Identifying Geographic Priorities for Coastal Wetland Conservation Funding in a Changing Climate

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Introduction

- ***<u>Conservation funders want to fund projects that will continue providing benefits into the future.</u> Can we identify and prioritize wetland conservation projects that can address SLR impacts and continue providing ecological benefits as wetland habitats shift?***

- ***<u>Restoring habitats to historical conditions has value but is no longer sufficient</u>. We should assume that habitats and species distributions will change and re-assemble themselves in unique ways and that not all will survive the transition. Over the long term, projects should facilitate adaptation to SLR with minimal loss of habitats and biodiversity.***

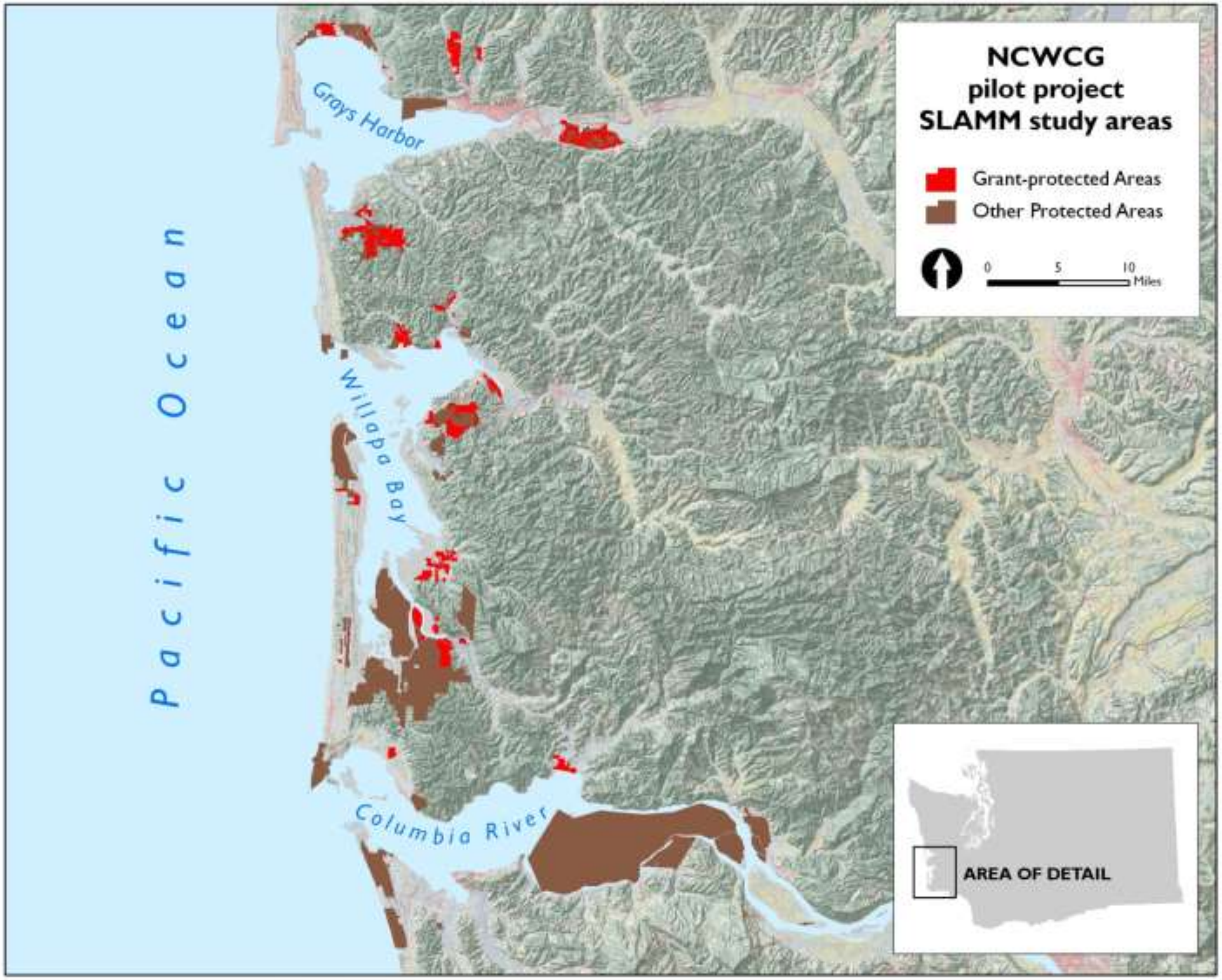
- ***<u>Relative to other projected climate change impacts, SLR impacts on wetlands are easier to predict.</u> The main uncertainties are how quickly and how high seas will rise and how well can wetland habitats can migrate into uplands and 're-assemble.'***

Introduction (continued)

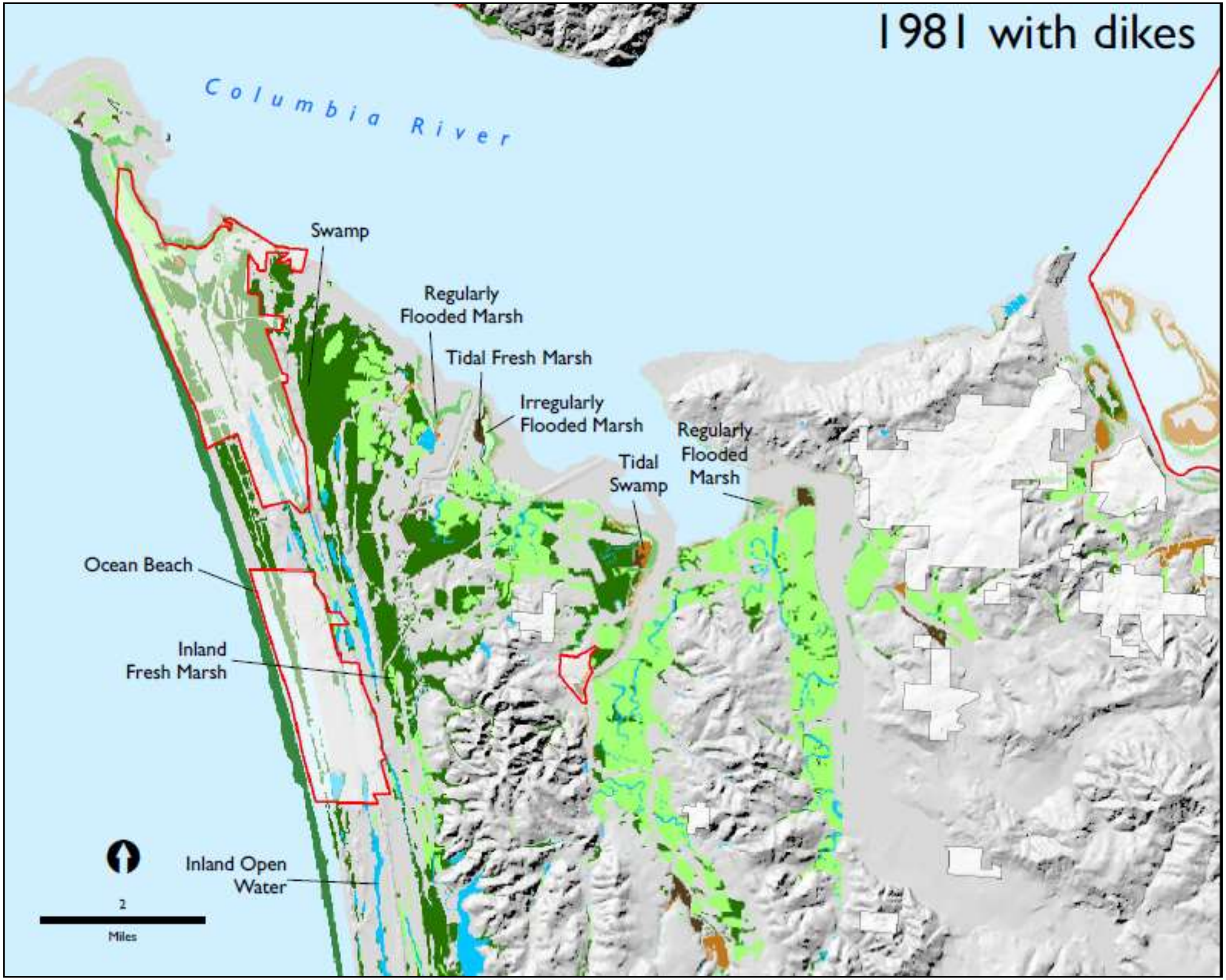
- ***<u>The challenge</u>* is to frame a range of realistic SLR impacts; create regional, geospatial filters that will help prioritize wetland projects most likely to remain viable as SLR occurs; and to identify and fill key data gaps and modeling needs.**

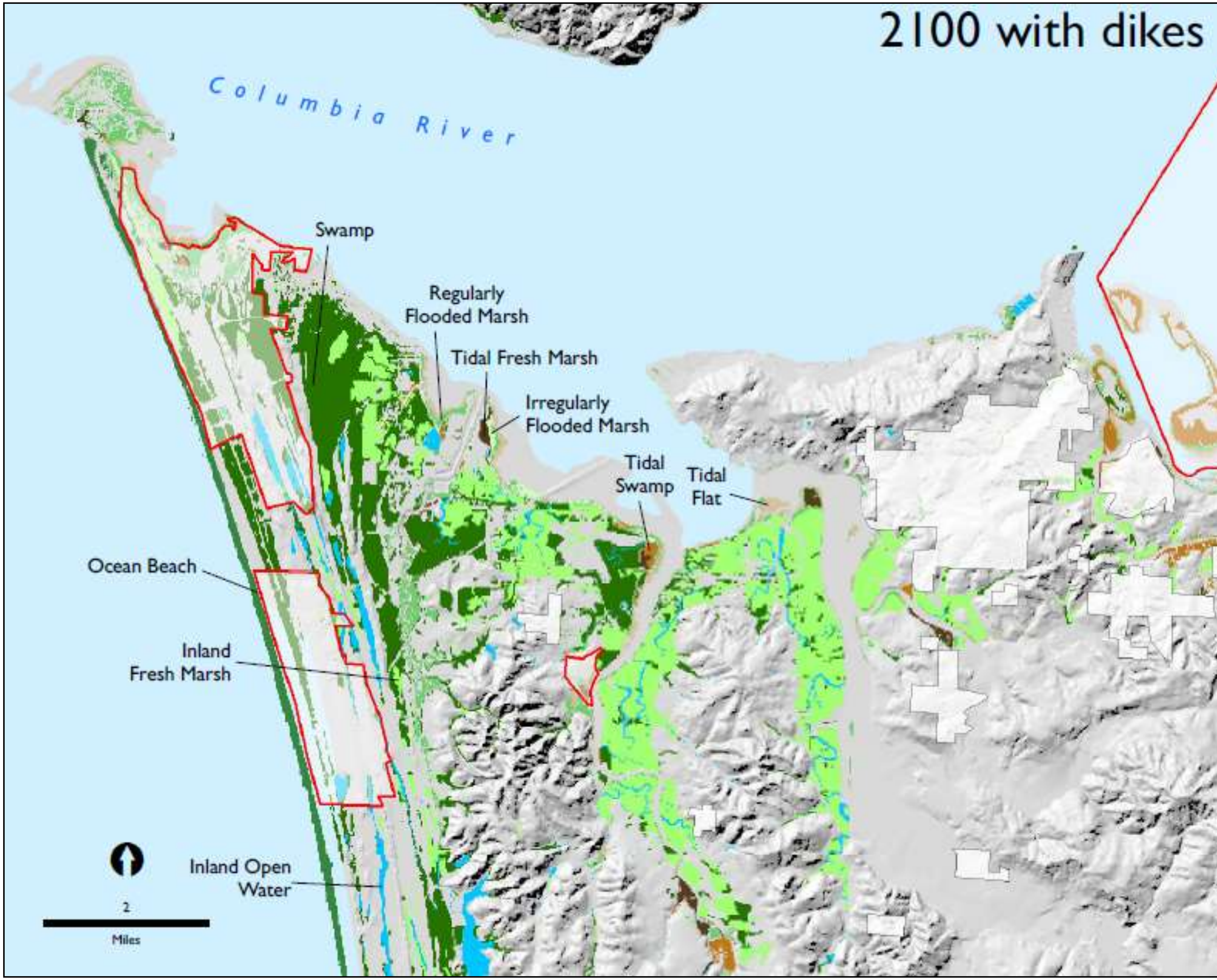
- ***<u>This presentation</u>* is mainly conceptual. It presents an early attempt to prioritize LCRE coastal wetlands for protection and provides suggestions for improvements.**

Coastal Wetland Grant Acquisitions and Protected Areas (2011)

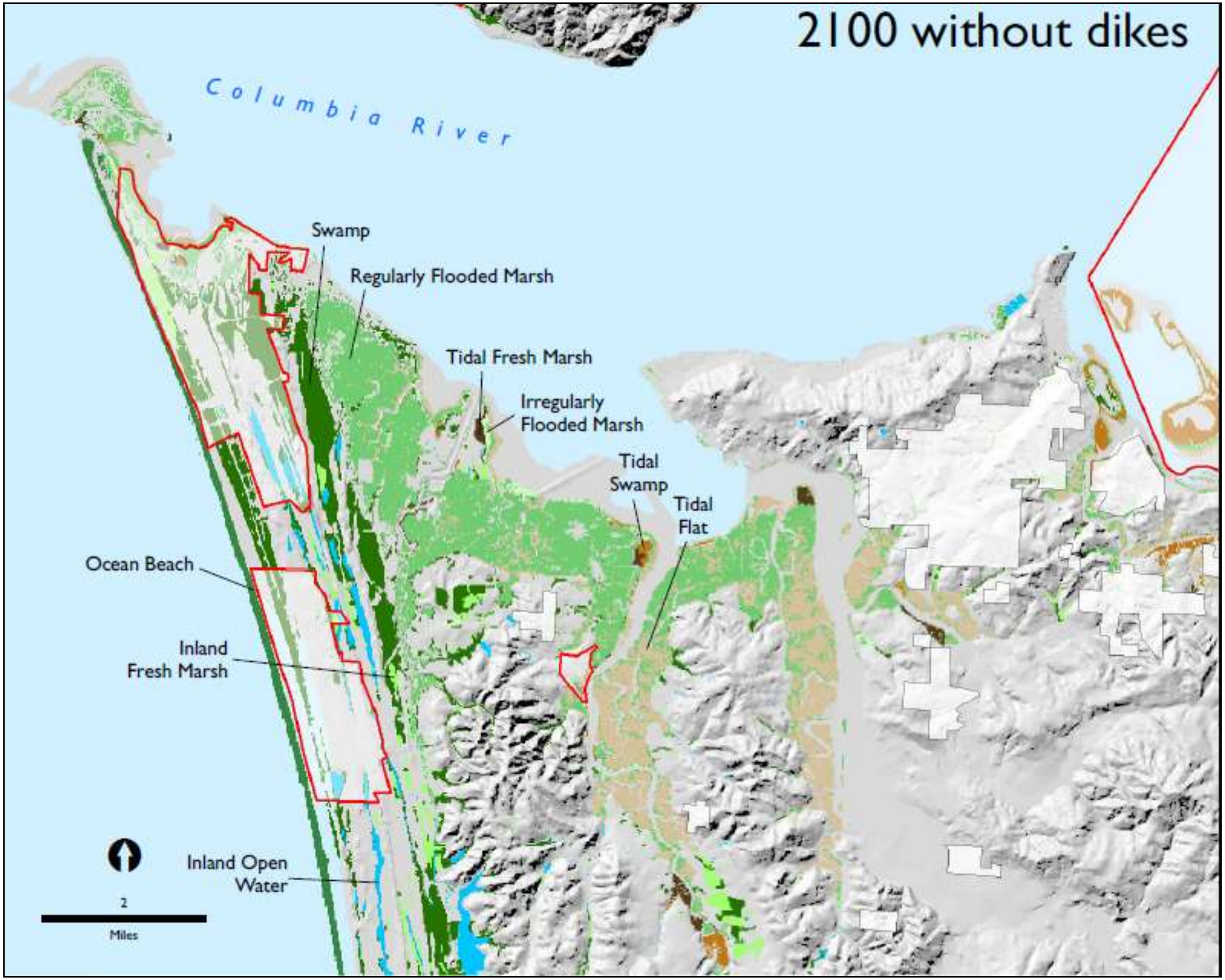


1981 with dikes

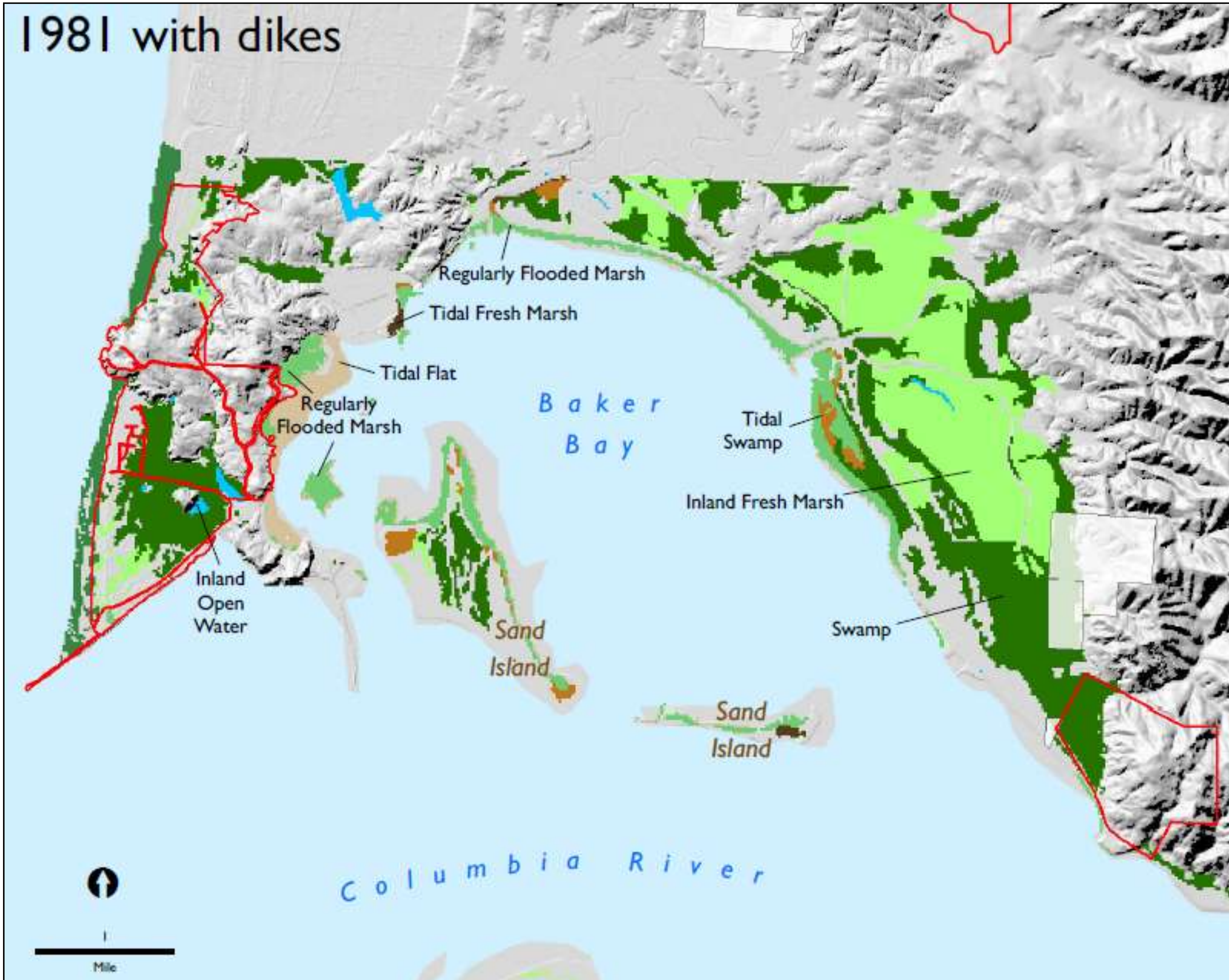


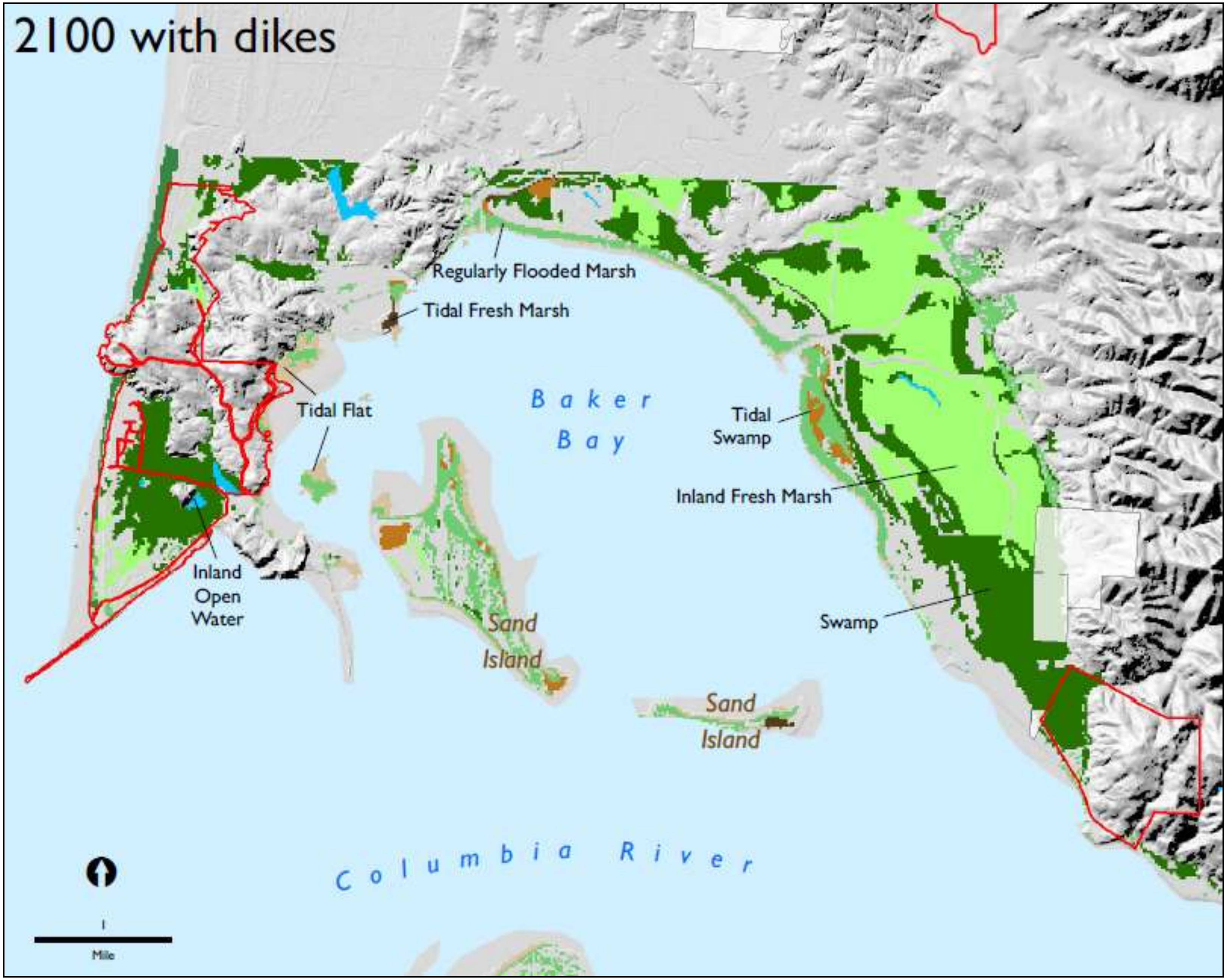


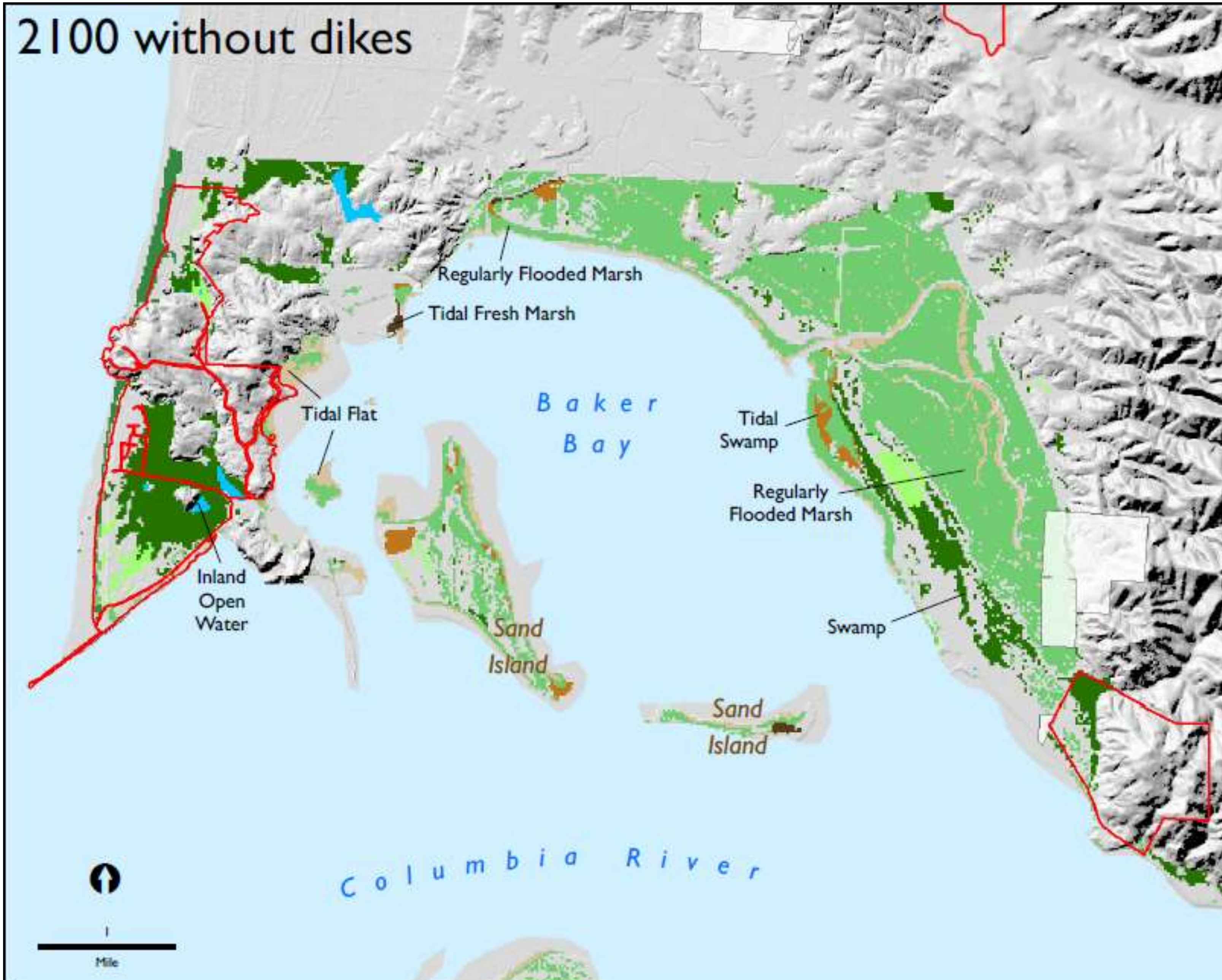
2100 with dikes
Columbia River
Swamp
Regularly Flooded Marsh
Tidal Fresh Marsh
Irregularly Flooded Marsh
Tidal Swamp
Tidal Flat
Ocean Beach
Inland Fresh Marsh
Inland Open Water
2
Miles

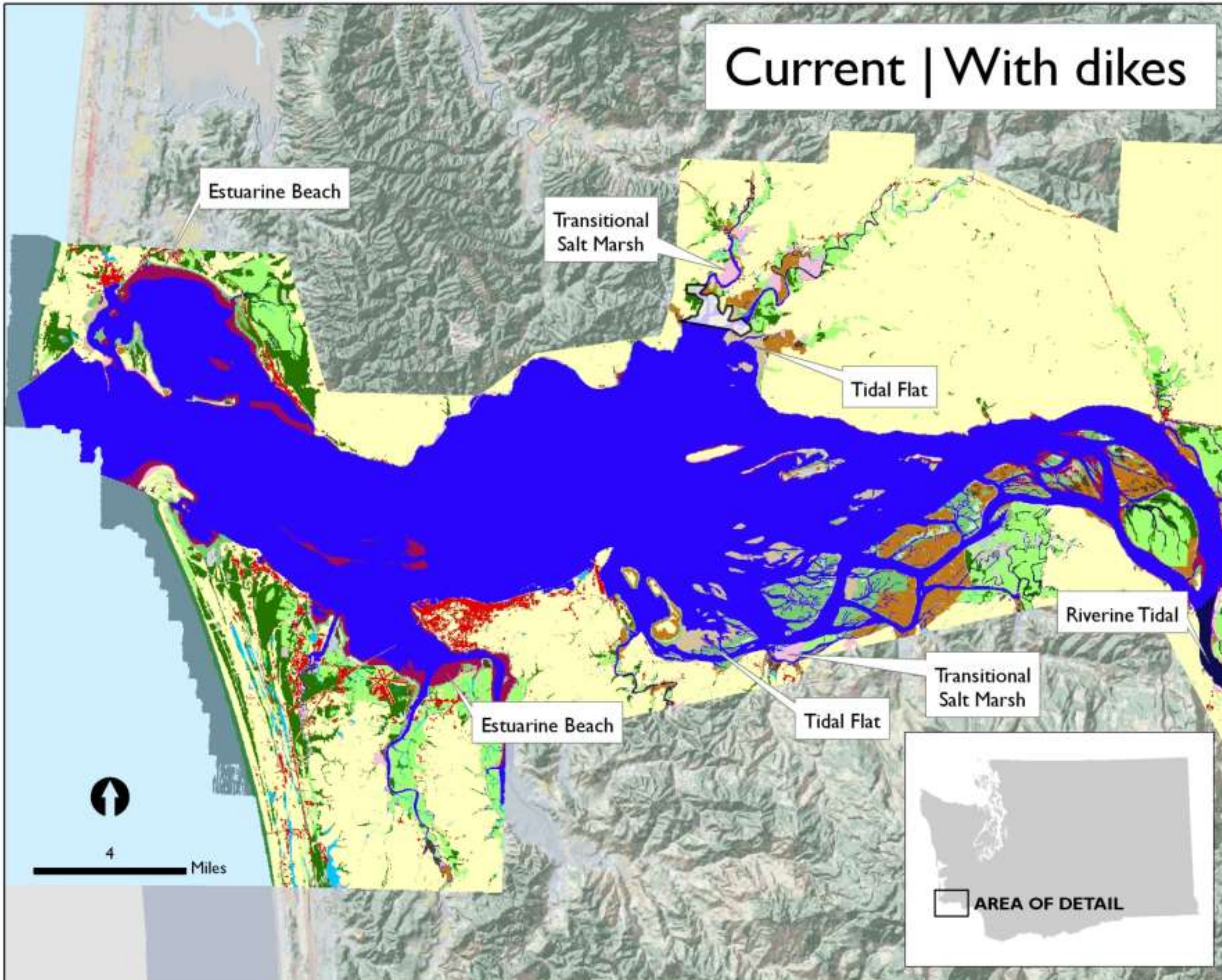

2100 without dikes
Columbia River
Swamp
Regularly Flooded Marsh
Tidal Fresh Marsh
Irregularly Flooded Marsh
Tidal Swamp
Tidal Flat
Ocean Beach
Inland Fresh Marsh
Inland Open Water
2
Miles

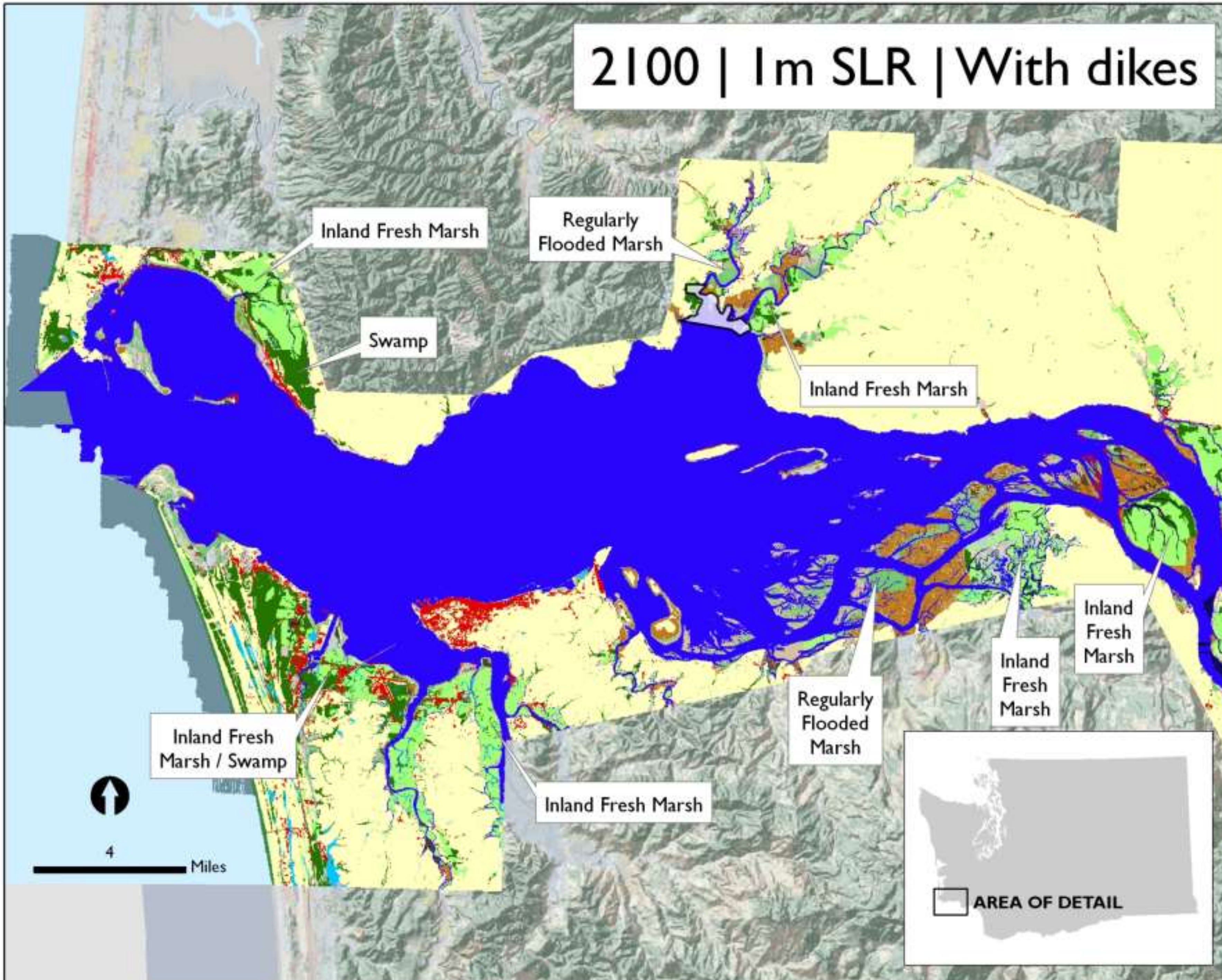
1981 with dikes

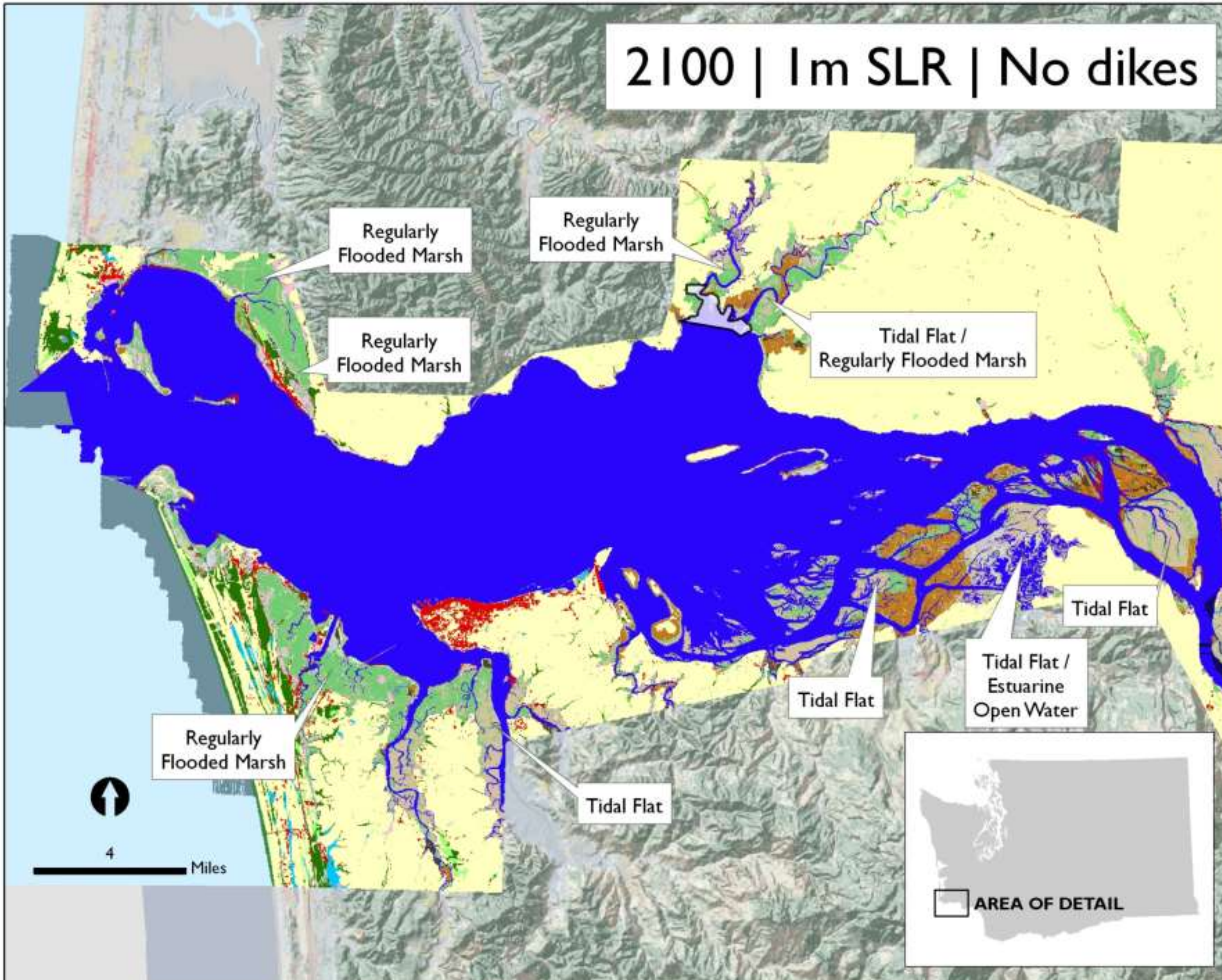



2100 with dikes
Regularly Flooded Marsh
Tidal Fresh Marsh
Tidal Flat
Baker Bay
Tidal Swamp
Inland Fresh Marsh
Inland Open Water
Sand Island
Sand Island
Swamp
Columbia River
1
Mile

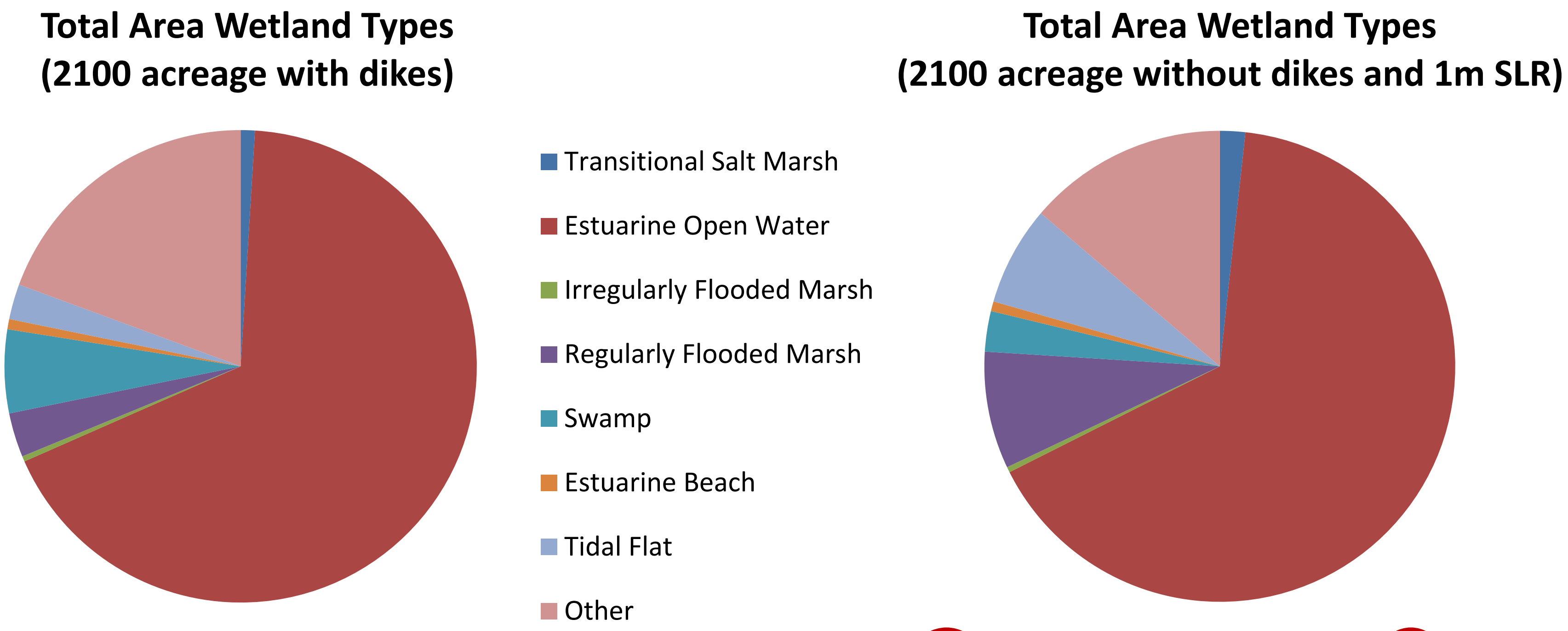

2100 without dikes
Regularly Flooded Marsh
Tidal Fresh Marsh
Tidal Flat
Baker Bay
Tidal Swamp
Regularly Flooded Marsh
Inland Open Water
Sand Island
Sand Island
Swamp
Columbia River
1
Mile


Current | With dikes
Estuarine Beach
Transitional
Salt Marsh
Tidal Flat
Riverine Tidal
Transitional
Salt Marsh
Tidal Flat
Estuarine Beach
4
Miles
AREA OF DETAIL


2100 | 1m SLR | With dikes
Inland Fresh Marsh
Regularly Flooded Marsh
Swamp
Inland Fresh Marsh
Inland Fresh Marsh / Swamp
Inland Fresh Marsh
Regularly Flooded Marsh
Inland Fresh Marsh
Inland Fresh Marsh
4
Miles
AREA OF DETAIL


2100 | 1m SLR | No dikes
Regularly Flooded Marsh
Regularly Flooded Marsh
Regularly Flooded Marsh
Tidal Flat / Regularly Flooded Marsh
Regularly Flooded Marsh
Tidal Flat
Tidal Flat
Tidal Flat / Estuarine Open Water
Tidal Flat
4
Miles
AREA OF DETAIL

LCR <u>TOTAL</u> WETLANDS: *2100 DIKED VS. 2100 UNDIKED*



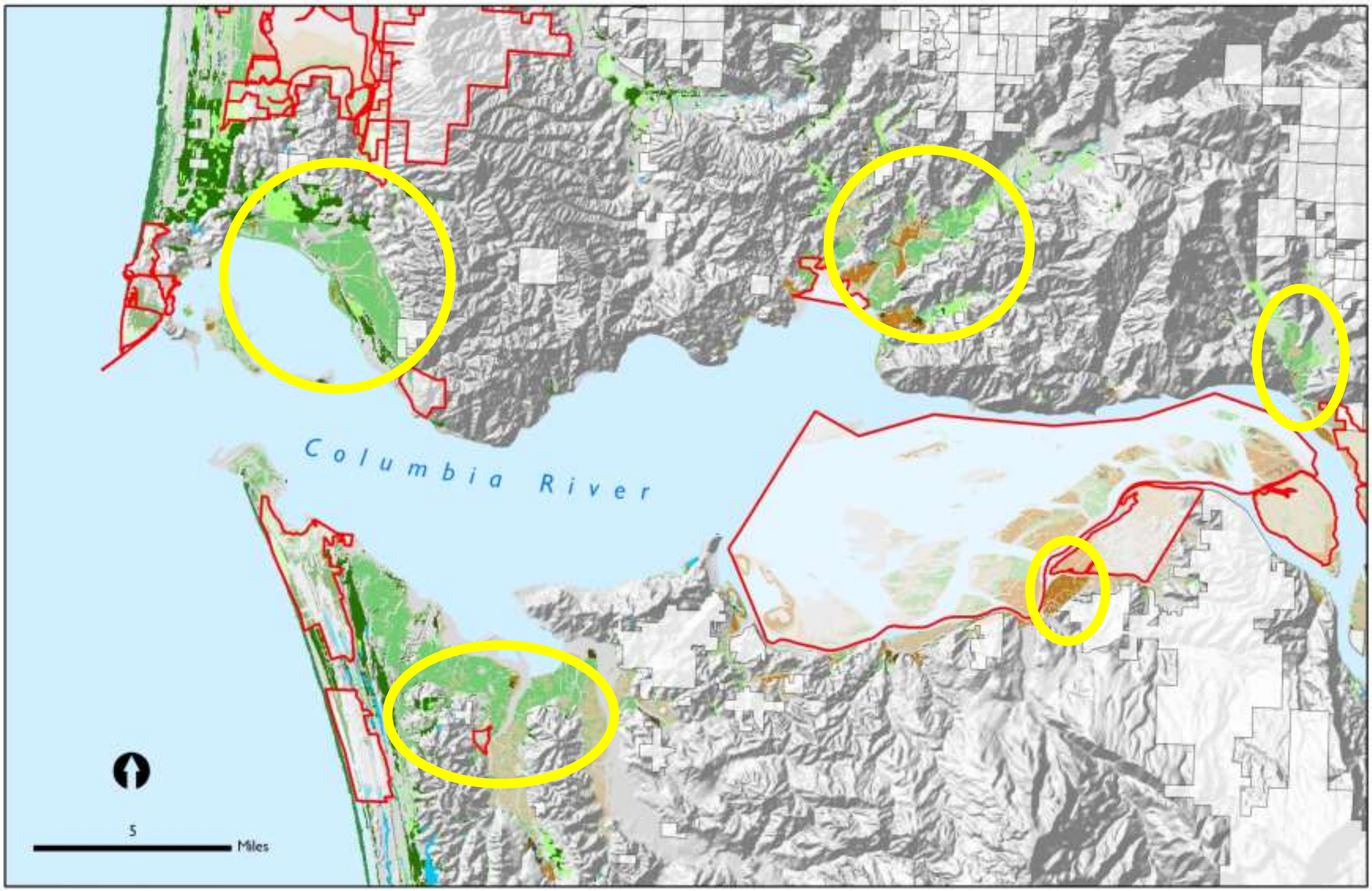
	Transitional Salt Marsh	Estuarine Open Water	Irregularly Flooded Marsh	Regularly Flooded Marsh	Swamp	Estuarine Beach	Tidal Flat	Other	Total
With dikes	1385	96315	525	4325	8155	995	3450	27675	142825
Without dikes	2575	97495	555	11910	4110	995	10095	20345	148040
Difference	**+1190**	**+1180**	**+30**	**+7585**	**-4045**	**0**	**+6645**	**-7330**	**+5215**

2011 framework for LCRE wetland acquisition priorities

Simple approach that identifies spatial overlaps of:

- *Projected locations of nationally declining wetland types existing under a 1.0 meter SLR and 'no dikes' scenario*
- *Future wetlands adjacent to protected areas*
- *Future wetlands on private lands (assumes willing sellers)*

2011 LCRE Prioritization Exercise: future nationally declining wetlands (1m SLR, no dikes) on private lands and near protected areas



Shortcomings of 2011 prioritization exercise

- Outdated SLR model
- Broad-brush approach
- No field surveys or species use data
- Data gaps – local accretion rates, tectonic uplift
- Did not delineate current upland areas projected to become wetland migration corridors
- Did not consider/know physical requirements for functional wetland migration corridors (soil types, hydrology, etc.)
- Did not consider larger, regional changes outside of the LCRE – *e.g.*, Pacific Flyway wetland habitat losses

Suggested geospatial filters to prioritize 'no regrets' coastal wetland protection areas

Group 1: Filters we already use:

- Large, intact wetland parcels
- Private lands with owners willing to consider fee sale, easements, or working lands conservation agreements
- Parcels creating or adding to large, buffered protected areas
- Areas where socioeconomic impacts of protection are acceptable
- Wetlands with multiple, intact habitat types supporting high species biodiversity
- Wetlands providing additional services: carbon storage, infrastructure protection, water filtration, recreation
- Avoid developed or 'hardened' areas that are difficult to restore

Suggested geospatial filters to prioritize ‘no regrets’ coastal wetland protection areas

Group 2: Filters specific to addressing SLR:

- *Intact wetlands adjacent to upland areas that can provide extensive migration corridors*
- *Geophysically diverse lands that ‘preserve the stage’ (e.g., soils, elevation, hydrology, microclimates)*
- *Important wetland types projected to decline regionally outside of the LCRE (e.g., Pacific Flyway mudflats for shorebirds)*
- *Wetlands downstream from sediment sources that can maintain accretion rates*

Data, Modeling and Research Needs

Data Needs for Model Inputs (many of these already exist for LCRE)

– Site-specific data: High-resolution DEMs, tectonic uplift/subsidence rates, wetland sediment accretion and erosion rates

– Ground-truthed dike/migration barrier data layer

– Current, high-resolution wetland habitat maps normalized to tide stage and verified with field surveys

SLR Model Improvements

– Incorporate impacts of freshwater input changes; *e.g.*, effects of changing amounts and seasonality of Columbia River flow

Ecological Research

– The ability of wetland habitats to migrate and re-assemble is assumed but largely untested. How quickly can wetlands re-establish in historically non-hydric soils when seed sources are rapidly diminishing due to submergence?

Suggestions

- States, tribes and NGOs applying for wetland conservation grants should consider the value of prioritizing their grant proposals based on long-term, SLR resilience of projects

- Consider finding resources to fill data gaps, scientific knowledge gaps, and socioeconomic analyses needed to ensure a robust wetland prioritization process

- Use this information to justify <u>protecting adjacent uplands and sediment sources</u> as part of wetland conservation funding proposals

Acknowledgements

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