt to increase the deer population and reallocate harvest from wolves to humans. This reallocation will occur in proximity to the community of Petersburg, where deer populations have remained stagnant at low levels for several years.

The experimental wolf reduction area encompasses approximately 1,680 km^2 (648 mi^2) or approximately 22% of the total land area in Unit 3. The treatment area includes Woewodski Island, Mitkof Island, and the Lindenberg Peninsula on eastern Kupreanof Island, (including Wildlife Analysis Areas (WAAs) #2007, #2008, #5135, #5136, #5137 and #5138). To evaluate whether if treatments are working (if wolf numbers are reduced by trapping and if deer numbers increase), and to determine if deer numbers also increase in areas where wolves are not significantly reduced by trapping, an approximately 1,200 km^2 (475 mi^2) non-treatment or "comparison area" will be established on western Kupreanof Island (including WAAs #5130, #5133 and #5134) (Fig. 4).

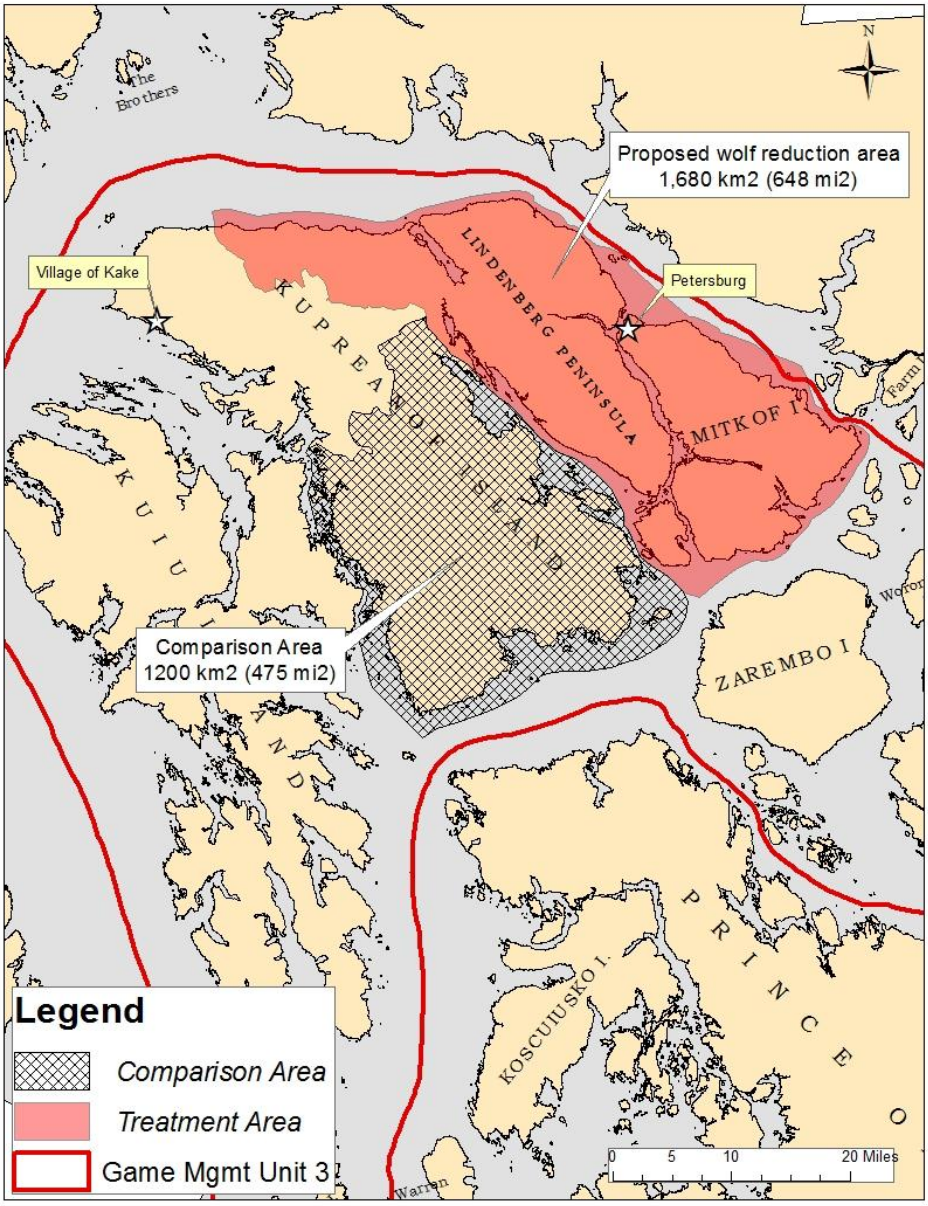

FIGURE 43. Intensive Management "treatment" and "comparison" areas in Game Management Unit 3.

There are currently no precise estimates for the wolf population in Unit 3. Population estimates for Unit 3 wolves are based on inferences derived from extensive wolf research (including radiotelemetry) conducted on neighboring Prince of Wales Island (GMU 2) during the late 1990s. Based on estimates of average wolf pack and home range sizes in GMU 2 we believe there are approximately 250 (range from 125-385) wolves in GMU 3, of which approximately 50 (20%) are harvested by hunters and trappers annually (data from 2000-2010) (Fig. 5). However, for management purposes, the wolves on Etolin Island, Wrangell

Island, and Zarembo Island should be considered separate populations from the wolves that inhabit Kuiu, Kupreanof, Woewodski, and Mitkof Islands.

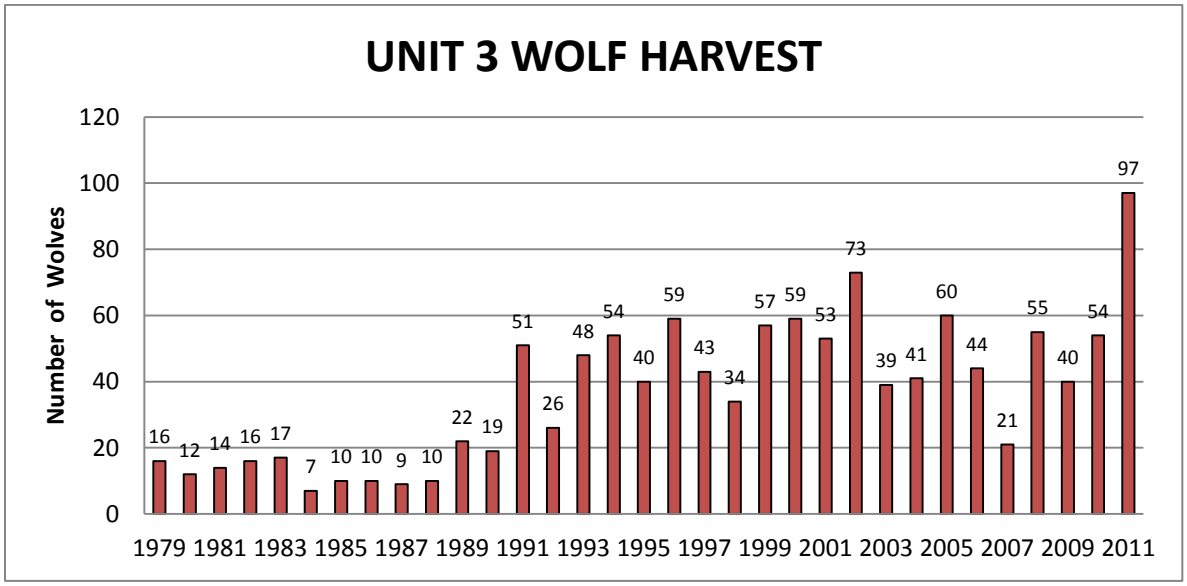

Figure 5. Unit 3 reported wolf harvest, RY 1979-2011.

We believe there are approximately 180 wolves within the Kuiu, Kupreanof, Woewodski, and Mitkof Island complex, of which about 33 (18%) are harvested annually (data from 2000-2010). When the IM Program is implemented, approximately 32% of the land area (with about 60 wolves) within this 4 island complex (or 1,680 km^2) will be established as a treatment area (Lindenberg Peninsula on Kupreanof Island, Mitkof Island, and Woewodski Island). Within the treatment area, up to 80% of the wolves (about 50 wolves in 5-6 packs) would be removed.

Because GMU 3 is not a closed population (wolves can easily move throughout much of the Unit) immigration of individual wolves or packs into the treatment area will likely require regular removal of wolves during the course of the control program. Wolves from outside the treatment area will serve as a source population to recolonize the treatment area when wolf trapping is suspended. Also, we do not believe the harvest of wolves within the treatment area, and normal harvest outside the control area, will result in an overall reduction in the wolf population that would result in a conservation concern for the unit as a whole. In the event the harvest of wolves within the treatment area, and normal harvest outside the control area results in a trend toward unsustainable harvests, wolf harvest in the remainder of the 4-island complex (outside the treatment area) will be reduced by the Department.

During the preceding 10 year period (RY 2002-2011), hunters and trappers harvested an average of 17 wolves annually (range: 5-32) from within the treatment area (Fig. 6). If normal wolf hunting and trapping effort remains relatively consistent with recent years, state sponsored trappers would initially (winter 1 of predator control) need to remove approximately 30 additional wolves from the treatment area. In subsequent years, harvest

levels would be adjusted downward to ensure that a minimum of 10 wolves are maintained within the treatment area.

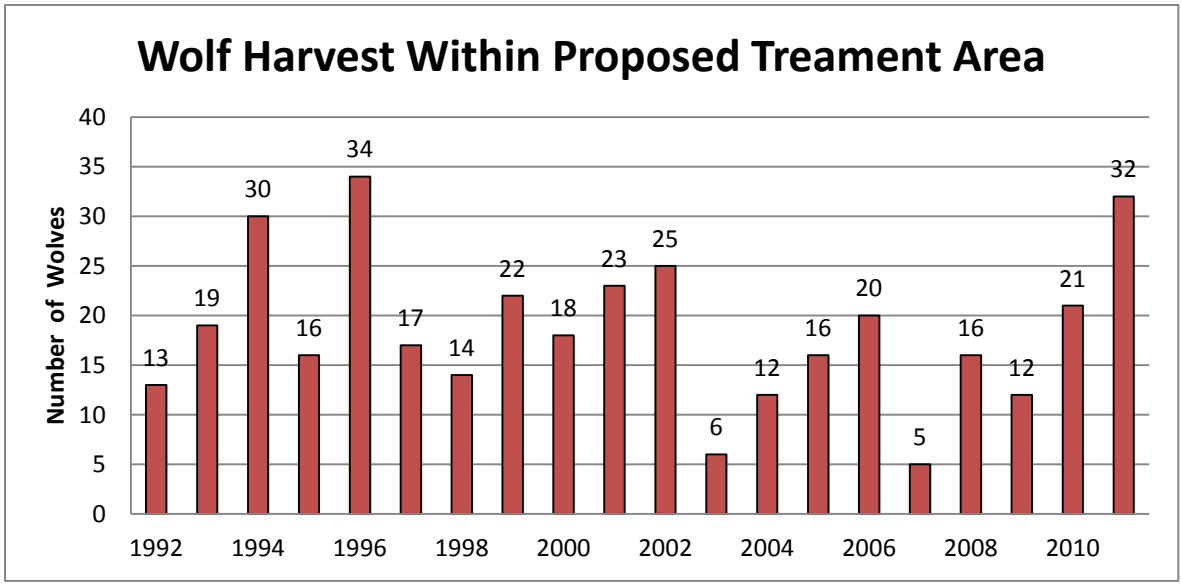

Figure 6. Reported wolf harvest within the IM Treatment Area in Unit 3.

Duration:

Unless there is evidence indicating that the program is ineffective, we propose to continue the state sponsored trapping effort for a minimum of 5 years in an attempt to achieve and maintain the desired reduction in wolf numbers.

Operational difficulties:

Although trapping by the public has seldom been shown to significantly reduce wolf numbers in Alaska, by hiring 1 or 2 experienced wolf trappers who will work full time within the treatment area, the department believes there is at least a moderate likelihood that wolf numbers can be reduced given the experience of these trappers. However, whether they can consistently maintain the wolf population at the desired control levels long enough to measurably improve deer survival and harvest remains uncertain.

Variations in winter weather conditions from year to year can have a profound influence on wolf trapping effort and success. Our ability to achieve and maintain the desired level of wolf reduction will similarly be affected by winter weather conditions and whether or not those conditions prove favorable or unfavorable to wolf trapping success.

Public role:

Public harvest of wolves under the current regulations will continue to be encouraged. While there are a number of wolf trappers operating within portions of the treatment area, high fuel costs and low pelt prices tend to limit most wolf trapping activity to a few individuals operating relatively few wolf sets at low to moderate intensities. Though normal trapping

generally considers return on investment to limit activity, this plan overcomes that issue by compensating experienced trappers even when trapping success is low.

B. *Habitat Enhancement:*

The Unit 3 landscape has been altered considerably by decades of forest management, which continues to reduce the deer carrying capacity. Nonetheless, anecdotal evidence suggests deer are currently far enough below the carrying capacity of the existing habitat that nutrition is not believed to be a major factor in the recent population decline. Deer numbers appear to have declined to low levels in all habitats. Nonetheless, winter habitat in the form of low elevation, high volume old growth forests is probably the most important and most limiting habitat for deer in this area. The stand characteristics typical of high volume old growth forest stands take hundreds of years to fully develop, and only after a period of approximately 150 years do second growth stands begin to take on old growth characteristics. The recent series of heavy snow winters and logging related reductions in low elevation, south facing high volume old growth forests important for deer overwinter survival may have contributed to the recent decline in deer numbers and limit achievable population increases.

While generally considered a silviculture prescription, precommercial thinning of the dense second-growth stands resulting from clear-cut logging can temporarily increase forage production, delay eventual canopy closure and stem exclusion, and accelerate forest succession to an old growth forest condition. As such, precommercial thinning provides the only real opportunity to improve habitat conditions for deer. While precommercial thinning of dense second-growth stands can provide some benefit to deer for a 5-25 year period following treatment, such treatments provide little benefit to deer in the near-term. Furthermore, most of the unit is comprised of Federal lands (National Forest) and it is not within the State's authority to undertake such activities. Even if habitat enhancement were feasible, we would not expect such efforts to significantly improve deer numbers in the near-term. Land ownership constants aside, no habitat enhancement efforts are being considered.

C. *Prey Harvest:*

Although seasons and bag limits will be restrictive, hunting seasons for deer will remain open (for bucks-only) within the treatment area. As a result of recent BOG action, except for a small archery-only hunt area adjacent to Petersburg (Petersburg Management Area), the majority of the treatment area will be managed under a restrictive 2-week season (Oct. 15 – Oct 31) with a 1-buck bag limit. If the IM program is successful in achieving increased deer numbers, liberalization of both the deer hunting season and bag limit will be considered (including the harvest of does if appropriate) to prevent the population from exceeding the area's carrying capacity.

II. ANTICIPATED RESPONSES TO TREATMENTS

A. *Predator Abundance:*

There currently no precise estimates of the wolf population in Unit 3. Population estimates for Unit 3 wolves are based on inferences derived from extensive wolf research (including

radiotelemetry) conducted on neighboring Prince of Wales Island (GMU 2) during the late 1990s. Based on estimates of average wolf pack and home range sizes in GMU 2, we believe there are approximately 250 (range from 125-385) wolves in GMU 3, of which approximately 50 (20%) are harvested by hunters and trappers annually (data from 2000-2010). However, for management purposes, the wolves on Etolin Island, Wrangell Island, and Zarembo Island should be considered separate populations from the wolves that inhabit Kuiu, Kupreanof, Woewodski, and Mitkof Islands.

We believe there are approximately 180 wolves within the Kuiu, Kupreanof, Woewodski, and Mitkof Island complex, of which about 33 (18%) are harvested annually (data from 2000-2010). Approximately 32% of the land area (with about 60 wolves) within this 4 island complex (or 1,680 km^2) will be established as a treatment area (Lindenberg Peninsula on Kupreanof Island, Mitkof Island, and Woewodski Island). In the treatment area, as close to 80% of the wolves as possible (about 50 wolves in 5-6 packs) would be removed.

Because GMU 3 is not a closed population (wolves can easily move throughout much of the Unit) immigration of individual wolves or packs into the treatment area will likely require continued removal of wolves (during winters 2-5). Wolves from outside the treatment area will serve as a source population to recolonize the treatment area when wolf trapping is suspended. Also, we do not believe the harvest of wolves within the treatment area, and normal harvest outside the control area, will result in an overall reduction in the wolf population that would result in a conservation concern for the unit as a whole. In the event the harvest of wolves within the treatment area, and normal harvest outside the control area results in a trend toward unsustainable harvests, wolf harvest within the remainder of the 4-island complex (outside the treatment area) will be reduced by the Department.

During the preceding 10 year period (RY 2002-2011), hunters and trappers harvested an average of 17 wolves annually (range: 5-32) from within the treatment area (Fig. 6). If normal wolf hunting and trapping effort remains relatively consistent with recent years, state sponsored trappers would initially need to remove approximately 30 additional wolves from the treatment area. In subsequent years, harvest levels would be adjusted downward to ensure that a minimum of 10 wolves are maintained within the treatment area.

In the event that the combined normal harvest of wolves and wolf control results in a significant reduction of wolves and a trend toward unsustainable harvests during the course of the control program (5-year period), wolf harvest within the remainder of the 4-island complex (outside the treatment area) will be reduced by the Department to ensure that the wolf population and harvests remain at sustainable levels.

All existing information, including observations from members of the public, local advisory committees, and biologists indicate that wolves are relatively abundant throughout GMU 3 and that our comparisons with wolves on Prince of Wales Island (GMU 2) are realistic.

Wolf numbers would have to be monitored for the life of the IM action to help evaluate the failure or success of the program to meet the specified objectives. Determining wolf numbers and monitoring them over a period of several years would only be feasible through the marking of animals with radio collars. This, in turn, would require the capture and handling of wolves within both the treatment and comparison areas. GPS radio collars with remote

download capabilities would provide the best means of gathering data and assess home ranges and travel corridors, which would be important to effectively direct removal efforts. Additionally, radiocollared wolves could then be radio tracked and observations made regarding pack sizes. This, along with home range information, would provide biologists with site-specific data for use in estimating Unit 3 wolf numbers.

Precise population estimates are not currently available for black bears in the unit, however, our estimated densities ranged from 0.5-2.5 bears/mile^2, our estimated population size ranged from about 2,500-4,500, and our estimated harvest rate ranged from about 2.3-13%. These density estimates were derived from subjective assessments of area biologists comparing each area to Kuiu Island (where bear density estimates have been derived using DNA-based capture-recapture estimates), along with habitat capability models. From 1992-2011, the Unit 3 black bear harvest averaged 227 bears per year (range 146-309) (Fig. 7), of which approximately 64 bears per year (range 34-95) were harvested from within the IM treatment area (Fig. 8). Harvest records and anecdotal evidence from big game guides, hunters, and agency biologists appears to indicate that black bear populations may have declined over the last decade.

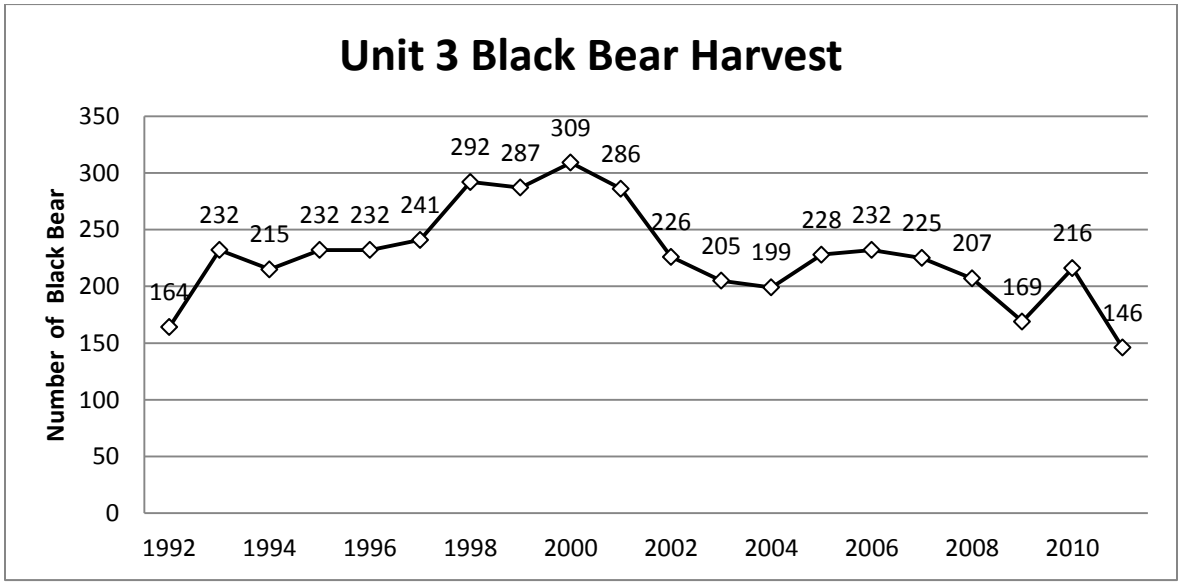

Figure 7. Unit 3 black bear harvest, RY 1992-2011.

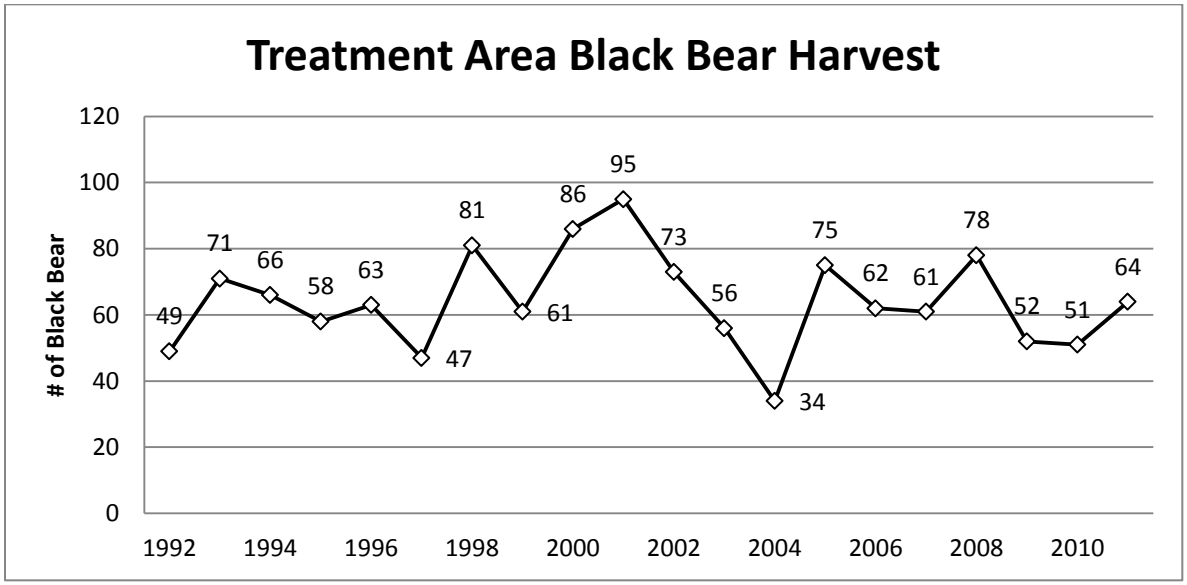

Figure 8. Black bear harvest within the IM treatment area in Unit 3, RY 1992-2011.

While brown bears are known to occur occasionally on those Unit 3 islands, separated from the mainland by only short water crossings, their numbers are believed to be very low. Therefore, brown bears are not believed to be a significant contributing factor to low deer numbers.

B. *Predation Rate:*

While little area-specific information is available regarding predation on deer in Unit 3, research conducted on deer, wolves, and black bears in neighboring Unit 2 (Prince of Wales Island) provides useful insight on the predator/prey relationship of these species in a similar environment. For example, where Sitka black-tailed deer represent the primary prey species for wolves in Southeast Alaska, the estimated predation rate is 26 deer per wolf per year (Person et al. 1996). Black bear predation on deer also occurs, and although we have no data from Unit 3, we are able to draw some inferences from an ongoing study in neighboring Unit 2 (Prince of Wales Island). In that study, deer fawns are subject to fairly intensive predation by black bears. It stands to reason that similar predation patterns on fawns may occur in Unit 3. Furthermore, reducing black bear numbers enough to reduce mortality of deer fawns is likely not feasible as black bears are at least as important economically as deer are.

C. *Prey Abundance:*

Despite the fact that the Unit 3 deer harvest has been restricted to bucks-only, the deer population throughout most of the unit has remained stagnant at low to moderate levels for decades. If the IM program is successful in achieving the desired 80% reduction in the wolf population within the "treatment" area, then a 20-25% annual increase in the deer population could be expected (Lou Bender (ADFG), pers. comm.). However, any attainable rate of population increase will be influenced by where the existing deer population stands relative to the area's carrying capacity.

D. *Prey Recruitment:*

We do not have any area specific information on deer pregnancy rates, fecundity, recruitment, mortality or survival. Unit 3 contains a multiple predator system that includes both black bears and wolves. Both are known to prey on deer, however, the respective role each plays in holding Unit 3 deer populations at low levels remains unknown. While wolves are known to prey primarily on adult and yearling deer, data from an ongoing fawn mortality study in neighboring Unit 2 indicates that black bears are an important source of fawn mortality, though their impacts on deer appear to be largely limited to the fawn age class. Therefore, the degree to which reducing wolf numbers would enhance the deer population given that bears numbers will not be reduced remains unknown. Additionally, severe winter weather has been shown to play a significant role in deer mortality, particularly during their first year of life.

E. *Prey Productivity or Nutritional Condition:*

We do not have any area specific information on deer productivity, pregnancy rates, twinning rates or fecundity. Except for normal fluctuations in body condition associated with seasonal variations in forage availability and quality, nutritional deficiency is not believed to be a major factor for the observed decline in Unit 3 deer populations. Deer densities on neighboring POW are much higher than Unit 3, yet research indicates those deer have pregnancy and twinning rates indicative of a productive deer population. Given similar habitat conditions in Unit 3, and the much lower deer densities, we would expect deer in Unit 3 to be at a similar or higher nutritional plane than deer on POW.

F. *Harvest:*

The objectives of the IM action would be to increase the deer population in a portion of Unit 3, and reallocate harvest from wolves to humans. This reallocation will occur in proximity to Petersburg, where deer populations are currently low. Harvest will continue to be restricted to bucks (thereby allowing the population to grow by protecting does).

G. *Use of Nontreatment Comparisons:*

In order to evaluate whether or not the treatment (wolf removal) is working, and to ensure that any desired results are not simply an artifact of nontreatment effects, an approximately 1,200 km^2 (475 mi^2) non-treatment or "comparison area" will be established on western Kupreanof Island for comparison to the area to be treated under the IM program (Fig. 4).

H. *Other Mortality Factors:*

The amount of winter snow accumulation has direct effects on deer survival. Severe winter weather has the potential to not only affect wolf trapping success, but also to confound or prevent recovery of the deer population, even if wolves are successfully reduced in the treatment area. However, severe winters generally occur in cycles and appear to be associated with the Pacific Decadal Oscillation. Usually two or three bad winters are followed by seven to ten mild winters. Separating the effects of severe winter weather and

wolf predation is difficult because these two factors are strongly linked. For example, during periods of heavy winter snowfall, deer tend to use low-elevation portions of their home ranges that are typically closer to shorelines. As a result, wolves typically frequent these same areas in search of prey, where they can more efficiently locate and kill deer.

III. Evaluation Criteria and Study Design to Document Treatment Response

Adaptive management with the intent to increase harvestable surplus of prey requires evaluating the biological response and achievable harvest after treatments are implemented. Evaluation will be reported to BOG each year with a semi-annual update of selected criteria.

A. *Predator Abundance and Potential for Return to Pre-treatment Abundance:*

The portion of Unit 3 proposed for experimental wolf reduction does not represent a "closed system." Wolves from adjacent non-treatment areas (western Kupreanof Island and the Unit 1B mainland) could easily move in and replace those removed. Therefore, in order to achieve and maintain the desired reduction in wolf numbers, it will be necessary to continue wolf removal efforts for a number of years to address immigration from adjacent areas and to offset annual increases in wolf numbers resulting from reproduction.

B. *Habitat and Forage Condition:*

We have yet to conduct any forage biomass or utilization studies in this area.

C. Prey Abundance, Age-sex Composition, and Nutritional Condition:

For the purposes of implementing AS 16.05.255(e) –(g), the Alaska Board of Game established the unit-wide deer population objective for Unit 3 at 15,000 (5 AAC 92.108) There is no area-specific population objective for the relatively small portion of Unit 3 in which this experimental wolf reduction effort will occur. The treatment area represents only a portion of Unit 3 (22%), so anticipated increases in deer abundance from this IM program is not expected to provide enough deer to meet the IM harvest objective on a unit-wide basis. However, the improved harvest levels will represent progress toward achieving those objectives. It may; however, allow for some deer to be reallocated from wolf predation to hunter harvest, which would provide local residents with additional harvest opportunity. The program will be treated as a management experiment to determine if wolf numbers can be reduced sufficiently by trapping to improve deer harvest, and to see if the results can be measured. If successful, this program could provide a blueprint for expanding the program to other parts of Unit 3 to further increase deer numbers and possibly meet the unit-wide population and harvest objectives.

D. *Prey Harvest:*

Beginning with the 2011 season, all deer hunters are required to submit hunt reports indicating the locations they hunted, the number of days hunted, and the number of deer harvested. We believe the mandatory deer hunt reports will improve our ability to detect changes in harvest and catch per unit effort (days per deer). Harvest statistics (including days

hunted per deer harvested) will be an important measure of deer abundance that will be useful for evaluating progress toward achieving the program's objectives.

IV. Decision Framework to Implement or Suspend a Treatment

A. *Predation Control:*

1. Prey Population Abundance.

Indices of deer abundance:

Because it is not currently possible to directly measure deer population size in either the comparison or treatment areas of GMU 3, we will rely on the following combination of indices of deer abundance to determine population trend and relative size:

1) Fecal pellet-group counts in the following areas:
    a. Portage Bay (VCU 442) (Treatment Area)
    b. East Duncan (VCU 437) (Treatment Area)
    c. Mitkof Island (VCU 448) (Treatment Area)
    d. Castle River (VCU 435) (Comparison Area)

    In addition, advances in the DNA technique for deer density estimation may be an option should the analysis that is ongoing support the use of that method.

2) We will continue to monitor hunter harvest using the recently implemented Harvest Report Card system. If the Harvest Report Card system is found to be too unreliable, we will recommend implementing a registration permit hunt.

3) Deer observed on trail cameras. This index will be developed during 2013-2014. Deer abundance will be expressed as deer photographed (detections) per camera day.

4) Aerial surveys of deer in alpine areas of Mitkof Island and Lindenburg Peninsula in the treatment area, and Kupreanof Island, Zarembo Island, and Etolin Island comparison areas.

If additional techniques are developed that provide better estimates of deer and wolf abundance, the criteria for measuring the success of the IM program and evaluating whether or not the program should be modified or discontinued may change.

Thresholds for continuing and suspending wolf control in the treatment area.

Deer Abundance:

1) If a combination of 2 of the 4 indices of abundance indicate that deer abundance has tripled in the treatment area within 5 years, control will be suspended and

normal hunting and trapping of wolves in the treatment area will be allowed to continue.

2) If a combination of 2 of the 4 indices of abundance indicate that deer abundance has not changed in the treatment area versus the comparison area after 5 years we will reevaluate the program and make changes or suspend it.

Wolf Abundance:

1) If indices of wolf abundance indicate that wolf control has been effective (i.e. most wolves have consistently been removed from the treatment area each year), but indices of deer abundance have not changed in the treatment area compared with the comparison area, the Department will initiate research to determine the major causes of deer mortality within the treatment area.

2) If indices of wolf abundance indicate that abundance within the treatment area has not changed after 5 years of the enhanced (i.e. Department sponsored) trapping program, Department sponsored trapping within the treatment area will be reevaluated to see if there are more feasible ways to reduce wolf numbers.

3) If there is some indication that wolf numbers have been reduced in the treatment area after 5 years and there is also some indication that deer numbers in the treatment area have improved, but have not increased as much as expected (i.e. tripled), the wolf trapping program with be reevaluated to determine if there are ways to make it more effective.

2. Prey Harvest Catch Per Unit Effort.

Because the focus of the IM program is to determine if it is possible to reduce wolf numbers and to increase the deer population and harvest in a portion of Unit 3, our most critical information needs include the ability to accurately measure changes in both deer and wolf abundance. Catch per unit effort will be important indices of both wolf numbers and deer numbers. Such information will be important for evaluating the reasons for the success or failure of the program. Outreach stressing the importance of accurate reporting of hunter effort and success by state and federal designated hunters will be conducted via the local Petersburg Fish and Game Advisory Committee and the local written and radio broadcast press. Deer harvest, especially if estimates of hunter effort (days per deer) are included, may be as good a measure of deer abundance as anything else, and would be particularly useful because improved deer harvest is the main goal of the predator control program. From 1999-2010, the average number of days per deer harvested in Unit 3 ranged from 4.8 to 9.7 days (Fig. 9). Beginning with the 2011 season, all deer hunters are required to submit hunt reports indicating the locations they hunted, number of days hunted, and the number of deer harvested. We believe mandatory deer hunt reports will improve our ability to detect changes in harvest and catch per unit effort. Consequently, these metrics of harvest may be our best means of detecting increases in deer numbers as a result of IM efforts.

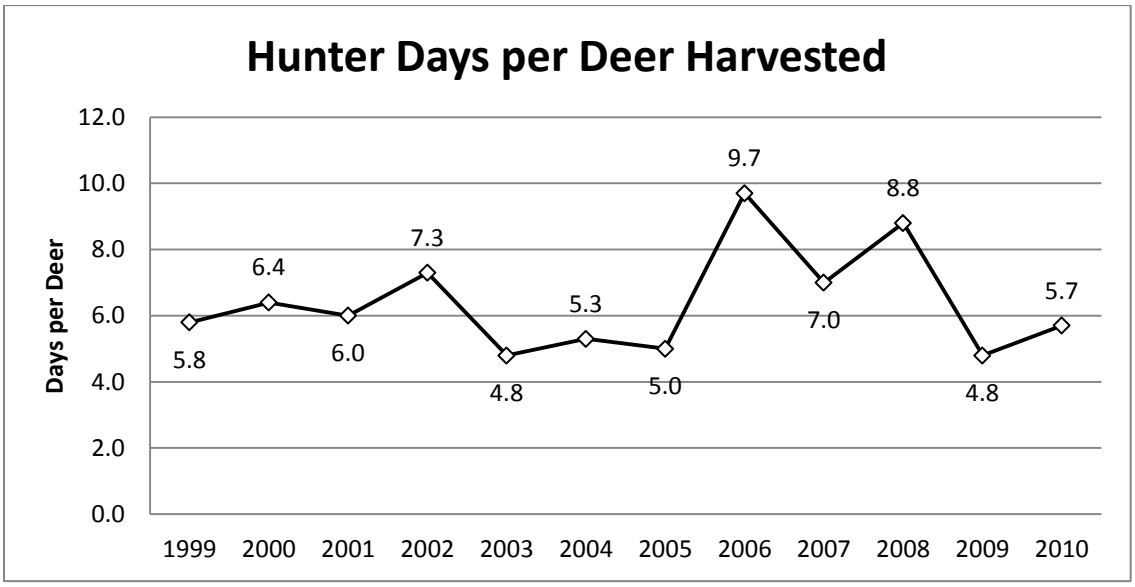

Figure 9. Hunter days per deer harvested in Unit 3, RY 1999-2010.

B. *Habitat Enhancement:*

No habitat enhancement efforts are being considered. Deer are currently believed to be far enough below carrying capacity that nutrition is not believed to be a contributing factor to the recent population decline. Nonetheless, we plan to assess current habitat conditions and habitat capability for deer in both the treatment and comparison areas prior to implementing wolf reduction measures. If research is initiated to better understand predator prey dynamics in Unit 3, the capture and handling of deer will provide us with the opportunity to assess their physical condition and gain insight regarding habitat conditions.

C. *Prey Harvest Strategy:*

1. Prey Harvest.

The estimation of deer harvest levels has recently changed from a regional questionnaire mailed randomly to 33% of deer harvest ticket holders, to a Harvest Ticket Report Card for all deer hunters. The approximate level of unreported harvest using the Harvest Ticket Report Card System has been studied in other areas of the state for caribou (Valkenburg, et al. 2002). Hunters have been found to report approximately 65% of successfully harvested caribou under the Harvest Report Card System. If the Harvest Report Card system is found to be too unreliable, we will recommend implementing a registration permit hunt.

We anticipate continuing with the present conservative harvest strategy for a minimum of 5 years for two main reasons. First, we want to achieve maximum possible population growth of deer by preventing harvest of does and minimizing harvest of bucks. Second,

because harvest of bucks under the existing two-week season will be an important index to deer abundance, changes in season or bag limit will undermine the utility of the index.

Once it is clear that the deer population has increased after the 5 year period, we will propose liberalized deer harvests to allow for greater hunting opportunity and to prevent the overpopulation of deer if that becomes a concern.

2. Prey Nutritional Index.

Although we have no quantitative information on deer body condition, we have no evidence indicating that deer are nutritionally stressed in this area. Hunters report that deer are in excellent condition with large reserves of body fat during the hunting season in October. Unless deer are captured and handled, and an evaluation of body condition and fitness is made in conjunction with IM related research efforts, we will continue to rely on reports of deer body condition provided by hunters.

V. PUBLIC INVOLVEMENT

A. *Continued Outreach by Department:*

Because the focus of the IM program is to initially increase wolf harvest and to eventually increase the deer population and harvest in a portion of Unit 3, our most critical information needs include the ability to accurately measure changes in both deer and wolf abundance via changes in hunter and trapper harvest. Such information will be critical to our ability to evaluate the reasons for the success or failure of the program. Outreach stressing the importance of accurate reporting of hunter effort and success by state and federal deer hunters will be conducted via the local Petersburg Fish and Game Advisory Committee and the local written and broadcast press.

Public participation in predator (wolf) harvest through standard hunting and trapping seasons will be encouraged. Department staff will work with local wolf trappers to develop a strategy for public participation and will monitor and attempt to mitigate trapper concerns that may arise from any perceived displacement of public wolf trappers by department sponsored trapping efforts. Prior to engaging in IM wolf removal activities the department will meet with local wolf trappers to encourage public participation, discuss and partition public and state sponsored trapping coverage, and to encourage high trapping intensity, regular trap checks and proper maintenance of wolf sets operated by public trappers.

B. *Continued Engagement to Confirm Criteria Chosen for Evaluating Success:*

Several parameters will be monitored to evaluate response of deer hunter success to the wolf control treatment, including the deer harvest trends, number of days hunted and days of effort per deer harvested.

C. *Participation in Prey and Predator Harvest or Predator Control:*

Local hunters and trappers will be encouraged to continue to harvest wolves during established hunting and trapping seasons to increase the effectiveness of the predation control effort.

D. *Monitoring and Mitigation of Hunting Conflict:*

Few, if any, hunting conflicts currently exist in the unit, nor are they anticipated as a result of the IM activity under consideration. Conflicts between hunters and nonhunters are rare in southeast Alaska.

VI. OTHER CONSIDERATIONS

Severe winter weather has the potential to confound or prevent recovery of the deer population, even if wolves are successfully reduced in the treatment area. Continued or periodically severe winter weather could negate or confound recovery of deer, and if deer numbers are low enough, predation on deer fawns by black bears could also prevent deer recovery. If deer are in poor condition due to habitat limitations (particularly winter habitat), then deer could be experiencing low productivity and/or survival due to environmental factors, although there is currently no evidence to suggest that this is the case. None of these factors can be effectively mitigated.

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APPENDIX A. Summary of supporting information.

Geographic Area and Land Status	
Management area(s)	Prey abundance assessment (1,123 mi^2), prey harvest assessment (1,123 mi^2), predator abundance assessment (1,1123 mi^2), predator control area (648 mi^2) (Fig. 1)
Land status	The vast majority of the land area in Unit 3, including the treatment area, is under federal ownership (National Forest) with small State and private in-holdings. However, land ownership patterns are not expected to affect the IM wolf trapping activities as efforts will be confined to State tidelands bordering Federal lands.
Biological and Management Situation	
Prey population	IM objectives: (No precise estimates available): For the purposes of implementing AS 16.05.255(e) –(g), in 2000 the board established the deer population and harvest objectives for Unit 3 at 15,000 and 900, respectively (5 AAC 92.108).
Prey harvest (human use)	IM objectives (rate): (No precise harvest rate available): Amount necessary for subsistence [Unit 3, *year determined*]: The Amount Necessary for Subsistence (ANS) in Unit 3 (unit-wide) was set by the board at 150-175 deer per year in 2000. The unit-wide ANS has been consistently achieved.
Feasibility of access for harvest	The treatment area is highly accessible using highway vehicles, boats, ATV's, snow machines, float planes or a combination of these means of transportation.
Nutritional condition	We do not have any information on deer condition, pregnancy rates, fecundity, recruitment, mortality or survival. Although we do not have quantitative measures of body condition for deer in Unit 3, hunters report that deer are in excellent condition with large reserves of body fat during the hunting season in October. Deer appear to be well below carrying capacity of the remaining productive habitats that nutrition is not expected to be a limiting factor even if deer numbers increase substantially, unless bad winters occur. However, continued reductions in deer habitat capability associated with past, present, and future timber harvest will continue to reduce the unit's ability to support high deer numbers over the long term (several decades).

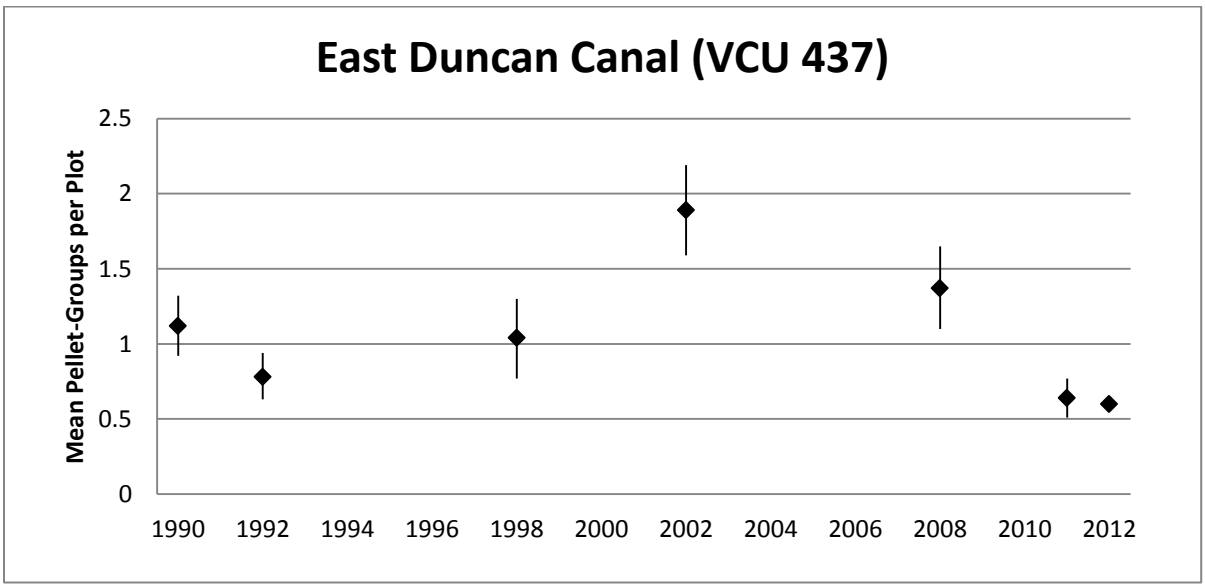
Habitat status and enhancement potential	Precommercial thinning of the dense second-growth stands that have resulting from clear-cut logging provides the only real opportunity to improve habitat conditions for deer. However, we would not expect such efforts to significantly improve deer numbers over the near-term. Furthermore, because most of the unit is comprised of Federal lands (National Forest) and it is not within the State's authority to undertake such activities.
Predator(s) abundance	Wolves, black bears and brown bears occur within Unit 3. Precise population estimates are not available for wolves in the unit or within the "treatment" area. Based on estimates of average pack and home range sizes derived from extensive wolf radio-telemetry studies on Prince of Wales Island in neighboring Unit 2, our best estimate for wolf numbers in Unit 3 is approximately 250 (range from 125-385) of which approximately 50 (20%) are harvested by hunters and trappers annually (data from 2000-2010). However, for management purposes, the wolves on Etolin Island, Wrangell Island, and Zarembo Island should be considered as separate populations from the wolves that inhabit Kuiu, Kupreanof, Woewodski, and Mitkof Islands. There are approximately 180 wolves within the Kuiu, Kupreanof, Woewodski, and Mitkof Island complex, of which about 33 (18%) are harvested annually (data from 2000-2010). When the IM Program is implemented, approximately 32% of the land area within this 4 island complex (or 1,680 km^2) will be established as a treatment area (Lindenberg Peninsula of Kupreanof Island, Mitkof Island, and Woewodski Island). Within the treatment area, as close to 80% of the wolves as possible (about 50 wolves in 5-6 packs) would be removed during the first year of predator control. Because GMU 3 is not a closed population (wolves can easily move throughout much of the Unit) immigration of individual wolves or packs into the treatment area will likely require regular removal of wolves. Wolves from outside the treatment area will serve as a source population to recolonize the treatment area when wolf trapping is suspended. Also, we do not believe the harvest of wolves within the treatment area, and normal harvest outside the control area, will result in an overall reduction in the wolf population that would result in a conservation concern for the unit as a whole. In the event that the combined normal harvest of wolves and wolf control results in a significant reduction of wolves and a trend toward unsustainable harvests during the course of the control program (5-year period), wolf harvest within the remainder of the 4-island complex (outside the treatment area) will be reduced by the Department to ensure that the wolf population and harvests remain at sustainable levels. During the preceding 10 year period (RY 2002-2011), hunters and trappers

	harvested an average of 17 wolves annually (range: 5-32) from within the treatment area (Fig. 6). If normal wolf hunting and trapping effort remains relatively consistent with recent years, state sponsored trappers would initially need to remove approximately 30 additional wolves from the treatment area. In subsequent years, harvest levels would be adjusted downward to ensure that a minimum of 10 wolves are maintained within the treatment area. Precise population estimates are not currently available for black bears in the unit, however, we estimated bear density, population size and harvest rates during Board of Game preparations in 2010. For all of Unit 3, our estimated densities ranged from 0.5-2.5 bears/mile^2, our estimated population size ranged from about 2,500-4,500, and our estimated harvest rate ranged from about 2.3-13%. These density estimates were derived from subjective assessments from area biologists by comparing each area to Kuiu Island (where bear density estimates have been derived using scientific data and findings), along with habitat capability models. Harvest records and anecdotal evidence from big game guides, hunters, and agency biologists appears to indicate that black bear populations have declined over the last decade. Black bears are known to prey on deer, and particularly on deer fawns. Therefore, reducing wolf numbers at a time when black bear populations appear to be at lower levels could increase the likelihood that wolf removal will increase deer survival and result in increased deer numbers. While brown bears are known to occur occasionally on those Unit 3 islands separated from the mainland by only short water crossings, their numbers are believed to be very low. Therefore, brown bears are not believed to be a significant contributing factor to low deer numbers.
Predator(s) harvest	The Unit 3 wolf harvest has remained relatively stable at approximately 50 wolves per year over the last 2 decades (Fig. 5). However, during RY 2011-2012 the unit-wide wolf harvest spiked to 97 wolves, 32 of which were taken within the "treatment" area (Fig. 6). From 1992-2011, the Unit 3 black bear harvest averaged 227 bears per year (range 146-309) (Fig. 7), of which approximately 64 bears per year (range 34-95) were harvested from within the IM treatment area (Fig. 8). While brown bears are known to occur occasionally on those Unit 3 islands separated from the mainland by only short water crossings, their numbers are believed to be very low. Therefore, brown bears are not believed to be a significant contributing factor to low deer numbers.
Evidence of predation effects	While little area-specific information is available regarding predation on deer in Unit 3, research conducted on deer, wolves, and black bears in neighboring Unit 2 (Prince of Wales Island) provides useful information on

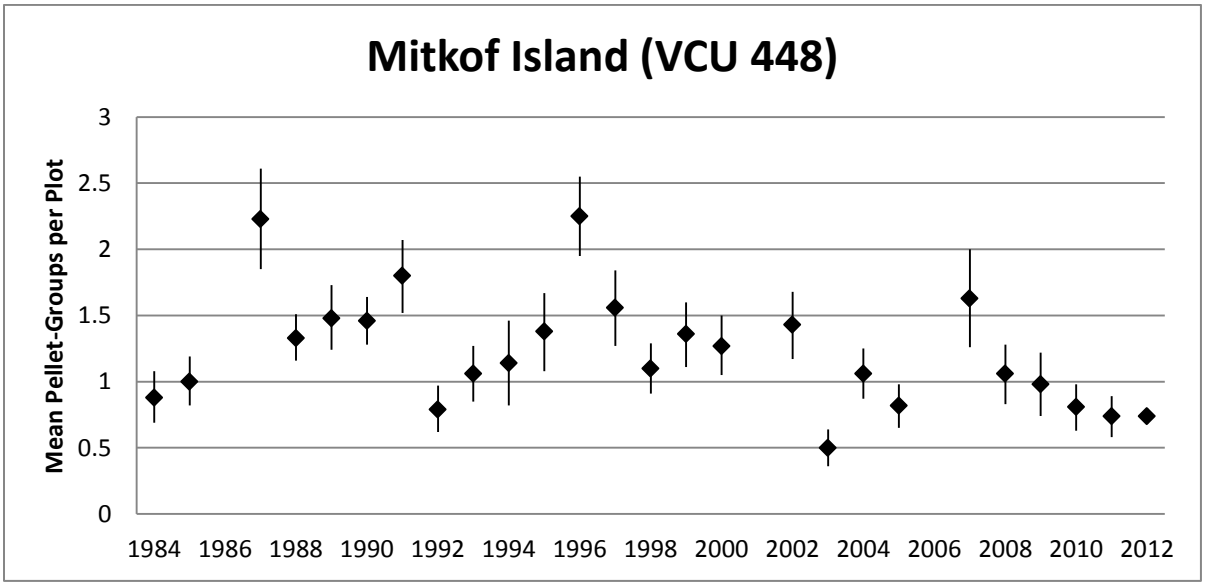
	the predator/prey relationship of these species in a similar environment. For example, where Sitka black-tailed deer represent the primary prey species for wolves in Southeast Alaska, the estimated predation rate is 26 deer per wolf per year (Person et al. 1996). Black bear predation on deer also occurs, and although we have no data from Unit 3, we are able to draw some inferences from an ongoing study in neighboring Unit 2 (Prince of Wales Island). In that study, deer fawns are subject to fairly intensive predation by black bears. It stands to reason that similar predation patterns on fawns may occur in Unit 3.
Feasibility of predation control	During the preceding 10 year period (RY 2002-2011), public hunters and trappers have harvested an average of 17 wolves per year (range: 5-32) from within the treatment area which includes Wildlife Analysis Areas (WAAs) #2007, #2008, #5135, #5136, #5137 and #5138 (Fig. 6). If public wolf hunting and trapping effort and success remain relatively consistent with recent years, then state sponsored trappers would need to remove approximately 30 additional wolves to achieve the desired 80% reduction of the wolf population within the treatment area. The treatment area is highly accessible using highway vehicles, boats, ATV's, snow machines, float planes or a combination of these means of transportation. The land ownership in this area is primarily federal (USFS), but the trapping activities would be conducted on State lands below mean high tide. Therefore, land ownership patterns are not expected to hinder an effective control program. While stopping short of providing a definitive answer, US Forest Service staff has indicated that the agency has no policy that specifically prohibits predator control or intensive management activities on Forest Service lands. Furthermore, if the activities were consistent with hunting and trapping regulations, the agency would have no basis to prohibit such activities since the agency supports the sustainable use of fish and wildlife (Deputy Forest Supervisor Patricia O'Connor, pers. comm. via email Sept. 11, 2012).
Other mortality	Predation, in combination with severe winter weather, seems to be the overriding factor that affects deer numbers in Unit 3. Available evidence from Unit 3 and comparisons of case histories from adjacent areas with and without wolves (e.g. Units 1, 2, and 4) indicate that predation by wolves (probably in combination with bear predation on fawns) is responsible for keeping deer in Unit 3 at low levels, particularly after severe winters. The harvest of productive old growth forest stands important for overwinter survival, and second growth forest stands entering stem exclusion, have and will continue to reduce the unit's carrying capacity for deer. However, the role habitat loss has played with regard to the most recent decline in deer numbers remains unclear. Unit 3 deer are at such low density that

	populations are not currently believed to be limited by the availability of winter habitat. However, it is possible that reductions in the amount of winter habitat exacerbated the effects of the severe winters experienced in Unit 3 during 2006-2009 thereby causing deer numbers to decline further than they might have had the habitat remained intact. As noted earlier, severe winter weather has perhaps the greatest impact on Unit 3 deer populations, often resulting in high levels of mortality. The Petersburg area has experienced well above average snowpack (> 150% of normal) during 4 of the past 5 winters. From 2006-2009, the central Alaska panhandle, including Unit 3, experienced 3 consecutive winters with well above average snowfall. During the winter of 2006–2007, the Petersburg and Wrangell areas broke all-time records for snowfall (229.7 inches for Petersburg and 148.5 inches for Wrangell) (NOAA 2010). The winter of 2008–2009 also resulted in above average snowpack though not as severe as the 2 preceding winters. Although the Petersburg area experienced below average snowpack during the winter of 2009-2010, the snowpack was once again well above average during the winter of 2010-2011.

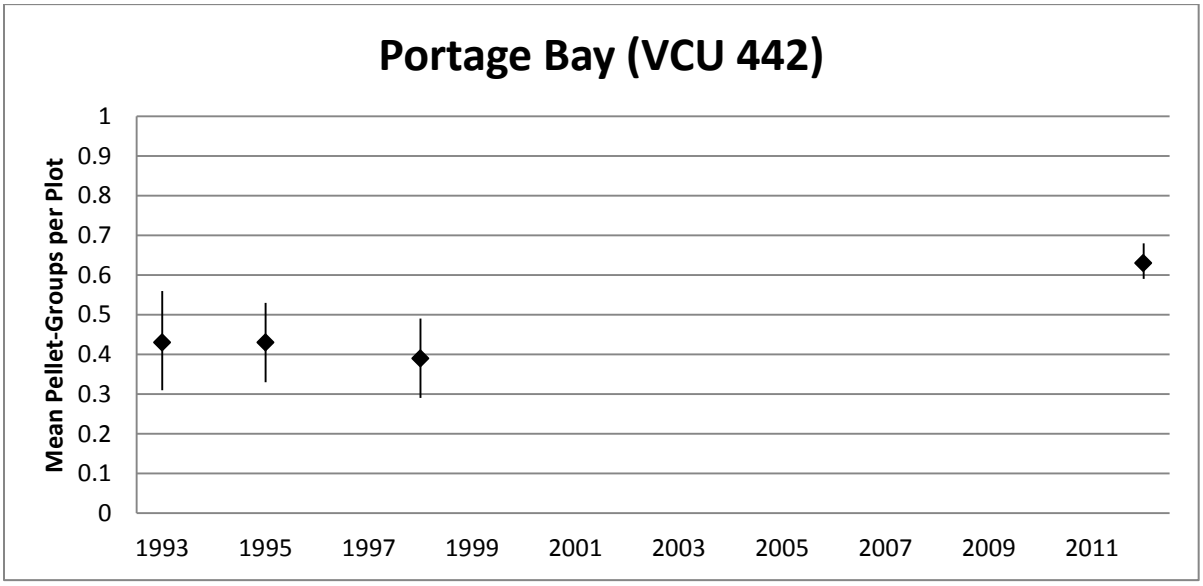
APPENDIX B. Baseline information on pellet-group density in IM treatment and control areas in Unit 3.



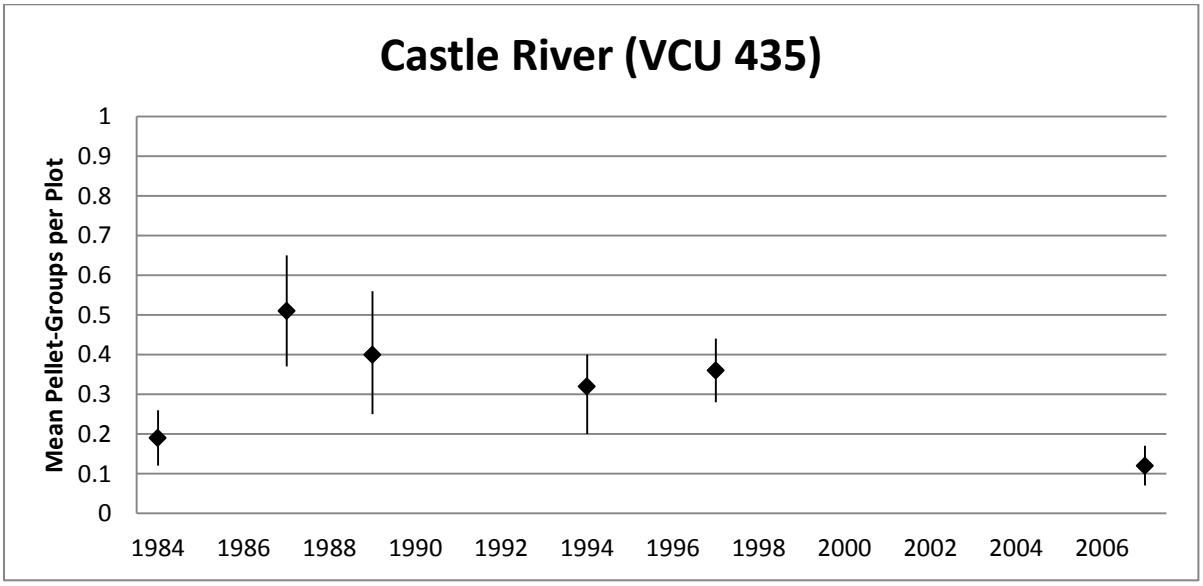
Deer fecal pellet-group counts in VCU 437 on southern Lindenberg Peninsula (within IM treatment area).



Deer fecal pellet-group counts in VCU 448 on southwest Mitkof Island (within IM treatment area).



Deer fecal pellet-group counts in VCU 442 on northern Lindenberg Peninsula (within IM treatment area).



Deer fecal pellet-group counts in VCU 435 on southern Kupreanof Island (within IM comparison area).