Carbon and Biodiversity Mapping and Assessment for the Islands Trust Area

March 23, 2014

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Executive Summary

This report first presents the contribution of the Islands Trust (IT) area to conservation in the Coastal Douglas-fir (CDF) Biogeoclimatic zone. It then details each of the data products that were used for the analysis of the Islands Trust area importance. Specifically, these are: i) predictive maps of standing carbon and carbon sequestration potential for the IT and CDF areas, ii) bird community diversity maps based on bird point counts and predictive distribution models, and iii) assessed property values for the IT and CDF region. Using these empirical data and predictive model results this report found that native bird community diversity is 39% higher in the Islands Trust (IT) area than in non IT parts of the CDF. Further, there is 82% more standing carbon and 43% higher carbon sequestration potential in the IT area than in non IT parts of the CDF. This report further investigated the cost-effectiveness of purchasing land for conservation in the CDF by protecting 20% of the total native bird community diversity. Two approaches were investigated; one where land was purchased outright and one where land purchase costs were offset by selling forest carbon credits. Both approaches point out the importance of the Islands Trust area to conservation in the CDF region. A 78% percent higher proportion of bird community diversity was protected in the IT area as compared to non IT parts of the CDF. A 102% higher proportion of standing carbon and 74% higher carbon sequestration potential was located in the IT area as compared to the non IT parts of the CDF. Finally, the area to be reserved was 57% higher in the IT area as compared to non IT parts of the CDF, when taking into account the proportion of the total CDF area that is in the IT area (33%) and non IT parts (67%).

Part 1. Contributions of the Islands Trust area to conservation in the Coastal Douglas-fir Biogeoclimatic zone

The Islands Trust area contributes disproportionally to the conservation of the bird community diversity, standing carbon, and carbon sequestration potential within the Coastal Douglas-fir area (Table 1). The IT area represents 33.2% of the CDF and includes 40.9% of the total bird community diversity in the region. This represents a 38.6% higher contribution to bird community diversity that non IT areas in the region. An even higher contribution was realized with standing carbon on the landscape, where 47.3% of the total carbon in the CDF area included here is located in the Islands Trust area. This represents 81.6% more standing carbon in the Islands Trust area as compared to non IT areas. The contribution of the Islands Trust area to carbon sequestration potential is also high with 41.4% of total carbon sequestration potential in the study region, or 43% more than non IT areas. Combining bird community diversity with standing carbon as well as carbon sequestration potential resulted in the representation of 45.9% and 40% of their total CDF values within the Islands Trust region. This represents 69.8% and 33.3% higher representation of these two metrics in the Islands Trust area as compared to non IT areas in the region.

Table 1: Summary of conservation features in the CDF area where TEM is available and the Islands Trust area. The rows of this table show the conservation features of interest that have been created for this report plus the area over which these features were summarized. The importance IT/CDF score shows the % increased contribution of the Islands Trust area to each conservation feature that is above what would be expected if the entire conservation feature were valued equally over the CDF landscape. The importance IT/Non_IT score shows the % increased contribution of the Islands Trust area to each conservation feature that is above what would be expected if the conservation feature for the Islands Trust area were valued in proportion to its value in the Non Islands Trust area.

Conservation Feature *	CDF	Non Isl. Trust	Islands Trust	% total in IT	Importance IT/CDF (%)	Importance IT/Non_IT (%)
Bird diversity (Beta diversity)	122742	72545	50197	40.9	**22.8**	**38.6**
Standing Carbon [t]	24314351	12806439	11507913	47.3	**43.0**	**81.6**
Sequestration Potential [t/yr]	459934	269355	190578	41.4	**25.2**	**43.0**
Beta + StC	56369	30505	25864	45.9	**37.8**	**69.8**
Beta + SeqC	80246	48185	32060	40.0	**20.0**	**33.3**
Total Area [km2]	2402	1604	798	33.2		

*data layers used for each Conservation Feature are described in Part 2 below.

Marxan cost-effectiveness analysis of conservation in the CDF

The Marxan[1] cost-effectiveness analysis incorporating assessed land values to prioritize the protection of 20% of the total bird community diversity in the CDF would result in a reserve network costing $390M if no carbon credits would be sold and $282M if the sale of both standing and sequestration potential carbon over 20 years would be included, using a rate of $12.50 per credit. According to the analysis, $187M or 48% of this money was proposed to be spent in the Islands Trust area if no carbon offsets were to be used and $134.5M or roughly 48% were proposed to be spent when carbon offset sales were considered. Both the 'Total Land Value' (Table 2) and the 'Total Land Value minus Carbon sales' (Table 3) clearly show that the Islands Trust area contributes substantially more to the protection of biodiversity and ecosystem carbon than non IT areas in the CDF region included here. Even though the Islands Trust area only represents 33.2% of the CDF area, around 44% of the proposed reserve networks, both with and without carbon sales were proposed to be located in the Islands Trust area, showing IT's importance to the protection of biodiversity in the region. About 47% of biodiversity protected was located in the Islands Trust area for both scenarios (Tables 2 and 3). Putting this into perspective over the entire CDF region, where the Islands Trust area represents 33.2% of the area, these scenarios show that almost 80% more protected biodiversity resides in Islands Trust area as compared to the non IT area in the study region.

[1] Marxan is software designed to aid systematic reserve design on conservation planning (Wikipedia, accessed March 2014). For the purposes of this assessment Marxan software was asked to protect 20% of bird beta diversity, which was used as a surrogate for the historical CDF habitat configuration, in the most cost effective manner.

Table 2: Total Land Value Marxan scenario results. The values presented show the amount of each conservation feature protected in the reserve network that Marxan recommended. The importance IT/CDF score shows the % increased contribution of the Islands Trust area to each conservation feature that is above what would be expected if the entire conservation feature were valued equally over the CDF landscape. The importance IT/Non_IT score shows the % increased contribution of the Islands Trust area to each conservation feature that is above what would be expected if the conservation feature for the Islands Trust area were valued in proportion to its value in the Non Islands Trust area.

Conservation Feature *	CDF	Non Isl. Trust	Islands Trust	% total in IT	Importance IT/CDF (%)	Importance IT/Non_IT (%)
Bird diversity (Beta diversity)	18190	9585	8605	47.3	**42.1**	**79.8**
Standing Carbon [t]	3978389	1981744	1996645	50.2	**50.7**	**101.8**
Sequestration Potential [t/yr]	86905	46223	40682	46.8	**40.6**	**76.3**
Beta + StC	9238	4691	4547	49.2	**47.8**	**94.2**
Beta + SeqC	13311	7104	6207	46.6	**40.0**	**75.0**
Area [km2]	326	182	144	44.1	**32.4**	**58.0**

*data layers used for each Conservation Feature are described in Part 2 below.

Table 3: Total Land Value minus Carbon Sales Marxan scenario results. The values presented show the amount of each conservation feature protected in the reserve network that Marxan recommended. The importance IT/CDF score shows the % increased contribution of the Islands Trust area to each conservation feature that is above what would be expected if the entire conservation feature were valued equally over the CDF landscape. The importance IT/Non_IT score shows the % increased contribution of the Islands Trust area to each conservation feature that is above what would be expected if the conservation feature for the Islands Trust area were valued in proportion to its value in the Non Islands Trust area.

Conservation Feature *	CDF	Non Isl. Trust	Islands Trust	% total in IT	Importance IT/CDF (%)	Importance IT/Non_IT (%)
Bird diversity (Beta diversity)	18170	9630	8540	47.0	**41.1**	**77.6**
Standing Carbon [t]	4032573	2003783	2028790	50.3	**51.1**	**102.8**
Sequestration Potential [t/yr]	86906	46815	40091	46.1	**38.5**	**71.5**
Beta + StC	9327	4738	4589	49.2	**47.8**	**94.0**
Beta + SeqC	13297	7168	6129	46.1	**38.4**	**71.3**
Area [km2]	32451	18267	14184	43.7	**31.3**	**55.5**

*data layers used for each Conservation Feature are described in Part 2 below.

In conclusion, both the results from the summary of conservation features in the CDF area (Table 1) and the results from the spatial conservation prioritization exercises (Tables 2 and 3) show that the IT area includes a disproportionate fraction of high carbon and high biodiversity landscapes within the CDF. The conservation prioritization results further highlight the importance of conservation investments in the Islands Trust area if conservation goals are to be achieved cost effectively within the CDF. Some of the limitations of this report include that existing reserve networks were not taken into account, as they might not be located in the highest carbon and biodiversity parts of the region, given a history of protecting lands in locations of low productivity or natural resource value (Pressey 1994). The results presented here are to be understood as a guideline for an idealized scenario where biodiversity, carbon and land value are the main determinants of conservation prioritization. A further potential limitation is that Terrestrial Ecosystem Mapping used for creating the data products was not available for areas in the CDF on the Lower Mainland and that Howe Sound Islands of the Islands Trust area were in the CWH zone. Due to the close proximity of CWH zone areas in the study system to the CDF, biases should be minor as site series and site indices for both zones are almost identical. Only for a small part of the CWH this is not the case where carbon values were most likely slightly over-estimated, but as this represents less than 0.5% of the study region and should not affect results or conclusions significantly.

Next steps in this analysis could be to predict biodiversity and carbon values further into the future by incorporating regional future climate predictions (Wang et al. 2006, 2012). This could, for example, help investigate potential distribution changes of individual bird species in relation to climate change, similar to (Matthews et al. 2011). Second, the approach of spatial prioritization for conservation should be extended, by taking exiting protected areas into account. Existing protected areas would form the baseline reserve network for further analysis and Marxan could be used to add to this baseline reserve network. To further ensure spatial compactness of the proposed reserve networks, network connectivity should be incorporated. A connected reserve network would allow for species to move as habitat suitability changes due to climate or land use change. This could be achieved by including recent developments from the field of Landscape Ecology (Pascual-Hortal and Saura 2006, McRae et al. 2008, Urban et al. 2009) and Marxan approaches (Bode et al. 2008, Kininmonth et al. 2010).

Part 2. Data Products

Carbon layers

The basic methodology for this deliverable followed the "Evaluation of Carbon Storage within Forests in the Coastal Douglas-fir Zone" technical report prepared by Brad Seely (included in the contract deliverables). Terrestrial Ecosystem Mapping (TEM) data provided by the Islands Trust was combined with TEM data for the CDF (MES 2008). The merged TEM data were structured such that each polygon was divided into up to three discrete subsections. Each subsection (defined in the data as a proportion of the whole polygon area) had a site series and structural stage defined. The key fields used are shown in Table 4. Note that TEM was not available for areas in the CDF on the Lower Mainland.

Table 4: Description of the key fields used from the TEM data.

Field	Extent	Use
Stand structural stage	Whole CDF	Estimation of stand age
Site series	Whole CDF	Determination of forest cover, Estimation of productivity class, stand age, assignment of C analysis unit (see Table 2), species determination
Date of last disturbance	Southern Gulf Islands	Measure of stand age used to verify estimates of stand age

For the carbon modeling Seely used FORECAST (Kimmins et al. 1999), a stand-level forest ecosystem simulator that is one of two models approved by the BC Ministry of Forests for carbon budget assessments (Ministry of Environment 2011), and the only model calibrated for use in the CDF (Blanco et al. 2007) and linked to TEM (Seely et al. 2004). To facilitate carbon analysis TEM polygons were stratified into homogenous analysis units (AU's) based on site series. Net ecosystem carbon storage was limited to: above and below-ground tree biomass, deadwood biomass, and dead below-ground biomass other than wood. Each AU was simulated for a period of 300 years with results reported for annual time steps. FORECAST results were subsequently assigned to individual TEM polygons by estimating the age of each polygon subsection based upon the current assigned structural stage and estimated productivity class (Seely et al. 2004). These age estimates were derived from ranges provided by Meidinger *et al.* (1998) for regional forest ecosystems. Ages of old stands (structural stage 7) were set at 200 to be conservative. Age estimates were verified against a subset of TEM polygons (Southern Gulf Islands) for which direct age estimates were available (n=254).

To extend the work of Seely to include predictions for the entire IT area this analysis assumed the following: 1) the CWHdm zone was comparable to the CWHxm zone in terms of species composition and site series, which is why CWHxm AU's from Seely's report were used here. 2) the CWHvm2 zone differs substantially from the CWHxm zone in terms of species composition and site series, but as only 65 CWHvm2 polygons were in the dataset and an adjustment of Seely's FORECAST calculations was beyond the scope of this report, CWHxm AU's were used for this report, which will most likely over-estimate carbon values as site indices for the CWHvm2 tend to be lower than for CWHxm.

The deliverables produced for the carbon analysis area are:

- An Excel file including Production classes, age classes, carbon curves from FORECAST and the resulting carbon calculations using a Visual Basic script (file: TEM_SEM_rs_for_carbon.xlsm)

- A shapefile containing the carbon predictions linked to TEM for the Islands Trust area (TEM_SEM_rs_carbon.shp) as well as a shapefile where these predictions are merged with the rest of the CDF (TEM_Carbon_IT_CDF_comb.shp)

Biodiversity data: bird community diversity

Birds are the most widely used indicators of vertebrate response to habitat type and condition because they are easily mapped and represent a very wide range of tolerances to human development (Chazdon et al. 2009, DeWan et al. 2009, Schuster and Arcese 2013).

Trained observers conducted 1,770 point counts on mainland BC and 53 islands from 30 Apr – 11 Jul, 2005 - 2011 to record all birds detected in 10 min, 50m radius counts between 5 AM – 12 PM at 713 sample locations (>100m apart). Locations were re-visited 1-12 times and geo-referenced via a GPS (GPS60, Garmin Ltd, Kansas, USA). Here the approach of Schuster & Arcese (2013) was extended geographically (from 1560km^2 to 2520 km^2) by adding 601 counts to create predictive distribution models for 47 bird species and 25 covariates based on remote-sensed data and models incorporating imperfect detectability (Mackenzie et al. 2002, Schuster and Arcese 2013).

Bird species indicators were associated with the habitats they were expected to occupy by using 11 experts to rank the likelihood of observing 47 species in 10 focal habitat types using photographic and text descriptions of herbaceous, shrub, woodland, wetland, four forest types (pole, young, mature and old), and 2 human-dominated habitats (rural, urban), to create two community metrics indicating Old Forest (OF, Schuster and Arcese 2013) and Savannah (SAV) habitats standardized between 0 and 1 by dividing through the maximum value possible, where:

$$OF = \frac{-2 * Herb - 1 * Shrub - 0.5 * Pole + 0.5 * YFor + 1 * MFor + 2 * OFor}{7}$$

$$SAV = \frac{2*Wood + 2*Herb + 1*Shrub}{5}$$

Each species contributed to the cumulative Old Forest or Savannah community score, weighted by its expert opinion score for the given sub-type, summed across species to create community specific association scores from 0 to 1, and corresponding to none versus all members of the community expected to be present. As the purpose of this report was to identify areas that maximized OF and SAV communities in conjunction, a β-diversity metric was created. This β-diversity metric allowed this study to specifically maximize highly diverse CDF habitat patches, which prior to European colonization was comprised of uneven-aged forests (often >300 years) dissected by shallow and deep-soil meadow and savannah communities (Meidinger and Pojar 1991, Mosseler et al. 2003). For this purpose the following metric was used:

$$\beta - score = \frac{2*OF*SAV}{OF + SAV}$$

This represents the Old Forest and Savannah community dissimilarity, using a scaling factor of 2 to create β-scores between 0 and 1. The metric was then projected spatially as predictive maps of community occurrence over the entire Islands Trust area as well adjacent CDF region at 1ha hexagonal polygons.

The deliverables produced for this the biodiversity data are:

- An Excel file including the TEM SiteMC reclassification table to simplify TEM site codes to match model predictions and the simplified and rearranged SiteMC codes using a Visual Basic script (file: TEM_SEM_rs_processed.xlsm)
- A shapefile containing the biodiversity predictions on a 1ha hegaxon scale for the Islands Trust area (IT_Hexagons_Biod_map_comb_TEM_no_LK.shp) as well as a shapefile where these predictions are merged with the rest of the CDF (Bird_Hex_IT_CDF_comb.shp)

Biodiversity and Carbon layers combined

In order to combine biodiversity and carbon predictions, standing carbon and carbon sequestration values were extracted from the TEM layer and summarized to the 1ha polygons using Geospatial Modelling Environment (Beyer 2012):

```
#Extract Standing Carbon values
isectpolypoly(in="D:\Islands_Trust\GIS\Biod_mapping\Bird_Hex_IT_CDF_comb.shp",
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poly="D:\Islands_Trust\GIS\Carbon\TEM_Carbon_IT_CDF_comb.shp", field="C_total",
prefix="StC", awm=FALSE, min=FALSE, max=FALSE, aws=TRUE);

#Extract Sequestration Carbon values
isectpolypoly(in="D:\Islands_Trust\GIS\Biod_mapping\Bird_Hex_IT_CDF_comb.shp",
poly="D:\Islands_Trust\GIS\Carbon\TEM_Carbon_IT_CDF_comb.shp", field="Seq_tot_yr",
prefix="SeqC", awm=FALSE, min=FALSE, max=FALSE, aws=TRUE);
```

The carbon values were then standardized to range between 0 and 1, equivalent to the β-score. Subsequently two metrics that maximized diversity and standing carbon or carbon sequestration potential were created:

$$Beta\_StC = \frac{2 * \beta - score * StC}{\beta - score + StC}$$

$$Beta\_SeqC = \frac{2 * \beta - score * SeqC}{\beta - score + SeqC}$$

StC represents "standing carbon" and SeqC "carbon sequestration potential".

The deliverables produced for the biodiversity – carbon overlap are:

- An Excel file including a row for each 1ha hexagon and corresponding BETA_scores, summarized StC values (StCAWS), SeqC values (SeqCAWS), scales carbon values and Beta_StC and Beta_SeqC metrics (file: Bird_Carb_Hex_IT_CDF_comb.xlsx)
- A shapefile containing the combined predictions on a 1ha hegaxon scale for the entire study region (Bird_Carb_comb_IT_CDF_comb.shp), including a field (Isl_Trust = 1) to identify the Islands Trust area part.

Cadastral layer: assessed land values

Spatial heterogeneity in land values was incorporated (Ando et al. 1998, Polasky et al. 2001, Ferraro 2003, Naidoo et al. 2006) in the cost-effectiveness analysis of land protection by using cadastral data and 2012 land value assessments (Integrated Cadastral Information Society of BC, ICIS). However, because there is no centralized entity curating cadastral data for British Columbia, data from ICIS, the BC Assessment agency and the Integrated Cadastral Fabric were combined. Doing so required processing to remove stacked and overlapping polygons and slivers. These data were combined with cadastral polygons from Islands Trust where the area extended beyond the CDF (mostly the Bowen-Gambier area). Where current assessment values were missing or reduced relative to market value due to taxation or administrative reasons (e.g. Farm Status or Private Managed Forest Lands), an inverse distance weighted interpolation was applied to estimate land values by splitting interpolations into 10 quantiles based on polygon size to accommodate high heterogeneity in cost using R v.2.15.2 (R Development Core Team 2012) and packages gstat v.1.0-14 (Pebesma 2004) and sp v.1.0-1 (Bivand et al. 2013). These polygons had either Land Class 7 (Managed Forest) or 9 (Farm) in the BC Assessment data, no land value at all or were assessed at a price lower than $500 per ha.

The deliverables produced for this analysis are:

- A shapefile containing the calculated land value and calculated total value of a property as well as a price/ha (Cadaster_RS_IT_non_RS_comb_no_atr.shp).

Cost-effectiveness of land protection

Marxan (Ball et al. 2009), software designed to aid systematic reserve design on conservation planning, was used to prioritize cadastral polygons for inclusion in a conservation network. Biodiversity and carbon estimates were calculated for each cadastral polygon using ArcGIS v.10.1 (ESRI 2012) and area weighted sums in Geospatial Modelling Environment v.0.7.2.1 (Beyer 2012). The combined biodiversity metric (β-scores) was used as input to Marxan. The conservation target was set as the percentage (20%) of total β-diversity habitat existing within the study region, with the goal to specifically maximize highly diverse habitat patches. Here two cost metrics were used:

- Total land value for each property, which is the sum of the assessed property value and any improvement on that parcel;
- Total land value minus the amount of standing carbon times the carbon credit price minus the amount of potential sequestration over 20 years times the carbon credit price. Here $12.5 per credit was used, which is half the amount that the Pacific Carbon Trust received for credits and about the average amount they paid for credits. The Pacific Carbon Trust was a crown corporation established in 2008 to deliver greenhouse gas offsets in the province of British Columbia (http://pacificcarbontrust.com). In November 2013, the Minister of Energy and Mines announced that the Pacific Carbon Trust will be transitioned into government. Carbon credits currently remain available through the Pacific Carbon Trust, but will be transitioned to the Ministry of Environment at some point in the future.

The analysis was first calibrated to ensure robust analysis by initially setting the diversity target to 20% and the number of restarts to 100. The interest here was not so much in the spatial configuration of the reserve network but rather its cost effectiveness (Ardron et al. 2010). For the same reason the compactness of the reserve network (represented in Marxan as the boundary length modifier) was not investigated either. Marxan solutions for combinations of the following species penalty factors (SPF's): 1-10,15,20 and number of iterations: 10k, 50k, 100k, 500k, 1M, 5M, 10M, 25M, 50M, 100M, for a total of 65 calibration analyses were created. Cumulative distribution functions using number of solutions on the y-axis, solution cost on the x-axis for SPF and Marxan score for number of iterations were produced (Ardron et al. 2010). Based on the results the following values for SPF and number of iterations were used respectively: 3 and 10 million. Summed solutions were also investigated to make sure every restart met its targets, excluding ones that missed the target by > 5%.

For each run in the actual analysis the cost of the total reserve system and the properties selected for each restart (100) were recorded, while ensuring the conservation target was met. Even though there was only a target set for β-diversity the analysis also kept track of the amount of standing carbon, carbon sequestration potential and diversity and carbon combined in each reserve network.

The deliverables produced for the cost-effectiveness analysis are:

- An R script detailing the Marxan analysis (Create.metrics.run.Marxan.r)
- Two Excel files including as rows the property ID's to be able to link them to GIS and as columns the amount of standing and sequestration potential carbon, β-diversity, carbon and biodiversity combines, cost with and without selling carbon credits, an identifier for properties in the Islands Trust region, the property size and 100 columns representing the Marxan runs (a 1 depicts that a property was selected in the reserve network). (files: cost.fr.csv, cost.C.fr.csv)
- Two shapefiles containing the Marxan results equivalent to the two Excel files, but combined with the cadastral shapefile and an added column for property selection frequency for map display (files: Marxan_Results_BETA.shp, Marxan_Results_BETA_Carbon.shp)

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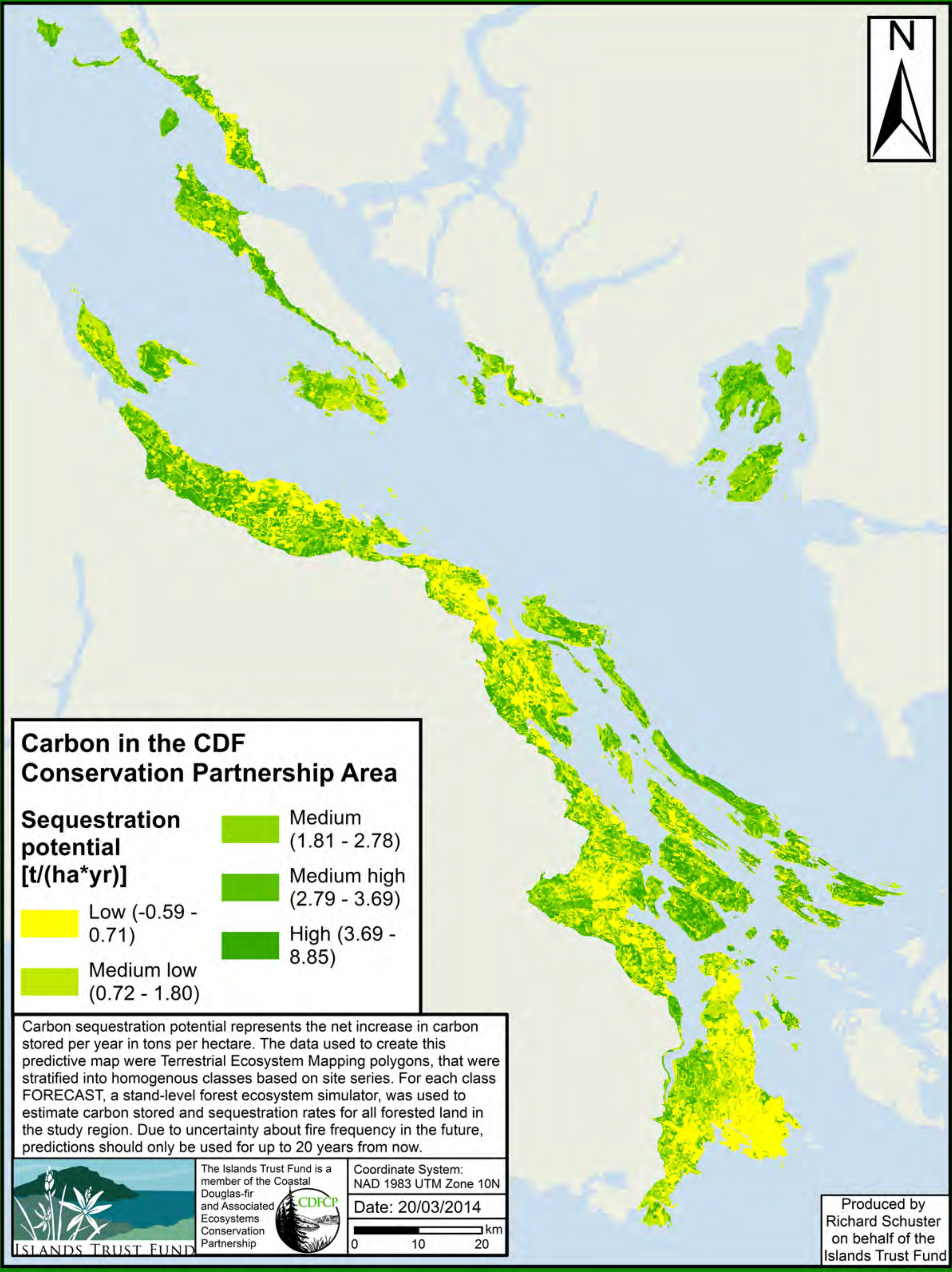
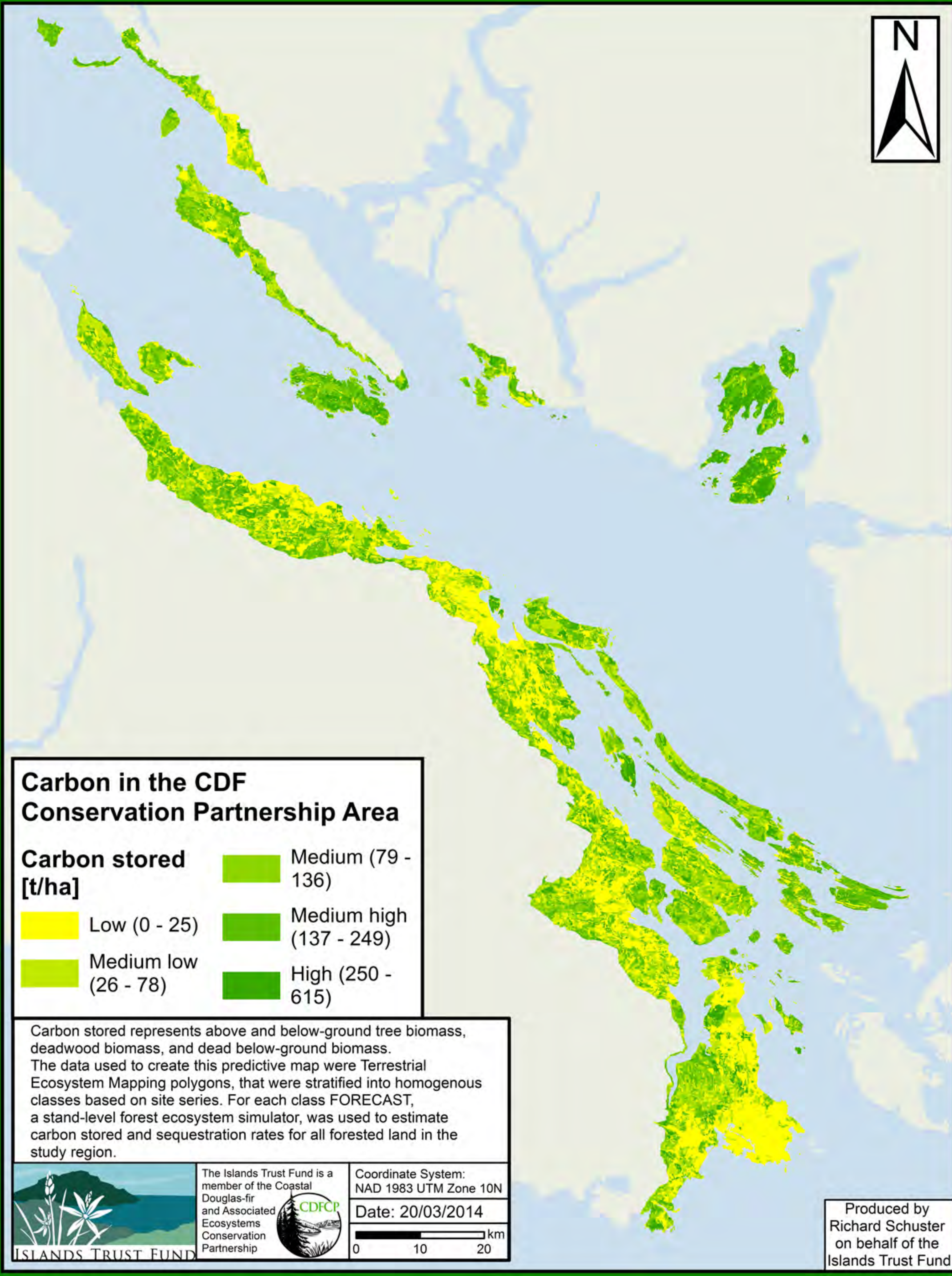

N
Carbon in the CDF Conservation Partnership Area
Sequestration potential [t/(ha*yr)]
Low (-0.59 - 0.71)
Medium low (0.72 - 1.80)
Medium (1.81 - 2.78)
Medium high (2.79 - 3.69)
High (3.69 - 8.85)
Carbon sequestration potential represents the net increase in carbon stored per year in tons per hectare. The data used to create this predictive map were Terrestrial Ecosystem Mapping polygons, that were stratified into homogenous classes based on site series. For each class FORECAST, a stand-level forest ecosystem simulator, was used to estimate carbon stored and sequestration rates for all forested land in the study region. Due to uncertainty about fire frequency in the future, predictions should only be used for up to 20 years from now.
Islands Trust Fund
The Islands Trust Fund is a member of the Coastal Douglas-fir and Associated Ecosystems Conservation Partnership
CDFCP
Coordinate System: NAD 1983 UTM Zone 10N
Date: 20/03/2014
0 10 20 km
Produced by Richard Schuster on behalf of the Islands Trust Fund


N
Carbon in the CDF
Conservation Partnership Area
Carbon stored [t/ha]
Low (0 - 25)
Medium low (26 - 78)
Medium (79 - 136)
Medium high (137 - 249)
High (250 - 615)
Carbon stored represents above and below-ground tree biomass, deadwood biomass, and dead below-ground biomass.
The data used to create this predictive map were Terrestrial Ecosystem Mapping polygons, that were stratified into homogenous classes based on site series. For each class FORECAST, a stand-level forest ecosystem simulator, was used to estimate carbon stored and sequestration rates for all forested land in the study region.
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km
0
10
20
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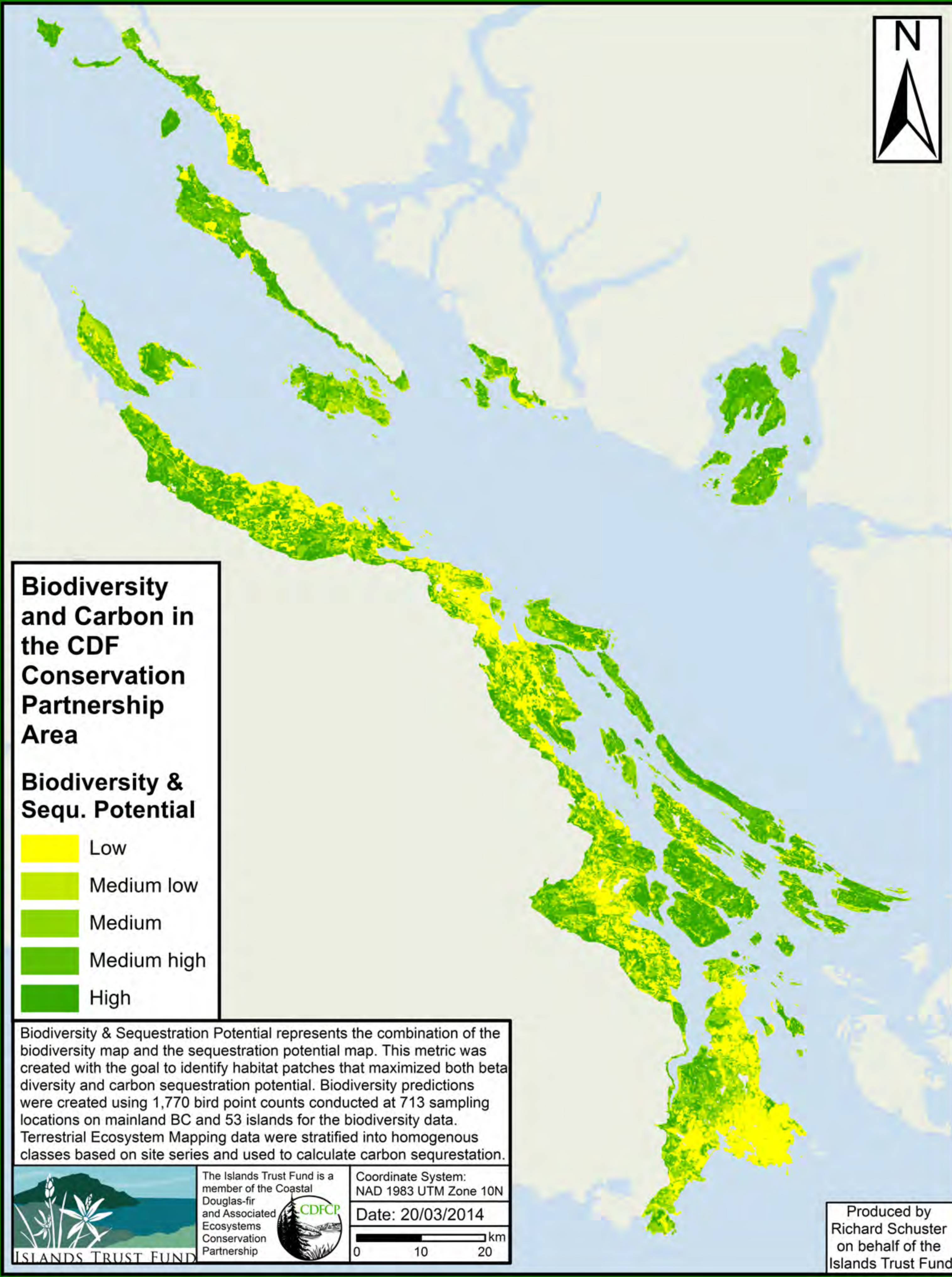
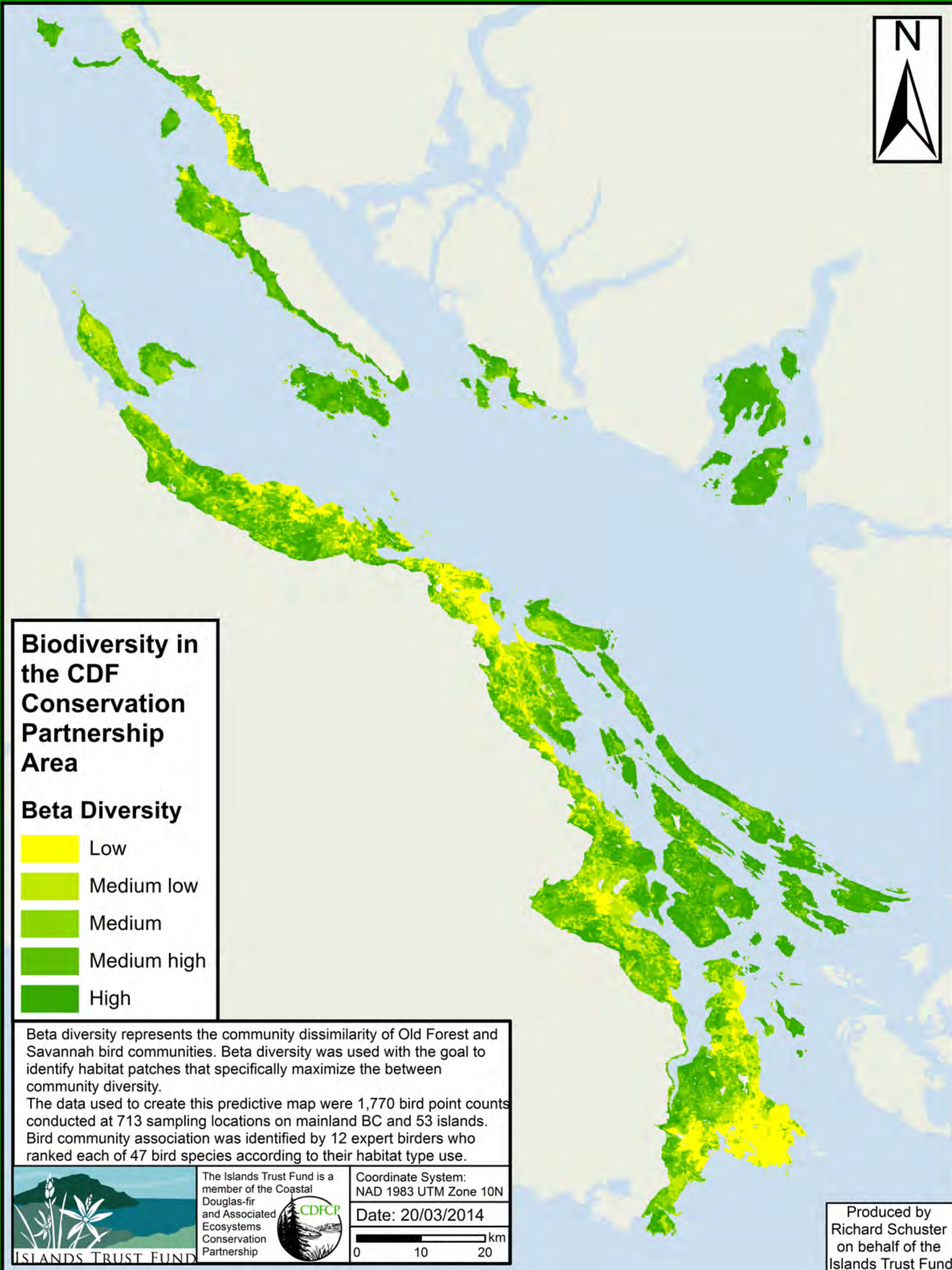


Biodiversity & Sequestration Potential represents the combination of the biodiversity map and the sequestration potential map. This metric was created with the goal to identify habitat patches that maximized both beta diversity and carbon sequestration potential. Biodiversity predictions were created using 1,770 bird point counts conducted at 713 sampling locations on mainland BC and 53 islands for the biodiversity data. Terrestrial Ecosystem Mapping data were stratified into homogenous classes based on site series and used to calculate carbon sequrestation.


N
Biodiversity in the CDF Conservation Partnership Area
Beta Diversity
Low
Medium low
Medium
Medium high
High
Beta diversity represents the community dissimilarity of Old Forest and Savannah bird communities. Beta diversity was used with the goal to identify habitat patches that specifically maximize the between community diversity.
The data used to create this predictive map were 1,770 bird point counts conducted at 713 sampling locations on mainland BC and 53 islands. Bird community association was identified by 12 expert birders who ranked each of 47 bird species according to their habitat type use.
ISLANDS TRUST FUND
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CDFCP
Coordinate System: NAD 1983 UTM Zone 10N
Date: 20/03/2014
km
0
10
20
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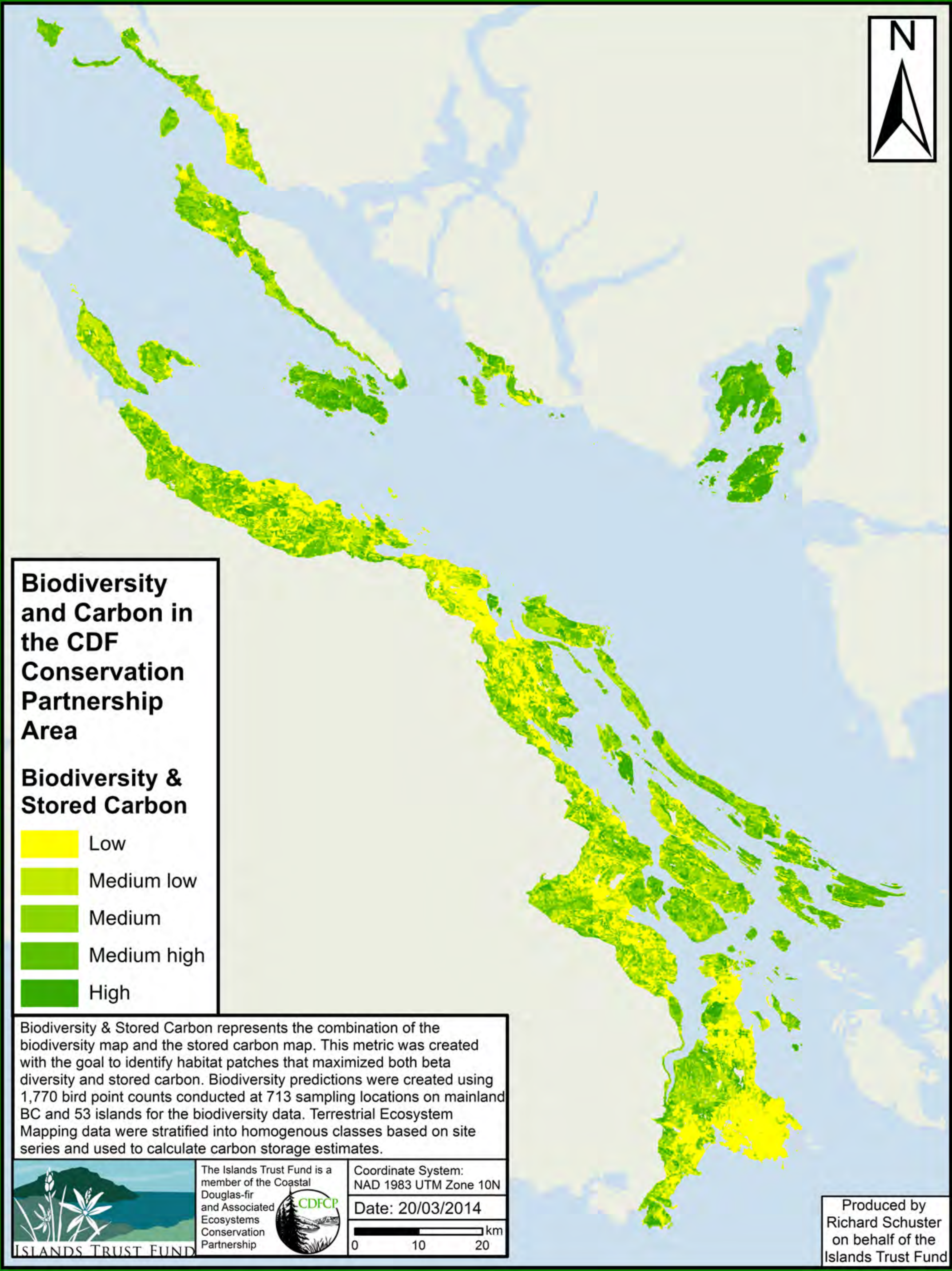
N
Biodiversity and Carbon in the CDF Conservation Partnership Area
Biodiversity & Stored Carbon
Low
Medium low
Medium
Medium high
High
Biodiversity & Stored Carbon represents the combination of the biodiversity map and the stored carbon map. This metric was created with the goal to identify habitat patches that maximized both beta diversity and stored carbon. Biodiversity predictions were created using 1,770 bird point counts conducted at 713 sampling locations on mainland BC and 53 islands for the biodiversity data. Terrestrial Ecosystem Mapping data were stratified into homogenous classes based on site series and used to calculate carbon storage estimates.
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CDFCP
Coordinate System: NAD 1983 UTM Zone 10N
Date: 20/03/2014
km
0
10
20
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