Marshes on the Margins

Task 2: Developing Natural and Nature-based Adaptation Strategies - Transition Zones

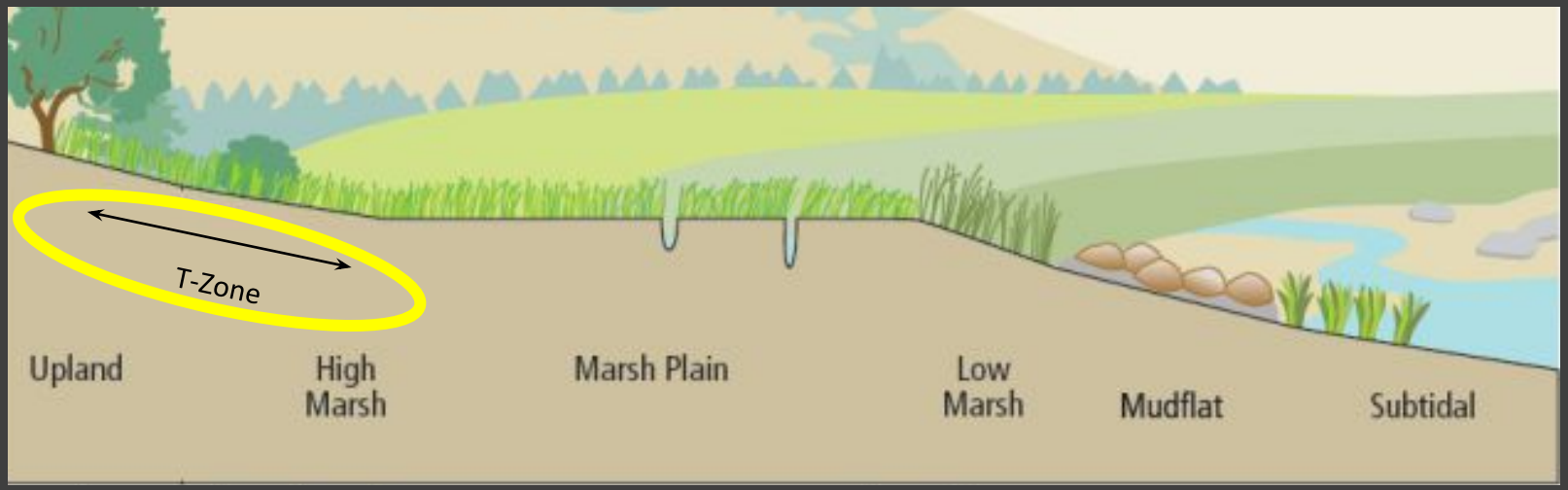
MTAG Workshop
August 14, 2018

Wetland-upland Transition Zones

- Importance of wetland-upland transition zones to provide ecosystem services
- Recognition of importance for habitat now and for sea level rise adaptation in the future
- Contested areas -habitat vs development
- Recognition of importance in RSU - objectives to increase opportunities for transition zone and wetland migration space.

Why focus on the t-zone?

- Important part of complete wetland systems
- Plays an important role in wildlife support and flood control
- Provides wetland migration space
- Contested area with both development and ecological value



Wildlife Refuge and Predation

60 - 500 ft (Collins et al 2007)

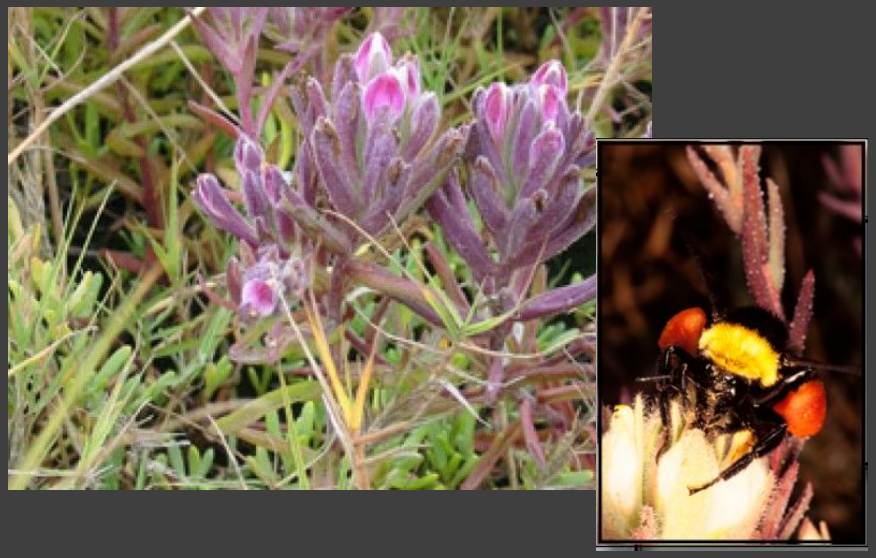
Wildlife Movement

- Daily movements
- Seasonal habitat shifts
- Juvenile dispersal

650 – 1300 ft (Alexander et al 2016)

Evolutionary Adaptation

- Transition zone species adapted to niche habitats
- Microclimate, salinity, and moisture gradients of 300 - 1600 ft?

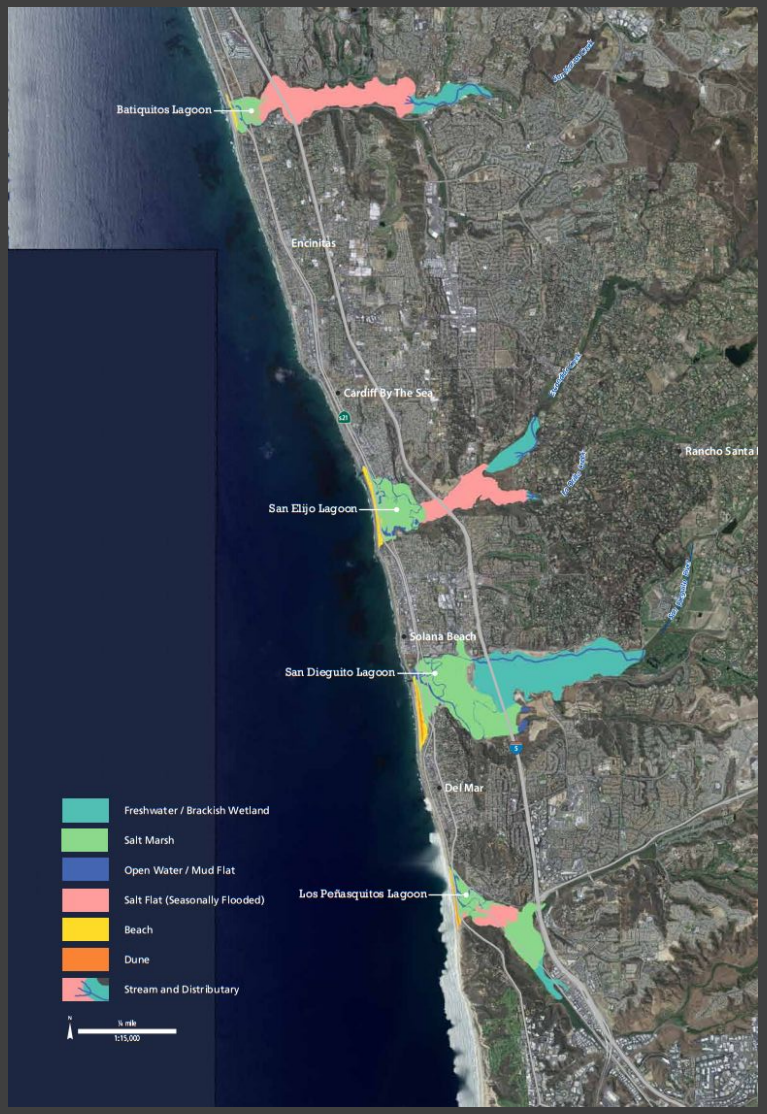


Landscape Complexity

"Extensive freshwater/brackish wetland complexes were present at the back edge of each estuary, creating a gradual transition zone between estuarine and upland habitat types that in some cases extended several miles inland.

These wetland complexes were composed of a matrix of seasonally and perennially flooded wetland habitat types reflecting a range of salinity tolerance."

- Beller et al., 2014



Landscape Complexity

- Unique habitats supported in and along the wetland-upland transition zone
  - Consider historical habitats, existing habitats, and site potential (300 - 3000 ft?)
  - Freshwater wetlands, Alkali wetlands, Willow groves

Goals of Task 2

1. Develop transition zone definitions based on needs of various ecosystem functions.

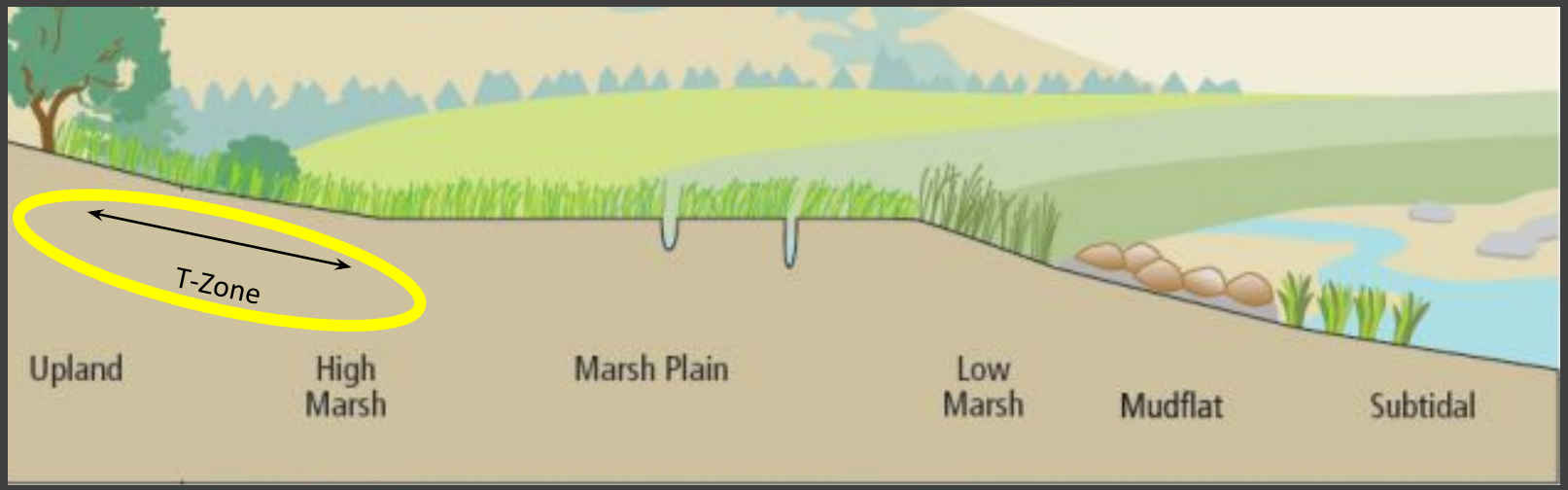
2. Map the existing areas of transition zones in Southern California.

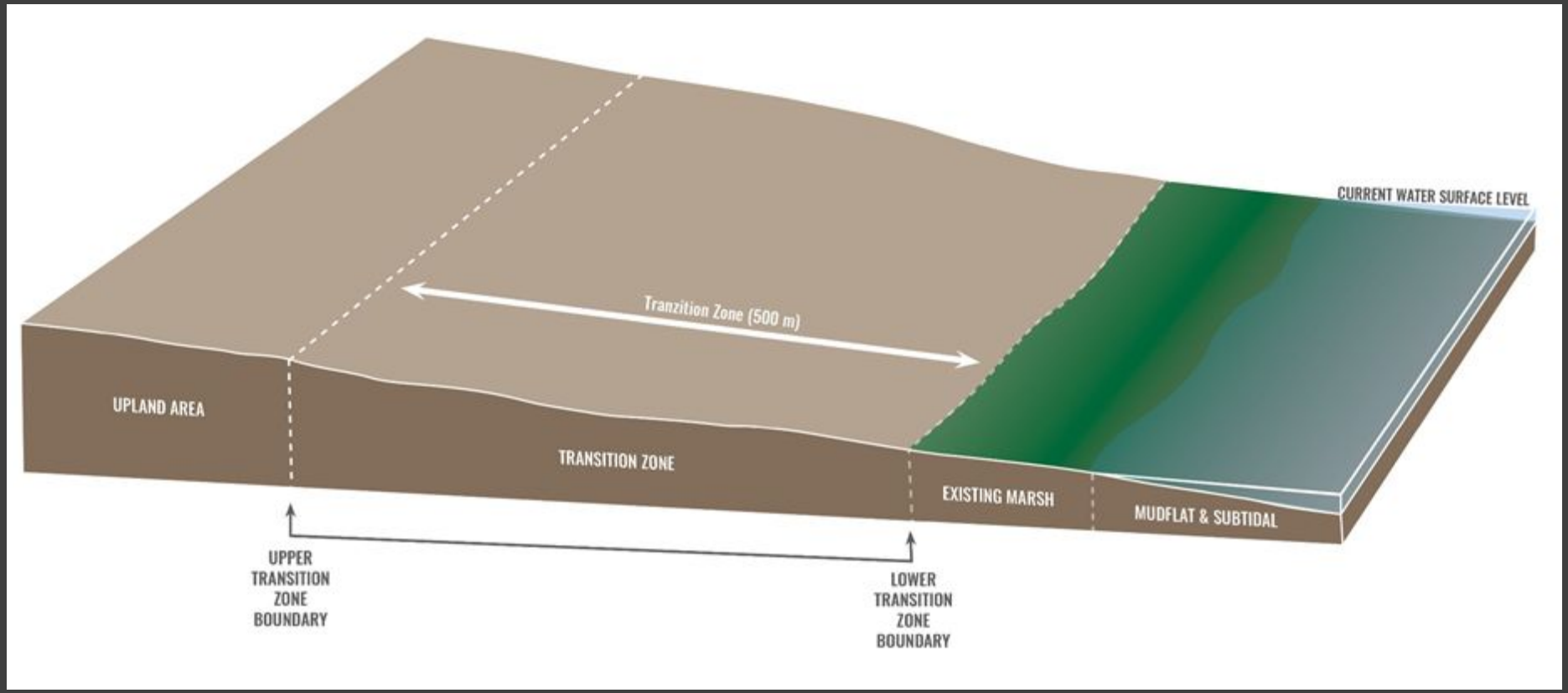
3. Identify and prioritize the areas for future transition zone protection, restoration, and enhancement.

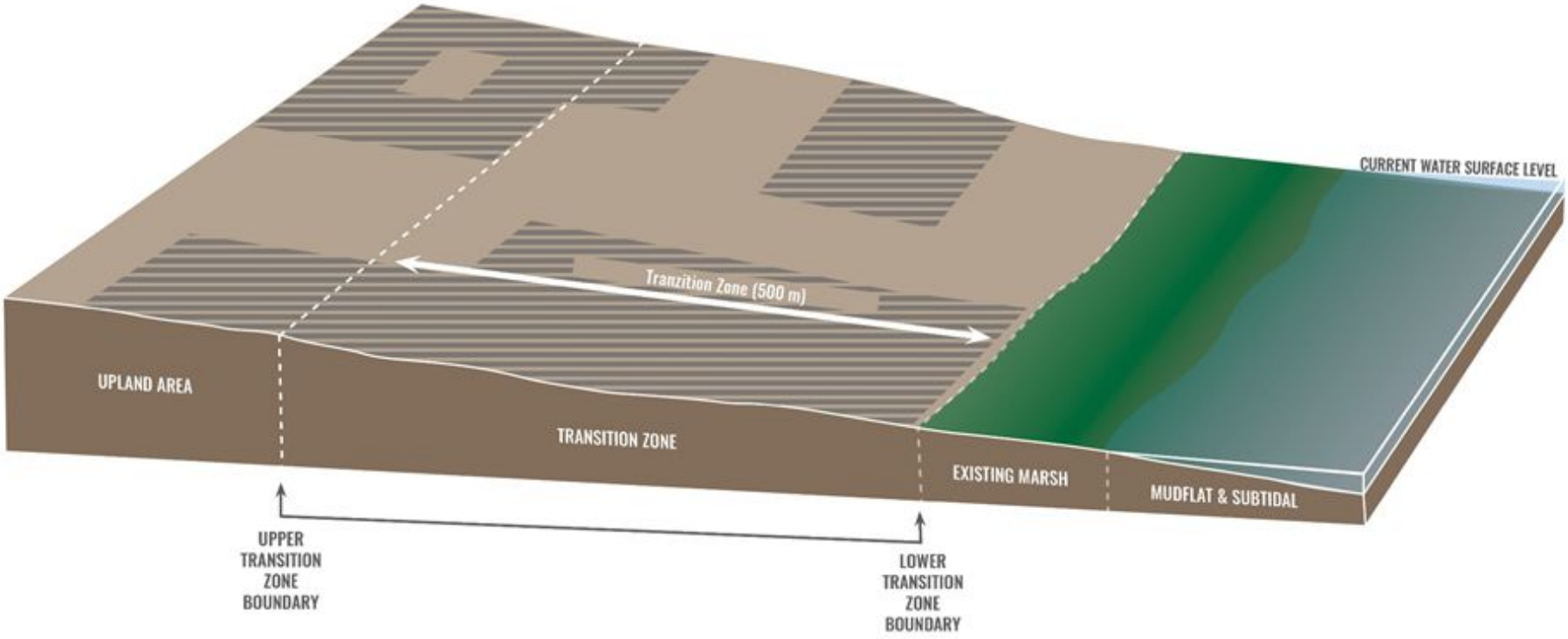
4. Develop design guidance for natural and nature-based features.

Estimating transition zone width beyond the extent of flooding

- Unique transition zone habitats (~300 - 3000 ft)
- Evolutionary adaptation (~300 - 1600 ft)
- Wildlife movement (~650 - 1300 ft)
- Marsh access for native predators (~60 - 500 ft)
- High tide refuge (~60 - 160 ft)




CURRENT WATER SURFACE LEVEL
Tranzition Zone (500 m)
UPLAND AREA
TRANSITION ZONE
EXISTING MARSH
MUDFLAT & SUBTIDAL
UPPER TRANSITION ZONE BOUNDARY
LOWER TRANSITION ZONE BOUNDARY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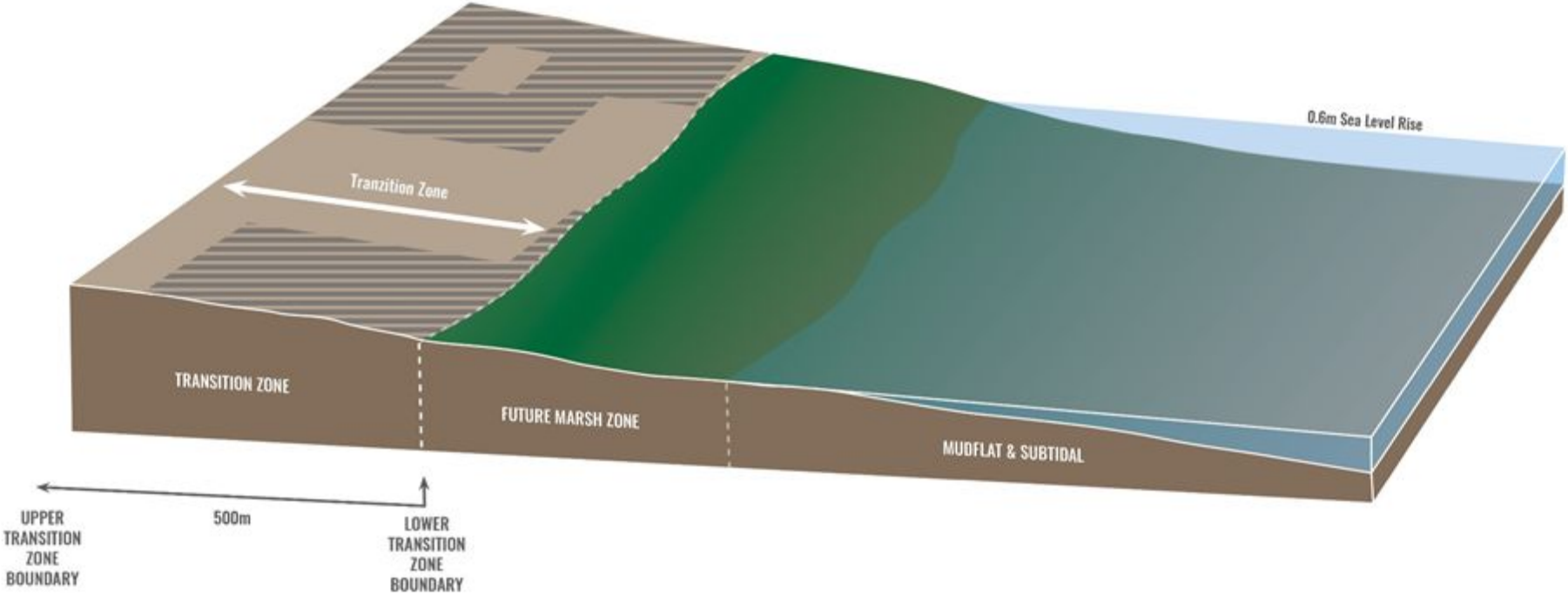
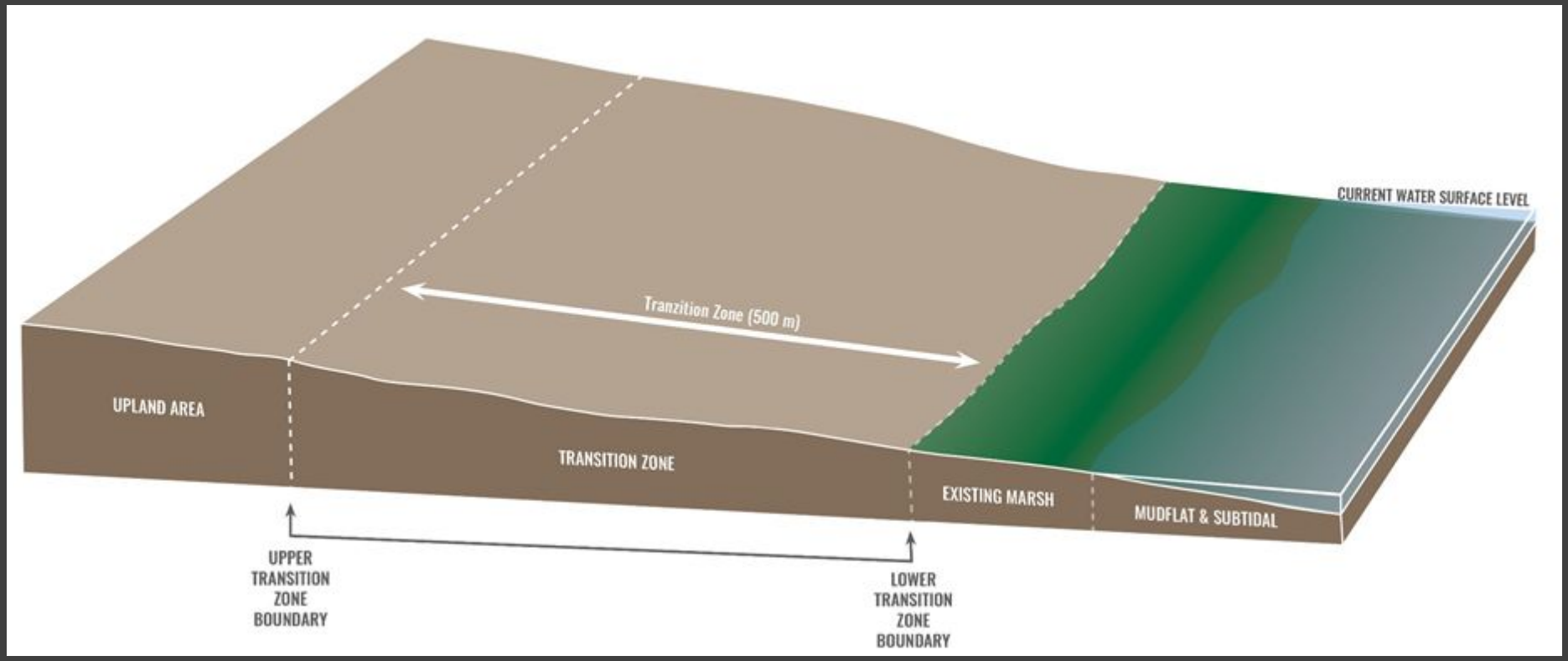

0.6m Sea Level Rise
Tranzition Zone
TRANSITION ZONE
FUTURE MARSH ZONE
MUDFLAT & SUBTIDAL
UPPER TRANSITION ZONE BOUNDARY
500m
LOWER TRANSITION ZONE BOUNDARY

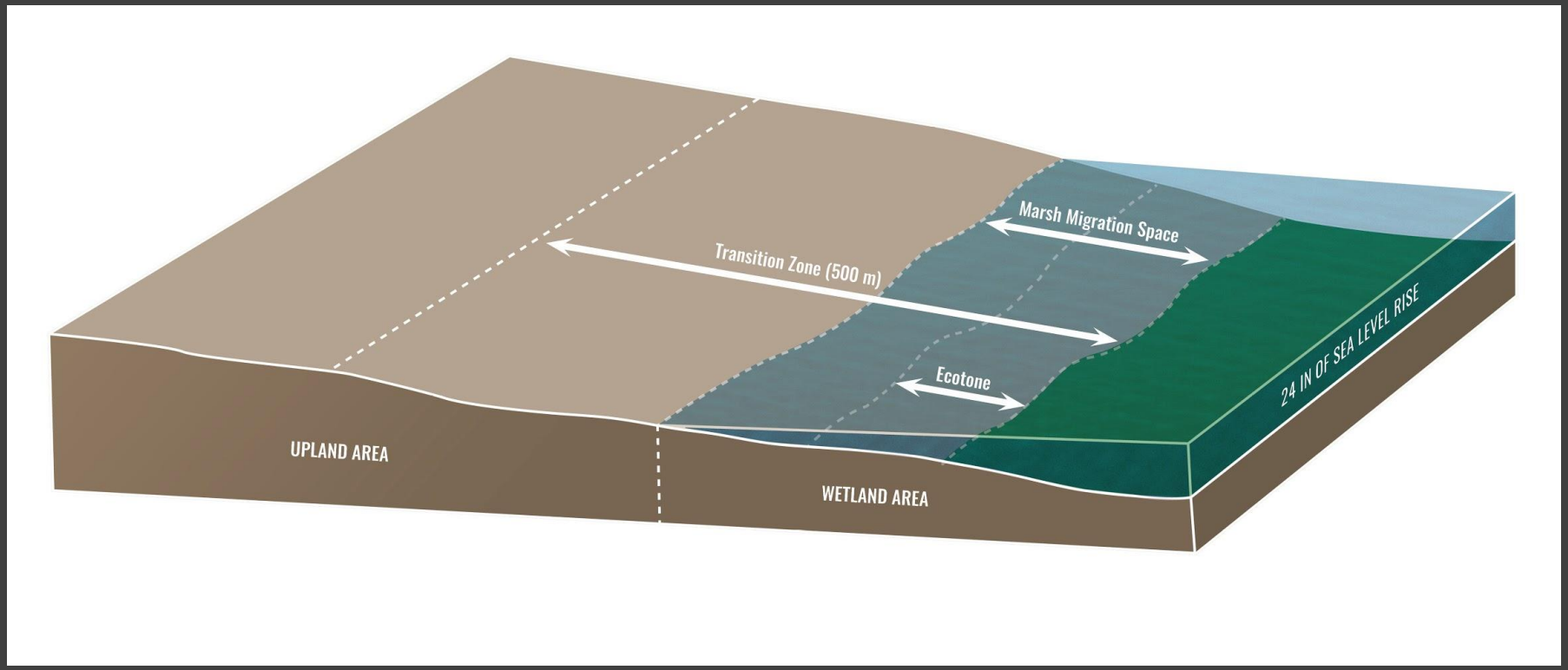
Transition Zone RSU Objectives

A. Protect all existing natural areas of wetland-upland transition zones up to 1,600 feet from the marsh edge.



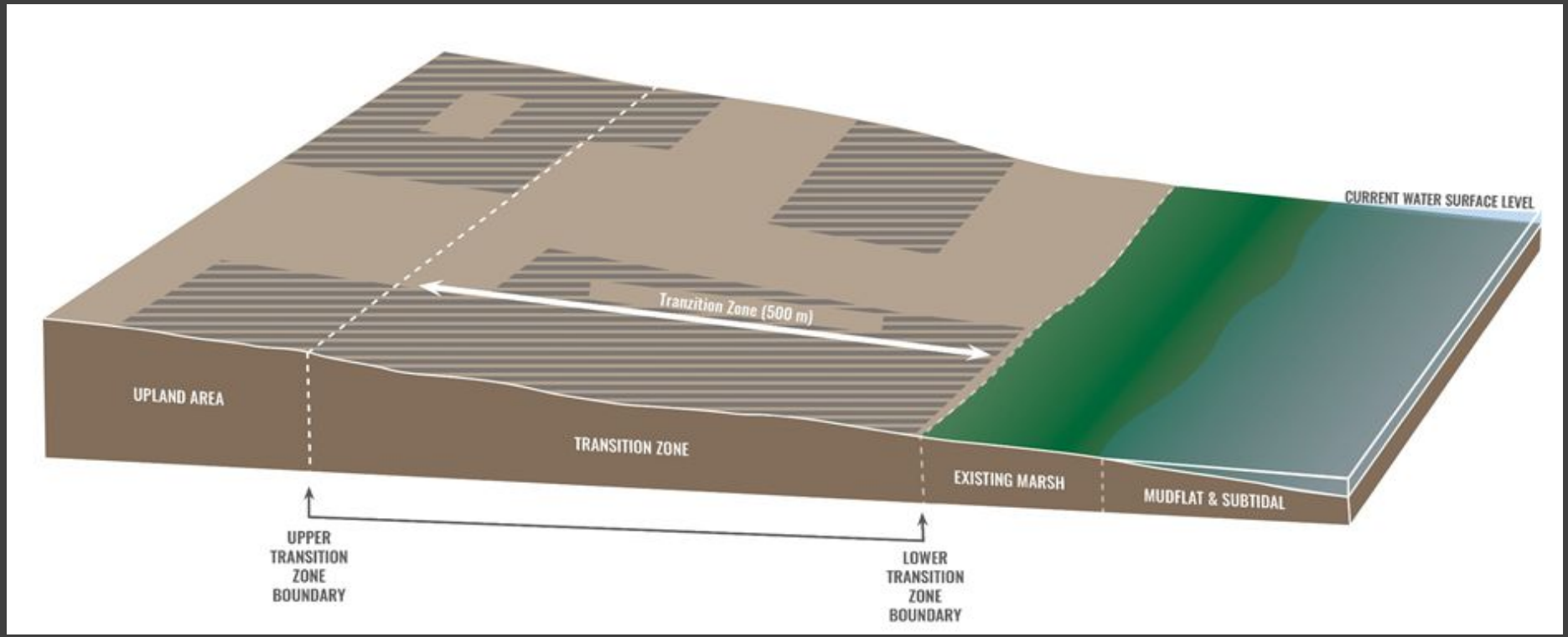
Transition Zone RSU Objectives

B. Increase area of transition zone so that the wetland perimeter is bounded by transition zone that extends inland for at least the estimated tidal extent under 24 inches of sea level rise.



Transition Zone RSU Objectives

C. Increase areas of transition zone up to 1,600 feet from the marsh edge, even in areas that are not contiguous with the marsh.



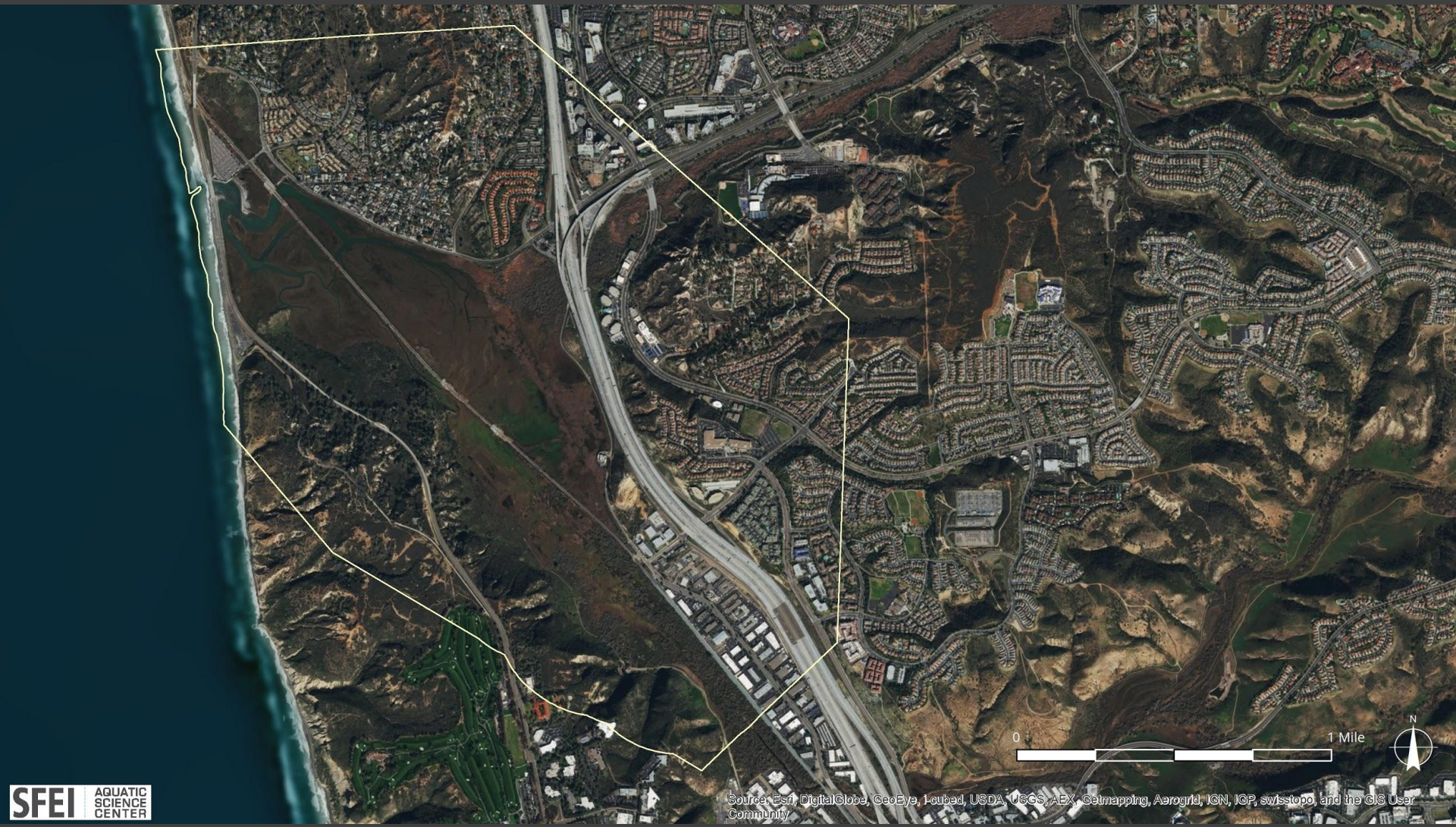
Transition Zone RSU Objectives

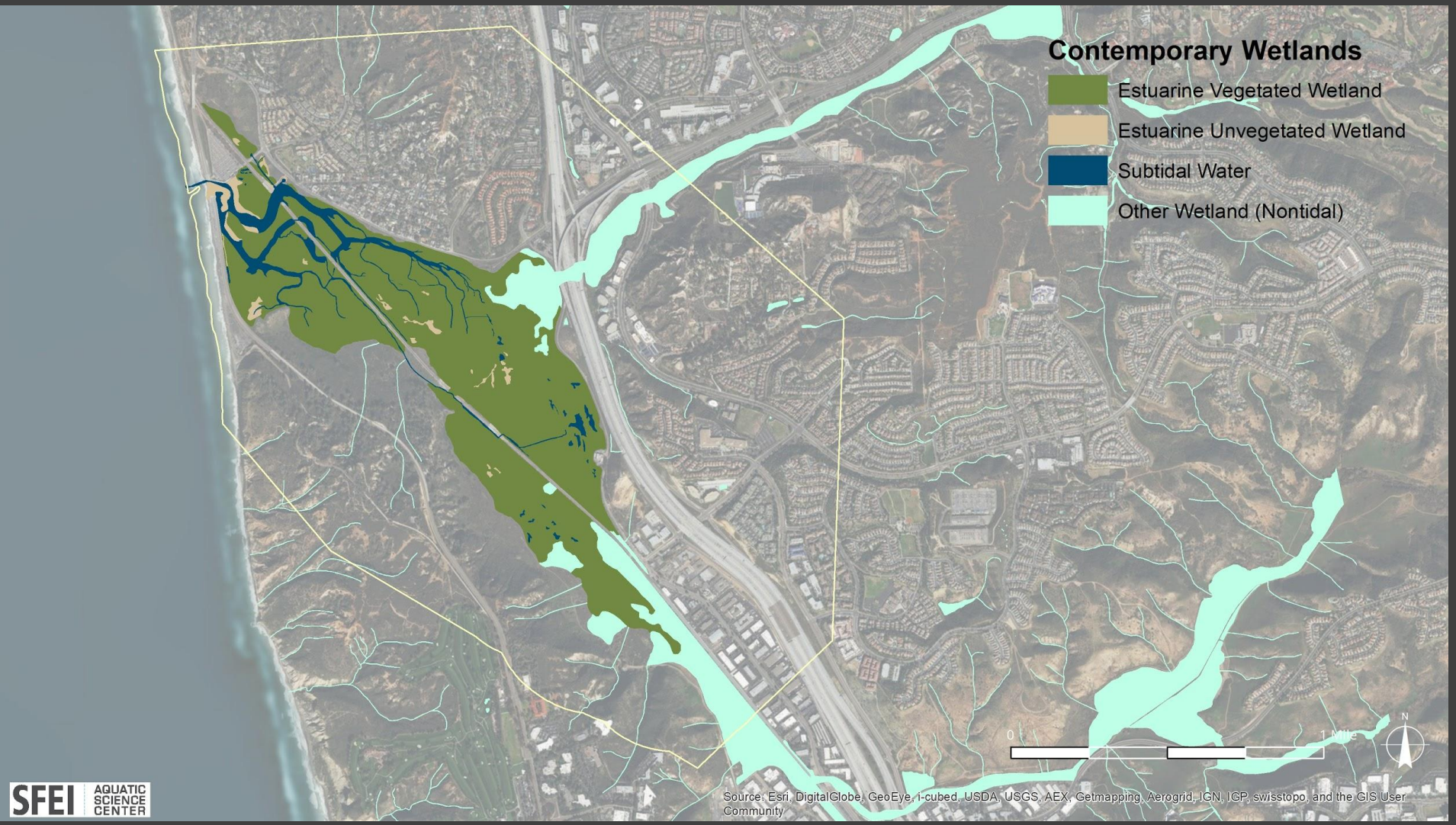
D. If the system has a river or creek, then an additional focus should be the creation of adjacent habitat that allows for the upstream migration of wetlands, at least to the head of tide under 24 inches of sea level rise.

Transition Zones & the Challenges they Face

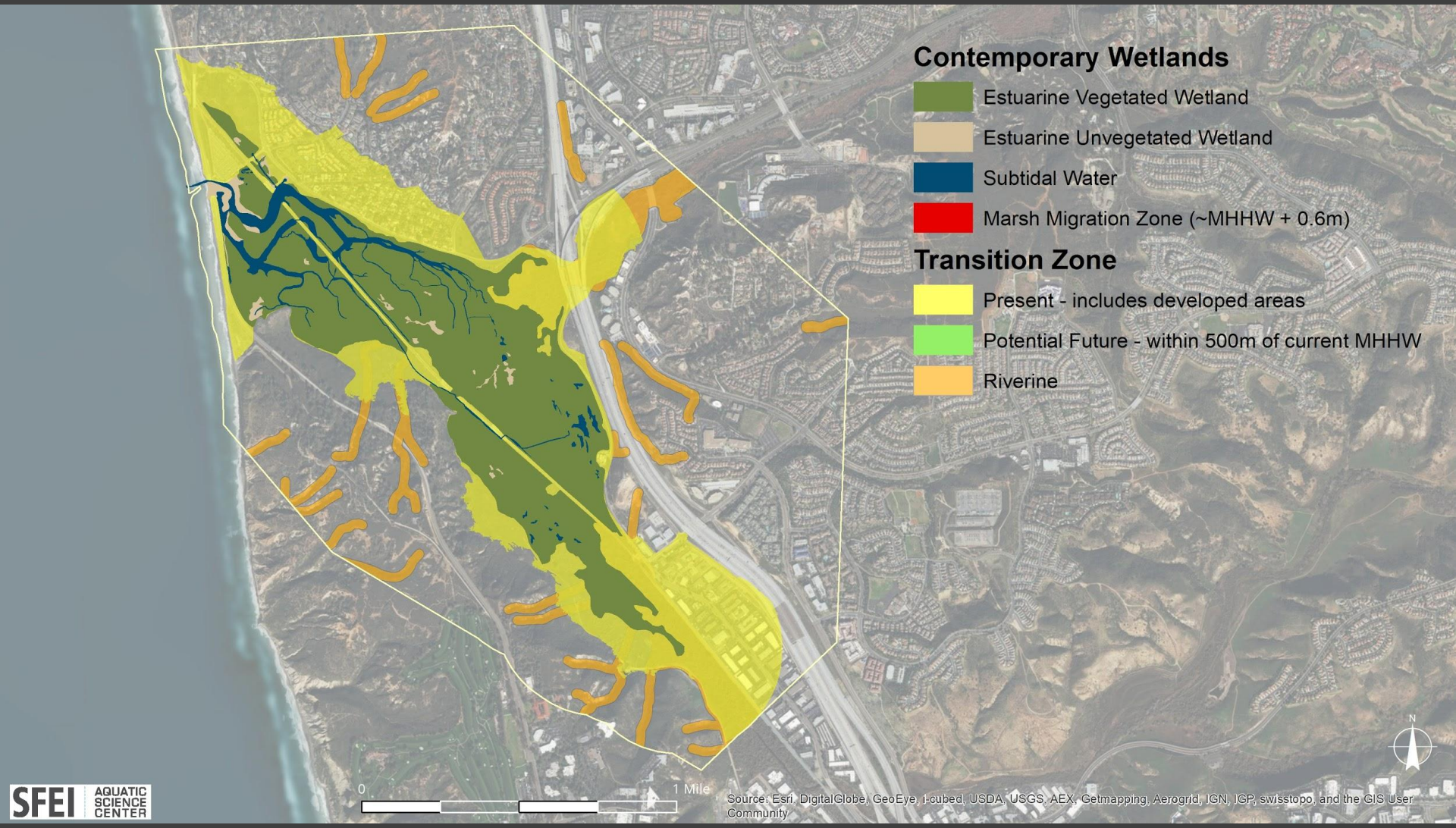
Objective: Increase understanding of different local transition zone types and the challenges they face in the future.

Los Peñasquitos - Large River Valley





SFEI AQUATIC SCIENCE CENTER


Contemporary Wetlands
Estuarine Vegetated Wetland
Estuarine Unvegetated Wetland
Subtidal Water
Marsh Migration Zone (~MHHW + 0.6m)
Transition Zone
Present - includes developed areas
Potential Future - within 500m of current MHHW
Riverine
N
0
1 Mile
Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community
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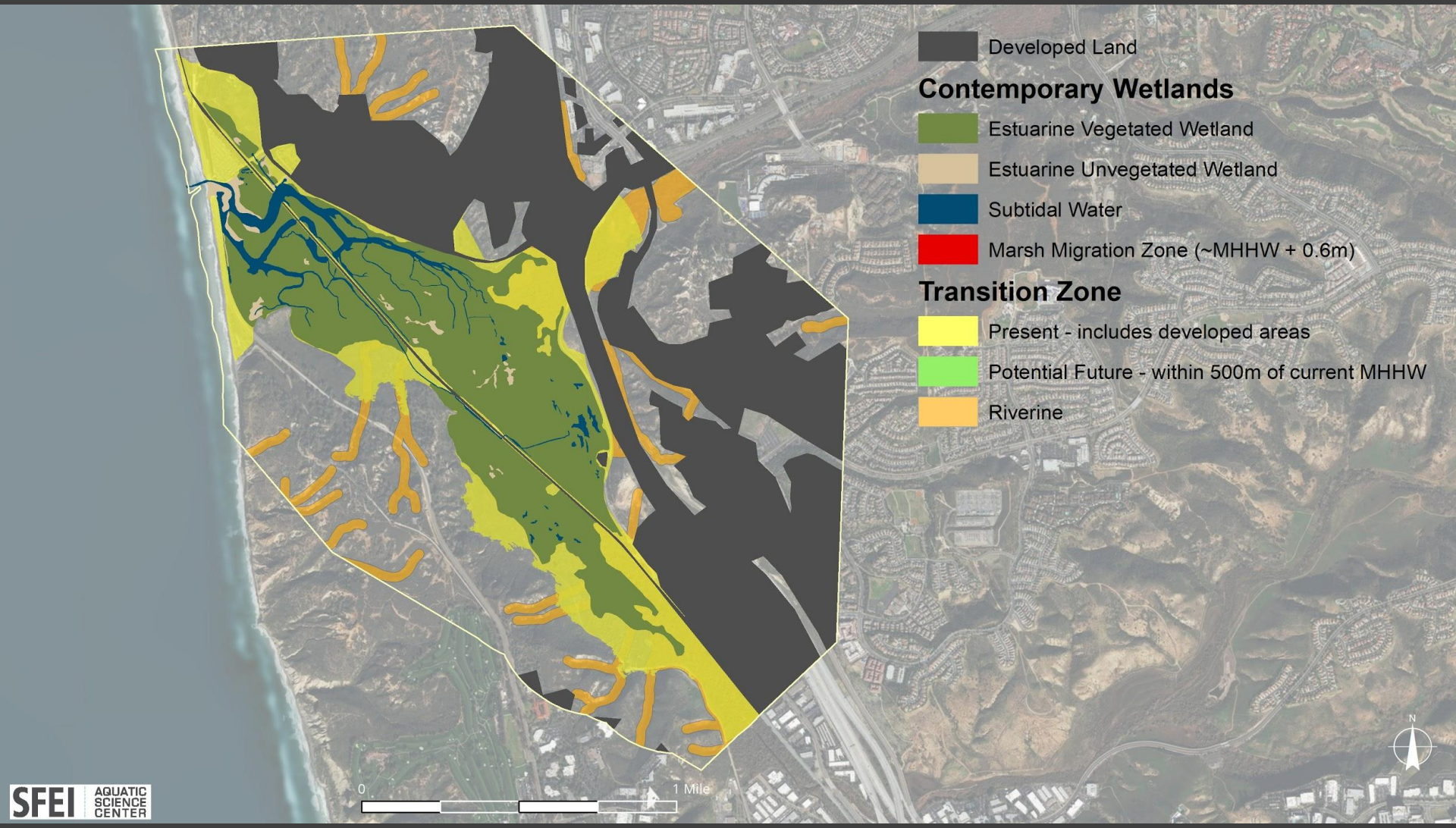
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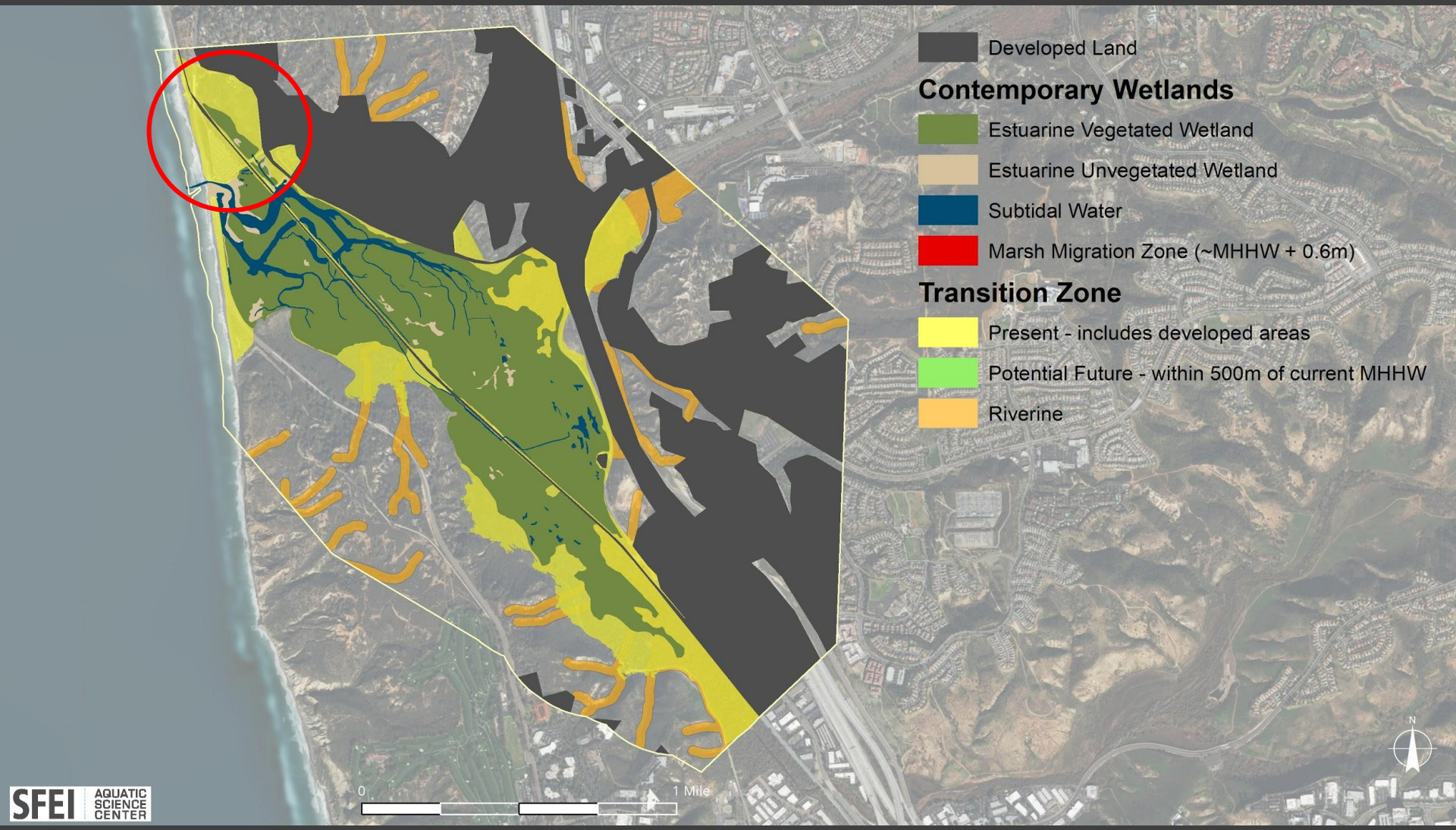
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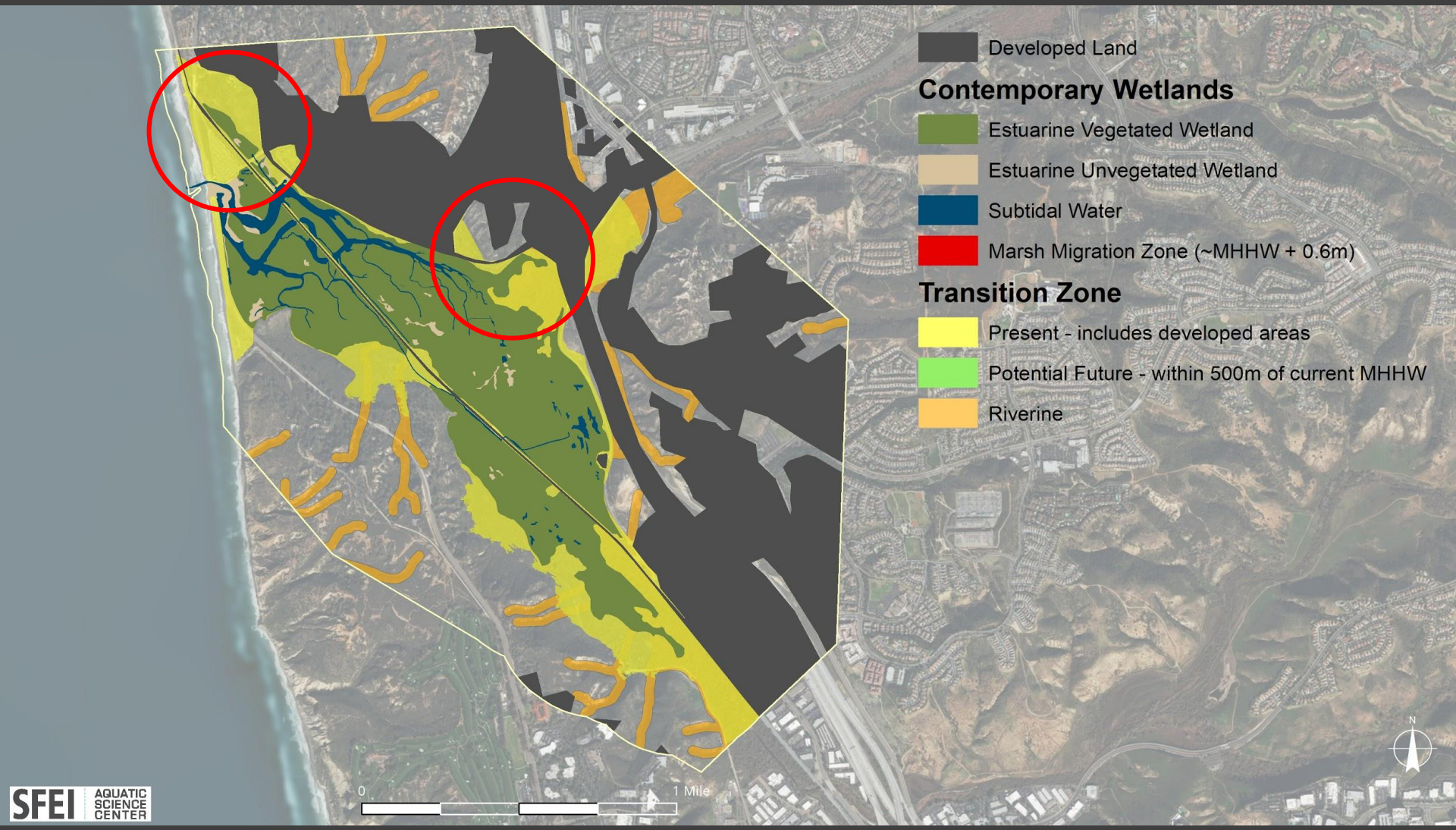
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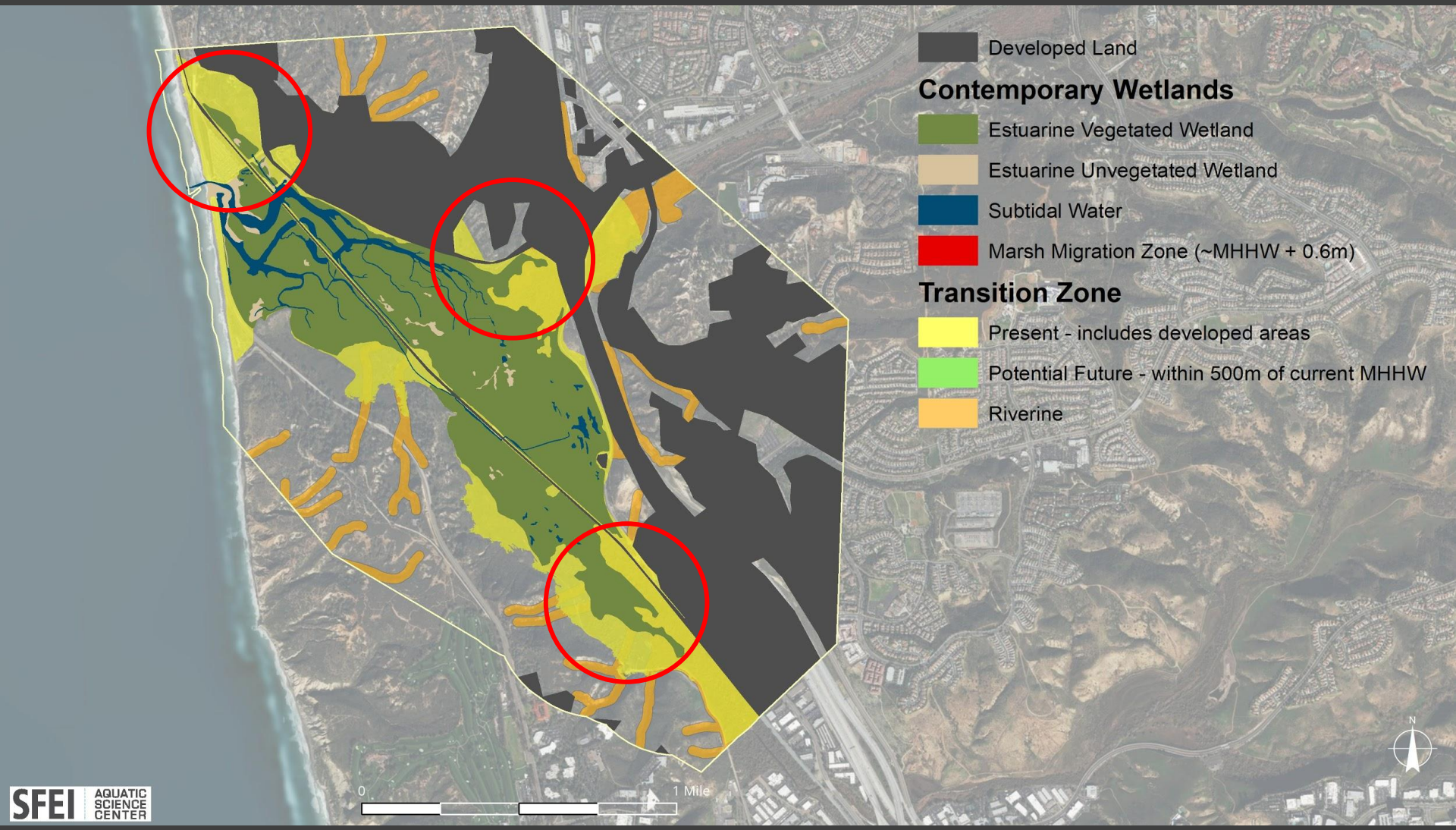
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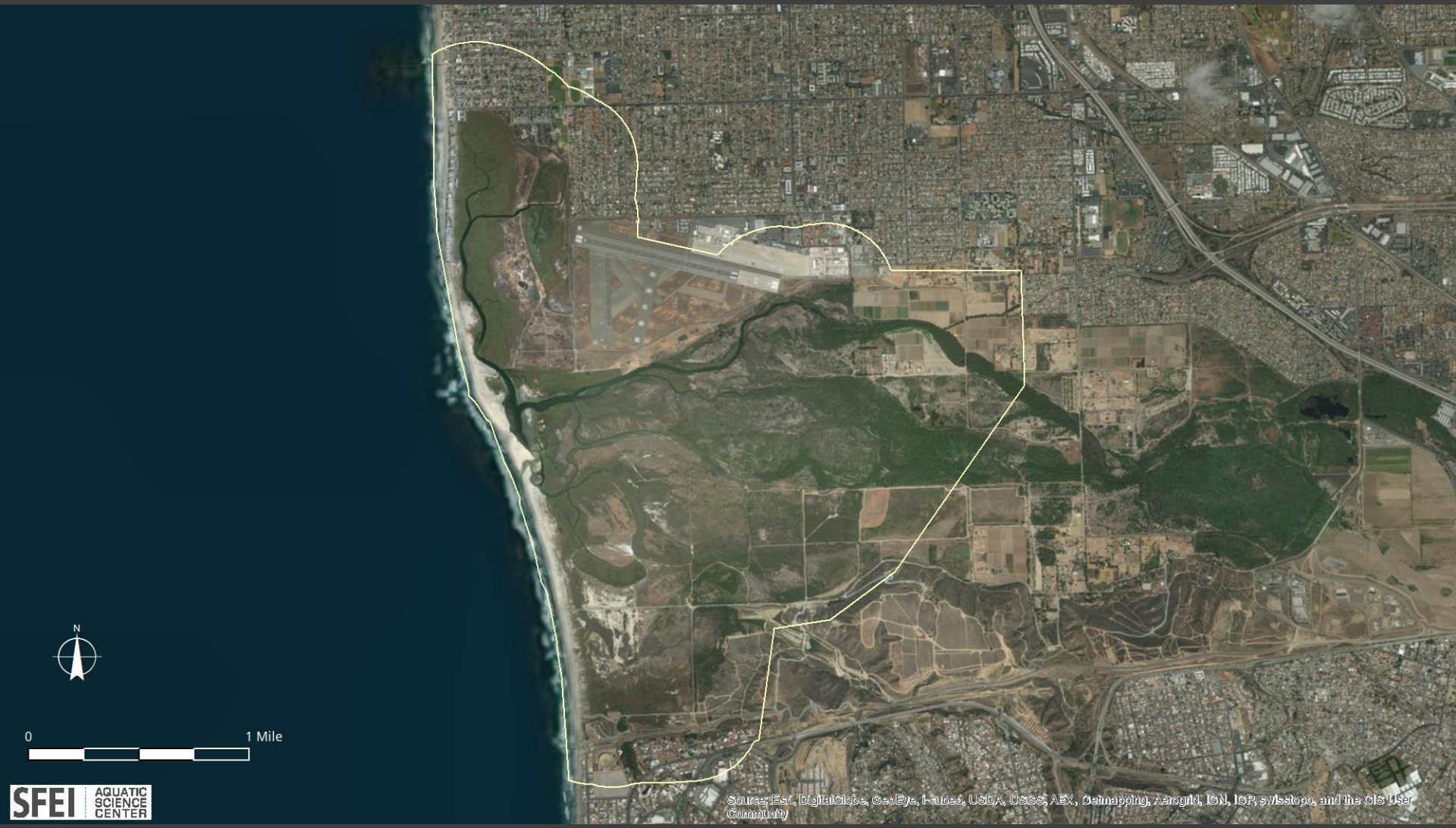
Tijuana - Large River Valley



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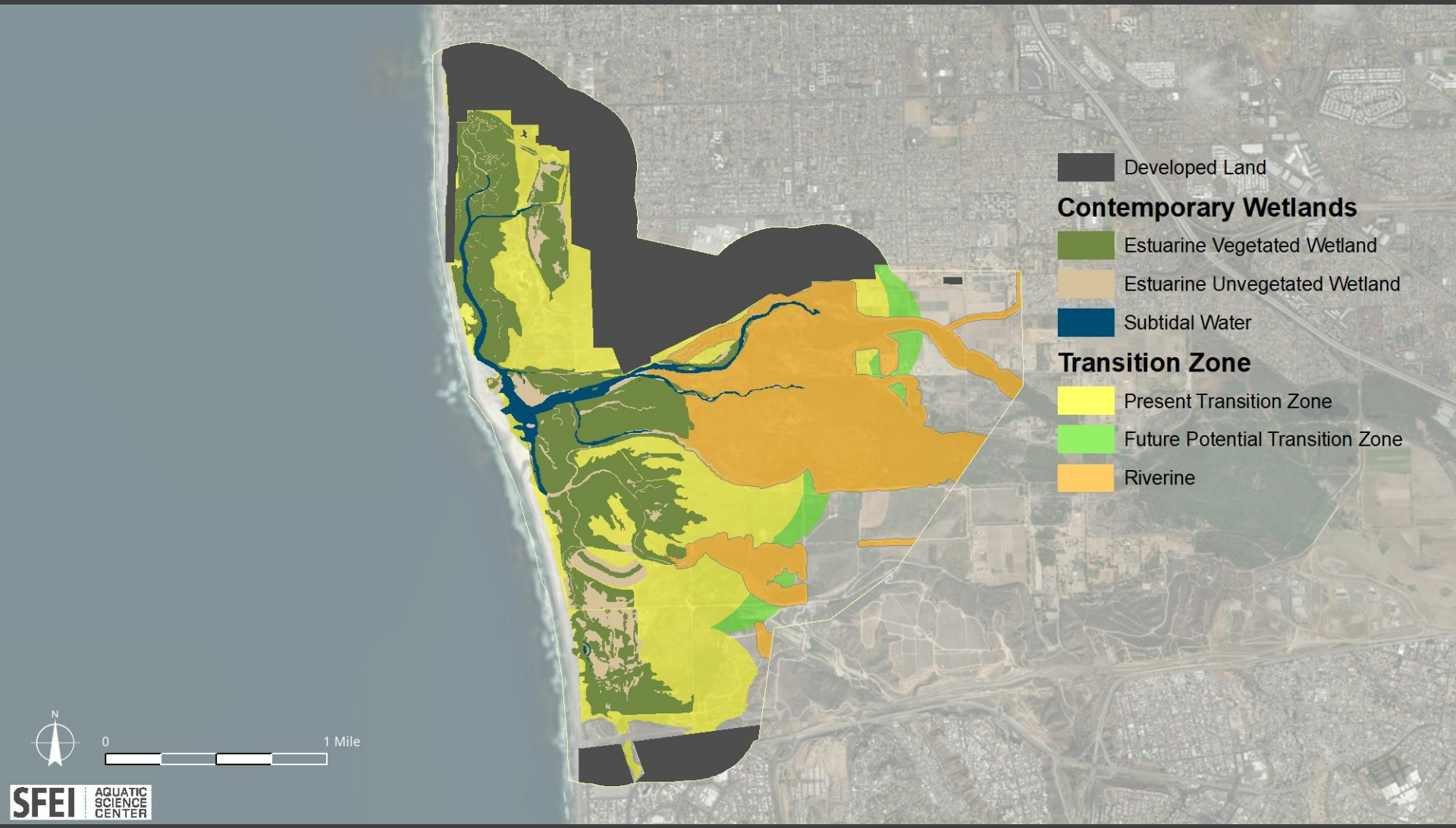

Goleta - Large River Valley

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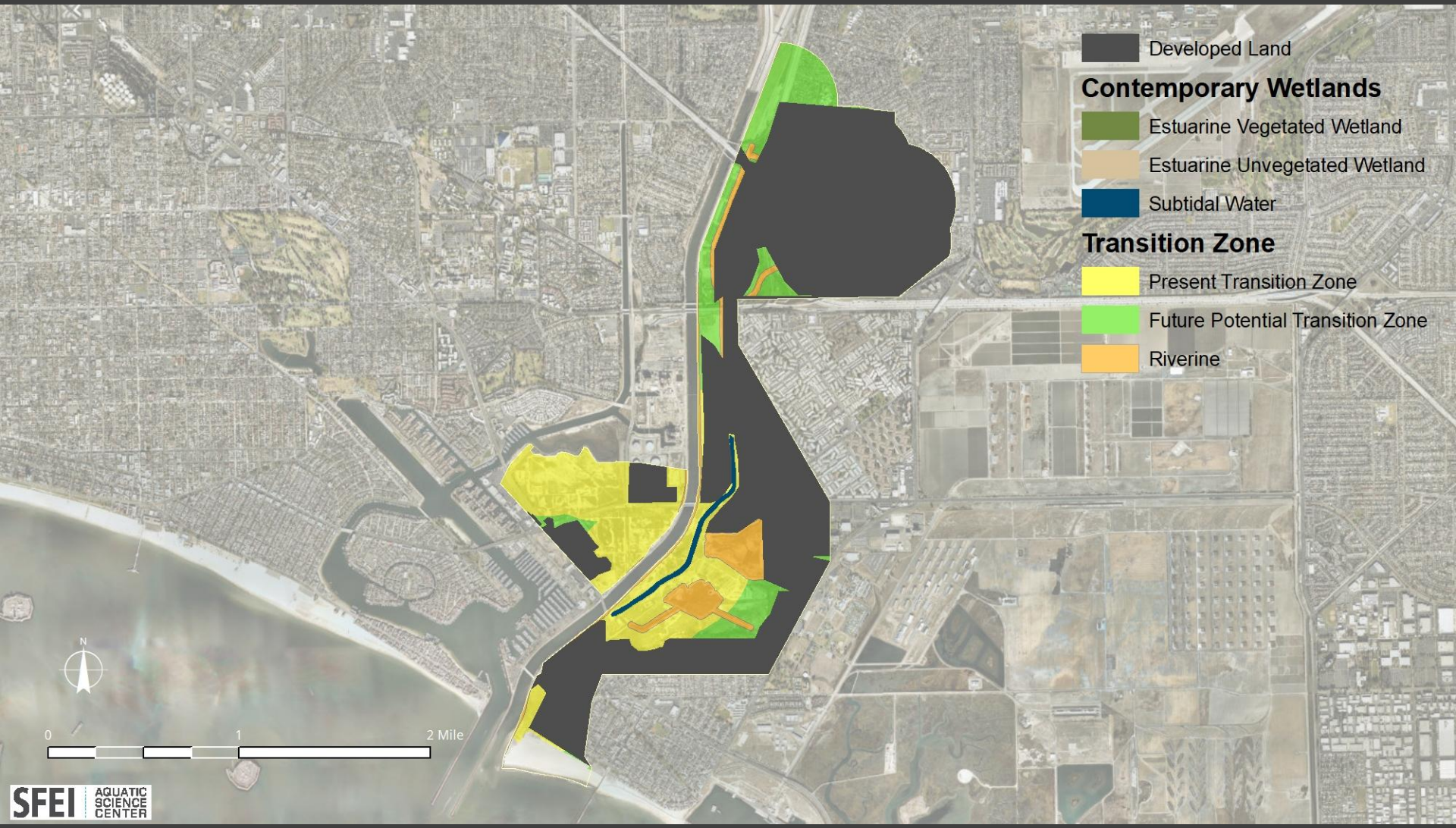
Los Cerritos - Fragmented River Valley

Los Cerritos - Fragmented River Valley

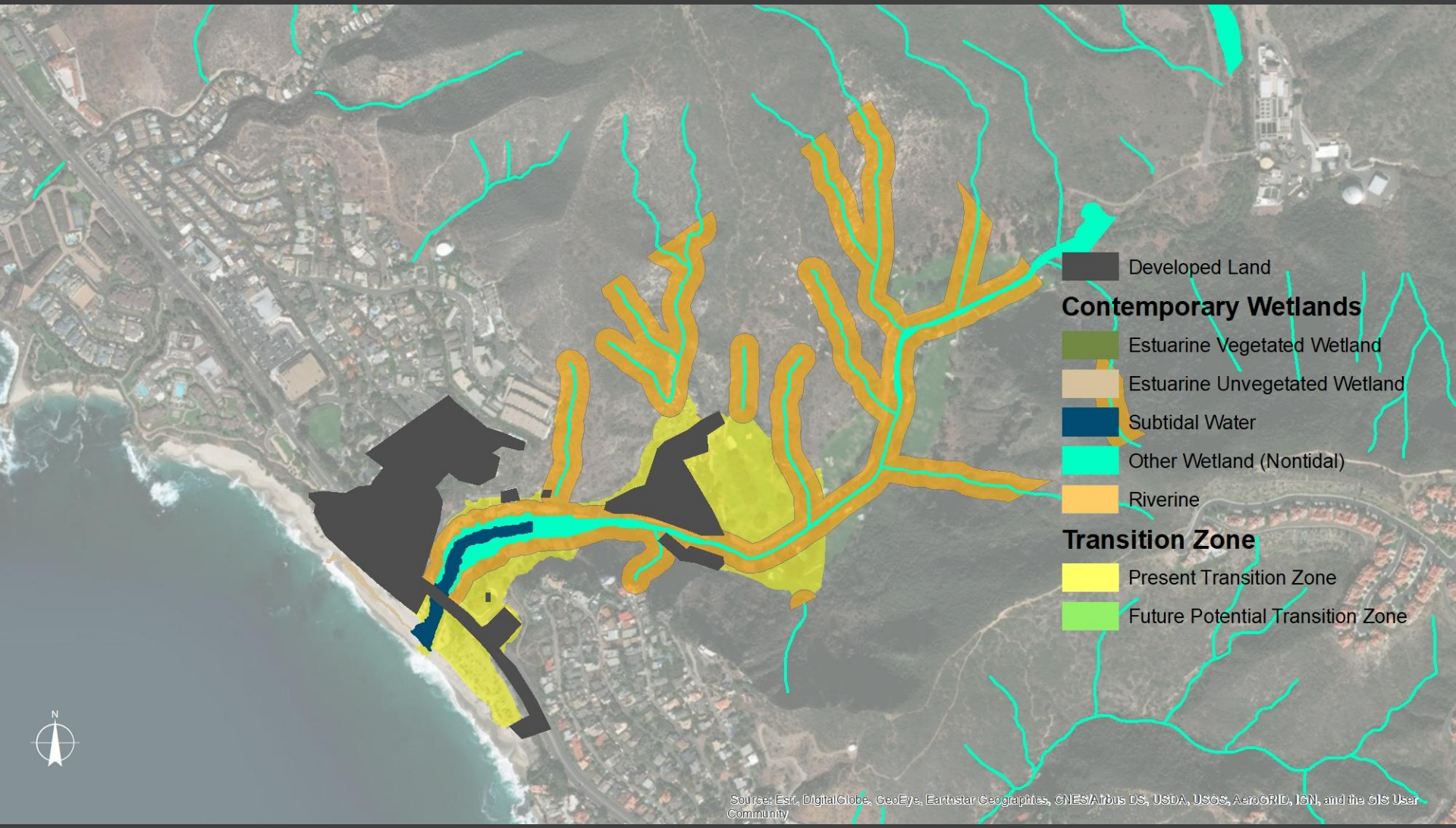


Mission Bay - Open Bay/Harbor

Mission Bay - Open Bay/Harbor

Aliso Creek - Small Creek

Aliso Creek - Small Creek



Discussion: Reflection on Challenges

- What challenges do these sites currently face? Will these problems stay the same or change into the future?
- What new or different challenges will we face in the context of sea level rise?
- Given SLR, what tradeoffs will we have to consider?

Transition Zones - Future Opportunities

Objective: Increase understanding of different local transition zone types and associated potential opportunities and solutions.

Future opportunities

Design for benefits to people (e.g., recreation, water recapture/storage, flood protection, water quality, wildlife support)

Actions for benefits to ecology:

- Stressor control (predators, contaminants, etc)
- Wildlife-friendly landscaping
- Increase appropriate connectivity for wildlife
- Emulate natural beneficial hydrology
- Encourage beneficial sediment transport/ deposition
- Re-create gradual slopes that support physical gradients across marsh-upland transitions
- Restore historical/novel transition zone habitats

Future opportunities

Design for benefits to people (e.g., recreation, water recapture/storage, flood protection, water quality, wildlife support)

Actions for benefits to community:

- Improve access
- More recreation spaces
- Improve water quality

Examples of tzone measures

- Management
- “Light Touch” Ideas
- Nature-based feature - Horizontal levees
- Land use strategies

Management

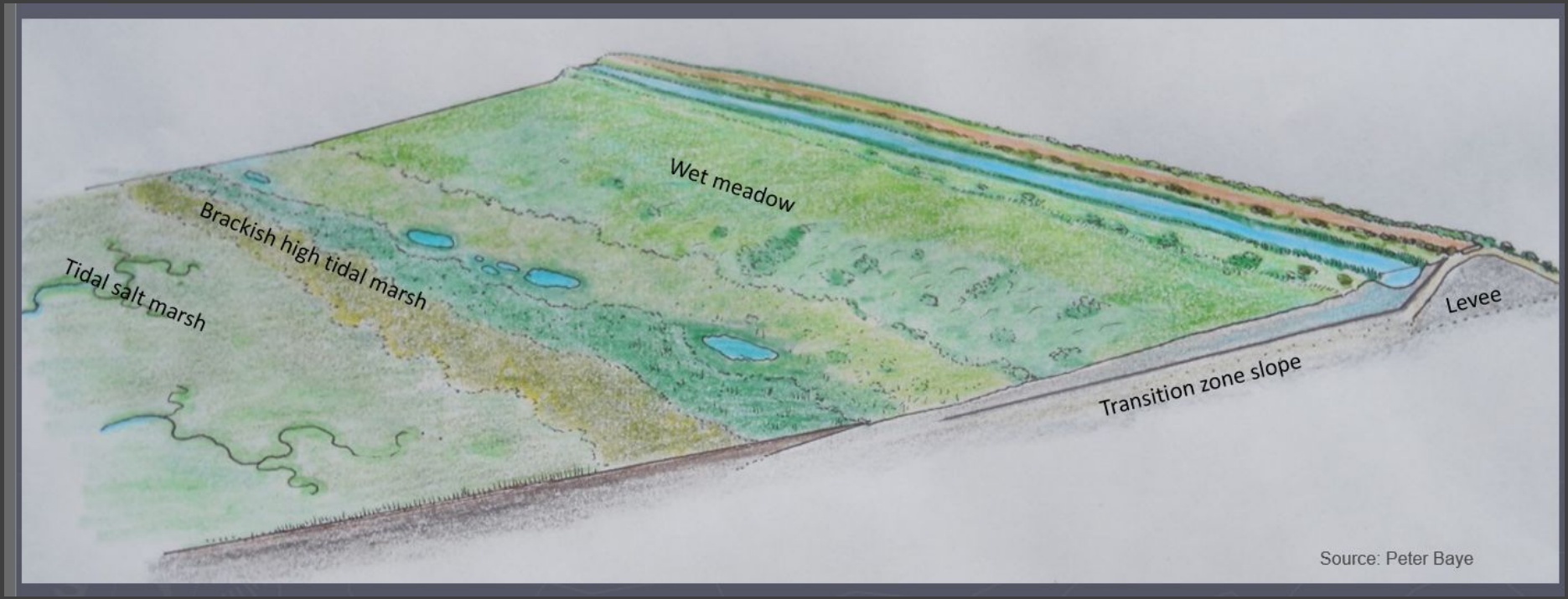
- Appropriate access
- Invasive species management
- Modify of remove infrastructure

“Light Touch” Design Ideas

- More appropriate land uses – greenhouses, ball fields, solar panels
- Provide more wildlife connectivity around parcels (e.g. plant native plants hedgerows, modify fences, widen bands of riparian vegetation)
- Allow for occasional flooding by using green infrastructure, such as swales, and floodproofing.
- Leave green corridors for wildlife which could incorporate public access.
- Where appropriate, protect undeveloped and underdeveloped parcels with appropriate development.

Nature-based feature - Horizontal levees

Nature-based feature - Horizontal levees



Deveraux Slough

Land Use Strategies

Financial

- Buyout programs - buyouts, leasebacks, and land acquisition
- Conservation easements
- Transfer of development rights
- Land swaps

Legal and Regulatory

- Development moratoria
- Overlay zones
- Redevelopment restrictions including rezoning

END