CONSERVATION PRIORITIZATION OF PRINCE OF WALES ISLAND

Identifying opportunities for private land conservation

Prepared by the Southeast Alaska Land Trust

With support from U.S. Fish and Wildlife Service

Southeast Alaska Coastal Conservation Program

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Southeast Alaska Land Trust

Stewarding Lands You Cherish

U.S. FISH & WILDLIFE SERVICE

DEPARTMENT OF THE INTERIOR

Conservation prioritization of Prince of Wales Island

IDENTIFYING OPPORTUNITIES FOR PRIVATE LAND CONSERVATION

INTRODUCTION

The U.S. Fish and Wildlife Service (USFWS) awarded the Southeast Alaska Land Trust (SEAL Trust) a Coastal Grant in 2012. SEAL Trust requested this grant to fund a conservation priority analysis of private property on Prince of Wales Island. This report and an associated Geographic Information Systems (GIS) map are the products of that work.

Driving SEAL Trust's interest in conservation opportunities on Prince of Wales Island is its obligations as 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[1], SEAL Trust must give priority to project sites within the same 8-digit Hydrologic Unit (HUC) as the permitted impacts. In the past 10 years, SEAL Trust has received a number of in-lieu fees from wetlands impacted by development on Prince of Wales Island, which, along with its outer islands, is the 8-digit HUC #19010103 (see Map 1). SEAL Trust has no conservation holdings or potential projects on Prince of Wales Island. In an attempt to achieve its conservation goals and compliance with the geographic elements of the Instrument, SEAL Trust wanted to take a strategic approach to exploring preservation possibilities in the Prince of Wales HUC.

PROJECT GOAL & OBJECTIVES

SEAL Trust aims to have the ability to quickly and objectively assess the conservation value of a potential project on Prince of Wales Island. In addition, this analysis will allow SEAL Trust to identify the most significant parcels for conservation acquisition, present and defend property acquisitions to funders, and make for 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. Develop a tool in ArcGIS to rank the conservation value of privately-held land on Prince of Wales Island.
3. Provide enough information in the tool to allow the user to query the data with scenarios of interest.

BACKGROUND

[1] "Instrument between Southeast Alaska Land Trust and the U.S. Army Corps of Engineers, Alaska District for the Southeast Alaska Land Trust In-lieu Free Program"

Prince of Wales Island is an ecologically rich island with relatively small amount of federally protected land compared to the rest of Southeast Alaska. It offers SEAL Trust the opportunity to make a sizeable impact on a region-wide conservation priority.

At 2,577 square miles, Prince of Wales Island is the largest island in the Alexander Archipelago. The Prince of Wales HUC includes many nearby islands and is more than 10,000 square miles. Overall, about 6,000 people live on the island with the largest towns on the island being Craig (1,239), Klawock (780), Thorne Bay (486), and Hydaburg (389). The towns are connected by the most extensive road system in the Tongass National Forest. Of the 1,500 miles of road, only about 200 miles are paved and 260 miles have been designated a Scenic Byway by the Alaska Department of Transportation (ADOT 2011). Prince of Wales Island is part of the Unincorporated Borough and has four federally recognized tribal governments. The vast majority of the land in the HUC is owned by the federal government and is part of the Tongass National Forest, which is the largest National Forest in the U.S.

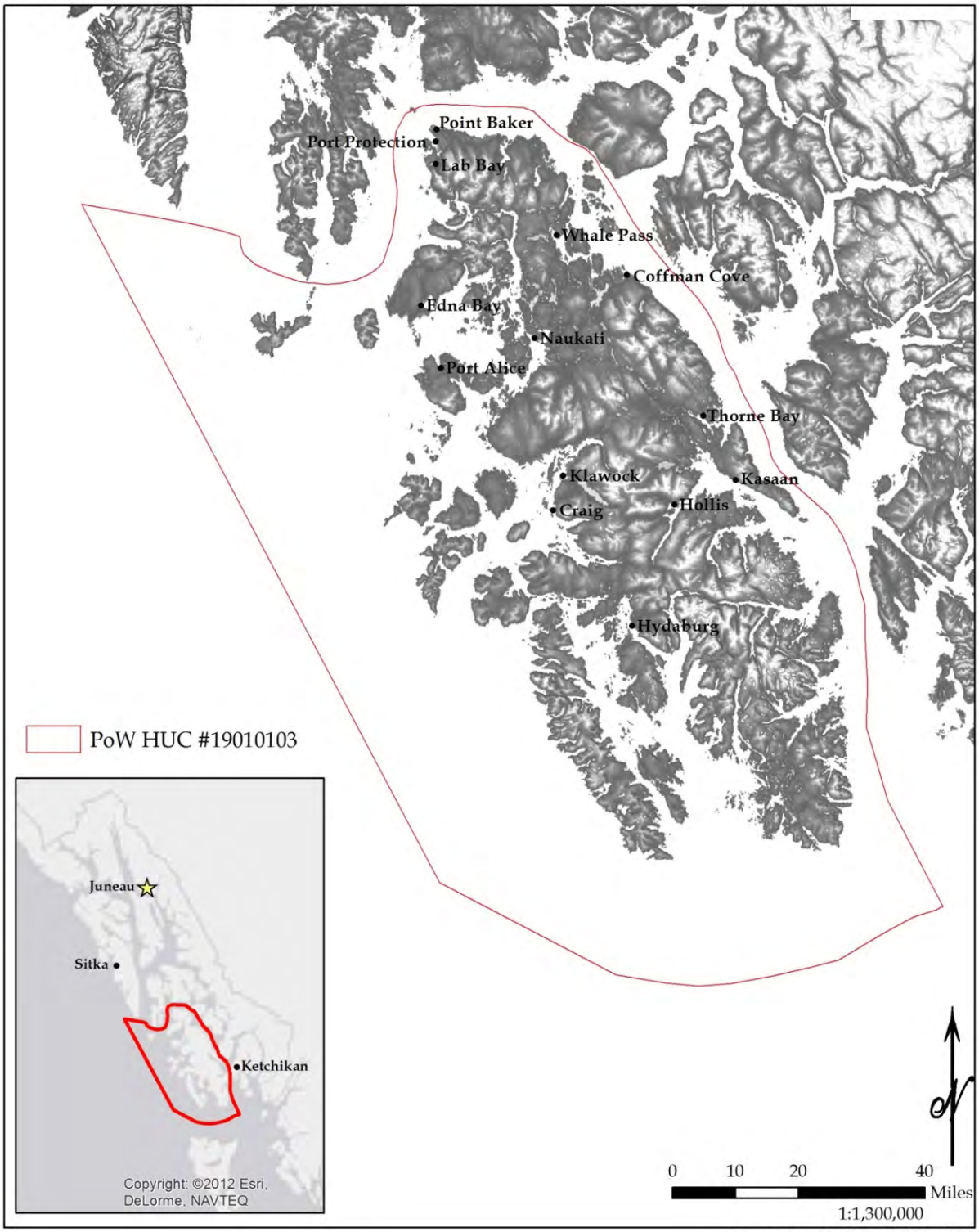
In 2007, the Nature Conservancy of Alaska and Audubon Alaska completed a conservation assessment and resource synthesis of Southeast Alaska, entitled *A Conservation Assessment and Resource Synthesis for the Coastal Forests and Mountains Ecoregion of Southeastern Alask and the Tongass National Forest* (Schoen & Dovichin 2007). They separated the region in 22 biogeographic provinces. Four of these provinces – North Prince of Wales, South Prince of Wales, Outside Islands, and Dall Island/Long Island – make up the Prince of Wales HUC. The following is a summary of the provinces' conservation values from the assessment – all information, unless otherwise referenced, is from Schoen & Dovichin 2007.

In general, the HUC is remarkably rich in ecological values. According to the above mentioned conservation assessment, Prince of Wales Island north of Hetta Inlet ranks the highest for ecological values[2] among 22 biogeographic provinces in Southeast Alaska. Northern Prince of Wales Island is also recognized internationally for the intensity and diversity of its karst resources, which provide recreational, biological, cultural, and paleontological values. In particular, karst supports the most productive big-tree forests and salmon streams in Southeast Alaska. Likely because of this geology, Schoen and Dovichin note that northern Prince of Wales Island "contains more productive forest land as well as substantially more of the rare large tree forests that any other province" (Chapter 4.21, p. 1). Predictably then, this biogeographic province has also had the most timber harvest of any other provinces. There remain a few large tree forests on the island – notably the Honker Divide, Karta Wilderness, and Nutkwa watershed. Several of these watersheds are congressionally protected through LUD II designations. Nevertheless, the assessment suggests that northern Prince of Wales Island in particular "may have among the least robust conservation systems of any province," suggesting a role for SEAL Trust (Chapter 4.21, p. 1).

Dall Island, which is in the southwest corner of the Prince of Wales HUC, also has very high quality karst topography. Like northern Prince of Wales Island, however, most of the original productive old growth and karst large tree forest has been logged.

[2] Values include large-tree forest, marbled murrelet habitat, salmon habitat, bear summer habitat, deer winter habitat, and estuarine area.

Map 1: Prince of Wales Island Context



Map prepared by Bethany Wylie, 2013

Despite the extensive timber harvest on Prince of Wales and Dall Island, several of the outside islands support a proportionally large amount of productive old growth forest. Heceta, San Juan, and Bautista Islands have been extensively high graded, but the others (Noyes, Lulu, Baker, Sumez, Warren, Coronation) remain relatively untouched. There is little to no private land on those islands and therefore they mostly uninvolved in this analysis. In addition, south Prince of Wales Island has the highest remaining percentage of large tree forest (25.8%) of all Southeast Alaska biogeographic provinces. Much of this forest is protected in the Nutkwa LUD II.

Many plant species reach their northernmost extent on Prince of Wales Island and its satellite islands. These include salal, Pacific redbark, twinflower honeysuckle, Pacific yew, and timber-quality Western red cedar. "Wind forest" – even aged, fine canopy forest – can be found on southerly slopes of south Prince of Wales Island. However, the majority of the forest is Western red cedar dominated. Dall Island's tree-line includes subalpine fir, which is not commonly found in archipelago and distribution may reflect glacial refugia.

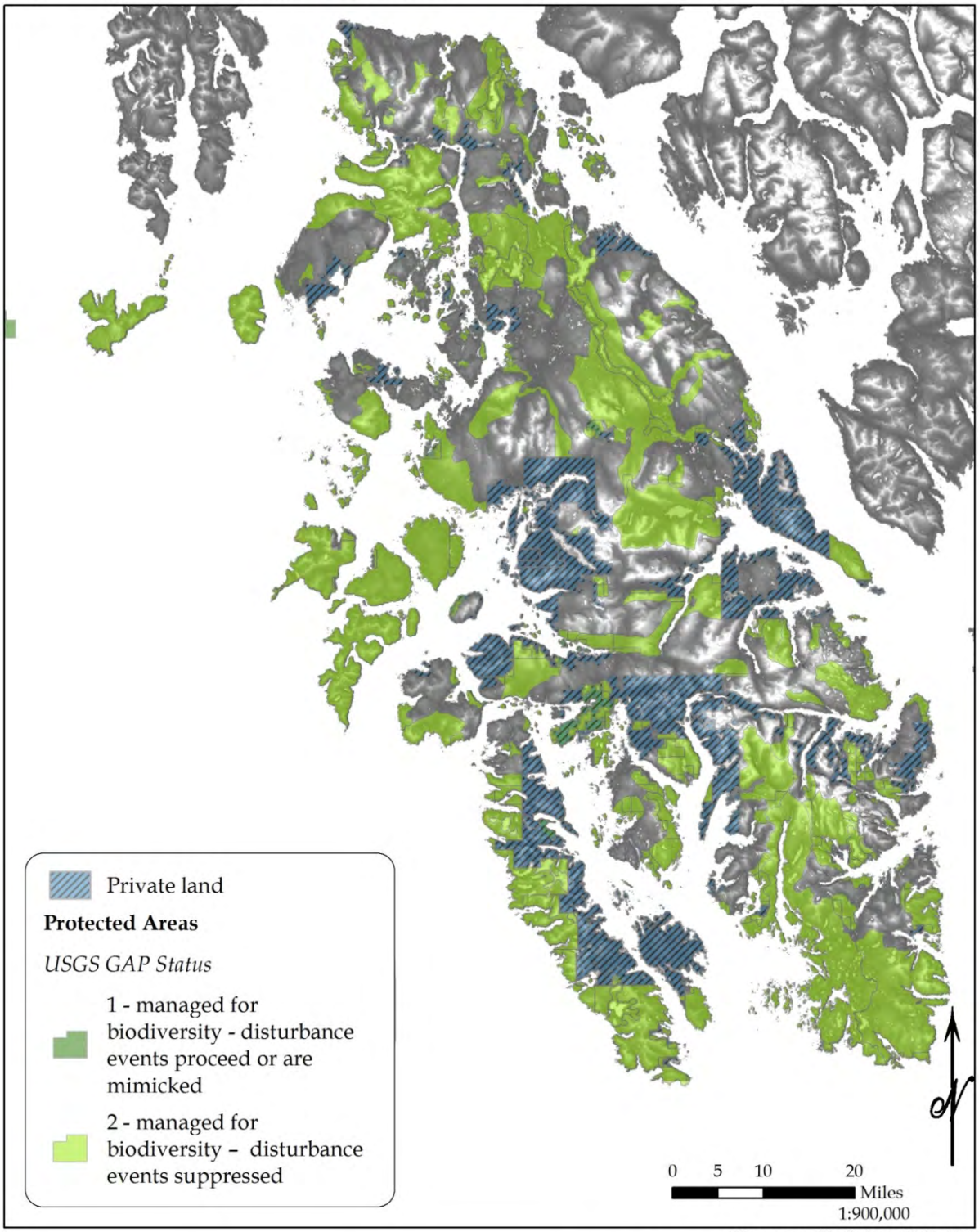
Prince of Wales Island supports a few mammal species important to conserve despite the large fjords that reduce connectivity by nearly dividing the island. All of the provinces, except south Prince of Wales, in the HUC support endemic mammals. The two endemics in northern Prince of Wales Island are genetically distinct enough that they may be candidates for full species status in the future. The endemic species of each province are listed in Table 1.

Table 1: Endemic Species in Prince of Wales Biogeographic Provinces

North Prince of Wales	*Glacomys sabrinus griseifrons* (a flying squirrel subspecies) *Mustela erminea celenda* (an ermine subspecies)
Outside Islands	*Sorex monticolus malitiosus* (a dusky shrew subspecies) *Mustela erminea seclusa* (an ermine subspecies) *Microtus longicaudis coronarius* (Coronation Island vole)
Dall/Long Island	*Peromyscus keeni oceanicus* (a subspecies of Keen's mouse) *Mustela erminea celenda* (an ermine subspecies)

Anadromous fish, deer, and black bear are also found in the Prince of Wales HUC. The Klawock Lake watershed is the only island watershed in Southeast Alaska to rank in the top 20 for salmon habitat. Staney Creek and Sweetwater Lake are also very productive salmon watersheds. Nutkwa Lagoon and Klakas Inlet on southern Prince of Wales Island support outstanding pink salmon runs (escapements of 155,000 and 108,333 respectively). The Prince of Wales HUC also supports large populations of deer and bear. The Karta River is among the top 10 watersheds for deer habitat and top 35 for black bear habitat in all of Southeast Alaska. Baker Island and Noyes Island are also in the top 20 watersheds for deer. Dall Island retains the majority of its original black bear summer habitat and deer winter habitat. Forrester, Petrel, Lowrie, and several other small islands near Dall Island are in the Alaska Maritime National Wildlife Refuge. They provide habitat for the largest known colonies of nesting seabirds in Southeast Alaska. Forrester is largest Steller sea lion rookery in world.

Map 2: Prince of Wales Island Protected Areas



Map prepared by Bethany Wylie, 2013
Data source(s): PAD-US 2012; USFS Tongass National Forest 2009

METHODS

This prioritization uses Geographic Information Systems (GIS) to identify privately owned parcels of land on Prince of Wales Island that have high conservation values. The first step in the prioritization was to identify private land on Prince of Wales Island. We extracted the private land parcels from a landownership layer from the U.S. Forest Service's Tongass National Forest, which was last updated on September 20, 2009[3]. This extraction resulted in 1,527 privately owned parcels on the island (see Map 3). It is important to note that the owners identified in this layer are fairly broad scale. For example, the State of Alaska is listed as a landowner for 345 parcels including State Mental Health Land Trust or the University of Alaska. Thus, the prioritization's use is currently limited as a *preliminary* tool for conservation project research (see "Results" on page 11).

The privately owned parcels used as a base layer for this prioritization range in size from less than one acre to nearly 43,000 acres. Also, because the prioritization normalizes attributes on the largest acreage for an attribute, it tends to skew favorably toward large properties. To address both of these issues, the overall private land layer was also intersected with a regular five-acre grid. This grid went through the same prioritization process as the full parcels. It provides a more specific understanding of where the important conservation values fall in a large property and allows SEAL Trust to be more precise about its interest in a parcel.

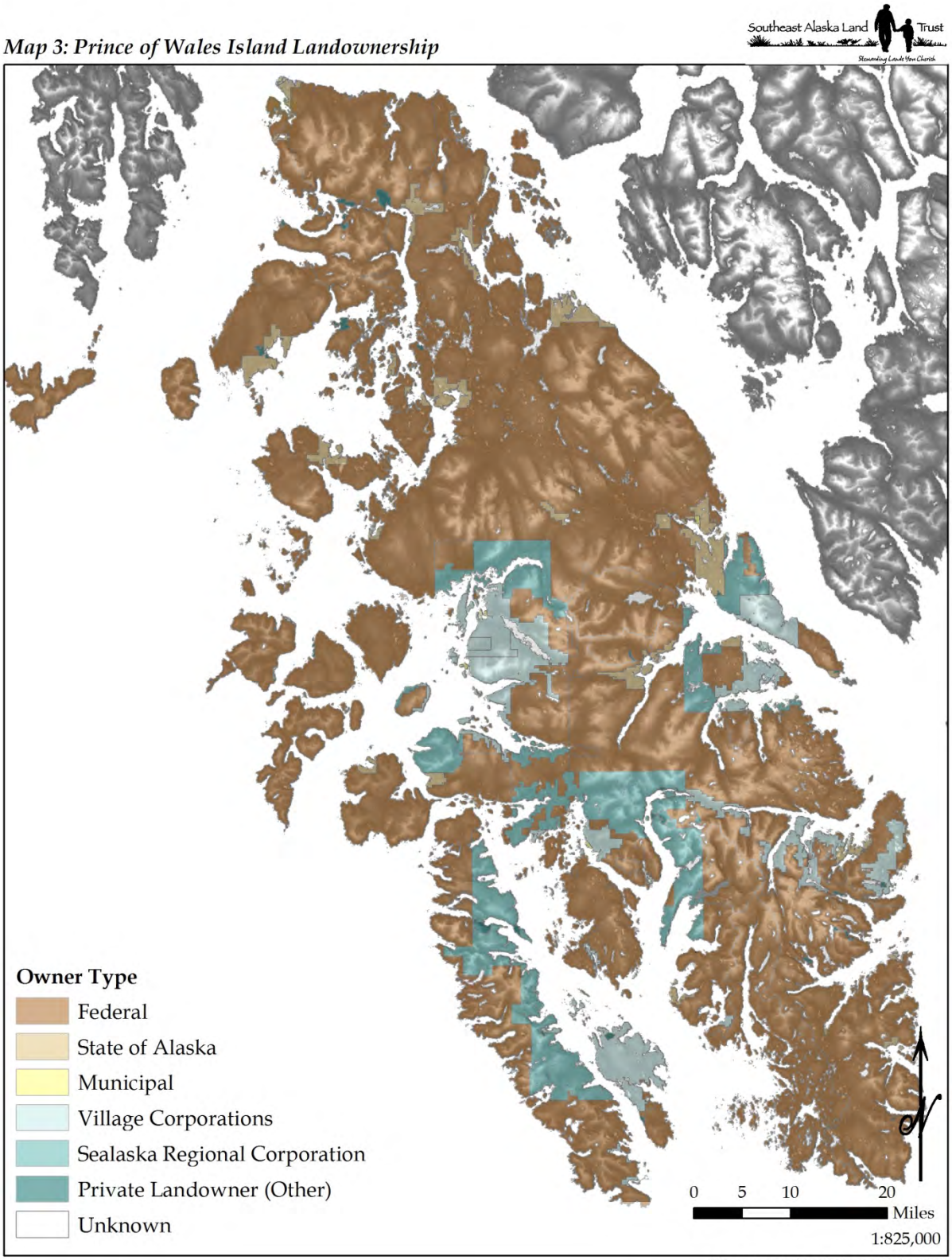
Each parcel or five-acre grid has a maximum prioritization score of fifteen (Table 2). The fifteen criteria established as indicators of conservation value were drawn from discussions with SEAL Trust staff and from Great Land Trust's prioritizations. We relied on Great Land Trust's experience in prioritization for developing the methodology of this prioritization. In addition to the fifteen criteria, the attribute tables of the prioritization layers include, as informational data, timber harvest acreage and the percent of the property clear-cut or in second growth. Various sources provided the GIS layers needed to develop these criteria (Table 2).

For a technical explanation of how the source layers were manipulated to obtain the criteria, see Appendix B. Appendix A defines the fields used in the attribute table of the prioritization layers.

Note that the normalized acreage criteria below are always normalized based on the parcel or 5-acre grid with the greatest number of acres of the attribute.

[3] To extract the private land parcels, we used the field "OWNER_TYPE," attribute code "4," which was identified as private land in the layer's metadata.

Map 3: Prince of Wales Island Landownership



Map prepared by Bethany Wylie, 2013
Data source(s): USFS Tongass National Forest 2009

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. Large intact habitats allow larger, healthier populations of a species to persist; thus, increasing the chance of survival over time. This criterion allows us to identify those parcels that might increase connectivity.	U.S. Protected Areas Database (2011)	We only included 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).
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 (Ramsar 2011)	U.S. Fish and Wildlife Service's National Wetlands Inventory (NWI)	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 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 critical habitat for many species of wildlife. They also 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 a lake.
Presence of streams & 300-foot buffer **Normalized acreage of streams & 300-foot buffer**	Streams and their corridors are critical habitat for many species of wildlife. 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 a stream.
Presence of floodplain streams & 300-foot buffer **Normalized acreage of**	Floodplains are important for waterbird breeding, nutrient cycling, invertebrate production, feeding ground for birds, and	Southeast Alaska Hydrography Database (2012)	Floodplain streams and their 300-foot buffer were extracted from the streams layer listed above. This "buffer" is a proximity

floodplain streams & 300-foot buffer	groundwater reservoir recharge (Inland Rivers Network). The floodplain stream criteria were particularly drawn out to protect the functions of the floodplains they supply.		criterion – SEAL Trust wants to acquire land near a stream.
Presence of anadromous streams & 300-foot buffer **Normalized acreage of anadromous streams & 300-foot buffer**	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, Edwards, Willson, & Wipfli, 2002).	Alaska Department of Fish and Game Catalog of Waters Important for Spawning, Rearing, or Migration of Anadromous Fishes – Southeastern Region, Effective June 1, 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 a stream.
Within a Conservation Priority Watershed **Normalized acreage of Conservation Priority Watershed**	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 & Dovichin 2007, "Conservation Assessment," pg. 34).	The Nature Conservancy & Audubon Alaska (2007)[4]	In addition to the normalized acreage, the attribute table also includes a field (H20SH_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.
Presence of karst **Normalized acreage of karst**	As mentioned in the Background section, karst supports the most productive big-tree forests and salmon streams in Southeast Alaska. While most of it has been logged on Prince of Wales Island, it is an important enough *potential* resource that both logged and unlogged karst should be targeted for protection.	U.S. Forest Service	None.
Criteria not included in Prioritization Score			

[4] From *A Conservation Assessment & Resource Synthesis for the Coastal Forests and Mountains Ecoregion in Southeastern Alaska and the Tongass National Forest*.

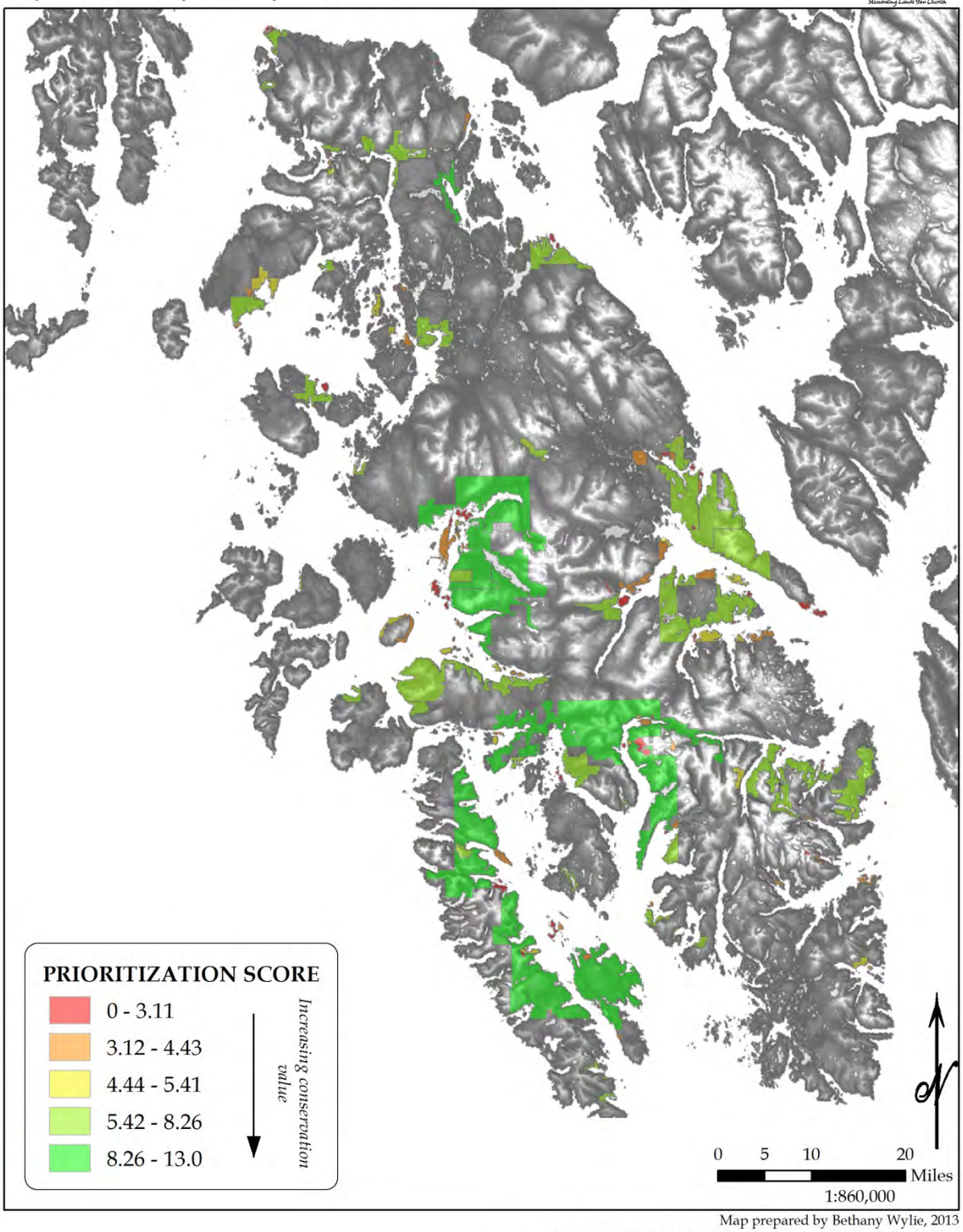
Presence of clear-cut or 2nd growth forest **Percent of parcel/grid in clear-cut or 2nd growth forest**	Timber harvest information is included in the attributes of the prioritization layers to provide context for decision-making. It was excluded from the total score because it is a fairly nuanced attributed. Harvest of a large percentage of the property is not necessarily a "deal-breaker," but it is also not a positive attribute.	The Nature Conservancy & Audubon Alaska (2007)[2]	Clear cut and second-growth forest were extracted from the Forest Type layer developed by The Nature Conservancy as part of their *Conservation Assessment*.

RESULTS

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. Some of the layers are out-of-date or vague in their detail. Those using this prioritization should visit and do more research on a site of interest before entering into any agreements.

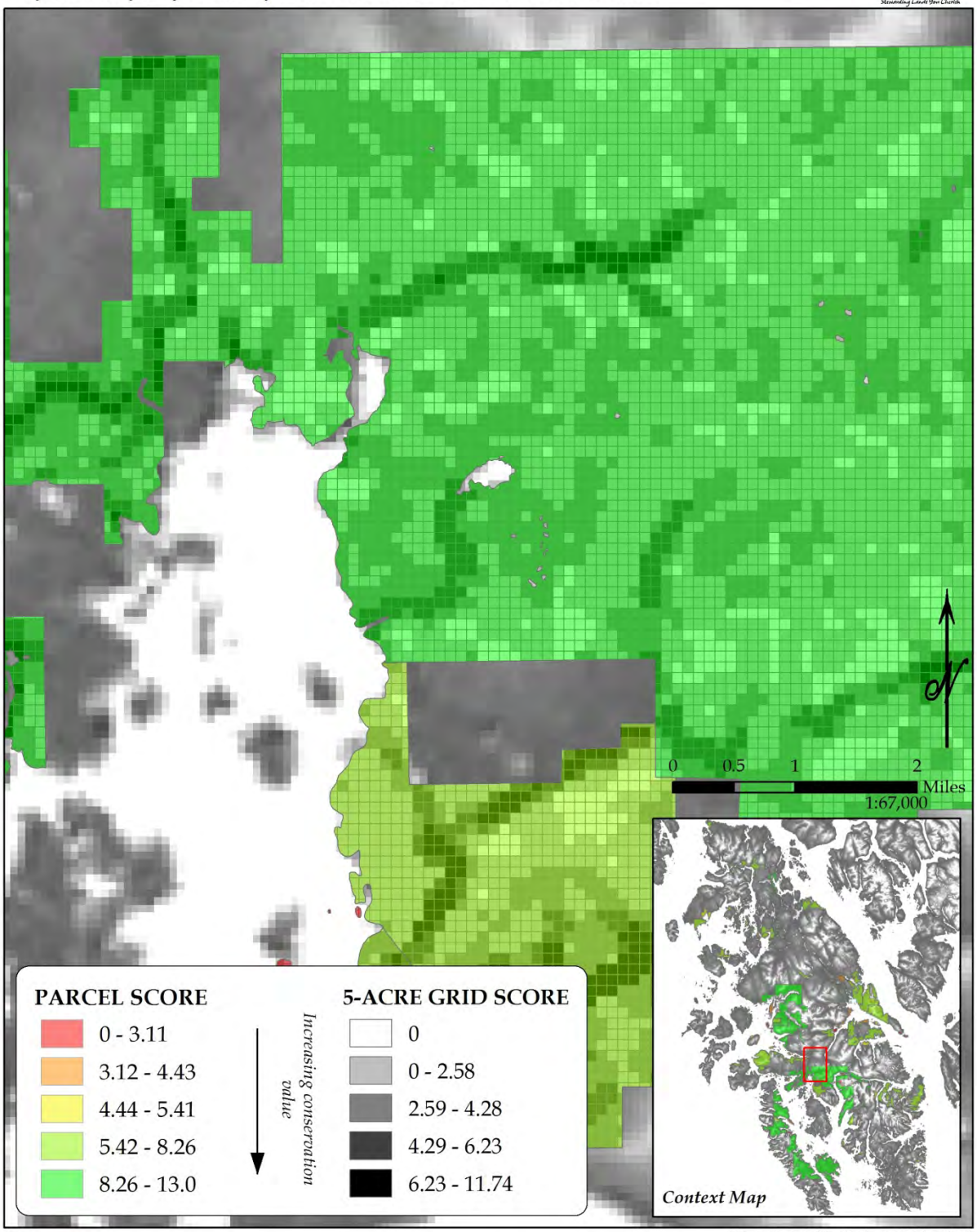
This section will provide maps of the most interesting results from this prioritization, but the ArcGIS map is a better tool for querying and exploring the prioritization.

Map 4: Overview of Prince of Wales Island Private Land Prioritization



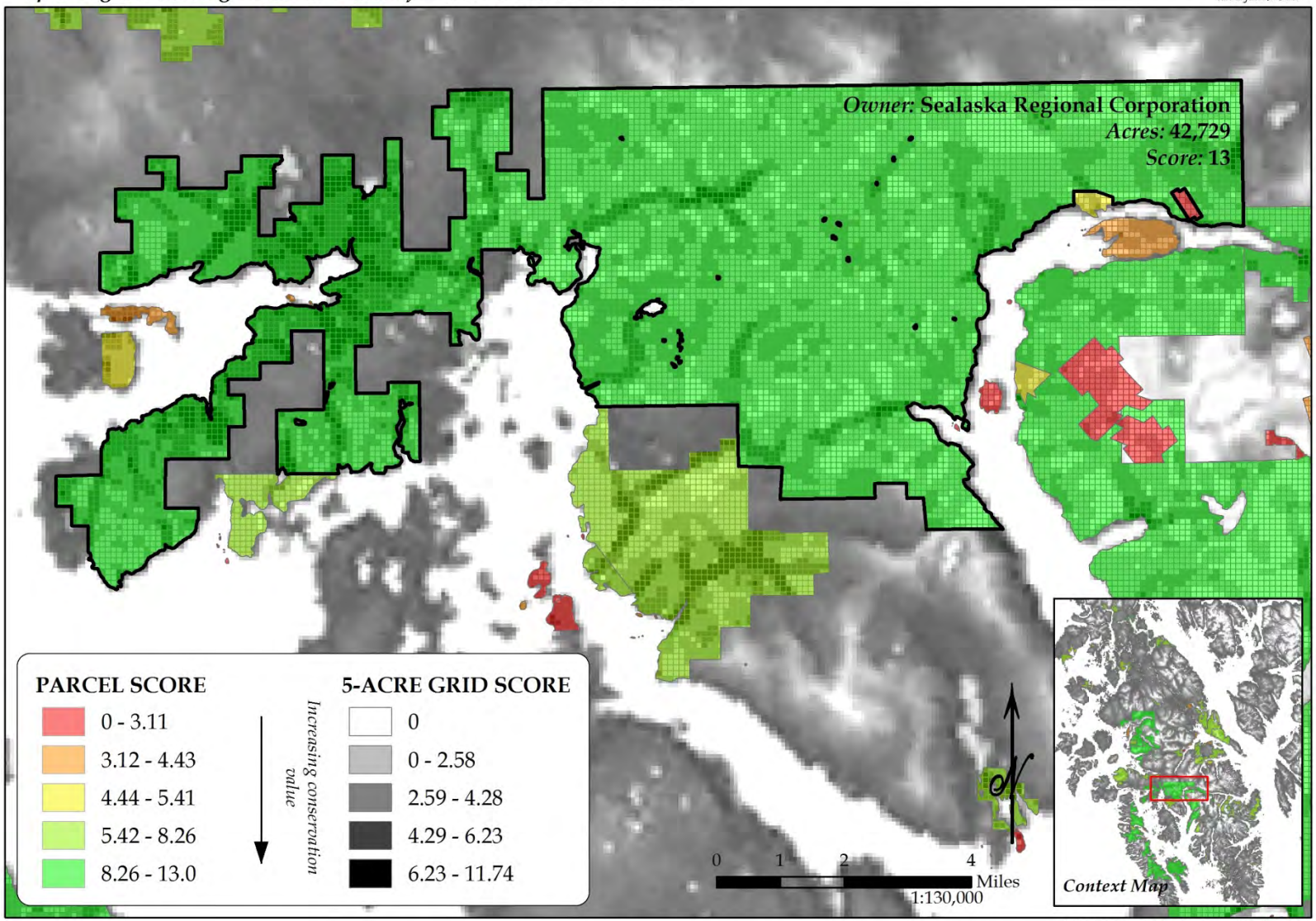
Map prepared by Bethany Wylie, 2013
Data source(s): PAD-US 2012; USFS Tongass National Forest 2009

Map 5: Example of Prince of Wales Island 5-acre Grid Prioritization



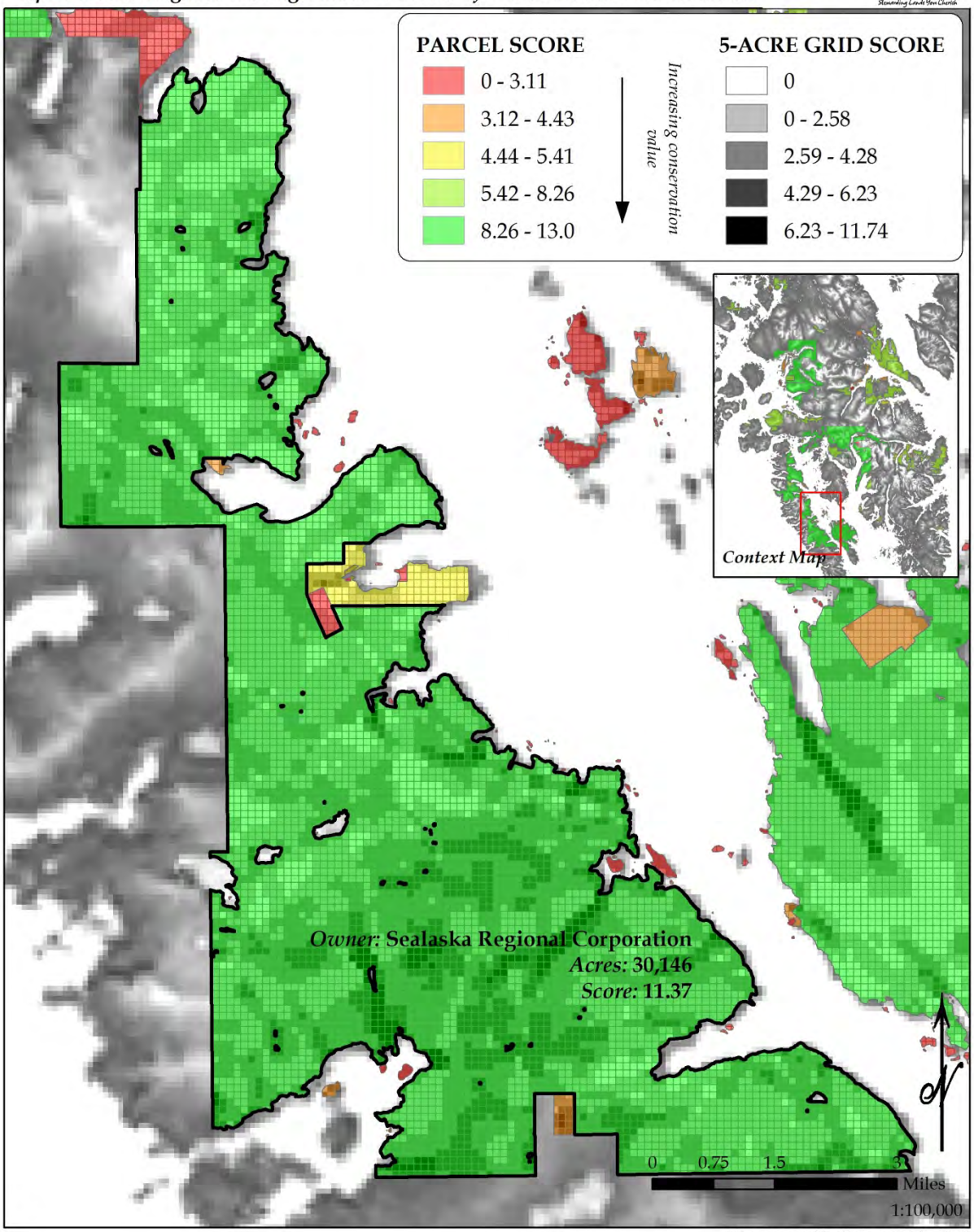
Map prepared by Bethany Wylie, 2013
Data source(s): USFS Tongass National Forest 2009

Map 6: Highest Scoring Parcel in Prince of Wales Island Prioritization



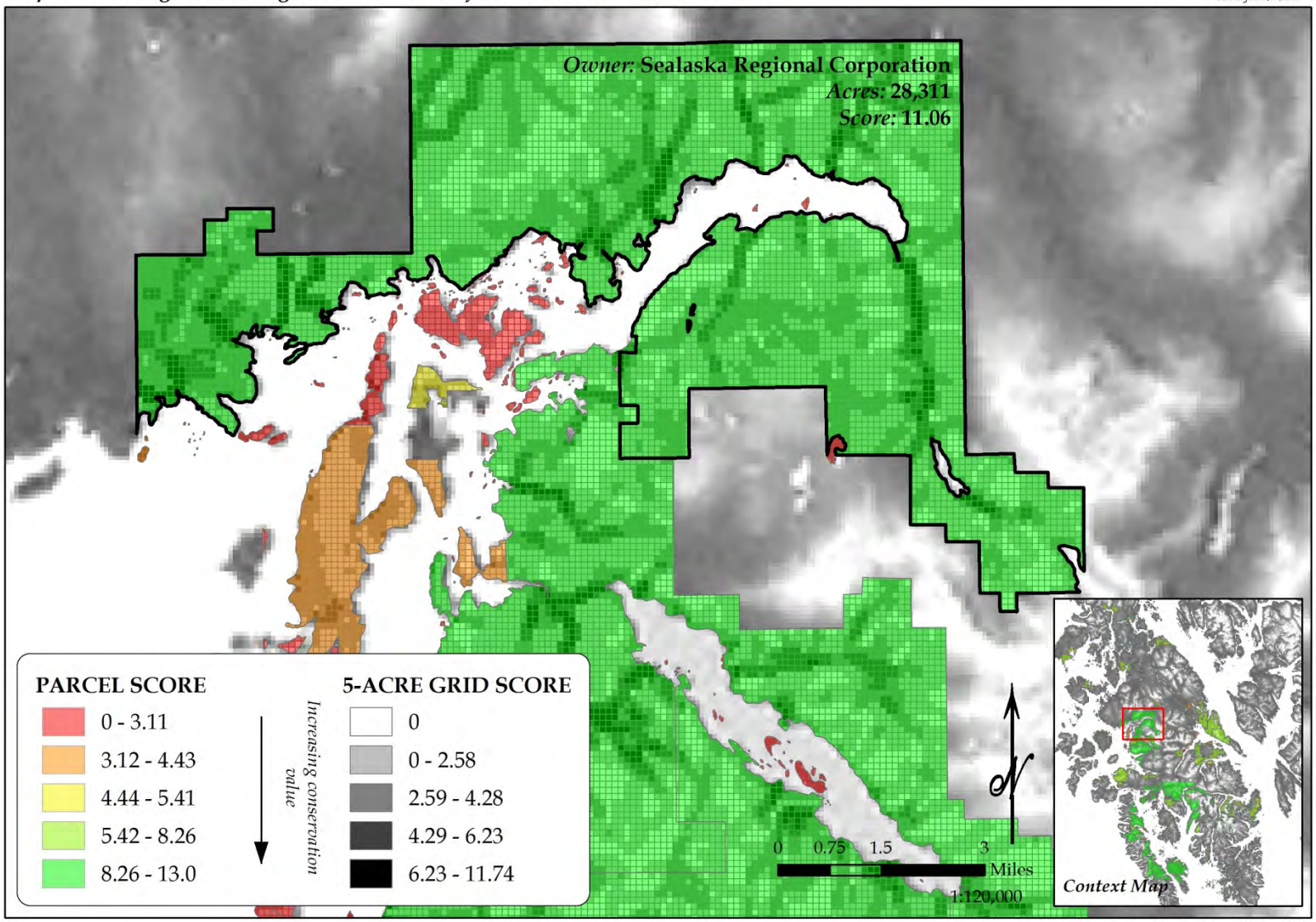
Map prepared by Bethany Wylie, 2013
Data source(s): USFS Tongass National Forest 2009

Map 7: Second Highest Scoring Parcel in Prince of Wales Island Prioritization



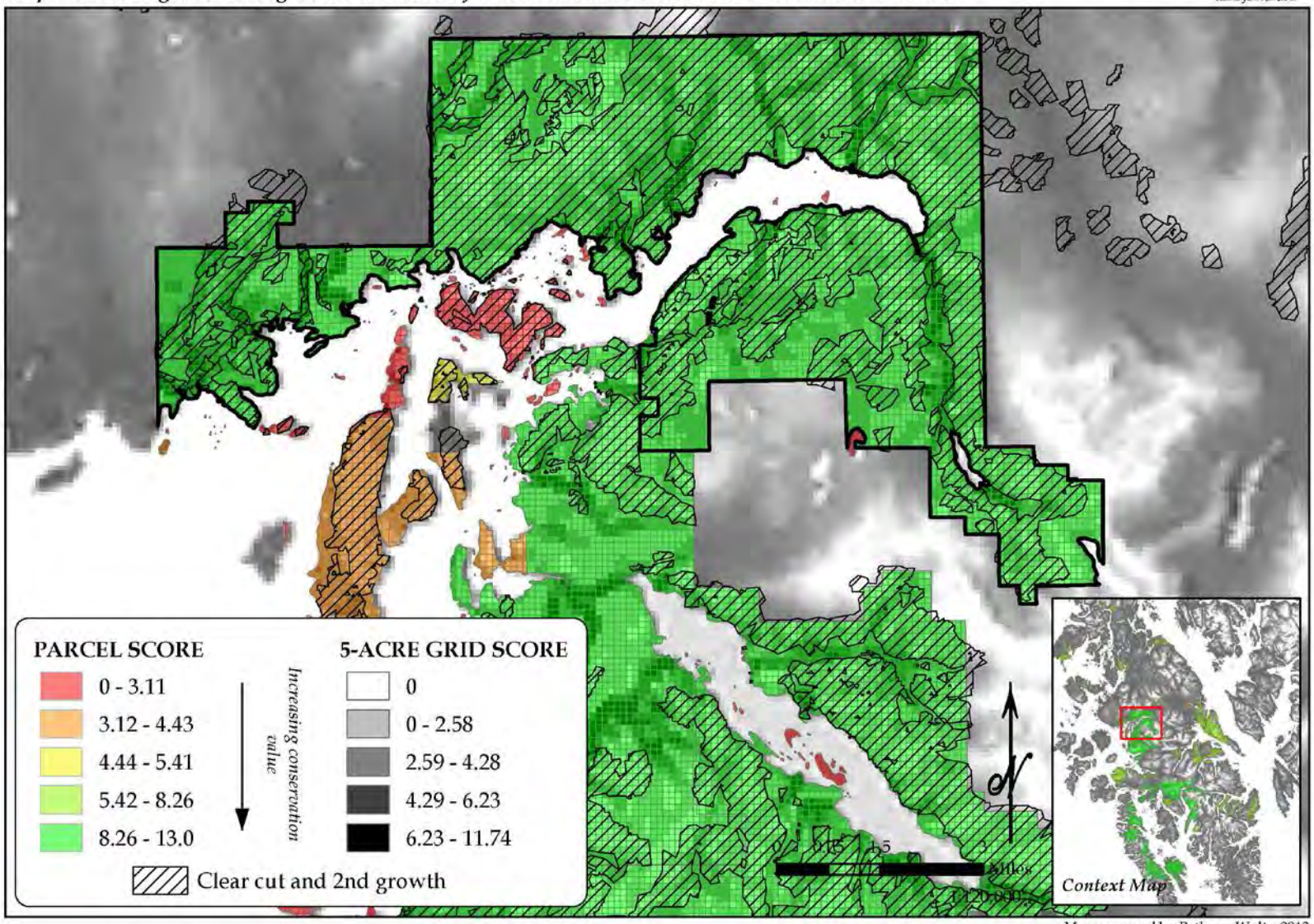
Map prepared by Bethany Wylie, 2013
Data source(s): USFS Tongass National Forest 2009

Map 8: Third Highest Scoring Parcel in Prince of Wales Island Prioritization



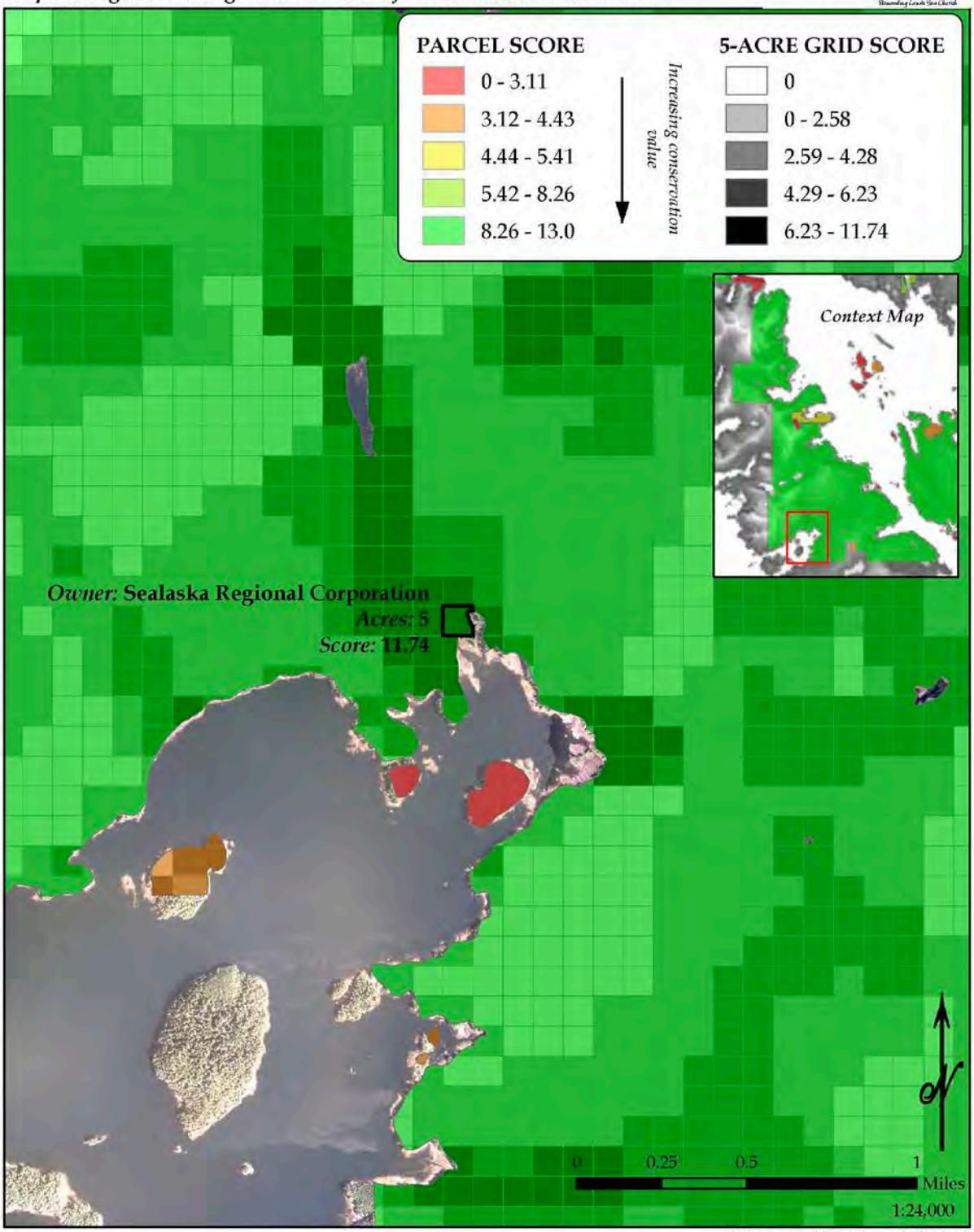
Map prepared by Bethany Wylie, 2013
Data source(s): USFS Tongass National Forest 2009

Map 9: Third Highest Scoring Parcel in Prince of Wales Island Prioritization with Timber Harvest



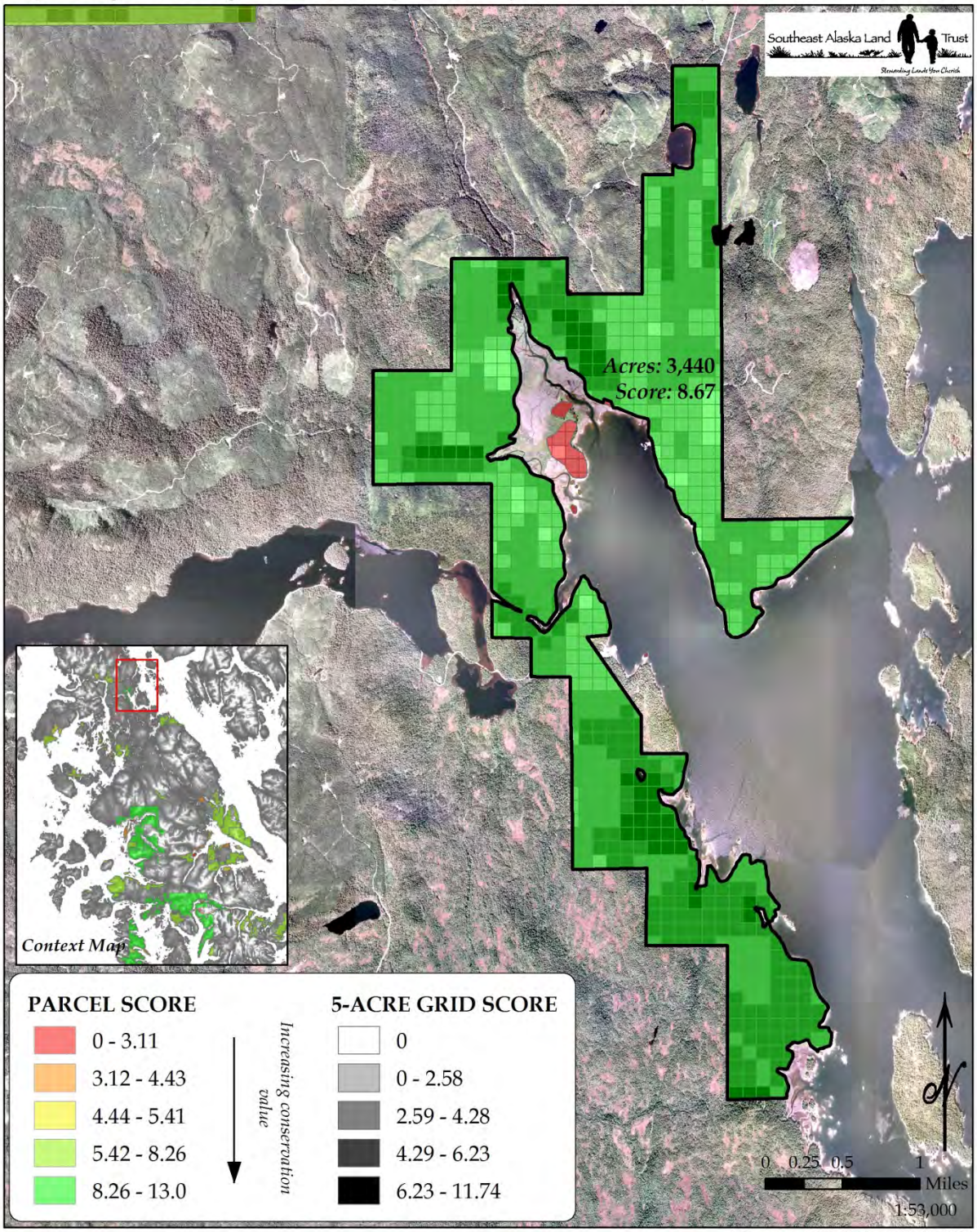
Map prepared by Bethany Wylie, 2013
Data source(s): USFS Tongass National Forest 2009; TNC & Audubon Alaska 2007

Map 10: Highest Scoring Grid in Prince of Wales Island Prioritization



Map prepared by Bethany Wylie, 2013
Data source(s): USFS Tongass National Forest 2009

Map 11: Highest Scoring Parcel owned by the State of Alaska in Prince of Wales Island Prioritization



Map prepared by Bethany Wylie, 2013
Data source(s): USFS Tongass National Forest 2009

DISCUSSION

The top three parcels are all extremely large – ranging from thirty thousand to over forty thousand acres in size. However, they are also all owned by the Sealaska Corporation. In fact, of the seven normalized attributes, the five records with the highest scores belong to Sealaska. Both of these facts suggest that SEAL Trust should consider approaching Sealaska about purchasing the most valuable areas of these large properties.

There are various ways to screen the results. For example, because SEAL Trust needs to monitor its properties once a year, access is an important consideration in property acquisition. Proximity of a road could be a proxy for access – 207 of the full parcels and approximately 28% of the 5-acre grids are within one-half mile of the road. In addition, much of SEAL Trust's funding comes from fees in-lieu of mitigation for impacts to wetlands. Therefore, another way to pare down the results is to look at the most highly ranked properties for wetlands and estuaries (Tables 3 and 4).

Table 3: Top 3 Parcels Ranked by Wetland Normalization Scores

Landowner	**Wetland Acres**	**Wetland Normalization Score**	**FID** *To identify parcel in GIS map*
Sealaska Regional Corporation	13,002	1	924
Sealaska Regional Corporation	12,679	0.9752	310
Sealaska Regional Corporation	6,664	0.5126	1219

Table 4: Top 3 Parcels Ranked by Estuary Normalization Scores

Landowner	**Estuary Acres**	**Estuary Normalization Score**	**FID** *To identify parcel in GIS map*
Klukwan Village Corporation	356	1	1277
Sealaska Regional Corporation	215	0.6032	1219
Sealaska Regional Corporation	170	0.477	924

Again, the prevalence of Sealaska as landowner suggests that it may be wise to approach the Corporation with a land acquisition proposal. Many other scenarios could be simulated and other questions could be asked of the data available in the prioritization. The GIS map and data offer SEAL Trust the ability to not only assess offers of land on Prince of Wales Island, but to also participate in strategic conservation that reflects the organization's values.

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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. 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.
4. 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.
5. WATER_CO	Code identifying saltwater.	L = Land F = Freshwater S = Saltwater
6. OWNER_TYPE	Code identifying type of landowner. Every value is the same because these layers only include private land.	4 = Private landowner
7. OWNER	Code identifying landowner.	9999 = unknown 1100 = Federal – BLM 2000 = State of Alaska 3003 = Craig

		3004 = Edna Bay 3008 = Hydaburg 3012 = Kasaan 3014 = Klawock 3020 = Point Baker 3022 = Port Protection 3027 = Thorne Bay 4003 = Haida Village 4006 = Kavilco Village Corp. 4007 = Klawock-Heenga Village Corp. 4008 = Klukwan Villa Village Corp. 4009 = Kootznoowoo Village Corp. 4010 = Sealaska Regional Corp. 4011 = Shaan-Seet Village Corp. 5754 = Private landowner assigned by Ketchikan 5760 = Private landowner assigned by Ketchikan 5761 = Private landowner assigned by Ketchikan 5762 = Private landowner assigned by Ketchikan 5763 = Private landowner assigned by Ketchikan 5764 = Private landowner assigned by Ketchikan
8. LS_NOTES	Notes on the owners, primarily their names.	Text.
9. ACRES	Acreage of parcels or grids.	Acres.
10. PA_PRESENCE	Within a protected area.	0 = not within a protected area 1 = within a protected area
11. PA_NAME	Name of protected area.	Text.
12. WET_PRESC	Presence or absence of wetlands (all except subtidal)	0 = no wetlands present

	as defined by the National Wetlands Inventory.	1 = wetlands present
13. WET_ACRES	Number of acres of wetlands in parcel or grid.	Acres.
14. WET_NORM	To calculate this attribute, WET_ACRES for each parcel or grid was divided by the WET_ACRES of the parcel or grid with the highest number of wetland acres. The top wetland acreage used was 13,002.38 acres (LANDSTAT_ = 20216; owned by Sealaska Regional 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 wetland priority
15. EST_PRESC	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
16. EST_ACRES	Number of estuarine acres in parcel or grid.	Acres.
17. EST_NORM	To calculate this attribute, EST_ACRES for each parcel or grid was divided by the EST_ACRES of the parcel or grid with the highest number of wetland acres. The top estuarine acreage used was 356.37 acres (LANDSTAT_ = 24679; owned by Klukwan Village Corporation). For the gridded analysis, the top estuarine acreage used was 4.94 acres (FID 9274; owned by the State of Alaska).	0-1, where 1 is the parcel or grid(s) with the highest estuary priority
18. AWC_PRESC	Presence or absence of all or part of anadromous stream(s) and its 300-foot buffer.	0 = no anadromous stream + 300-foot buffer present 1 = all or part of anadromous stream(s) + 300-foot buffer present

19. AWC_ACRES	Number of acres of anadromous streams and 300-foot buffer in parcel or grid.	Acres.
20. 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. The top anadromous stream acreage used was 2,948.93 acres (LANDSTAT_ = 17269; owned by Klukwan Village 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 anadromous stream priority
21. 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
22. HYDRO_ACRES	Number of stream or lake and 300-foot buffer acres in parcel or grid.	Acres.
23. HYDRO_NORM	To calculate this attribute, HYDRO_ACRES for each parcel or grid was divided by the HYDRO_ACRES of the parcel or grid with the highest number of stream/lake acres. The top stream/lake acreage used was 14,915.44 acres (LANDSTAT_ = 20216; 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
24. FP_PRESC	Presence or absence of floodplain streams and their 300-foot buffers.	0 = no floodplain + 300-foot buffer present 1 = all or part of floodplain stream(s) +

		300-foot buffer present
25. FP_ACRES	Number of floodplain stream and 300-foot buffer acres in parcel or grid.	Acres.
26. 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. The top floodplain stream acreage used was 1,223.84 acres (LANDSTAT_ = 17269; owned by Sealaska Regional Corporation). For the gridded analysis, the top floodplain stream acreage used was 5 acres (many grids).	0-1, where 1 is the parcel or grid(s) with the highest floodplain stream priority
27. H20SH_PRES	Within a Conservation Priority Watershed (CPW).	0 = not within a CPW 1 = within a CPW
28. H20SH_ACRES	Number of acres of the parcel or grid within a CPW.	Acres.
29. H20SH_NORM	To calculate this attribute, H20SH_ACRES for each parcel or grid was divided by the H20SH_ACRES of the parcel or grid with the highest number of CPW acres. The top CPW acreage used was 11,749.71 acres (LANDSTAT_ = 19883; owned by Sealaska Regional Corporation). 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
30. H20SH_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
31. KARST_PRES	Presence or absence of karst.	0 = no karst present

		1 = karst present
32. KARST_ACRES	Number of karst acres in parcel or grid.	Acres.
33. KARST_NORM	To calculate this attribute, KARST_ACRES for each parcel or grid was divided by the KARST_ACRES of the parcel or grid with the highest number of karst acres. The top karst acreage used was 10,302.042 acres (LANDSTAT_ = 21102; owned by Sealaska Regional Corporation). For the gridded analysis, the top karst acreage used was 5 acres (many grids).	0-1, where 1 is the parcel or grid(s) with the highest karst priority
34. SCORE	Total of 15 attributes. The expression is: [PA_PRESENC]+ [WET_PRESC]+ [WET_NORM]+ [EST_PRESC]+ [EST_NORM]+ [AWC_PRESC]+ [AWC_NORM]+ [HYDRO_PRES]+ [HYRDO_NORM]+ [FP_PRESC]+ [FP_NORM]+ [H20SH_PRES]+ [H20SH_NORM]+ [KARST_PRES] + [KARST_NORM]	
35. TIMB_ACRES	Acres of second growth and clear cut forest in a parcel or grid.	Acres.
36. 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 Prince of Wales. 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 Prince of Wales HUC, but this is not necessary – it simply made for faster geoprocessing.
3. Create a new field called "ACRES" and calculate its geometry (right click on field header, select Calculate Geometry, Units: Acres).
4. Summarize the attribute of interest by LANDSTAT_ or FID, depending on which is a unique identifier for the source layer. Include the summary statistic of SUM for the newly created field of ACRES. This will create an 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 output table to the base Parcel Prioritization or 5-acre Grid Layer based on the unique identifier field (generally LANDSTAT_ or FID). Keep all records. This will also create a count field that lists the number of records that are being summarized for each unique identifier.
7. 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 (field from joined table) of greater than 0.
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 ACRES field 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).