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Islands Trust

Print Date: June 11, 2020

Top Priorities Report

Local Planning Committee

1. *Application Processing Services Update*	Responsible	Dates
CURRENT: Combine policies 5.6.1, 5.6.2 and 5.6.3, add Model Fee Bylaw and model DAI Bylaw - draft back to LPC for May 2020 **PLANNED:** RFD to Trust Council on revised policy and model fees	Narrisa Chadwick	Rec'd: 22-Aug-2019 Target: 20-May-2020

2. *Protect quality and quantity of fresh water resources of the Trust Area*	Responsible	Dates
Freshwater Management Strategy: Develop a regional freshwater management strategy that addresses responsibilities under the Water Sustainability Act, identifies water resources throughout the Trust Area, integrates water resource management into land use decision-making, and accounts for the impacts of climate change on island water resources (2018-2022 Strategic Plan item #7).	Narrisa Chadwick William Shulba	Rec'd: 12-Feb-2020 Target: 20-May-2020

3. *Project Charters for Trust Council Strategic Plan Items:*	Responsible	Dates
1. Model DPAs to protect CDF (2018-2022 Strategic Plan Strategy #2) 2. Eelgrass mapping (2018-2022 Strategic Plan Strategy # 5) 3. Affordable Housing Floor Area Ratio (2018-2022 Strategic Plan Strategy #16)	David Marlor Narrisa Chadwick	Rec'd: 11-Jun-2020

Islands Trust

Print Date: June 11, 2020

Top Priorities Report

Local Planning Committee

4. *Protecting Cultural Heritage - Interim Measures*	Responsible	Dates
Staff to provide options report back to LPC	David Marlor Lisa Wilcox	Rec'd: 11-Jun-2020

Islands Trust

Print Date: June 11, 2020

Projects Report

Local Planning Committee

1. *Shoreline Marine Planning*	Responsible	Date Received
Trust Council - 2015-2018 Strategic Plan Item Conduct a working group session to brainstorm possible directions.		09-Nov-2017

2. *Preserve, protect and advocate for forest and terrestrial ecosystems*	Responsible	Date Received
1. Map contiguous tracts of the Coastal Douglas-fir zone (CDF) and associated ecosystems to aid in protection of that zone and its associated ecosystems (underway by contractor for completion March 31, 2020) (2018-2022 Strategic Plan item 1). 2. Create a model development permit area for Local Trust Committee-Bowen Island Official Community Plans bylaws to protect Coastal Douglas-fir zones throughout the Trust Area (2018-2022 Strategic Plan item 2).		12-Feb-2020

3. *Preserve and protect marine ecosystems*	Responsible	Date Received
1. Map the extent of eelgrass and kelp beds throughout the Trust Area (2018-2022 Strategic Plan item 5). 2. Undertake a review of Local Trust Committee- Bowen Islands Municipality foreshore policies and regulatory bylaws and develop model policy and regulatory bylaws for the protection of the foreshore and nearshore (2018-2022 Strategic Plan item 6).		12-Feb-2020

4. *Protect quality and quantity of fresh water resources of the Trust Area*	Responsible	Date Received

Projects Report

Local Planning Committee

1. Map and develop water budgets for groundwater aquifers in the Trust Area (2018-2022 Strategic Plan item 8)
2. Develop a model land use regulation regarding freshwater sustainability including groundwater, rainwater catchment and greywater recycling (2018-2022 Strategic Plan item 9).

12-Feb-2020

5. *Strengthen housing affordability throughout the Islands Trust Area*	Responsible	Date Received

Implement the high priority actions outlined in the Affordable Housing in the Trust Area: Strategic Actions for Islands Trust previously referred by Trust Council:

1. Develop model bylaws that use floor area ratio as a density metric for consideration of implementation in local trust area land use bylaws (2018-2022 Strategic Plan item 16).
2. Develop model density bonus bylaws for consideration of implementation in local trust area land use bylaws (2018-2022 Strategic Plan item 16).
3. Develop model bylaws to address the use of building stratas as a tool for affordable housing (2018-2022 Strategic Plan item 16).

12-Feb-2020

6. *Mitigate and adapt to climate change impacts*	Responsible	Date Received

1. Amend Official Community Plans and land use bylaws to foster climate change resilience, including measures to protect Coastal Douglas fir, foreshore and nearshore environments and groundwater. (2018-2022 Strategic Plan item 11).

12-Feb-2020

REQUEST FOR DECISION

To:	Trust Council	**For the Meeting of:**	June 16, 2020
From:	**Local Planning Committee**	**Date Prepared:**	June 11, 2020
SUBJECT:	**Contiguous Forest Mapping Project**		

RECOMMENDATION:
That the Trust Council circulate the "Contiguous Forest Mapping in the Islands Trust Area Report" prepared by Cabin Forestry Ltd, and the "Map Book, Forest Ecosystems in the Islands Trust" to local trust committees and Bowen Island Municipality for information.

CHIEF ADMINISTATIVE OFFICER'S COMMENTS:
This work is undertaken at the direction of the Local Planning Committee and in cooperation with the Islands Trust Conservancy, and the Coastal Douglas-fir and Associated Ecosystems Conservation Partnership (CDFCP). The completion of this work fulfils Trust Council Strategic Plan Strategy No. 1, and provides material for undertaking Strategy No. 2.

1 PURPOSE:
To present the results of the contiguous forest mapping project requested and funded by the Islands Trust Local Planning Committee.

2 BACKGROUND:

At its regular business meeting on June 11, 2020, the Local Planning Committee passed the following two resolutions:

> *That the Local Planning Committee request that Staff develop a Project Charter, budget, scope and timeline creation of model development permit areas for Local Trust Committee-Bowen Island Official Community Plans bylaws to protect Coastal Douglas-fir zones throughout the Trust Area, and information from upcoming delegation to TC and work being done on salt spring island be incorporated into the project.*
>
> *That the Local Planning Committee forward the "Contiguous Forest Mapping in the Islands Trust Area Report" prepared by Cabin Forestry Ltd, and the "Map Book, Forest Ecosystems in the Islands Trust" to Trust Council with a recommendation to circulate to local trust committees and Bowen Island Municipality for information.*

The Islands Trust and Islands Trust Conservancy (ITC) are working to advance Coastal Douglas-fir (CDF) protection throughout the Islands Trust Area, and to prioritize protection of remaining areas of contiguous forest cover.

In August, 2019, the Local Planning Committee passed resolution 2019-016:

That the Local Planning Committee direct staff to spend up to $15,000 to map contiguous tracks of the Coastal Douglas-fir zone and its associated ecosystems in partnership with the Coastal Douglas-fir and Associated Ecosystems Conservation Partnership (CDFCP).

Islands Trust staff worked with Islands Trust Conservancy Staff to contract, through a competitive process, Cabin Forestry Ltd. to conduct this work. The project objective was to map patches of connected forest across the full extent of the Islands Trust Area, including all islands and islets, with a goal of identifying important areas of contiguous forest for protection.

The A/Manager and A/Ecosystem Protection Specialist worked closely with planning staff and the contractor to develop appropriate methodology to identify contiguity and to determine 'quality' or ability of patches to provide ecosystem functions. At draft stages planners were engaged to ensure that the final map products are suitable to inform their work and to meet the needs of the Local Planning Committee.

The final product consists of a report, a series of maps, and spatial data that can be integrated with our existing TAPIS mapping, to be used by planners and other Islands Trust and ITC staff.

This work completes Trust Council Strategic Plan Strategy No 1:

Map contiguous tracks of the Coastal Douglas fir zone (CDF) and associated ecosystems to aid in protection of that zone and its associated ecosystems.

The work also informs Trust Council Strategic Plan Strategy No. 2:

Create a model development permit for Local Trust Committee-Bowen Island Official Community Plans bylaws to protect Coastal Douglas fir zones throughout the Trust Area

Work won Strategy 2 is envisioned to occur in Fiscal Year 2021/22, and as such a budget and Project Charter has not been created for this work.

3 IMPLICATIONS OF RECOMMENDATION

ORGANIZATIONAL:
No implications.

FINANCIAL:
Consideration of budget for FY2021/22 to include work on Strategic Plan Strategy No. 2

POLICY:
Consistent with Islands Trust Council Strategic Plan.

IMPLEMENTATION/COMMUNICATIONS:
Staff will forward copies of the report and maps to local trust committees and Bowen Island Municipality.

FIRST NATIONS:
No implications.

OTHER:
No other implications.

4 RELEVANT POLICY(S):

2.3.1 Council Committees policy
2.3.2 Local Planning Committee Terms of Reference
6.2.1 Priority Setting/Review guidelines

5 ATTACHMENT(S):

1 *Contiguous Forest Mapping in the Islands Trust Area*, report prepared by CABIN Forestry Ltd, March 2020.

2 Map Book, *Forest Ecosystems in the Islands Trust*, containing maps for each Trust Area (low resolution attached, high resolution maps available).

RESPONSE OPTIONS

Recommendation:
That the Trust Council circulate the "Contiguous Forest Mapping in the Islands Trust Area Report" prepared by Cabin Forestry Ltd, and the "Map Book, Forest Ecosystems in the Islands Trust" to local trust committees and Bowen Island Municipality for information.

Alternative:
As directed by Trust Council.

Prepared By: **David Marlor, Director, Local Planning Services**

Reviewed By/Date:

Contiguous Forest Mapping in the Islands Trust Area

Prepared by:

Cabin Resource Management
Unit 20A - 100 Kalamalka Lake Road
Vernon, BC V1T 9G1

For:

Islands Trust
200 - 1627 Fort Street
Victoria, BC V8R 1H8

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1.0 Executive Summary

Cabin Resource Management was hired by the Islands Trust to map contiguous forest patches in consultation with the Islands Trust Conservancy (ITC). The goal of the mapping exercise was to identify contiguous forest patches within the Islands Trust Area in order to provide the Islands Trust with information to underpin policy, regulatory and legal conservation tools that protect Coastal Douglas-fir forests and their associated ecosystems. This mapping was identified as an essential step in the Islands Trust's report titled "Protecting the Coastal Douglas-fir Zone & Associated Ecosystems: An Islands Trust Toolkit."

After the initial proposal of using overlays of Terrestrial Ecosystem Mapping (TEM) and disturbance layers in a Geographic Information System (GIS), various subsequent analyses were evaluated by the project team and members of the ITC staff. Consultation with ITC staff was focused on the identification of ecological values and careful consideration of the geographic scale of the planning activities that would be informed by the resulting product. Following the identification of the ecological parameters, Islands Trust staff provided input on the draft mapping products and these products were adjusted to reflect planning needs. The resulting maps and data sets show the distribution of forested ecosystems in the Islands Trust Area, differentiating between established forests and forested ecosystems in earlier structural stages; a stand quality rating was calculated considering low or high intensity of effects based on road density and structure locations.

2.0 Background Information

The Islands Trust and the Coastal Douglas-fir and Associated Ecosystems Conservation Partnership have emphasized the protection of Coastal Douglas-fir (CDF) and associated ecosystems in order to maintain their unique ecological value and the numerous ecosystem services they provide. Mapping of the CDF and associated ecosystems is essential to the establishment of conservation priorities and the administration of regulatory tools such as zoning and Development Permit Areas (DPAs) which can serve to protect these values.

3.0 Approach and Rationale

Through consultation with the ITC, a constraints mapping and inventory approach[1] was taken to identify and map contiguous forest patches. The patches were subsequently ranked by the presence and the type of disturbance within the forested area. The consultation

[1] Constraints mapping is used in land use planning to minimize negative effects to a landscape and to identify areas of high or low sensitivity. Areas of constraint are present when there is higher potential for environmental impact or where there are high value natural resources (e.g. older forest).

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process focused strongly on accurate problem definition and avoiding the incorporation of implicit biases in the model design.

TEM polygons were chosen as the basic spatial unit of the analysis. Each TEM polygon has a defined spatial boundary and unique attributes. The individual polygons provide spatially explicit information that describes the distribution of ecological features on the landscape. These TEM polygons can be aggregated to larger patch sizes composed of sets of polygons which share common attributes. Where these attributes define a forested ecosystem, the aggregated set of adjacent units may form a contiguous area where boundaries are shared. At the landscape level, defined by islands, the aggregated patch size is an informative metric. For instance, this can tell us how much recruitment stage forest is present versus established forest for an island. While large aggregated polygons may store a quantitative summary of their individual TEM components, any variation within the patch cannot be shown on the maps. The value of maintaining TEM polygons as intact spatial units is that their boundaries and attributes are defined by a standard process and the attributes can be queried to provide more information than is symbolized in map layouts.

In ranking contiguous forest patches, proposed approaches included evaluation of patch size, and defining interior versus edge affected patches. Much of the relevant literature regarding contiguity and continuity of forested ecosystems focuses on large fauna, most of which are absent from the Islands Trust study area. The chosen approach did not use contiguity criteria from any specific animal species to limit the spatial distribution of forested ecosystems as the use of such criteria risked de-valuing or excluding patches that did not meet the criteria for that particular species. For instance, it was recognized during modelling parameter discussions that if a minimum patch size criterion was set, it would discount small patches that otherwise provide important refuge for many wildlife species. Likewise, a similar result would be realized if only "interior forest" patches set back from the forest edge were considered high-quality or included in the final data set.

The following analyses were undertaken to describe the forested components of the Islands Trust land base:

1. Use of Terrestrial Ecosystem Mapping: TEM was acquired by the ITC between 2007 and 2011 and was updated in 2017. The TEM formed the basis of both the disturbance layers generated in this analysis and the classification of contiguous forest patches. TEM polygons are based on air-photo interpretation at 1:10,000 to 1:20,000 scale and field sampling. Each polygon has attributes that indicate the ecosystems types (site units) within the polygons, their relative representation and attributes such as structural stage. Anthropogenic features are also attributed as unique Map Codes in the TEM (*Standard for Terrestrial Ecosystem Mapping in British Columbia,* 1998).

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2. Incorporation of disturbances into analyses: Provincial road and structure location data sets were used to augment the information contained in the TEM. Because of the significant investment in TEM mapping made by the Islands Trust and the ecological merits of the data, it was intended that the integrity of that data set be preserved in any data products resulting from the subsequent analysis. As such, information was added to the polygon framework of the TEM without modifying the TEM polygons spatially. The approach was first subtractive, removing anthropogenically modified sites on the landscape. The threshold for anthropogenic disturbance was set at 20%. The assumption was made that above this threshold the value of ecological communities would decrease in response to losses of habitat availability. This threshold is consistent with the low-risk target for maintaining habitat representation across a Coastal Douglas-fir landscape described in *Conservation Planning in the Coastal Douglas-fir Ecosystem* (Holt, 2007). Natural non-forest ecosystems were then removed from the data set, and impacts on the remaining forested area were identified.

   Road presence was determined to be a negative impact on the score of patch quality where it occurred above a linear density threshold. Unless they were greater than 20% of a polygon in the original TEM, roads were not considered to break contiguity of forest patches. The presence of roads is generally considered to affect both plant and animal communities. The impacts may include the avoidance of roads by certain species, direct mortality of species, as well as negative effects associated with the use of roads by humans and the increased colonization of habitat by invasive plant species. The general effects of roads on large vertebrate population at the landscape scale is well supported, however site-level effects on specific species may be more difficult to generalize (USFS, 2001). The threshold at which road density affects animal populations varies widely by species, with estimates ranging from 0.36 - 1.9 km/km^2 for large mammals and avoidance distances ranging from 35 m for salamanders and 300 m for deer (Robinson et al, 2010). These effects may be due to either presence of the infrastructure or motor vehicle traffic. Road features that were considered infrequently used by the public, or that were designated for non-motorized use only, were excluded from the analysis. Polygons with road densities greater than 1 km/km^2 were considered high road density polygons, and this layer was included in patch quality analysis.

   Structure location point density was classified using the Jenks natural breaks classification method. Where structure location points occurred at high densities in TEM polygons, the TEM polygons were classified as anthropogenic non-forest sites. At low structure densities, the forest ecological quality of TEM polygons was reduced. This procedure attempted to fill gaps in the disturbance mapping present in the TEM.

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The potential edge effects created by structures location points were not quantified because they did not bisect polygons and were not always visible in aerial photos. The low-density structures were not considered to have equivalent effects to road edges but may still cause lesser edge effects which are not accounted for in the analysis.

3. "Naturalness" was classified: Forest patches were described using a three-class system representing their relative "naturalness". All forest ecosystems were retained in the analysis.

4. Identification of areas with restoration potential: The final forest polygon layer was divided into early and late structural stage classes. The purpose of this was to identify polygons that have not matured into the "young forest" stage but have the potential to increase in structural complexity as they age.

4.0 Analysis Procedure

1. TEM Disturbance Mapping
    a) Non-forest polygons were identified in the TEM. Non-forest attributes are indicated by a '00' code in the Site Series field. Polygons which represented 20% or greater non-forest area were identified.
    b) Non-forest polygons with 20% or greater anthropogenic disturbance were identified. Polygons with Map Codes corresponding to the following definitions were flagged: 'Cultivated Field', 'Cultivated Orchard', 'Cultivated Vineyard', 'Exposed Soil', 'Golf Course', 'Gravel Pit', 'Industrial', 'Pasture', “Reservoir”, 'Road Surface'', 'Rural Development', 'Transmission Line', 'Urban/Suburban'.
2. Additional Disturbance Calculation
    a) The Structure Point data set from the BC Wildfire Service was used to identify structures which were not present in the TEM data used above.
        i. The structure density per TEM polygon was calculated as the number of structures within each polygon boundary divided by the polygon area in hectares. The resulting data were classified using Jenks breaks, rounded to the nearest whole number.

Range	Class	Non-Forest Polygon
<=1	1	NO
>1, <=4	2	NO

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>4, <=9	3	YES
>9, <=21	4	YES
>21, <=86	5	YES

ii. Polygons with a structural density of Class 3 or higher were considered to have anthropogenic modification equivalent to the anthropogenic map codes identified above and were removed from the forested area. Class 2 was considered to have a lesser influence on the forested ecosystem and were considered in the classification of forest ecosystem quality below. Class 1 was considered to have a negligible effect.

b) Roads from the Digital Road Atlas were used to identify additional linear disturbance not represented in the TEM.
   i. Roads that were classified as 'driveway', 'pedestrian', 'recreation', 'restricted' and 'resource' were removed from the analysis.
   ii. The linear density of roads within each polygon was calculated by dividing the total length of all road segments within each polygon by the area of the enclosing polygon.
   iii. The resulting data were grouped into two classes – 'High' and 'Low' where road density was greater than 1 km / km^2 and less than or equal to 1 km / km^2. The polygons with high road density classes were considered to have an influence on forested ecosystems and were not excluded from the forested area but were used in rating forest ecosystem quality.

3. Forest Patch Classification
   a) Forested polygons were divided into two classes. For each TEM polygon 'Established Forest' was identified where the Structural Stage was greater than 4 in at least 50% of the combined deciles of the polygon. The remaining forested polygons were classified as 'Recruitment Forest'.
   b) The 'naturalness' of each forested polygon was rated using the following criteria ranking disturbance:

Disturbance	Modifier
No Disturbance	0
Road Class High	-1
Road Class Low	0
Structure Class 2	-1

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Structure Class 1	0

c) The cumulative disturbance scores were represented by the following patch quality classes:

Map Class	Disturbance Level	Score
3	Low	0
2	Moderate	-1
1	High	-2

5.0 Results

Forest mapping in the Islands Trust reveals highly variable spatial patterns of forest distributions between islands. Visual interpretation of the data shows corridors between larger contiguous patches, the dominance of stands in the recruitment stage of their growth, and different matrices of forest patches and disturbances. For instance, the mapping of Bowen Island shows corridors between large established forest patches with relatively undisturbed interiors (Figure 1). Whereas the mapping of northern portion of Salt Spring Island shows a more diffuse distribution of smaller patches of different quality and structural stage classes (Figure 2). Another unique pattern is observed on North Pender where Class 1 mature forest is sparsely distributed within an anthropogenically dominated landscape (Figure 3). Many islands show a combination of these patterns. Complete map layouts for the local trust areas are appended to this document and are available in digital form.

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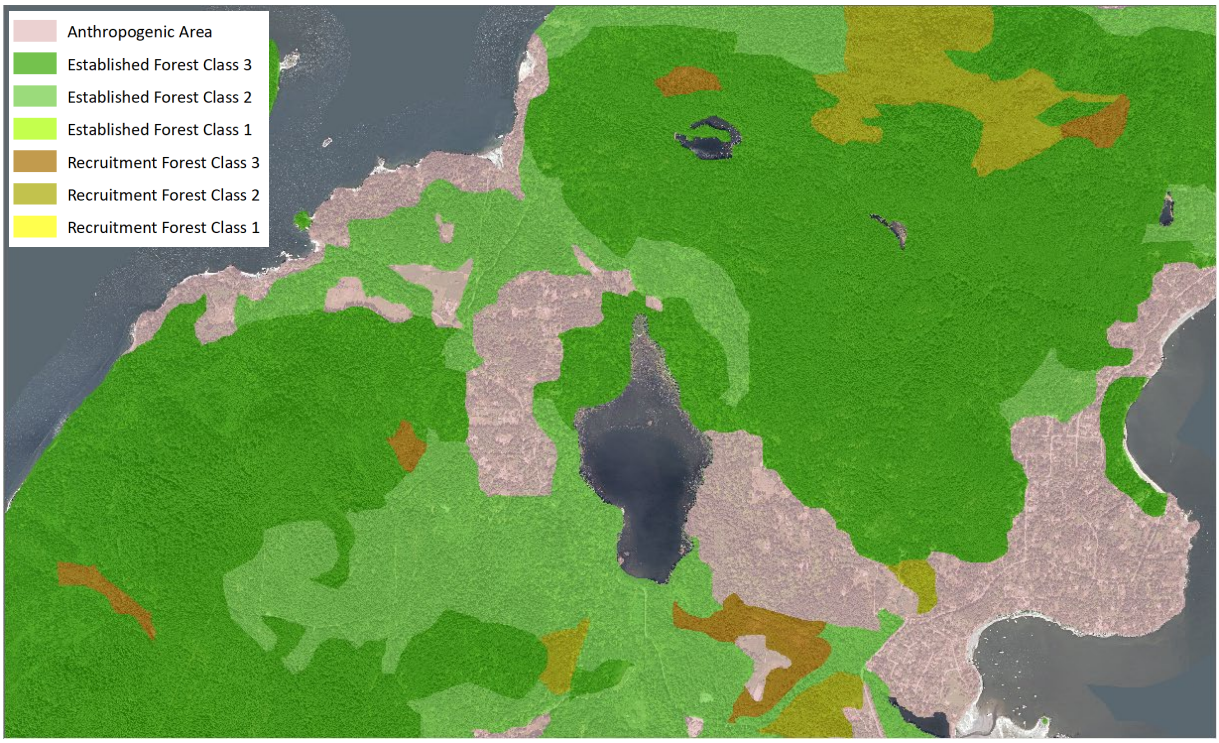

Figure 1. Corridors connecting large established forest areas on Bowen Island.

Figure 2. Diffuse patches of forested ecosystems in different structural stages on Salt Spring Island.

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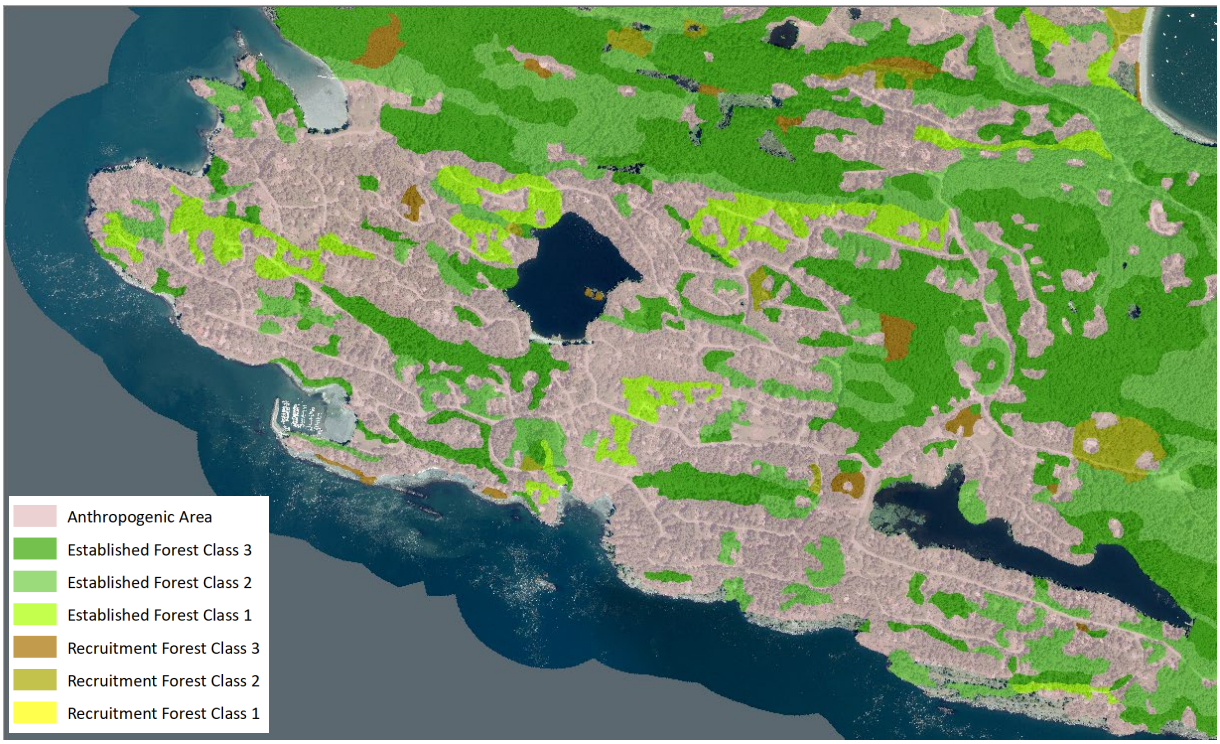

Figure 3. Small mature patches embedded in matrix of anthropogenic landscape features on North Pender.

6.0 Interpretation and Use

Using the provided mapping, management decisions can be contextualized in the forested, non-forest, and anthropogenic landscape. The data provided here can be used to inform the planning of Development Permit Areas (DPA) or recommend zoning restrictions in some areas, provided site-level ground truthing is completed. However, the key utility of this product is to help planners understand the wider spatial context in which those specific decisions are being made and to emphasize the unique patterns in each local trust area which bear on those decisions.

The variability observed in the spatial organization and size distribution of the patches between islands, as well across islands, provides an important context for site-level management decisions. However, the degree of variability described by this mapping places the weight of decision making on a case-by-case interpretation of the results.

Interpretation of these map products to define conservation goals, particular to each island or local trust area, will help inform key management decisions. For instance, restoration efforts could be focused on areas where early succession forests are dominant. Likewise, where the forested landscape is composed of small isolated patches of established forest, protection measures may be appropriate to increase connectivity between patches, to

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protect this scarce resource. The provided map products can be used to identify areas of connectivity between forest patches, prioritize their protection from development pressures, or identify areas of potential connectivity towards which restoration can be focused. Some combination of these strategies should be utilized in each trust area, but the balance and emphasis of management actions must rest on a detailed assessment of the needs and values of each local trust area and incorporate a variety of data, local and traditional knowledge. Local trust area specific GIS models or decision support systems may have utility, but a detailed synthesis of available knowledge and an articulation of values is critical to this process.

It is recognized that logging occurs on private land in the Islands Trust. It may be difficult to anticipate these activities as parcels change ownership and the values of the owners change over time. It may be prudent to encourage the long term, sustainable management of private forests and the incorporation of public values into this management. The mapping tools currently available to the Islands Trust can be useful in developing measures which take into consideration the existing level of fragmentation of the forested ecosystems. For instance, existing road openings and forest edges and can be used to minimize the creation of new disturbances. Alternative silviculture systems such as single tree or small patch selection could also be used to maintain canopy cover over the landscape.

7.0 Limitations

The most challenging limitation inherent in this type of analysis is the scale and accuracy of the underlying mapping. Since primary data collection was outside the scope of this project, it relied on the previously collected TEM data. This was mapped at the 1:10,000-1:20,000 scale, depending on the island. This level of precision means that decisions which require highly detailed mapping should employ a measure of "ground truthing" to verify the accuracy of TEM boundaries and attributes in the field. While considerable effort was made within the scope of this project to ensure the TEM data attributes followed conventional standards, errors and omissions may be present which would require additional field work to correct. Some of these errors may have been introduced by land use changes which occurred after the completion of this initial field work. Likewise, the identification and mapping of contiguous forest was generalized, as it was not specific to any species habitat and therefore avoided over specifying the model. Relevant ecological questions might become evident at finer scales that are not addressed here. These mapping products should be used to contextualize site-level decisions within the forested landscape but not be relied on to execute them.

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8.0 Considerations for Future Work

Constraints mapping and inventory of forested ecosystems in the Islands Trust may form the basis of further analysis or provide context for other types analysis of the Trust's forest ecosystems.

Trust Area Specific Modelling and Mapping: The present model could be further developed to reflect the conservation planning goals of each trust area and the development challenges they face. This could resemble a refinement of the patch quality ratings to incorporate conservation values which have been identified per island.

LiDAR Analysis of Forest Resources: LiDAR could be used to update the present analysis with greater precision and accuracy. This will identify both recent openings and small openings in the canopy that are not presently accounted for in the TEM, and would provide a more accurate inventory of forest resources. Furthermore, the identification of veteran trees from this data set may have value for planning around natural heritage values. Additionally, LiDAR may be used in some cases to expedite the ground-truthing of DPA or zoning sites.

Resiliency and Climate Change: This inventory of forest resources in the Islands Trust could be improved by an assessment of the resiliency of stands to a changing climate and modelling compositional changes of forest ecosystems. These models can help inform long-term, multi-generational decision-making.

Carbon: Using a detailed forest inventory, the current and potential storage and sequestration rates of forest carbon can be calculated under different management scenarios. As the carbon economy matures, these models may become critical to responsible management of forest resources and provide an economic incentive for sustainable forest management.

9.0 References

Holt, R.F. (2007). *Conservation Planning and Targets for the Coastal Douglas Fir Ecosystem. A Science Review and Preliminary Approach*. Integrated Land Management Bureau, Nanaimo.

Resources Inventory Committee, Province of British Columbia. (1998). *Standards for Terrestrial Ecosystem Mapping in British Columbia*. Publication No. 7680000609.

Robinson, C., Duinker, P.N., Beazley, K.F. (2009). A Conceptual Framework for Understanding, Assessing and Mitigating Ecological Effects of Forest Roads. NRCan Research Press.

United States Department of Agriculture Forest Service. 2001. *Forest Roads: A Synthesis of Scientific Information*. General Technical Report PNW-GTR-509.

10.0 Appendices

A. Decision criteria for constraints and forest mapping.

Map Feature	Objective	Analysis	Decision criteria
Anthropogenic Non-forest	Identify anthropogenically modified polygons	TEM data classification	>= 20 % non-forest polygon (Site Series = '00') and TEM Map Code represents anthropogenic landscape feature. (Holt, 2001).
Natural Non-forest	Identify natural non-forest polygons	TEM data classification	>= 20 % non-forest and TEM map code represents natural non-forest features such as rock outcrops, open water, etc.
Roads	Model disturbance caused by roads	Density analysis	Road density is over or under a threshold of 1 km / km^2. (USDA, 2001).
Structures	Model disturbance caused by structures	Density analysis	Structure density is classified by Jenks breaks. Higher classes represent disturbances not captured in TEM but observed in ortho photography.
Structural stage	Distinguish between structurally complex mature forest and early succession forests.	TEM data classification	Established Forest has TEM Structural Stage > 4 in >= 50 % of polygon. The remainder are Recruitment Forest stands in early succession.

B. Summary of forested TEM units by local trust area.

STRUCTURAL STAGE CLASS		Established Forest			Recruitment Forest			
PATCH QUALITY CLASS		1	2	3	1	2	3	**Total (ha)**
TRUST AREA	**BM**		1,162	2,543		148	93	**3,947**
	DE		729	674		1,162	421	**2,986**
	EX			29			14	**43**
	GB	17	2,094	517		821	79	**3,528**
	GL		2,594	910	3	1,456	220	**5,183**
	GM	8	1,641	6,312	18	366	460	**8,803**
	HO		568	835		2	371	**1,776**
	LA		1,392	4,551		34	151	**6,129**
	MA	15	673	869		61	92	**1,709**
	NP	34	1,184	2,171	2	174	152	**3,717**
	SA	14	1,336	1,565	2	98	163	**3,178**
	SP	2	301	387		35	17	**742**
	SS	14	3,360	5,273		1,827	2,825	**13,300**
	TH		1,205	1,947		366		**3,518**
Total (ha)		**105**	**18,239**	**28,583**	**24**	**6,549**	**5,059**	**58,559**

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Prepared By:

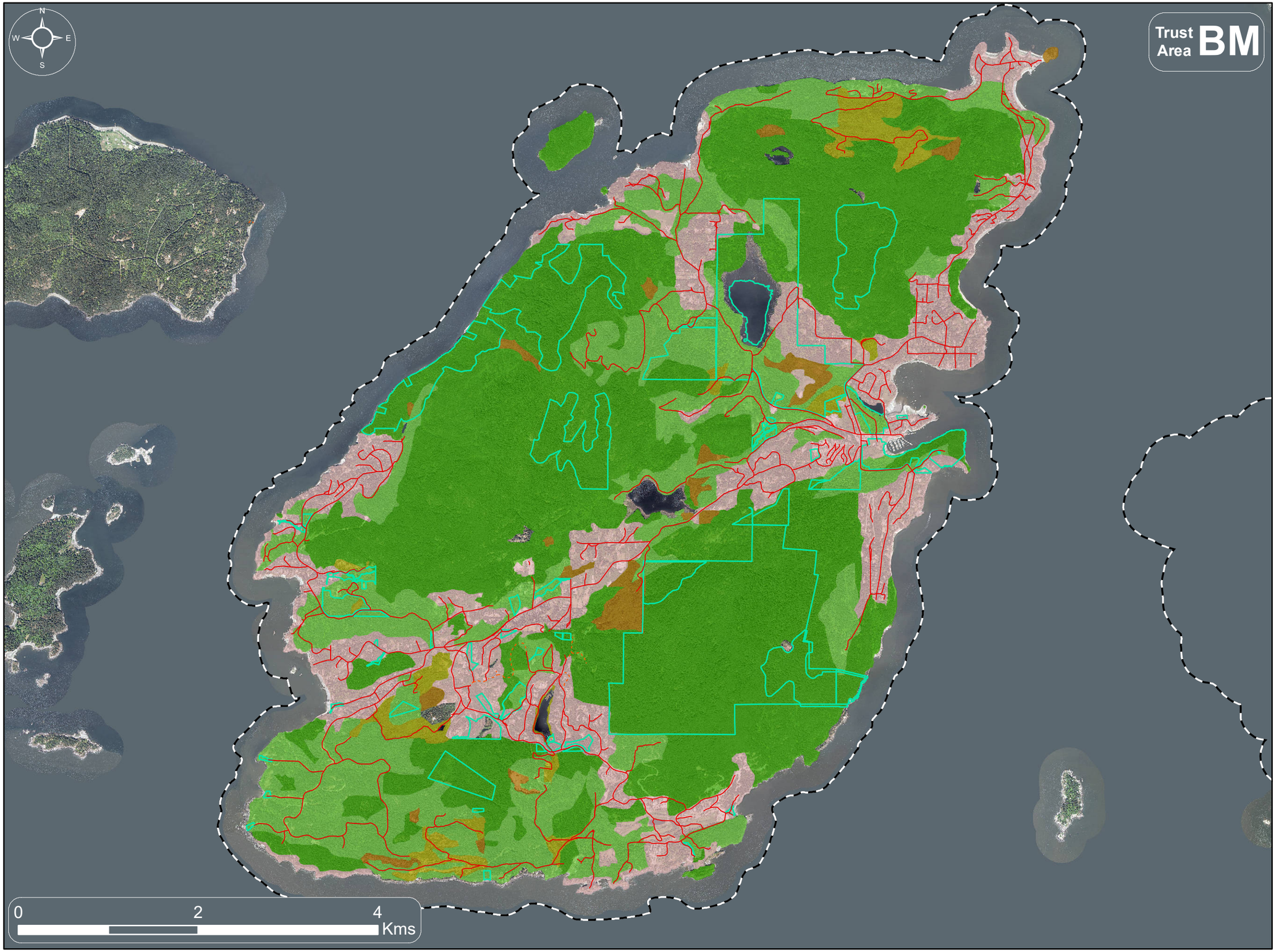
Liam Quan, FIT
Resource Analyst
Cabin Resource Management

Reviewed By:

Mike Crone, RPF
Partner
Cabin Resource Management

May 4, 2020

"I certify that the work described herein fulfills the standards expected of a member of the Association of British Columbia Forest Professionals and that I did personally supervise the work."



Forest Ecosystems In The Islands Trust

- Private Road/Driveway
- Road
- Anthropogenic Area
- Established Forest Class 3
- Established Forest Class 2
- Established Forest Class 1
- Recruitment Forest Class 3
- Recruitment Forest Class 2
- Recruitment Forest Class 1
- Federal/Provincial Parks, Nature Reserves And Protected Areas
- Trust Area Boundary

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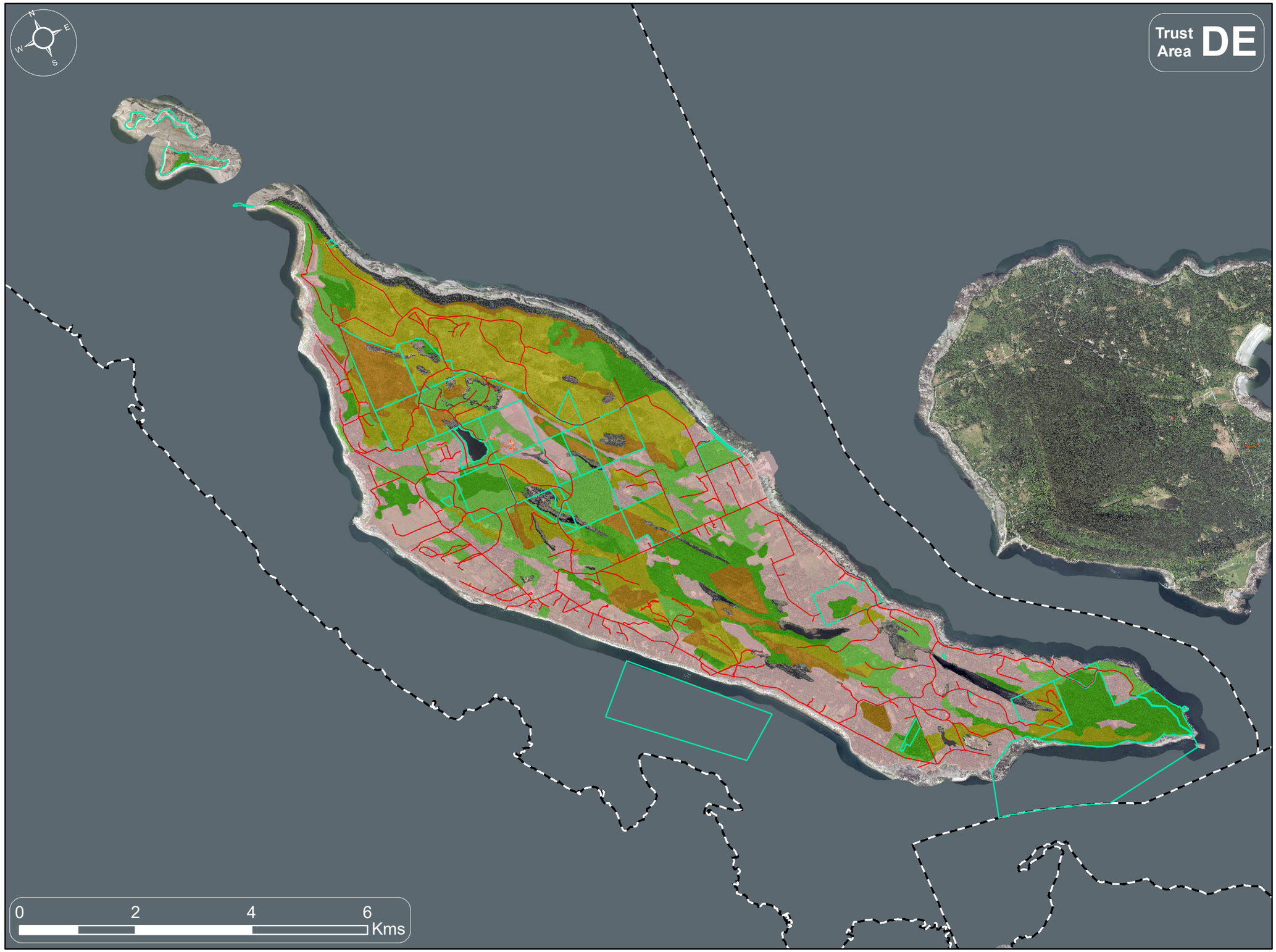

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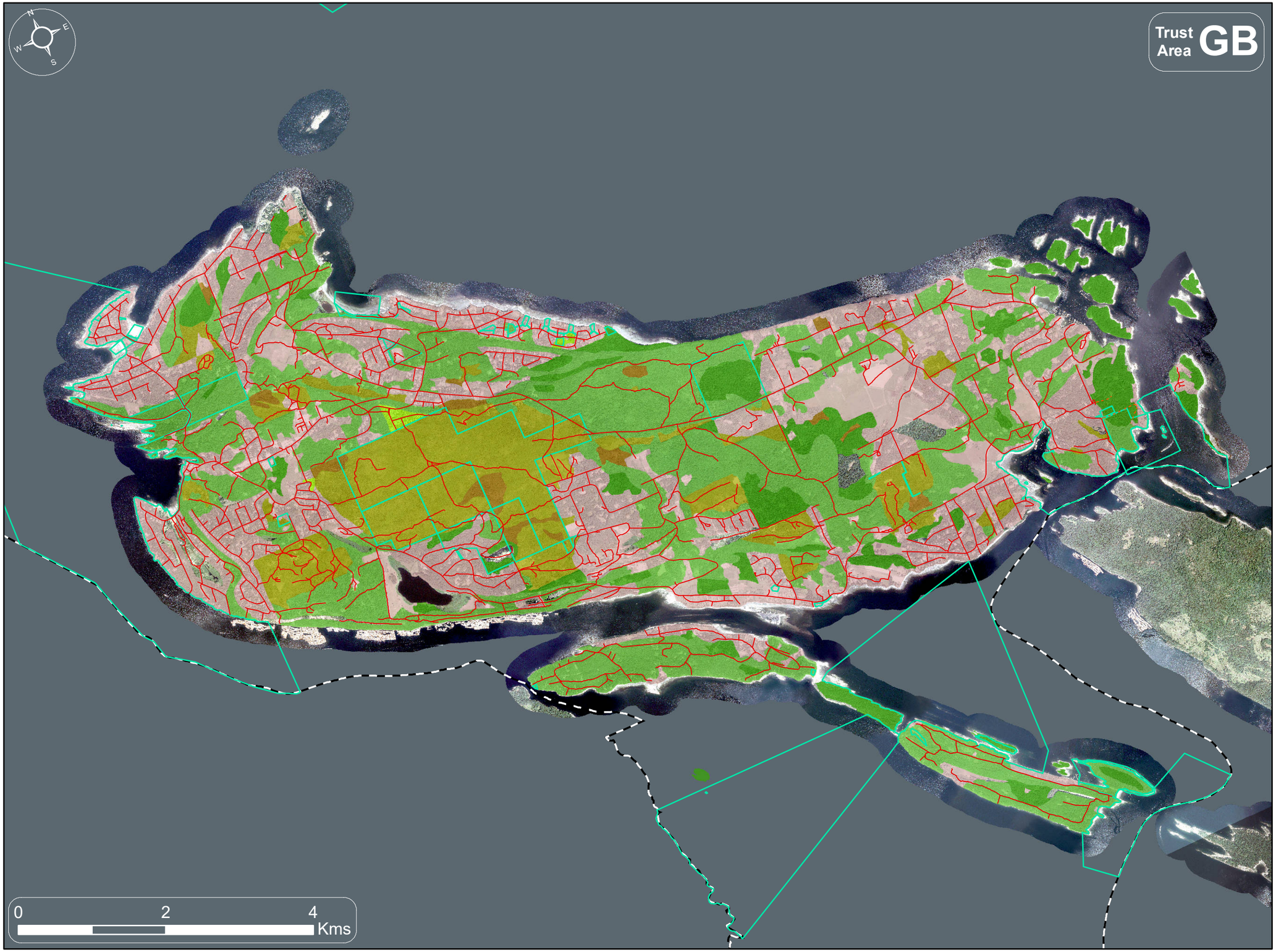

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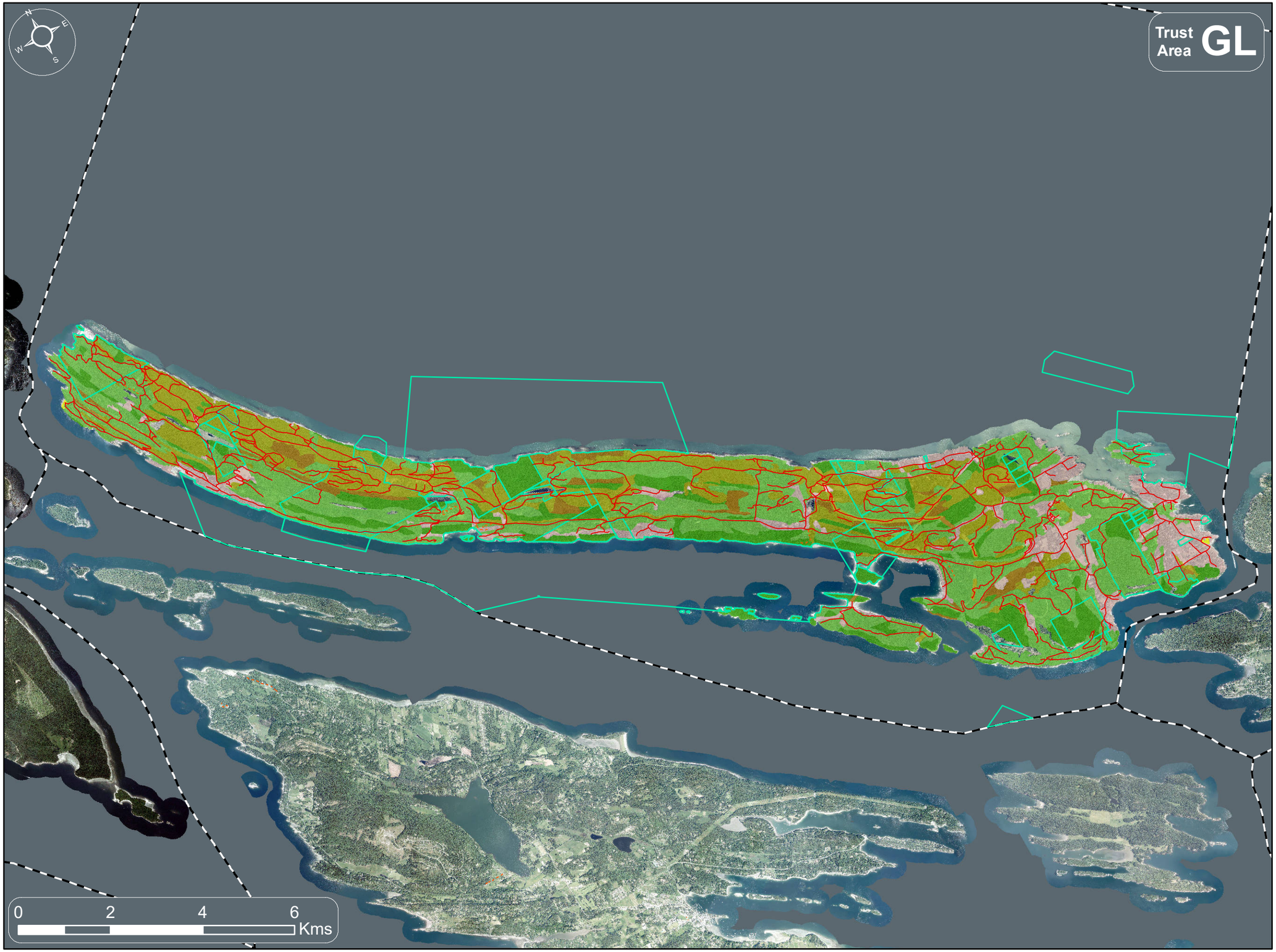

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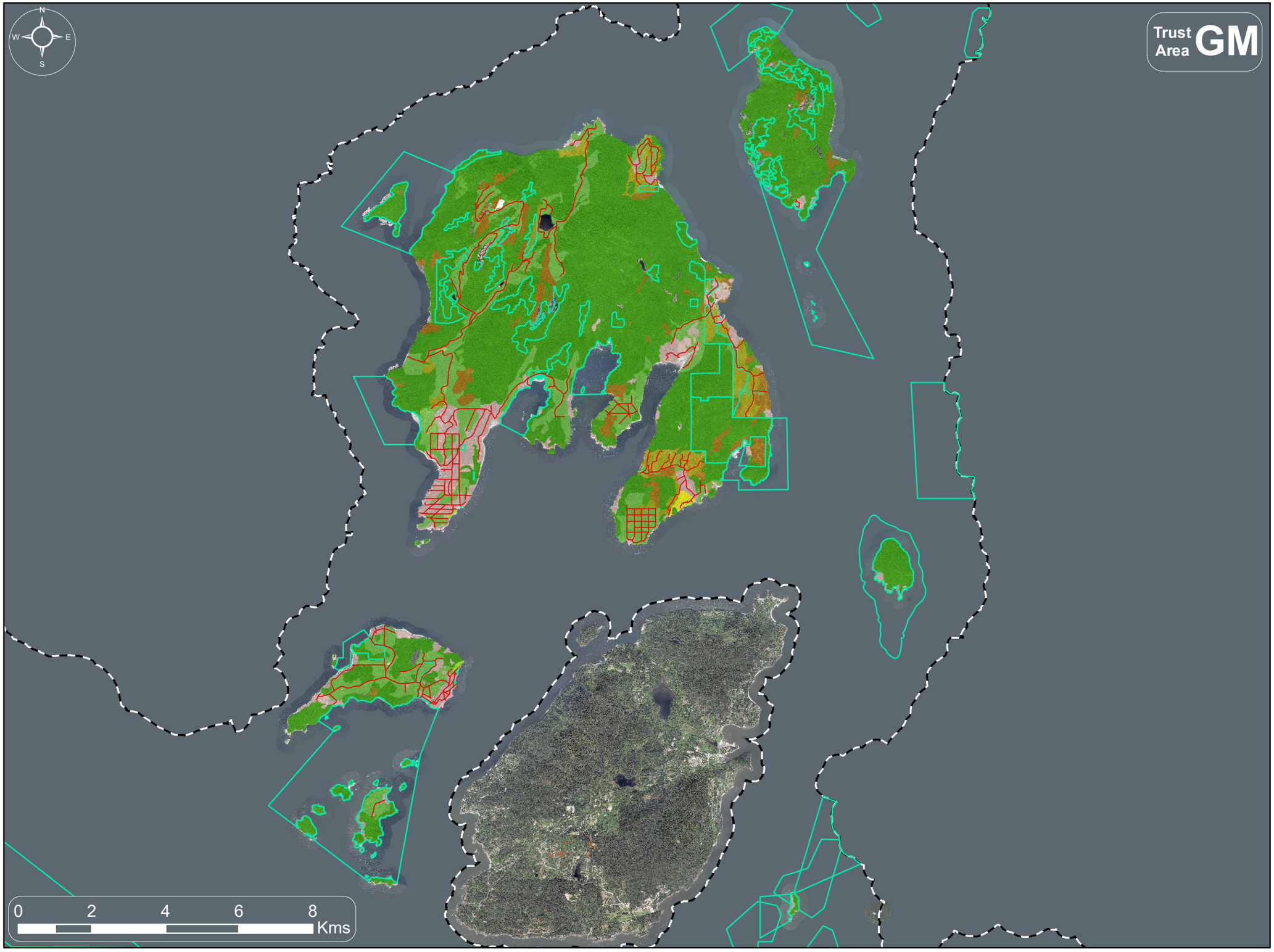

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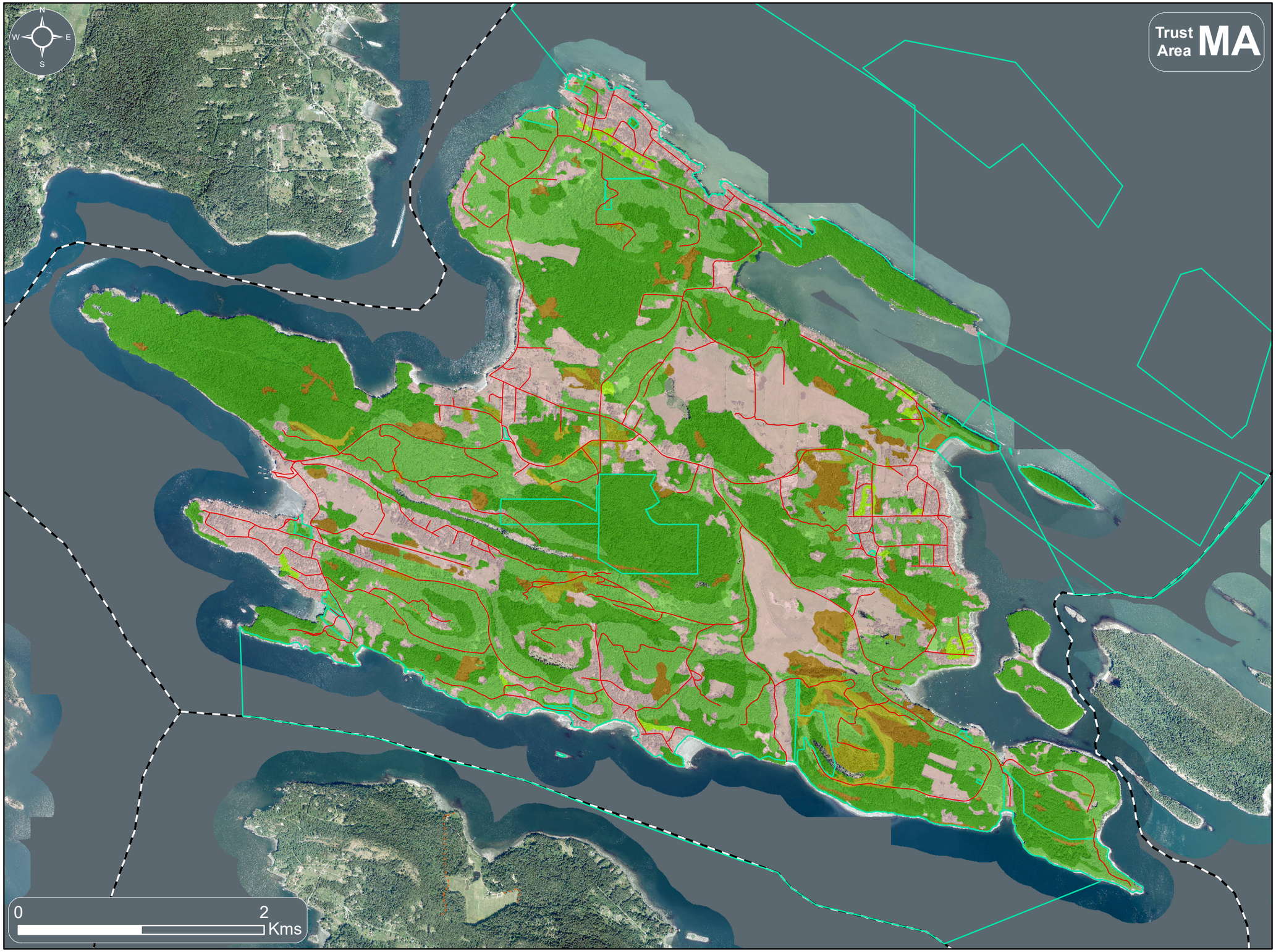

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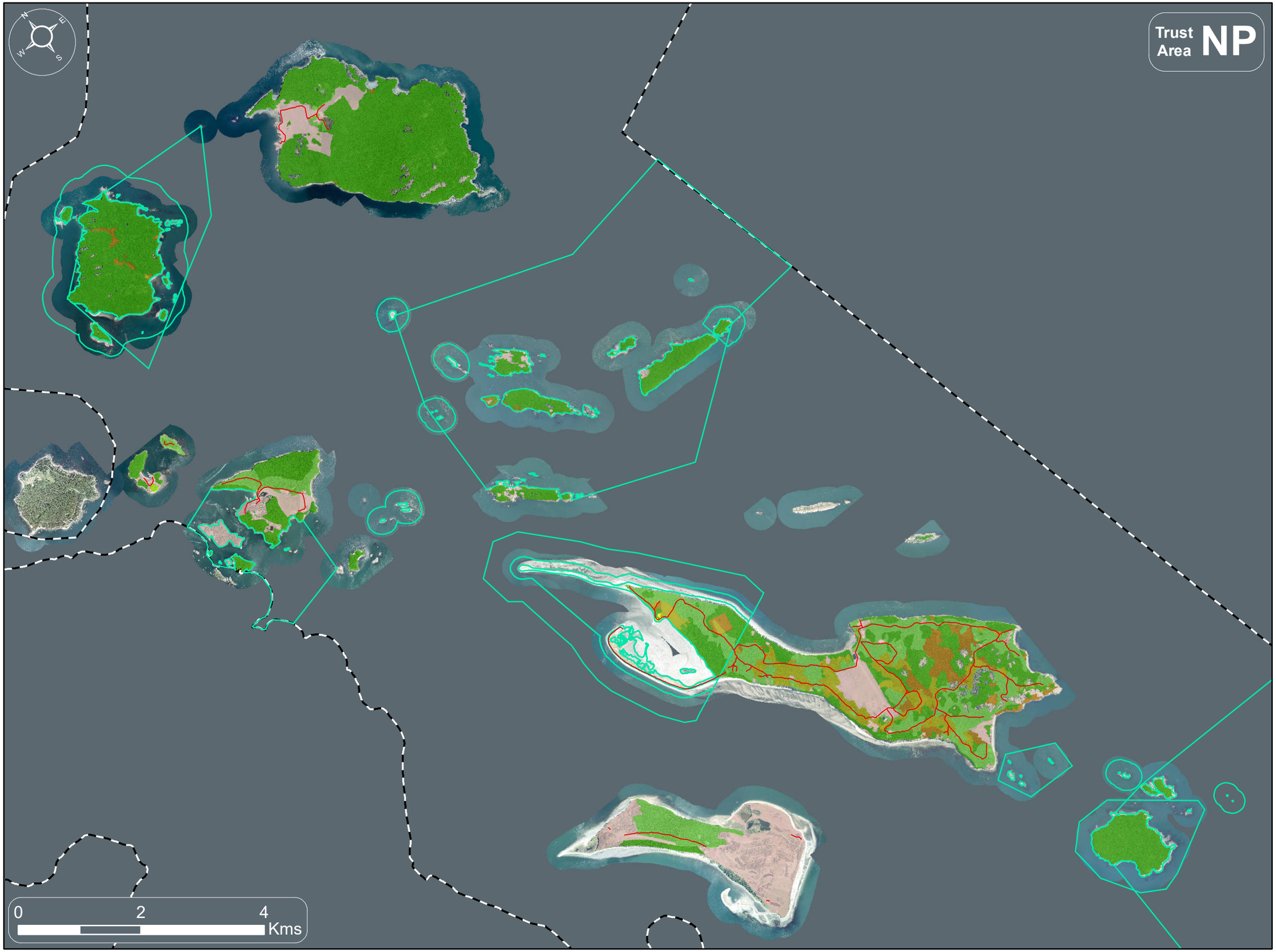

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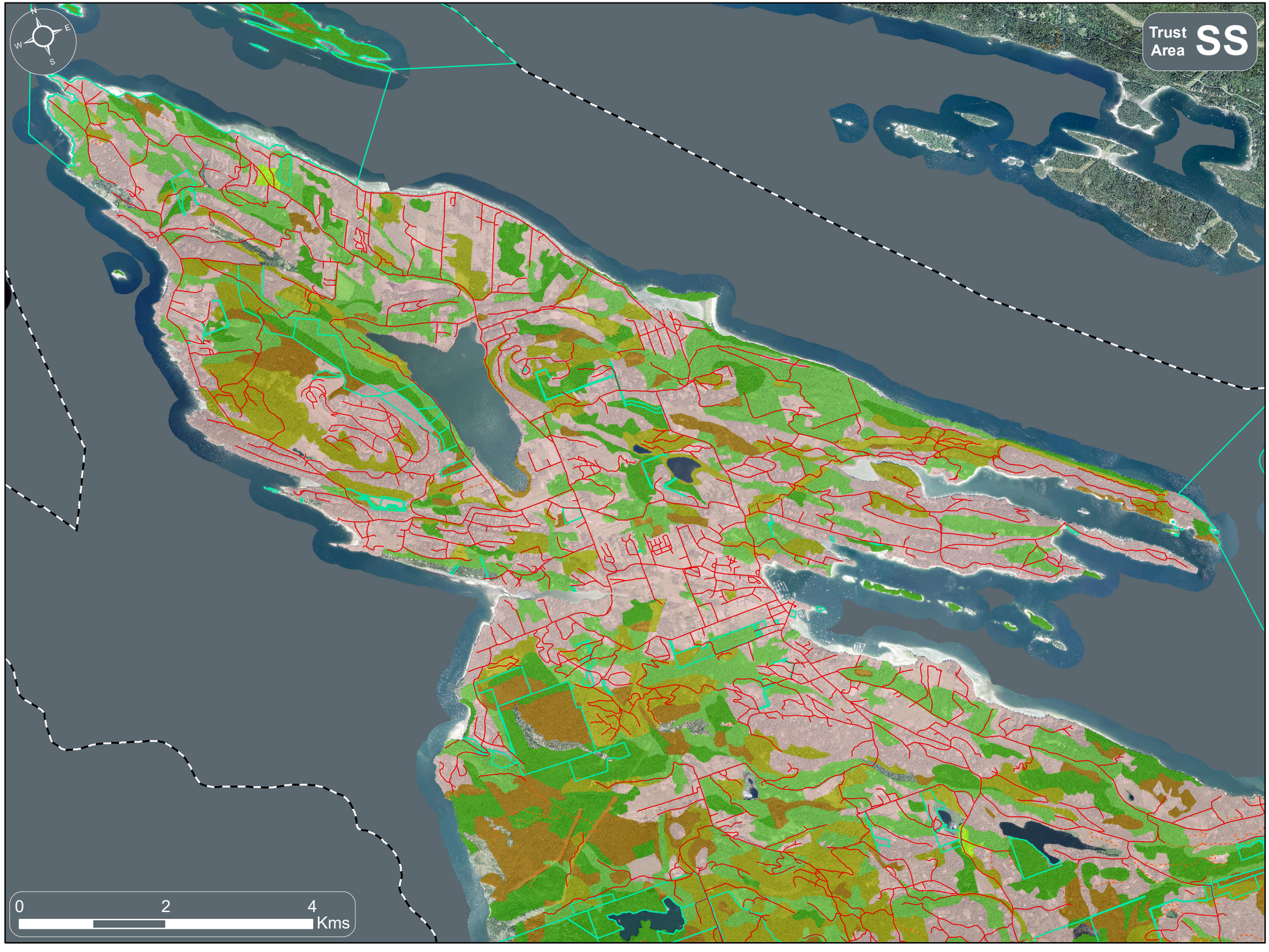

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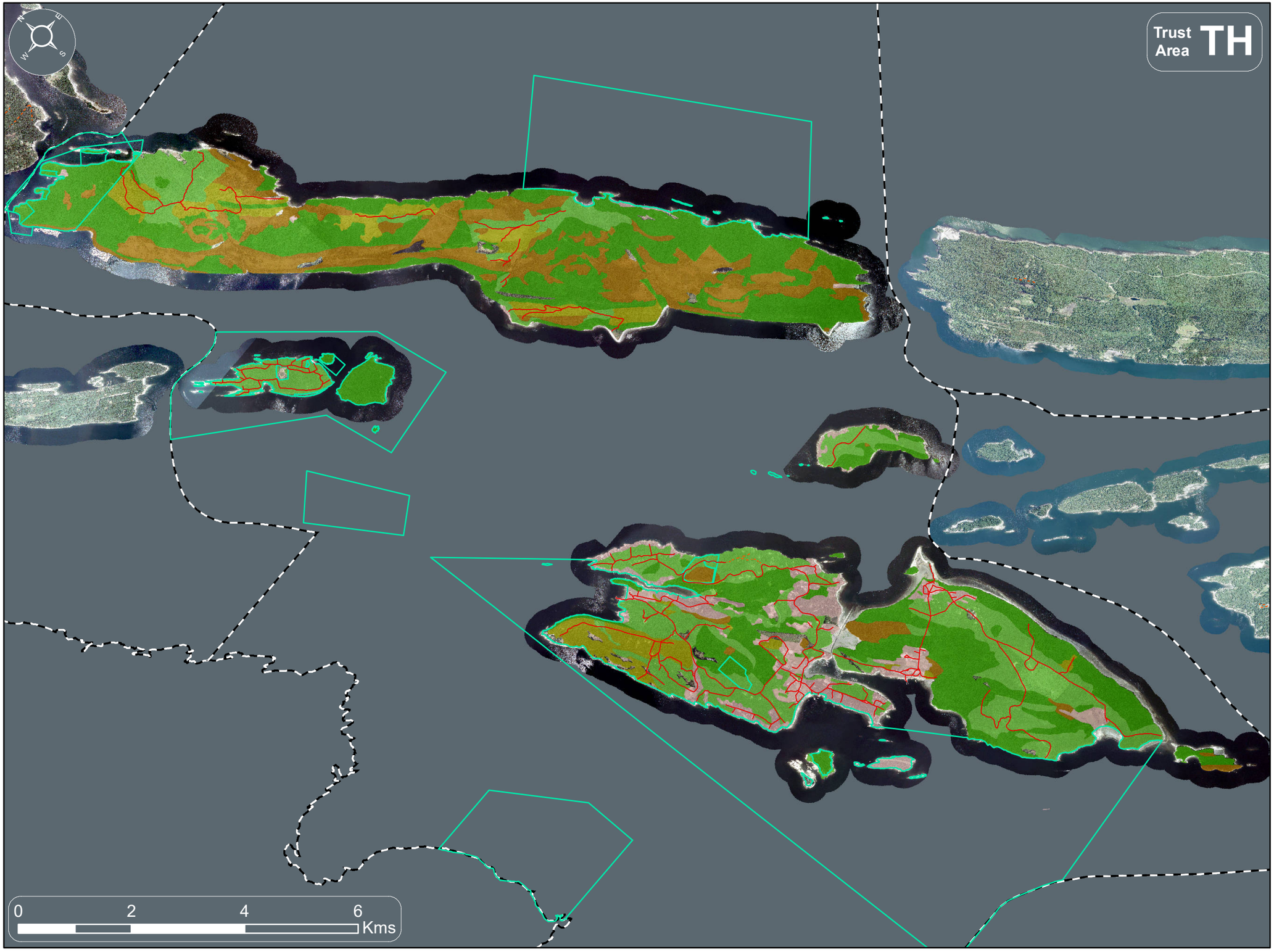

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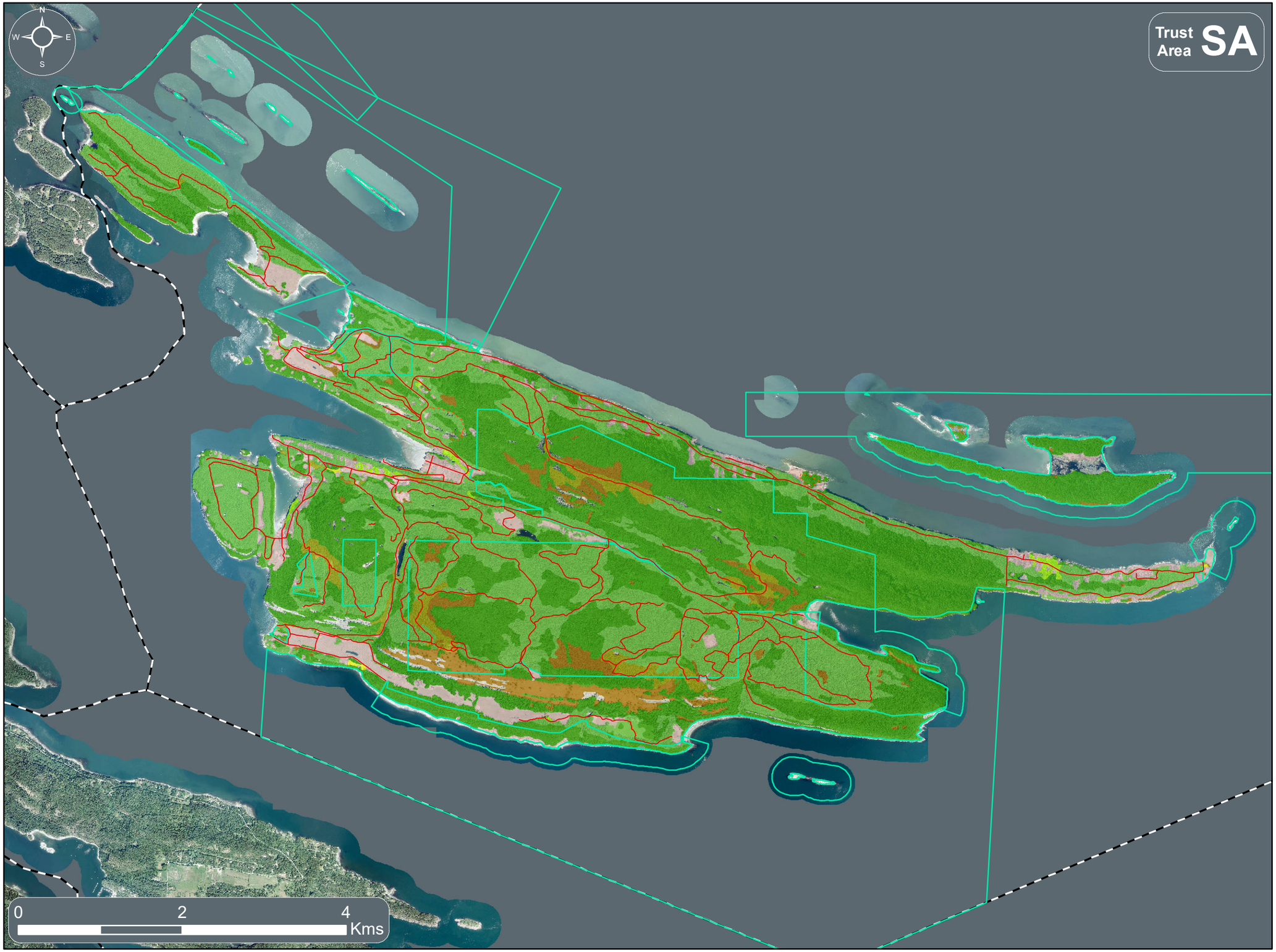

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Islands Trust Budget:

- increases every year
- is difficult for a lay person to understand due to presentation methods
- draws on “surplus funds” to “moderate” increases in property tax – this is unsustainable
- public is asked for input on less than 3% of the budget
- 97% of $8million plus is allocated to fixed charges with no discussion invited

SIRRA asks that Islands Trust :

- Review total IT work scope with a view to reducing work and staff levels – and property tax!
  - Overlap of work with other regional departments such as CRD should be examined for efficiency gains
- Present the budget so that a lay person can easily understand it
  - Compare actual spend year on year
- Demonstrate financial prudence
  - explain how the use of surplus funds can be eliminated or managed sustainably

SIRRA asks that Islands Trust:

- Request public input into the entire $8million spend (not merely the 2.5% that is not allocated to staff and other fixed costs)
- Design feedback surveys so that dissent is encouraged – surveys to date merely ask people to agree with the wide ranging goals of the IT
- In view of the economic impact of CV19, urgently re-examine the budget for larger reductions than those publicised recently

Dissolution of Office of the Auditor General for Local Government (AGLG):

- SIRRA is disappointed by the decision to dissolve the office of the AGLG
- SIRRA asks that IT explain how a rigorous external audit of costs and benefits to the taxpayers can be undertaken?
- Does the Union of B.C Municipalities (who vigorously opposed the office of the AGLG and of which IT is a member) have a process for external audits?

Conclusion

SIRRA welcomes a response to the questions raised and is available for consultation at any time

Thank you

NOTE: SIRRA hopes that virtual meetings will continue in a cost effective manner - to allow public attendance and an overall reduction in costs.

Ecological Research Network: A Concept to Support the Islands Trust Strategic Plan

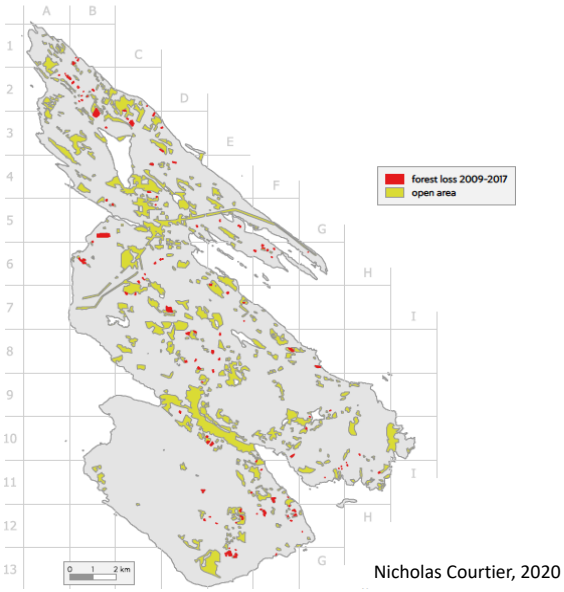
Tara Martin, Briony Penn, Ruth Waldick, Susan Hannon, Hannah Carpendale

What we offer

1. Up-to-date Science, Data and Decision-Making Tools
2. Timely and defensible knowledge to inform Ecosystem Based Management
3. High return on investment
4. Collaboration

Understanding cumulative impacts

- Land Use Change
- Climate Change
- Loss of Understory
- Fire Ecology
- Invasive Species



Nicholas Courtier, 2020

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- **Land Use Change**
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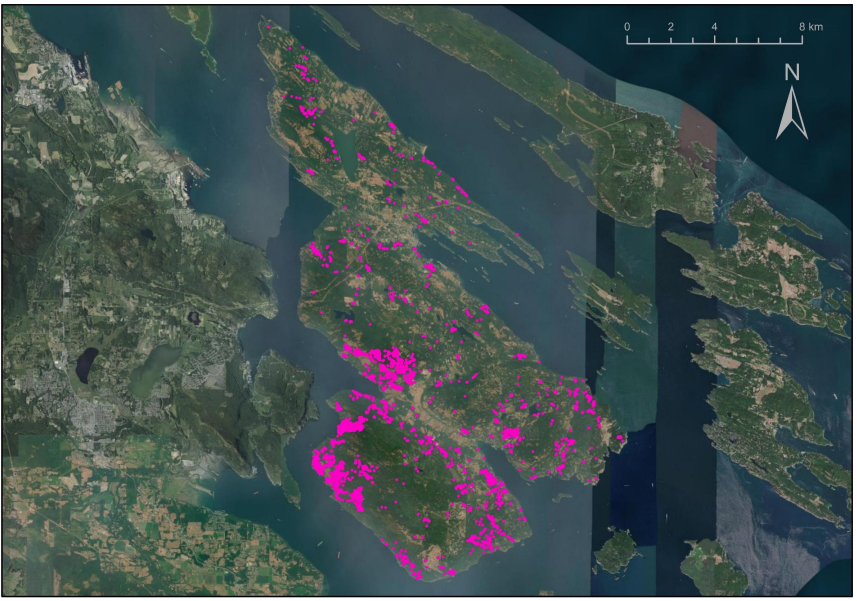

TALL TREE DISTRIBUTION

- Trees >50m

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June 8, 2020
GCS_WGS_1984

THE UNIVERSITY OF BRITISH COLUMBIA
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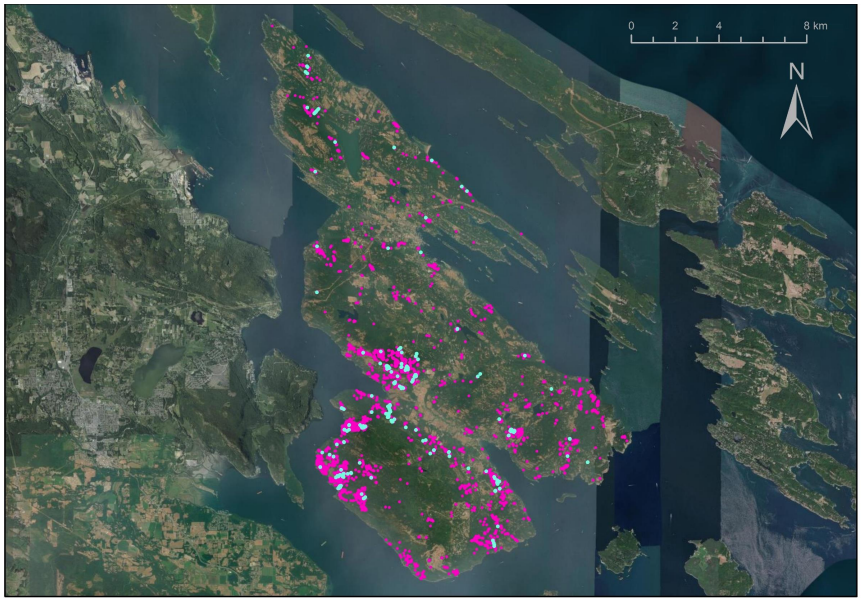

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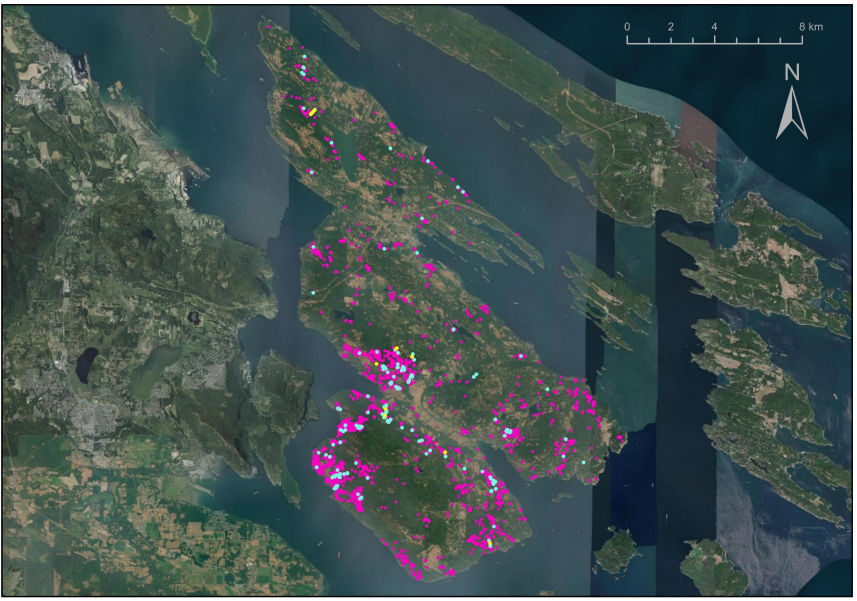

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- Trees >60m
- Trees >70m

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June 8, 2020
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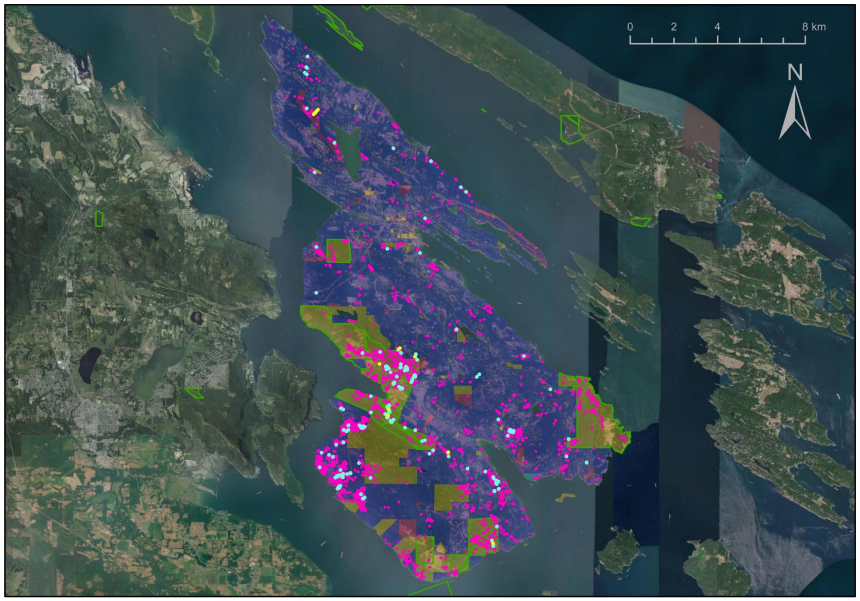

TALL TREE DISTRIBUTION

- Trees >50m
- Trees >60m
- Trees >70m
- Crown/government
- First Nation Reserve
- Mixed/unknown
- Private
- Protected Areas

Cassandra Holt
Conservation Decisions Lab
Dept. of Forest and Conservation Sciences
tara.martin@ubc.ca
June 8, 2020
GCS_WGS_1984

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Understanding cumulative impacts

- Land Use Change
- **Climate Change**
- Loss of understory
- Fire Ecology
- Invasive Species

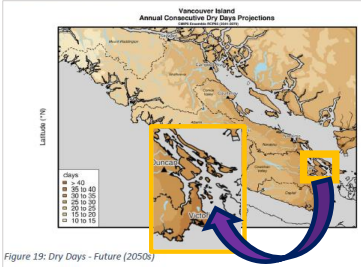
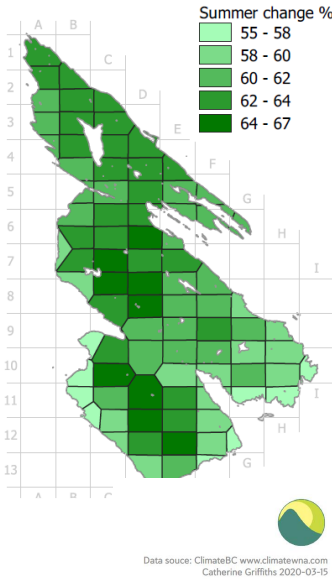


Figure 19: Dry Days - Future (2050s)

Excerpt from IT Conservancy Climate Projections for Islands Trust Area Report. 2020. Pinna Sustainability

% Summer moisture deficit

PCIC climate data downscaled for SSI (Waldick for CAP 2.0)



Data souce: ClimateBC www.climatewna.com
Catherine Griffiths 2020-03-15

Understanding cumulative impacts

- Land Use Change
- Climate Change
- **Understory loss**
- Fire Ecology
- Invasive Species

Understanding cumulative impacts

- Land Use Change
- Climate Change
- **Understory loss**
- Fire Ecology
- Invasive Species

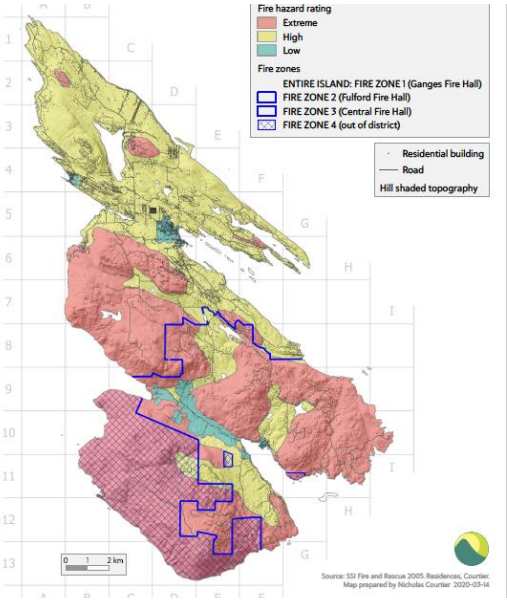
Understanding cumulative impacts

- Land Use Change
- Climate Change
- **Understory loss**
- Fire Ecology
- Invasive Species

Understanding cumulative impacts

- Land Use Change +
- Climate Change +
- Understory Loss +
- Fire Ecology +
- Invasive species

= Increased Fire Risk, Loss of biodiversity, Loss of our natural heritage, lost opportunity for carbon sequestration

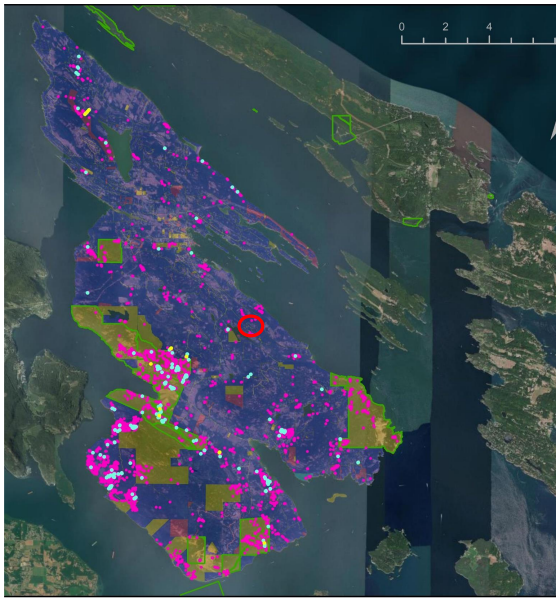


Our Climate Responsibility

Projected emissions from recent 10ha clearcut on Beddis Rd = 15,000 tonnes C02e

Or 3,260 cars

To restore would cost $1.5M and >105 years to re-sequester carbon emitted



Benefits

1. Timely & accessible scientific evidence
2. Bring together priorities of ITC (CDF, Climate Change, Water, First Nations Reconciliation)
3. Prioritize management action

Tony MacLeod, Susan Hannon & Donna Martin planting Garry Oaks at AVNR

Atl'ka7tsem/Howe Sound Update

The scheduled Howe Sound Community Forum was moved to an online event on April 24th. About 40 elected representatives from all levels of government and from West Vancouver to Whistler participated. The focus was on communities coping with the pandemic, but there were several positive accounts of the increased wildlife activity in the Atl'ka7tsem area as well. This forum continues to be an incredibly valuable opportunity for elected representatives and First Nations to combine ideas and resources as a region.

One of the long-term goals of the Forum has been to recognize Atl'ka7tsem as a region distinct from all the overlapping jurisdictions that criss-cross the area especially in terms of ecological recovery and sustainable development. The Howe Sound/Atl'ka7tsem Biosphere Regional Initiative will greatly enhance the recognition of this area. This past December, the nomination package was presented to the Canadian Commission for UNESCO in Ottawa by Project Lead Ruth Simons and Sḵwx̱wú7mesh Uxwumixw Council member, Joyce Williams. The HSBRI Society received positive feedback from the Commission that they have a solid proposal for the UN's Man and the Biosphere Program and it is now responding to specific questions around long-term governance and sustainability. The Society will make a final submission to UNESCO in September for their summer 2021 announcements of Biosphere Reserves.

For full details please see https://www.howesoundbri.org/

Ruth, who lives part-time on Gambier Island, also wanted me to remind the Trust Council that 2021 begins the UN Decade of Ocean Science for Sustainable Development and the Canadian Commission is very focused on the relationship with OceanWise and Fisheries and Oceans Canada as it is a UNESCO led initiative focused on ocean literacy.

In light of the developing structure around the Biosphere, the Ocean Watch Task Force (supported over the past two years by funding through the Islands Trust Programs Committee) is reviewing its terms of reference. The goal is to determine the long-term role of the Task Force in relation to the local governments and First Nations that participate on it, the ongoing recommendations from the Ocean Watch document, and how to best support the Biosphere Initiative. One of the Task Force's ongoing responsibilities is as the leadership committee for the Marine Reference Guide for Howe Sound, a comprehensive data set for scientists, planners, visitors, story-tellers and others to access about the region. This should become live in the Spring of 2021.

Feeding into the Marine Reference Guide is the David Suzuki Foundation's Mapping Project for Atl'ka7tsum/Howe Sound. The Foundation provided a workshop in April 30th on how to use the mapping program and staff from the Islands Trust Conservancy as well as from the Trust's Northern Office attended. Please take a minute to go into the mapping program and see the amazing information that has been gathered for the marine environment in the Atl'ka7tsem area.

https://davidsuzuki.org/project/howe-sound/

I'm sure my fellow Atl'ka7tsem Trustees can fill you in with further details about the various projects that make this part of the Trust such an exciting and rewarding place to represent.

KL Stamford, Gambier Local Trust
June 2020

From: Francesco Sindico <francesco.sindico@strath.ac.uk>
Sent: Tuesday, May 5, 2020 3:25 PM
To: Francesco Sindico <francesco.sindico@strath.ac.uk>
Cc: Giulia Sajeva <giulia.sajeva@strath.ac.uk>; Nicola Sharman (Student) <nicola.sharman.2019@uni.strath.ac.uk>; Patricia Berlouis (Student) <patricia.berlouis.2015@uni.strath.ac.uk>
Subject: Islands and Covid-19

Dear Colleague,

Please find attached the latest update of the data collated by Island Innovation and SCELG on islands and Covid-19. In the attached document you will find updates for the following countries/islands:

- Croatia
- Seychelles
- Estonia
- Germany
- Mauritius
- Curaçao (NEW)
- Cook Islands (NEW)
- Spain
- Maldives (NEW)
- Denmark
- Trinidad & Tobago
- U.S.A
- Madagascar (NEW)
- Scotland
- Portugal
- Ireland
- Canada
- Australia (NEW)

The web site is being updated and the changes should be live tomorrow (6 May) after 5PMhttps://www.strath.ac.uk/research/strathclydecentreenvironmentallawgovernance/ourwork/research/labsincubators/eilean/islandsandcovid-19/. On the web page you will be able to retrieve the info per country and per survey question. As I anticipated last week, on some islands/countries we are entering a second phase, one where the lockdown is starting to be relaxed. I would like to thank those of you who have started to share information from islands who have started this process and I strongly encourage you to continue to update us on any relevant developments in this important new phase. For your convenience I am attaching the responses from islands focusing on the relaxation of the lockdown, which you will also be able to find on the website from tomorrow afternoon onwards.

I am also happy to share with you a link to a Podcast I contributed to where I discussed, amongst other things, my initial observations stemming from the survey -https://www.patchedheart.ca/otok/s1e6-covid19-islands-and-francesco-sindico Together with James Ellsmoor at Island Innovation I also authored a short piece that starts to capture some of the findings from the survey – see attached and from tomorrow after 5PM you can also find it

at https://www.strath.ac.uk/research/strathclydecentreenvironmentallawgovernance/ourwork/latestoutcomesfromourwork/policybriefs/

Finally, let me kindly remind you that tomorrow (06 May) Island Innovation is organising a first webinar on islands and covid-19, which I will have the pleasure to moderate. With speakers from Greenland, the Maldives, the Canary Islands and Anguilla I am sure it will be an exciting opportunity to learn more about how islands are moving through the ongoing Covid-19 crisis. You can still register and join the webinar athttps://us02web.zoom.us/webinar/register/WN_sjMA9alaQFeehOOR9-yD6g

Regards and thanks again for your precious and generous input into SCELG and Island Innovation efforts to collate data about islands and Covid-19.

Francesco

Dr Francesco Sindico
Co-Director, Strathclyde Centre for Environmental Law and Governance
Programme Leader, Strathclyde LLM in Global Environmental Law and Governance
Reader in International Environmental Law

twitter: @fsindico / @scelg / @OneOceanHub
email: francesco.sindico@strath.ac.uk
website (SCELG): https://www.strath.ac.uk/research/strathclydecentreenvironmentallawgovernance/
website
(LLM): https://www.strath.ac.uk/courses/postgraduatetaught/globalenvironmentallawgovernance/

<image001.jpg>

Co-investigator on the One Ocean Hub -
https://www.strath.ac.uk/research/strathclydecentreenvironmentallawgovernance/oneoceanhub/

<12 Covid 19 Island Responses 05052020.pdf><14 Coronavirus_A Global Island Perspective.pdf><12 Covid 19 Island Responses 04052020 - Question 7.docx>

From: Hope Dallas <HDallas@bimbc.ca>
Sent: Thursday, June 11, 2020 11:06 AM
To: Lori Foster <lfoster@islandstrust.bc.ca>
Cc: Sue Ellen Fast <sefast@bimbc.ca>; Bonny Brokenshire <bbrokenshire@bimbc.ca>
Subject: Request for Islands Trust Support - Recreational Use of Motorized Vehicles on Mt. Gardner

If possible, can you please include the following Council Resolution from the June 8th Regular Council meeting on the June 15th Executive Committee agenda?

Request to Prohibit Recreational Motorized Vehicle Use on Mount Gardner - Bonny Brokenshire, Manager of Environment & Parks Planning, dated May 29, 2020	The Manager of Environment and Parks Planning presented a staff report containing a draft letter to Tom Blackbird intended to provide Council's rationale for requesting a prohibition of motorized use on Mt. Gardner. Discussion ensued.
RES#20-285	**It was Moved and Seconded** Whereas Council adopted Resolution No. 20-276 at its May 11, 2020 meeting requesting that the Province prohibit motorized vehicle use on Mount Gardner; Therefore be it resolved, that Council approve the draft letter, dated May 20, 2020, that outlines rationale for prohibiting recreational motorized use on the Mount Gardner Crown Land polygon, to be signed under the Mayor's signature and submitted to Tom Blackbird, Ministry of Forest, Lands, Natural Resource Operations and Rural Development, District Recreation Officer; and Further be it resolved, that Council request the Islands Trust to support Bowen Island Municipality in its efforts to oppose recreational use of motorized vehicles on the Mount Gardner Crown Land polygon. CARRIED *(Councillor Morse opposed)*

Please let me know if you need anything further, or if a more formal request is required.

Thanks,
Hope

Hope Dallas
Corporate Officer
Bowen Island Municipality
981 Artisan Lane, Bowen Island, BC V0N 1G2
hdallas@bimbc.ca
604-947-4255

BOWEN ISLAND
Municipality

From: scdirtbikers@gmail.com <scdirtbikers@gmail.com>
Sent: Monday, June 8, 2020 4:05 PM
To: chair <chair@islandstrust.bc.ca>
Subject: Contact Form Submission

Contact: Chair, Islands Trust Council
Name: Sunshine Coast Dirt Bikers Association
Email: scdirtbikers@gmail.com
If you would like to be contacted using a different method than E-mail, please enter the details:
email is preferred
Write your message:

Dear Mayor and Council of Bowen Island, Mr.Tom Blackbird - Recreation Officer (Chilliwack Recreation District) and, Chair of the Islands Trust Council:

I am writing on behalf of the Board of the Sunshine Coast Dirt Bikers Association. We have over 50 local members in our organization. We have reviewed the recommendation before the Bowen Island Council to Prohibit Recreational Motorized Vehicle Use on Mount Gardner that is available on your website for today's regular council meeting. As fellow coastal trail stewards, like the Bowen Island Trail Riders Association, who commit thousands of volunteer hours to the maintenance and upkeep of the trails in our community we respectfully submit our support of continued multi-use access on Bowen Island. The Sunshine Coast Trail Strategy which was adopted by the Sunshine Coast Trail Society in April 2014 provides our community with a framework under which we have been able to maintain the multi-use trail network here on the Sunshine Coast.

The Sunshine Coast Dirt Bikers Association is an active participant organization under the umbrella of the Sunshine Coast Trails Society and this has allowed any community concerns which may arise out of shared trail use to be addressed pro-actively and respectfully. It is in this spirit of inclusion that our community has been able to prevent the strife and animosity that we have observed bubble up in other communities when certain user groups are unjustly prohibited from shared enjoyment of Crown Land - which is rightfully and responsibly a public asset.

Thank you for your time and consideration of our submission.

Sincerely,

Nicole Huska - Director, for the Sunshine Coast Dirt Bikers Association Board

cc: Chair, Islands Trust Council via website contact form

From: Ruth Waldick [redacted]
Sent: Tuesday, June 9, 2020 12:19 PM
To: ssiinfo <ssiinfo@islandstrust.bc.ca>
Subject: Forestry on Gulf Islands and Role of IT - New Business Item 12.1

Dear Trustees,

I am writing to support your New Business item in the upcoming June Agenda (12.1) which proposes that Islands Trust request Minister Donaldson to amend the Private Managed Forest Land Act, as stated below:

New Business, item 12.1

Trustee Langereis - PMFL Act Amendments - RFD

That the Islands Trust Council request the Chair write to the Honourable Doug Donaldson, Minister of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD) and the Honourable Minister of Municipal Affairs and Housing (MAH) requesting amendments to the Private Managed Forest Land Act that would enable local trust committees to regulate, but not prohibit, forest activities on land within the Islands Trust Area.

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Ruth Waldick, Ph.D.
Department of Geography,
Carleton University

https://www.researchgate.net/profile/Ruth_Waldick
https://agr-gc.academia.edu/RuthWaldick