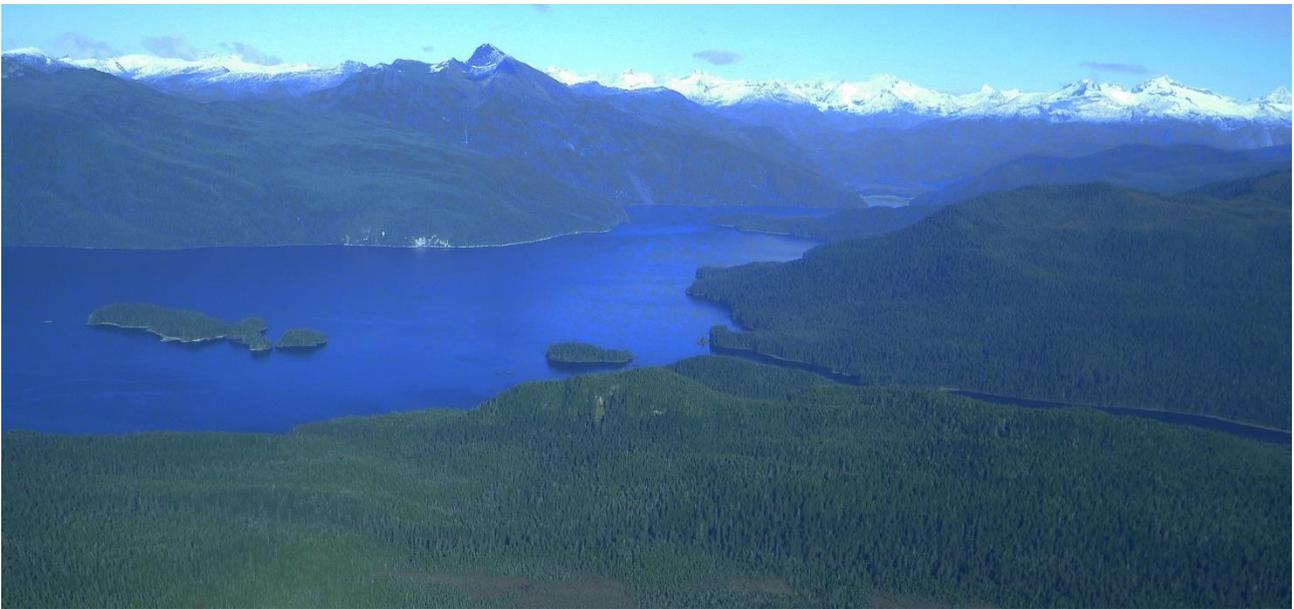


CONSERVATION PRIORITIZATION OF KKMEZW “MIDDLE” ISLANDS



Identifying Opportunities for Conservation

Prepared by the Southeast Alaska Land Trust
With support from U.S. Fish and Wildlife Service
Southeast Alaska Coastal Conservation Program
October 2017



Conservation Prioritization KKMEZW “Middle” Islands

IDENTIFYING OPPORTUNITIES FOR CONSERVATION

INTRODUCTION

The goal of this conservation priority analysis is to identify private, native corporations/tribal, municipal, and state land on which SEAL Trust could potentially hold conservation easements, deed restrictions, or purchase as fee-simple conservation properties. SEAL Trust wants to take a strategic approach in exploring additional conservation opportunities within the Kuiu, Kupreanof, Mitkof, Etolin, Zarembo, and Wrangell (KKMEZW) Islands HUC, more commonly known as the “Middle Islands,” and throughout all of Southeast Alaska. The properties will be identified through use of landowner and resource data combined and prioritized in a geographic information system (GIS).

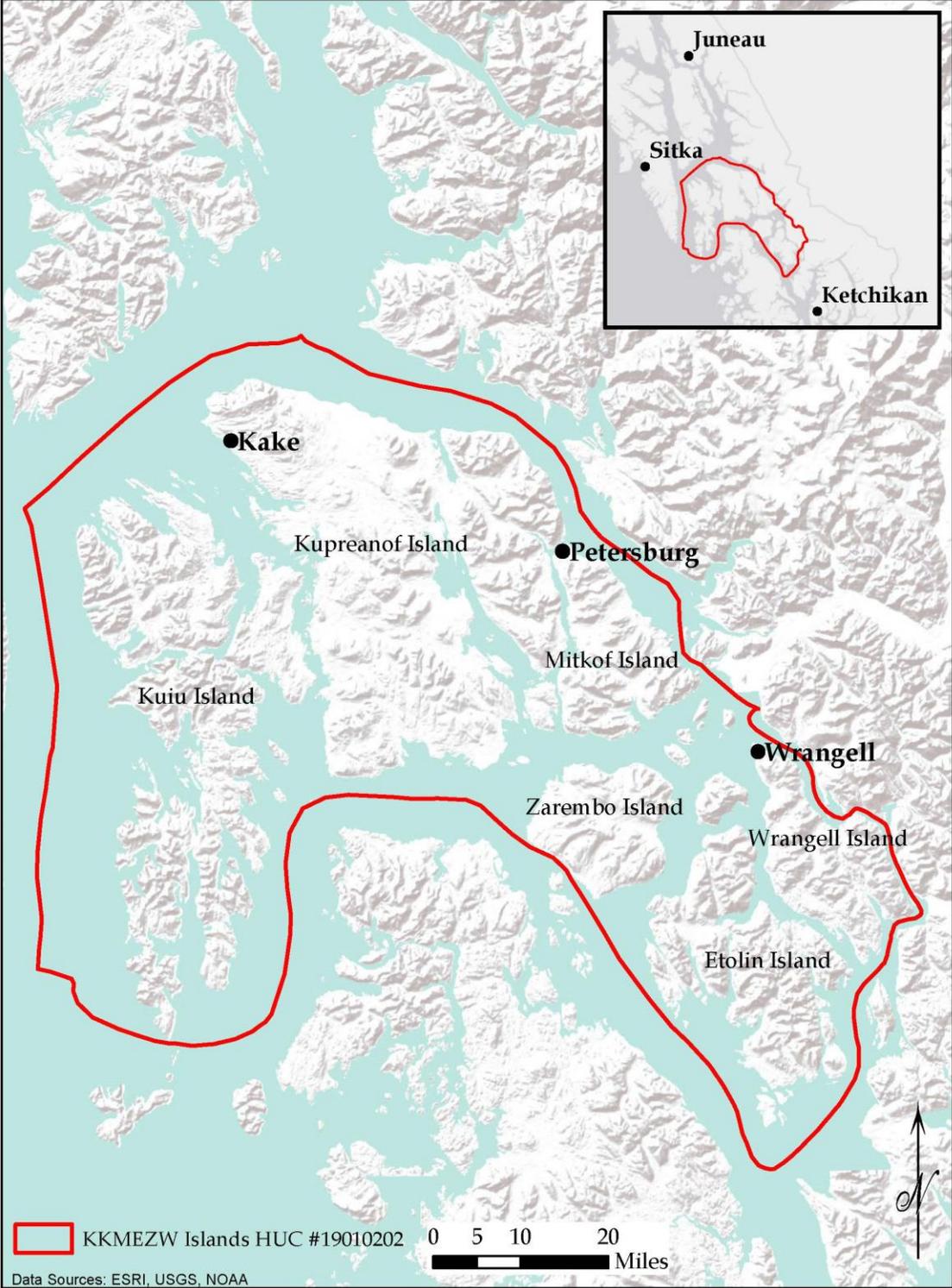
The U.S. Fish and Wildlife Service (USFWS) awarded the Southeast Alaska Land Trust (SEAL Trust) a Coastal Program grant in 2013 and 2014. SEAL Trust requested this grant to fund a conservation priority analysis of private property (defined as non-federal land) within the 8-digit Hydrologic Unit Code (HUC) #19010202, KKMEZW Islands (Map 1). This report and associated GIS maps are the products of that work. A similar prioritization was done for Prince of Wales Island in 2013.

SEAL Trust currently holds two adjoining conservation easements within the KKMEZW Islands HUC, located on Kupreanof Island near the City of Kake. One easement covers 1,430 acres owned by the City of Kake and the other easement covers 1,127 acres owned primarily by Kake Tribal Corporation. These easements were both signed in 2001 and together protect 2,557 acres of the Gunnuk Creek watershed. SEAL Trust would like to continue to build on its conservation efforts in this region.

SEAL Trust is an In-Lieu Fee Sponsor for Southeast Alaska, which makes it eligible to receive fees in-lieu of mitigation for wetland impacts. Under its instrument with the U.S. Army Corps of Engineers, SEAL Trust generally prefers to protect sites within the same 8-digit HUC as the permitted impacts. SEAL Trust has received two in-lieu fees from wetland impacts within the KKMEZW Islands HUC and would like to protect wetland resources within the same HUC.

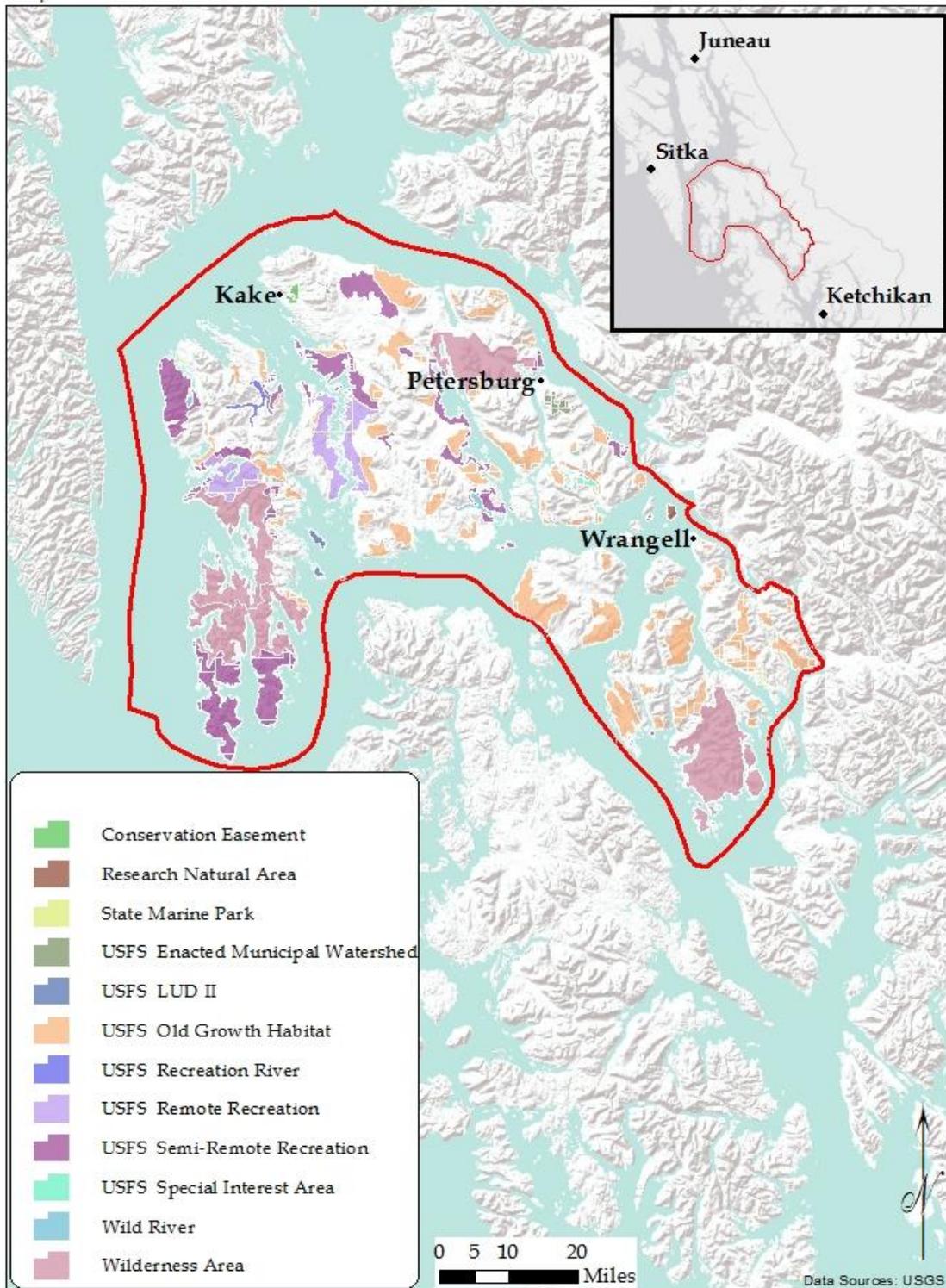
Protecting crucial habitats in the KKMEZW Islands HUC is important because these islands are rich in biodiversity and are home to 23 documented mammal species, making it the second most biodiverse HUC of the Southeast Alaska islands. The KKMEZW Islands HUC includes lands under varying degrees of protection as defined by the USGS Gap Analysis Program - wilderness, LUD II, remote recreation, old growth habitat, and others, but few of these protections are on private land (Map 2).

Map 1: KKMEZW Islands HUC Context



Date prepared: December 15, 2015
Prepared by: Michael Hekkers

Map 2: KKMEZW Islands HUC Protected Areas



Date prepared: December 15, 2015
Prepared by: Michael Hekkers

PROJECT GOAL & OBJECTIVES

SEAL Trust aims to have the ability to quickly and objectively assess the conservation values of potential projects within the KKMEZW Islands HUC. This analysis will allow SEAL Trust to identify the most significant parcels for conservation acquisition, to present and defend property acquisitions to funders, and to make more efficient use of our resources.

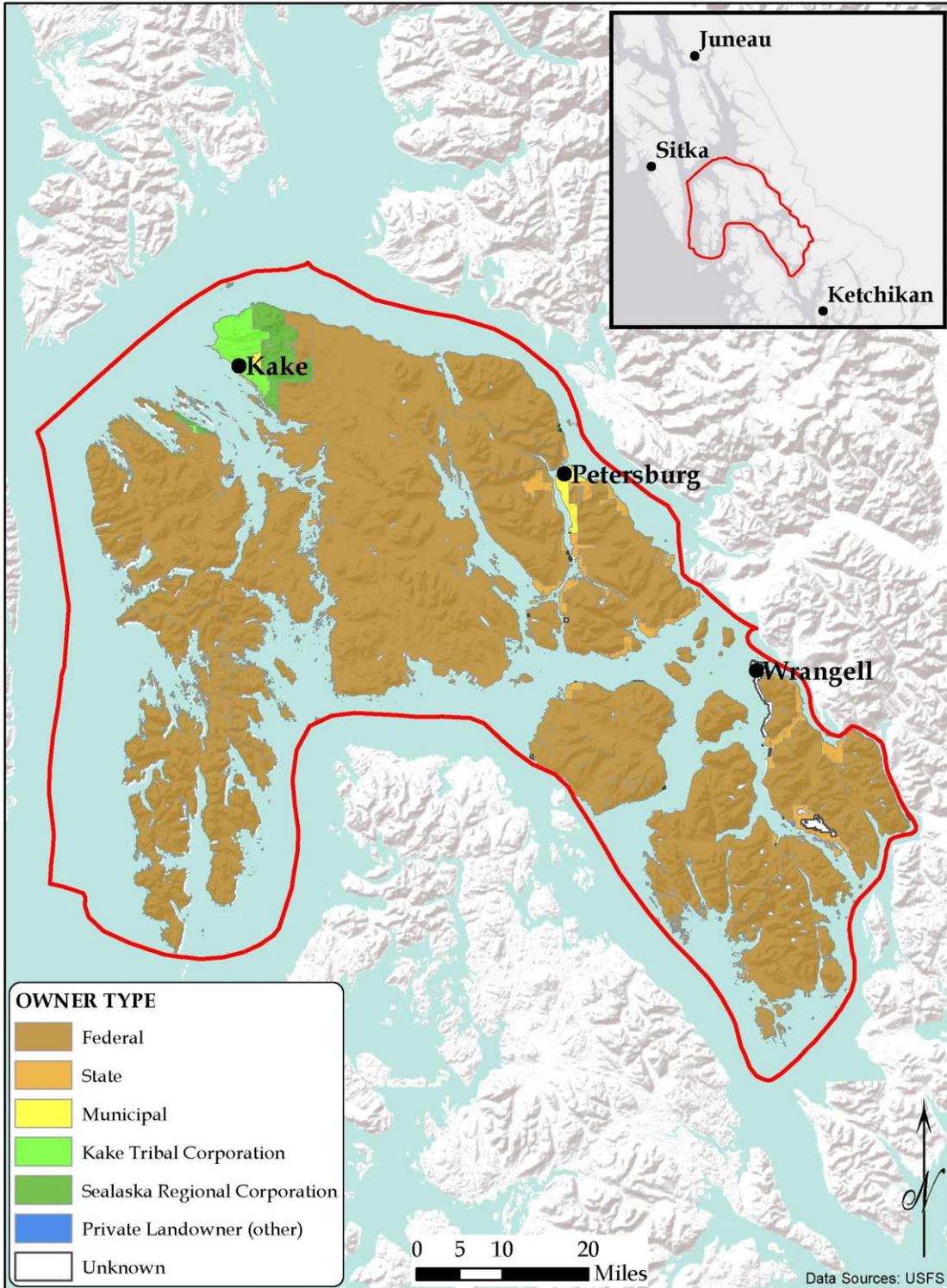
The project objectives include:

1. Define resource values that contribute to SEAL Trust’s definition of “conservation value;”
2. Create a tool in ArcGIS to rank the conservation value of private, tribal, municipal, and state lands within the KKMEZW Islands HUC;
3. Provide enough data within the tool that a user can easily query data of interest.

GEOGRAPHY

The “Middle Islands” have varying topography and are sparsely populated with little development, but clear cuts from the timber industry over the last century are still visible. These “Middle Islands” are located between the southern mainland of southeast Alaska to the east, Prince of Wales and Revillagigedo islands to the south, Admiralty Island to the north, Baranof Island and the Gulf of Alaska to the west. The KKMEZW Islands HUC encompasses 1.85 million acres, most of which is under Federal ownership (Map 3). The people of this region have mainly settled into the communities of Kake, Petersburg, and Wrangell which have a combined 2014 population of approximately 6,000. Despite over 1,400 miles of mostly logging roads on these islands, the communities are only connected by air and water. Combined, the logging efforts have affected approximately 118,000 acres across the islands and are now in various stages of regrowth.

Map 3: KKMEZW Islands HUC Land Ownership



Date prepared: December 15, 2015
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CONSERVATION STATUS

Audubon Alaska and The Nature Conservancy conducted and published “A Conservation Assessment and Resource Synthesis for the Coastal Forests and Mountains Ecoregions in Southeastern Alaska and the Tongass National Forest.” This assessment breaks Southeast Alaska into Biogeographical Provinces (Schoen & Dovichin, 2007). The Middle Islands include the Biogeographical Provinces: Kuiu Island, Kupreanof/Mitkof Islands, and Wrangell/Etolin/Zarembo Complex. Most of the regional information for this report, unless otherwise referenced, is from this Schoen & Dovichin report.

Kuiu Island has several decades of logging history, from the 1960s to 1980s, but still has important habitat. Kuiu Island contains 36,331 acres of large-tree stands. It has two watersheds that have been estimated to have the highest habitat capability for juvenile coho outside of the large mainland rivers. It also has one of the highest density of black bear populations in North America. The island is home to distinct lineages of black bear and marten (Table 1) and a total of sixteen mammal species. Deer hunting on all the “Middle Islands,” which is also Game Management Unit 3, was closed from 1975-1979 due to low populations (Lowell, 2016).

Kupreanof and Mitkof islands hold the highest proportions of developed lands in Southeast Alaska, yet both have a high number of mammal species despite some habitat loss. The islands have the fourth highest percentage of productive old growth in Southeast, but most of the large-tree old growth has been selectively logged. Mitkof Island has the northernmost red cedars and both islands are experiencing systematic yellow cedar die-off (Hennon, 2006). The island is home to twenty-one mammal species which is a reflection of the proximity to the Stikine River and the wildlife corridor that the river provides. Kake and Petersburg, the two largest communities, rely on both the surrounding marine and terrestrial resources. The Alaska Native community of Kake sources much of the food from subsistence hunting, fishing and gathering. The health of the marine and freshwater aquatic habitats is vital to the commercial fishing town of Petersburg. The islands have over 1,000 miles of freshwater salmon habitat, ranking the fourth highest in Southeast Alaska. The high estuary values of these two islands, attributed to the easily erodible slopes, are rare for areas without major rivers, thanks in part to the Rocky Pass estuary, the third highest ranked island estuary. Summer black bear habitat and winter deer habitat are fractions of their original values, 67 percent and 78 percent respectively. Notably, these two islands rank low on the representation of habitat values within protected areas that encompass entire watersheds. Only five percent of these two islands are protected by Congress.

Seventeen percent of Wrangell, Etolin, and Zarembo islands are legislatively protected, and this province has the highest number of mammals in the HUC. These islands are home to twenty-three mammal species, the second highest of the island provinces. The adjacent Stikine River and its wildlife corridor function, support the high amphibian richness of the rivermouth islands with long-toed salamanders (*Ambystoma macrodactylum*) and Columbia spotted frogs (*Rana luetiventris*). Etolin Island is the only island in Southeast Alaska to host three deer family species: Sitka black tail deer, colonizing moose, and introduced elk. Logging patterns were similar to Kupreanof and Mitkof islands, resulting in only 24 percent of remaining large-tree forest occurring in watershed-scale reserves. Habitat losses for bear and deer are also similar to the neighboring Kupreanof and Mitkof islands. Twenty percent of anadromous fish habitat are protected in watershed-scale reserves.

Table 1: Endemic Species in KKMEZW Islands Biogeographic Provinces

	<i>Clethrionomys gapperi wrangeli</i> (a red-backed vole subspecies)
Wrangell, Zarembo, Etolin Islands	<i>Peromyscus keeni</i> (a unique black-colored deer mouse)
	<i>Bufo boreas</i> (a distinctive western toad)
Kuiu Island	<i>Martes caurina</i> (a marten species also found on Admiralty Island)
	<i>Ursus americanus</i> (a distinctive lineage of black bear)

METHODS

This prioritization uses GIS to identify privately owned (non-federal) parcels and five-acre grids in the KKMEZWI HUC and rank them based on 15 conservation criteria. Private land parcels were extracted from a landownership layer from the U.S. Forest Service’s Tongass National Forest, which was last updated on September 20, 2009. The conservation criteria used were natural resource GIS layers: protected areas, wetlands, estuaries, anadromous waters, streams and lakes, floodplain streams, watersheds identified by The Nature Conservancy (TNC) as conservation priorities, and karst areas. Protected areas had one ranking of absence or presence (0-1). All other criteria had two rankings, absence or presence (0-1), and a normalized ranking (0-1) based on parcel size for that criteria. Anadromous waters, streams and lakes, and floodplain streams were all buffered by 300 feet to include vital nearby habitat. The fifteen criteria were summed to create a maximum possible score of 15. Percent of timber cut and cut acreage were included in the attribute table for informational purposes only and not a part of the score. These timber attributes were excluded from the score to more accurately reflect the long-term (centuries) conservation values of an area, not recent developments.

Five acre private grids were also ranked with the same criteria to more precisely target high priority smaller areas, e.g. sub-watersheds that might get otherwise outranked by large parcels. Five-acre grids also provide a more specific understanding of where the important conservation values fall in a large property. The private grids were created by intersecting the overall private land layer with a regular five-acre grid.

Various sources provided the GIS layers needed to develop these criteria (Table 2). Appendix A defines the fields used in the attribute table of the prioritization layers. For a technical explanation of how the source layers were manipulated to obtain the criteria, see Appendix B.

Table 2: Criteria used to score parcels

Criteria	Reason for Inclusion	Data Source	Notes
Within a protected area(s)	Large habitat patches typically support greater biodiversity and can maintain more ecosystem processes than small patches (Graves <i>et al.</i> 2007). Large intact habitats allow larger, healthier populations of a species to persist; thus, increasing the chance of survival over time (Fahrig & Merriam, 1994). This criterion allows for identification of those parcels that might increase connectivity (Briers, 2002).	U.S. Protected Areas Database (2012)	Protected areas given a USGS GAP status of 1 (managed for biodiversity – disturbance events proceed or are mimicked) or 2 (managed for biodiversity – disturbance events suppressed) were included.
Presence of wetlands Normalized acreage of wetlands	Wetlands provide a wide variety of important ecosystem services, such as flood control, groundwater replenishment, water purification, sediment and nutrient retention and export, and as reservoirs of biodiversity (World Resources Institute, 2005).	U.S. Fish and Wildlife Service’s National Wetlands Inventory (NWI) (2002)	All wetland types were included except marine subtidal wetlands and uplands. Marine subtidal wetlands were deemed to be impossible to protect under SEAL Trust’s model. Uplands are not a conservation value of interest at this time.
Presence of estuaries Normalized acreage of estuaries	Estuaries are critical for water filtration. They also provide productive habitats for waterbirds and other wildlife because they hold the nutrients that their supply streams bring (NOAA 2008).	U.S. Fish and Wildlife Service’s National Wetlands Inventory (NWI)	This prioritization includes only estuarine subtidal and estuarine intertidal. Under NWI, these are coded as Subsystems (SYSB) E1 and E2, respectively.
Presence of lakes & 300-foot buffer Normalized acreage of lakes & 300-foot buffer	Lakes and their lacustrine zones are important freshwater ecosystems (Kalff, 2002). They provide water supply and can provide recreational opportunities. They also provide scenic views.	Southeast Alaska Hydrography Database (2012)	A 300-foot buffer was added to the lakes layer to incorporate the heightened ecological values of the lacustrine zone. This “buffer” is a proximity criterion – SEAL Trust wants to acquire land near lakes.
Presence of streams & 300-foot buffer Normalized acreage of streams & 300-foot buffer	Streams and their corridors are critical fish and wildlife habitat (Murphy <i>et al.</i> , 1986; Thomas <i>et al.</i> , 1979). They also provide water supply and can provide recreational opportunities.	Southeast Alaska Hydrography Database (2012)	A 300-foot buffer was added to the streams layer to incorporate the heightened ecological values of the riparian zone. This “buffer” is a proximity criterion – SEAL Trust wants to acquire land near streams.

Conservation Prioritization KKMEZW “Middle” Islands

Criteria	Reason for Inclusion	Data Source	Notes
<p>Presence of floodplain streams & 300-foot buffer</p> <p>Normalized acreage of floodplain streams & 300-foot buffer</p>	<p>Floodplains are important for waterbird breeding, nutrient cycling, invertebrate production, feeding ground for birds, and groundwater reservoir recharge (Tockner and Stanford, 2002; Opperman <i>et al.</i>, 2009) Inland Rivers Network, 2007). The floodplain stream criteria were particularly drawn out to protect the functions of the floodplains they supply.</p>	<p>Southeast Alaska Hydrography Database (2012)</p>	<p>Floodplain streams FP3 (small) to FP5 (large) and their 300-foot buffer were extracted from the streams layer listed above. This “buffer” is a proximity criterion – SEAL Trust wants to acquire land near streams.</p>
<p>Presence of anadromous streams & 300-foot buffer</p> <p>Normalized acreage of anadromous streams & 300-foot buffer</p>	<p>Anadromous streams are critical conservation priorities for a wide variety of reasons. They provide habitat for commercial species of fish important to the Southeast Alaskan economy. Culturally, salmon and other anadromous fish play an important role in traditional lifestyles and traditions. In addition, the fish resources support a wide variety of other wildlife, such as bears and raptors, and provide nutrients to freshwater systems (Gende <i>et. al.</i>, 2002).</p>	<p>Alaska Department of Fish and Game Catalog of Waters Important for Spawning, Rearing, or Migration of Anadromous Fishes – Southeastern Region, Effective June 1, 2010</p>	<p>A 300-foot buffer was added to the streams layer to incorporate the heightened ecological values of the riparian zone. This “buffer” is a proximity criterion – SEAL Trust wants to acquire land near streams.</p>
<p>Within a Conservation Priority Watershed</p> <p>Normalized acreage of Conservation Priority Watershed</p>	<p>These are watersheds that TNC and Audubon Alaska determined to be “high value watersheds in primarily intact condition.” These watersheds “generally encompass the highest current ecological values within each province and represent the first ecological priorities for conservation actions” (Schoen and Dovichin 2007, “Conservation Assessment,” pg. 34).</p>	<p>The Nature Conservancy & Audubon Alaska (2007)</p>	<p>In addition to the normalized acreage, the attribute table also includes a field (H2OSH_PERC) that gives the percent of the total watershed occupied by the intersect between the parcel/grid and the watershed. This attribute is included only for information. It does not factor into the prioritization score.</p>
<p>Presence of karst</p> <p>Normalized acreage of karst</p>	<p>Karst supports the most productive big-tree forests and salmon streams in Southeast Alaska (Baichtal and Swanston, 1996; Bryant <i>et al.</i>, 1998). Karst is an important enough</p>	<p>U.S. Forest Service</p>	<p>None.</p>

Criteria	Reason for Inclusion	Data Source	Notes
	<i>potential</i> resource that both logged and unlogged karst should be targeted for protection.		
<i>Criteria not included in Prioritization Score</i>			
Presence of clear-cut or 2nd growth forest Percent of parcel/grid in clear-cut or 2nd growth forest	Timber harvest information is included in the attributes of the prioritization layers to provide context for decision-making. It was excluded from the total score because it is a fairly nuanced attributed. Harvest of a large percentage of the property is not necessarily a “deal-breaker,” but it is also not a positive attribute.	U.S. Forest Service (2003)	Clear cut and second-growth forest were extracted from the Forest Type layer developed by The Nature Conservancy as part of their <i>Conservation Assessment</i> .

RESULTS

This section provides the resulting maps and tables from the parcel and five-acre grid prioritization, but the ArcGIS map is a better tool for querying and exploring the prioritization. Parcel prioritization weights or normalizes attributes on the largest acreage for an attribute and thereby tends to skew favorably toward large properties. This extraction resulted in 250 privately owned parcels on the islands ranging in size from less than one acre to 25,953 acres totaling 115,516 acres. It is important to note that the owners identified in this layer are fairly broad scale: one regional Alaska Native corporation, one village Alaska Native corporation, state, municipal, and other private land owners. For example, the State of Alaska is listed as a landowner for 160 parcels, Sealaska Regional Corporation owns 37 parcels, 29 parcels’ owners are unknown, Kake Tribal Corporation owns 16 parcels, City of Kake owns three parcels, the towns of Petersburg and Kupreanof own one each, and three are owned by individuals. Lowest scoring parcels are shown in red with higher scores being depicted in orange, yellow, or green respectively. Results are shown in Table 3 and Map 4.

Table 3: Top Ten Parcels

Rank	Landowner	Acres	Score (0-15)	LANDSTAT_
1	Kake Tribal Corporation	22,628	12.47	7,289
2	Sealaska Regional Corporation	25,953	10.84	7,283
3	State of Alaska	6,197	9.18	12,581
4	State of Alaska	3,540	7.87	11,700
5	State of Alaska	6,759	7.64	10,965
6	State Selected	2,400	7.62	12,660
7	State of Alaska	3,107	7.40	9,608
8	State of Alaska	5,270	7.38	9,140
9	Petersburg	6,610	7.26	8,980
10	State of Alaska	816	7.21	10,244

The five-acre grid prioritization shows areas of wetlands, sub-watersheds, areas of estuaries, or specific areas of karst that rank high within parcels. The five-acre grid prioritization produced 27,368 grids totaling 115,516 acres with 19,346 five-acre grids and the remaining 8,022 grids having an average size of 2.34 acres. Grid scoring is depicted in increasing shades of gray, and are combined with the parcel score color. Thus, darker green grid squares depict the highest quintile score ≥ 5.65 (703 grids) in the 5 acre grid prioritization. See Map 5 as an example.

The two highest ranking parcels are neighboring and are the two largest private parcels containing 42 percent of the total private acreage (Map 6). Kake Tribal Corporation owns the second largest parcel with 22,628 acres, but it received the highest score 12.47. High scores are reflected in nearly

every attribute except TNC’s Conservation Priority Watersheds where none are present. Estuaries, anadromous waters, and karst with its acreage of 275, are its best attributes. Approximately 49 percent of the timber has been harvested from this parcel.

The neighboring parcel owned by Sealaska Regional Corporation is the largest parcel at 25,953 acres. This parcel received the second highest score of 10.84. The normalization score was the highest for floodplains, streams and lakes, and wetlands. Few acres of anadromous waters gave it a low score 0.18, and it received no scores for TNC’s designated Conservation Priority Watershed. Karst is present, 35 acres, but much less extensive than its neighbor and therefore received a low normalization score of 0.13. Approximately twenty-two percent of the timber has been harvested.

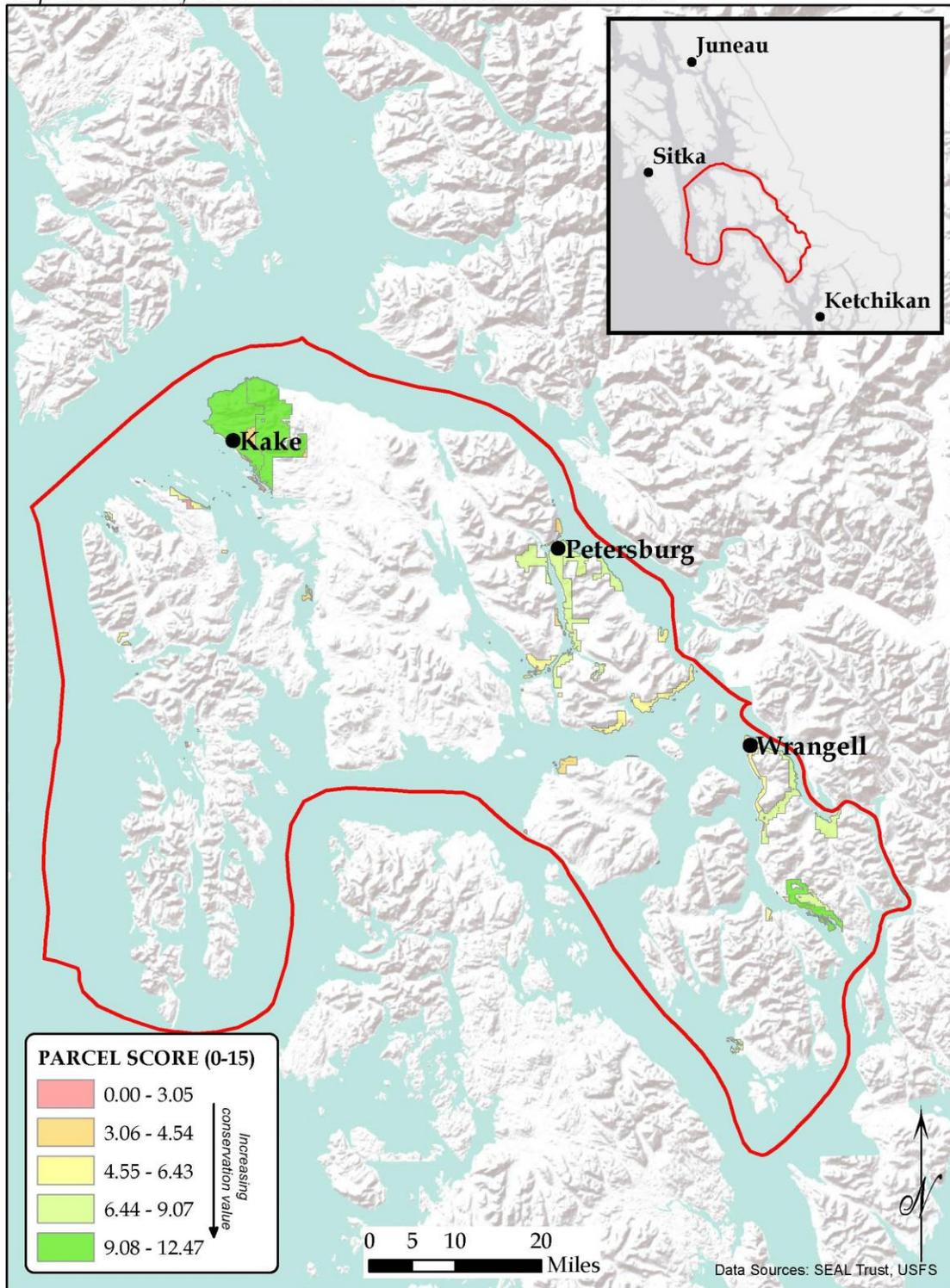
Wrangell Island is home to the third through sixth highest scoring parcels (Map 7). The third highest ranking parcel, owned by State of Alaska and includes Thoms Place State Marine Park, 6,197 acres, is the only one to score in the highest quintile 9.18 (Map 8). The highest ranking normalized attribute is TNC’s Conservation Priority Watershed, 0.74 score. Although only 29 percent of the designated Conservation Priority Watershed(s) lie within the property boundaries. This parcel beat out its sixth-ranked neighboring parcel because of valuable estuary attributes. The fourth, fifth, and sixth parcels scored considerably lower 7.87 - 7.62 range out of the total possible 15 points.

The single highest scoring 5-acre grid (score 10.61) is informative, but possibly more insightful is the parcel with the greatest aggregate of high scoring grids. The highest scoring grid scored high in all attributes except karst and estuaries. The sixth ranked parcel which is under State Selection from the Federal Government, had the highest number, 168 five-acre grids with a score equal to or greater than 5.65 and it also contains the highest scoring grid mentioned earlier. The third ranked parcel owned by the State of Alaska and includes Thoms Place State Marine Park, had 127 grids with the highest scores. The Kake Tribal Corporation parcel had the third highest number of high-ranked grids, 97. The State of Alaska parcel across from Petersburg had the fourth highest with 83 high scoring grids while the Sealaska parcel had only 22 despite its large size.

Interestingly, when looking at more valuable conservation attributes on five-acre lots and the respective higher grid scores greater than or equal to 7.0, (209 grids of 27,368), the sixth ranked parcel still had the highest number of grids, 83, but the third parcel, State of Alaska which includes Thoms Place State Marine Park, had the second most with 46 grids, the State of Alaska parcel across from Petersburg had 32 grids. The Kake parcel moved down with the fourth most with 18 grids, and the Sealaska parcel had no grids with a score greater than or equal to 7.0.

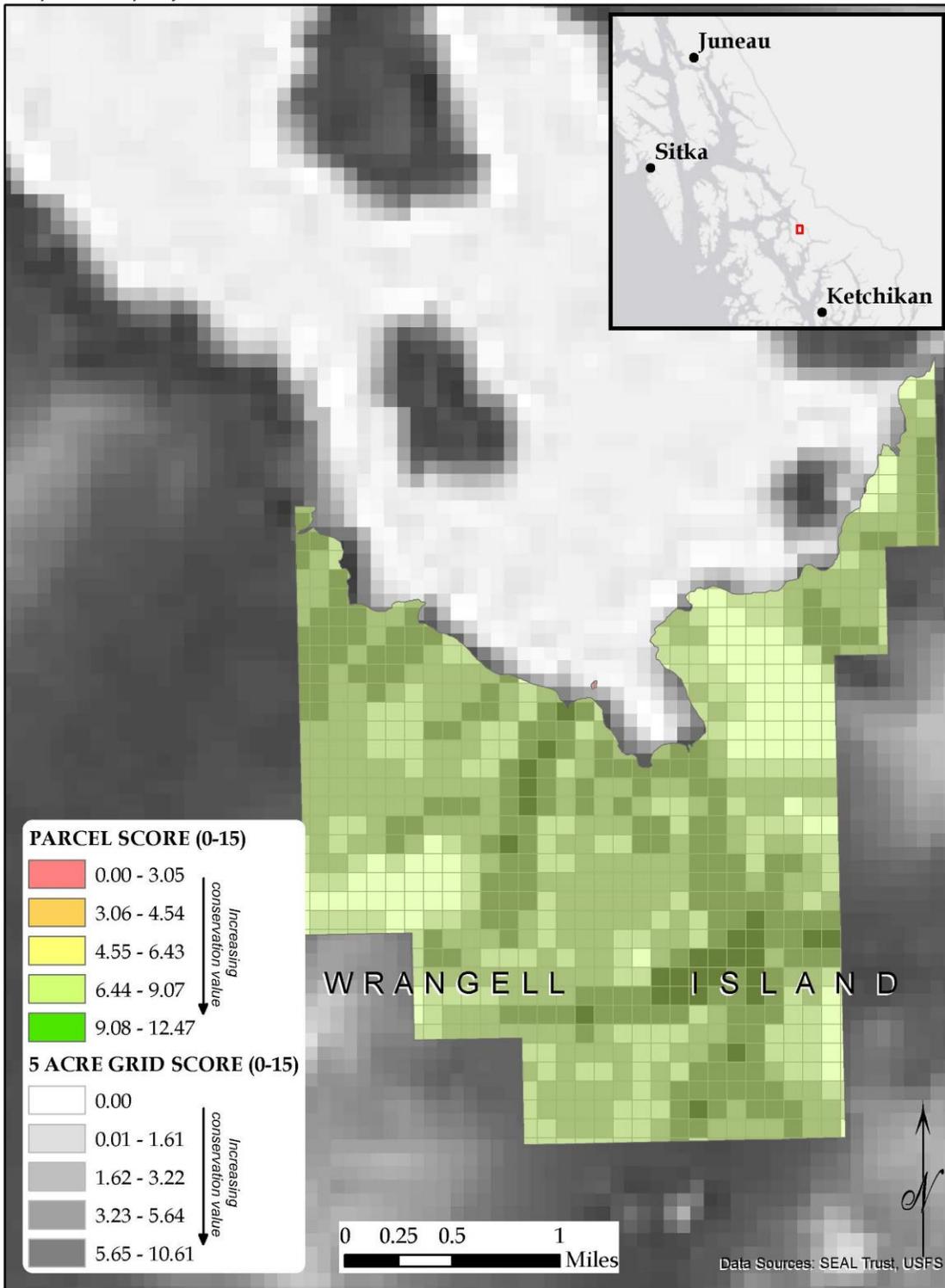
Kake Tribal Corporation’s greatest density of high-ranking grids occupy a watershed with karst geology on the northern coast of Kupreanof Island (Map 10). The grids rank high for wetlands, floodplain streams, streams and lakes, and anadromous streams (coho and pink salmon). The karst geology borders on five watersheds and has its own conservation merits- preservation of caves resources and productive substrate for large trees.

Map 4: Overview of KKMEZW Islands HUC Private Land Prioritization

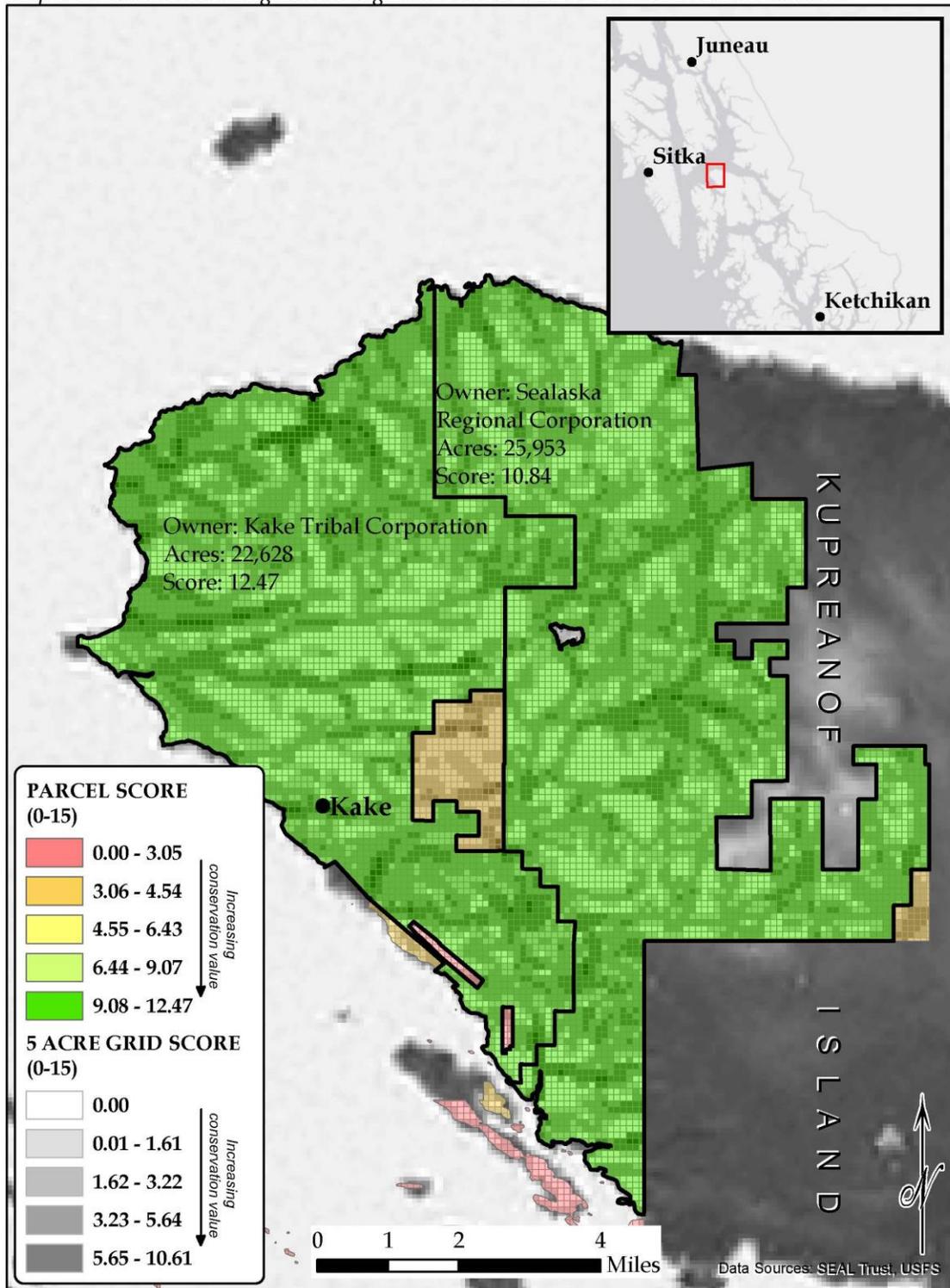


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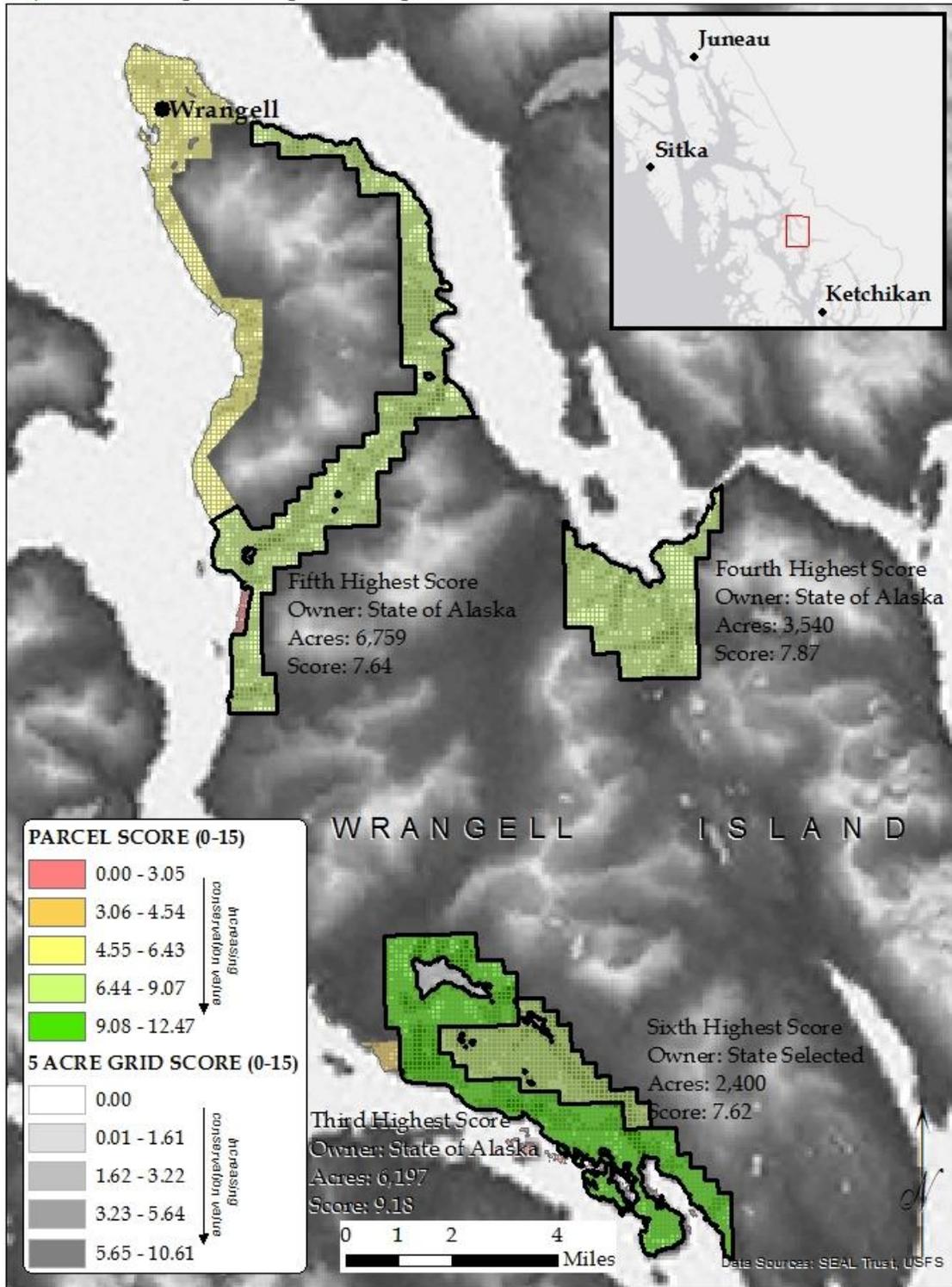
Map 5: Example of KKMEZW Islands HUC 5 Acre Grid Prioritization



Map 6: First and Second Highest Scoring Parcels in KKMEZW Islands HUC Prioritization

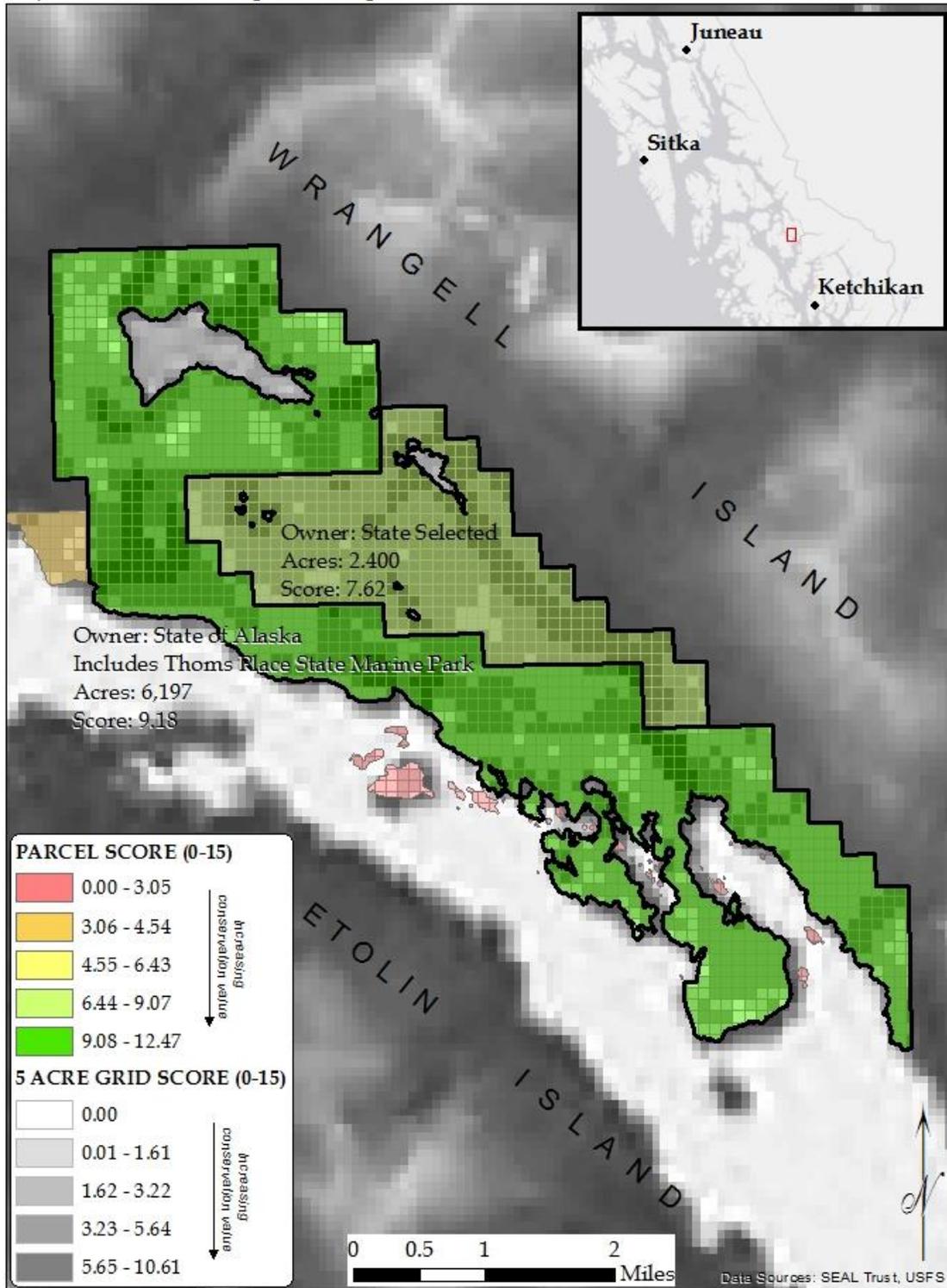


Map 7: Third through Sixth Highest Scoring Parcels in KKMEZW Islands HUC Prioritization



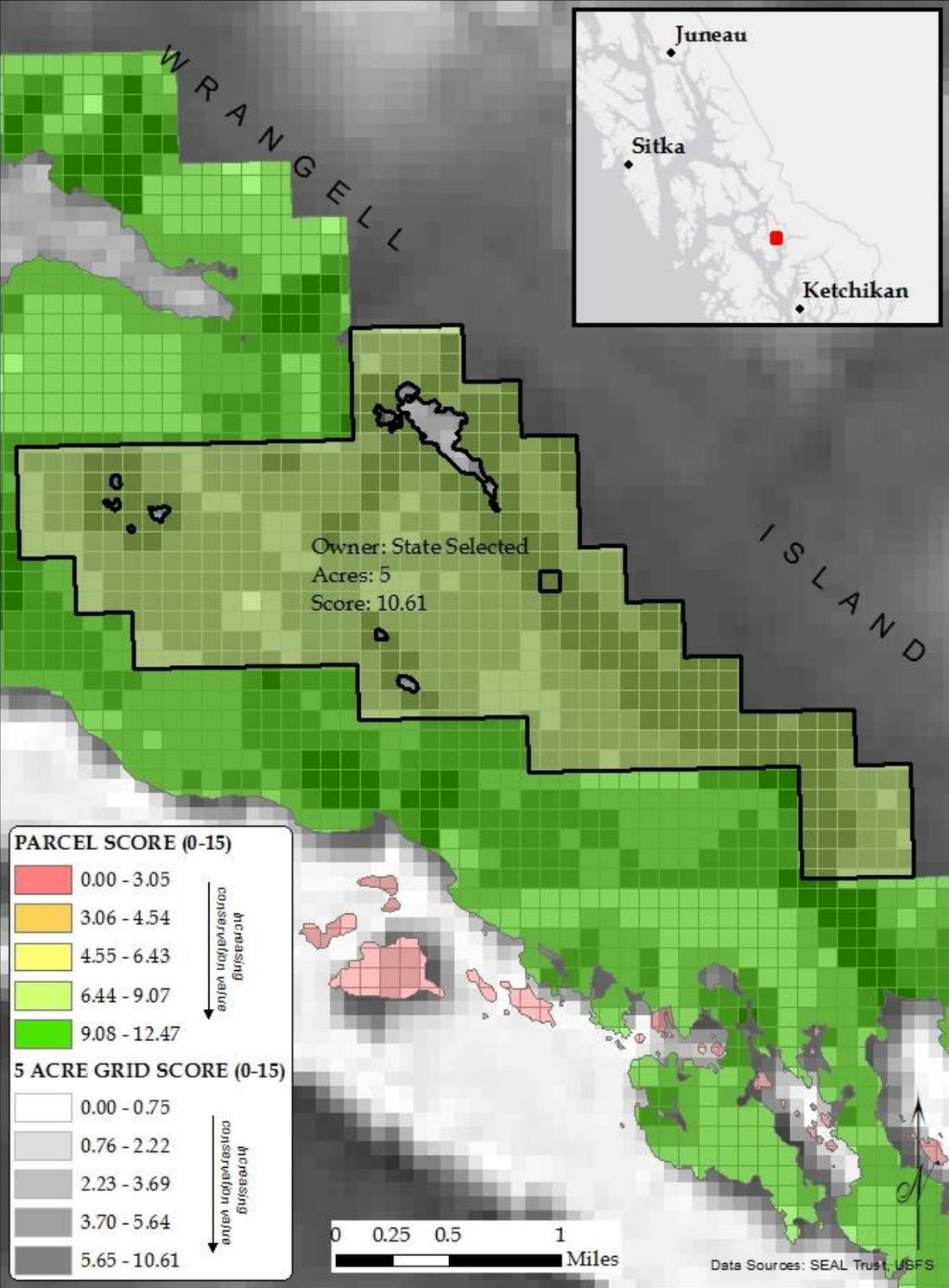
Date prepared: December 29, 2015
Prepared by: Michael Hekkers

Map 8: Third and Sixth Highest Scoring Parcels in KKMEZW Islands HUC Prioritization



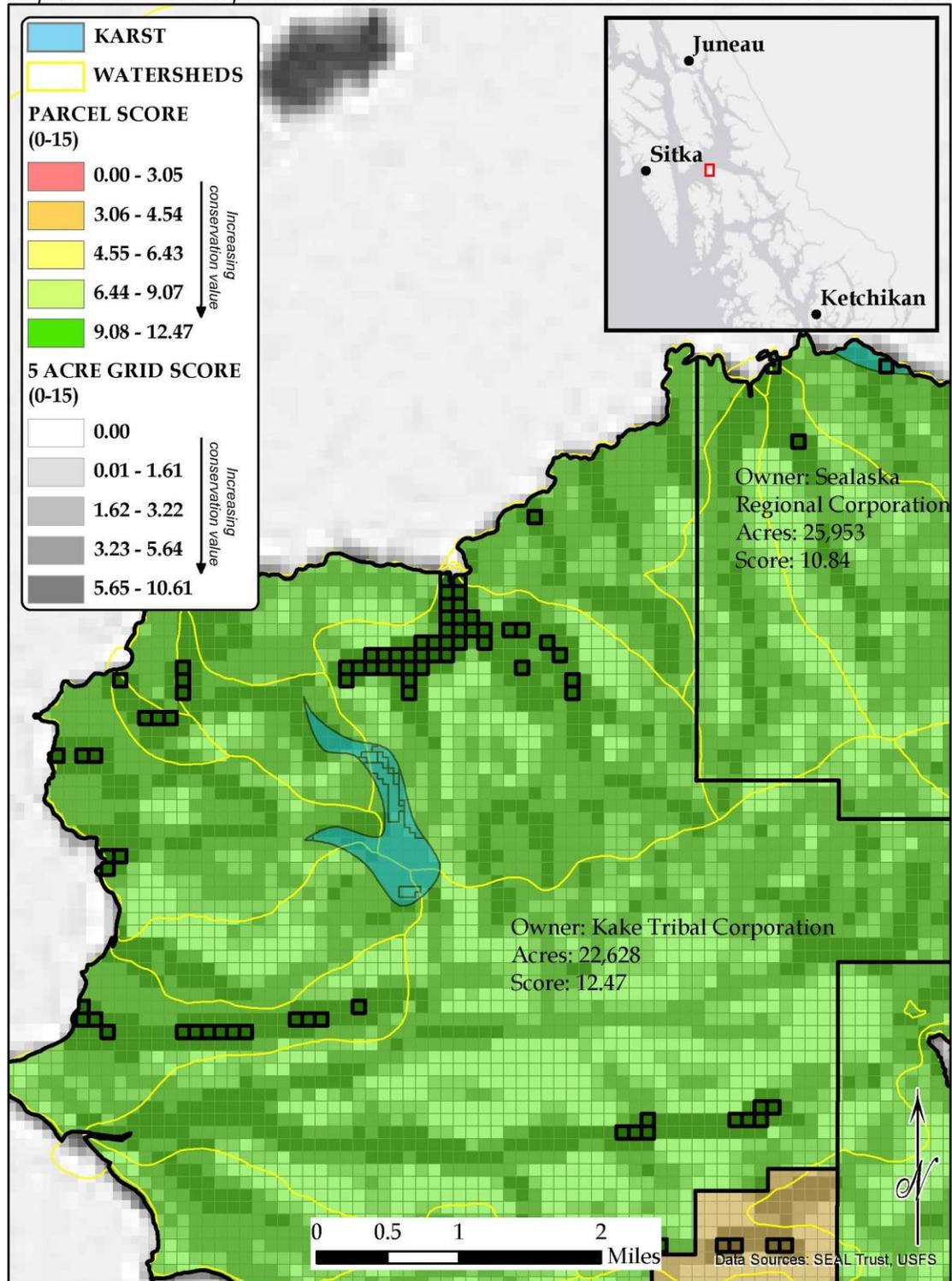
Date prepared: December 30, 2015
Prepared by: Michael Hekkers

Map 9: Highest Scoring Grid and Most 5th Quintile Grids in KKMEZW Islands HUC Prioritization



Date prepared: December 29, 2015
Prepared by: Michael Hekkers

Map 10: Kake Tribal Corporation Most Valuable 5 Acre Grids in KKMEZW Islands HUC Prioritization



DISCUSSION

The largest properties are not necessarily the most desirable for conservation, at least not in their entirety, and placing conservation easements on a 20,000 acre parcel is unlikely. SEAL Trust should use a more targeted conservation approach highlighting the most valuable watersheds. The largest parcel which ranked second, owned by Sealaska Regional Corporation, had the second highest parcel score because it's large enough to contain most of the conservation attributes. However it contained very few of the most desirable five-acre grids. This prioritization does not include the 2014 Sealaska Selection Lands which transferred ownership of three parcels in the Middle Islands: North Kuiu (4,573 acres), East Payne Island (157 acres) north of Kuiu Island, Turnabout Island Village (69 acres) north of the Kake Tribal Corporation lands. We assume these Selection Lands are slated for harvest.

SEAL Trust has the opportunity to partner with Sealaska Regional Corporation to further protect 9,453 acres of the Gunnuk Creek Watershed above Kake (Map 11). SEAL Trust currently holds two easements in Kake, one with the City of Kake and the other with Kake Tribal Corporation, protecting 2,557 acres of the Gunnuk Creek watershed, the lower 27 percent. Sealaska owns 7,265 acres of the upper watershed, and the very farthest eastern edges are on U.S. Fish and Wildlife property. According to 2003 Tongass timber harvest data, approximately 37 percent of that was cut. The five-acre grid map of the upper portion of Gunnuk Creek within the Sealaska parcel shows grids of relatively low average value 1.82, but the purpose of the two existing SEAL Trust conservation easements was to protect the drinking and hatchery water of Gunnuk Creek, wildlife habitat, and subsistence and recreational resources. A conservation easement on the upper portion of Gunnuk Creek on Sealaska land would nearly triple the upstream protected area and would complete conservation efforts on Gunnuk Creek.

SEAL Trust should use a targeted approach on the Kake Tribal Corporation parcel to protect the karst resources and the high-ranking northern watershed. A potential conservation easement encompassing 4,884 acres would protect the watershed which has coho and pink salmon, flood plain reaches, and wetlands and the karst geology that border on four other watersheds (Map 12). Approximately 2,326 acres, around 48 percent, of timber on the proposed conservation lot have been cut.

Portions of the third and sixth-ranked parcels together might present some conservation options for SEAL Trust or at least the opportunity to encourage the state to designate and protect all of the Thoms Lake (2,184 acres) and Thoms Creek parcels (1,828 acres and 572 acres) together (Map 13). The third and sixth ranked parcels together contain 295 high-ranking grids, but have a patch quilt of land status designations according to Alaska Department of Natural Resources (DNR), Alaska Mapper. After a January 8, 2016 meeting with Lee Cole Jr., AK DNR Natural Resources Manager, the current status of these parcels was clarified. The 2000 Area Plan for Central and Southern Southeast Alaska show the Thoms Lake parcel is “Tentatively Approved or Patented” (owned) by the state and designated “habitat, public recreation and tourism-undeveloped, and public facilities-retain.” The inner Thoms Creek is designated “habitat” and has been preliminarily selected by the state. The state is committed to “retain” the Thoms Lake parcel and once they have selected and patented the Thoms Creek parcel it too should be designated “public facilities-retain.” The selection process can take years or decades, but a deed restriction or expansion of Thoms Place

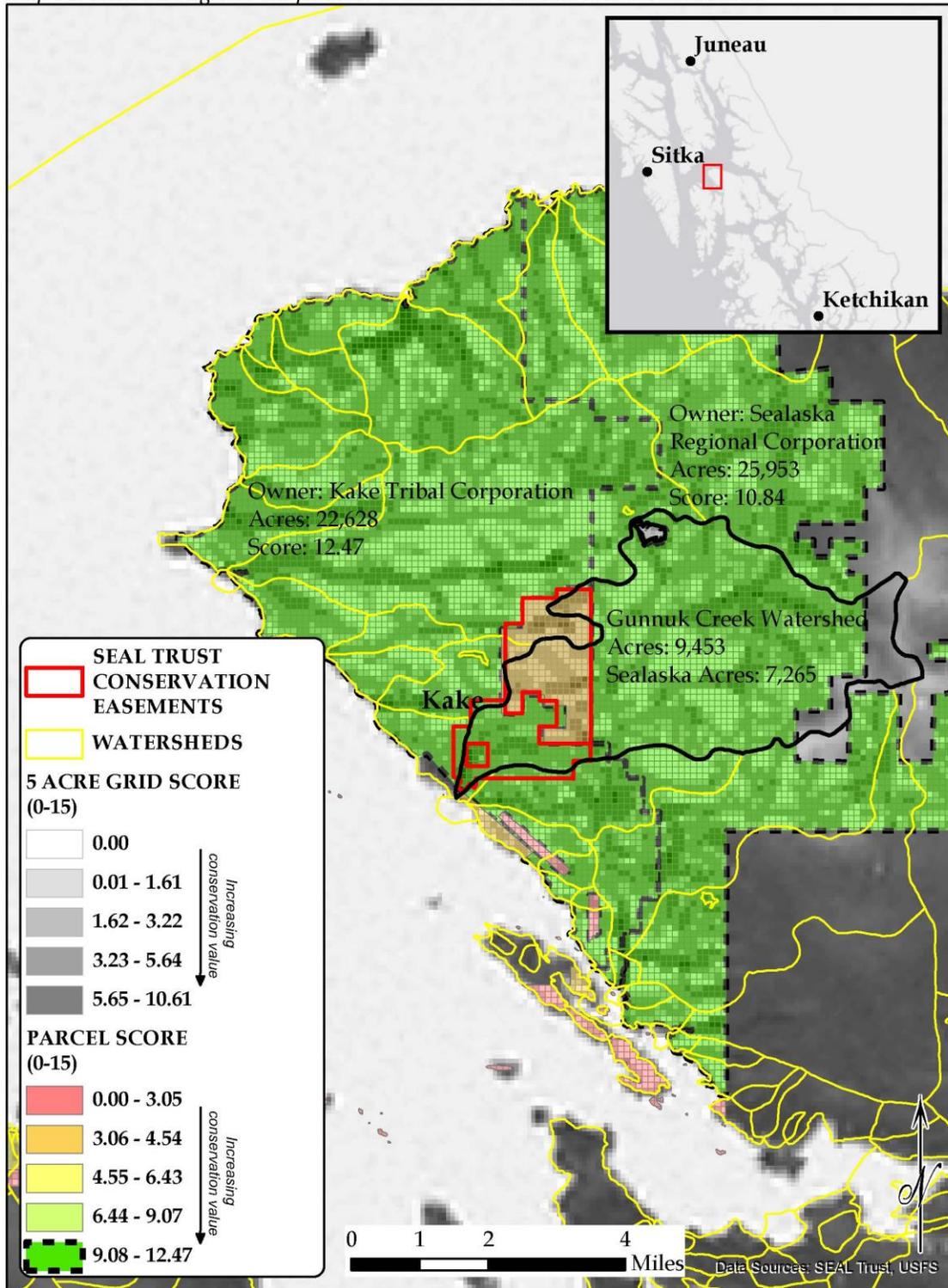
Conservation Prioritization KKMEZW “Middle” Islands

State Marine Park to include Thoms Lake and Thoms Creek would help protect these resources, an addition of 4,584 acres.

This prioritization heavily weights water resources e.g. wetlands, floodplains, streams and lakes, anadromous streams; and places little direct emphasis on other habitat for birds, amphibians, or mammals-deer, bear. We assume that some bird, amphibian, and megafauna habitat will overlap with these water resources, but upland habitat is not taken into account in this prioritization neither is winter habitat. A study on Mitkof Island show in winter deer favor south-facing low elevation slopes (Doerr et al. 2005), and those too are not necessarily accounted for in this prioritization. A future prioritization such as a five-acre grid prioritization might capture this other vital habitat on a fine scale.

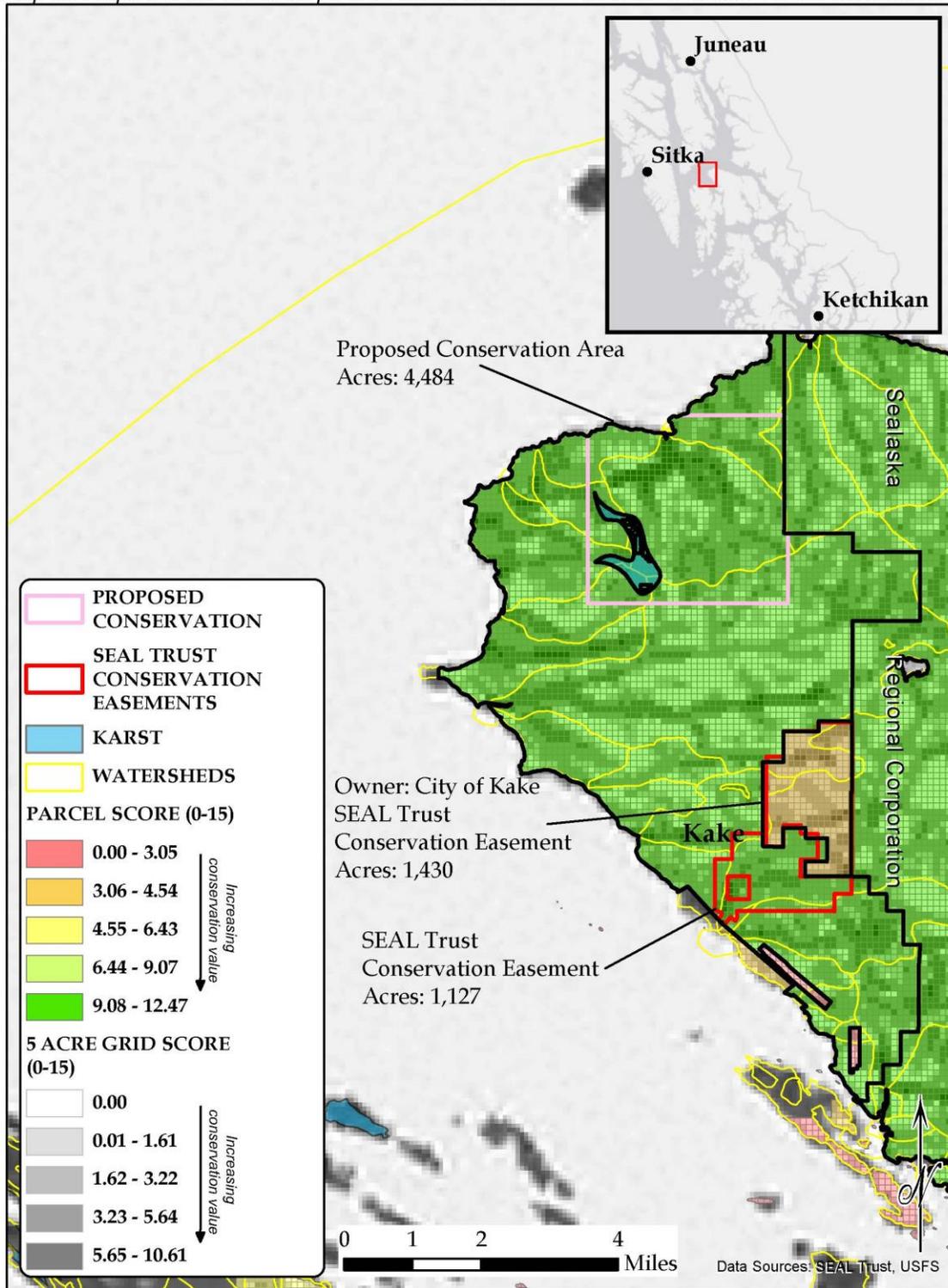
The TNC Conservation Priority Watershed attribute heavily weights intact watersheds at the expense of high value modified watersheds with roads and timber harvest. For intact watersheds, our highest ranking of “1” for Core Areas of Biological Value and “0.5” for High Value Watersheds overlooks other “High Value Integrated Management Watersheds” which have young-growth and old-growth and would otherwise rank equally high. A cursory review of TNC’s Conservation Area Design Map shows a parcel in Petersburg currently ranked ninth that would likely rank fourth had it not been modified.

Map 11: Sealaska Regional Corporation in KKMEZW Islands HUC Prioritization



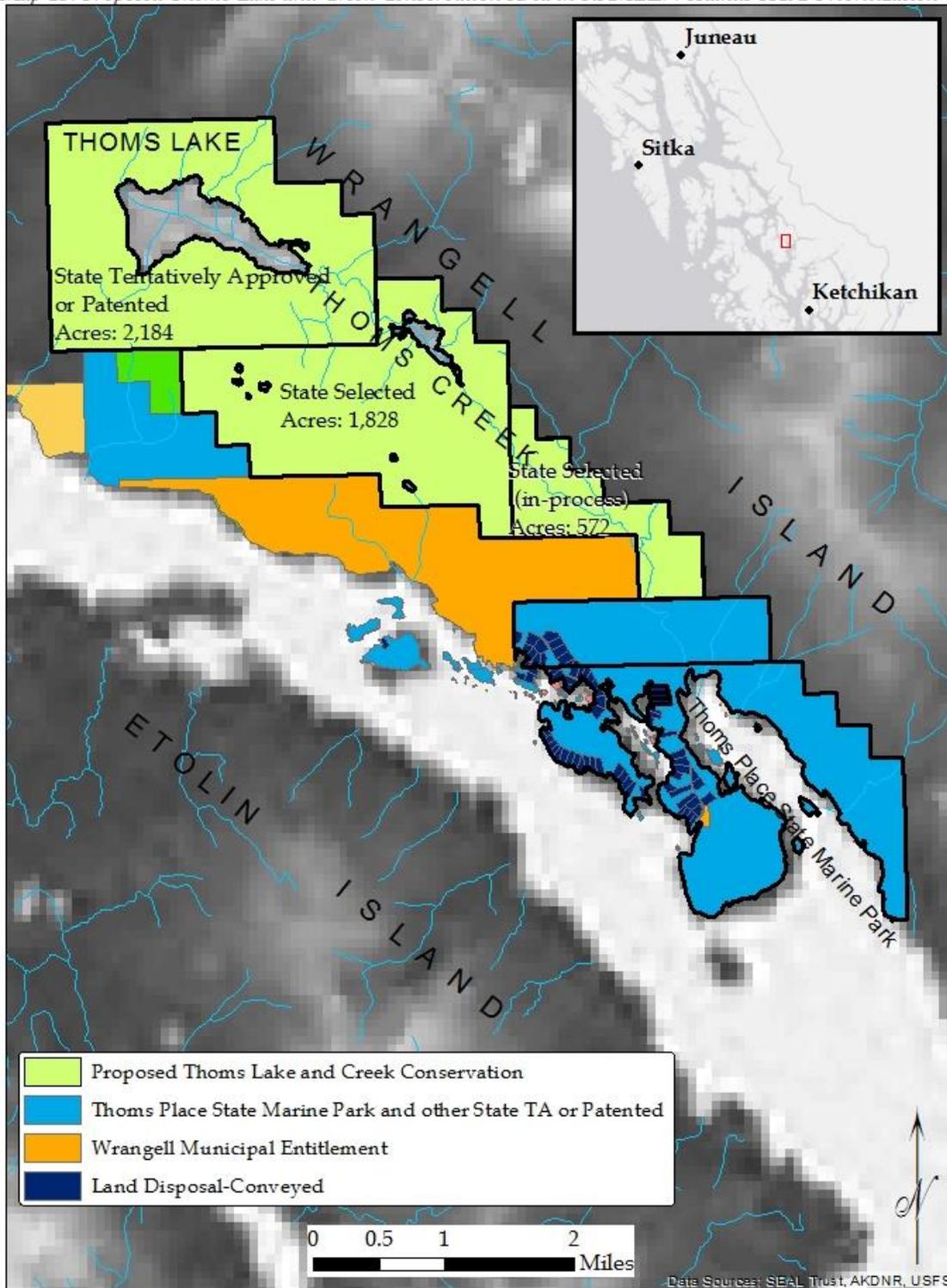
Date prepared: December 31, 2015
Prepared by: Michael Hekkers

Map 12: Proposed Kake Tribal Corporation Conservation Area- KKMEZW Islands HUC Prioritization



Date prepared: January 4, 2016
Prepared by: Michael Hekkers

Map 13: Proposed Thoms Lake and Creek Conservation Area in KKMEZW Islands HUC Prioritization



CONCLUSION

As a result of this analysis, there are three recommendations to help guide SEAL Trust in conservation options in the KKMEZW Islands HUC:

- SEAL Trust could further develop partnership with Kake Tribal Corporation and approach Sealaska Regional Corporation about the potential to protect the upper reaches of Gunnuk Creek. Protection would complement the lower reaches of Gunnuk Creek that are already under SEAL Trust conservation easements.
- SEAL Trust could partner with Kake Tribal Corporation to protect the watershed and karst geologic resources on the northern coast of Kupreanof Island.
- Using a collaborative approach, SEAL Trust could investigate unification of various state selected parcels to protect the Thoms Lake and Creek area above the Thoms Place State Marine Park on southern Wrangell Island.

Outside of this report, the most important result of this prioritization is an ArcGIS map that includes the prioritized layers as well as all of the source data. This map allows the user to interact with the prioritized parcels to quickly obtain a great deal of resource information about a potential conservation project. However, the map and its layers should be used only as a first step in identifying a project. In the future, some of the layers could be updated to reflect new science, ownership, or mapping campaigns. Ultimately, use of this prioritization should be a first step followed by a site visit and additional research on a site of interest before entering into any agreements.

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APPENDIX A: GIS ATTRIBUTES

Note that many of these fields come from the USFS landownership layer, which was the basis for creating the Full Parcel Prioritization Layer. I have only included those values that appear in the Full Parcel Prioritization Layer. See the metadata for the landownership layer if you want to know what other values exist.

Field Name	Description	Values
1. FID	Sequential unique whole numbers that are automatically generated.	Number.
2. Shape	Feature geometry.	Polygon.
3. AREA_	Feature area.	Number.
4. PERIMETER	Feature perimeter.	Number.
5. LANDSTAT_	Number identifying a parcel. Note that there are repeat numbers in the 5-acre parcel grid because this identifies which parcel each grid falls into.	Number.
6. LANDSTAT_I	Same purpose as LANDSTAT_. These are holdovers from the USFS landownership layer. It is unclear exactly what they mean and why there are two types of LANDSTAT fields. This field is equal to LANDSTAT_ minus 1.	Number.
7. WATER_CODE	Code identifying saltwater.	L = Land
8. OWNER_TYPE	Code identifying landowner.	4 = Private landowner 5 = State of Alaska 7 = Kake Tribal Corporation 8 = Sealaska Regional Corporation 9 = Municipalities 10 = Unknown
9. OWNER	Code identifying landowner.	1001 = Unknown

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		2000 = State of Alaska 3011 = Kake 3016 = Kupreanof 3019 = Petersburg 3028 = Unknown 4005 = Kake Tribal Corporation 4010 = Sealaska Regional Corp 5000 = Unknown 5002 = Private Owner 5003 = Private Owner 5004 = Private Owner 5007-5043 = Unknown 5060, 5999 = Private Owner Unknown 9999 = Unknown
10. LS_NOTES	Notes on the owners, primarily their names.	Text.
11. Shape_Leng	Feature length.	Number.
12. Shape_Area	Feature area.	Number.
13. Owner_Text	Shortened names.	Text.
14. AREA_ACRES	Acreage of parcels or grids.	Acres.
15. PA_PRESC	Within a protected area.	0 = not within a protected area 1 = within a protected area
16. PA_NAME	Name of protected area.	Text.
17. WET_PRES	Presence or absence of wetlands (all except subtidal) as defined by the National Wetlands Inventory.	0 = no wetlands present 1 = wetlands present
18. WET_ACRE	Number of acres of wetlands in parcel or grid.	Acres.
19. WET_NORM	To calculate this attribute, WET_ACRES for each parcel or grid was divided by the WET_ACRE of the parcel or	0-1, where 1 is the parcel or grid(s) with the highest wetland priority

	grid with the highest number of wetland acres. The top wetland acreage used was 8,981.85 acres (LANDSTAT_ = 7283; owned by Sealaska Regional Corporation). For the gridded analysis, the top wetland acreage used was 5 acres (many grids).	
20. EST_PRES	Presence or absence of subtidal and/or intertidal estuaries as defined by the National Wetlands Inventory.	0 = no part of estuary present 1 = all or part of estuary present
21. EST_ACRE	Number of estuarine acres in parcel or grid.	Acres.
22. EST_NORM	To calculate this attribute, EST_ACRE for each parcel or grid was divided by the EST_ACRE of the parcel or grid with the highest number of wetland acres. The top estuarine acreage used was 110.18 acres (LANDSTAT_ = 7289; owned by Kake Tribal Corporation). For the gridded analysis, the top wetland acreage used was 5 acres (many grids).	0-1, where 1 is the parcel or grid(s) with the highest estuary priority
23. AWC_PRESC	Presence or absence of all or part of anadromous stream(s) and its 300-foot buffer.	0 = no anadromous stream 1 = all or part of anadromous stream(s) + 300-foot buffer present
24. AWC_ACRES	Number of acres of anadromous streams and 300-foot buffer in parcel or grid.	Acres.
25. AWC_NORM	To calculate this attribute, AWC_ACRES for each parcel or grid was divided by the AWC_ACRES of the parcel or grid with the highest number of anadromous stream acres.	0-1, where 1 is the parcel or grid(s) with the highest anadromous stream priority

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	The top anadromous stream acreage used was 1601.64 acres (LANDSTAT_ = 7289; owned by Kake Tribal Corporation). For the gridded analysis, the top wetland acreage used was 5 acres (many grids).	
26. HYDRO_PRESC	Presence or absence of streams and/or lakes and their 300-foot buffers.	0 = no stream and/or lake + 300-foot buffer present 1 = all or part of stream(s) and/or lake + 300-foot buffer present
27. HYDRO_ACRE	Number of stream or lake and 300-foot buffer acres in parcel or grid.	Acres.
28. HYDRO_NORM	To calculate this attribute, HYDRO_ACR for each parcel or grid was divided by the HYDRO_ACR of the parcel or grid with the highest number of stream/lake acres. The top stream/lake acreage used was 7,117.54 acres (LANDSTAT_ = 7283; owned by Sealaska Regional Corporation). For the gridded analysis, the top stream/lake acreage used was 5 acres (many grids).	0-1, where 1 is the parcel or grid(s) with the highest hydrologic priority
29. FP_PRES	Presence or absence of floodplain streams defined as channel type FP3 to FP5 and their 300-foot buffers.	0 = no floodplain + 300-foot buffer present 1 = all or part of floodplain stream(s) + 300-foot buffer present
30. FP_ACRES	Number of floodplain stream and 300-foot buffer acres in parcel or grid.	Acres.
31. FP_NORM	To calculate this attribute, FP_ACRES for each parcel or grid was divided by the FP_ACRES of the parcel or grid with the highest number of floodplain stream acres.	0-1, where 1 is the parcel or grid(s) with the highest floodplain stream priority

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	The top floodplain stream acreage used was 876.26 acres (LANDSTAT_ = 7283; owned by Sealaska Regional Corporation). For the gridded analysis, the top floodplain stream acreage used was 5 acres (many grids).	
32. H2O_PRES	Within a Conservation Priority Watershed (CPW).	0 = not within a CPW 0.5 = within a CPW 1 = within a CPW (core)
33. H2O_ACRES	Number of acres of the parcel or grid within a CPW.	Acres.
34. H2O_NORM	To calculate this attribute, H2O_ACRES for each parcel or grid was divided by the H2O_ACRES of the parcel or grid with the highest number of CPW acres. The top CPW acreage used was 2,400.56 acres (LANDSTAT_ = 12660; which is under State Selction). For the gridded analysis, the top CPW acreage used was 5 acres (many grids).	0-1, where 1 is the parcel or grid(s) with the highest CPW priority
35. H2O_PERC	Percent of the entire CPW covered by the intersection of the parcel/grid and the CPW.	0-1, with 1 meaning that the intersection between the CPW and the parcel/grid is equal to 100% of the total CPW
36. KARST_PRES	Presence or absence of karst.	0 = no karst present 1 = karst present
37. KARST_ACRE	Number of karst acres in parcel or grid.	Acres.
38. KARST_NORM	To calculate this attribute, KARST_ACRE for each parcel or grid was divided by the KARST_ACRE of the parcel or grid with the highest number of karst acres. The	0-1, where 1 is the parcel or grid(s) with the highest karst priority

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	top karst acreage used was 275.68 acres (LANDSTAT_ = 7289; owned by Kake Tribal Corporation). For the gridded analysis, the top karst acreage used was 5 acres (many grids).	
39. SCORE	Total of 15 attributes. The expression is: [PA_PRESC]+ [WET_PRES]+ [WET_NORM]+ [EST_PRES]+ [EST_NORM]+ [AWC_PRESC]+ [AWC_NORM]+ [HYDRO_PRES]+ [HYRDO_NORM]+ [FP_PRES]+ [FP_NORM]+ [H2o_PRES]+ [H2o_NORM]+ [KARST_PRES] + [KARST_NORM]	
40. TIMB_ACRES	Acres of second growth and clear cut forest in a parcel or grid.	Acres.
41. TIMB_PERC	Percent of total parcel or grid that is in second growth or has been clear cut (TIMB_ACRES divided by ACRES).	0-1, with 1 meaning 100% of the parcel or grid has been logged.

Note that the 5-acre grid layer also has an attribute field of the FID from the landownership layer.

APPENDIX B: GIS METHODS

The general method used to determine attributes 10-33 and 35-36 is as follows:

1. Create a base Parcel Prioritization and/or 5-acre Grid Prioritization layer. In this example, the base Parcel Prioritization layer was created by extracting the privately owned parcels from the USFS's landownership layer for the KKMEZWI HUC. The grid layer can be created by intersecting the private land parcel layer with a regular 5-acre grid layer.
2. Intersect the parcel or grid layer with the targeted attribute layer. Generally, the attribute layer was clipped to the KKMEZWI HUC, but this is not necessary – it simply made for faster geoprocessing.
3. In the intersect layer, create a new field called “ACRES” (double 10, 2) and calculate its geometry (right click on field header, select Calculate Geometry, Units: Acres).
4. In the intersect layer, summarize the attribute of interest by LANDSTAT_ (for parcels). Include the summary statistic of SUM for the newly created field of ACRES. This will create a summary output table. For the grid layer use FID, export the attribute table and save the Export_Output table.
5. In the base Parcel or 5-acre Grid layer, create new fields for each of the relevant attributes. For example, if you are working with the wetlands layer, you would create three fields – WET_PRESC, WET_ACRES, and WET_NORM.
6. Join the base Parcel Prioritization or 5-acre Grid Layer to the output table based on the unique identifier field (LANDSTAT_) for parcels and (FID) for grids. The fields will be FID and FID_KKMEZW or similar. Keep all records. For parcels, this will also create a count field that lists the number of records that are being summarized for each unique identifier.
7. In the base file, select all the records that do not have a <NULL> value. One easy way to do this is to “Select by Attributes” and choose all records that have a count for parcels or acres for grids (field from joined table) of greater than 0. For the 5 acre grid, use the Acres field.
8. For a presence field, right click on the field header and select Field Calculator. In the text box, type the number 1 and click the OK button. This will assign “1” (meaning present) to the presence field of all of the selected records.
9. For an acres field, right click on the field header and select Field Calculator. In the Fields box, scroll down to and select the SUM ACRES field (for parcels) or ACRES (for grids) from the joined table (created in step 4). Click the OK button. This will make the relevant acres field (e.g. WET_ACRES) equal to the acres field from the joined table for all of the selected records.
10. You can deselect the records by clicking on the Clear Selection button. This is not necessary, but it is good practice. Remove the joined table (under Table Options > Joins and Relates).
11. For the normalization field, right click on the field header and select Field Calculator. Using the Fields box, create the following expression (using the appropriate fields):
[WET_ACRES] / Highest # of acres for category.

12. Continue the process of creating intersect shapefiles (step 2), summarizing based on a unique (step 4), joining the summary table (step 6), and calculating the relevant fields (steps 8, 9, & 11) for each of your prioritization attributes.
13. To sum a final score for the attributes, create a SCORE field. Right click on the field header and select Field Calculator. Sum all the attributes that contribute to the total score (see the description of the SCORE field in Appendix A for an example expression).