CHAP

Combined Habitat Assessment Protocols

Wildlife Advisory Committee

Operational Losses

July 10, 2014

Northwest Habitat Institute
Thomas O'Neill

How is CHAP different?

- Uses a Habitat and Biodiversity Accounting System (IBIS);
- Gives Quantifiable Value to Habitat; Not on a scale of 0 to 1 or 1 to 100;
- Approved by the ISRP; and 7 single use approvals from the Corps of Engineers' Center for Planning Expertise;
- Transparent and Transferable – Los Angeles River, Rio Grande River, & Willamette River;
- Multiple Applications;

CHAP Applications

Procuring Method for:

- Impact and Mitigation Assessments – State of Oregon & Bonneville for $150 million;
- Ecosystem Restoration – Los Angeles River, Corps Engineers & Los Angeles City for $1.8 billion;
- Flood Risk Management – San Francisco Bay, Corps of Engineers & Santa Clara Water District;
- Ecosystem Restoration for Operational Impacts – Orange County Water District & Corp of Engineers;
- Conservation Planning – Principle component for a conservation framework and assessment; SCAG;
- Single Species Recovery – Supported the delisting of the first listed fish species in the US, ODFW;

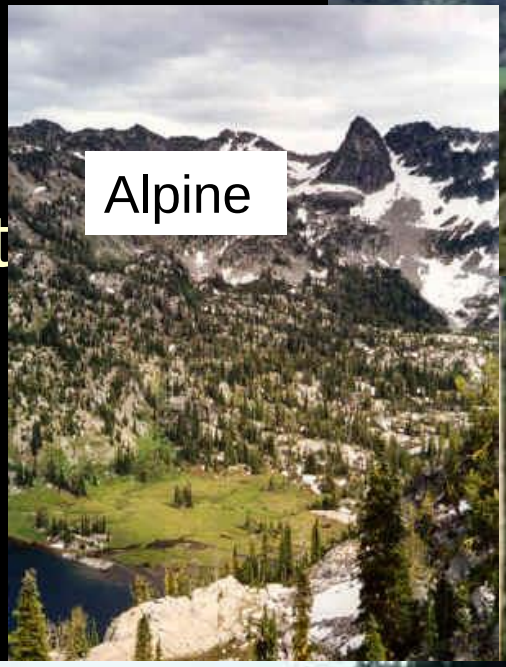
PURPOSE: To have a consistent approach to habitat evaluations that employs sound scientific principles, builds a common understanding for management, and can be used in multiple venues.

"By looking through the eyes and lives of fish and wildlife"

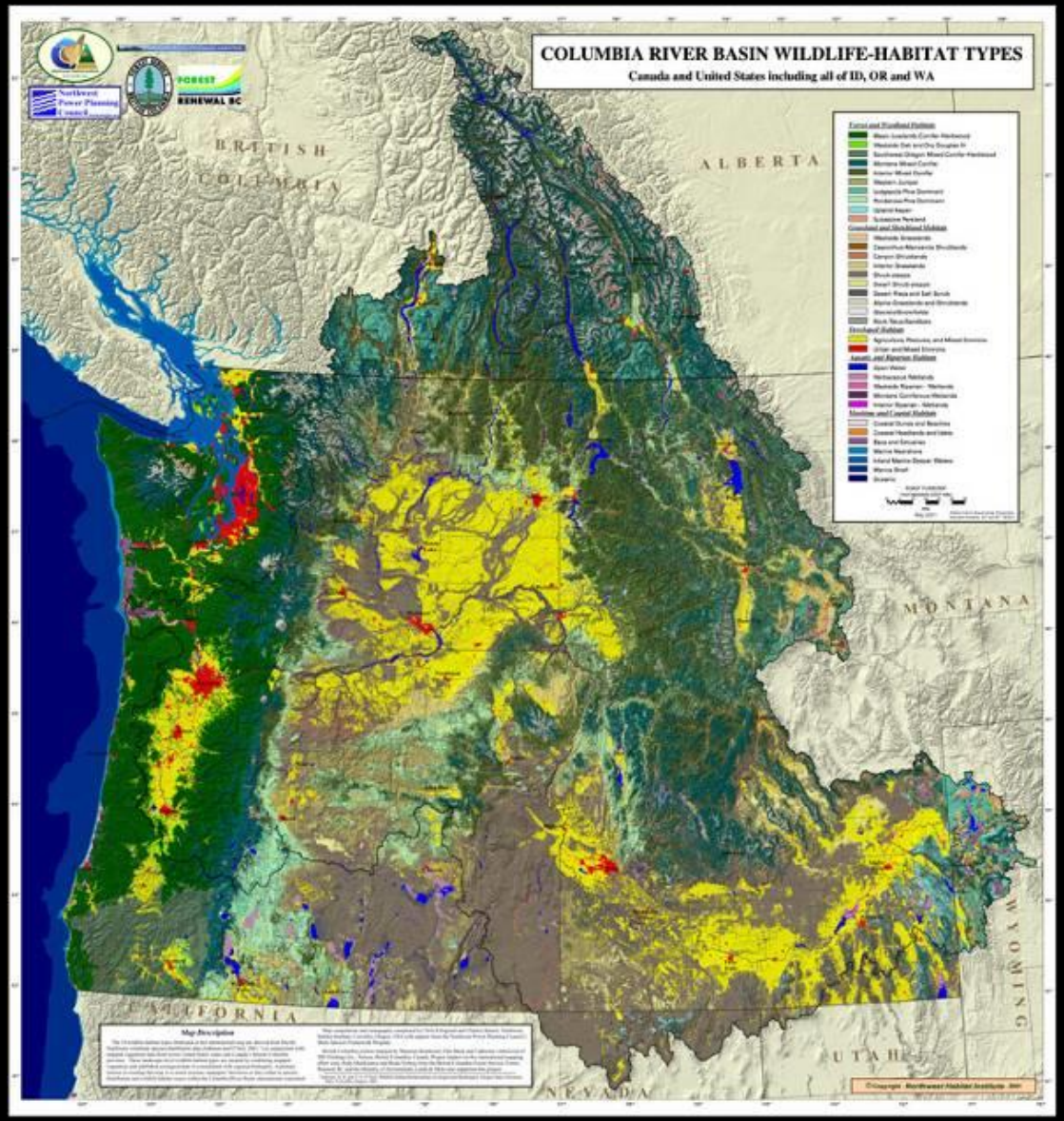
Northwest Habitat Institute

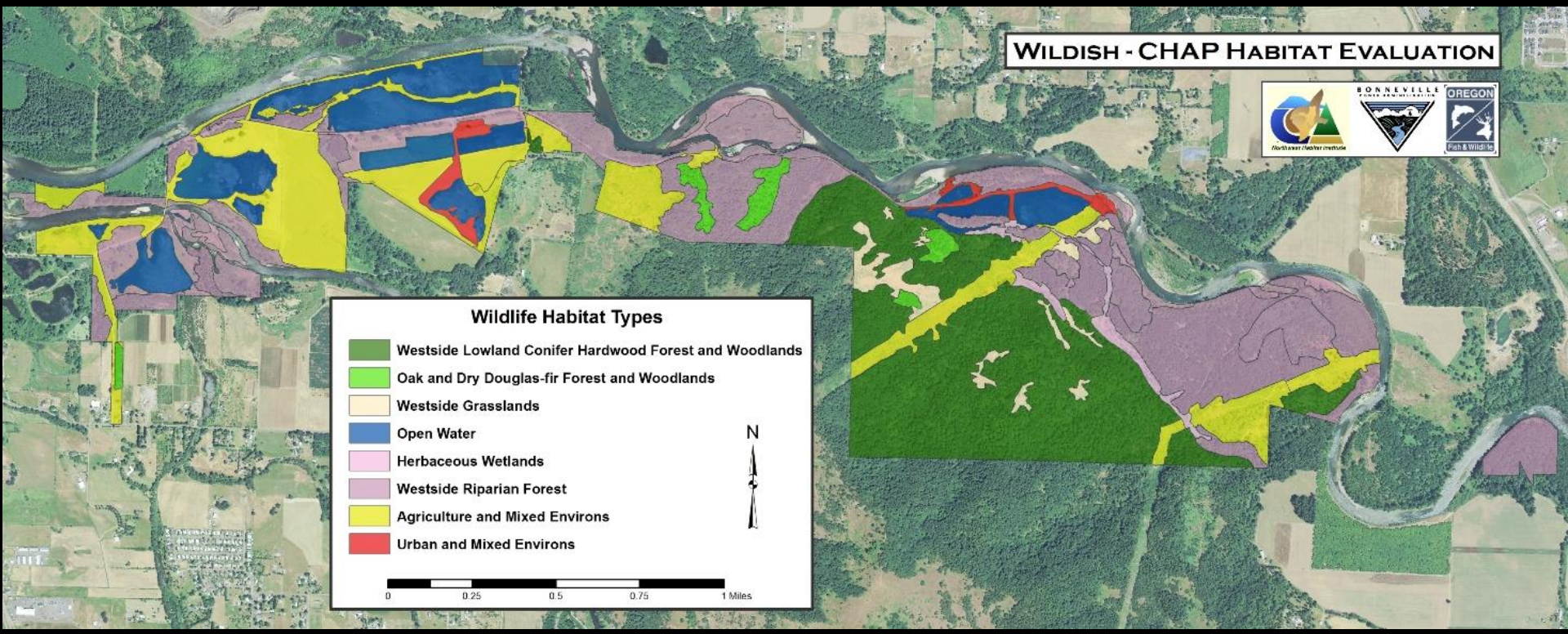
Common Language & Terms …

32
Wildlife-Habitat Types are consistent identified
(Johnson & O'Neil, 2001)

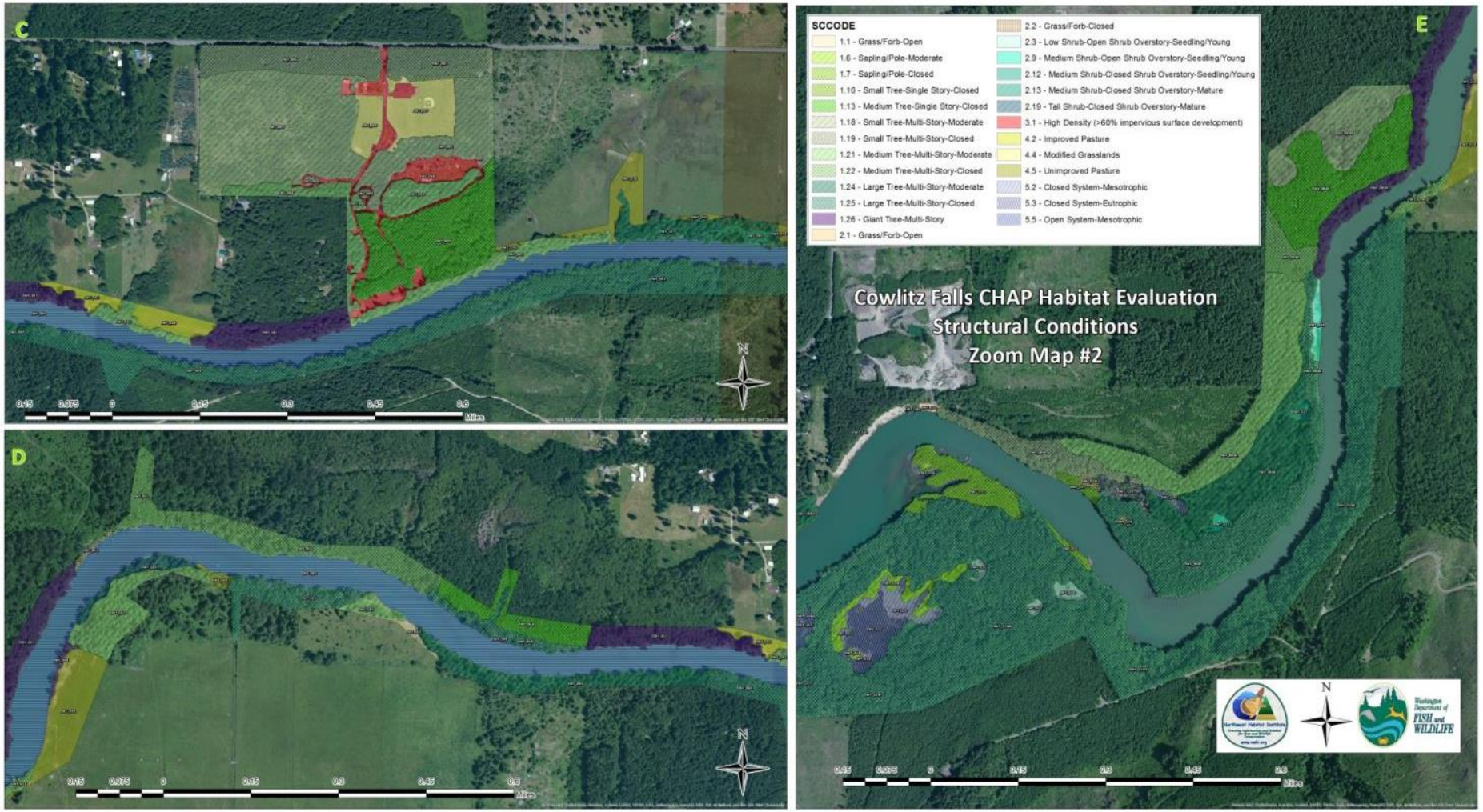


Habitat Classifications

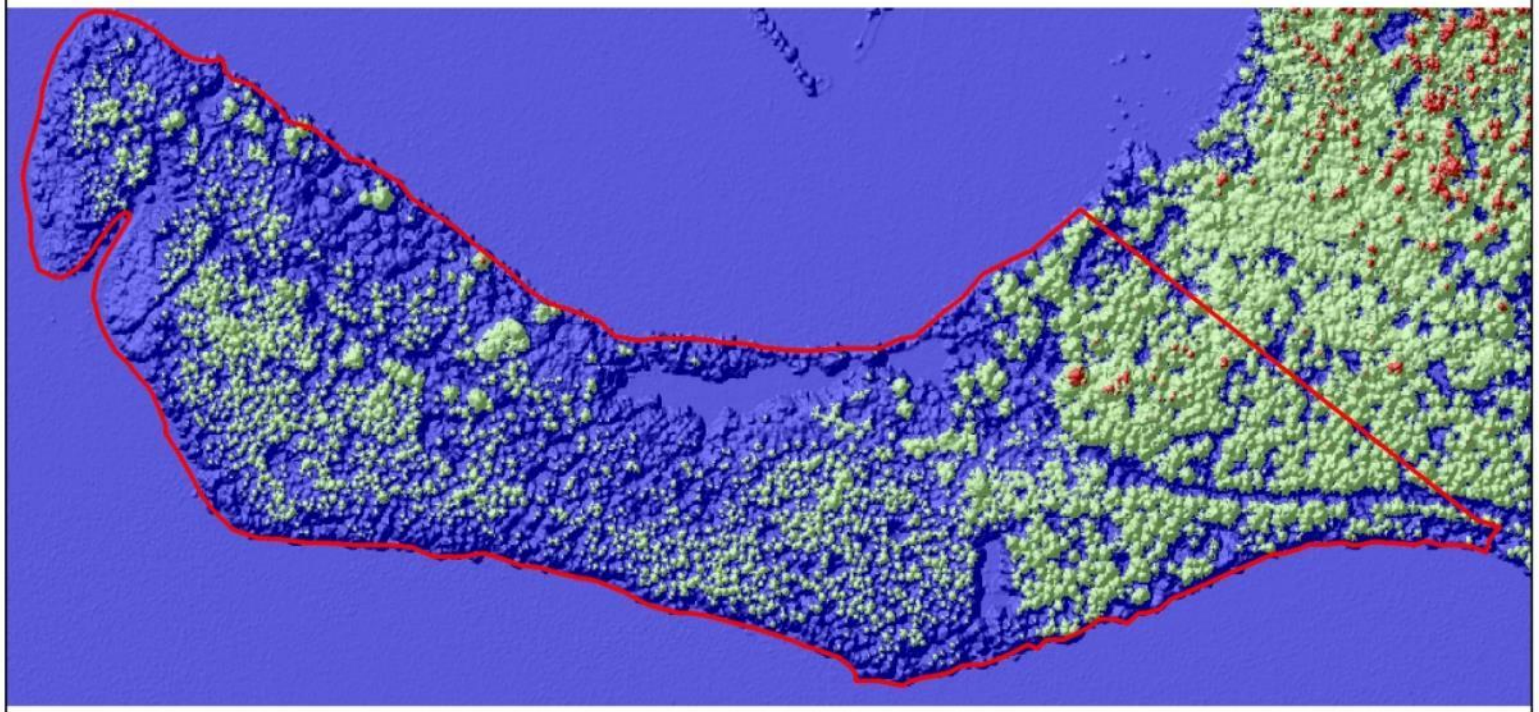



WILDISH - CHAP HABITAT EVALUATION
BONNEVILLE
OREGON
Fish & Wildlife
Wildlife Habitat Types
Westside Lowland Conifer Hardwood Forest and Woodlands
Oak and Dry Douglas-fir Forest and Woodlands
Westside Grasslands
Open Water
Herbaceous Wetlands
Westside Riparian Forest
Agriculture and Mixed Environs
Urban and Mixed Environs
N
0
0.25
0.5
0.75
1 Miles

47
Structural Conditions and Land Uses are consistently identified


C
D
E
SCCODE
1.1 - Grass/Forb-Open
1.6 - Sapling/Pole-Moderate
1.7 - Sapling/Pole-Closed
1.10 - Small Tree-Single Story-Closed
1.13 - Medium Tree-Single Story-Closed
1.18 - Small Tree-Multi-Story-Moderate
1.19 - Small Tree-Multi-Story-Closed
1.21 - Medium Tree-Multi-Story-Moderate
1.22 - Medium Tree-Multi-Story-Closed
1.24 - Large Tree-Multi-Story-Moderate
1.25 - Large Tree-Multi-Story-Closed
1.26 - Giant Tree-Multi-Story
2.1 - Grass/Forb-Open
2.2 - Grass/Forb-Closed
2.3 - Low Shrub-Open Shrub Overstory-Seedling/Young
2.9 - Medium Shrub-Open Shrub Overstory-Seedling/Young
2.12 - Medium Shrub-Closed Shrub Overstory-Seedling/Young
2.13 - Medium Shrub-Closed Shrub Overstory-Mature
2.19 - Tall Shrub-Closed Shrub Overstory-Mature
3.1 - High Density (>60% impervious surface development)
4.2 - Improved Pasture
4.4 - Modified Grasslands
4.5 - Unimproved Pasture
5.2 - Closed System-Mesotrophic
5.3 - Closed System-Eutrophic
5.5 - Open System-Mesotrophic
Cowlitz Falls CHAP Habitat Evaluation
Structural Conditions
Zoom Map #2
N
0.45 0.375 0 0.45 0.9 0.45 0.9
Miles
Washington Department of FISH and WILDLIFE

Wildlife Management Area 3 Tree Height
Based on 2009 LiDAR Data



WMU 3 Boundary

Vegetation Height (ft)

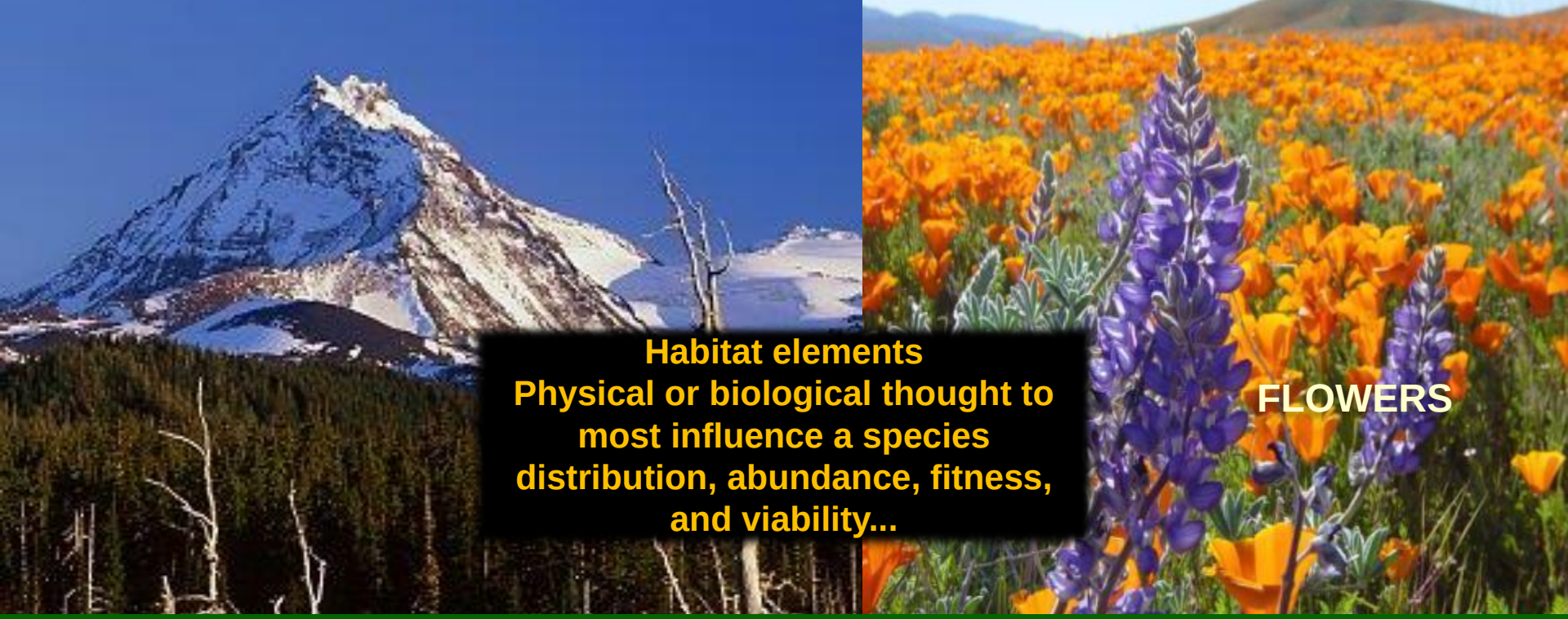
- 0 - 80
- 80 - 130
- > 130

N

Washington Department of FISH and WILDLIFE

0 75 150 300 450 600

Feet



Habitat elements
Physical or biological thought to most influence a species distribution, abundance, fitness, and viability...

FLOWERS

Key Environmental Correlates (KECs)

SNAGS

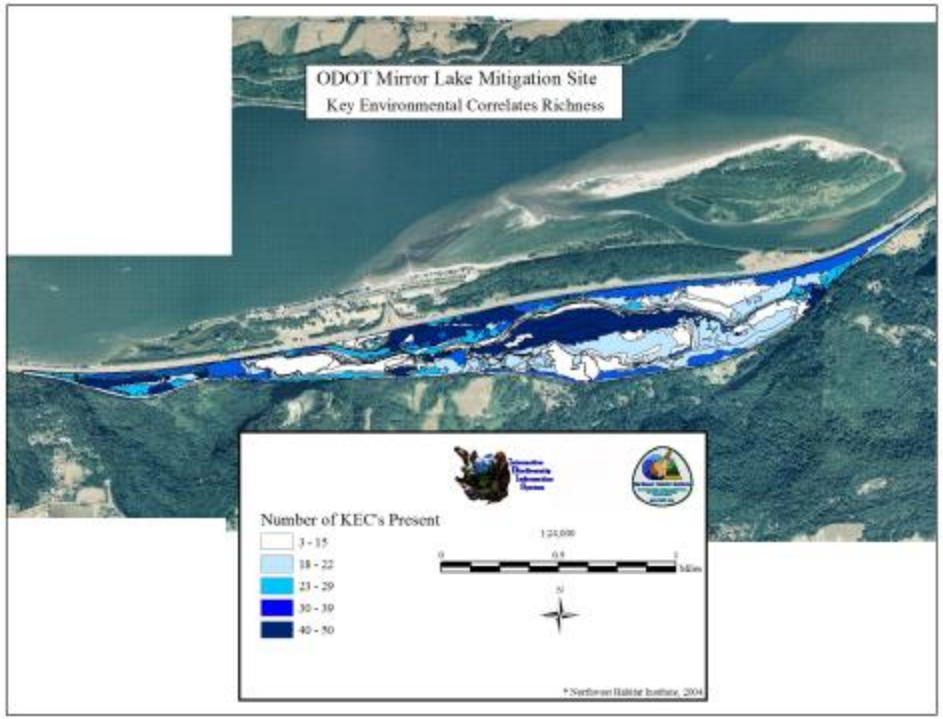
DOWN WOOD
IN STREAM

Key Environmental Correlates (KECs)

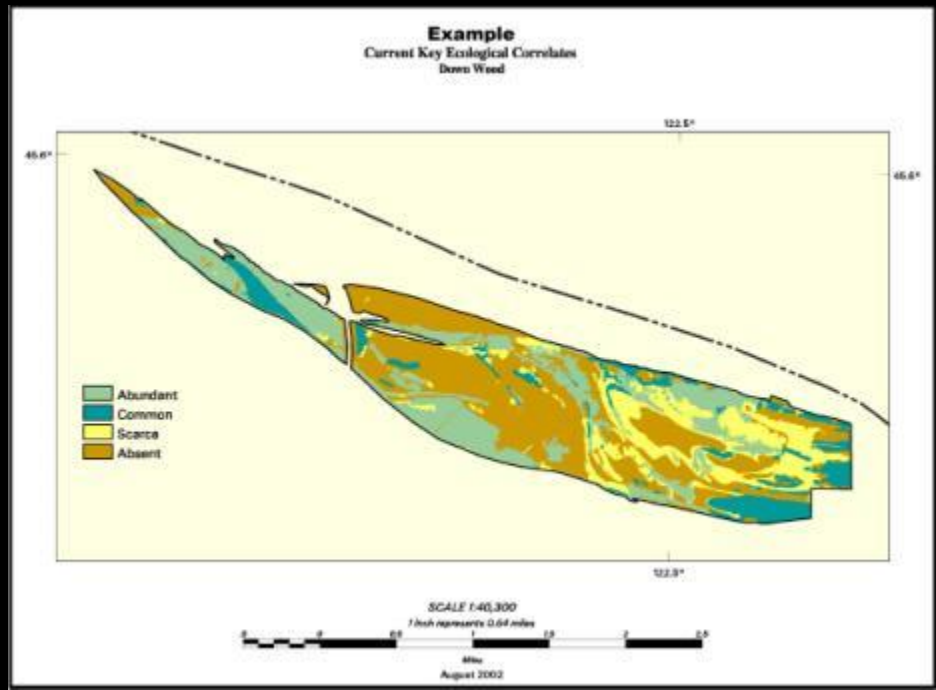
- **Beaver and muskrat activity: dams, lodges, ponds**
- **Burrows: aquatic or terrestrial**
- **Rivers and Streams**
- **Oxbows**
- **Seeps or Springs**
- **Submergent and Emergent Vegetation**
- **Ephemeral Pools**
- **Wetlands, Marshes, and Wet Meadows**
- **Riverine Wetlands**
- **Seasonal Flooding**
- **Anthropogenic Disturbances and Elements: Irrigation ditches, hatchery facilities/fishes**

Example: Pacific Tree Frog

(Photo Credit: USGS)



Key Environmental Correlates (KECs)



The principal way organisms influence the environment

Key Ecological Functions (KEFs)

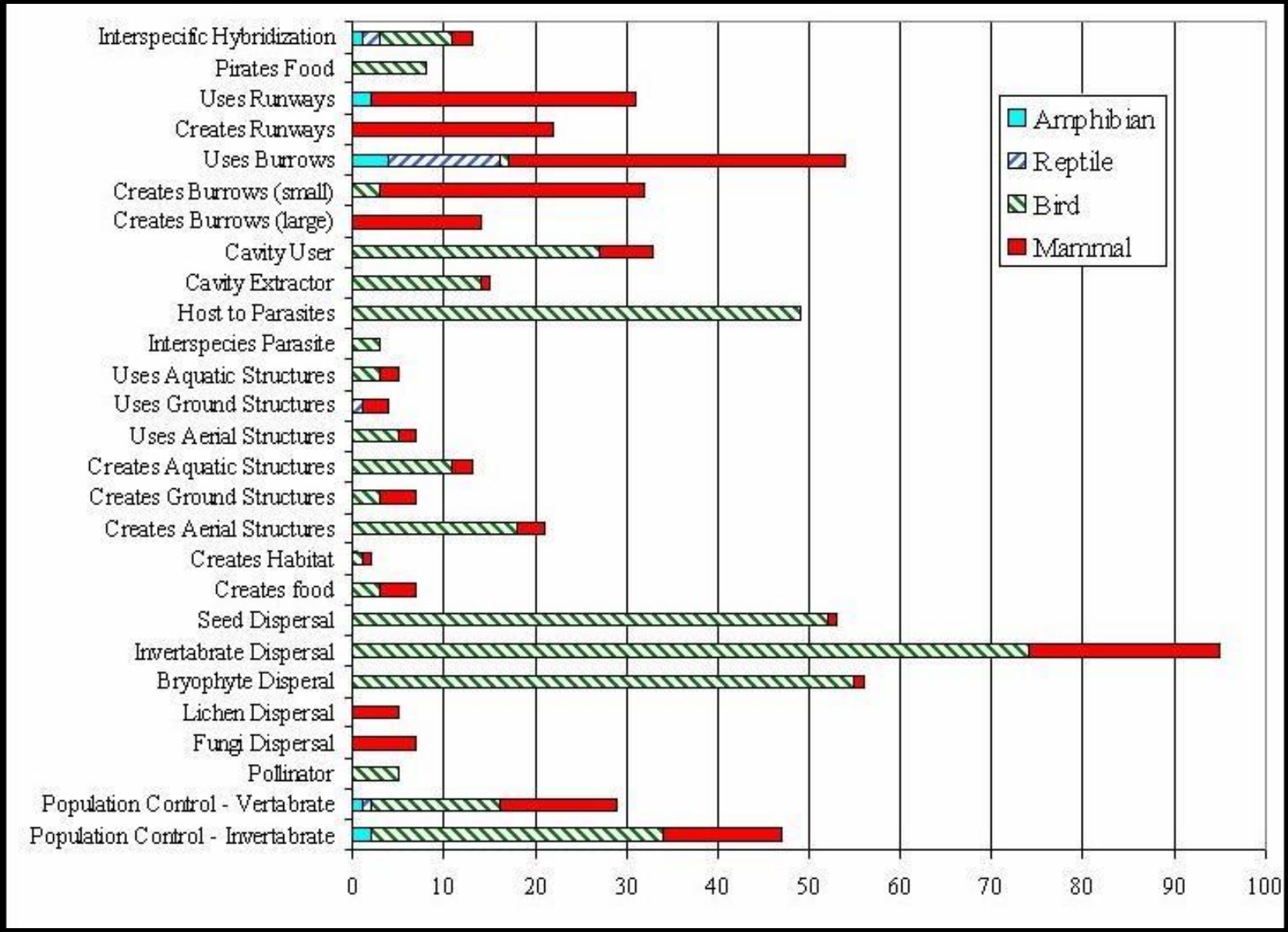
Key Environmental Functions (KEFs)

- Heterotrophic Consumer
- Primary Consumer
- Aquatic Herbivore
- Feeds in Water on Decomposing Substrate
- Invertebrate Eater
- Prey for Secondary or Tertiary Consumer
- Aids in Physical Transfer of Substances for Nutrient Cycling
- Uses Burrows Dug by Other Species
- Uses Runways Created by Other Species

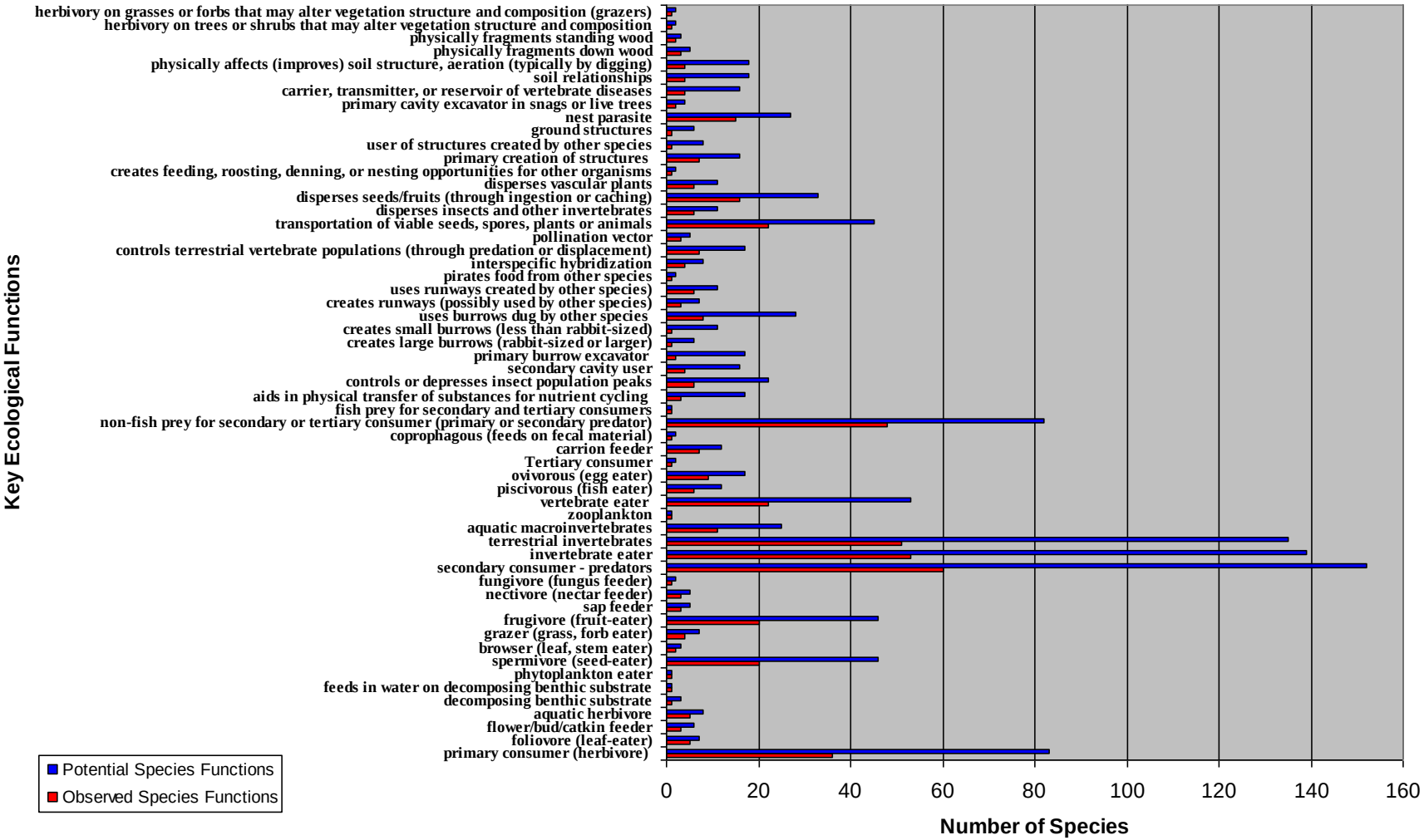
Example: Pacific Tree Frog

(Photo Credit: USGS)

Key Ecological Functions

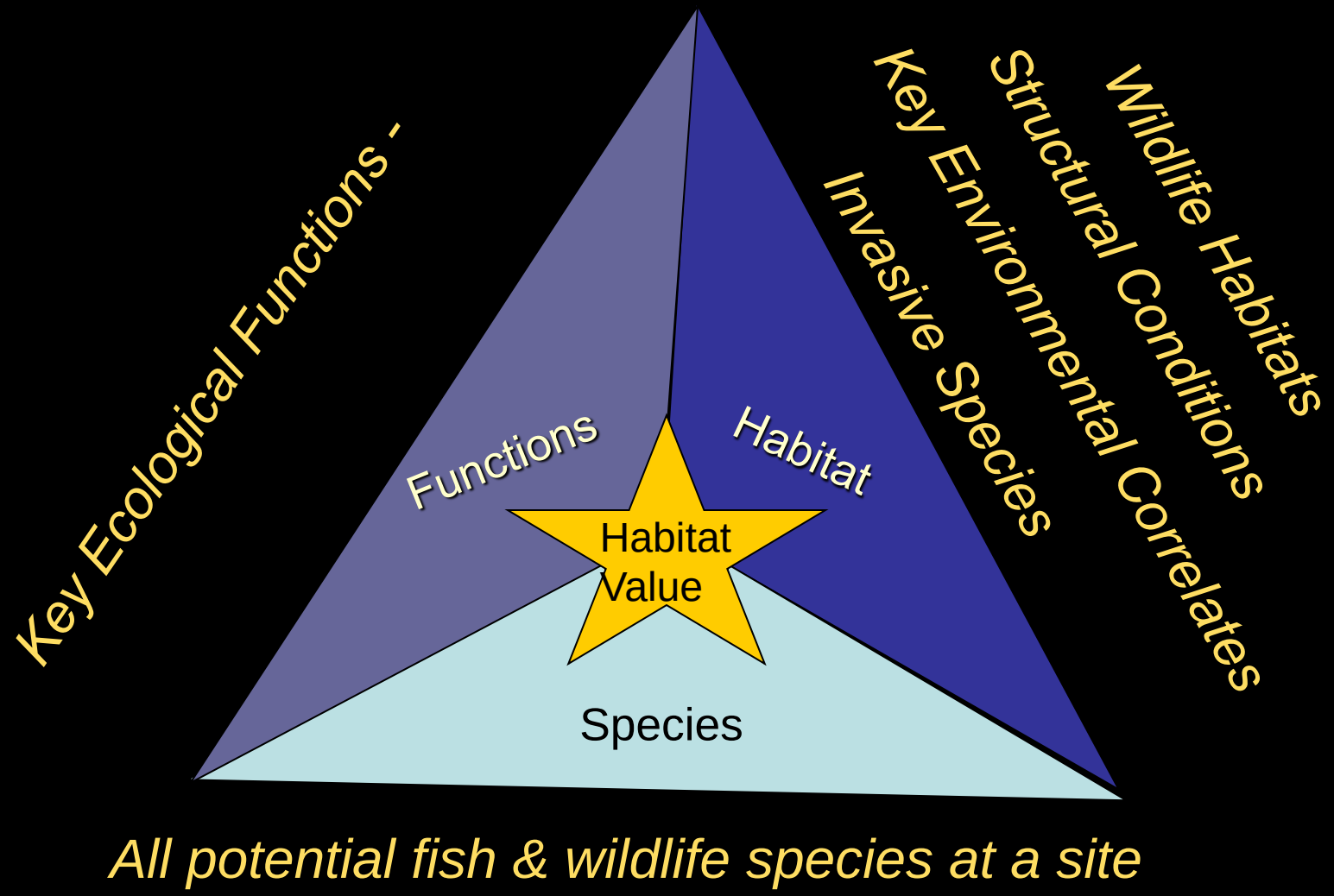


Species Functional Redundancy for Species Potential vs Observed



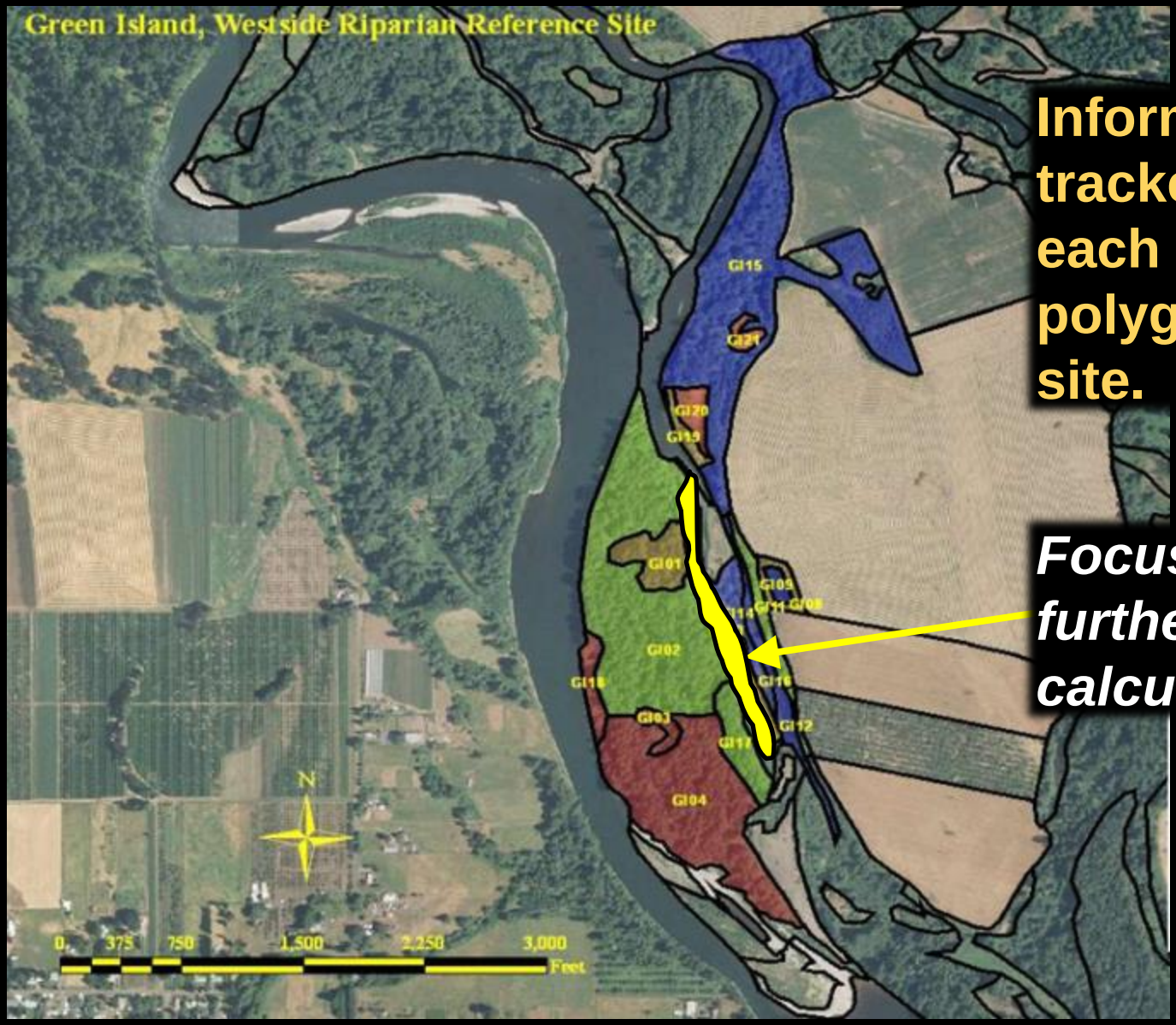
The Calculations…

CHAP
Habitat Accounting and Appraisal



All potential fish & wildlife species at a site

Calculations



Information tracked for each polygon at a site.

Focus for further calculations

Lowland Mixed Conifer Habitat Type (Potential)	Function 1 Transportation of Viable Seeds, Spores or Plants	Function 2 Breaks up Down Wood	Function 3 Primary Excavator	Function 4 Eats Terrestrial Invertebrates
Least Bell's Vireo				1
Downy Woodpecker		1	1	1
Black Bear	1	1	1	1
Black-tailed Deer	1	1		
Steelhead Trout	1			1

Species-Function Matrix

Lowland Mixed Conifer Habitat Type (Actual)	Function 1 Creates Snags	Function 2 Breaks up Down Wood	Function 3 Primary Excavator	Function 4 Filtering Water	Function 5 Eats Terrestrial Insects
Down Wood		1			1
Snags	1		1		1
Tree Cavities	1	1	1		1
Hollow Living Trees		1			1
Ephemeral Pools					1
Emergent Vegetation				1	

Habitat-Function Matrix

Habitat Value: Calculations

Divide: $\dfrac{\textbf{total number of 1s}}{\textbf{total number of non-zero functions}}$

A

1. ***Total # of 1s = 12***
2. ***Total # non-zero fxns = 4***

$$\frac{\text{Number of species performing functions}}{\text{Total number of potential functions}} = \frac{12}{4} = 3.0$$

B

1. ***Total # of 1s = 13***
2. ***Total # non-zero fxns = 5***

$$\frac{\text{Number of KECs at site}}{\text{Total number of functions characterized}} = \frac{13}{5} = 2.6$$

Habitat Value
5.6

Westside Riparian Habitat Type	Function 1 Food	Function 2 Religious/ Ceremonial (symbols or rituals)	Function 3 Trading	Function 4 Medicine	Function 5 Myths and Legends
Elk or Red Deer	1	1	1		1
Bald Eagle		1			1
Chinook Salmon	1	1	1		1
Coyote		1	1		1
Red Elderberry	1			1	
Pacific Yew		1		1	1

Key Cultural Function Matrix

Habitat Value: Calculations

Adding Key Cultural Functions

A + B

C

1. ***Total # of 1s = 18***
2. ***Total # non-zero fxns = 5***

$$\frac{\text{Number of KCFs at site}}{\text{Total number of functions characterized}} = \frac{18}{5} = 3.6$$

Field Inventory Conducted for Each Polygon

Grass/Forb Layer Invasive Plant Value by Polygon

Shrub Layer Invasive Plant Value by Polygon

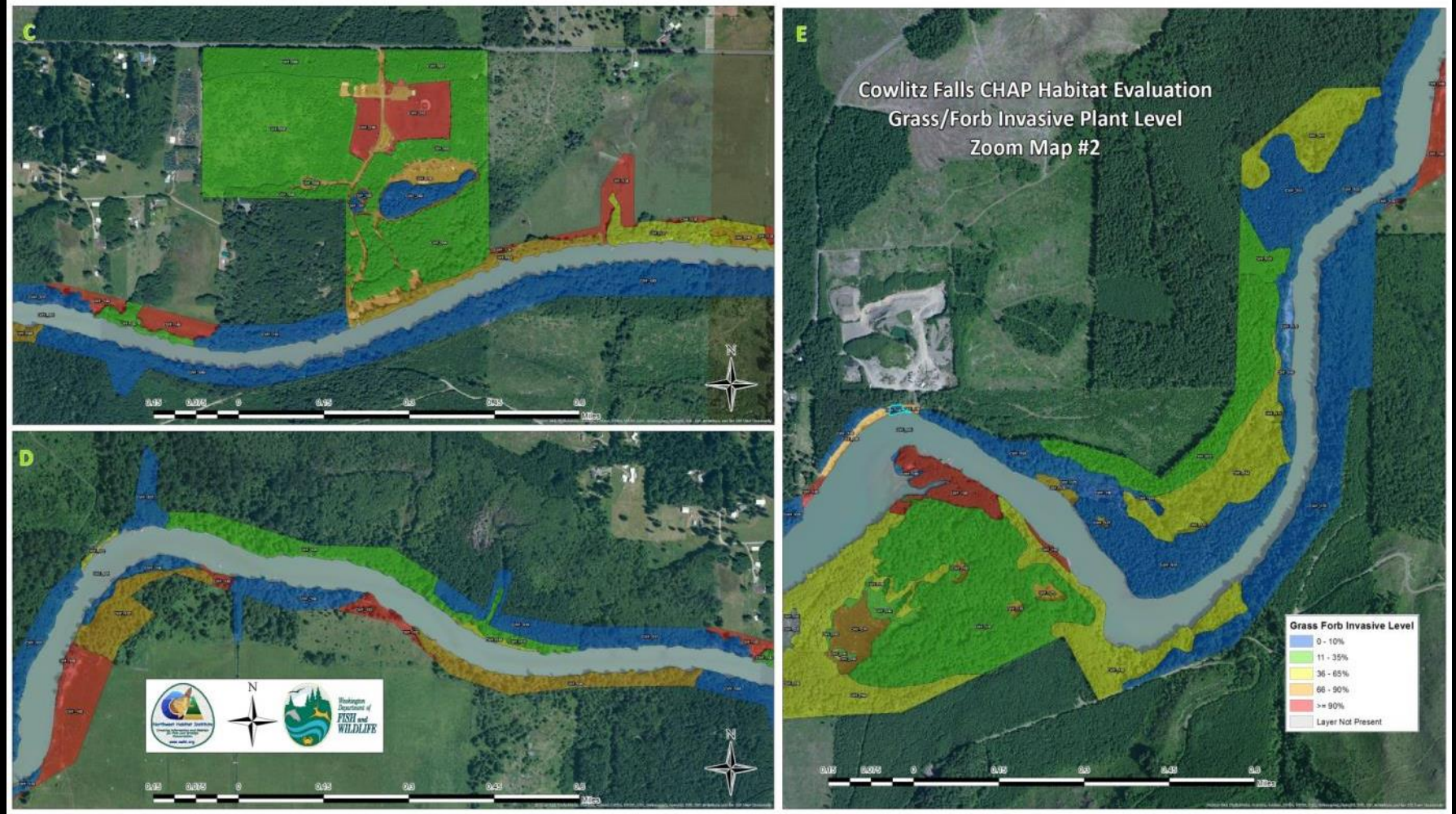
Tree Layer Invasive Plant Value by Polygon

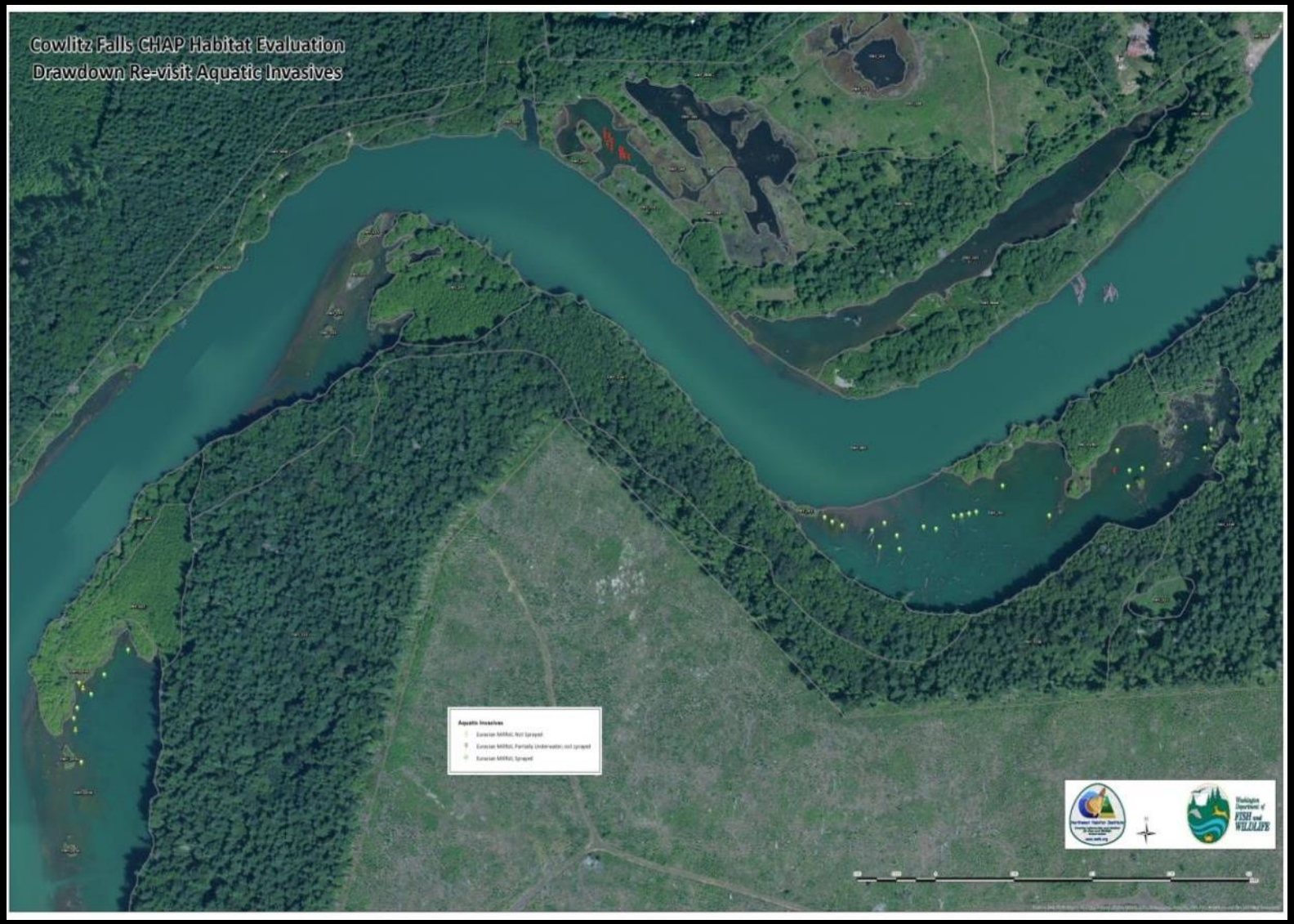
1. Determine Invasive Plant Correction Value for Each Structural layer in Each Polygon

Invasive Plant Species Cover Correction Values	x
0-10%	1.0
11-35%	0.9
36-65%	0.7
66-90%	0.5
>90%	0.3

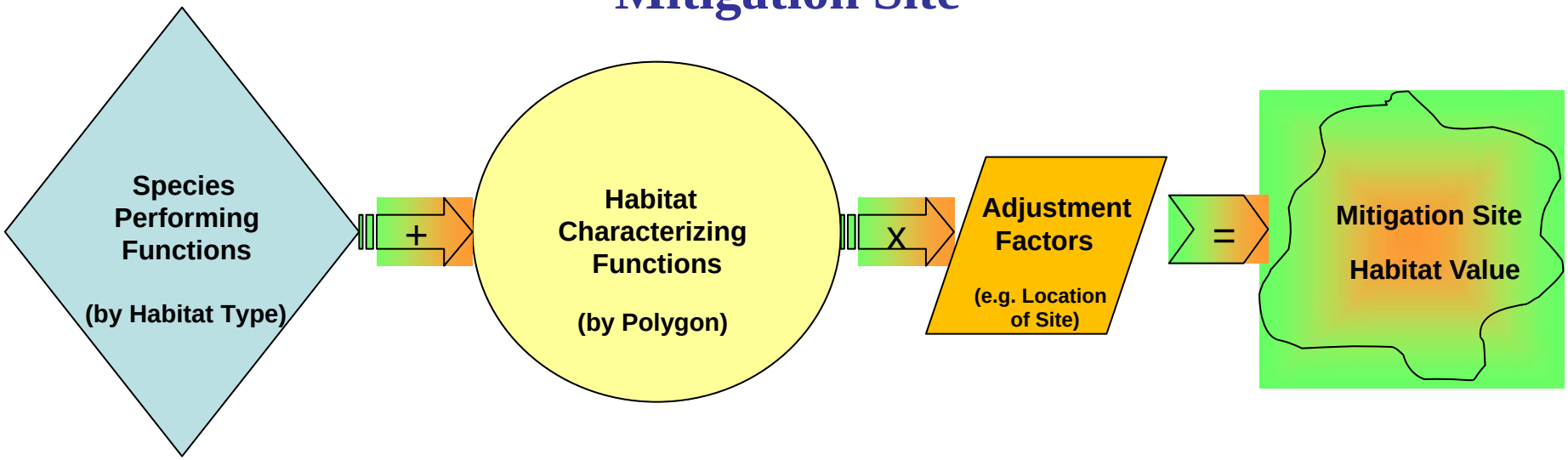
2. Calculate the GeoMean of the Three Structural Layer Values to Determine the Invasive Correction Value for the Polygon

GeoMean(0.3 + 0.7 + 0.9)/3 = 0.57

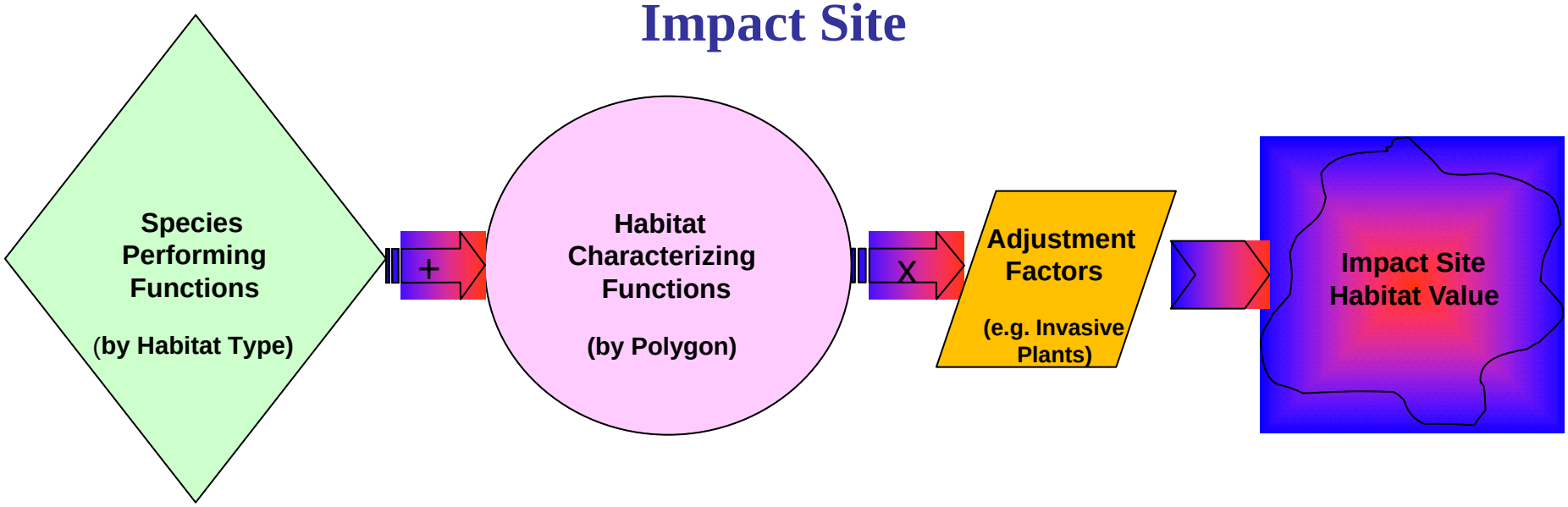

C
D
E
Cowlitz Falls CHAP Habitat Evaluation
Grass/Forb Invasive Plant Level
Zoom Map #2
Grass Forb Invasive Level
0 - 10%
11 - 35%
36 - 65%
66 - 90%
>= 90%
Layer Not Present
N
Miles

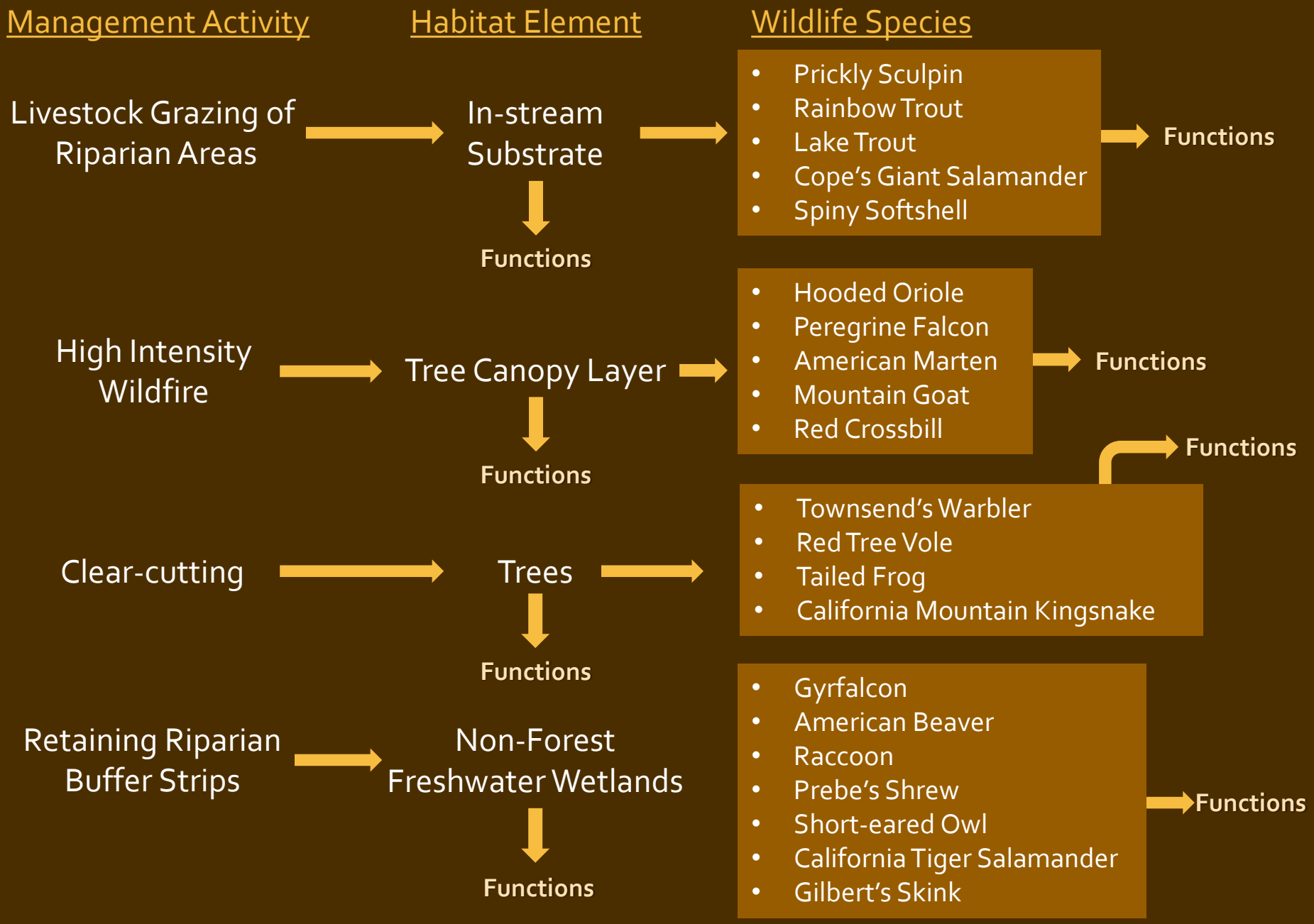

Cowlitz Falls CHAP Habitat Evaluation
Drawdown Re-visit Aquatic Invasives
Aquatic Invasives
Eurasian Milfoil, Not Sprayed
Eurasian Milfoil, Partially Underwater, not sprayed
Eurasian Milfoil, Sprayed
FISH and WILDLIFE

Mitigation Site



Impact Site




Management Activity
Habitat Element
Wildlife Species
Livestock Grazing of Riparian Areas
In-stream Substrate
Functions
Prickly Sculpin
Rainbow Trout
Lake Trout
Cope's Giant Salamander
Spiny Softshell
Functions
High Intensity Wildfire
Tree Canopy Layer
Functions
Hooded Oriole
Peregrine Falcon
American Marten
Mountain Goat
Red Crossbill
Functions
Townsend's Warbler
Red Tree Vole
Tailed Frog
California Mountain Kingsnake
Functions
Clear-cutting
Trees
Functions
Retaining Riparian Buffer Strips
Non-Forest Freshwater Wetlands
Functions
Gyrfalcon
American Beaver
Raccoon
Prebe's Shrew
Short-eared Owl
California Tiger Salamander
Gilbert's Skink
Functions

Linkages to Management Activities

Actions

Actions to KECs

Habitat Element	Trail use and camping	Snowmobiling	Off-road driving	Fish stocking
1. habitat elements	☑	☐	☐	☐
1.1.14.3 tree size	☑	☐	☐	☐
1.1.5 moss	☑	☐	☐	☐
1.1.8 forbs	☑	☐	☐	☐
3.2 soils	☑	☐	☑	☐
3.2.4 soil organic matter	☑	☐	☑	☐
8.19.3 water pollution	☑	☐	☐	☐
2.1.2 animals	☐	☐	☐	☑
1.1 forest/woodland veget	☑	☐	☐	☐
1.2 shrubland and grasslar	☑	☐	☐	☐
1.2.1 herbaceous layer	☑	☐	☑	☐

Species to KECs

aKEC Fish and Wildlife

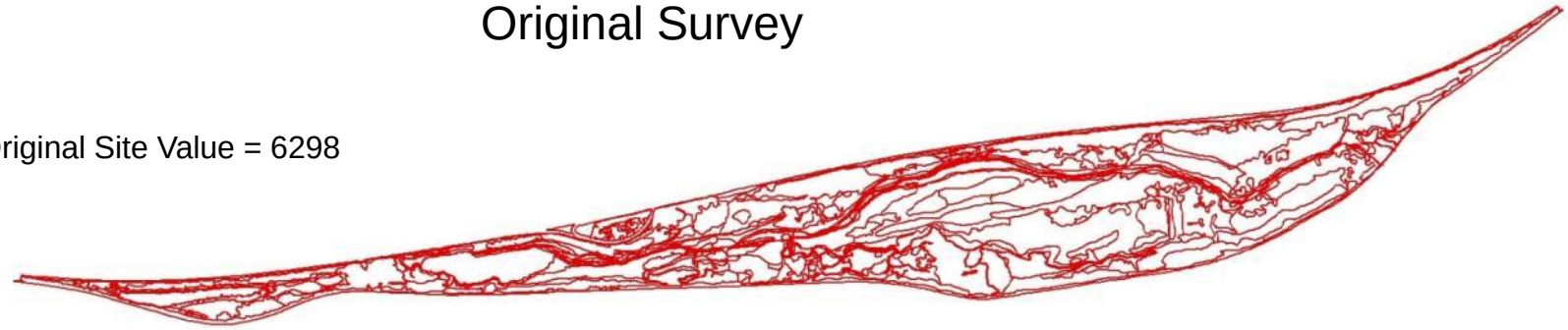
SPPID	Name	KECID	KEC Code	Possitive	Negative
10001	Pacific lamprey	143	4	0	0
10001	Pacific lamprey	144	4.1	0	0
10001	Pacific lamprey	148	4.1.12	-1	0
10001	Pacific lamprey	154	4.1.7	-1	0
10001	Pacific lamprey	157	4.2	0	-1
10001	Pacific lamprey	159	4.2.10	-1	0
10001	Pacific lamprey	166	4.2.15.4	0	-1
10001	Pacific lamprey	170	4.2.2.3	-1	0
10001	Pacific lamprey	171	4.2.3	-1	0
10001	Pacific lamprey	173	4.2.3.2	-1	0

Earthwork (Excavation; Embankment) Construction

KEC	KEC_Description	Affects	Duration/Months 0-6 Negative	Duration/Months 0-6 Positive	Duration/Months 6-12 Negative	Duration/Months 6-12 Positive	Duration/Months >12 Negative	Duration/Months >12 Positive	Season Fall	Season Winter	Season Spring	Season Summer
1	Forest, Shrubland, & Grassland Habitat	1	1		1		1		1	1	1	1
1.1	forest/woodland vegetative elements or substrates	1	1		1		1		1	1	1	1
1.1.1	down wood (includes downed logs, branches, and rootwads, in any context)	1	1		1		1		1	1	1	1
1.1.1.1	decay class	1	1		1		1		1	1	1	1
1.1.1.1.1	hard [class 1, 2]	1	1		1		1		1	1	1	1
1.1.1.1.2	moderate [class 3]	1	1		1		1		1	1	1	1
1.1.1.1.3	soft [class 4, 5]	1	1		1		1		1	1	1	1
1.1.1.2	down wood in riparian areas	1	1		1		1		1	1	1	1
1.1.1.3	down wood in upland areas	1	1		1		1		1	1	1	1
1.1.10	fungi	1	1		1		1		1	1	1	1
1.1.11	roots, tubers, underground plant parts	1	1		1		1		1	1	1	1

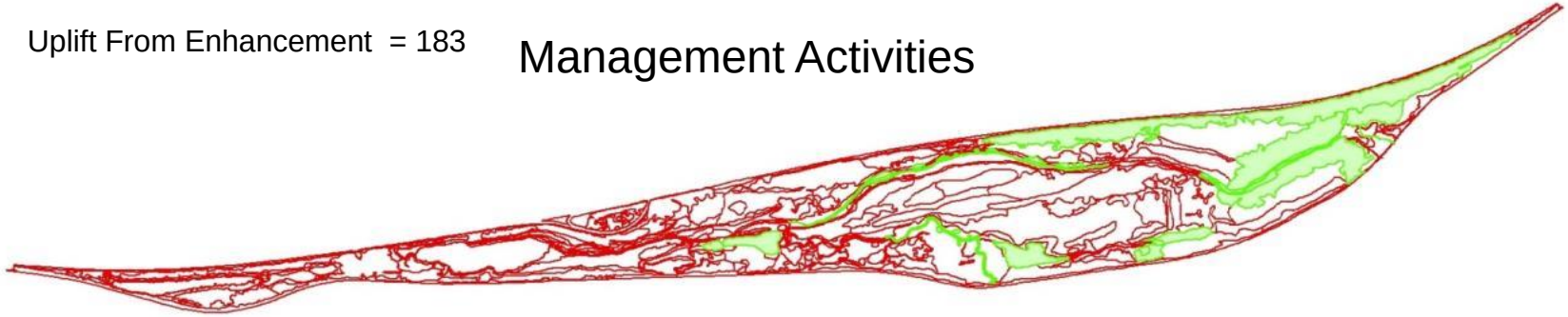
Original Survey

Original Site Value = 6298



Uplift From Enhancement = 183

Management Activities



Future Conditions

Future Site Value = 6501

Uplift From Conversion = 20

Polygon Site ID	Acres	Corrected Per-Acre Value	Corrected Polygon Value
SJC_042	4.50	16.76	75.44
SJC_189	4.60	7.72	35.49
SJC_216	4.65	8.42	39.17
SJC_043	4.70	11.53	54.21
SJC_182	4.71	15.30	72.08
SJC_156	4.81	10.24	49.23
SJC_212	4.81	8.42	40.48
SJC_008	5.49	5.03	27.60
SJC_007	5.83	5.95	34.67
SJC_020	6.19	10.61	65.66
SJC_029	6.34	10.85	68.85
SJC_060	6.89	11.53	79.52
SJC_004	7.10	5.37	38.12

During different times of the year, the habitat value change based on the diversity of birds, ***that is habitat value is not static throughout a year***…

San Francisco, CA – (South Bay Salt Ponds Restoration Project)

SITE_ID	Acres	Habitat Units
Spring		
SF_Pond A09	365.92	7,146.4
SF_Pond A10	249.81	4,626.3
SF_Pond A11	261.70	4,937.6
SF_Pond A12	308.20	5,662.5
SF_Pond A13	266.65	4,937.3
SF_Pond A14	336.92	6,563.2
SF_Pond A15	250.89	4,738.6
SF_Pond A16	242.06	4,778.4
SF_Pond A17	130.88	2,583.0
SF_Pond A18	826.87	16,222.3
Total	**3,240**	**62,195.6**

SITE_ID	Acres	Habitat Units
Fall		
SF_Pond A09	365.92	7,678.3
SF_Pond A10	249.81	4,948.0
SF_Pond A11	261.70	4,766.6
SF_Pond A12	308.20	5,757.0
SF_Pond A13	266.65	5,334.2
SF_Pond A14	336.92	6,635.9
SF_Pond A15	250.89	4,963.1
SF_Pond A16	242.06	4,555.4
SF_Pond A17	130.88	2,731.0
SF_Pond A18	826.87	16,002.5
Total	**3,240**	**63,372.0**

SITE_ID	Acres	Habitat Units
Summer		
SF_Pond A09	365.92	6,359.4
SF_Pond A10	249.81	4,196.7
SF_Pond A11	261.70	4,321.4
SF_Pond A12	308.20	5,123.7
SF_Pond A13	266.65	4,219.3
SF_Pond A14	336.92	5,756.5
SF_Pond A15	250.89	4,455.5
SF_Pond A16	242.06	4,587.8
SF_Pond A17	130.88	2,492.3
SF_Pond A18	826.87	14,127.7
Total	**3,240**	**55,640.3**

SITE_ID	Acres	Habitat Units
Winter		
SF_Pond A09	365.92	7,437.2
SF_Pond A10	249.81	4,795.1
SF_Pond A11	261.70	4,799.4
SF_Pond A12	308.20	6,061.6
SF_Pond A13	266.65	5,130.1
SF_Pond A14	336.92	6,769.1
SF_Pond A15	250.89	4,624.6
SF_Pond A16	242.06	4,881.8
SF_Pond A17	130.88	2,538.7
SF_Pond A18	826.87	16,543.9
Total	**3,240**	**63,581.5**

Habitat Unit: value by **p**ond; determined using the diversity of bird species and number of key environmental correlates associated with each pond by season*

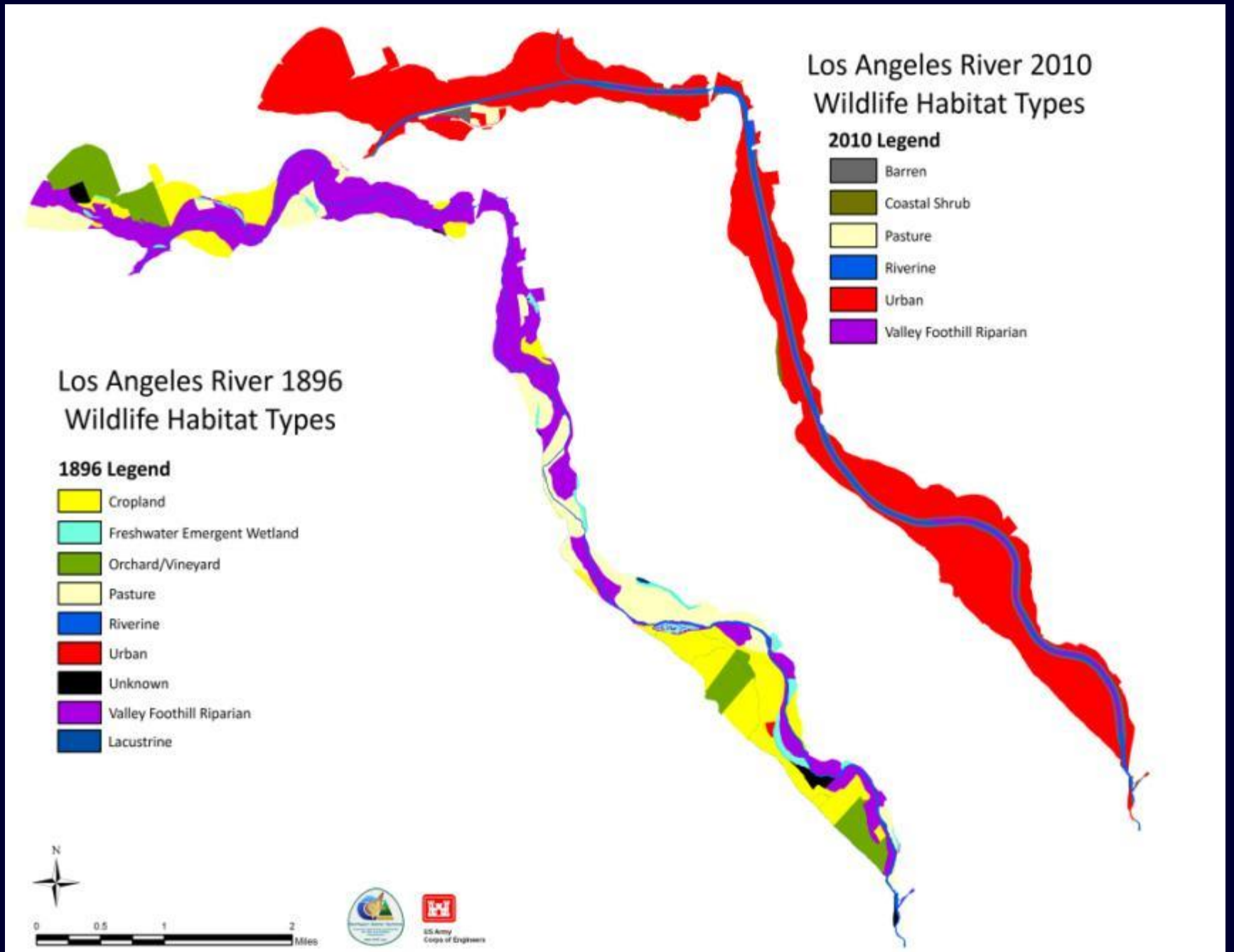

Mitigate for Habitat Impact
Created by Federal Actions


TOPOGRAPHICAL MAP
LOS ANGELES RIVER
ELYSIAN PARK

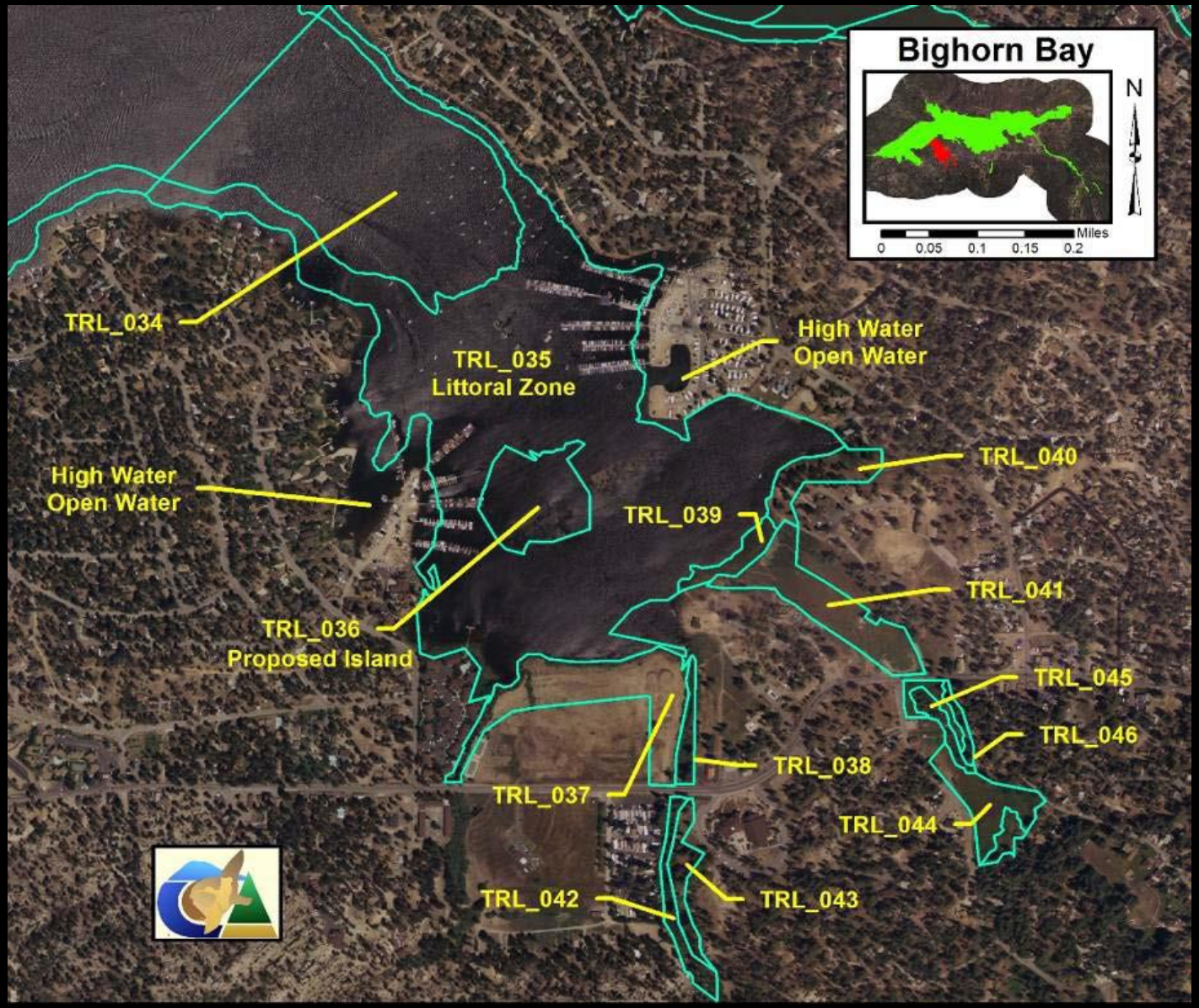

TOPOGRAPHICAL MAP
LOS ANGELES RIVER

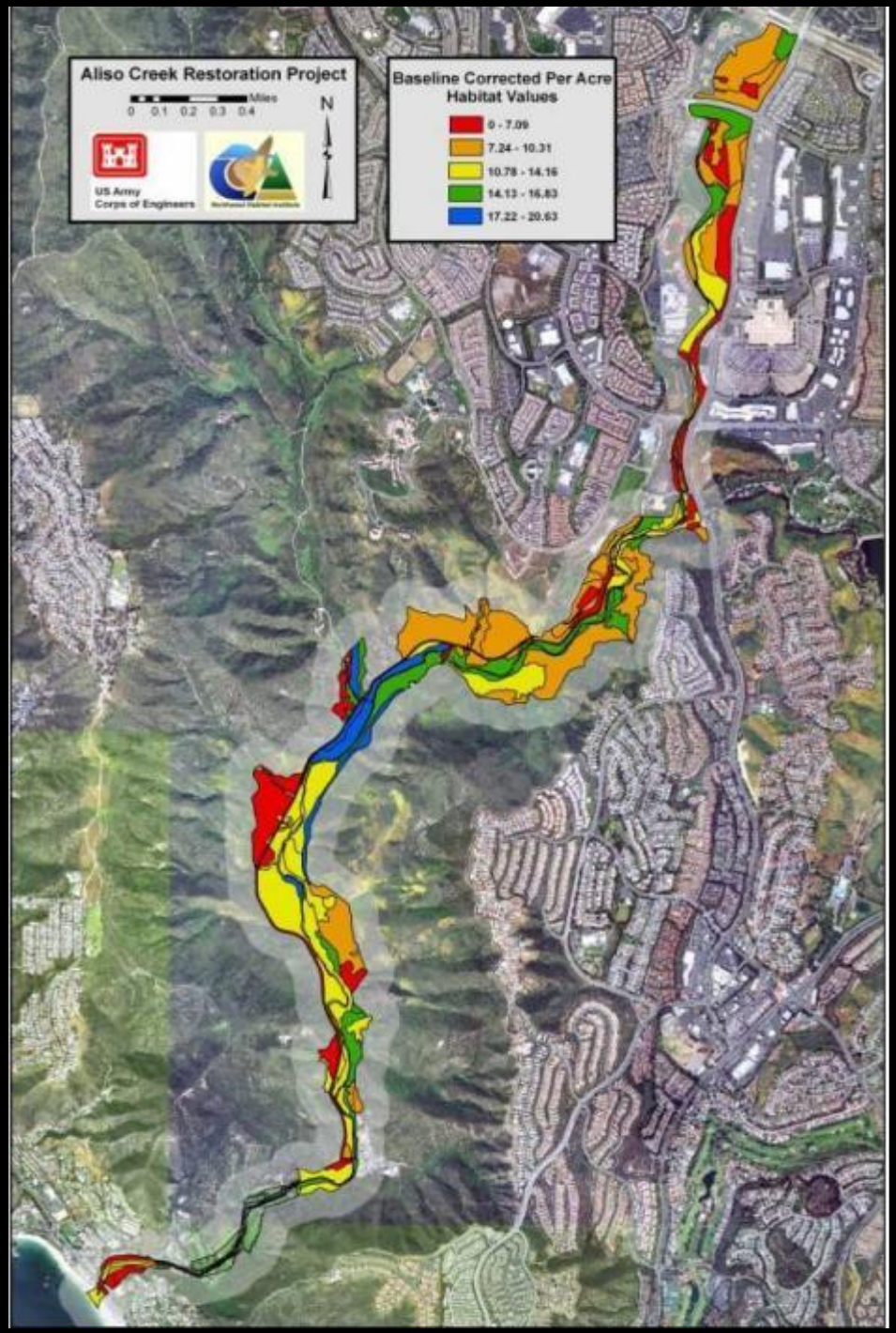

TOPOGRAPHICAL MAP
LOS ANGELES RIVER


2005 NAIP Aerial Imagery
Green Island Conservation Site
Change Detection 2005 - 2009
2009 NAIP Aerial Imagery
Channel Closes off
Riparian forest removed
Channel Closes off
Riparian forest removed
Channel Closes off
New gravel bar island
Increase in density and age class of gravel bar willows
Island bisected


Los Angeles River 2010
Wildlife Habitat Types
2010 Legend
Barren
Coastal Shrub
Pasture
Riverine
Urban
Valley Foothill Riparian
Los Angeles River 1896
Wildlife Habitat Types
1896 Legend
Cropland
Freshwater Emergent Wetland
Orchard/Vineyard
Pasture
Riverine
Urban
Unknown
Valley Foothill Riparian
Lacustrine
N
0
0.5
1
2
Miles
US Army
Corps of Engineers

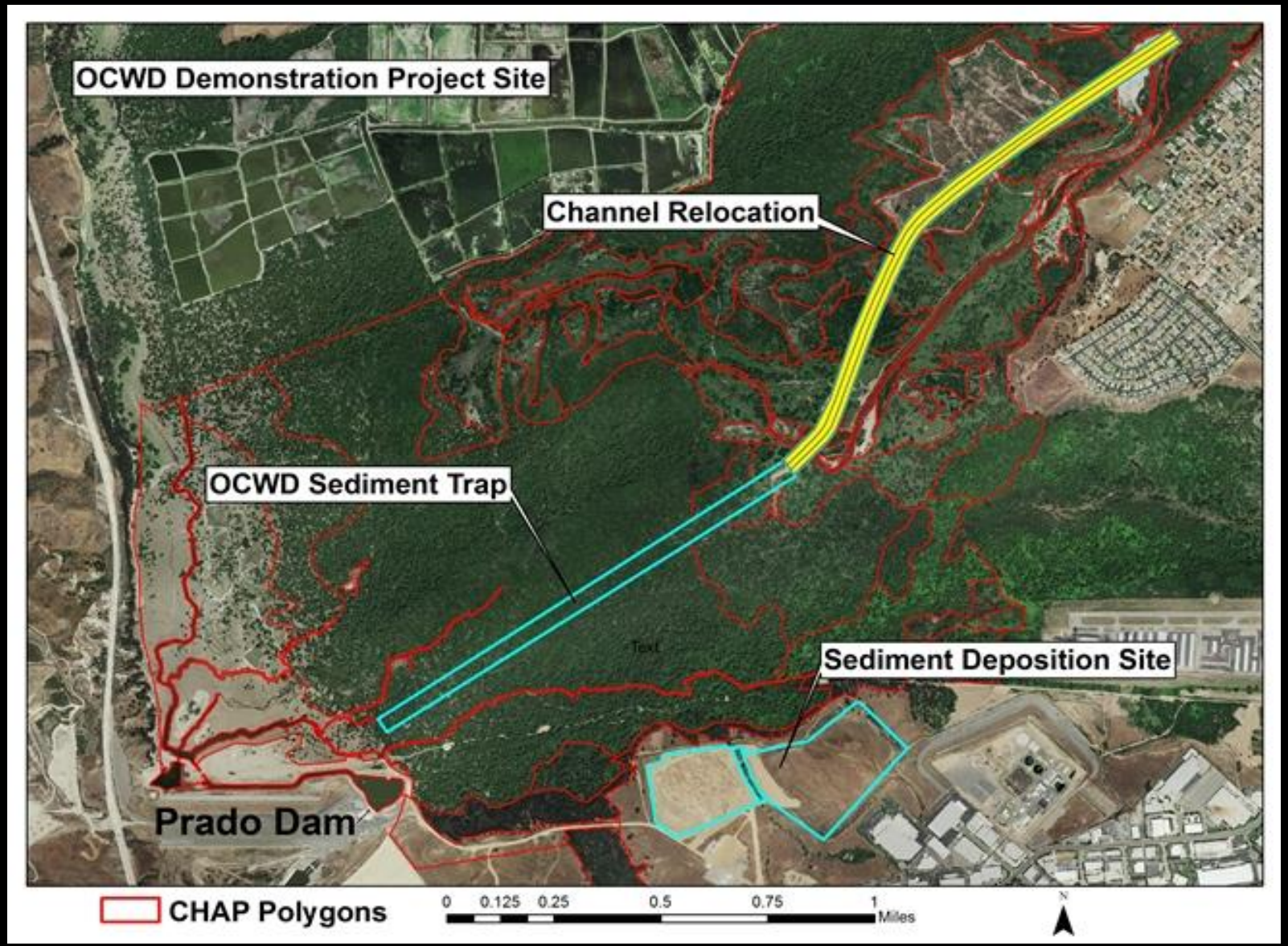
Habitat Mapping

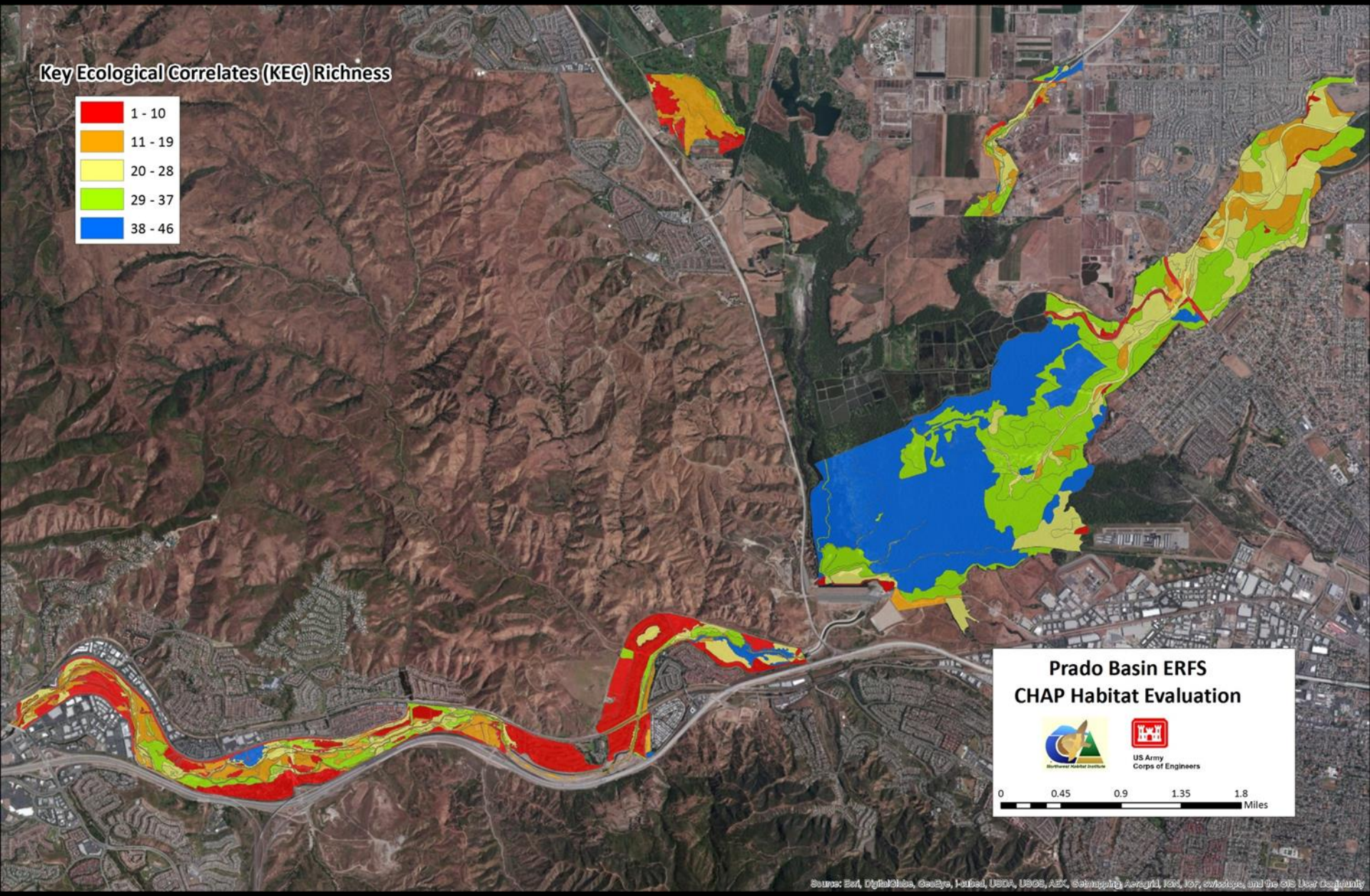




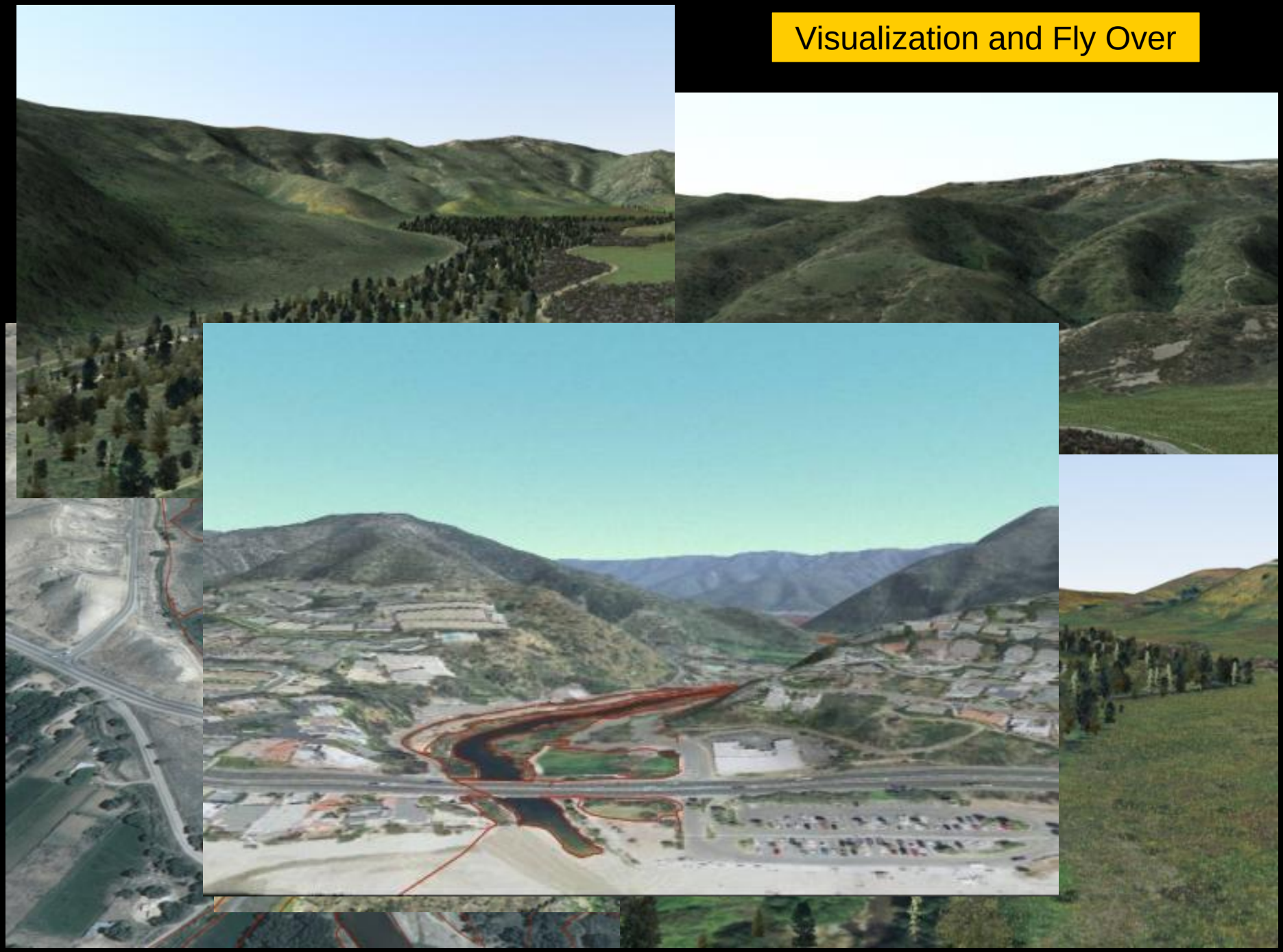
Operational Impacts

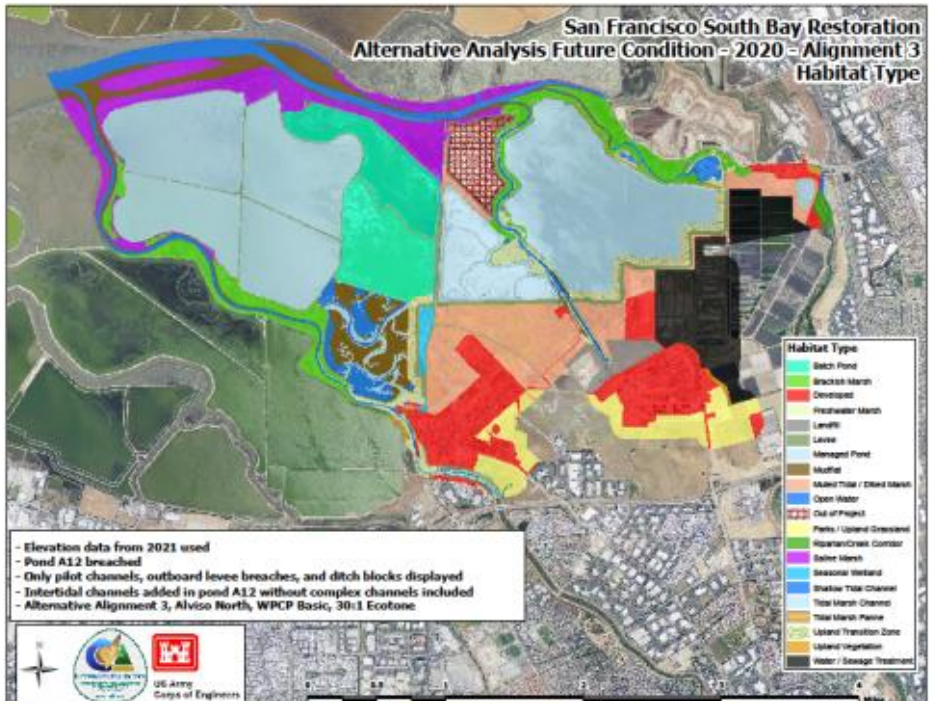
Highly Incised and Disconnected from Oxbow

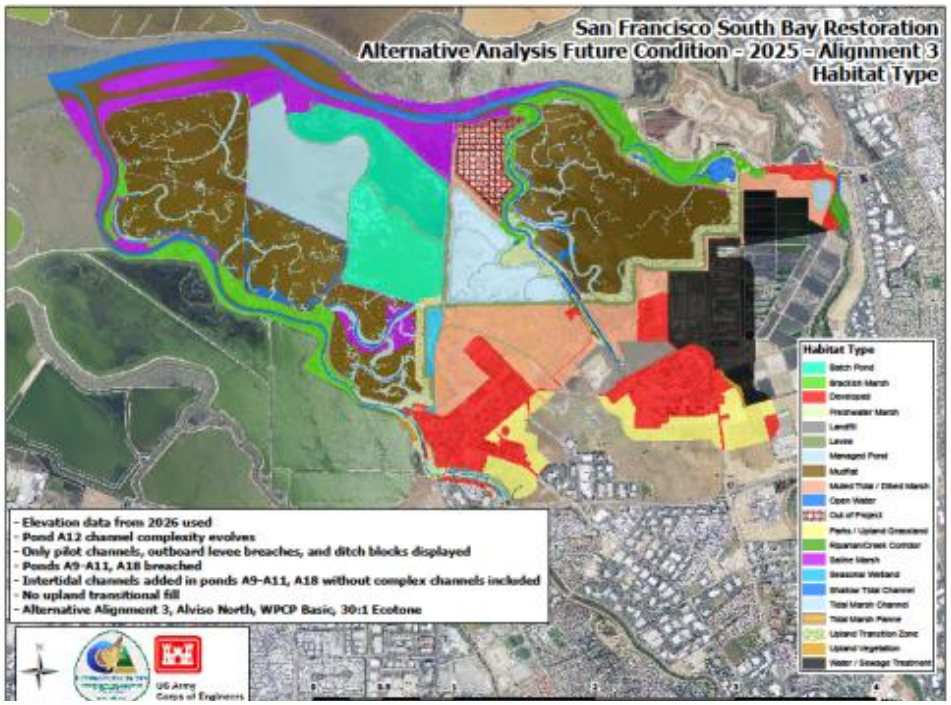

OCWD Demonstration Project Site
Channel Relocation
OCWD Sediment Trap
Sediment Deposition Site
Prado Dam
CHAP Polygons
0 0.125 0.25 0.5 0.75 1
Miles
N

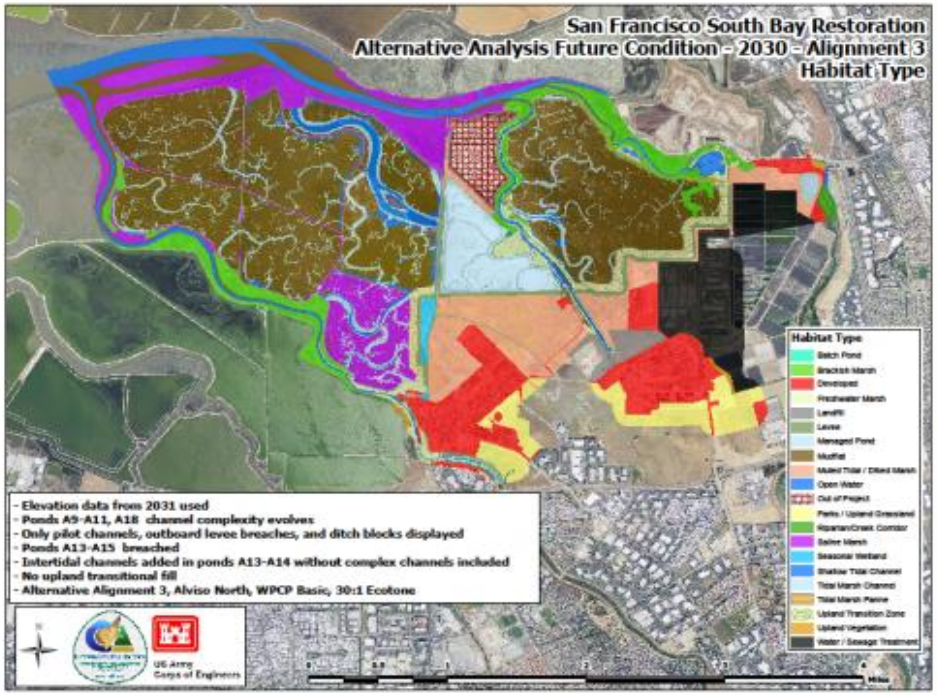

Key Ecological Correlates (KEC) Richness
1 - 10
11 - 19
20 - 28
29 - 37
38 - 46
Prado Basin ERFS
CHAP Habitat Evaluation
US Army
Corps of Engineers
0
0.45
0.9
1.35
1.8
Miles
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

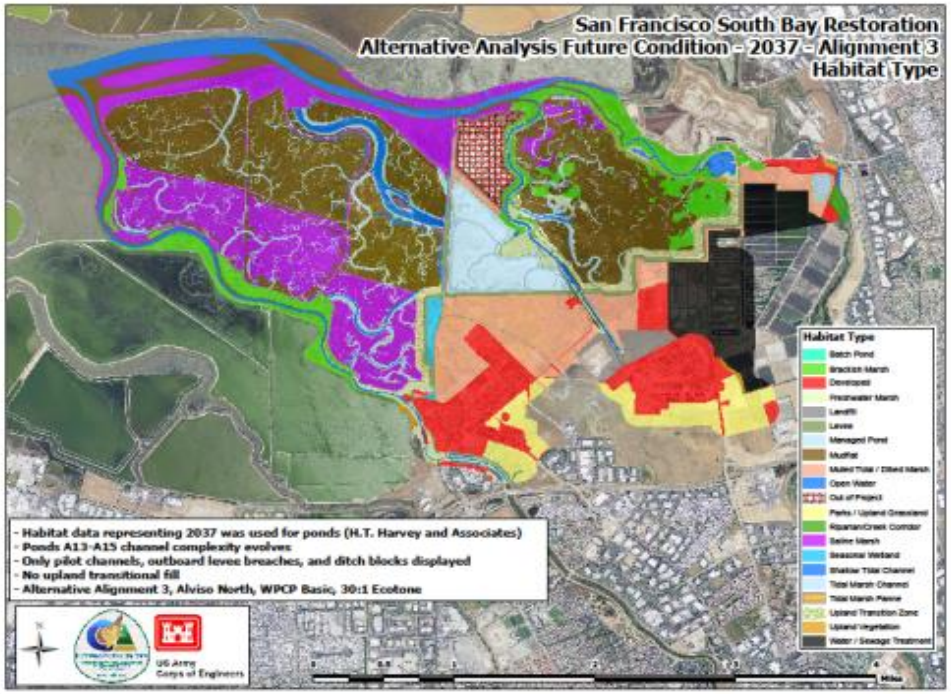
Visualization and Fly Over



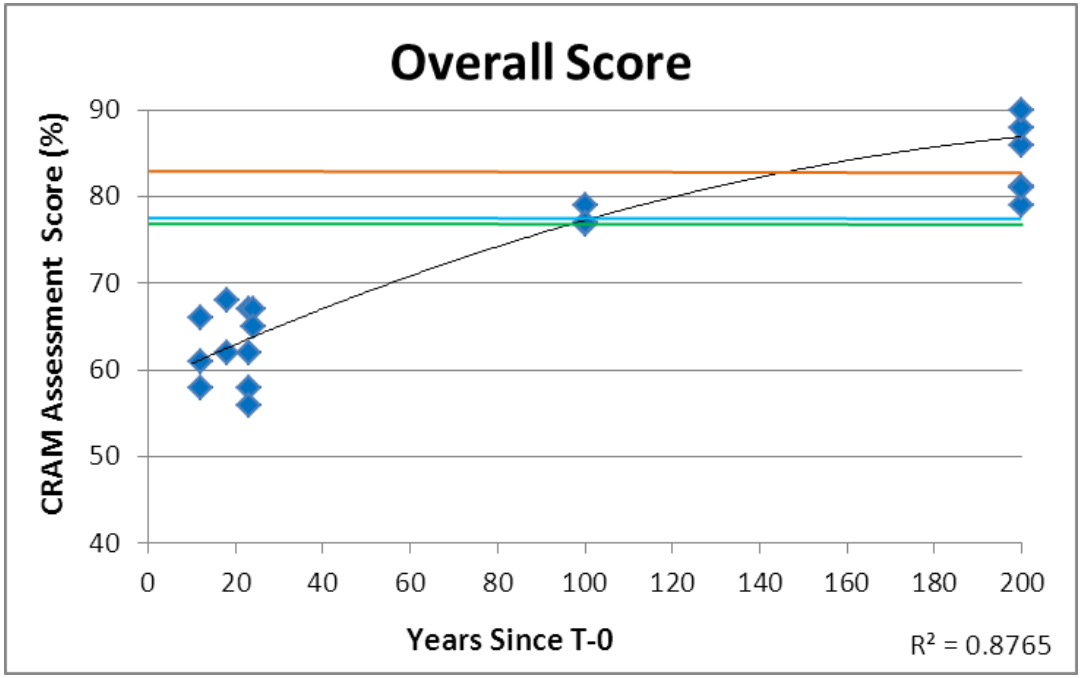

San Francisco South Bay Restoration
Alternative Analysis Future Condition - 2020 - Alignment 3
Habitat Type
- Elevation data from 2021 used
- Pond A12 breached
- Only pilot channels, outboard levee breaches, and ditch blocks displayed
- Intertidal channels added in pond A12 without complex channels included
- Alternative Alignment 3, Alviso North, WPCP Basic, 30:1 Ecotone
Habitat Type
Batch Pond
Brackish Marsh
Developed
Freshwater Marsh
Landfill
Levee
Managed Pond
Mudflat
Mudflat Tidal / Diked Marsh
Open Water
Out of Project
Parks / Upland Grassland
Riparian/Creek Corridor
Saline Marsh
Seasonal Wetland
Shallow Tidal Channel
Tidal Marsh Channel
Tidal Marsh Pannne
Upland Transition Zone
Upland Vegetation
Water / Sewage Treatment
US Army Corps of Engineers


San Francisco South Bay Restoration
Alternative Analysis Future Condition - 2025 - Alignment 3
Habitat Type
- Elevation data from 2026 used
- Pond A12 channel complexity evolves
- Only pilot channels, outboard levee breaches, and ditch blocks displayed
- Ponds A9-A11, A18 breached
- Intertidal channels added in ponds A9-A11, A18 without complex channels included
- No upland transitional fill
- Alternative Alignment 3, Alviso North, WPCP Basic, 30:1 Ecotone
Habitat Type
US Army Corps of Engineers

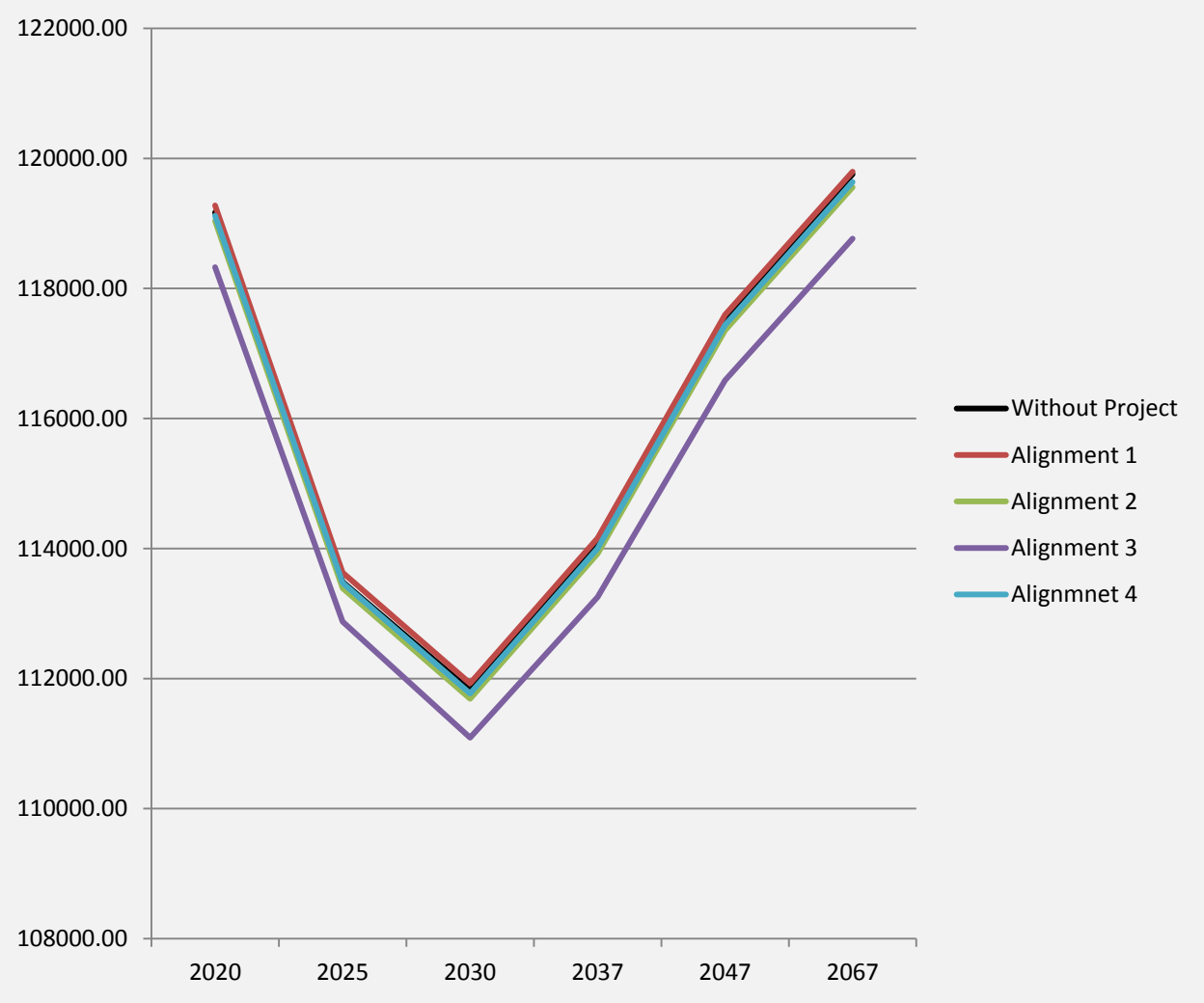

San Francisco South Bay Restoration
Alternative Analysis Future Condition - 2030 - Alignment 3
Habitat Type
- Elevation data from 2031 used
- Ponds A9-A11, A18 channel complexity evolves
- Only pilot channels, outboard levee breaches, and ditch blocks displayed
- Ponds A13-A15 breached
- Intertidal channels added in ponds A13-A14 without complex channels included
- No upland transitional fill
- Alternative Alignment 3, Alviso North, WPCP Basic, 30:1 Ecotone
Habitat Type
US Army Corps of Engineers

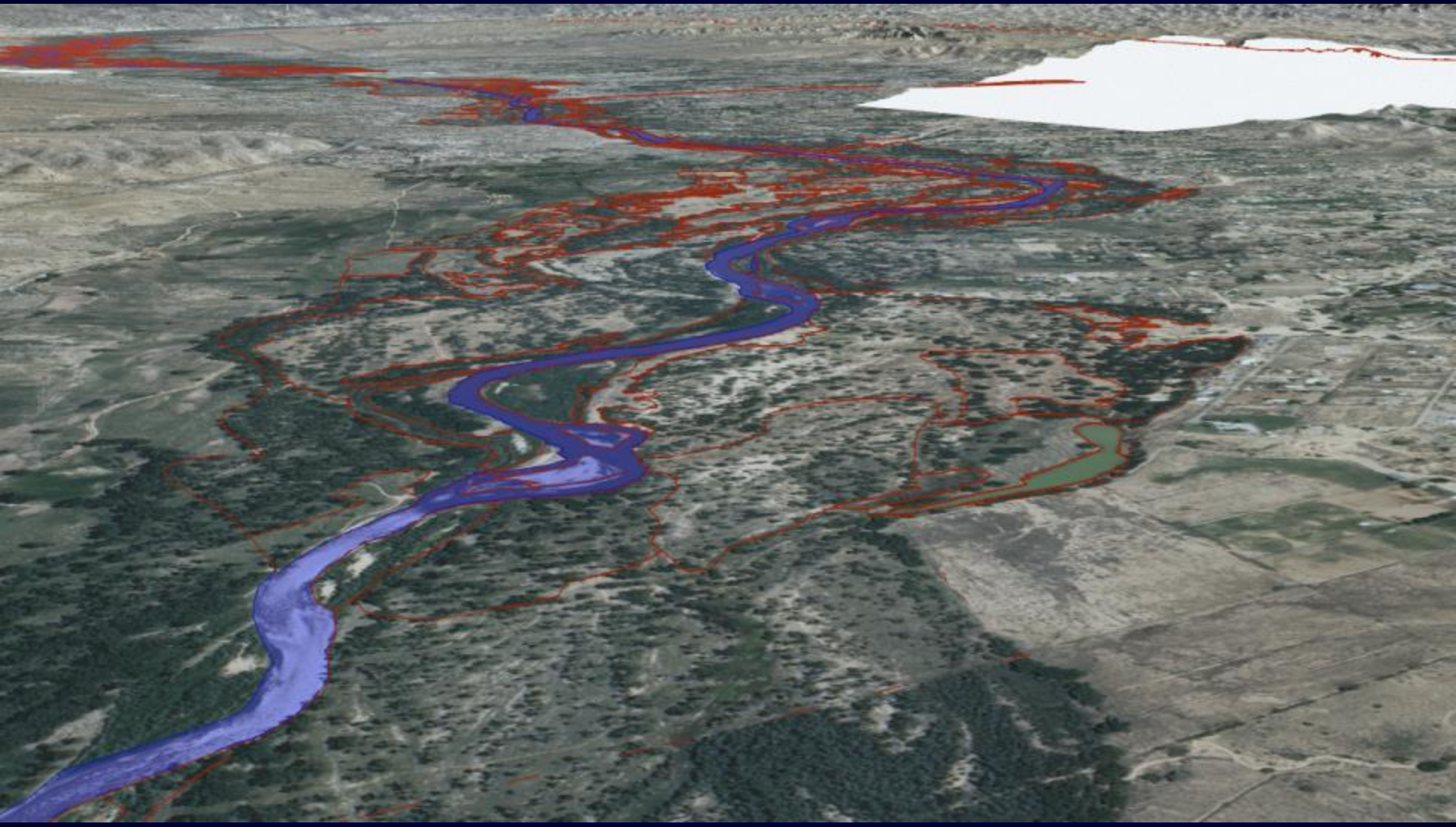

San Francisco South Bay Restoration
Alternative Analysis Future Condition - 2037 - Alignment 3
Habitat Type
- Habitat data representing 2037 was used for ponds (H.T. Harvey and Associates)
- Ponds A13-A15 channel complexity evolves
- Only pilot channels, outboard levee breaches, and ditch blocks displayed
- No upland transitional fill
- Alternative Alignment 3, Alviso North, WPCP Basic, 30:1 Ecotone
Habitat Type
US Army Corps of Engineers

Performance Curves for the Overall Condition
relative to the average scores for North Coast (Orange), Bay Area (Blue), and Statewide (Green)



Change in Habitat Units (HUs) over time for each alignment





Habitat Evaluation Team

Key

- Wildlife Ecologists
- Fish Ecologists – Salmon/Fish Wildlife Assessments
- Hydrologists
- Fluvial Geomorphologists
- Engineers
- Economists – Valuing Ecosystem Services
- Other Stakeholders

Purpose: to discuss nuisances and guide the habitat evaluation. Every site will be different hence composition of the Team will change.

Conservation Framework and Assessment

Prepared for:

SOUTHERN CALIFORNIA
ASSOCIATION of GOVERNMENTS

Northwest Habitat Institute
Corvallis, Or
Thomas O'Neill and Jennifer Bohannon

July 2014


GUINNESS
WHERE THE
MAGIC HAPPENS
TEACH TÁBHAIRNE
The
Washington
Inn

Questions?













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Corvallis, Oregon 97339

Combined Habitat Assessment Protocols (CHAP)

HEP HABITAT UNIT

- *Based on single species*
- *Generally derived from 2 to 6 habitat variables*
- *Coarse cover types*
- *Rarely accounts for invasive vegetation, or most anthropogenic impacts/influences*
- *Single species/single cover type approach*

HAB HABITAT UNIT

- *Based on multiple species*
- *Derived from over 200 KECs and Structural Conditions*
- *Habitat types to fine filter multi-strata polygons*
- *Accounts for invasive vegetation and anthropogenic influences*
- *Ecosystem/triad approach*