VIA ELECTRONIC MAIL

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Re: Comments Regarding Draft Supplemental Information Report on Big Thorne Project

June 23, 2014

Dear Mr. Cole:

Thank you for the opportunity to comment on the Big Thorne Supplementary Information Report (SIR). Audubon believes there is significant risk that a viable Alexander Archipelago wolf (*Canis lupus ligoni*) population will not survive on Prince of Wales (POW) and the associated islands of Game Management Unit (GMU) 2. The available evidence indicates a rapid population decline over the past twenty years. In addition, logging and roading on POW have so dramatically reduced deer carrying capacity and wolf habitat security (i.e. areas safe from human hunting pressure) that there would be great cause for concern for the viability of the wolf population and its long-term survival even if the population had not been already reduced by roughly half since 1993 [1].

In these comments, we provide several new spatial analyses illustrating the impacts logging and roads have had on POW deer and wolf habitat at the landscape scale over the area of GMU 2. While the SIR does acknowledge that wolves and deer are likely to decline within the Big Thorne project area, the analysis does not adequately address the broader cumulative source-sink dynamics which demonstrate that a viable POW/GMU 2 wolf population is at significant risk. Audubon argues that the Forest Service failed to adequately consider this risk and its implications in its Big Thorne Final Environmental Impact Statement (FEIS), Record of Decision (ROD), and SIR. At a project-level scale, these comments also address the Forest Service's assertion that the small Old-Growth Reserves (OGRs) in the Big Thorne ROD are comparable in value to the small OGRs they replaced. Audubon used spatial analysis to demonstrate that the original OGRs have far higher deer habitat than the replacement OGRs.

Ultimately, Audubon urges the Forest Service to acknowledge the significant risk to the POW wolf population and the primary role the Forest Service's timber program has played in its making, to cancel the Big Thorne sale as a first step in mitigating that risk, and to follow through on its 2010 commitment to transition out of old growth logging and support the fishing and recreation industries that truly drive Southeast Alaska's economy.

Background

The Big Thorne Project was proposed in 2010. In 2013, the Tongass National Forest issued a ROD approving the sale of roughly 149 mmbf of timber, including approximately 120 mmbf of old-growth trees. It is the largest timber project approved on the Tongass in well over a decade.

The Big Thorne FEIS focused its discussion of the impacts of Big Thorne on the local, project-level impacts to deer and wolf habitat and recognized that the project could lead to local declines (e.g., FEIS p. 3-175). The FEIS included no substantive analysis of the cumulative impacts of POW logging, including the Big Thorne sale, on island-wide populations of wolves and deer, instead tiering to the 2008 Tongass Land Management Plan (TLMP) (e.g., FEIS p. 3-181). The Tongass Land Management Plan (TLMP), written prior to information that the POW wolf population has fallen by up to 57% in the last twenty years [1], concluded that it would "provide a high likelihood of maintaining viable wolf populations in Southeast Alaska" (TLMP ROD p. 24).

As part of the appeal process for Big Thorne, several appellants[1] attached a statement from Dave Person declaring that Big Thorne, in combination with the cumulative impacts of previous logging on POW, "likely will be the collapse of a sustainable and resilient predator-prey ecological community" [1]. Person is a recently retired wolf biologist from the Alaska Department of Fish and Game (ADFG). He has spent over 20 years studying wolves in GMU 2 (POW and associated islands) and is the acknowledged expert on POW wolves.[2]

The basis of Person's concerns regarding Big Thorne and the cumulative impacts of logging and roading on the POW wolf population is his understanding of wolf-deer-human interactions and their impacts on population size. In short, he argues that a decline in deer habitat (especially winter foraging habitat sheltered from heavy snow) at the level found on POW has already resulted in deer habitat capability below the sustainable level of 18 deer/mi^2 across the majority of GMU 2. A significant reduction in deer populations leads to a decline in wolf populations in two ways: 1) a lack of prey, and 2) more importantly, lower deer hunting success for humans which leads to greater hunting and illegal persecution of wolves [1]. Such a response could threaten, endanger, or extirpate the wolf population in GMU 2, because as humans experience less hunting success, they view wolves as competition for a limited number of deer and increase their take of wolves. Road and marine access greatly facilitates the take of wolves. If legal take is limited, wolves are taken illegally. Person's research suggests that the illegal take of wolves on POW now is roughly equal to the legal take [2]. As a result of the combination of lack of prey and increased take of wolves Person writes: "I have concluded that the Big Thorne timber sale, if implemented, represents the final straw that will break the back of a sustainable wolf-deer predator-prey ecological community on Prince of Wales Island, and consequently, the viability of the wolf population on the island may be jeopardized" [1].

[1] See Cascadia Wildlands et. al. (2013) and Alaska Wilderness League et. al. (2013).
[2] See, e.g., Person 2001, Person and Bowyer 1997, Person and Brinkman 2013, Person et al. 1996, Person and Logan 2012.

The Forest Service rejected all Big Thorne appeals, but Regional Forester Beth Pendleton responded to Person's statement by ordering the Tongass Forest Supervisor to prepare the SIR to determine whether Person's statement "presents significant new circumstances or information relevant to cumulative effects on wolves" (Response to Audubon Appeal, September 30, 2013, citing 40 CFR 1502.9(c)(1)(ii).

The SIR process was a complicated one. The Forest Service convened an interagency wolf team consisting of two Forest Service employees, two ADF&G employees, and two U.S. Fish and Wildlife Service (USFWS) employees to examine Person's statement. The team ultimately could not agree on a unanimous response. In general, the ADF&G representatives and one Forest Service employee minimized Person's concerns. The USFWS representatives and the Forest Service's lead wildlife biologist for the Tongass were concerned. They found that "the Big Thorne Project, when combined with the cumulative effects of past and foreseeable harvest and associated road building, increases the likelihood of low wolf populations occurring on Prince of Wales and associated islands…it is unknown whether a substantial risk of island-wide predator/prey collapse or loss of sustainable populations of deer and wolves will result" (SIR, Appendix A, p. 5).

With the wolf team's report completed, the Forest Supervisor published a draft SIR for public comment. In the draft SIR, the Supervisor found that Person's statement had not provided new information but, to the extent the statement did provide new information, the information focused on hunter and trapper-caused mortality to wolves which was not relevant to Forest Service management of the Big Thorne sale. Big Thorne appellants were given 30 days to respond to the SIR.

Landscape Analysis of Conditions on POW and Associated Islands (GMU 2)

Audubon's concern is the cumulative impacts of logging and roads on the wolf population across POW. It should also be the Forest Service's concern. Unfortunately, the Big Thorne FEIS focused almost exclusively on the local impacts of the Big Thorne project, tiering to the acceptable range of habitat outcomes included in the 2008 TLMP rather than evaluating the potential risk to a sustainable wolf population itself (FEIS p. 3-176). The SIR was not tasked with conducting an analysis of the cumulative impacts of logging and road building on POW wolf populations and it did not do so. However, the report concluded that the FEIS and ROD had conducted a sufficient analysis of those impacts by tiering to the 2008 TLMP.

Audubon disagrees. Significant information on the POW wolf population was acquired after the completion of the 2008 plan. Information about declining wolf populations and the USFWS positive 90-day Endangered Species Act (ESA) finding on the Alexander Archipelago wolf both necessitate a new analysis of the cumulative impacts of logging and roads to wolf and deer populations. Audubon argues that an adequate analysis of cumulative effects requires an analysis of the greater landscape context surrounding the Big Thorne project area, and the consideration of wolf source/sink population dynamics in GMU 2. Such an analysis is presented here.

Audubon begins our analysis by discussing the declining Alexander Archipelago wolf population on POW and associated islands and the USFWS finding that there is substantial information suggesting the wolf

should be listed under the ESA. We then discuss existing impacts to the landscape, deer habitat conditions on POW, and wolf mortality risk and source/sink mapping that build a strong case for exercising prudence in proceeding with any new logging activities in GMU 2, especially in the Northern POW biogeographic province.

History of Past Logging on POW Island

POW and associated islands have already undergone 60 years of logging, resulting in a dramatic shift in forest structure from historic old-growth conditions. DM Albert and JW Schoen [3] described the disproportionate logging, or highgrading, which is most concentrated on POW Island. At the timber stand scale, 32% of the productive forest lands on North Prince of Wales biogeographic province have been logged [4]. This percentage is 2.7 times higher than the forest-wide average, and 1.6 times higher than the next most intensively logged province. In total, 296,000 acres have been logged in this single province, which is 38% of what has been logged forest-wide. At the landscape scale, 31% of contiguous high-volume forest in Southeast Alaska historically occurred on northern POW Island. These forests were reduced by 94% between 1954 and 2004 (191,596 acres to 11,864) [3]. Figure 3 from their paper shows the loss of contiguous high-volume forest and the dramatic shift in forest structure resulting from targeted highgrading of the largest stands. Figure 1 in Appendix A shows the loss of contiguous high-volume forest on POW Island and the shift in forest structure from older to younger volume classes [3].

DM Albert and JW Schoen [3] found that:

> "Nowhere are these factors more evident than on northern Prince of Wales Island. This province has extensive low-elevation karst, landscape-scale tracts of productive forests, high-quality habitat for a range of species (Albert & Schoen 2007), and is an important center of endemism (Cook &MacDonald 2001; Cook et al. 2006). The island has also sustained the highest rates of logging in the region (Albert & Schoen 2007; DellaSala et al. 2011). Although northern Prince of Wales contained only 10.9% of all productive forests in the region in 1954 it received 37.8% of all the logging. Consequently, 93.5% of its highest volume landscape-scale blocks of old growth had been logged."

Furthermore:

> "The specific threshold at which habitat alteration affects population viability is difficult to determine (Fahrig 2001). However, results of a review of habitat thresholds literature (to inform forest planning in coastal British Columbia) indicated that maintaining loss of habitat below 40% of historical abundance poses a low risk to most species, whereas declines above that level result in less confidence that risks of extirpation will remain low (Price et al. 2009). On the basis of this criterion, rare forest types that have been reduced by >40% of historical abundance such as landscape-scale blocks of high-volume old growth, and particularly those on Prince of Wales Island, may warrant special consideration (Cook et al. 2006)."

With 94% of the contiguous high-volume forest already logged on northern POW Island, Schoen and Albert's analysis constitutes important new information that indicates that this region is already beyond acceptable levels of impact to habitat for deer, wolves, and other focal species.

Decline in Deer Habitat Capability Below Sustainable Standards for GMU 2

The TLMP wolf standards and guidelines state that "habitat to support a density of 18 deer per square mile is necessary to provide wolves and hunters with adequate foraging/hunting opportunities" [5]. Using the Forest Service's deer model output for Big Thorne [6], we mapped the Wildlife Analysis Areas (WAAs) above and below the 18 deer/mi^2 threshold for three time periods: Historic Year (1954), Current Year (2013), and stem exclusion stage of succession (26 years post-harvest; 2040): Alternative 3. See Figure 2 in Appendix A.

Historically, 11 out of 21 of the WAAs supported more than 18 deer/sq mi. Currently, six do, and this is predicted to drop to five by the stem exclusion phase. Of the remaining five, three include large land selections requested by Sealaska in Senate Bill 340, which would leave just two remaining sustainable WAAs if this legislation is enacted. Based on USFS deer model output data, on average, deer density has dropped to 76% of what it was in 1954, with 10 WAAs having declined by more than 25%, and 5 WAAs by more than 40% since 1954. Even if S. 340 is not passed, the Forest Service is still counting on 5 WAAs with a mean density of 23.9 deer/sq mi to act as a source population for 16 WAAs with a mean density of 12.5 deer/sq mi, following stem exclusion. In addition, Figure 3 in Appendix A shows that even of those WAAs that are predicted to meet deer standards in the future, some, such as west Kosciusko Island have been heavily impacted, losing more than 40% of the deer capability that existed historically. Because the model does not account for fragmentation effects, it is likely that even these WAAs realistically have a much lower habitat capability than estimated.

In total, the USFS projects a decline of 13,989 deer between 1954 and the stem exclusion phase. Assuming a management goal of at least 18 deer/sq mi in every WAA, in 1954 there were 9,293 extra deer in the source WAAs, to make up for 5,081 missing deer in the sink WAAs. In 2040, based on the USFS projections, there will be 1,494 extra deer in the sources, to make up for a 11,271-deer shortfall in the sinks.

Decline of the POW Island Complex Population of Alexander Archipelago Wolves in GMU 2

The Alexander Archipelago wolf is smaller and darker than other wolf populations in Alaska and is considered a distinct subspecies. "Recent genetic analyses of Southeast wolves suggest they have undergone a distinct evolutionary history and have been isolated from continental wolf populations" [7]. In 2001, the population of wolves on POW and adjacent islands likely represented a third of the Southeast wolf population [8]. The POW population is insular, "probably derived from a few founders that reached the island before it was isolated from other islands and the mainland by postglacial rise in sealevel" [9]. "As a result of the isolated and naturally fragmented geography of Southeast, the Alexander Archipelago wolf is potentially more sensitive to human activity and habitat disturbance that elsewhere in the state. This greater sensitivity is particularly a concern in the southern archipelago where deer populations are strongly influenced by the loss and fragmentation of old-growth forest habitat." [7]. If POW wolves "are extirpated or reduced to a small population, rescue or recolonization by dispersing wolves from the mainland is unlikely" [10].

In a study using radio-collared wolves, Person estimated the POW Island population to be roughly 300–350 wolves during the mid-1990s. Person conducted another formal estimate during 2000–2004, which

indicated that the population had declined to roughly 250–300 wolves. In 2010, ADF&G estimated during a Board of Game meeting that the GMU 2 population had declined to as few as 150 wolves, or roughly 50% of the 1990s population (see Cascadia Wildlands et. al. 2013).

There is also evidence that wolf packs in central POW have continued to decline since the 2010 ADFG report. Dave Person, acting in his capacity as ADFG biologist, documented the potential mortality of over 60% of the wolves in the Big Thorne area. [1]. The rapid decline of the wolf population requires a re-examination of the cumulative impacts of logging and roads before the Forest Service authorizes even more logging and road building.

USFWS Positive 90-day Finding for the Alexander Archipelago Wolf Under ESA

TLMP sets a goal for the Forest Service to "[m]aintain ecosystems capable of supporting the full range of native and desired non-native species and ecological processes." An objective of the plan is to "provide sufficient habitat to preclude the need for listing species under the Endangered Species Act, or from becoming listed as Sensitive due to National Forest habitat conditions." Audubon believes that ESA listings should be the last resort effort to protect species and agrees with the Forest Service's stated commitment to provide sufficient habitat to preclude the need for listing the Alexander Archipelago wolf.

On March 31, 2014, the USFWS made a positive 90-day finding under the ESA on a petition to designate the Alexander Archipelago wolf as a threatened or endangered species based on the threat to the POW population. According to the USFWS, the agency makes a positive 90-day finding and engages in more review if the petition would lead a "reasonable person" to believe protecting the species may be warranted (USFWS 2014; see also 16 USC 1533(b)(3)(A)). In its decision to engage in further review, USFWS found that there was substantial information suggesting that TLMP, its Old-growth Habitat Conservation Plan, and its standards are inadequate to protect wolves from being listed.

The USFWS 90-day finding was not released until after the Big Thorne ROD, but was available before the SIR was completed. The SIR's analysis of the new information provided by the 90-day notice focuses on the impacts of the Big Thorne OGR modifications and does not cumulative impacts of logging and roading on the island. (SIR, p. 14).

As discussed above, the Forest Service tiered its cumulative impacts analysis of the island-wide wolf population to the 2008 TLMP plan, which was developed prior to new information now available, including revised wolf population estimates, multiple peer-reviewed scientific papers by Person and others analyzing wolf population habitat and population dynamics, and Person's 2013 statement. Additionally, the analysis presented here incorporates those scientific data and constitutes new information about the ecological health of POW Island. Even without our additional analysis, the USFWS finding that substantial information exists to indicate the species may require ESA protections due to the failure of TLMP, its conservation plan and guidelines, provides ample indication that the assumptions underlying TLMP's wolf and deer provisions require re-examination.

Mapping Source and Sink Areas for Wolf Populations in GMU 2

Person (2013) states 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."

In response, the SIR noted that this formulation: "presents information in a different way than the Big Thorne Project analysis…[The analysis] did not specifically highlight particular levels of development such as the 40% and 25% of wolf pack range logged and roaded as noted in the Statement. Additionally, the FEIS or ROD did not link these to the potential for a population sink." Audubon believes an adequate assessment of Person's concerns was not possible without a landscape-wide analysis of his statement about sources and sinks. Audubon provides that analysis here, demonstrating that a majority of POW is now a wolf population sink.

We conducted a spatial analysis to identify areas meeting the 25% and 40% threshold identified by David Person. We identified, first, all previously logged areas, then added to this all existing roads, buffered to 1 km (the distance considered readily accessible to hunters and trappers) [12]. We then performed moving window analyses with radii of 9.772 and 3.742 km, equivalent to an average wolf home range of 300 km^2 [1] and an average wolf core area of 44 km^2 (Dave Person, personal communication, 2014), to identify the total logged and roaded area within a wolf home range or core area centered around any given point. Next, we calculated the total land area within these same radii, and used this to calculate the percent of land area logged or roaded, for any given wolf range or core area. Figure 4 shows wolf source and sink areas at the 300 km^2 home range scale, and Figure 5 shows sources and sinks at the 44 km^2 core area scale.

Table 1. Percent of potential home ranges and core areas (areas with a radius equivalent to the average range and core area size) above the 25% and 40% thresholds, for GMU 2 and the Big Thorne Project Area.

	Game Management Unit 2		Big Thorne Project Area	
	Wolf Home Range	Wolf Core Area	Wolf Home Range	Wolf Core Area
Likely Sink (> 40% developed)	69%	59%	100%	88%
Potential Sink (>25% developed)	78%	65%	100%	94%

These analyses indicated that 49% of GMU 2 is already logged/roaded, as is 72% of the Big Thorne Project Area. Furthermore, very large proportions of the potential wolf home ranges and core areas have already been logged and roaded to an extent that makes them likely population sinks.

In the SIR Appendix A, the Wolf Task Force Report, reviewers state that "As outlined in the Big Thorne record, high mortality of wolves is expected in the Big Thorne Project area and other areas of high road densities. We are unaware…of any evidence that population sink dynamics are occurring on over 50 percent of the island." Our analysis concludes that 59-78% of GMU 2 is a sink for wolves, as well as 88-

100% of the Big Thorne project area (Table 1).

Mapping Risk of Mortality for Wolves Near Infrastructure and Human Access

Some members of the SIR Wolf Team state that the 25% and 40% development levels do not represent an ecological threshold where mortality changes abruptly. Although this may be true, it is an oversimplification of the science. The >40% development threshold approximates the line where wolf recruitment tends to be lower than mortality, but not all areas within the population sink zone have equal risk of mortality.

To illustrate this, we sought to quantify and map the existing mortality risk for the Alexander Archipelago wolf across GMU2, which is centered on Prince of Wales Island. As nearly all (approximately 87%) of the wolf mortality on POW Island has been shown to result from legal and illegal harvest activities by humans [2], we modeled wolf mortality risk as a function of human access.

Studies have emphasized distance from roads as an important factor affecting human access for hunting and trapping. Specifically, hunters have been shown to travel up to 10 km away from a vehicle when hunting, with greater hunting effort occurring at lesser distances [12]. Other studies have associated mortality risk with the density of roads in an area. DK Person and AL Russell [2] show that the harvest rate of wolves on POW Island increases linearly with increasing road density up to 0.9 km/km^2. Road densities greater than this produce an increase in the variance of the harvest rate, and the linear relationship disappears. The negative impact of increasing road density has been shown in other regions as well. Similarly, research in Minnesota has shown that 80% of the habitat used by wolf packs occurred in areas with a road density of less than 0.23 km/km^2, few portions of any wolf pack territory were in areas of greater than 0.45 km/km^2 road density, and no portion of any pack area was located in an area of greater than 1.0 km/km^2 road density [13].

In addition to the road network, boat access to shoreline areas provides an important means of access for hunters and trappers. In one study, half of the wolves killed were taken by harvesters using boats to access hunting and trapping areas along the shoreline [2]. Shoreline areas associated with estuaries are often targeted, and traps are placed in tidal pools, with snares being placed along the access trails to these areas (Dave Person, personal communication, 2014).

Analysis Methods. Euclidean distance from roads was calculated from all existing roads, including decommissioned roads as well as snowmobile and ATV access trails. Closed roads were included in this analysis because it has been noted that even closed roads still provide a means of access via snowmobiles in the winter and ATVs year-round [2]. This variable was linearly scaled with a maximum value (greatest mortality risk) of 100% risk at road's edge, decreasing to zero (0) at a distance of 10 km from the road.

The road density variable was calculated using the same road network as the distance from road variable and is based on the average road density, given in km length per square km area within a search radius of 3.7424 km. This search radius window results in an area of 44 square km, which approximates the average core home range for wolves on POW Island (Dave Person, personal communication, 2014).

This variable was linearly scaled, with a value of 0% mortality risk at a road density of 0 km/km^2 and a maximum mortality risk of 100% at a road density of 0.9 km/km^2 and above. It should be noted that while the maximum mortality risk is reached at a road density of 0.9km/km^2, lower road densities may still produce unsustainable wolf harvest rates. A study using linear regression to examine the influence of road density on wolf harvest rates produced the following equation for areas with a road density up to, and including, 0.9km/km^2: Harvest rate = [0.073 + 1.126 * road density]^2 [2]. ADF&G currently manages wolf harvest in GMU 2 so that total harvest does not exceed 30% of the estimated fall population, ensuring sustainable population numbers [14]. Solving the equation for a 30% harvest would indicate that road densities above 0.422 km/km^2 would be likely to result in unsustainable wolf harvest rates. A map showing these important road density thresholds has been included with these comments.

Mortality risk resulting from boat access to the shoreline was also mapped. Shoreline areas associated with estuaries were selected, and the ocean distance from towns was calculated to a buffer 50 m inland from the estuary shorelines. These are the areas most frequently targeted by trappers (Person, personal communication, 2014). The mortality risk for these areas was also linearly scaled such that an estuary-associated shoreline near a town received the maximum risk score of 100%, while a shoreline area located at the maximum distance from town received a value of 0%.

These three variables were then combined to arrive at the final mortality risk. Road density and distance from roads were combined equally (averaged, with a maximum score of 100% representing the highest mortality risk) and applied to all areas in GMU 2, aside from the area within 50 m of estuary-associated shorelines. The ocean distance from towns was applied separately to only areas within 50 m of estuary-associated shoreline and mosaicked with the road density risk to create the final map.

Results. The resulting map can be described as the risk of wolf mortality given that a wolf and hunter are present at a given location. The landscape contours of wolf mortality risk are shown on Figure 6. Our results show that a significant portion of GMU 2 presents a very high mortality risk to the POW Island Complex population of the Alexander Archipelago wolf, with the most concentrated risk in the central portion of POW Island. Areas with greater than 50% risk of mortality are places where it is more likely that wolf mortality will exceed wolf recruitment, thus creating a sink population. This interpretation of the model output is supported by the agreement with the separate analysis of wolf core area impacts also included with these comments.

As noted, road density alone is an important predictor of human-caused wolf mortality. Analysis results indicate that 52% of GMU 2 and 58% of POW are above 0.422 km/km^2 road density, indicating that hunting and trapping harvest rates are likely to exceed the sustainable level of 30% over much of the study area [14]. Additionally, 32% of GMU 2 and 37% of POW are above 0.9 km/km^2 road density, indicating that these areas are likely experiencing the highest rates of human-caused wolf mortality in the study area. This analysis constitutes significant new information that should be considered in the Big Thorne Project design and decision.

Existing and Projected Impacts to Old-Growth Reserves

As described below, OGRs in the Big Thorne Project area are insufficient to provide source populations for deer and wolves, yet the SIR, tiered to TLMP, relies on these regions as a key part of a conservation strategy to justify the Big Thorne sale. Audubon also uses its deer habitat model to evaluate the deer habitat values of the small Big Thorne replacement OGRs and finds them to have significantly lower value than the original small OGRs.

Big Thorne Area OGRs at the Landscape Scale. The Big Thorne FEIS assumes that the Honker Divide and Karta Wilderness will act as an inexhaustible source for wolves for the local area without researching source/sink dynamics across GMU 2. However, Person (2013) stated that "the data showed how vulnerable packs are to access via roads, even for the pack occupying the Honker Divide OGR because that OGR is simply too small to encompass their home range." Our analysis of source/sink areas supports this claim, illustrating that Honker Divide and Karta Wilderness have already been compromised by encroachment surrounding these reserves, and that the source areas within these reserves are smaller than the size of a wolf home range (Figure 7).

Based on DK Person and AL Russell [2] and DK Person [1], our analysis exhibits that 86% of the Honker Divide/Karta Wilderness area is a predicted sink at the home range scale, or 43% at the core area scale. Indeed, 30% of the Honker Divide/Karta Wilderness area is either impacted directly by young growth resulting from harvest or lies within 1 km of a road. Additionally, 59% of the Big Thorne Project area is predicted to have over 90% risk of wolf mortality when human hunters and wolves occur. These broader landscape dynamics render even the largest old-growth reserves and source populations ineffective at providing population stability over the long term.

Big Thorne Project OGR Modifications. The Big Thorne Project includes several changes to the small OGRs. OGRs are a component of the TLMP conservation plan. They are designed to ensure sufficient quality, quantity, and spatial arrangement of mature forest habitat to support ecosystem processes and the species dependent upon mature forest stands. Under TLMP, the location, composition and size of small OGRs may be adjusted if the new OGRs provide "comparable achievement of the Old-growth Habitat LUD goals and objectives." To determine comparability, the Forest Service must consider a number of factors, including total OGR acres, general shape, road miles, large-tree POG acres, deep snow deer and marten habitat, goshawk and murrelet nesting habitat, and low-elevation POG. Although winter deer habitat is mentioned specifically, good winter deer habitat possesses most of the criteria used to determine comparability.

Because the USFWS questioned several of the OGR changes, the SIR addressed the reasoning and process used to determine the changes in the OGR. The SIR "concluded that the use of older young-growth (greater than 50 years old) and old-growth stands that were partially harvested maintain enough snow interception, would achieve comparable elevational connectivity for deer in these areas, and is consistent with the direction in the Forest Plan" and "resulted in a net increase of acreage of Old-growth Habitat LUD within the entire project area".

Audubon believes the Forest Service analysis failed to adequately consider the importance of the location of the OGRs. The OGRs now proposed for harvest were originally left for the purpose of

providing elevational connectivity in a specific location. For instance, the OGR proposed for clear-cut harvest on Ratz Mountain (unit 440 in the ROD) is bordered to the east and west by 26 and 34 year-old clearcuts, respectively. These young clearcuts will fail to provide necessary elevational connectivity during snowy winters if this OGR is clear-cut.

Using a deer habitat model developed jointly by Audubon Alaska and The Nature Conservancy (TNC) , Audubon performed an objective analysis of the comparability of the original and new OGR deer habitat scores—an approximation of the habitat's ability to intercept snow and provide access to winter browse. We found that deer habitat scores in the new OGRs averaged 9.06, while the average deer habitat score for the OGRs being lost was 39.17. A large factor in the difference between these scores is likely the higher average elevation for the OGRs being gained (516 m) compared to the average elevation of those being lost (195.95 m). Both the Audubon Alaska / TNC and USFS deer habitat models rank areas of higher elevation as having lesser value for deer winter habitat, as these areas receive higher snowfall.

The SIR emphasizes the subjective nature of the Forest Service's determination of comparability. At a minimum, Audubon's analysis indicating the superiority of the original OGRs in terms of deer habitat requires the Forest Service to acknowledge the very significant drop in deer habitat value and places a burden on the Forest Service to more fully explain its determination. We do not believe the ROD or the SIR have met that burden.

Conclusion

Since the enactment of 2008 TLMP, there is ample new evidence that the POW wolf population is at significant risk. The best information available tells us that the wolf population has fallen by roughly half in the last 20 years. The USFWS has determined that there is substantial reason to believe the Alexander Archipelago wolf may be threatened or endangered due to impacts to the POW population. And spatial interpretation of David Person's 2013 and 2014 statements illustrate the severe difficulties the POW wolf population faces in the face of the cumulative impacts of logging and roading.

Even after the convening of a wolf team and completion of a SIR, the Forest Service refused to address concerns about the cumulative impacts of Big Thorne and 60 years of logging and roading. The SIR finds that "consideration or direct evaluation of the potential for the increase of people targeting wolf harvest (legal and illegal) to improve deer abundance or for other motivations was not part of the Big Thorne Project analysis because of the incomplete and speculative nature of the scenario, the spatial extent of the project, consideration of wolf mortality in the Forest Plan (to which the Big Thorne analysis tiered), and lack of objectively obtained supporting data." Audubon believes that the analyses presented here constitute substantial new information that should be considered, and that the Forest Service should and could have done such a cumulative effects analysis to spatially interpret the 2013 statement of concern by David Person.

Ultimately, our analysis support Person's assertion that "the cumulative effects of 60 years of clear-cut logging plus the Big Thorne project could result in the ecological collapse of the predator-prey system

and result in wolf numbers well below minimum viability both demographically and genetically, which would eventually result in their extirpation or extinction within the Prince of Wales Archipelago." We reject the SIR's contention that this is not the Forest Service's problem. POW wolf population issues are primarily attributable to Forest Service management decisions and the Forest Service has the opportunity to avoid further management actions that will increase risks to the POW wolf population. As the Will Rogers saying goes, "When you find yourself in a hole, stop digging."

Sincerely,

Jim Adams
Policy Director
Audubon Alaska

References

1. Person DK: **Statement of David K. Person, Regarding the Big Thorne Project, Prince of Wales Island**. In.; 2013.

2. Person DK, Russell AL: **Correlates of Mortality in an Exploited Wolf Population**. *The Journal of Wildlife Management* 2008, **72**(7):1540-1549.

3. Albert DM, Schoen JW: **Use of historical logging patterns to identify disproportionately logged ecosystems within temperate rainforests of Southeastern Alaska**. *Conservation Biology* 2013, **27(4)**.

4. Albert DM, Schoen JW: **A comparison of relative biological value, habitat vulnerability, and cumulative ecological risk among biogeographic provinces in Southeastern Alaska**. In: *A conservation assessment and resource synthesis for the coastal forests & mountains ecoregion in Southeastern Alaska and the Tongass National Forest.* Edited by Schoen JW, Dovichin E. Anchorage, AK: Audubon Alaska and The Nature Conservancy; 2007.

5. USFS Tongass National Forest: **Tongass Land and Resource Management Plan: Final Environmental Impact Statement: Plan Amendment: Volume 1**. In.; 2008.

6. USFS Tongass National Forest: **Deer Model Results**. In. Edited by 736_0385_DeerModelResults20130517_BW.xlsx; 2013.

7. Schoen JW, Person DK: **Alexander Archipelago wolf**. In: *A Conservation Assessment and Resource Synthesis for the Coastal Forests & Mountains Ecoregion in Southeastern Alaska and the Tongass National Forest.* Edited by Schoen JW, Dovichin E. Juneau, AK: The Nature Conservancy and Audubon Alaska; 2007.

8. Person DK: **Alexander Archipelago Wolves: Ecology and Population Viability in a Disturbed, Insular Landscape, PhD Dissertation**. Fairbanks, AK: University of Alaska Fairbanks; 2001.

9. Weckworth BV, Talbot S, Sage GK, Person DK, Cook J: **A signal for independent coastal and continental histories among North American wolves**. *Molecular Ecology* 2005, **14**:917-931.

10. Person DK, Brinkman TJ: **Succession debt and roads: short- and long-term effects of timber harvest on a large-mammal predator-prey community in Southeast Alaska**. In: *North Pacific Temperate Rainforests: Ecology and Conservation.* Edited by Orians GH, Schoen JW. Seattle, WA: University of Washington Press; 2013: 143-167.

11. **ESA Actions** [http://www.fws.gov/southeast/candidateconservation/esaactions.html]

12. Brinkman TJ, Chapin T, Kofinas G, Person DK: **Linking Hunter Knowledge with Forest Change to Understand Changing Deer Harvest Opportunities in Intensively Logged Landscapes**. *Ecology and Society* 2009, **14(1)**(36).

13. Mladenoff DJ, Sickley T, A., Haight RG, Wydeven AP: **A Regional Landscape Analysis and Prediction of Favorable Gray Wolf Habitat in the Northern Great Lakes Region**. *Conservation Biology* 1995, **9(2)**:279-294.

14. Alaska Department of Fish and Game: **Status of Wolves in Southeast Alaska**. In.: ADFG Division of Wildlife Conservation; 2012.

15. Person DK, Bowyer RT: **Population viability analysis of wolves on Prince of Wales and Kosciusko Islands, Alaska. Final Report**. In. Juneau, AK: U. S. Fish and Wildlife Service; 1997.

16. Person DK, Kirchhoff MD, Van Ballenberghe V, Iverson GC, Grossman E: **The Alexander Archipelago Wolf: A Conservation Assessment. General Tech. Report PNW-GTR-384**. In. Juneau, AK: USDA Forest Service; 1996.

17. Person DK, Logan BD: **A Spatial Analysis of Wolf Harvest and Harvest Risk on Prince of Wales and Associated Islands, Southeast Alaska. Final wildlife research report, ADF&G/DWC/WRR-2012-06**. In. Juneau, AK: Alaska Department of Fish and Game; 2012.

Appendix A:

Maps and Figures

Figure 1: Maps and graph from Albert and Schoen 2013 showing loss of contiguous high-volume forest on Prince of Wales Island and the shift in forest structure from older to younger volume classes.

Figure 2: USFS habitat capability model results for Sitka black-tailed deer for four time periods.

Figure 3: Percent change in deer habitat capability from historic to future condition.

Figure 4: Wolf source and sink areas at the home range scale

Figure 5: Wolf source and sink areas at the core area scale

Figure 6: Contours of wolf mortality risk

Figure 7: Old-growth Reserves and wolf source sink areas in the Big Thorne Project area

Figure 1.

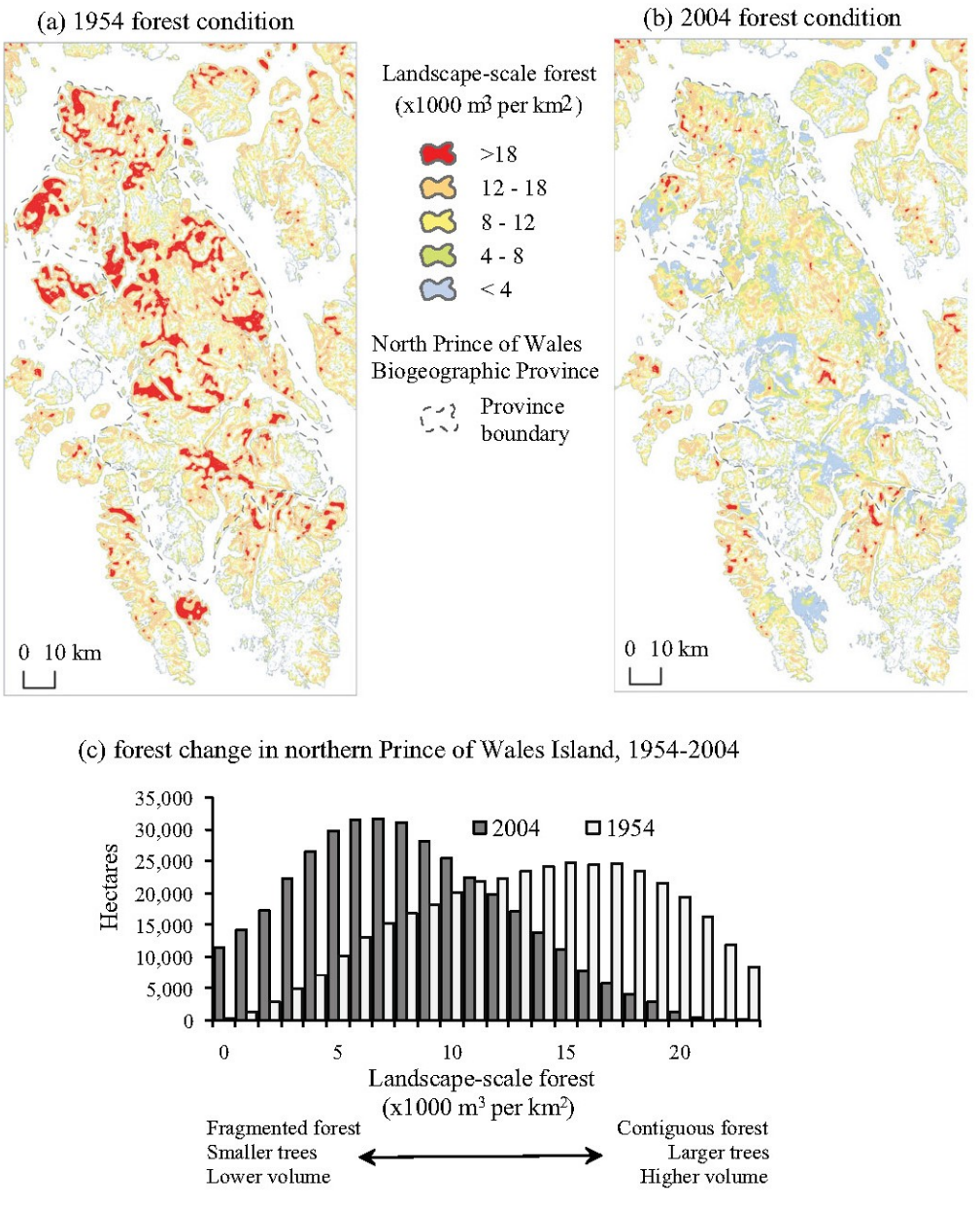
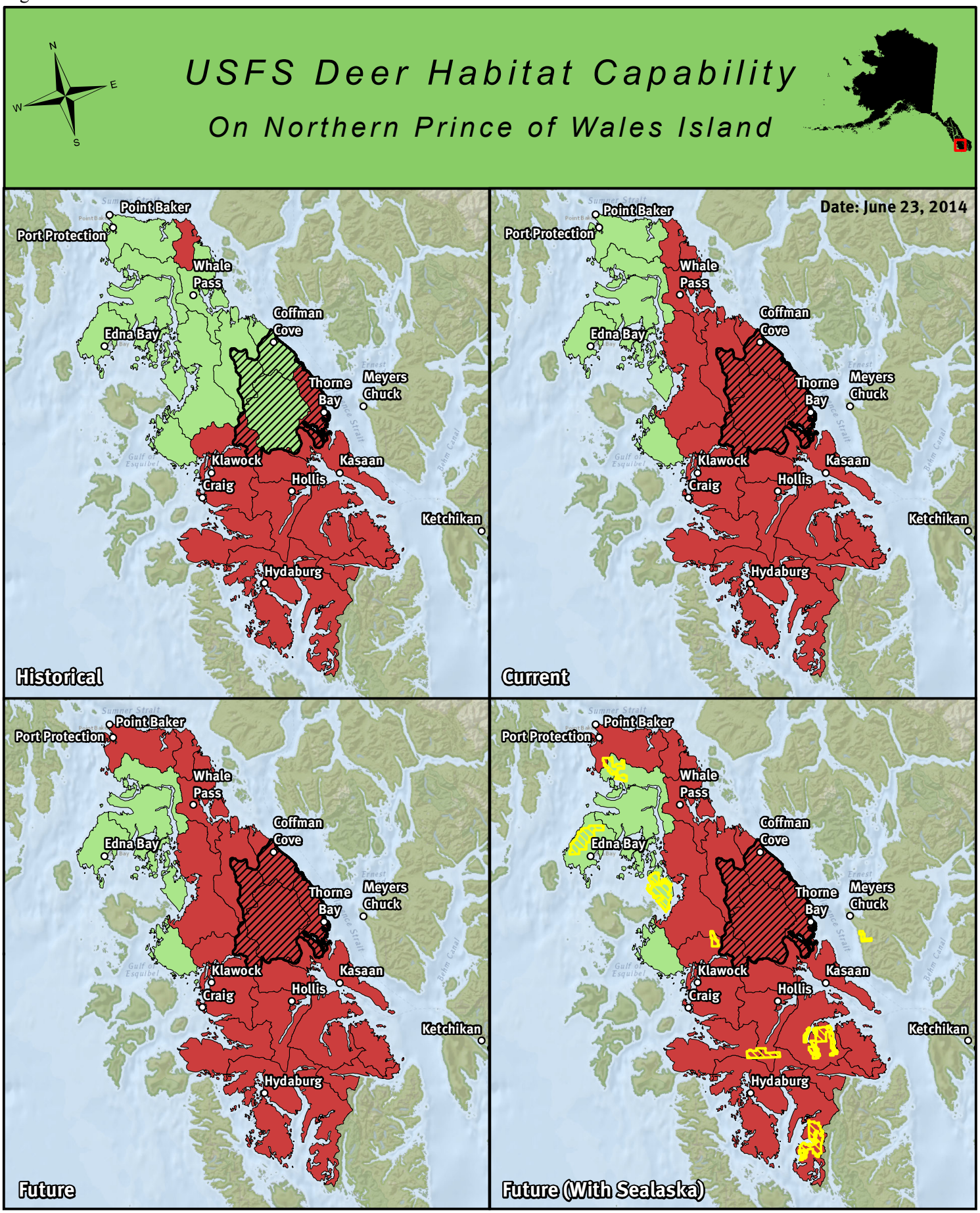
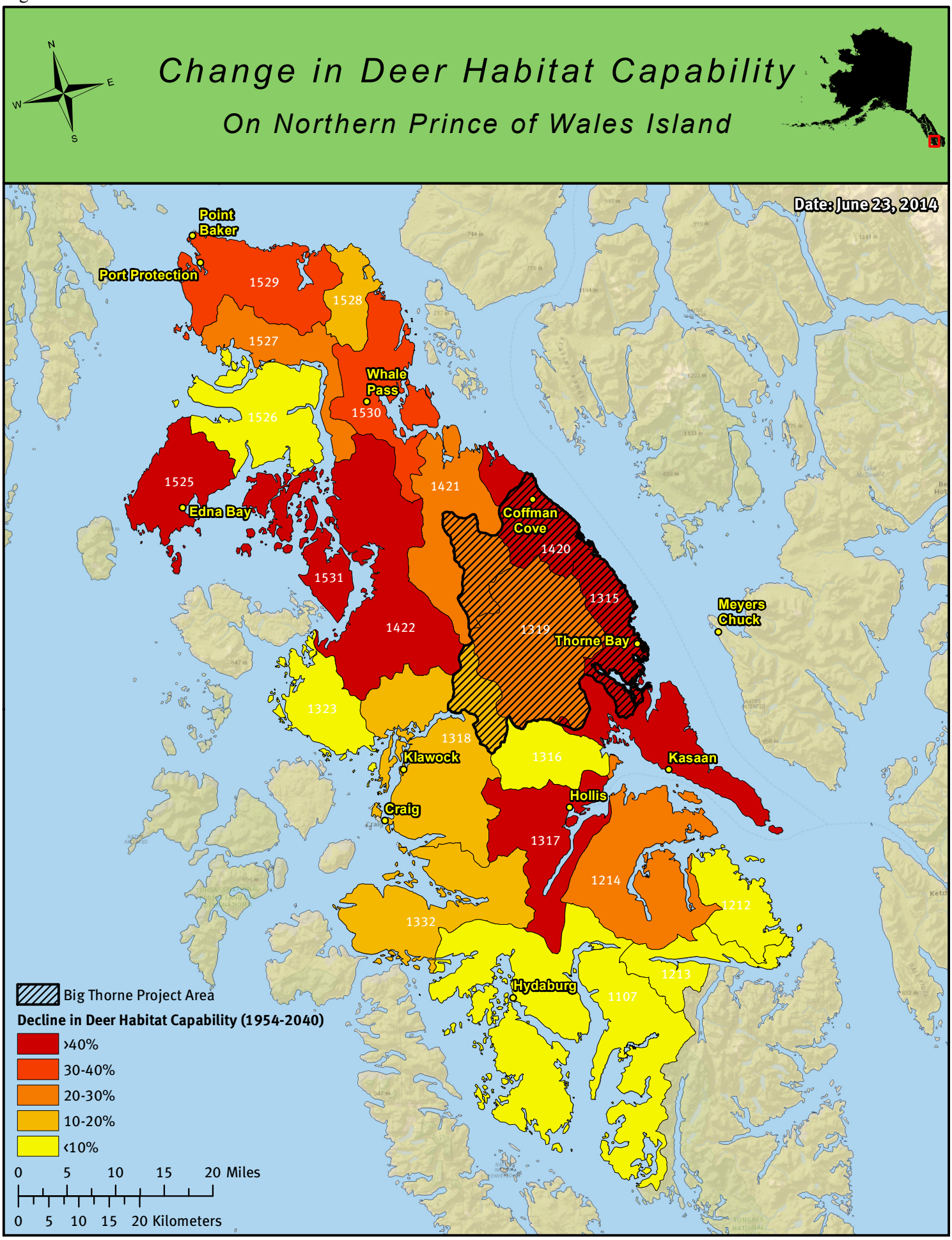

(a) 1954 forest condition
(b) 2004 forest condition
Landscape-scale forest
(x1000 m3 per km2)
>18
12 - 18
8 - 12
4 - 8
< 4
North Prince of Wales
Biogeographic Province
Province
boundary
0 10 km
0 10 km
(c) forest change in northern Prince of Wales Island, 1954-2004
Hectares
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
2004
1954
0
5
10
15
20
Landscape-scale forest
(x1000 m3 per km2)
Fragmented forest
Smaller trees
Lower volume
Contiguous forest
Larger trees
Higher volume

Figure 2.



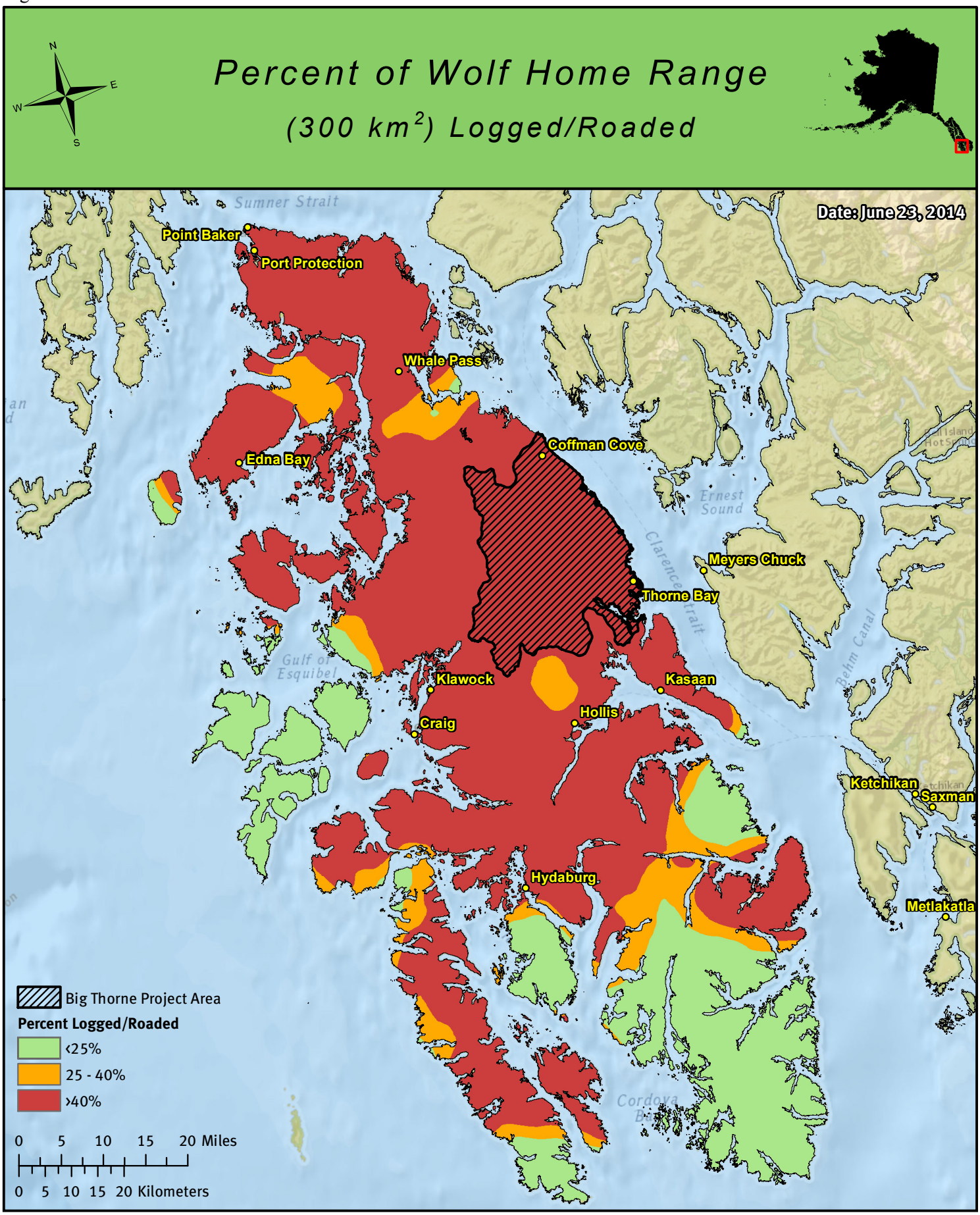
Source: USFS Tongass National Forest. 2013. Deer Habitat Model Results. Document 736_085. Map time series based on 'Historical Year' (1954), 'Current Year' (2013), and 'Stem Exclusion Stage of Succession, Alternative 3.'

Figure 3.



Source: USFS Tongass National Forest. 2013. Deer Habitat Model Results. Document 736_085. Map based on 'Historic Year' (1954), compared with 'Stem Exclusion Stage of Succession, Alternative 3.'

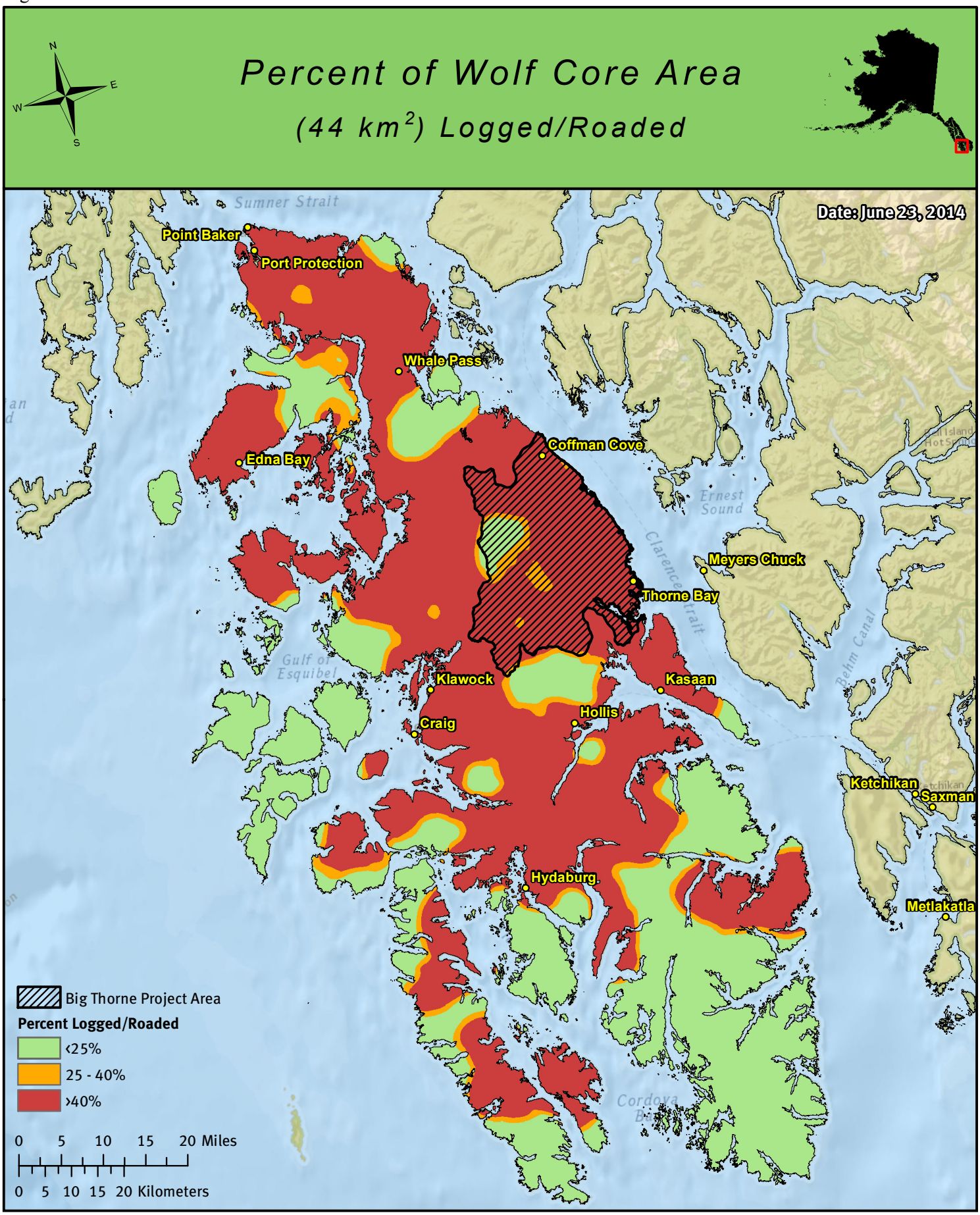
Figure 4.



"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 5.



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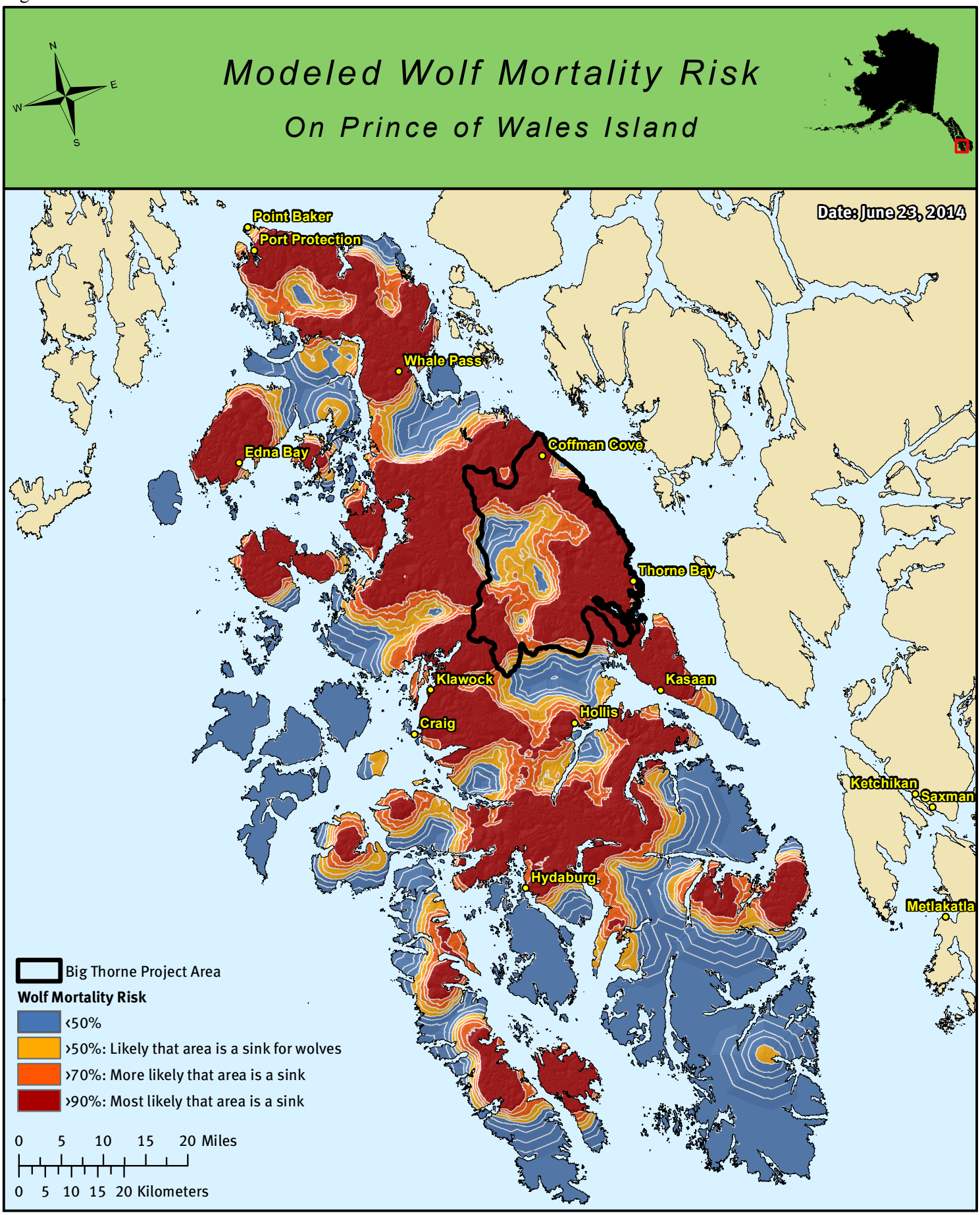
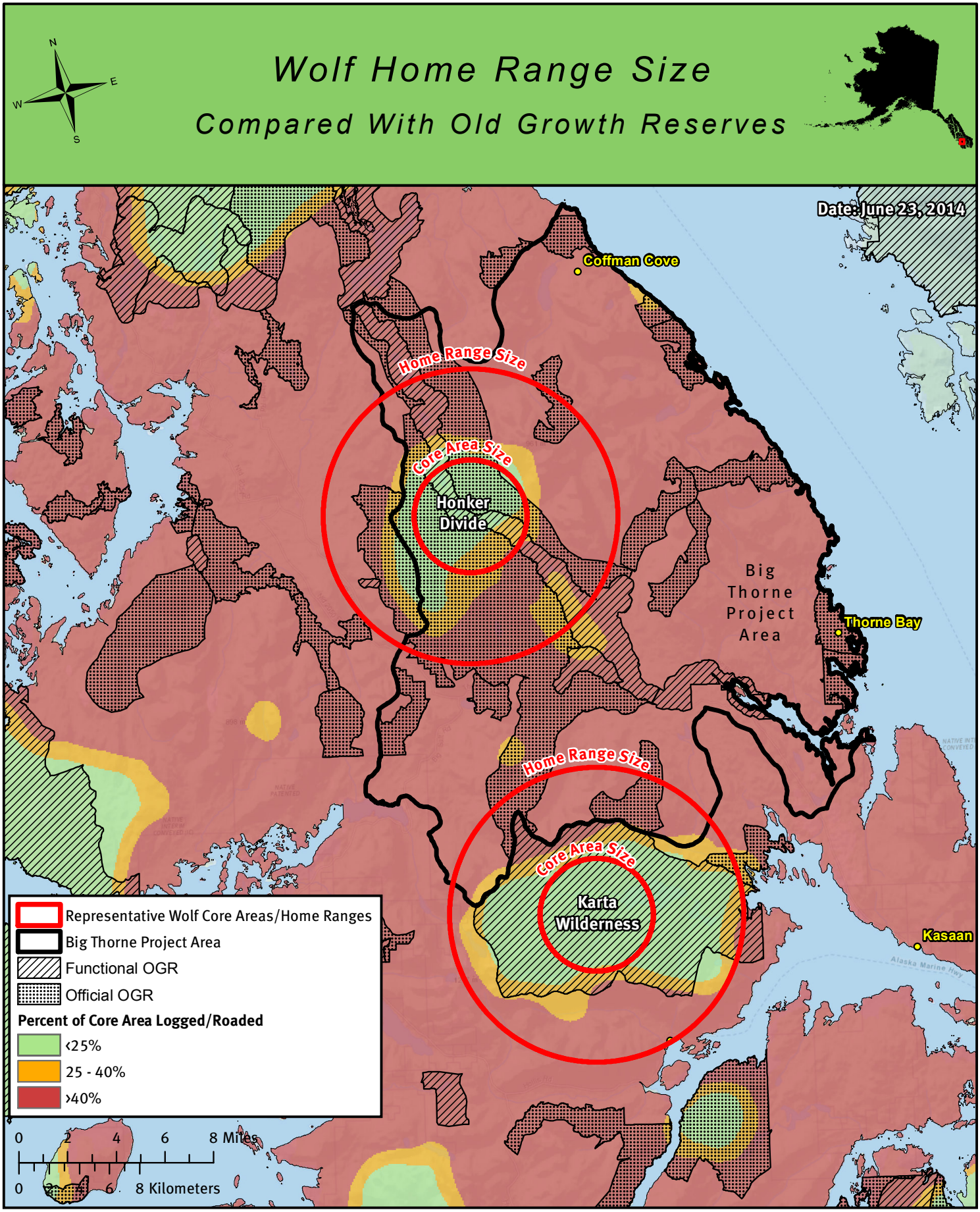
Wolf Core Area = 44 sq. km; Roaded = area within 1 km of a road

Figure 6.



Human-caused mortality (hunting and trapping) on Prince of Wales Island is estimated at 87% of total wolf mortality (Person and Russell 2008). The probability of a wolf being taken in a given area increases with the mortality risk contours. Areas of greater than 50% mortality risk are places where it is likely that wolf mortality will exceed wolf recruitment, thus creating a sink population.

Figure 7.



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