I, DAVID K. PERSON, state as follows:

1. I am a wildlife scientist with 22 years of experience studying Alexander Archipelago wolves (*Canis lupus ligoni*) and Sitka black-tailed deer (*Odocoileus hemionus sitkensis*) in Southeast Alaska. My educational and professional history is detailed in the original statement I prepared during the Big Thorne Project administrative appeal process (Aug. 16, 2013).

2. I appreciate the opportunity to review the draft supplemental information report (Draft SIR) and interagency Wolf Task Force report (Wolf Task Force Report) associated with the Big Thorne Project (Big Thorne). The forest supervisor, Forrest Cole, opted to dismiss concerns that I raised concerning the viability of the predator-prey system on Prince of Wales and the associated islands (Game Management Unit 2) largely relying on statements in the Wolf Task Force report from three of the six members that support his position. Their arguments as well as those in the Draft SIR and Big Thorne Environmental Impact Statement (Big Thorne EIS) do not address the issues I raised in my original statement. Indeed, their arguments:

a. Do not analyze or present supporting information concerning claims and assumptions they make about the future sustainability of wolves and the viability of the predator-prey system post Big Thorne.

b. Provide no compelling evidence that the responsible agencies can adequately preserve high quality habitat for deer necessary for a viable predator-prey system and manage legal and illegal take of wolves in a manner to maintain a sustainable and viable population currently and into the future after Big Thorne.

c. Rely almost completely on abstract paper and GIS representations of the Big Thorne project area and adjacent lands without addressing the actual conditions of

deer populations, deer habitat, wolf ecology, or wolf populations within Game Management Unit 2.

d. Assign assumptions and interpretations to my statement that are incorrect. Indeed, the scenario of ecological community collapse that I described in my statement was peer reviewed and published. Neither the Wolf Task Force Report nor the Draft SIR provide comparable support.

Overview

3. The Draft SIR and half of the Wolf Task Force members conclude that effects on wolves and deer due to Big Thorne are too small to represent some threshold of collapse of the predator-prey system in Game Management Unit 2. Their argument relies mostly on the small incremental decrease in deer habitat capability caused by Big Thorne. They ignore the fact that currently 15 of 21 wildlife analysis areas in the North Central Prince of Wales Island Biogeographic Province are below the guideline deer habitat capability level (18 deer/mi^2) established in the Tongass Land Management Plan (TLMP) (Fig. 1). This is a significant reduction in deer habitat capability from historical conditions (Fig. 2).

4. Our work to develop the deer habitat capability level (18 deer/mi^2) was peer-reviewed (Person et al. 1996). The deer habitat capability value of 18 deer/mi^2 was accepted by the U.S. Forest Service and the Alaska Department of Fish and Game, as well as expert panels assessing the viability of wolves during the 1997 revision of TLMP, as a minimum level below which there was greatly increased risk of predator-prey instability, loss of resilience of both wolf and deer populations, and insufficient deer to sustain human subsistence harvesting. Additionally, the U.S. Fish & Wildlife Service considered the Forest Service's decision to incorporate the deer habitat capability guideline in TLMP an important factor when it decided

against listing wolves in southeast Alaska as threatened under the Endangered Species Act in the late 1990s.

5. I was a resource expert during expert panel discussions about wolf population viability during the 1997 and 2008 revisions of TLMP and none of the resource experts involved expected the Forest Service to approve of so much logging that the majority of wildlife analysis areas in any biogeographic province would fall below that guideline level. They also recognized that in some areas historic natural conditions made it impossible to meet that level. Big Thorne may worsen the current deer habitat capability landscape (Fig. 3) by a relatively small amount but it compromises a situation that as a result of logging over the last few decades is already well below the guideline established in TLMP.

6. The Wolf Task Force Report also dismisses my discussion of the nonlinear behavior of predator-prey dynamics, which warns that a small change in carrying capacity for deer (deer habitat capability) may result in a big change in actual deer numbers resulting from predation. That occurs because rates of predation do not necessarily follow in sync with declines in prey population. There are usually long time lags in which wolves and bears simply hunt longer and harder placing more predatory pressure on their prey (Bowyer et al. 2005). The same holds true for human harvesting of wolves. Half of the Wolf Task Force members cited my predator-prey modeling (Person and Bowyer 1997) as showing wolf harvest can dampen variability in predator-prey dynamics. They ignore the fact that this only holds true if harvest (or predation) occurs in sync with the prey population. That is basic predator-prey theory. When out of sync, predation and harvest will cause more erratic behavior in the system leading to instability and possibly collapse (May 1974).

7. Half of the members of the Wolf Task Force cite predator-prey modeling that indicated a low risk of extinction of wolves in Game Management Unit 2 (Person and Bowyer 1997). They do not acknowledge, however, that we consistently qualified our conclusions indicating 1) we cannot model the behavior of people in Game Management Unit 2 reacting to low deer numbers and promoting killing of wolves, 2) we do not know the additive effect of bear predation on deer, and 3) model outcomes for wolves were very optimistic. In addition, the modeling did not incorporate information now available that indicates lower reproduction in wolves (Person and Russell 2009) than assumed by the models and the extent of bear predation on deer. Also, we did not account for illegal killing of wolves because the data at the time were very limited. Before, that modeling can legitimately be used to address concerns raised in my original statement, it needs to be updated to incorporate the following new information:

a. Latest updated vegetation and timber harvest maps and data layers;
b. Current and proposed land ownership (what is and will be under federal control versus state control after proposed land exchanges with state and private entities (e.g., Sealaska, Mental Health Trust, Alaska Department of Natural Resources). Lands traded will almost certainly be clearcut logged with no regard for protecting deer habitat given the differences between federal and state logging laws and practices;
c. Updated demographic parameters for wolves based on Person and Russell (2008) and Person and Russell (2009);
d. Updated harvest mortality function that includes a weighting of risk derived from correlates of harvest mortality such as roads, ocean distance to towns, percent of

muskeg within modeled pack areas, etc. from Person and Russell (2008) and Person and Logan (2012); and,

e. Inclusion of some mortality rate associated with illegal and unreported killing.

Concerns Regarding the Loss of Deer Habitat on Wolves

8. The Forest Service and half of the Wolf Task Force members dismiss my concerns about predator-prey viability by suggesting that six wildlife analysis areas with deer habitat capability (deer habitat capability) above the deer habitat capability guideline (18 deer/mi^2) will assure that viability despite the rest of the wildlife analysis areas in the biogeographic province failing to meet that guideline.

9. The Forest Service failed to analyze the actual condition of those wildlife analysis areas or explain why they are sufficient to support a sustainable wolf population and predator-prey system given conditions elsewhere on Prince of Wales. For example, wildlife analysis area 1323 is mostly muskeg scrub, habitat that is poor for deer and thus not likely to sustain a resilient population capable of supporting wolves (and deer hunters). Wildlife analysis area 1526 is mostly a combination of muskeg scrub with alpine and subalpine landscapes that are poor winter habitat for deer. Wildlife analysis area 1525 is mostly old stem exclusion seral forest that long ago suffered a major decline in deer habitat, deer population, and opportunity for deer hunters. Wildlife analysis area 1531 is a collection of more than 100 small islands, and all the larger islands have already been logged extensively. The Forest Service also erroneously identifies wildlife analysis area 1332 as an area with deer density above the deer habitat capability guideline.

10. Additionally, the average home range of wolf packs in Game Management Unit 2 is about 300 km^2 (Person and Russell 2008, Person and Logan 2012), but only one wildlife

analysis area, 1529, is comparable in size (310 km^2) to a pack home range. The rest of the wildlife analysis areas are too small (1323 [158km^2], 1525 [131 km^2], 1526 [277 km^2], 1527 [163 km^2], 1531 [159 km^2]).

11. In addition, anticipated transfers of land to Sealaska Corporation, which will be logged under state rules that provide no effective protection for deer winter habitat, undermine the deer habitat capability in three of those six wildlife analysis areas (Fig. 4).

12. The Forest Service also failed to consider wolf mortality in these areas. Average wolf pack size in autumn is about eight (Person 2001) and we expect an additional two nonresident wolves within a pack home range (Person 2001). Wolves do not permanently occupy wildlife analysis area 1531, which is a collection of small islands that are occupied intermittently by neighboring packs (Person 2001), therefore, it cannot function as a source. One pack (8 + 2 nonresidents = 10 wolves in autumn) typically occupies both 1525 and 1526 (a total of 10 wolves), which comprise Kosciusko Island (Person 2001). Based on area alone, collectively wildlife analysis areas 1527 and 1529 could support one and a half packs (12 residents + 3 nonresidents = 15 wolves in autumn). The remaining area, wildlife analysis area 1323, is sufficiently large to support half of a pack (4 residents + 1 nonresident = 5 wolves in autumn). Consequently, only five of the six wildlife analysis areas might support a source population (assuming the areas had sufficient deer habitat), which likely would number about 24 resident wolves augmented by six nonresidents. The total average annual harvest from those five wildlife analysis areas is 16 wolves (Person and Russell 2008) and natural mortality will account for one more (Person and Russell 2008). Thus, the expected total average annual mortality would be 57% (17/30), well beyond sustainable limits for wolves anywhere in North America (Ballard et al. 1987, Fuller 1989, Person 2001, Person and Russell 2008, Person and Logan

2012). Moreover, this does not include unreported and illegal harvest, which may approach the same level as reported harvest (Person and Russell 2008). Wolf packs in several of those wildlife analysis areas are at risk of complete elimination (Person and Logan 2012). For example, the probability of a pack being eliminated after 2015, despite road closures planned by the Forest Service, is 1.00 for wildlife analysis area 1526, 0.50 for wildlife analysis area 1527, and 0.48 for wildlife analysis area 1529 (Person and Logan 2012). A probability of 0 indicates no chance of elimination and a probability of 1 indicates certainty that the pack will be eliminated at least once after 2015. By way of illustration, during 1992-1993, a single trapper working from Point Baker virtually eliminated wolves from wildlife analysis areas 1525, 1526, 1527, and 1529. Thus, even assuming the area had sufficient deer habitat, which it does not, the area cannot serve as a source population for the rest of the North Central Prince of Wales Island Biogeographic Province or the rest of Prince of Wales Island.

13. Harvest mortality plays a major role in wolf viability. The Forest Service has no evidence that the Alaska Department of Fish and Game anticipates closing all of those wildlife analysis areas to wolf harvest so they can function as a source population. In the State of Alaska's comments about Big Thorne, the Alaska Department of Fish and Game explained that it does not manage wildlife at a scale below that of a Game Management Unit despite a recommendation by Person and Logan (2012) that they do so. Thus, the Forest Service knows that the Alaska Department of Fish and Game only manages at the level of the entire Game Management Unit 2, making it impossible to ensure a large portion of the kill does not come from those wildlife analysis areas. The Forest Service has not grappled with the problems created by its lack of habitat management for deer and wolves, which will force those few

wildlife analysis areas to serve as the foundation for a sustainable wolf population and a viable predator prey relationship.

14. The Forest Service also claims the Honker Divide old growth reserve and the Karta wilderness area will provide additional area to support wolves in conjunction with the six wildlife analysis areas previously discussed. As an initial matter, both areas are too small to encompass a wolf pack home range. The Honker Divide old growth reserve is less than 200 km^2. The Karta wilderness area is 166 km^2 of mostly muskeg scrub land and a big lake.

15. The wolves in Honker Divide have been decimated by trappers during the last two trapping seasons, demonstrating the old growth reserve is too small and wolves occupying it are at great risk. That risk is now particularly acute because of the close proximity of the towns of Thorne Bay, Coffman Cove, Klawock, and Craig connected by paved roads. It will become worse because of access provided by building and opening of roads due to Big Thorne. During my 22 years of wolf research in Game Management Unit 2, I never once detected a wolf pack permanently occupying the Karta wilderness area. It was a borderland between two adjacent packs, Rio Roberts and Twelve Mile Arm.

16. Finally, the Draft SIR, Big Thorne EIS, and Wolf Task Force Report attempt to minimize the effects of logging on deer habitat capability, claiming commercial and pre-commercial thinning of second growth will enhance habitat for deer and is factored into deer habitat capability for the project and surrounding areas. Yet, there are no data whatsoever, indicating deer select pre-commercially thinned stands. The slash left behind is a serious barrier to access and by the time the slash has mostly decayed, the boost in forage created by opening the canopy is mostly finished (Cole et al. 2010). There are no data from southeast Alaska showing selection by deer of commercially thinned stands. More importantly, thinning opens the

forest canopy to enhance understory forage for deer, but this allows snow to cover the ground, which offsets most of the benefit from forage production during snowy winters. Deer habitat capability is supposed to represent carrying capacity for deer during winter conditions with snow and, as a result, thinning cannot enhance deer habitat capability.

Lack of Understanding Regarding the Current Wolf Population

17. Nowhere in the Draft SIR, Big Thorne EIS, or Wolf Task Force Report are there any details concerning how Federal and state officials will effectively monitor and manage the predator-prey system, a critical point I raised in my original statement.

18. Half of Wolf Task Force members argue the Alaska Department of Fish and Game and the Federal Subsistence Board demonstrated effective management by adopting a harvest guideline for wolves and using it to close the trapping season twice in 16 years. A closer look at that history supports my concerns. In 1996, the Alaska Board of Game, concerned about the need to act on wolf harvest in Game Management Unit 2 because of a pending petition to list wolves as threatened under the Endangered Species Act, adopted a wolf harvest guideline. Upon reaching the guideline harvest limit, the trapping season would be closed by emergency order. The current guideline is 30% of the estimated wolf population in autumn, which is based on the understanding that wolves can sustain a total of 35% mortality, of which most (30%) comes from hunting and trapping. To be effective, however, the guideline requires a reliable population estimate and during the 16 years since the guideline was adopted, the Alaska Department of Fish and Game and the Federal Subsistence Board had current and scientifically credible population estimates for only one year (2003).

19. A harvest limit of 90 wolves remained in place until 2011, despite growing evidence of wolf population decline since 2008 (ADFG 2012). It was lowered to 60 after the

2010 Board of Game meeting, but there was no population estimate conducted to support the application of that harvest limit. I was at that meeting and the Alaska Department of Fish and Game and some trappers suggested a population estimate of 150 wolves, but it was nothing more than a guess. Nonetheless, at that population, the harvest limit should be 45 wolves (0.3*150). After discussions with Federal Subsistence Board staff and some local wolf trappers attending the meeting, the guideline increased to 60. Simply put, there is no scientifically credible reason for the harvest guideline to be 60, 45, 30, or 10 because neither the Forest Service nor the Alaska Department of Fish and Game has a scientifically credible wolf population estimate.

20. The guideline, moreover, is only enforced when reported harvest reaches the limit. Person and Russell (2008) documented illegal and unreported take that may equal reported harvest. The harvest guideline fails to take illegal harvest into account.

21. Implementation of TLMP's road density guideline to reduce the risk to wolves of over harvest depends on consultation with the Alaska Department of Fish and Game to determine if there is a wolf mortality concern in the project area. To assess the impact of harvest on wolves, the agencies need a population estimate or some reliable measure of wolf population trends. Without those data, the agencies cannot identify a mortality concern and, as result, the guideline is never implemented. Nor can the Forest Service evaluate if the guideline actually works.

22. That brings me to statements by the Alaska Department of Fish and Game and Hayward (Forest Service) in the Wolf Task Force Report explaining that the State and the Forest Service are working to develop methods to estimate wolf and deer populations. I initiated all of that work. Unfortunately, the progress reports from the wolf research reflects worsening concerns that the low wolf numbers are not recovering in central Prince of Wales Island.

23. Until credible methods for estimating the wolf population are ready, tested, and functioning on a routine basis, Big Thorne should be put on hold. The Forest Service and the Alaska Department of Fish and Game have failed to provide a reasoned basis, supported by the available evidence, that the North Central Prince of Wales Island can sustain a wolf population and viable predator-prey system. They need to estimate wolf and deer numbers in those wildlife analysis areas, determine if wolves can actually function demographically as a source population, show that agencies can track harvest accurately in those wildlife analysis areas and stop it in a timely manner when it is too high. Without the information and any analysis, assurances by the Wolf Task Force and the Forest Service concerning wolf and predator-prey viability after Big Thorne are empty promises.

Population Sink on Prince of Wales Island and Game Management Unit 2

24. Half of the Wolf Task Force members dismiss my analyses showing that when more than 40% of a wolf home range is roaded or logged, there is a high risk that it becomes a population sink, sustainable only by immigration, rather than being a population source. The other half of the Wolf Task Force members cite my work, as I did in my original statement, as evidence of a viability problem for wolves. Those that dismiss it simply state that it was not peer-reviewed, and therefore, does not constitute actionable information.

25. My metric for identifying risk of a "sink" was based on empirical data from eleven wolf packs in Game Management Unit 2. It is based on measured litter sizes, pack sizes, and rates of mortality. We presented the analysis to the Alaska Department of Fish and Game, the U.S. Fish and Wildlife Service, and Forest Service staff, including the Forest Supervisor, Forrest Cole, at the TLMP conservation strategy review in 2006.

26. Figures 5 and 6 show analyses by Audubon Alaska using my metric to identify potential sinks in Game Management Unit 2. A roaded area consisted of a road surrounded by a one km buffer, which was the very conservative buffer size used in the wolf mortality assessment (Person and Logan 2012)) to represent the distance from roads likely to be hunted and trapped. For Figure 5, the proportion of logged and roaded was calculated for a moving window the size of an average wolf pack home range. For Figure 6, that window was the size of the 50% adaptive kernel home range for wolf packs representing their core area of activity. A 50% adaptive kernel home range is the area that encloses half of the radio locations of that wolf pack. Both maps show that the majority of Game Management Unit 2 is at risk of only supporting ephemeral sink wolf packs. Red areas on the maps overlap very well with home ranges of wolf packs that I documented were eliminated (Person 2001, Person 2008), or wildlife analysis areas with a high risk of pack depletion from harvest (Person and Logan 2012). For example, wildlife analysis areas 902, 1003, 1211, 1214, 1315, 1317, 1318, 1332, 1420, 1421, 1526, 1527, and 1529 identified as at high risk of depletion (Person and Logan 2012) all are colored at least partially red or orange on both maps. In my opinion, the maps reflect the Forest Service's failure to manage habitat and road density in a manner necessary to sustain wolves, deer, and a predator-prey system. Big Thorne can only make that worse.

27. The Draft SIR and Wolf Task Force Report do not address my concerns regarding the genetic consequences to wolves for a population sustained by such a small portion of Prince of Wales Island. We know that inbreeding and a loss of genetic diversity for the three wolf packs on Isle Royale may cause the extinction of that population (Hedrick et al 2014). We know that wolves in Game Management Unit 2 are genetically isolated from other wolves in southeast Alaska (Weckworth et al. 2005), and we know the Game Management Unit 2 population already

exhibits low genetic diversity (Weckworth et al. 2005). Genotypes from sources will eventually replace those in the sinks. The Forest Service has failed to explain how it has addressed these considerations.

Additional Comments about the Wolf Task Force Report

28. It is unfortunate that so few members of the Wolf Task Force have any direct experience with wolf-deer predator-prey systems in Southeast Alaska or deer and wolf habitat relationships in temperate rainforests. Indeed, to my knowledge, two panel members have no experience with southeast Alaskan ecosystems at all much less mammalian predator-prey systems in temperate rainforest. I believe it is significant that the panel members (Brian Logan and Steve Brockman) most familiar with current wolf and deer research data were also the most concerned about the impacts of Big Thorne in conjunction with the cumulative effects of 60 years of clearcut logging on the viability of the predator-prey system. However, I am pleased to see that at least in the Wolf Task Force Report the group transmitted their differences of opinion rather than try and speak with "one voice". I appreciate that level of transparency.

29. The Wolf Task Force Report contends my statement relies on four assumptions and it addresses six points that I made in my statement. There was much disagreement within the group about those assumptions and points, so I will briefly address those issues.

30. Assumption "A" is addressed in detail in Paragraphs 3–7 above.

31. Assumption "B" claims I assume a population of 250-300 wolves is required to maintain equilibrium with deer and that assumption undermines the importance of the deer density guideline. They misinterpret Person et al. (1996) and ascribe an assumption that we never made. In all of my work, I emphasize that an abundant and resilient deer population is required to assure the viability of wolves and the predator-prey system. Faced with natural and

anthropocentric disturbances, wolf populations will fluctuate and abundant deer will assure that populations can bounce back. The deer density guideline is meant to assure wolf and deer population resilience, not a particular population level of either species. Nor does it assume equilibrium is ever obtained. It is based on the number of deer predicted by the equilibrium model (Keith 1983, Person et al. 1996, Person et al. 2001) to have a high probability (95%) of supporting a hypothetical equilibrial population of 200 wolves on Prince of Wales and Kosciusko Islands. That density of deer provides the envelope within which the predator-prey dynamics between wolves and deer has a high probability of functioning (which includes population swings for both species) and persisting. Moreover, as I stated previously, the deer guideline was peer-reviewed and accepted by all agencies involved in the revision of TLMP in 1997 as a minimum measure to assure viability of wolves and the predator-prey system. If a timber project cannot meet the guideline, it should be a red flag that the ecologically prudent limit of harvesting old-growth has been reached.

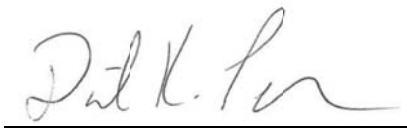
32. Assumption "C" is that a declining deer population will induce hunters and trappers to kill wolves, leading to excessive wolf mortality. Half of the Wolf Task Force members correctly state that excessive killing (legal and illegal) of wolves has and is continuing to occur for the purpose of "protecting deer" from wolf predation. Indeed, I was at the 2010 Alaska Board of Game meeting when trappers testified that they had reduced wolf numbers down to a level they desired, despite the fact there was no government sanctioned predator control effort in place and the Alaska Department of Fish and Game personnel expressed concern over unsustainable wolf harvest. Excessive illegal and unreported harvest of wolves documented in Person and Russell (2008) demonstrates the limited effect of state and federal harvest regulations.

33. Assumption “D” is addressed in Paragraphs 22–23 above.

34. I addressed most of points 1-6 in the Wolf Task Force Report above, however, point 3 in the Wolf Task Force Report requires comment. Half of task force members assert management agencies can deal with local depletions of deer and wolves through regulation (bucks only seasons in the case of deer in Game Management Unit 2) and that doing so is routine and that my statement does not introduce “new” information that was not addressed in the Big Thorne EIS. The other half of the Wolf Task Force members disagree. They insist the Big Thorne EIS does not consider local reactions to even a perception by hunters of depletion of deer and the influence that would have on motivating them to kill wolves and other predators. They are correct and describe actions by local residents that are already occurring within the Big Thorne project area. I discussed those risks and those circumstances during meetings with Forest Service staff prior to Big Thorne but the Big Thorne EIS does not address these issues.

This statement is true and accurate to the best of my scientific expertise and knowledge.

Dated this 23rd day of June, 2014.



David K. Person, Ph.D

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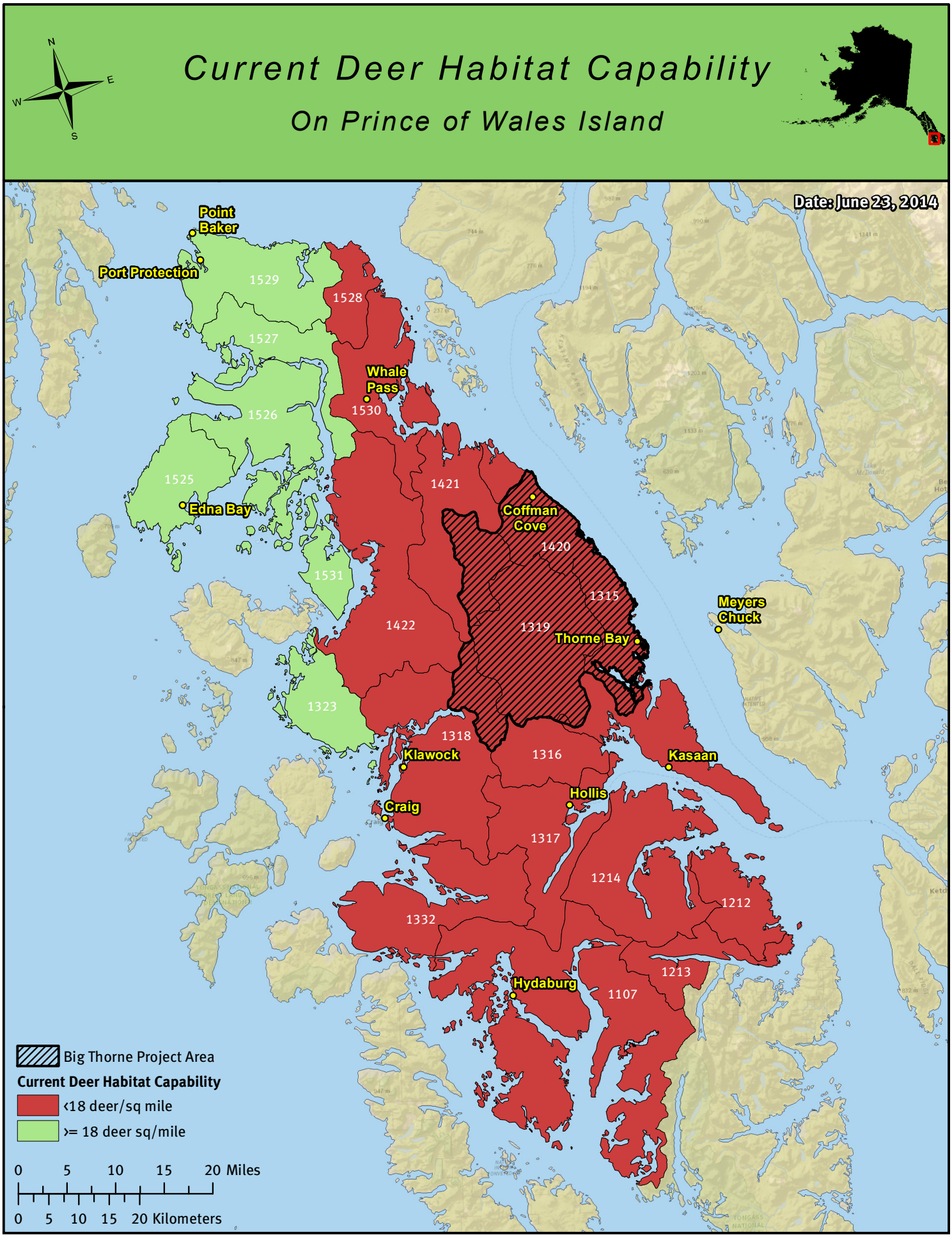
Figure 1.



Source: USFS Tongass National Forest. 2013. Deer Habitat Model Results. Document 736_085. Map based on 'Current Year' (2013).

Figure 2.

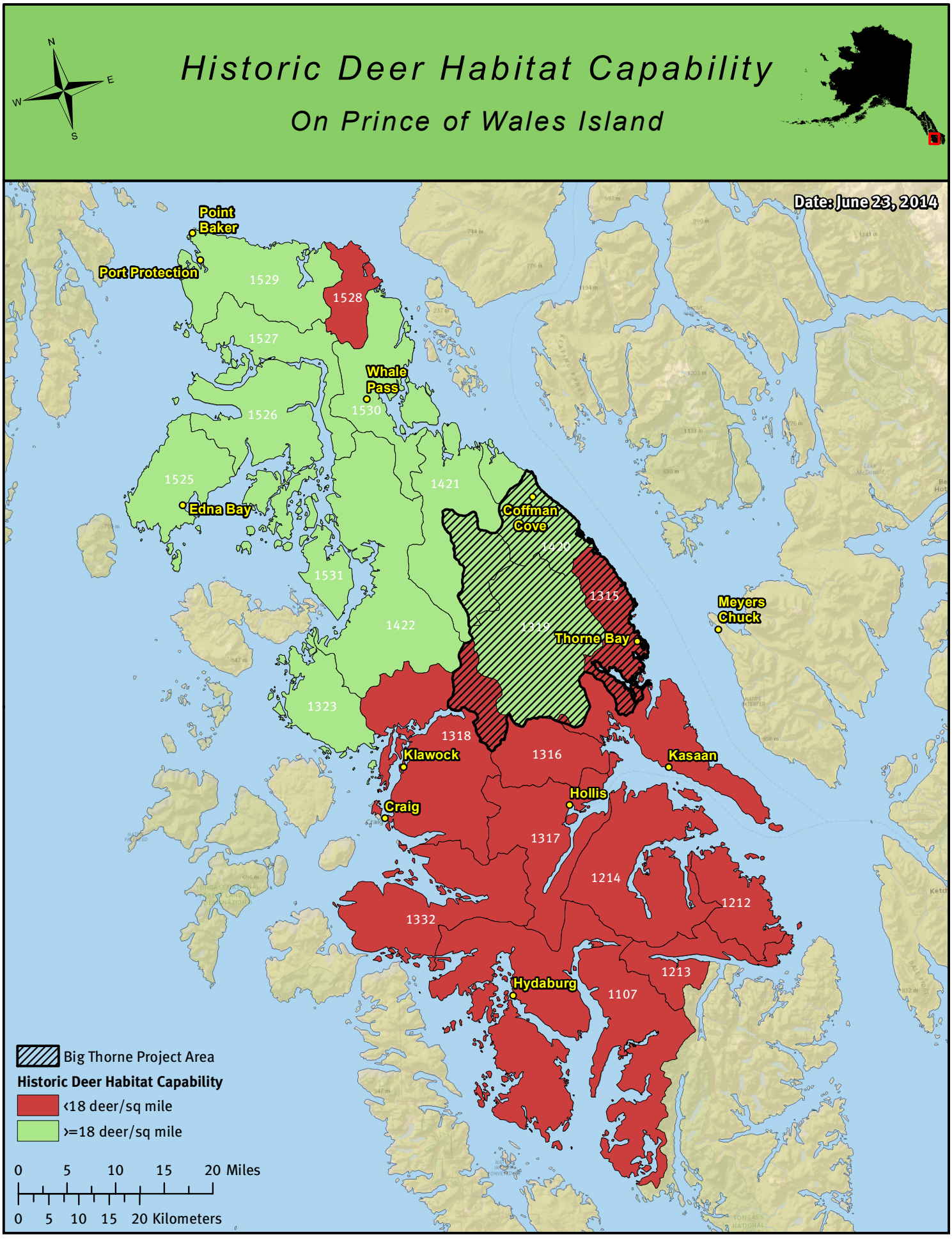


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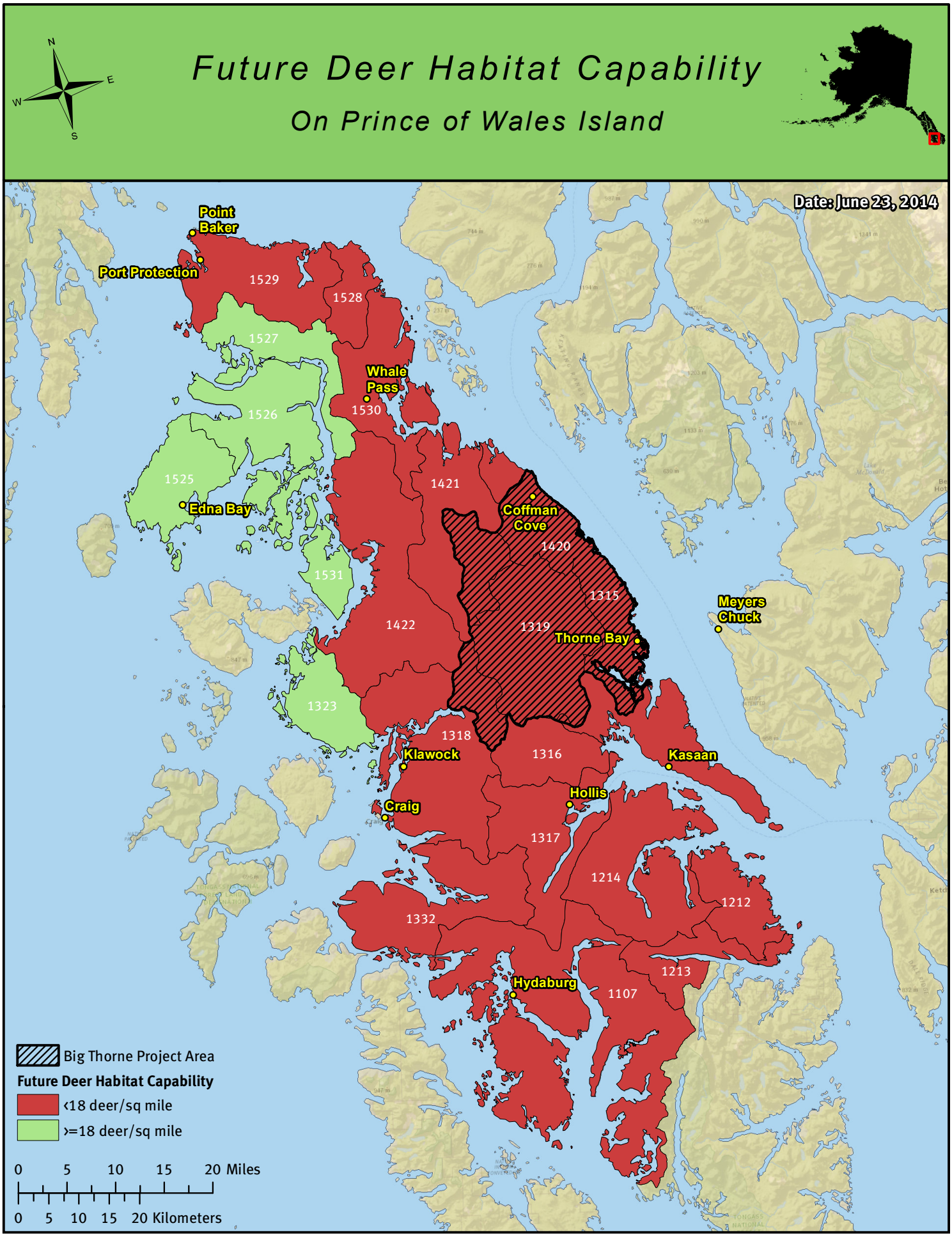
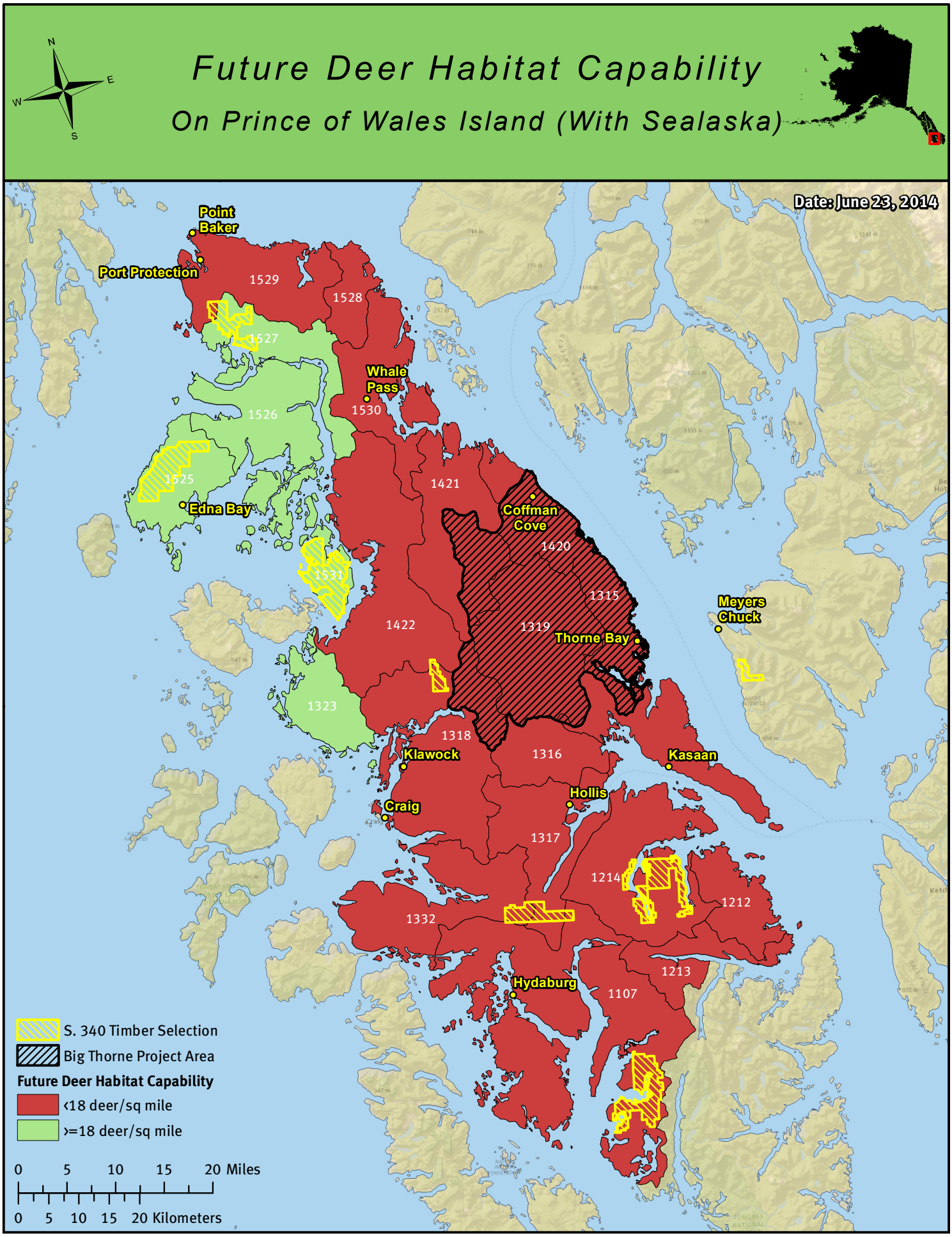
Figure 3.



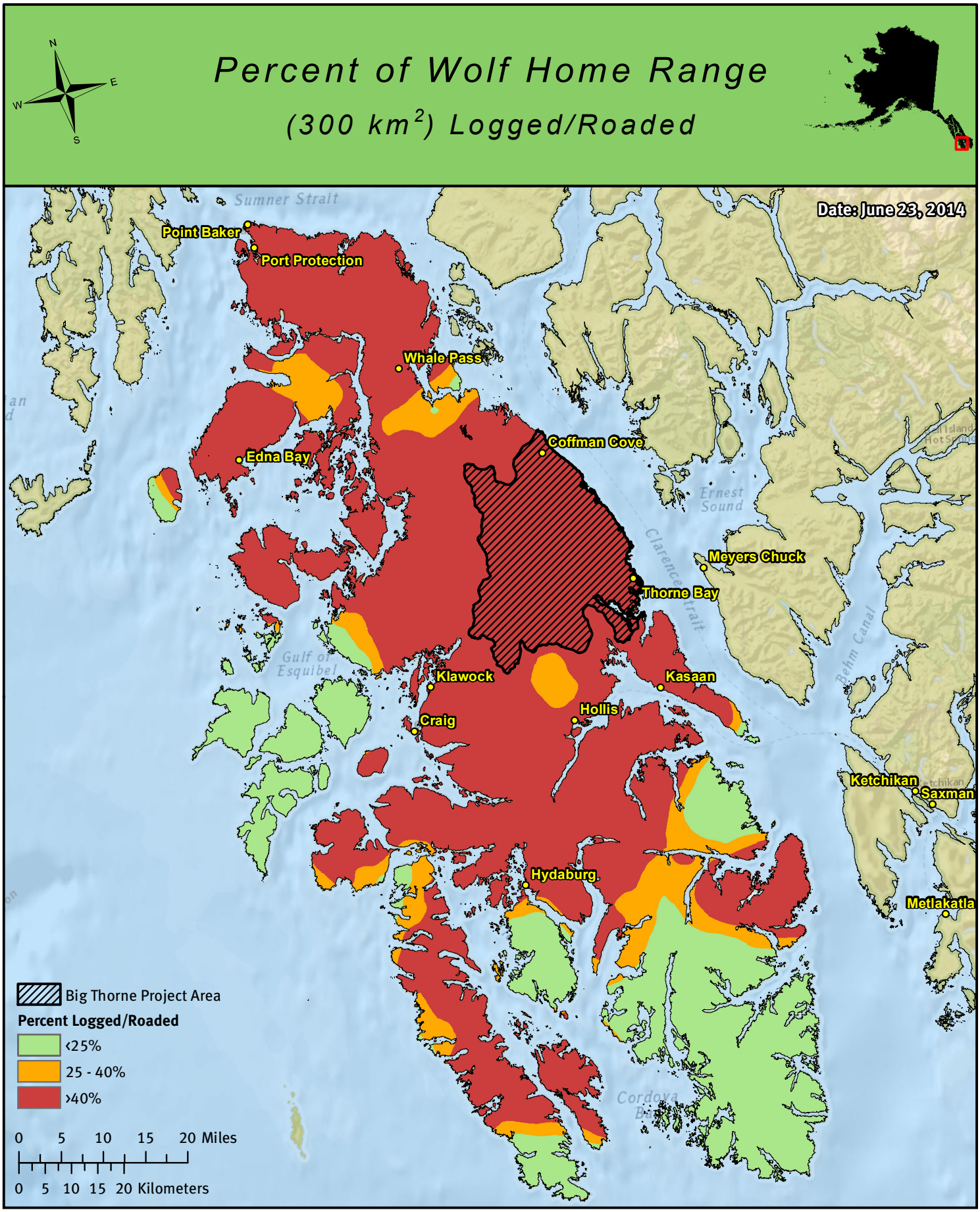
Source: USFS Tongass National Forest. 2013. Deer Habitat Model Results. Document 736_085. Map based on 'Stem Exclusion Stage of Succession, Alternative 3.'

Figure 4.



Source: USFS Tongass National Forest. 2013. Deer Habitat Model Results. Document 736_085. Map based on 'Stem Exclusion Stage of Succession, Alternative 3.'

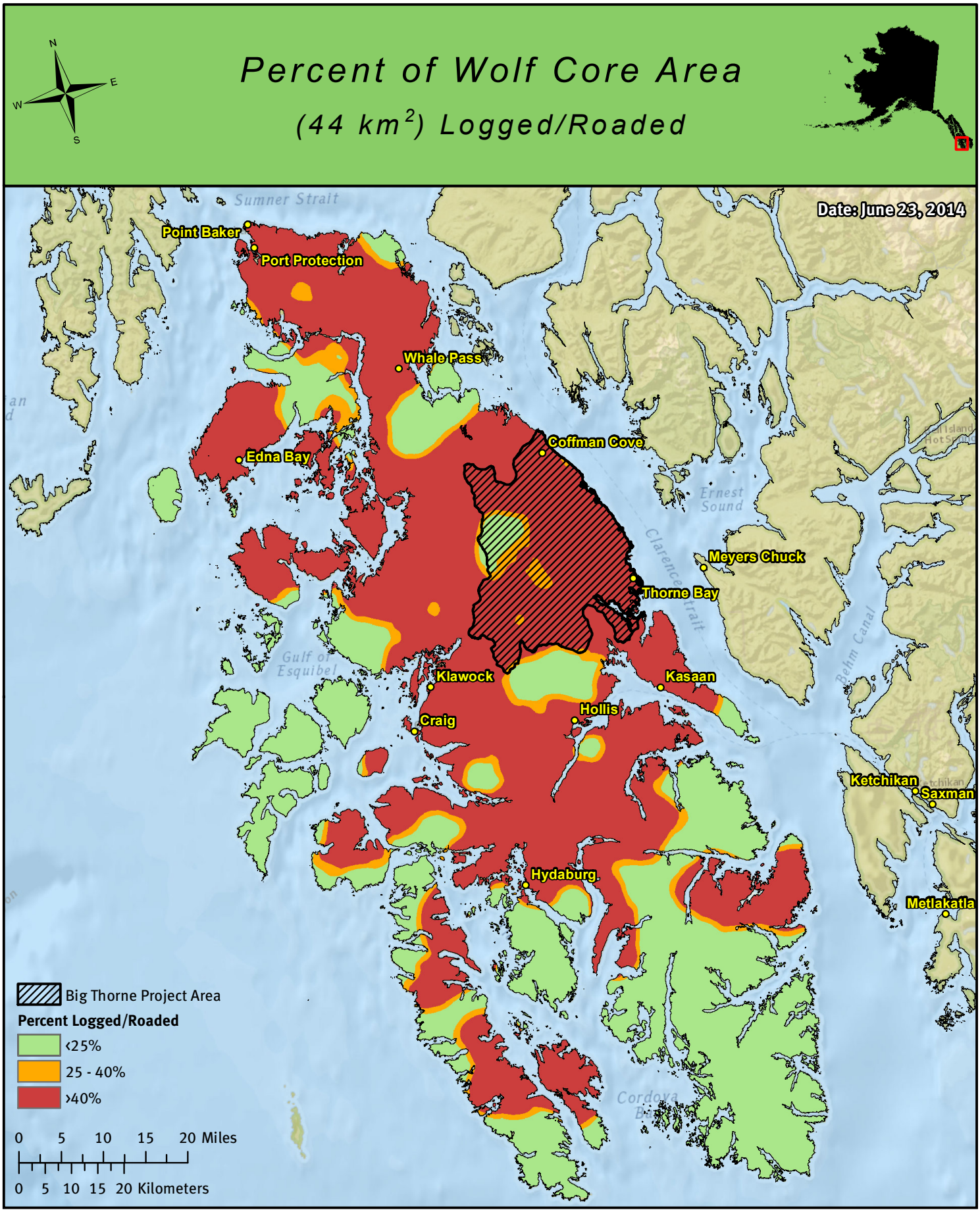
Figure 5.



"My analyses indicated that when about 40% of a pack's total home range is logged and roaded, there is a very high risk that mortality (mostly from hunting and trapping) will exceed reproduction and the pack area becomes a population sink. Indeed, even when as little as 25% of a pack's home range is logged, the ratio of reproduction to mortality is very close to one. Sinks are only maintained by immigration of wolves from other areas, which [...] is not likely to happen on Prince of Wales Island given the population's isolation and small numbers."
- Statement of David K. Person Regarding the Big Thorne Project, Prince of Wales Island (August 16, 2013).

Wolf Home Range = 300 sq. km; Roaded = area within 1 km of a road

Figure 6.



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- Statement of David K. Person Regarding the Big Thorne Project, Prince of Wales Island (August 16, 2013).

Wolf Core Area = 44 sq. km; Roaded = area within 1 km of a road