Cross-boundary Planning for Resilience and Restoration of Oak Savannah and Coastal Douglas-fir Forest Ecosystems

P Arcese, R Schuster, E Kleynhans, A Rodewald, T Wang, P Dunwiddie, J Alexander, T Martin, K Emming, J Lawlor, B Klinkenberg, D McConkey

Univ of British Columbia, Cornell Univ, Univ of Washington, The Nature Trust of BC, Islands Trust, BC Ministry of FLNRO, Klamath Bird Observatory, Coastal Douglas Fir Conservation Partnership

CDFCP Coastal Douglas-fir & Associated Ecosystems Conservation Partnership

The Cornell Lab

The Nature Trust of British Columbia

real estate foundation British Columbia

NSERC CRSNG

North Pacific Landscape Conservation Cooperative

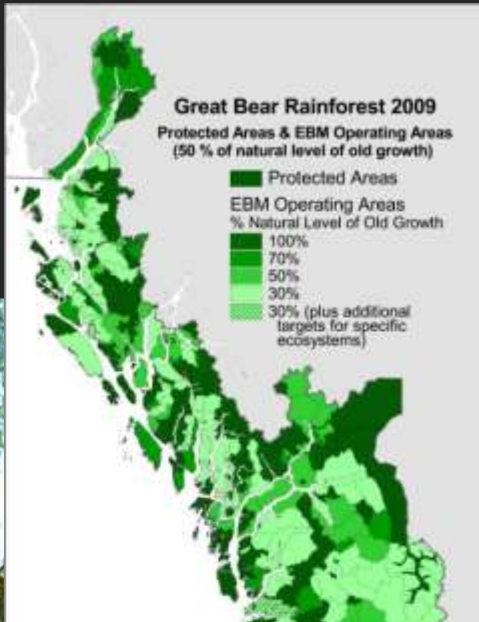
Traditional Goal of Conservation Area Design

Prioritize and Conserve ‘Intact’ or ‘Relic Ecosystems’

- Multiple criteria
- Decision support tools (Marxan)

Impractical in Human-dominated Landscapes

- No Benchmark Ecosystems
- Biological Survey Data Often Biased
- Many Threats Hard to Map

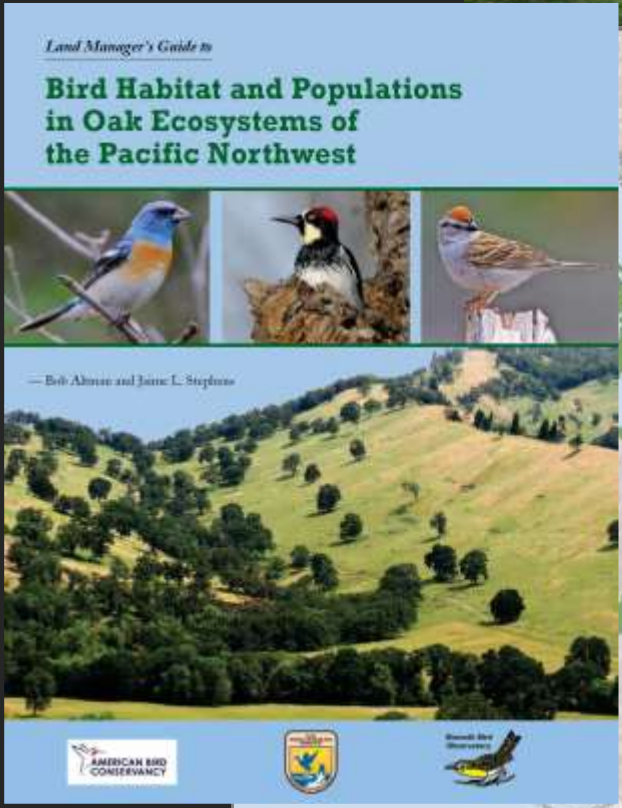


Dry Forest / Savanna Habitats of the Georgia Basin

- 49% Converted to Human Use
- < 3% Pre-settlement Forest Intact
- > 80% Privately-owned
- ≥157 Species At Risk

- Most Imperiled Ecosystem in BC

  And Throughout the Pacific Northwest



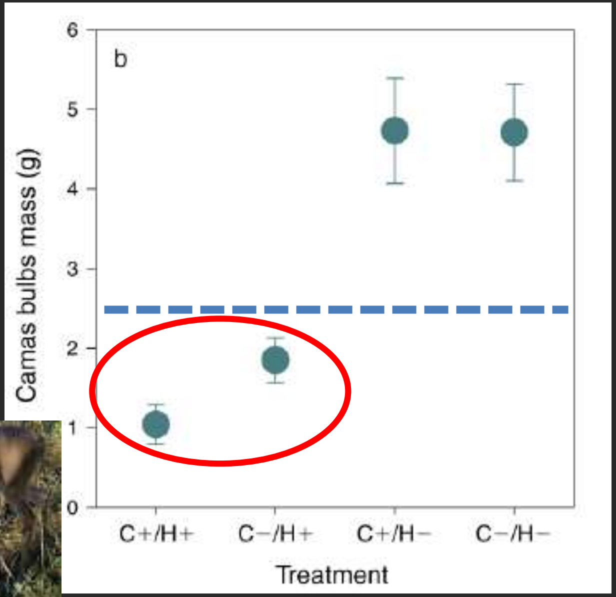
Deep and Shallow Soil Forest / Savanna Sites

First Nations History

Camas gardens of the Coast Salish

- 400 bulbs/hr
- 1.0 – 2.3 million bulbs/1000 people/yr

Turner 2014,
Beckwith 2004



Gonzales &
Arcese 2008

Conserving Functional Landscapes

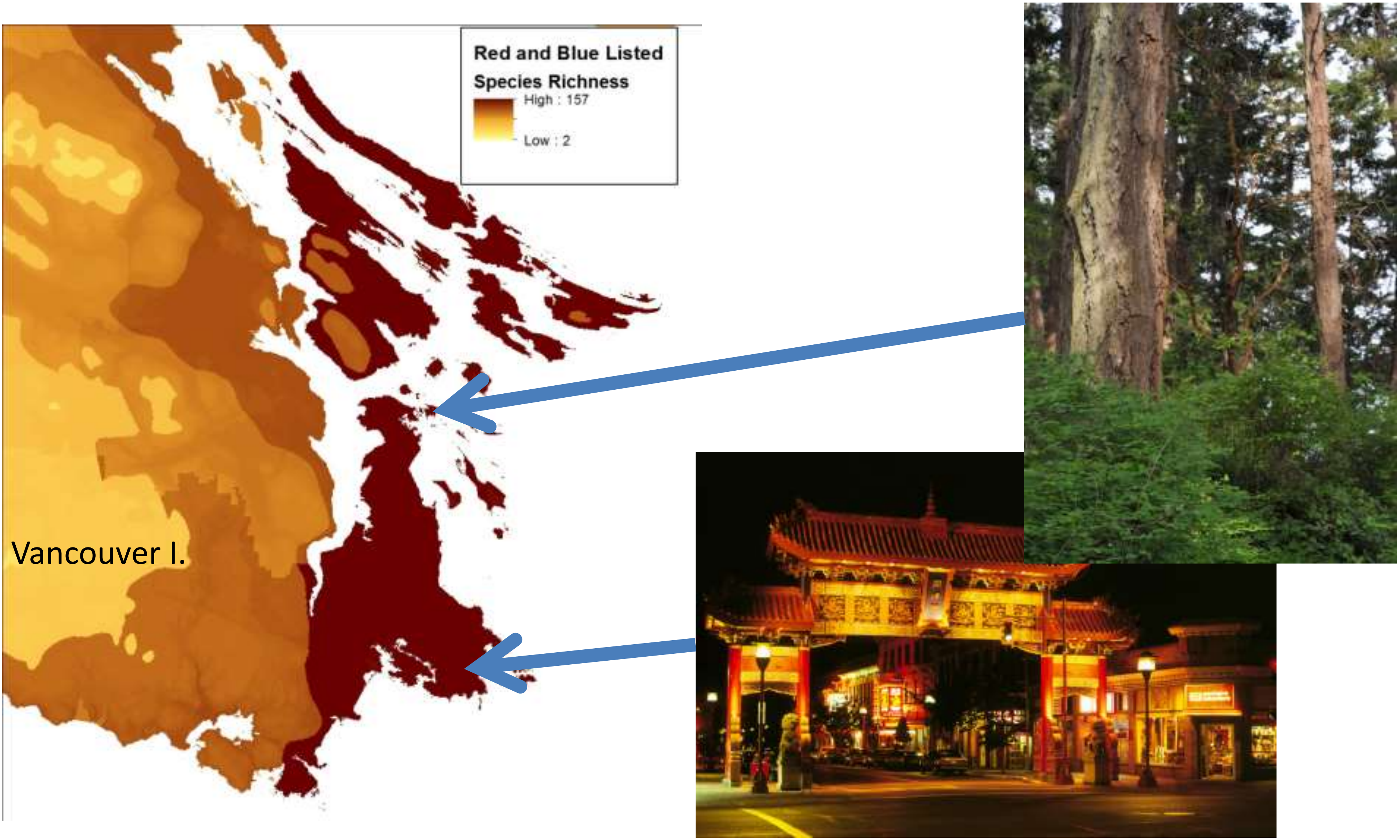
- Identify Reliable Predictors of Biodiversity Targets at Landscape Scales
- Prioritize Relatively ‘Intact’ Parcels for Conservation / Restoration
- Provide Open-source Tools to Facilitate Collaborative Landscape Planning at *Regional* and *Parcel* Scales

Example: Can We Identify Stands Already Hosting Relatively Intact Old-Growth Communities?

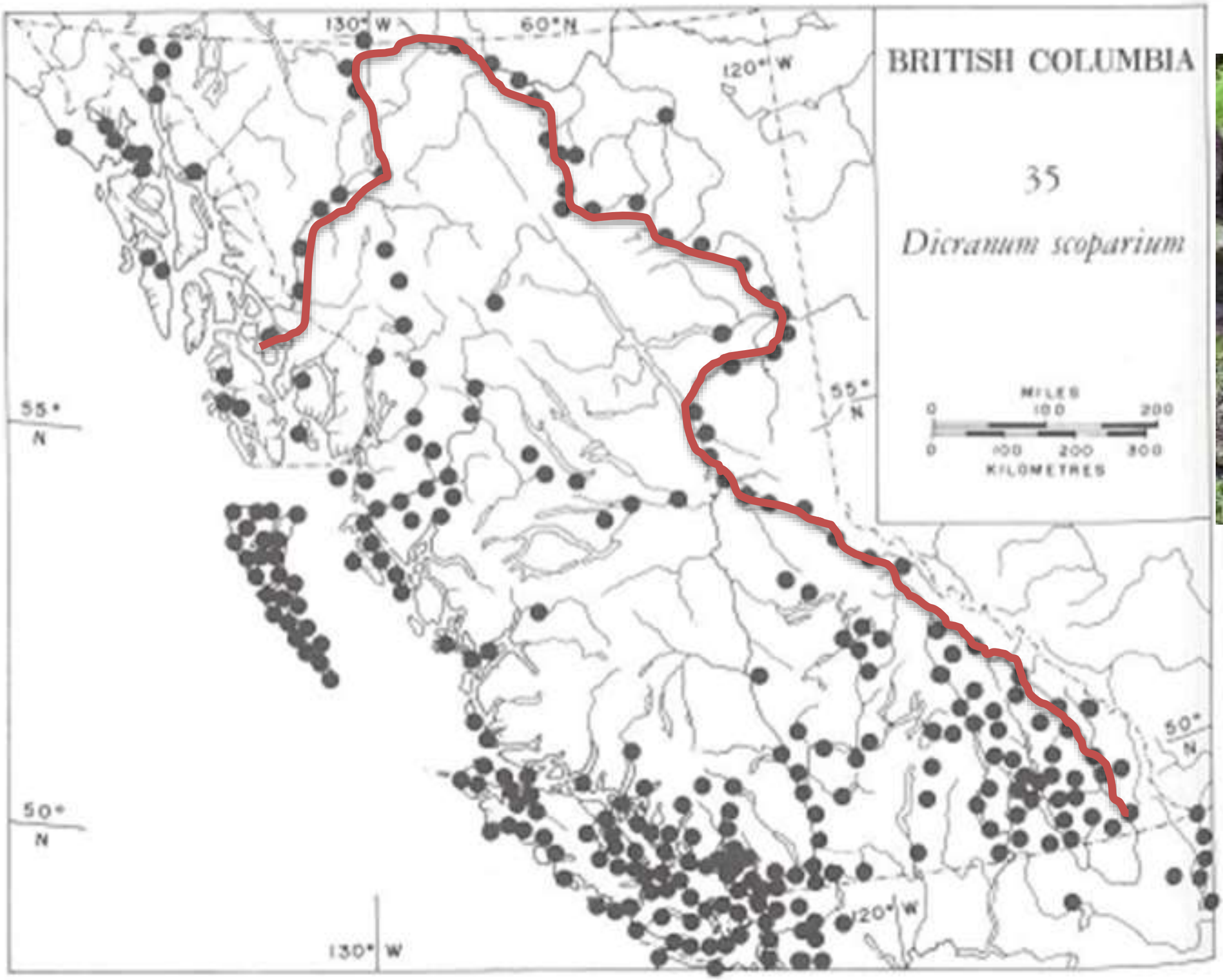





Expert Map: Distribution of 157 Threatened Species



‘Species Occurrence’ Often Biased by Access



Dicranum scoparium

Serious Practical Limits on the ‘Best Available Science’

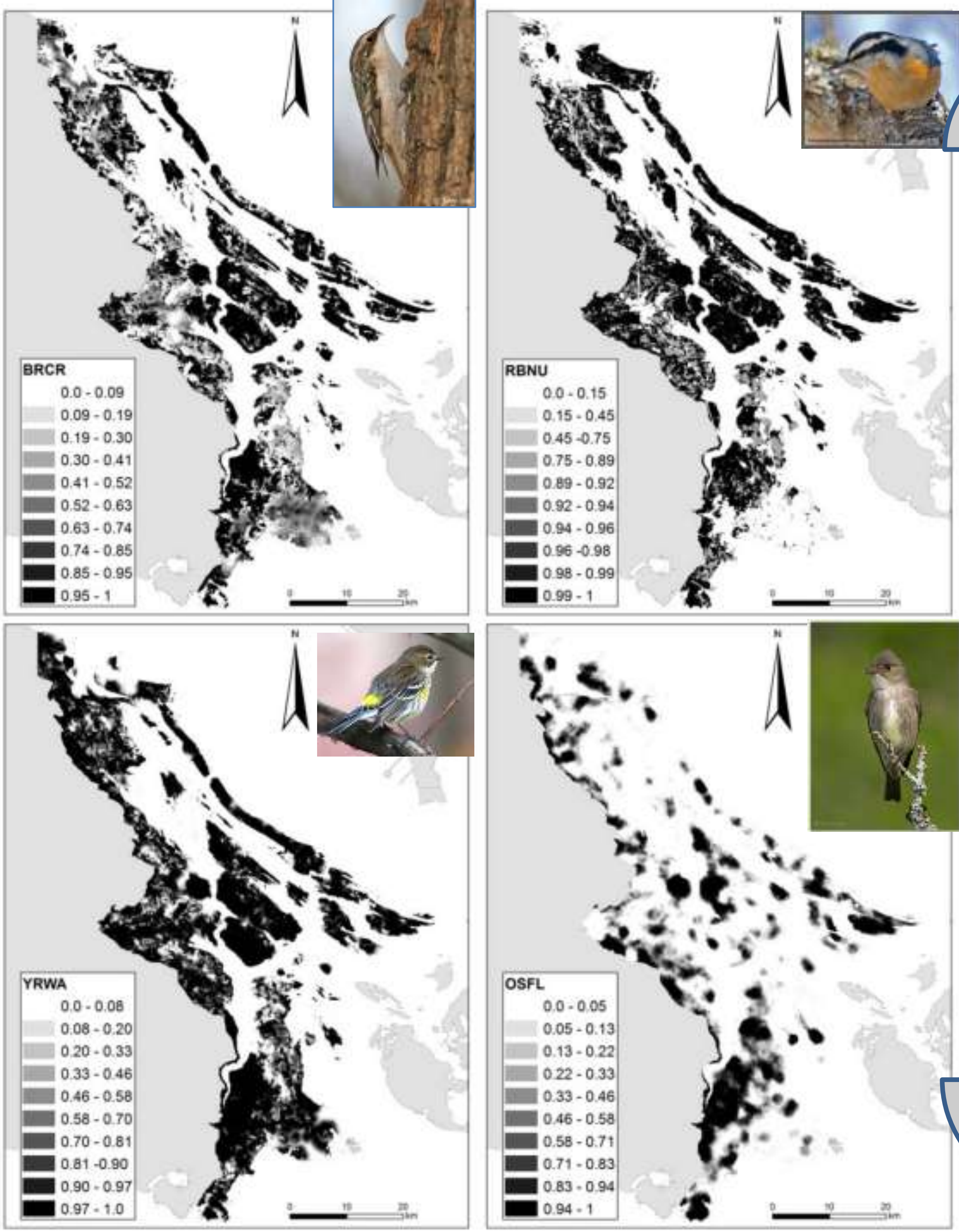
How Do We Identify Intact Sites Without Visiting All Sites?

High Native Cover/Richness vs High Exotic Cover/Richness

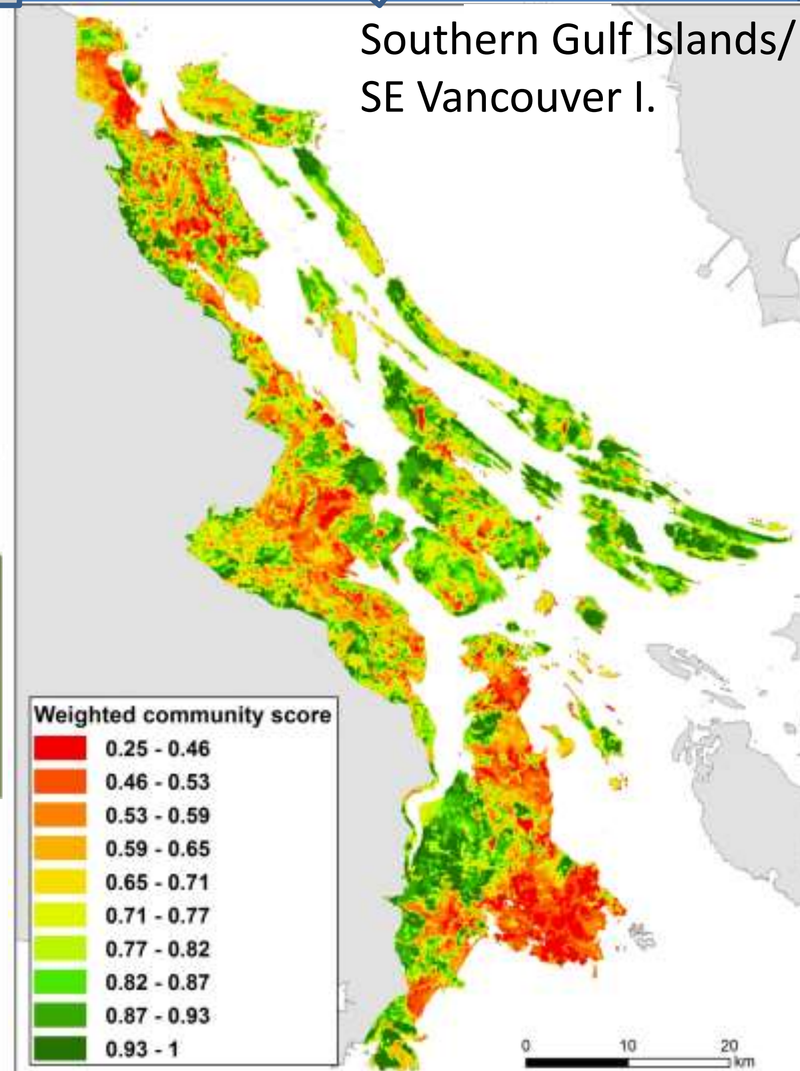
Conservation Values Predicted by Focal Indicators

- 93,000 eBird Detections of Presence/Absence
- 27 Landscape and 5 Current and Future Climate variables and AIC to map 'Occupancy'

- 74 Species with ≥ 50 Detections, representing 34 Families
- Assembled into Communities by Experts given 'Habitat Reliance'



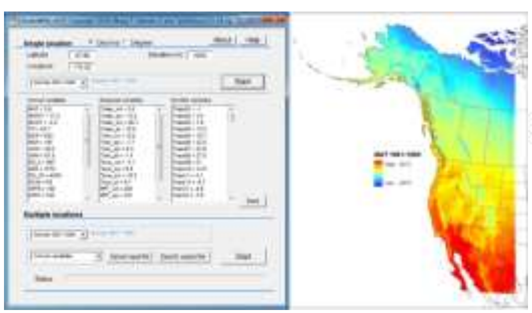
Southern Gulf Islands/
SE Vancouver I.



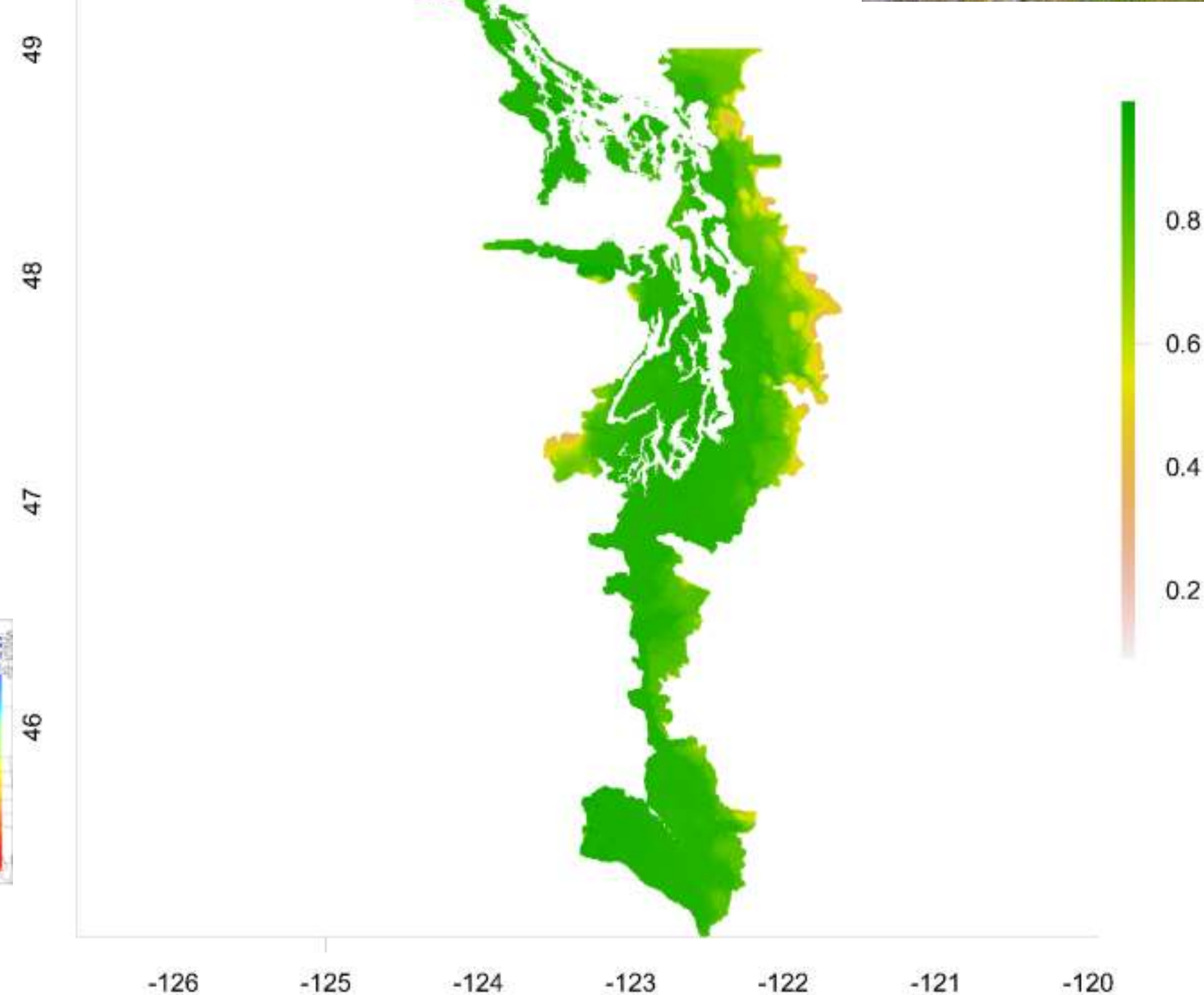
Schuster & Arcese 2013, Ecography

Climate Prediction

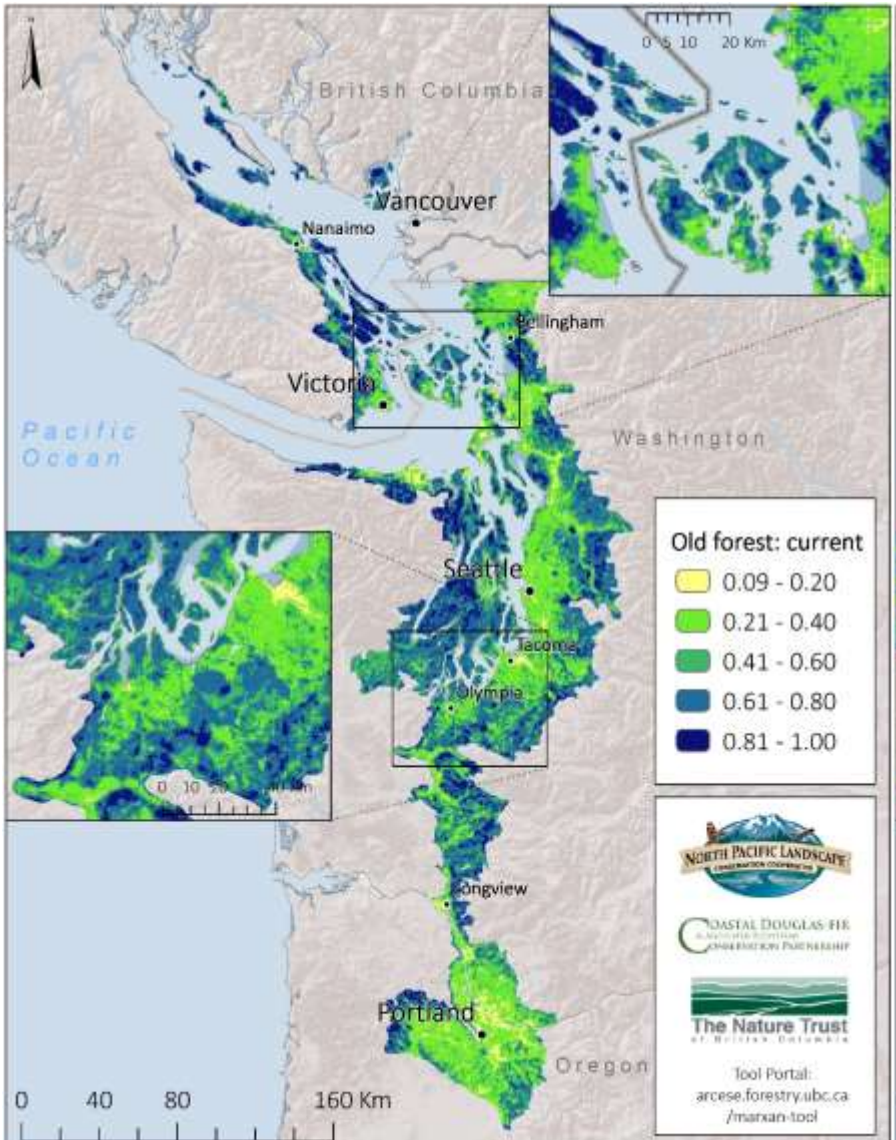
Tong Li Wang
ClimateWNA



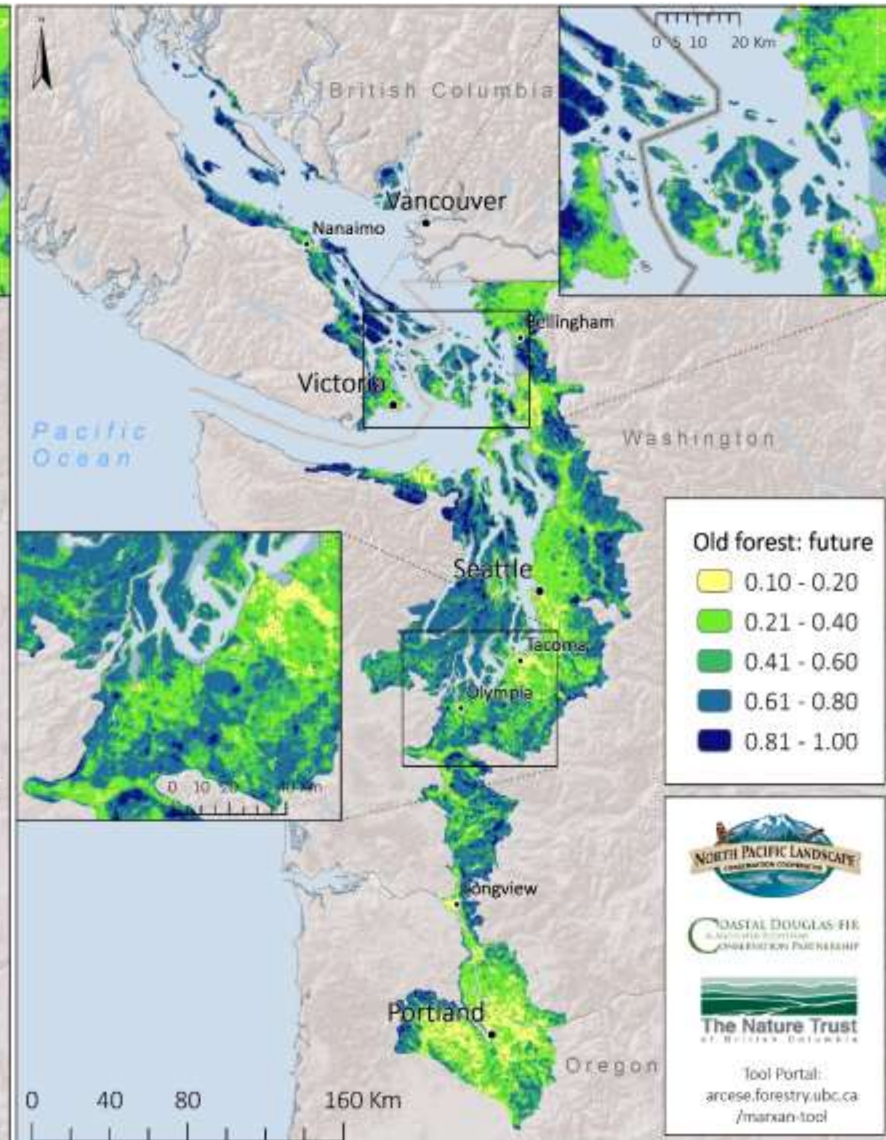
rcp45_QUERGAR



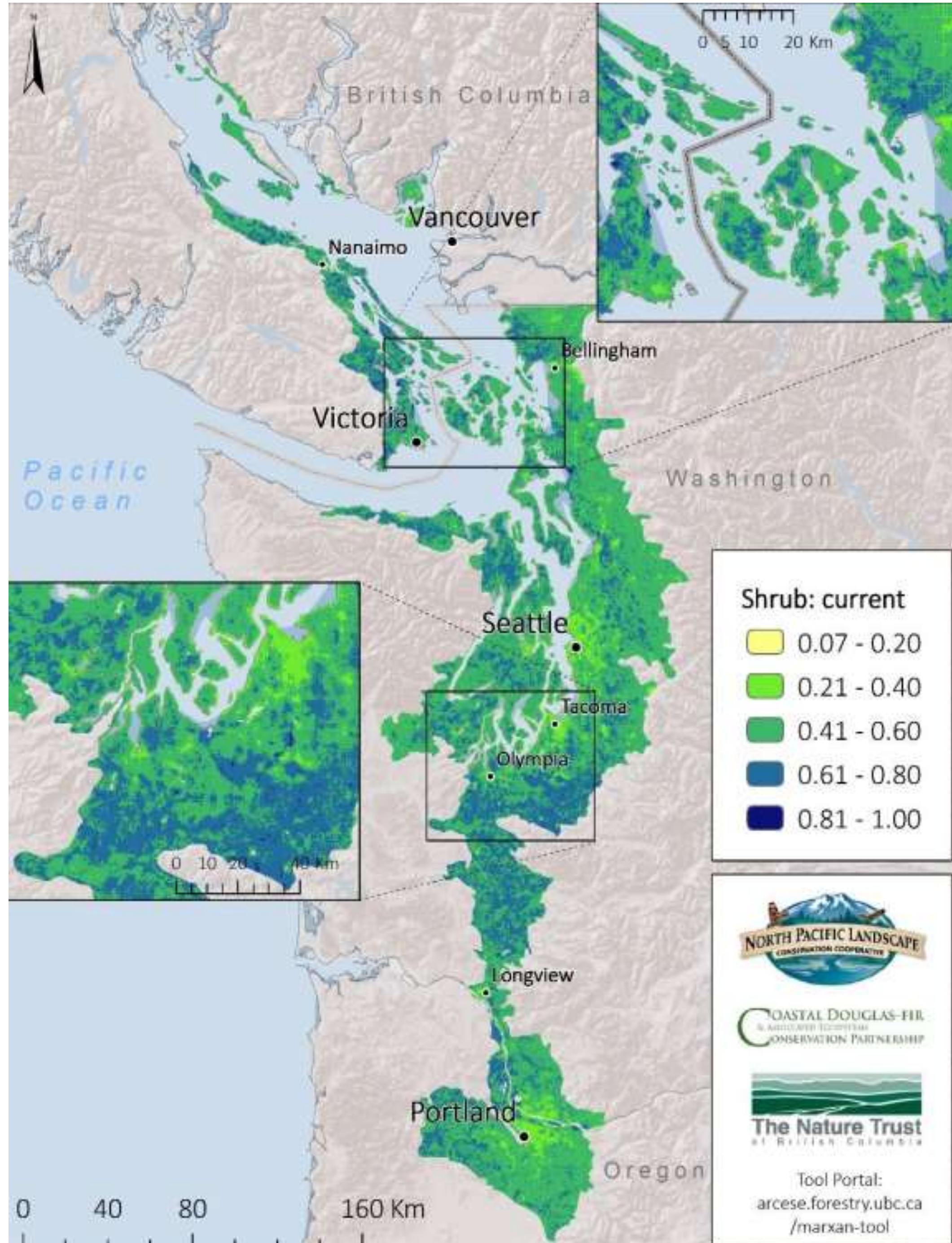
Current Distribution of 'Old Forest' Community (17 spp)



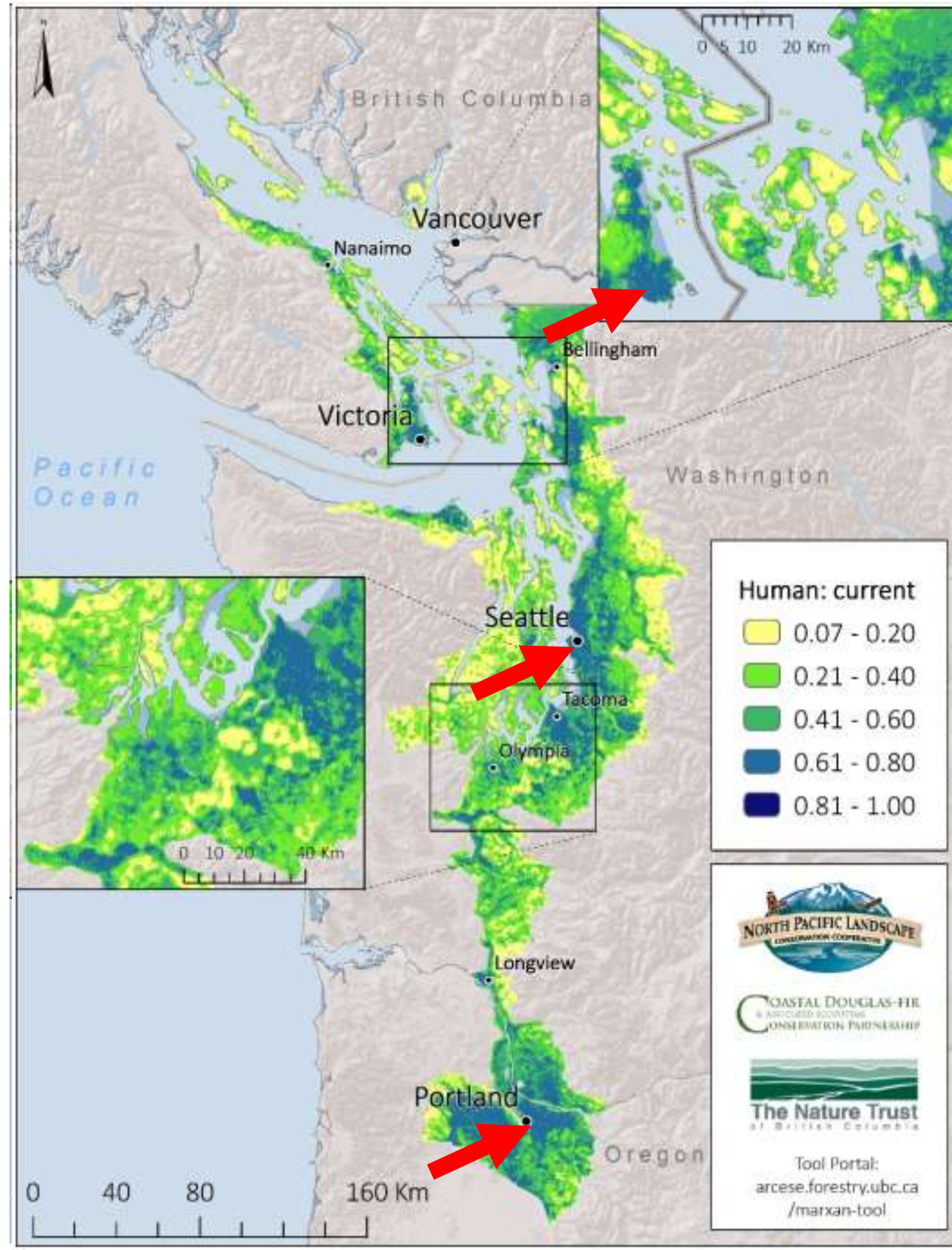
Predicted Distribution in 2045



Savanna, Shrub, Wetland and Human Commensal Communities

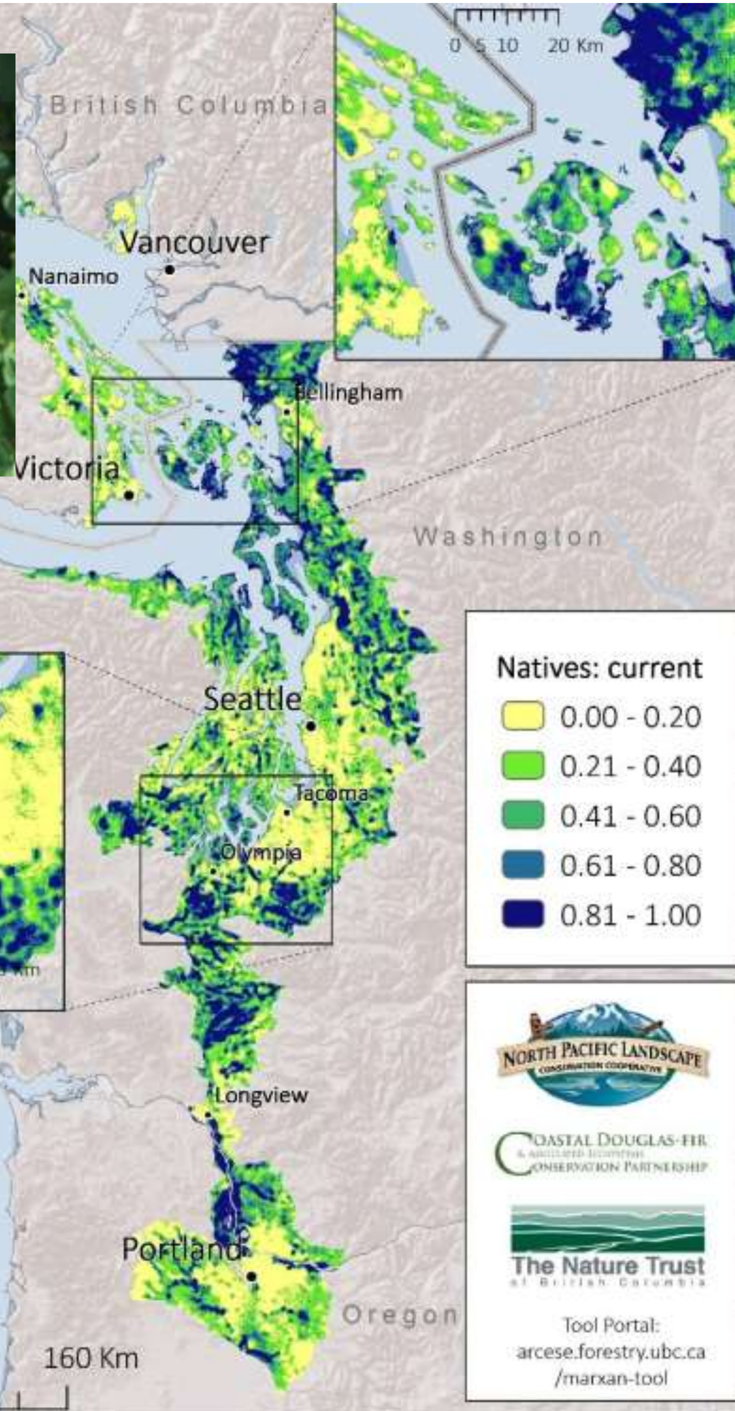


Savanna, Shrub, Wetland and Human Commensal Communities



Native and Exotic Plants

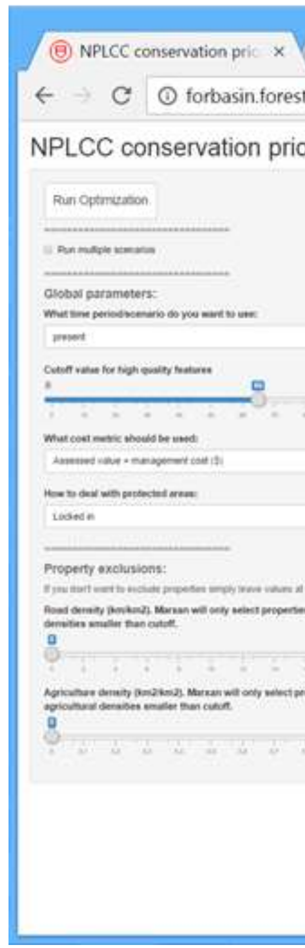
Common Name
Great camas
Red fescue
Crown brodiaea
Cleavers/stickyweed
Common camas
Fool's onion
Yarrow
Pacific blacksnakeroot
Seablush
Blue wild rye
Maiden blue-eyed Mary
Licorice fern
Common woodrush
Field mouse-ear/chickweed
Desert deervetch
Western buttercup
California oatgrass
Long-stolon sedge
Tomcat clover
Common lomatium/spring gold

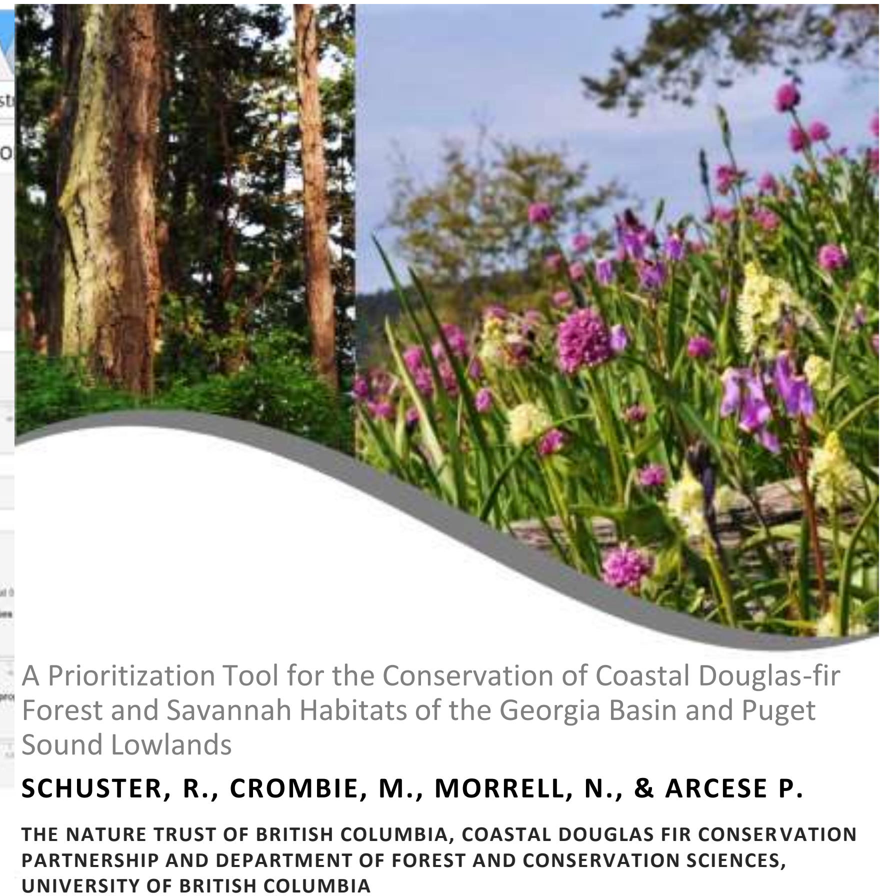


On-line Marxan ILP Tool: High Priority Parcels at Low ‘Cost’

CDFCP
Coastal Douglas-fir & Associated Ecosystems Conservation Partnership

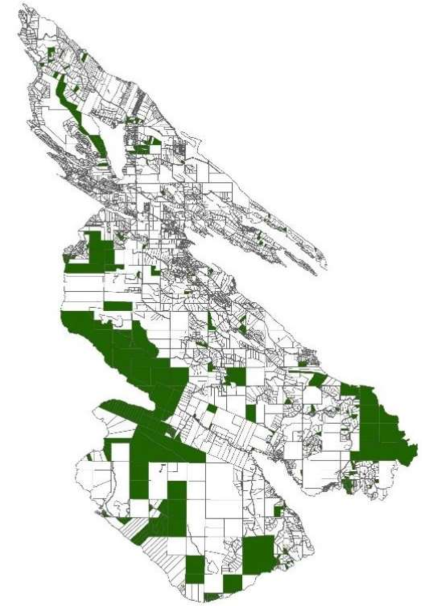
- Engage Stakeholders to Identify Targets and Costs
- Prioritize 3 million Land Parcels to Facilitate Conservation Decisions





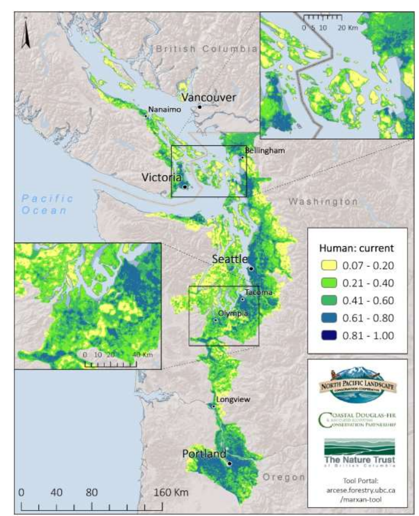
http://arcese.forestry.ubc.ca/marxan-tool/

Maximizing Benefits Given 'Cost'



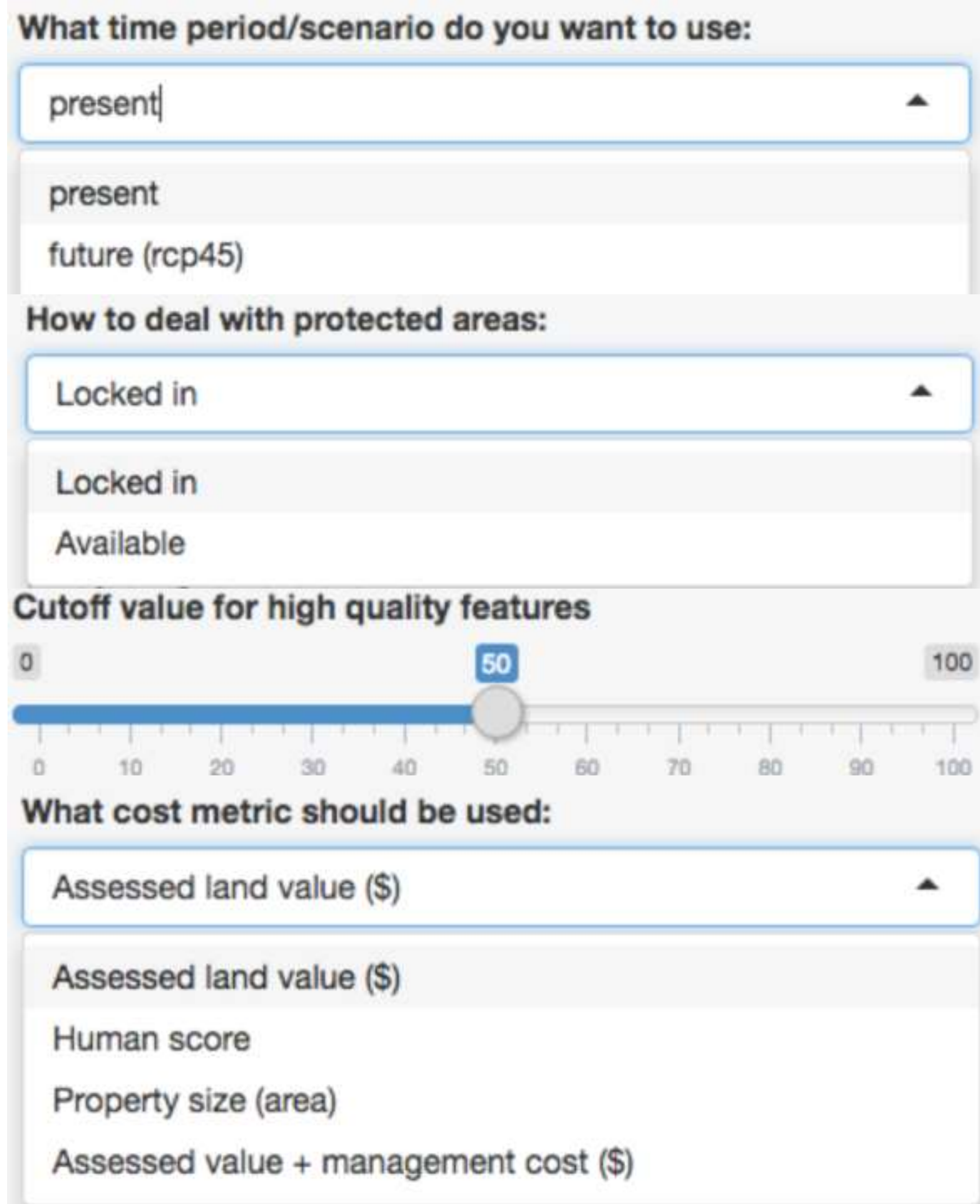
- Tax Assessed Value

- Human-commensal Cost (plants & birds)



- Management/Restoration Cost (predicted condition, location)

Exploring Scenarios

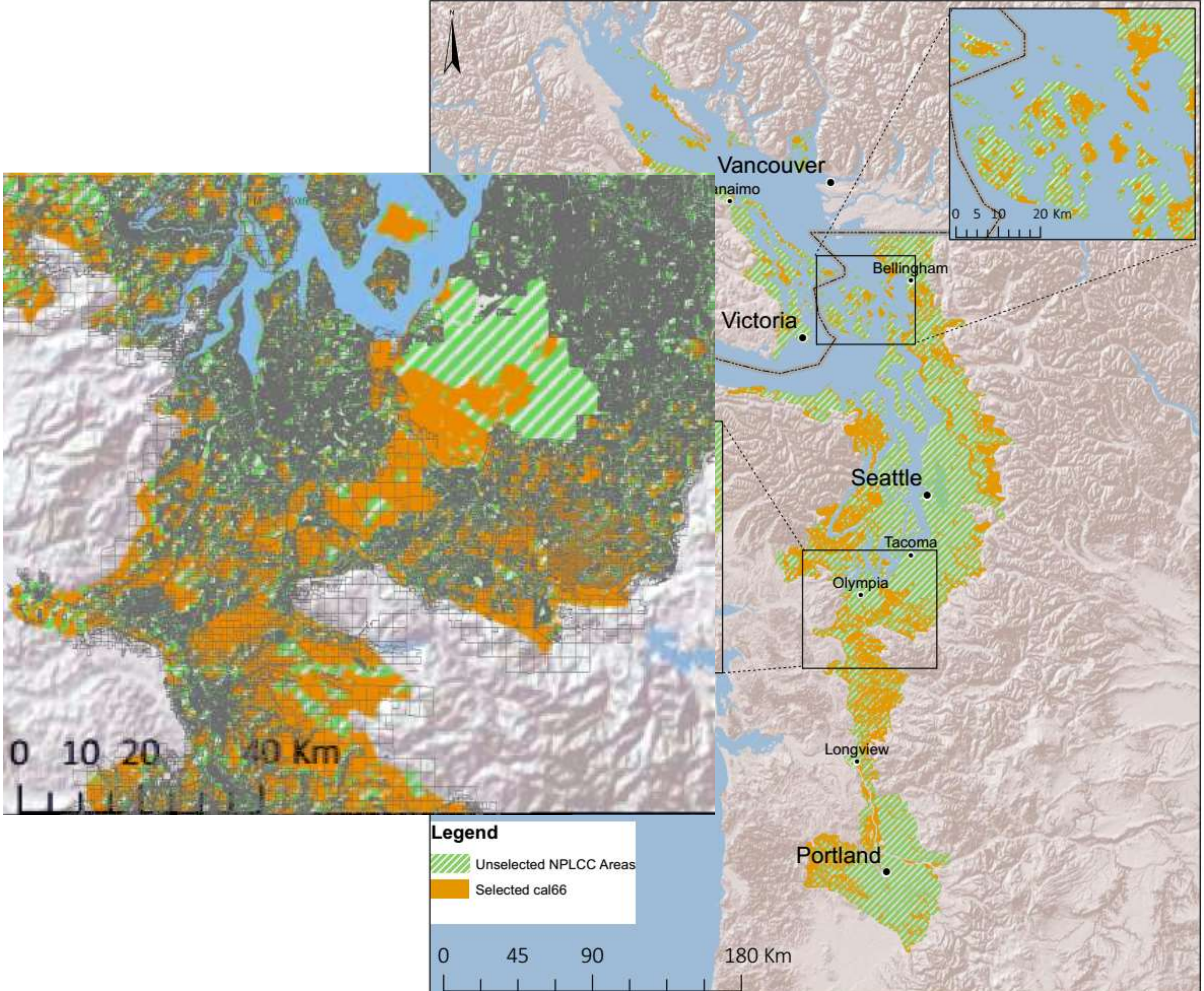


Goal

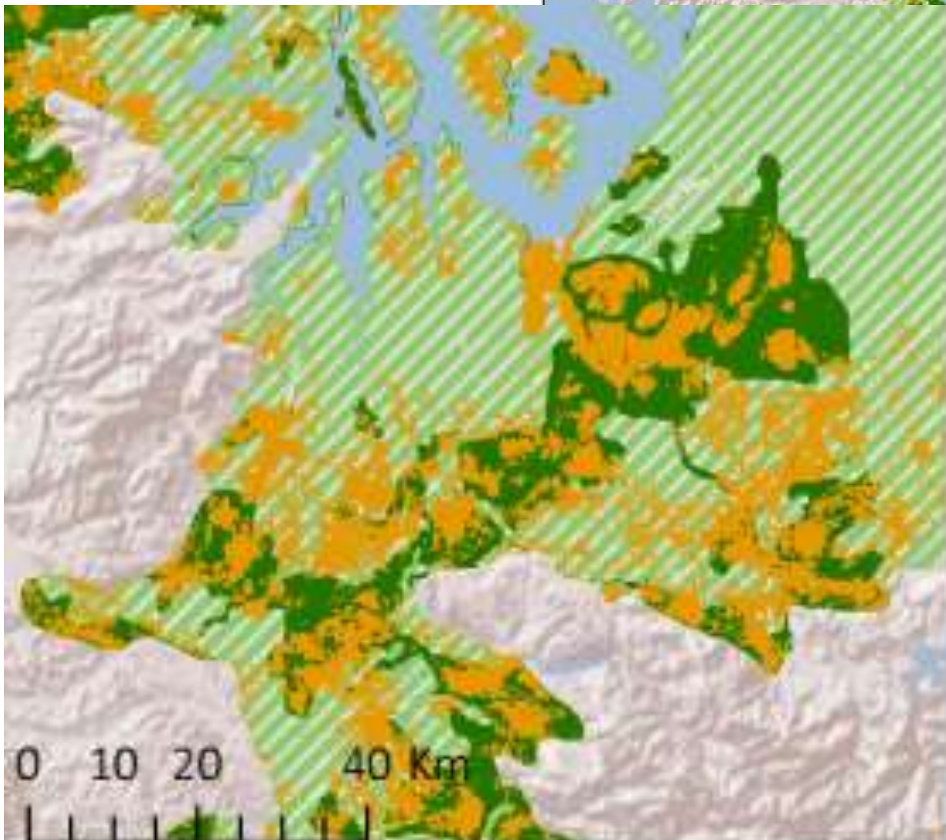
Protect 50% of the Best 33% OF, SAV, WET and NAT Ecosystems

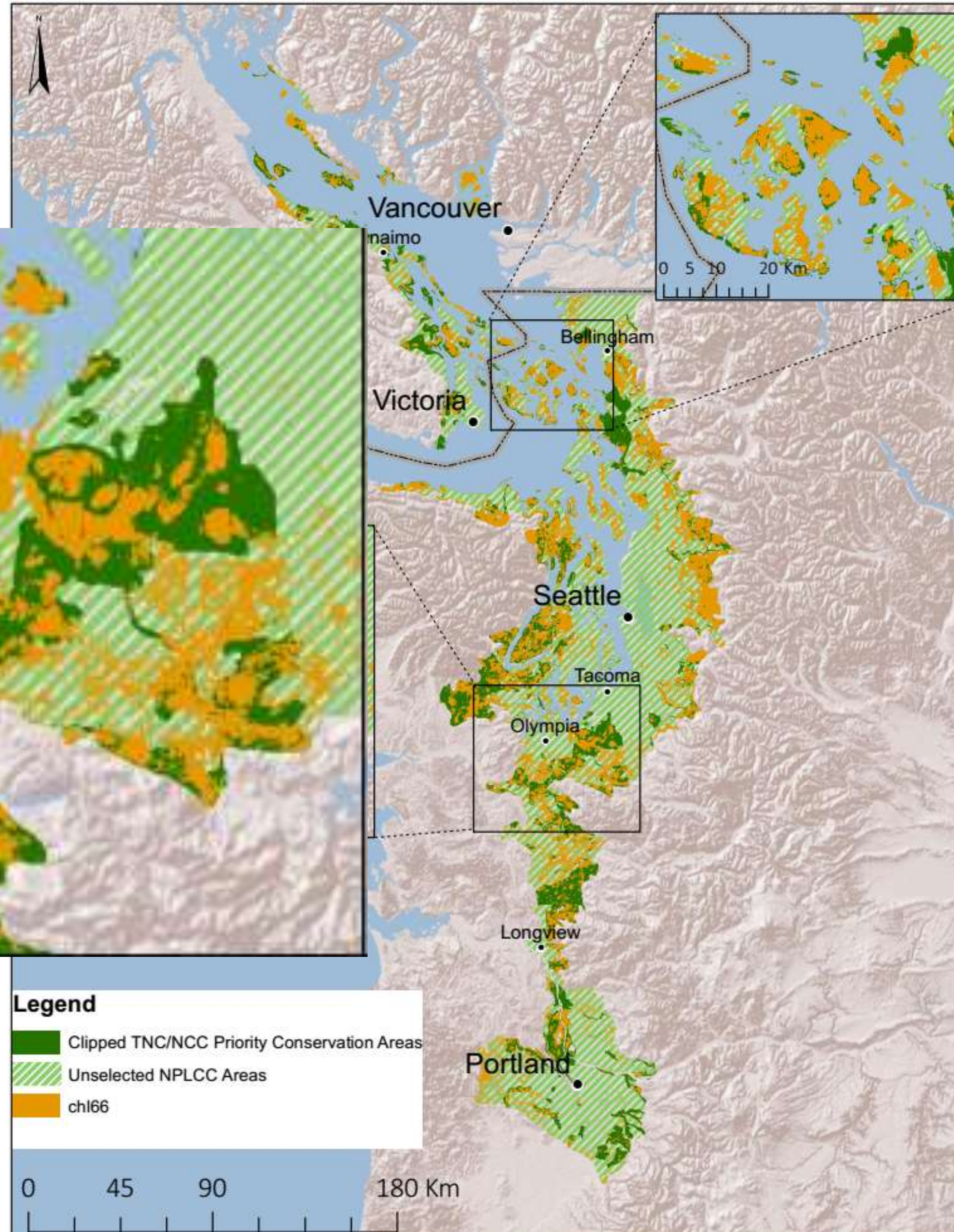
Edit Target | Input Layers

	id	Percent	name
1	1	50	OF
2	2	50	SAV
3	3	0	SHR
4	4	50	WET
5	5	0	HUM1
6	6	50	NAT
7	7	0	EXO1
8	8	0	TREE


Vancouver
Victoria
Bellingham
Seattle
Tacoma
Olympia
Longview
Portland
0 5 10 20 Km
0 10 20 40 Km
Legend
Unselected NPLCC Areas
Selected cal66
0 45 90 180 Km

57% Overlap with TNC Ecoregional Priorities





96% Overlap for Current and 2045 Scenarios

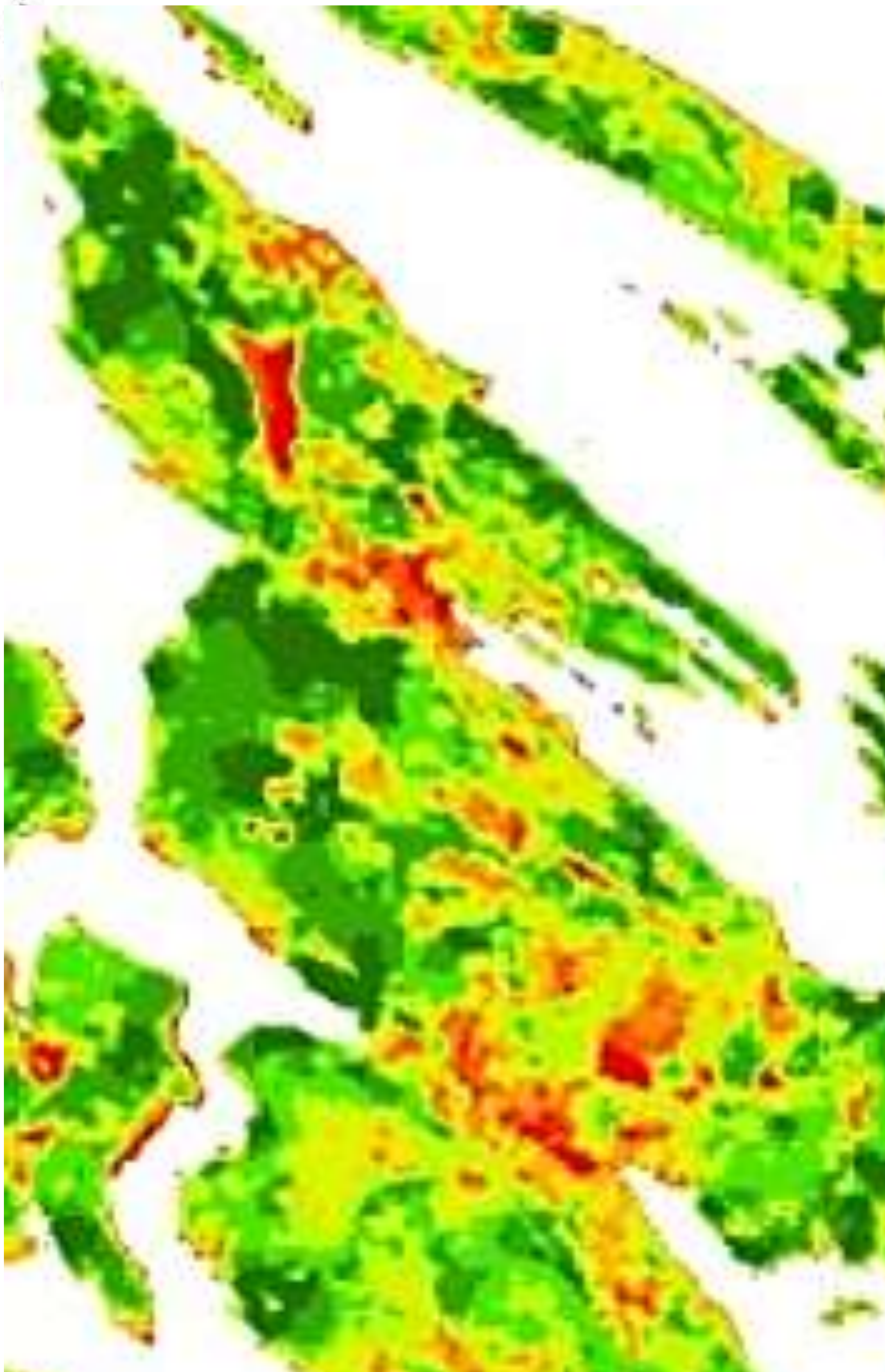
Applications?

The Nature Trust
of British Columbia

Acquire Biodiverse Parcels

Minimize Management Costs, Maximize Return on Conservation Investments

Develop Contact Lists to Engage Private Landowners in Landscape-level Conservation

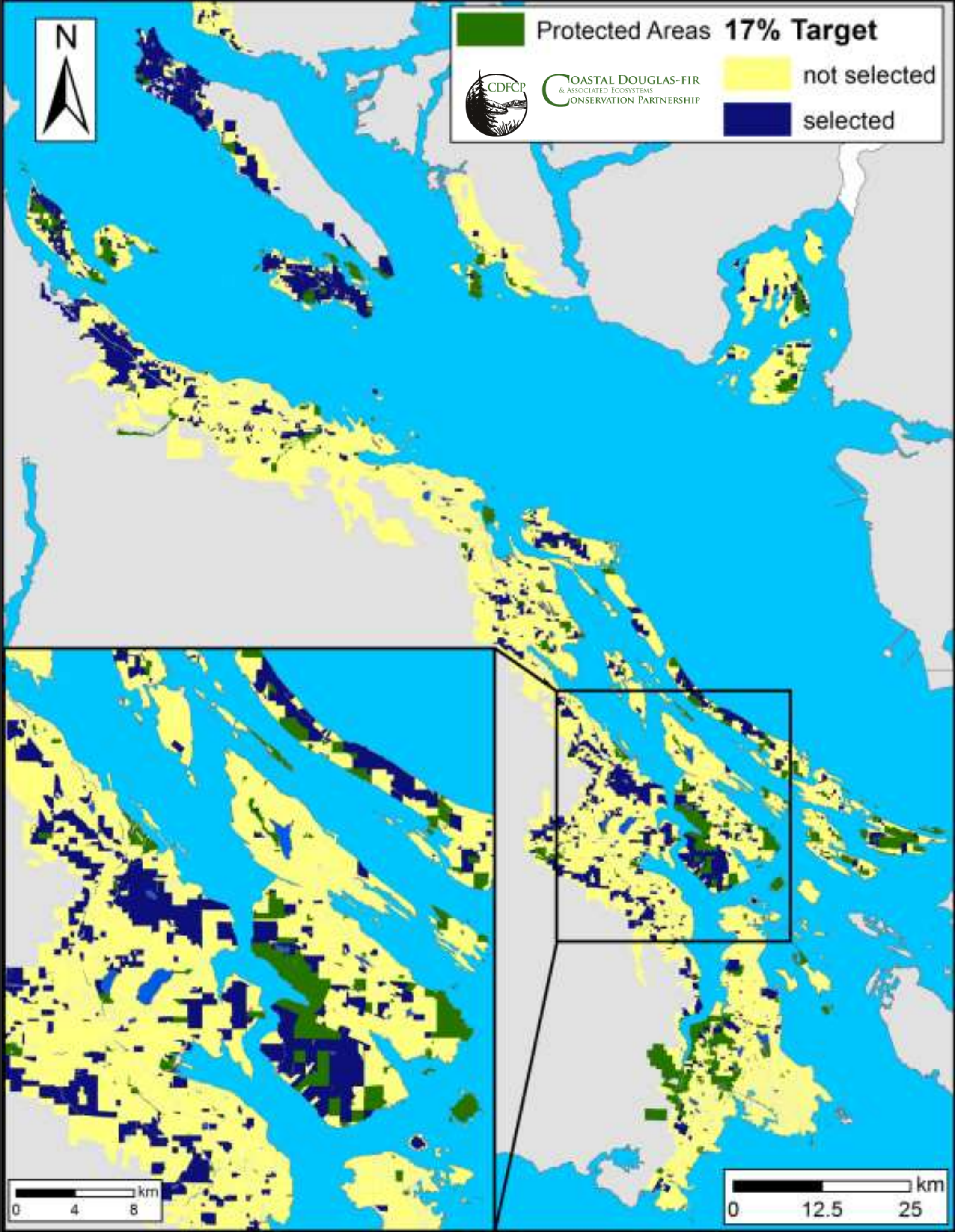


CDFCP: Prioritize Parcels to Facilitate Collaborative Decision-making

Complying with the **CBD** Means Increasing PA's from 9 to 17%

Acquisition?

~$500,000,000 Assessed Value



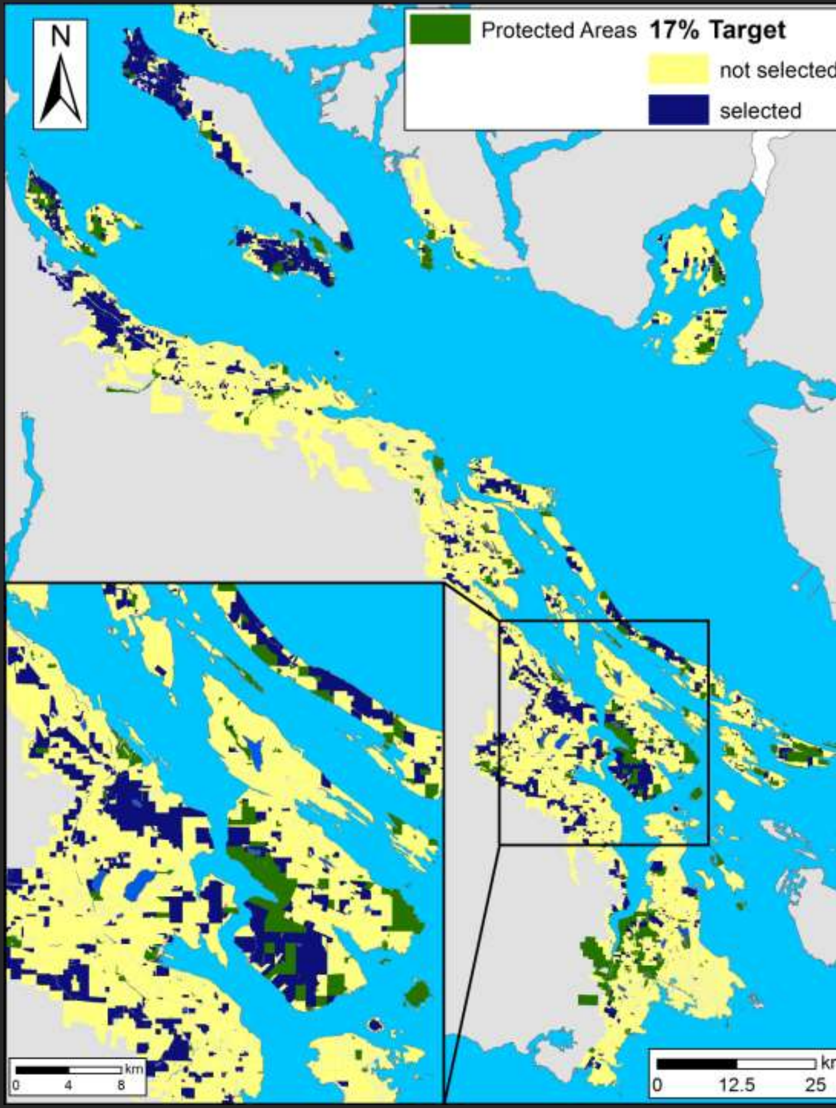
‘Tax Shifting’

1) Identify Priority Parcels
2) Shift Taxes from High to Low Biodiversity-value Parcels

CDFCP Goals

Reduce	**Cost**	**Requisite Increase**
100%	$3.1m	$0.22 / $100K (0.18%)

Tax Shifting Could Facilitate Strategic Targeting of Incentives at No Net Cost to Governments

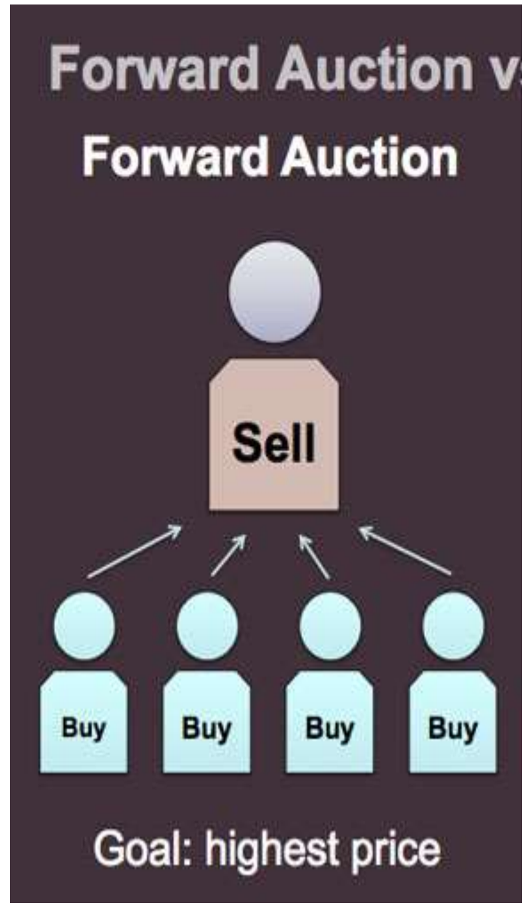


Strategic Investment for 'Co-benefits'

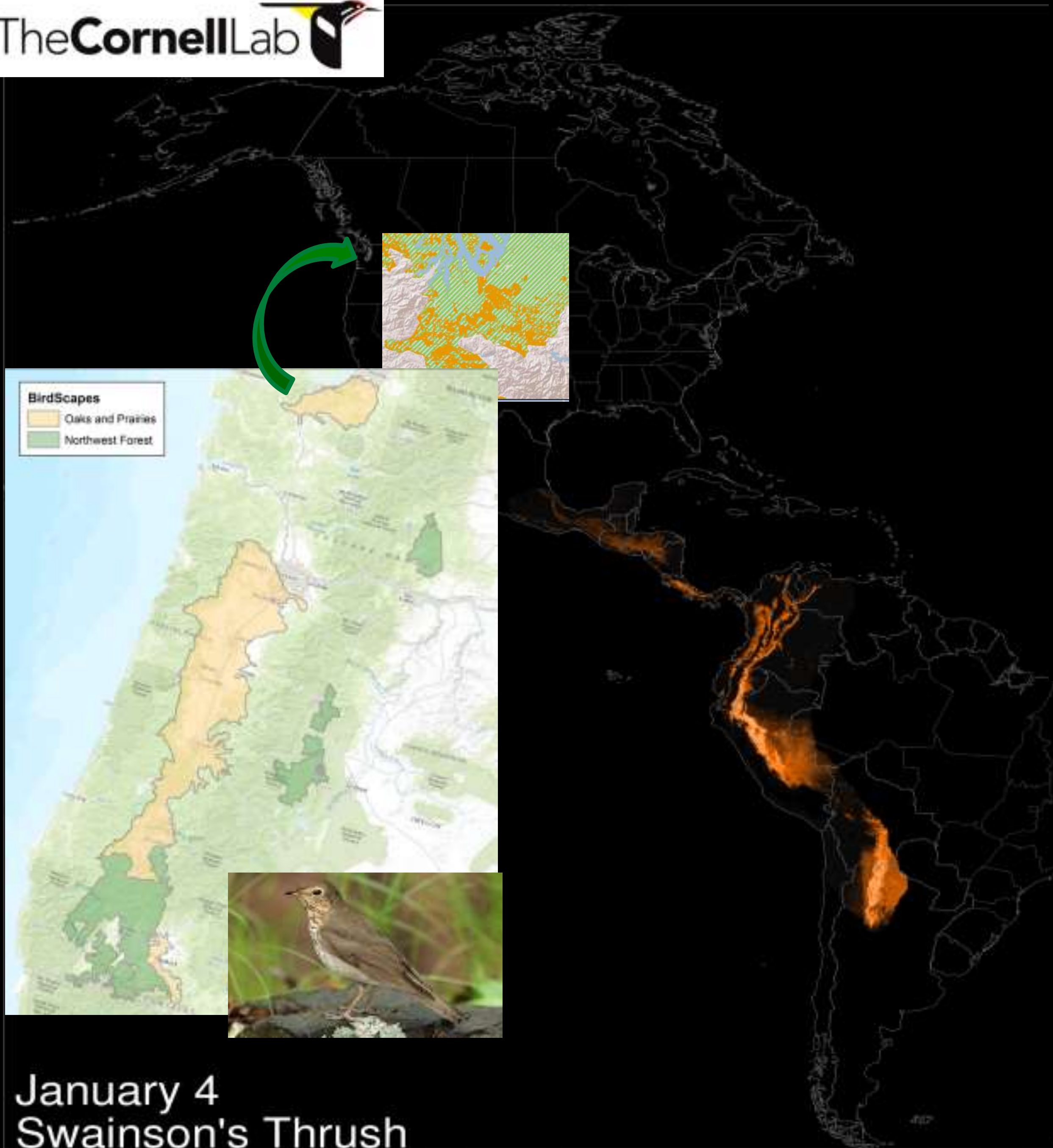
Standing / Sequestered Carbon

Water Quality / Supply

Organic Farm Practices



TheCornellLab



Next Steps?

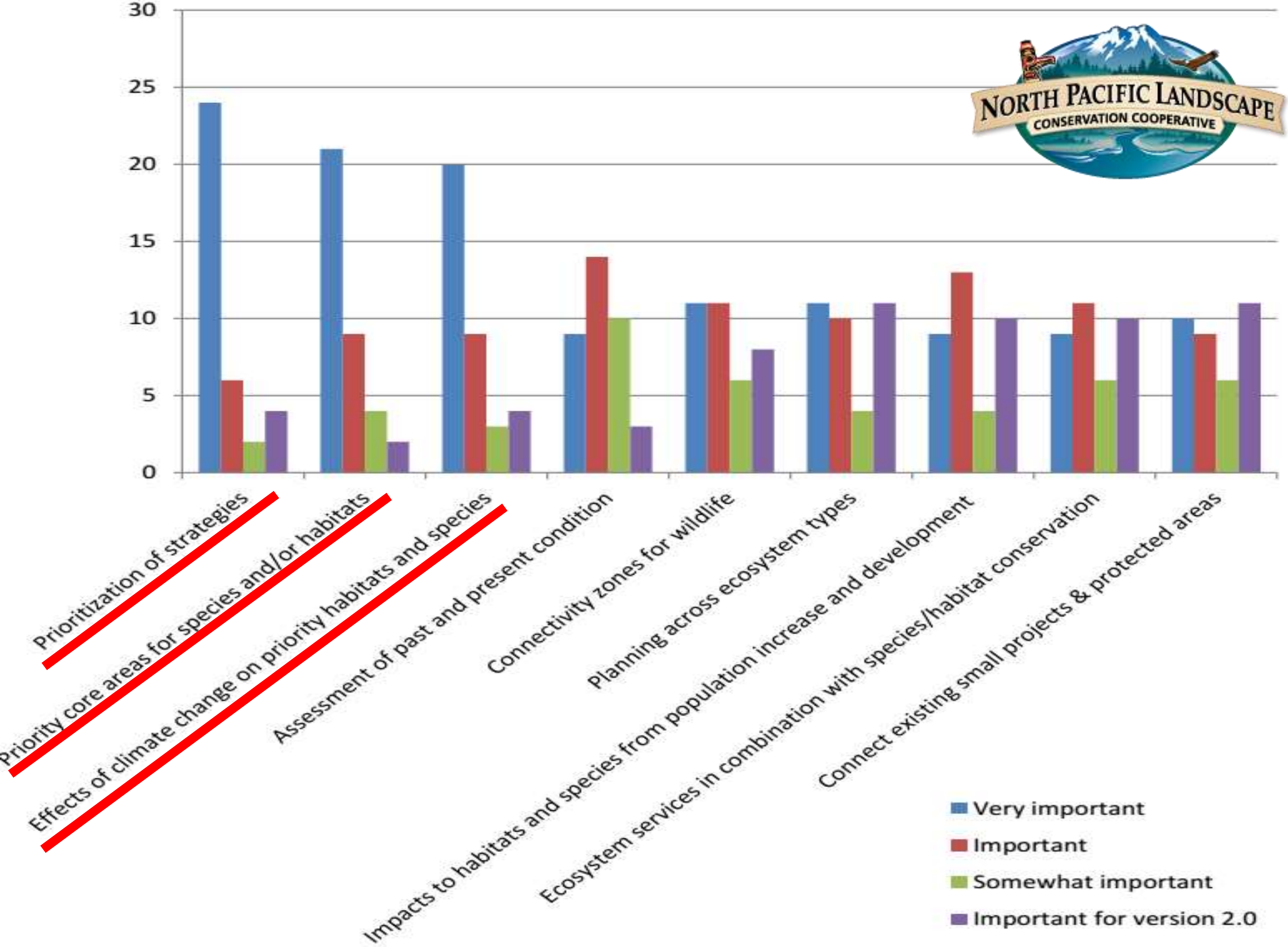
STEM Models Predict Species Abundance Over the Entire Annual Cycle

~150 Species to Date

Working with ABC and CLoO to Apply STEM to Parcel Level Selection Tools

AMERICAN BIRD CONSERVANCY

eBird



NORTH PACIFIC LANDSCAPE
CONSERVATION COOPERATIVE
30
25
20
15
10
5
0
Prioritization of strategies
Priority core areas for species and/or habitats
Effects of climate change on priority habitats and species
Assessment of past and present condition
Connectivity zones for wildlife
Planning across ecosystem types
Impacts to habitats and species from population increase and development
Ecosystem services in combination with species/habitat conservation
Connect existing small projects & protected areas
Very important
Important
Somewhat important
Important for version 2.0

Conclusions

- Humans have Pervasive ‘Indirect’ Effects on Species and Ecosystems via the ‘Bad Actors’ they Facilitate
- Ecosystem Maps Offer a Direct Route to Prioritize ‘Intact’ Target Communities
- Parcel-level lanning Tools Facilitate Stakeholder Engagement in Target Identification, Goal-setting and Policy Development

NORTH PACIFIC LANDSCAPE CONSERVATION COOPERATIVE

NSERC CRSNG

The Nature Trust of British Columbia

CDFCP

COASTAL DOUGLAS-FIR & ASSOCIATED ECOSYSTEMS CONSERVATION PARTNERSHIP

real estate foundation BRITISH COLUMBIA

http://arcese.forestry.ubc.ca/marxan-tool/