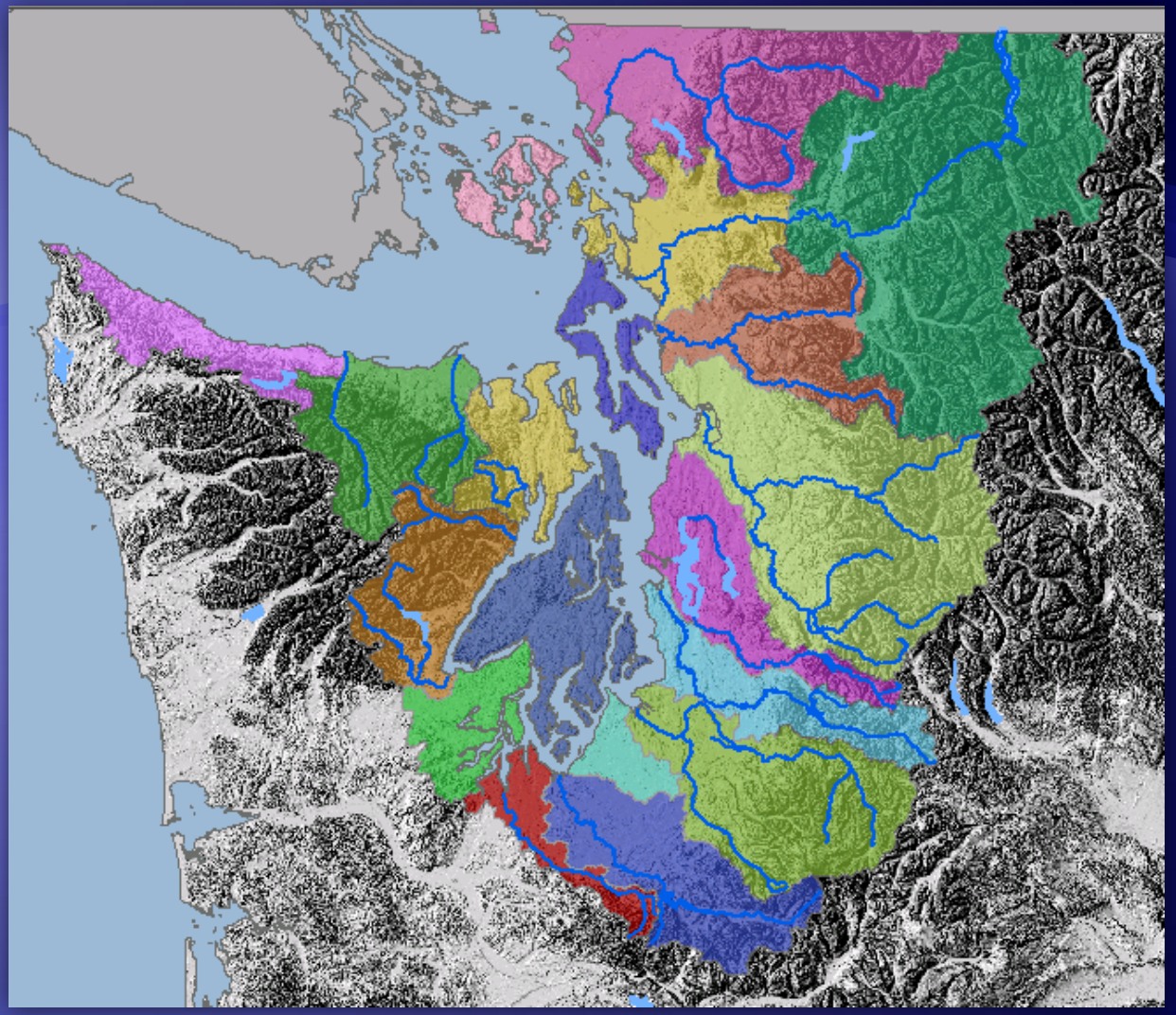
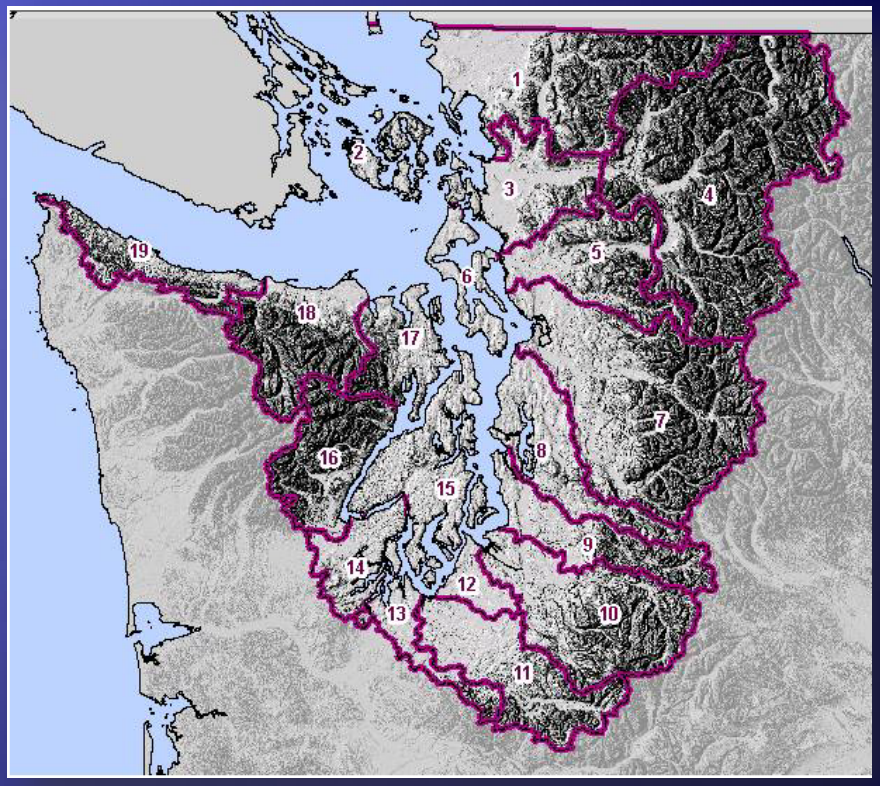
Update for Shoreline Planner's Meeting 7/22/10



PUGET SOUND CHARACTERIZATION PROJECT -

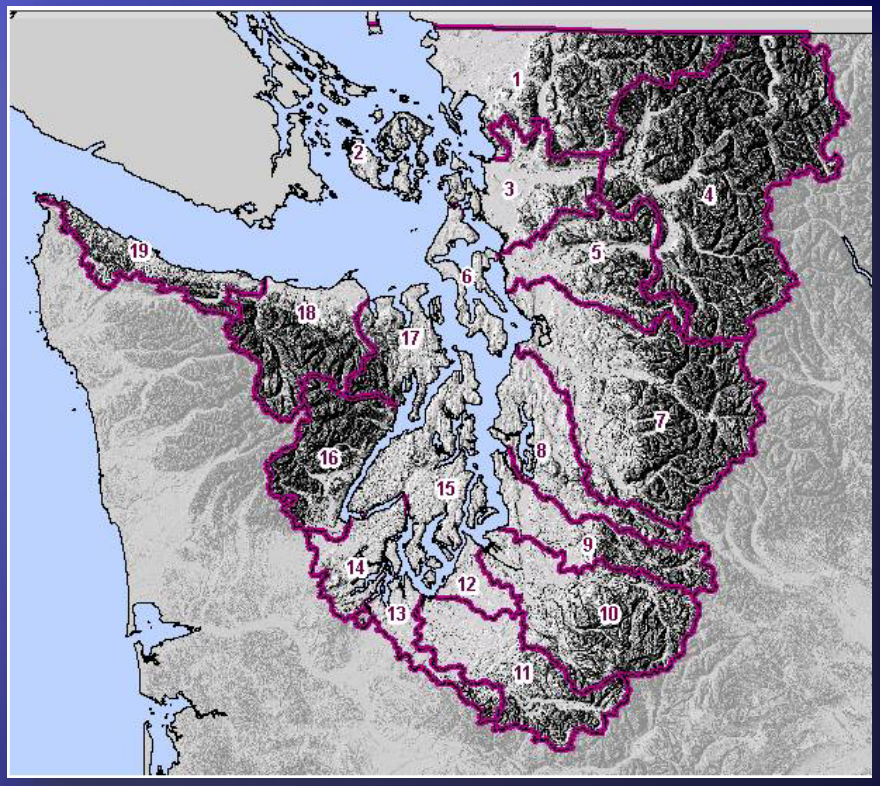
Phase I Product Results – 7/2010

- Draft Assessment of Water Flow Processes for 18 WRIA's , completed (except WRIA 6)
- All Peer Review Comments in.



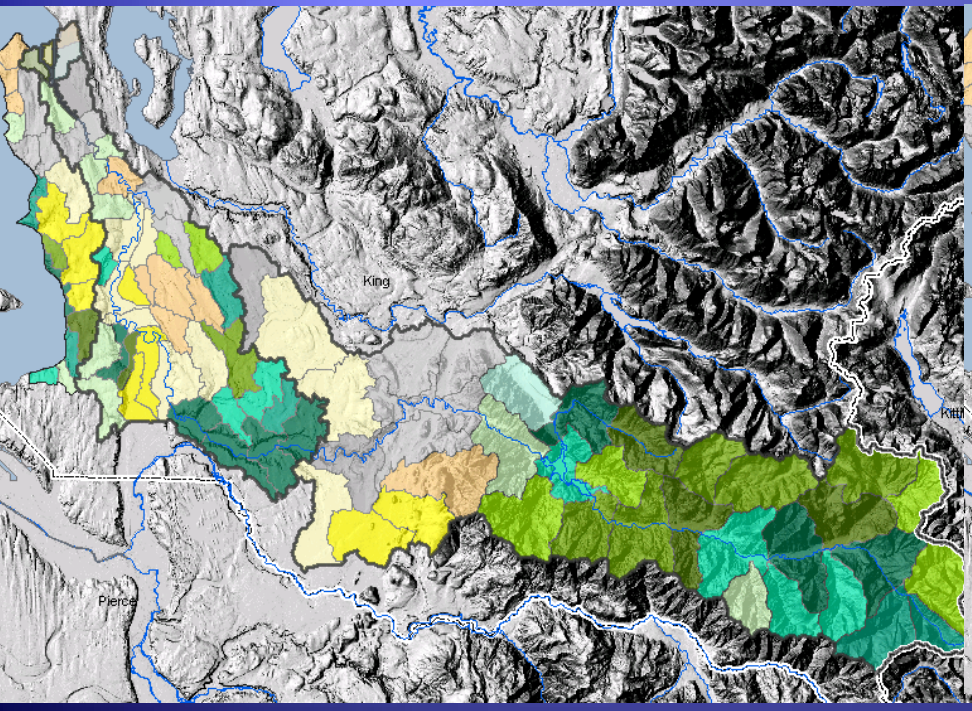
Phase I Product Results – 7/2010

- Based on Comments, following changes will be made:
  - Large Lake Landscape Group
  - Well analysis based on number of residential connections and exempt wells
  - Dam impairment variable
  - Impairment will be run across all landscape groups
- New model results in Oct

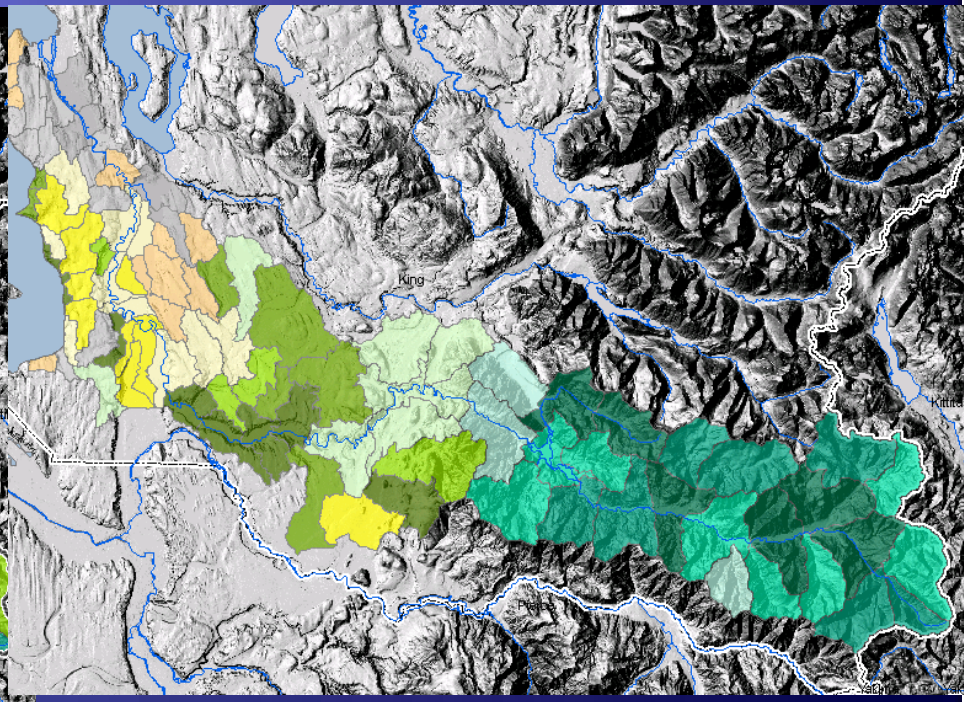


Overall Results for WRIA 9

Analysis Within Landscape Groups for both Importance and Impairment

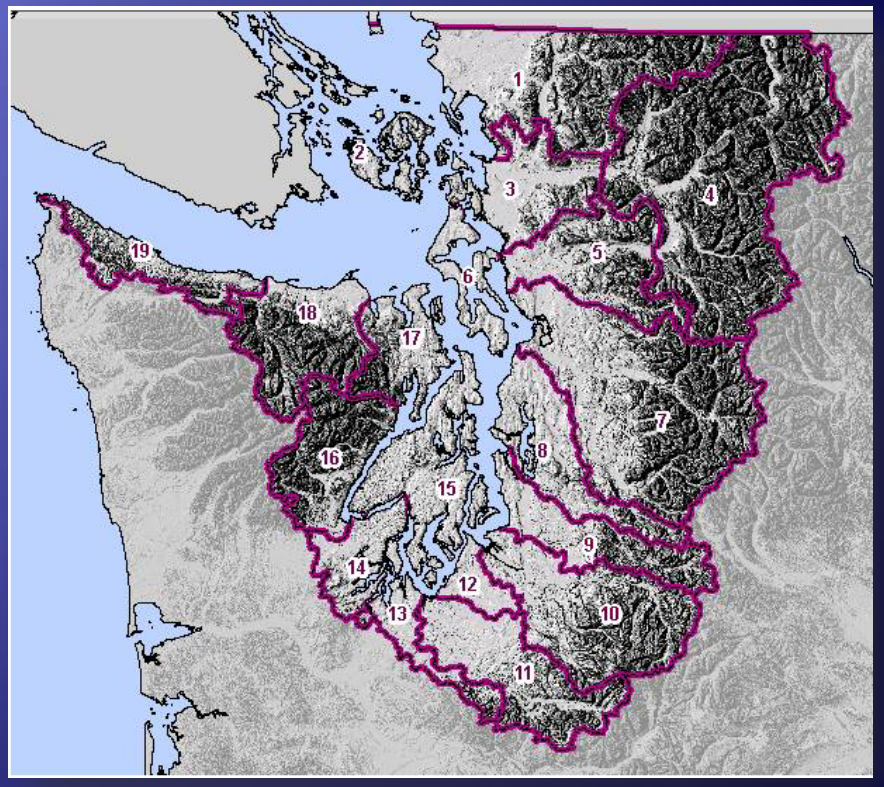


Analysis within Landscape Groups for Importance only



Phase II Product – 6/2011

- RFP for Phase II is complete & approved by management:
  - Waiting for approval by human resources and union
  - Tentative release in 3 weeks



Objectives:

Integrate environment data – decision templates

Water Flow Index	Water Quality Index	Fish & Wildlife Index	Water-shed Issues	Hydro Unit Impacts	Hydro Unit Actions	Public Rating of Current Conditions	Public Input
0.3	0.4	0.5		Diked	Remove		

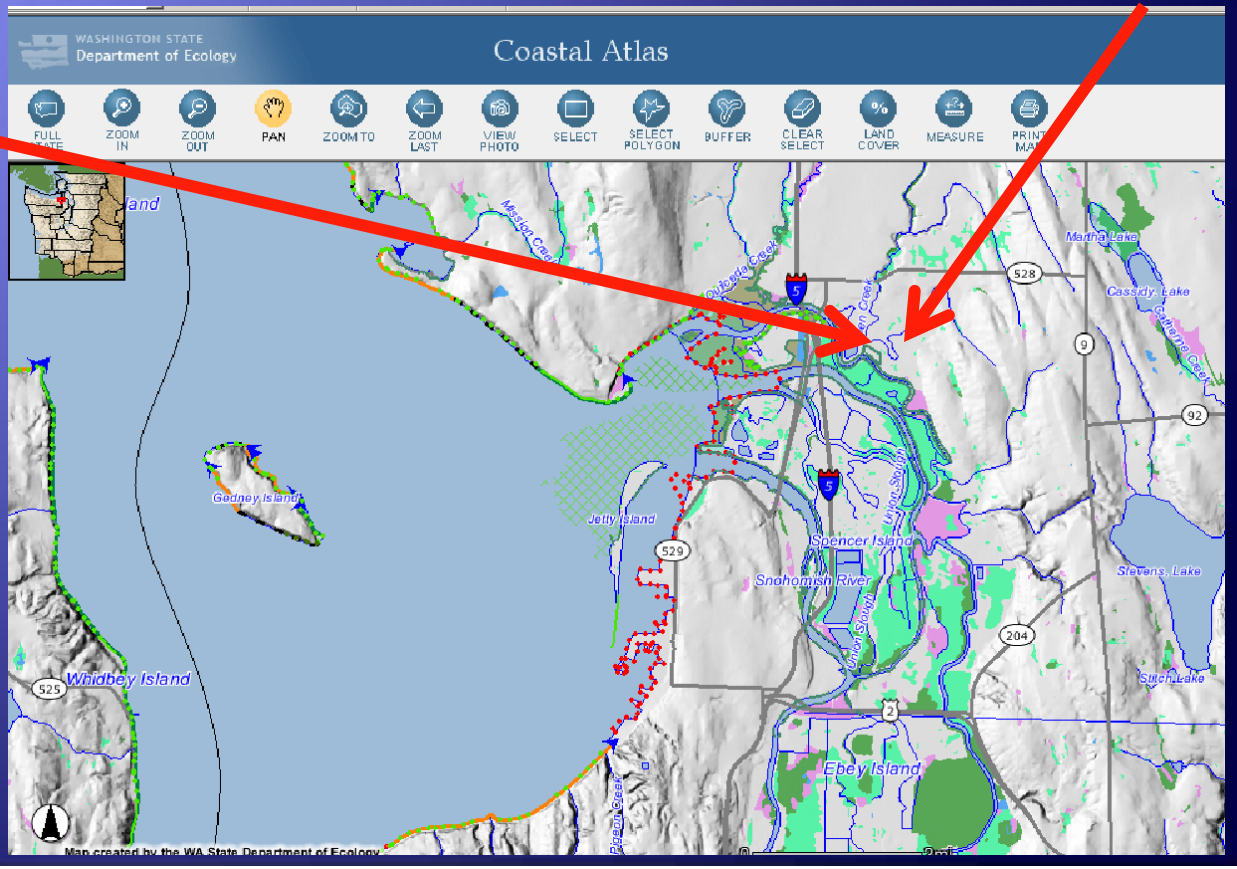
SMP updates

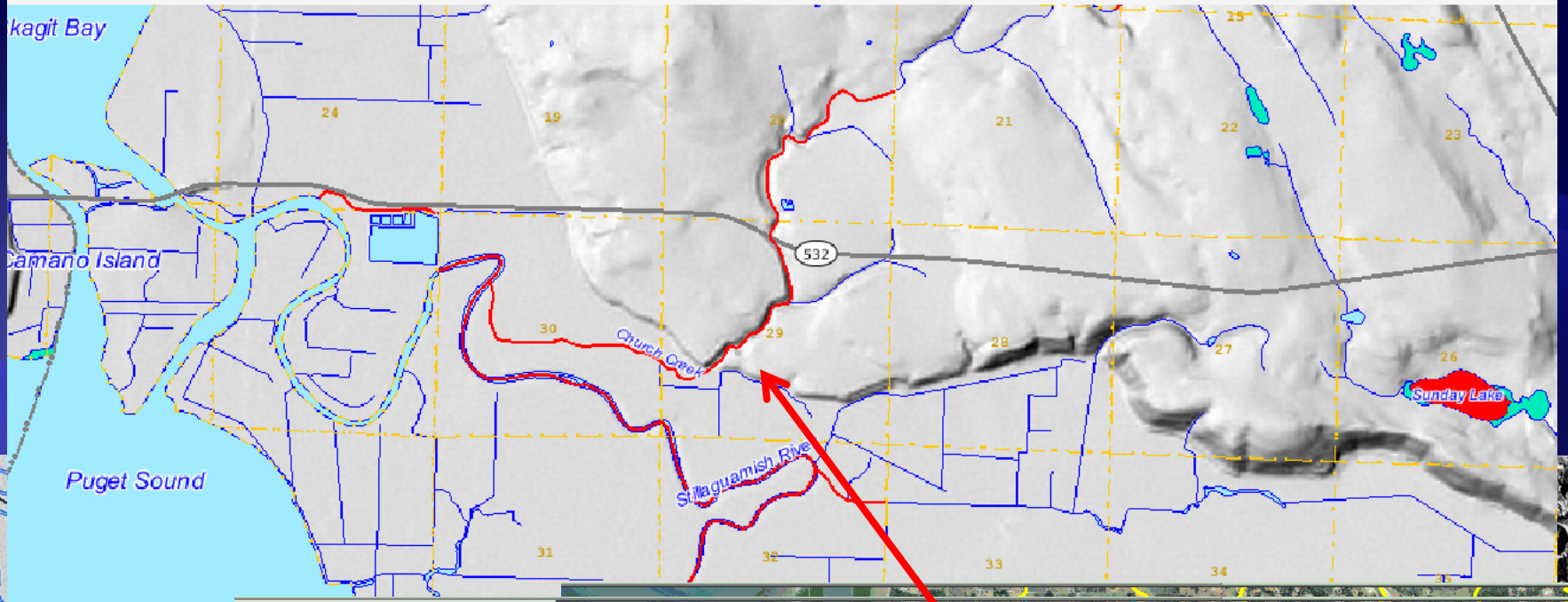
GMA updates

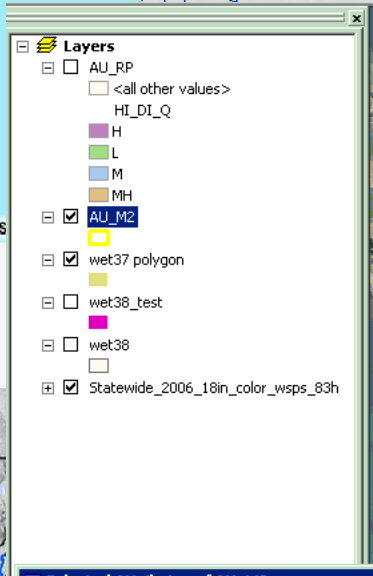
Specific Plans

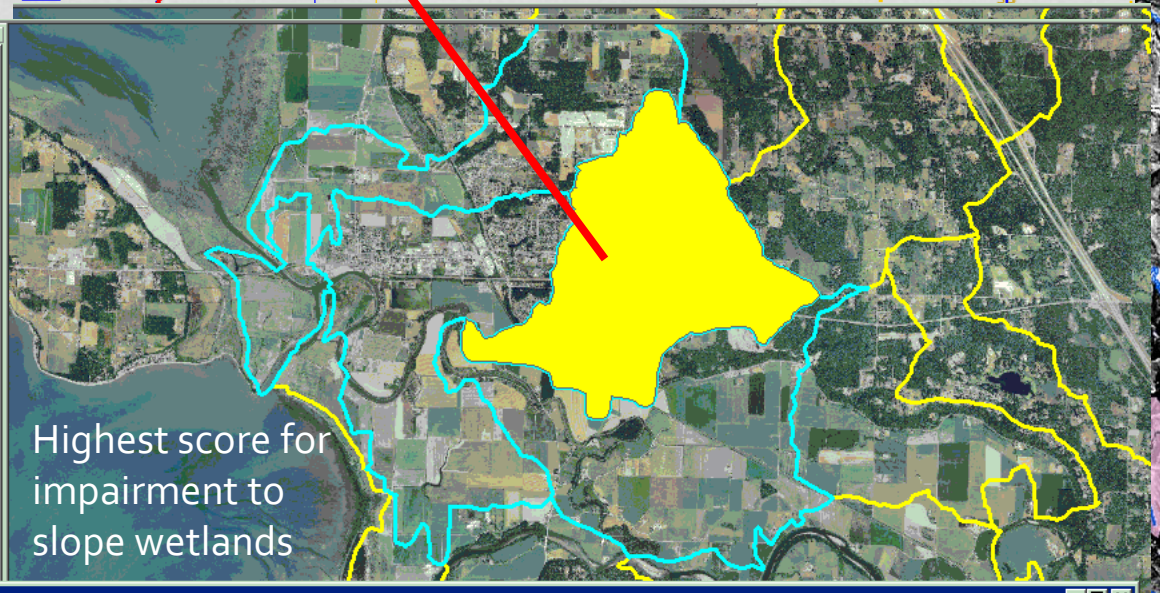
Acquisition and Restoration Actions

Alternative Mitigation (Banks, In-Lieu Fee programs)









Selected Attributes of AU_M2

AU_ID	LG	WELL_CNT	UCHP_U	UCHP_R	SLPW_U	SLPW_R	HI_9	HI_10	HI_11	HI10_HI11	HI_SD	HI_12	HI_13	HI12_HI13	HI_WD	HI_SD_HI_H	HI_DI
50947	L	9	0.07	1.84	329.34	291.53	0.42	0.07	1.19	1.26	0.18	0.5	0.29	0.79	1	1.6	1
50948	L	0	1.91	8.88	108.12	59.22	0	1.7	5.25	6.95	1	0.15	0.05	0.2	0.25	1.25	0.78
50949	L	3	0.09	2.34	67.51	205.75	0.16	0.1	1.71	1.81	0.26	0.12	0.23	0.35	0.44	0.86	0.54
51872	C	0	0	0.42	10.33	33.88	0	0	1.24	1.24	0.16	0.07	0.15	0.22	1	1.16	1
50943	L	0	1	5.74	24.11	150.53	0	0.89	3.4	4.29	0.62	0.03	0.14	0.17	0.22	0.84	0.52

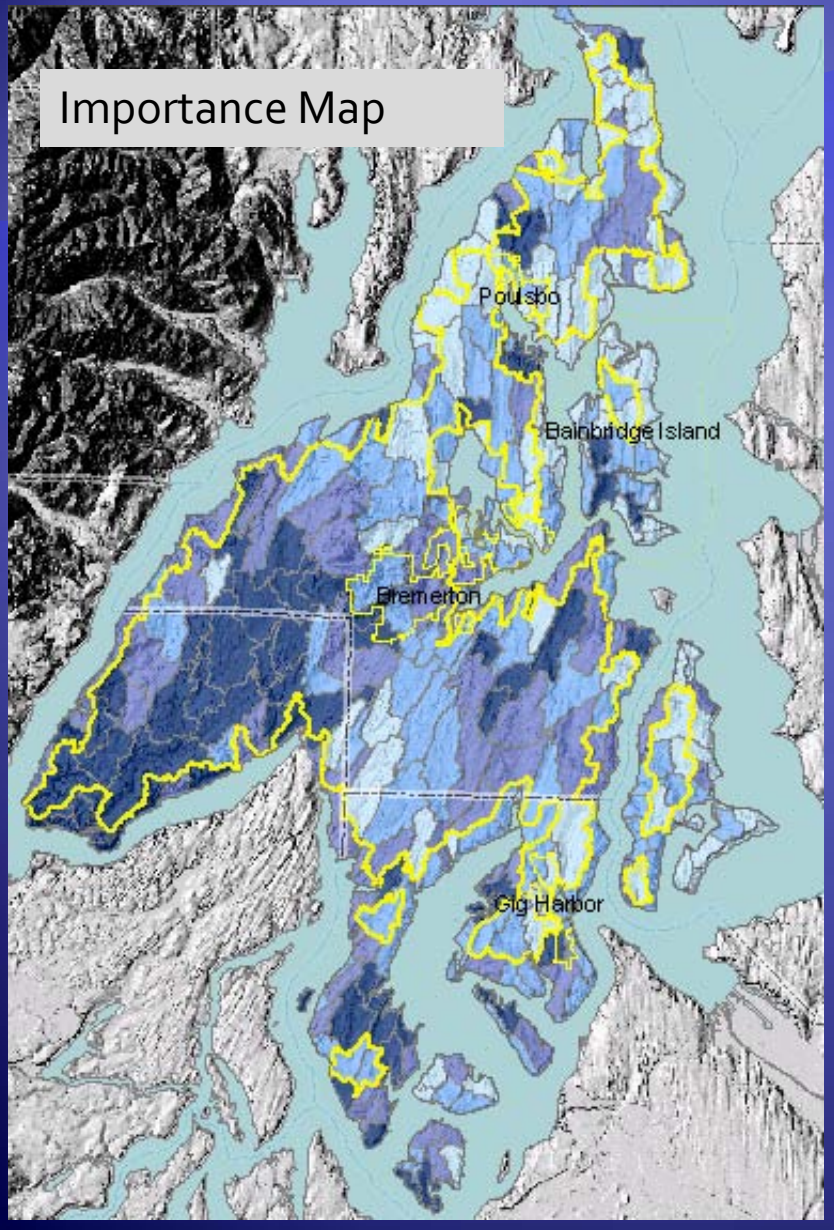
Link to Technical Document for Characterization:

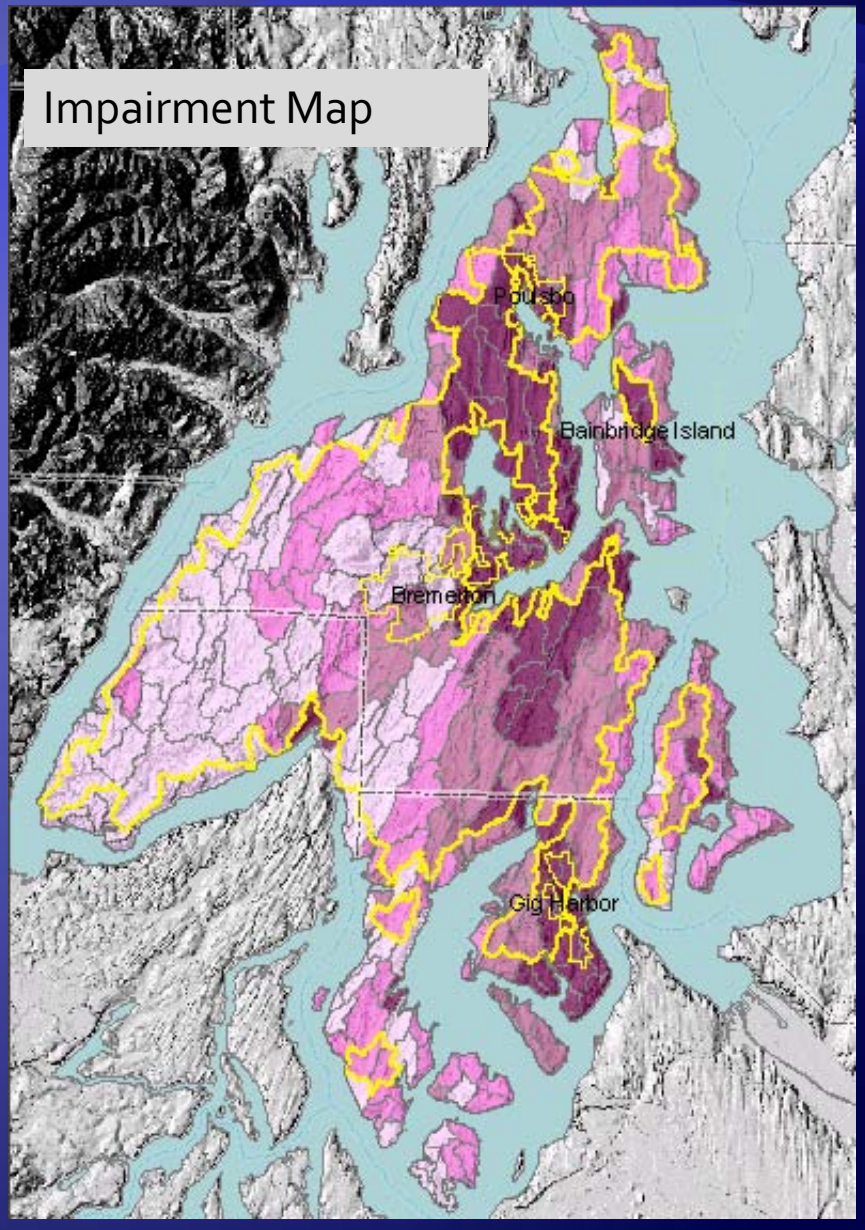
http://www.ecy.wa.gov/mitigation/landscapeplan/peerreview.html

Link to Data:

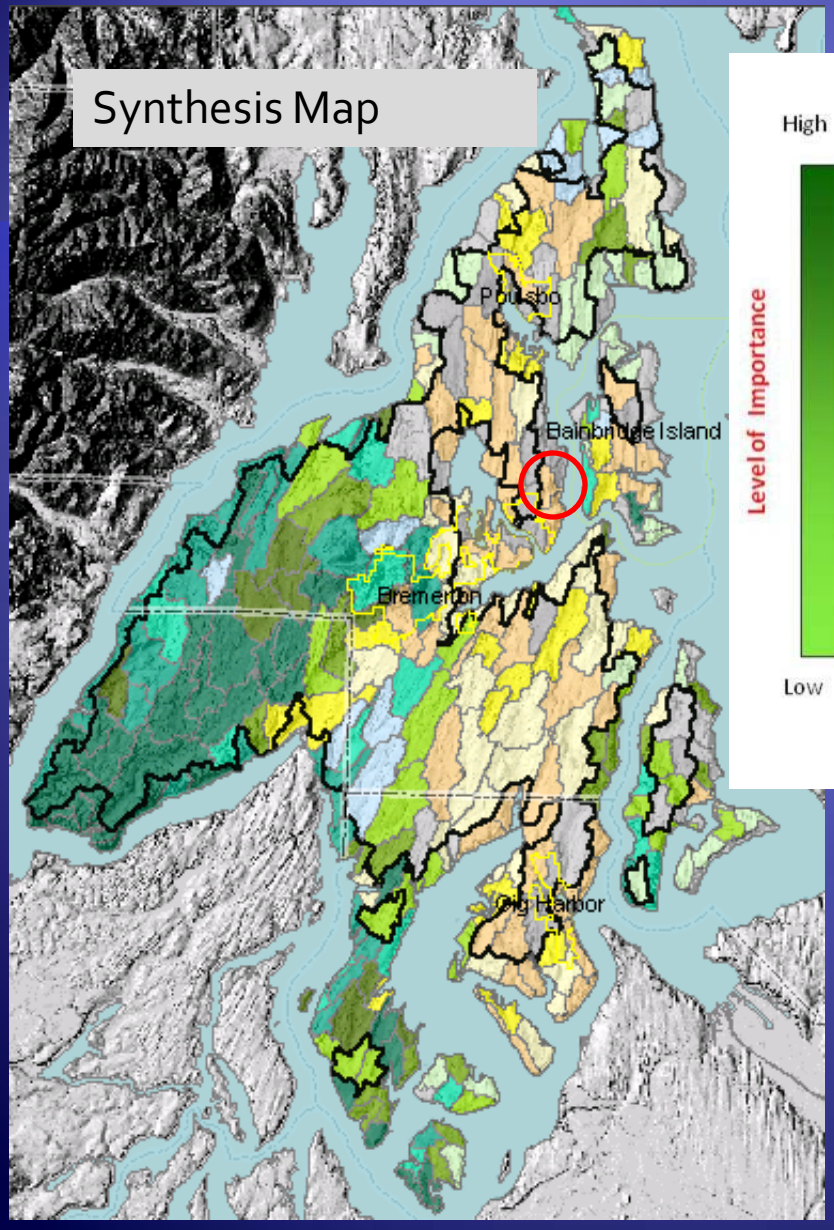
We will send the link out

Overall Results for Water Flow Process



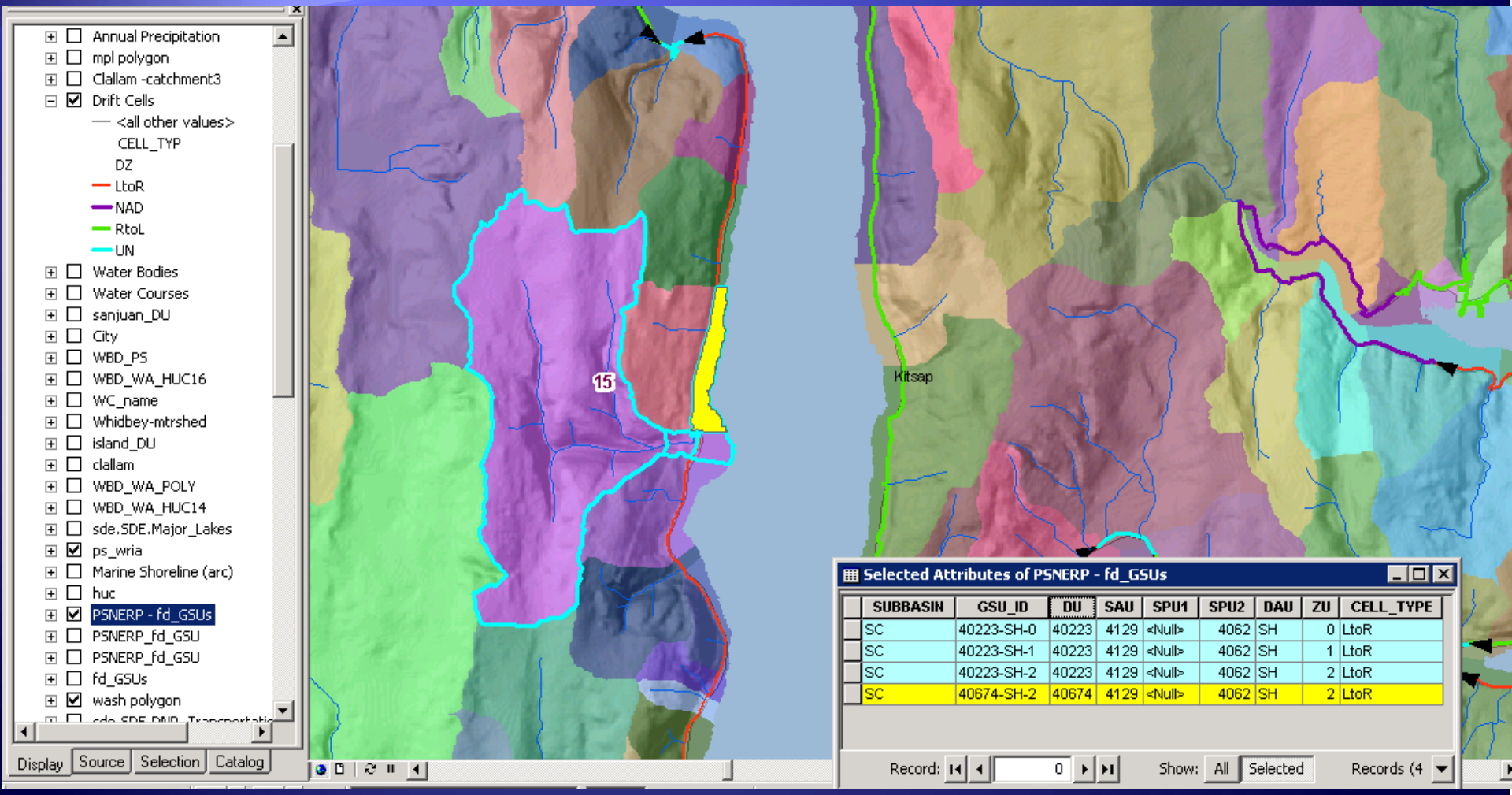


Overall Results for Water Flow Process

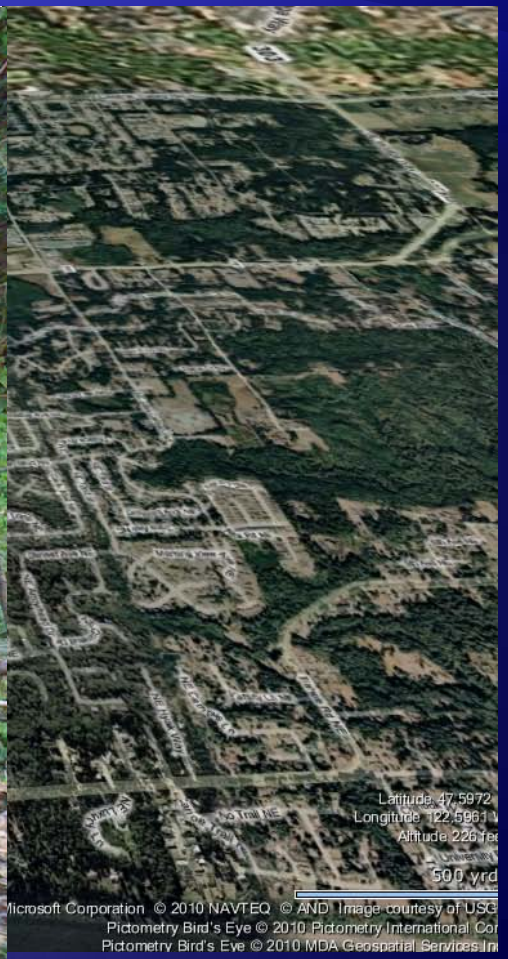


Level of Importance	Level of Impairment			
High				
	PROTECTION P1 H,L	Protection 1 Restoration P1R H, M	Restoration 1 R1 H,MH	**RESTORATION** R H,H
	Protection 2 P2 MH, L	Protection 2 Restoration P2R MH,M	Restoration 2 R2X MH,MH	Restoration 2 R2 MH,H
	Protection 3 P3 M, L	Protection 3 Restoration P3R M,M	Restoration Least Impact 2 RLI2 M,MH	Restoration Least Impact 1 RLI1 M,H
	Conservation 1 C1 L,L	Conservation 2 C2 L,M	Less Impact to Processes 2 LI2 L,MH	Less Impact to Processes LI1 L,H
Low				High

Analysis Units – Illahee Creek



Shoreline Issue – Increased Sediment Delivery



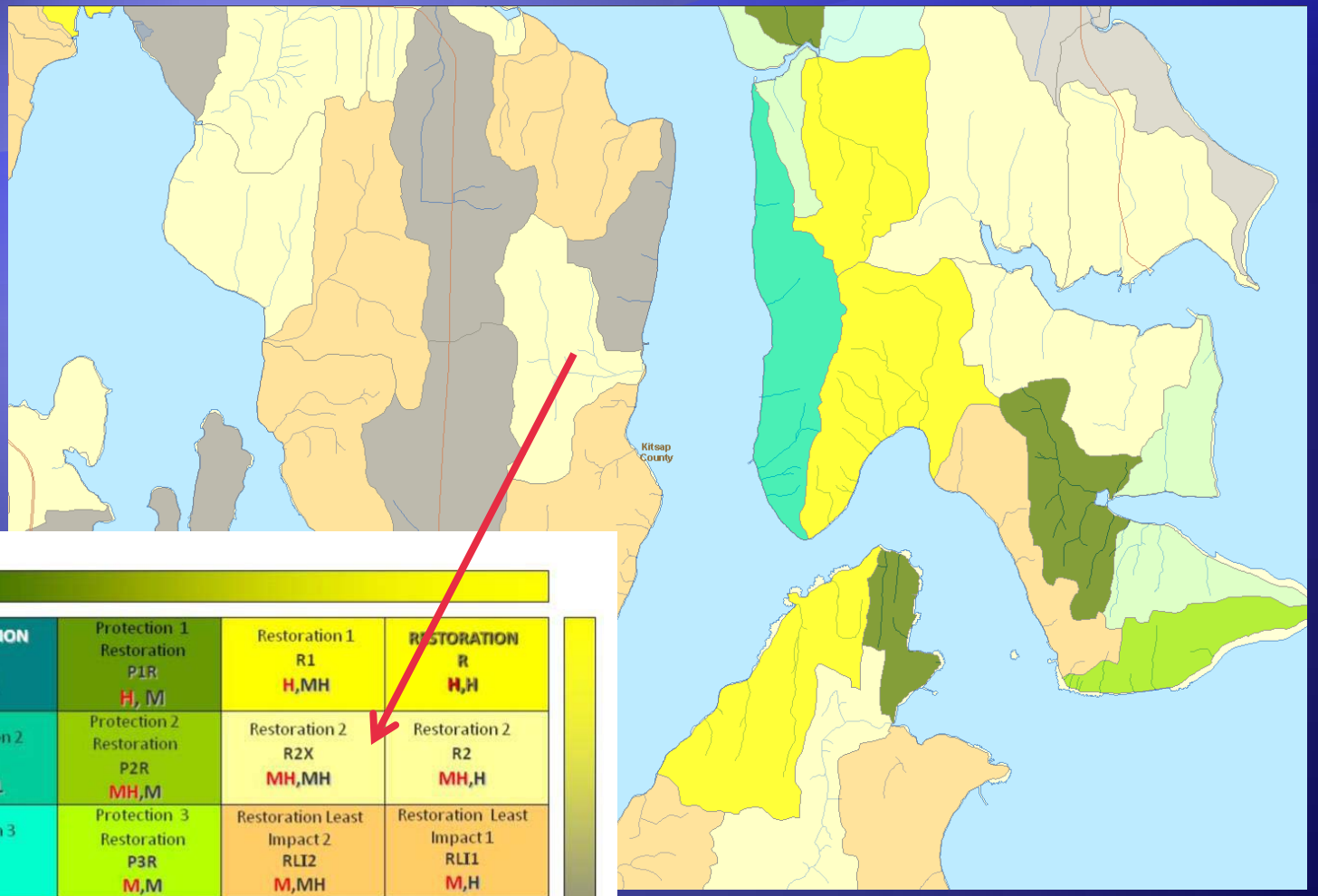
Downstream Erosion and Bedload Transport and Deposition is Occurring

Conducting the Inventory & characterization – Illahee Creek

- Use analysis template to address issues (Issaquah example)

Shoreline Issue	How have ecosystem processes been changed relative to issue?
High sediment delivery to shoreline. Building of delta – affecting public access to dock and habitat functions.	Sediment Processes have been impaired within the shoreline

Storage is Impaired – Illahee Creek



PROTECTION P1 H,L	Protection 1 Restoration P1R H, M	Restoration 1 R1 H,MH	**RESTORATION** R H,H
Protection 2 P2 MH, L	Protection 2 Restoration P2R MH,M	Restoration 2 R2X MH,MH	Restoration 2 R2 MH,H
Protection 3 P3 M, L	Protection 3 Restoration P3R M,M	Restoration Least Impact 2 RLI2 M,MH	Restoration Least Impact 1 RLI1 M,H
Conservation 1 C1 L,L	Conservation 2 C2 L,M	Less Impact to Processes 2 LI2 L,MH	Less Impact to Processes LI1 L,H

High

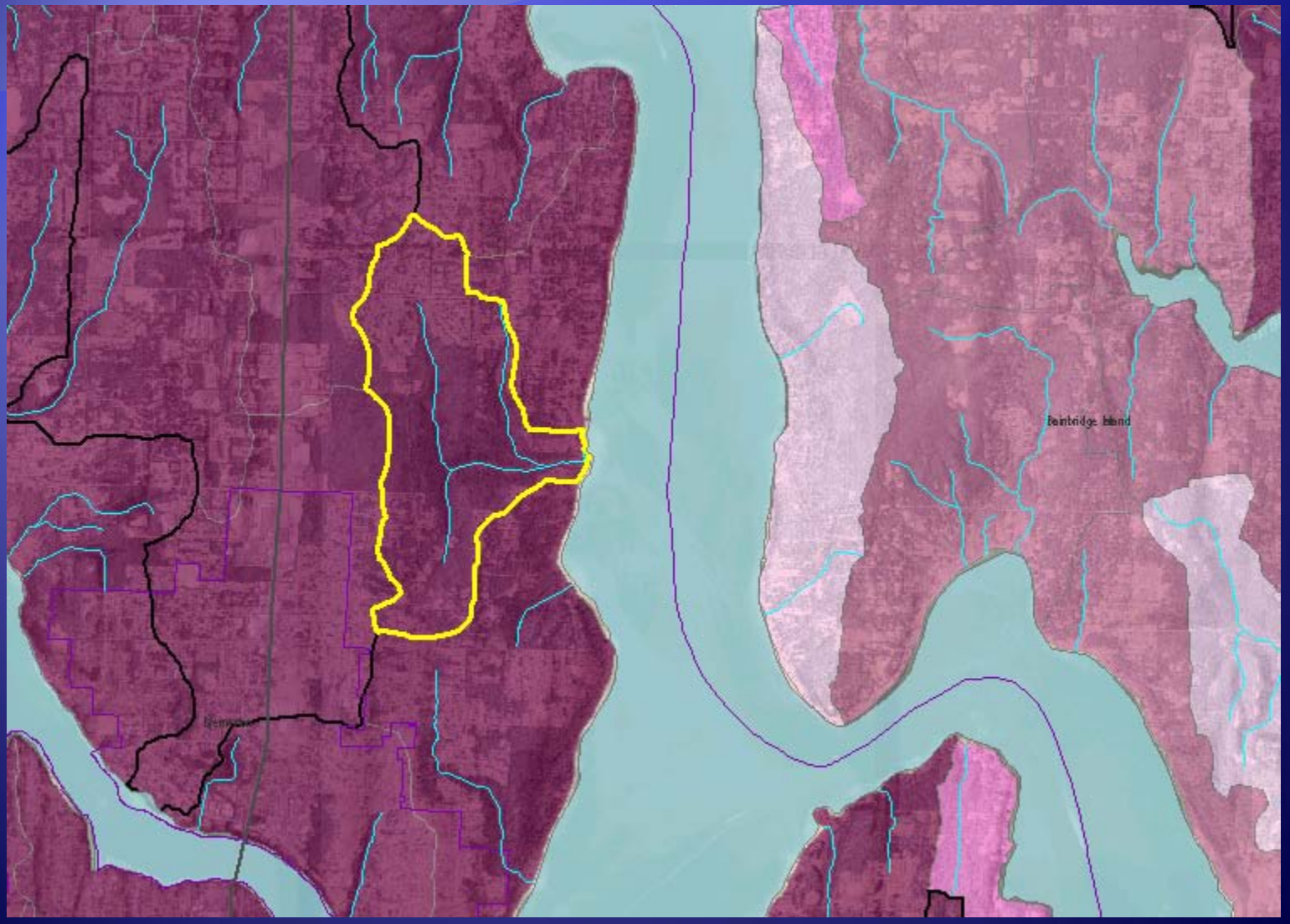
Level of Importance

Low

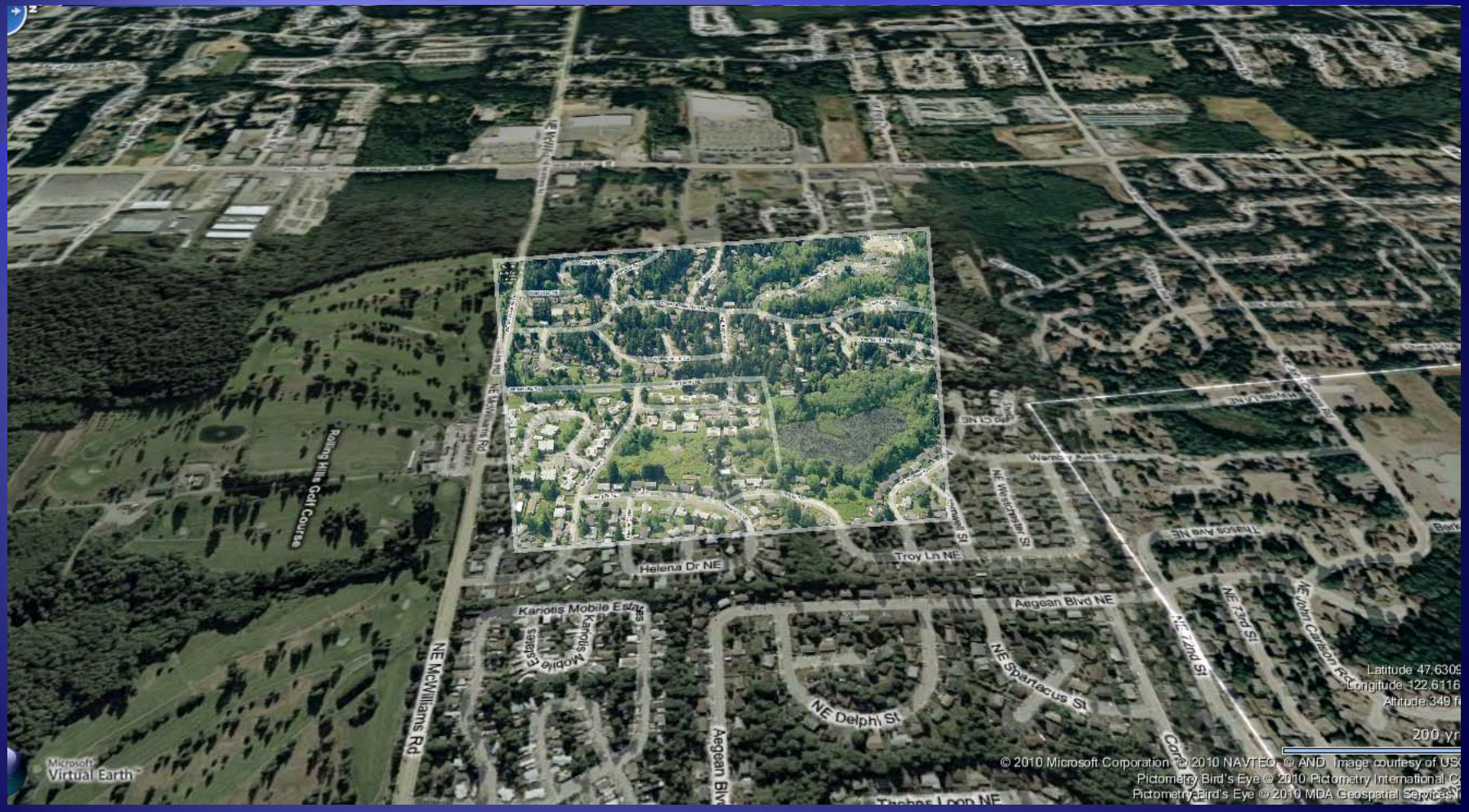
High

Level of Impairment

Delivery is Impaired – Illahee Creek



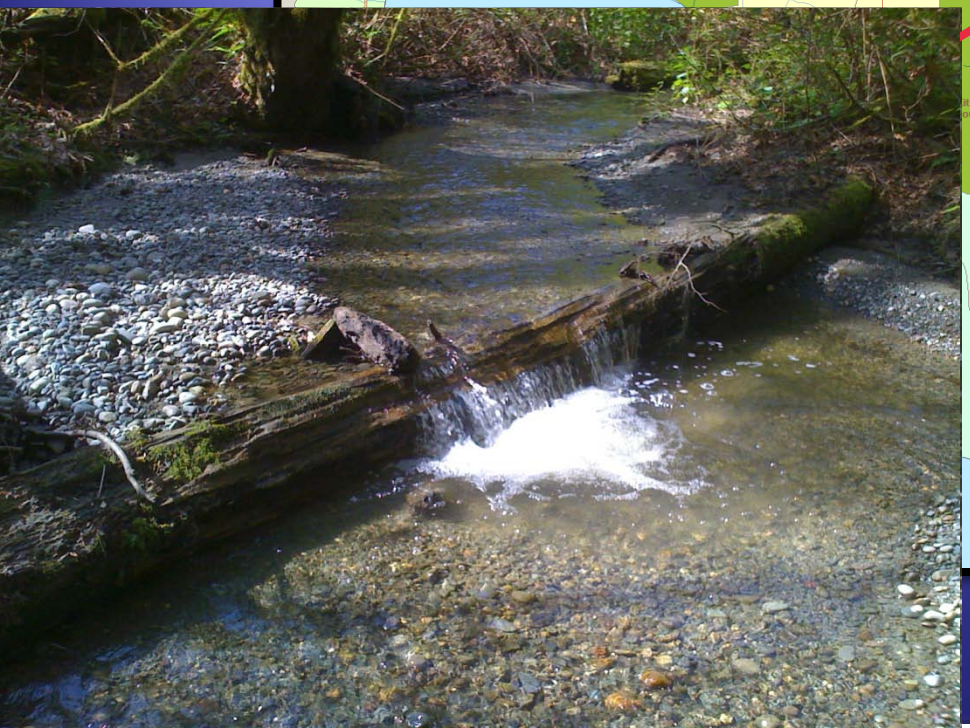
Storage & Delivery are Impaired – Illahee Creek



Downstream Erosion and Bedload Transport and Deposition is Occurring

Discharge Map – Illahee Creek

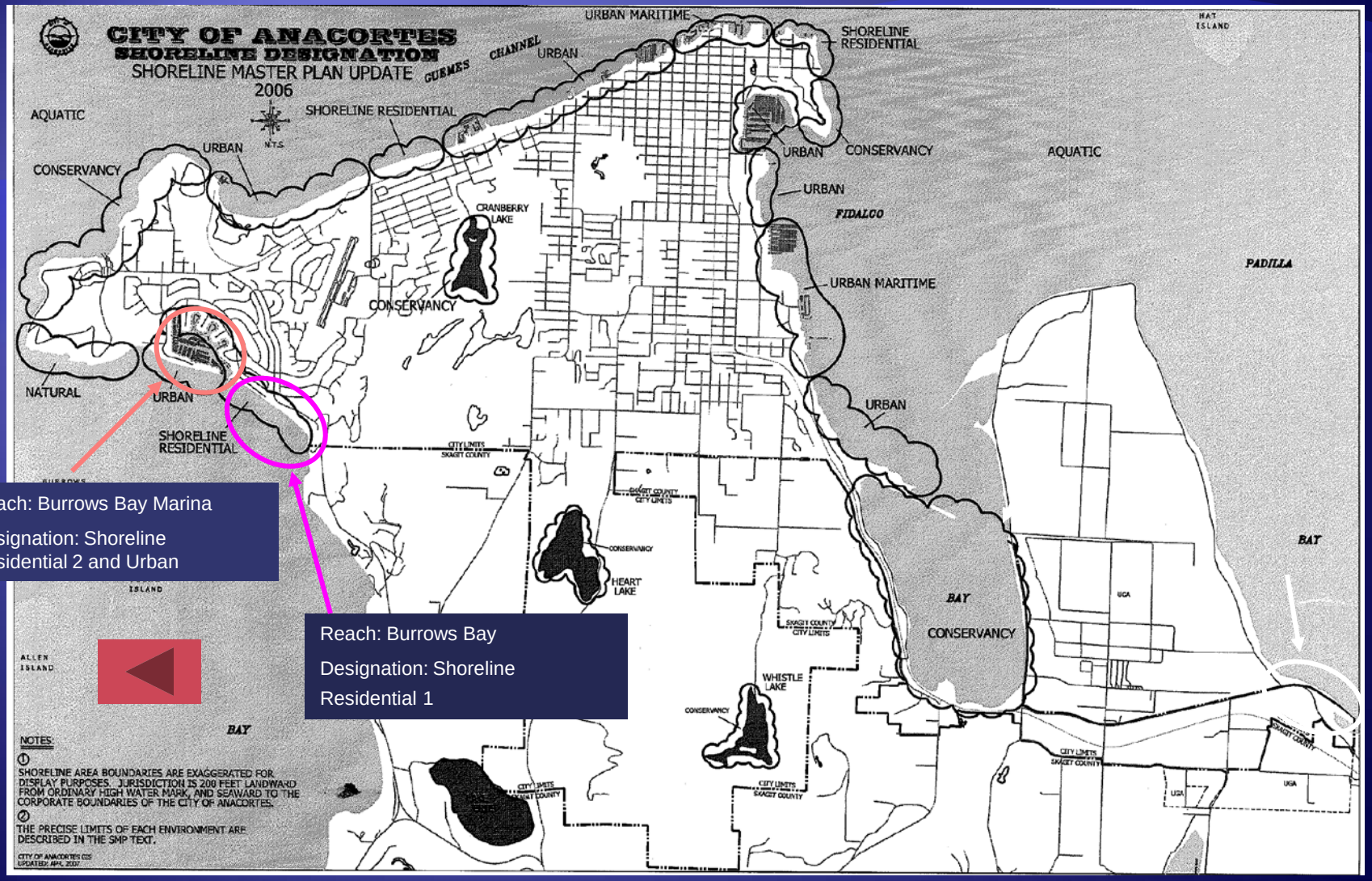
Helps establish relative importance of stream system and restoration priority



Conducting the Inventory & Characterization – Illahee Creek

Solution	Actions: Recommended protection & restoration measures and environment designations
Stormwater Retrofit – Route runoff from impervious surfaces to rain gardens, infiltration galleries and detention ponds. Detention ponds necessary on golf course. Limit development on outwash deposits adjacent to steep slopes.	Provisions in SMP for stormwater mitigation fee. Develop new standards for stormwater retrofit. New BMPs and larger buffers elsewhere. High Priority for restoration – historic salmonid run. Year round flows.

Anacortes SMP



Reach: Burrows Bay Marina

Designation: Shoreline Residential 2 and Urban

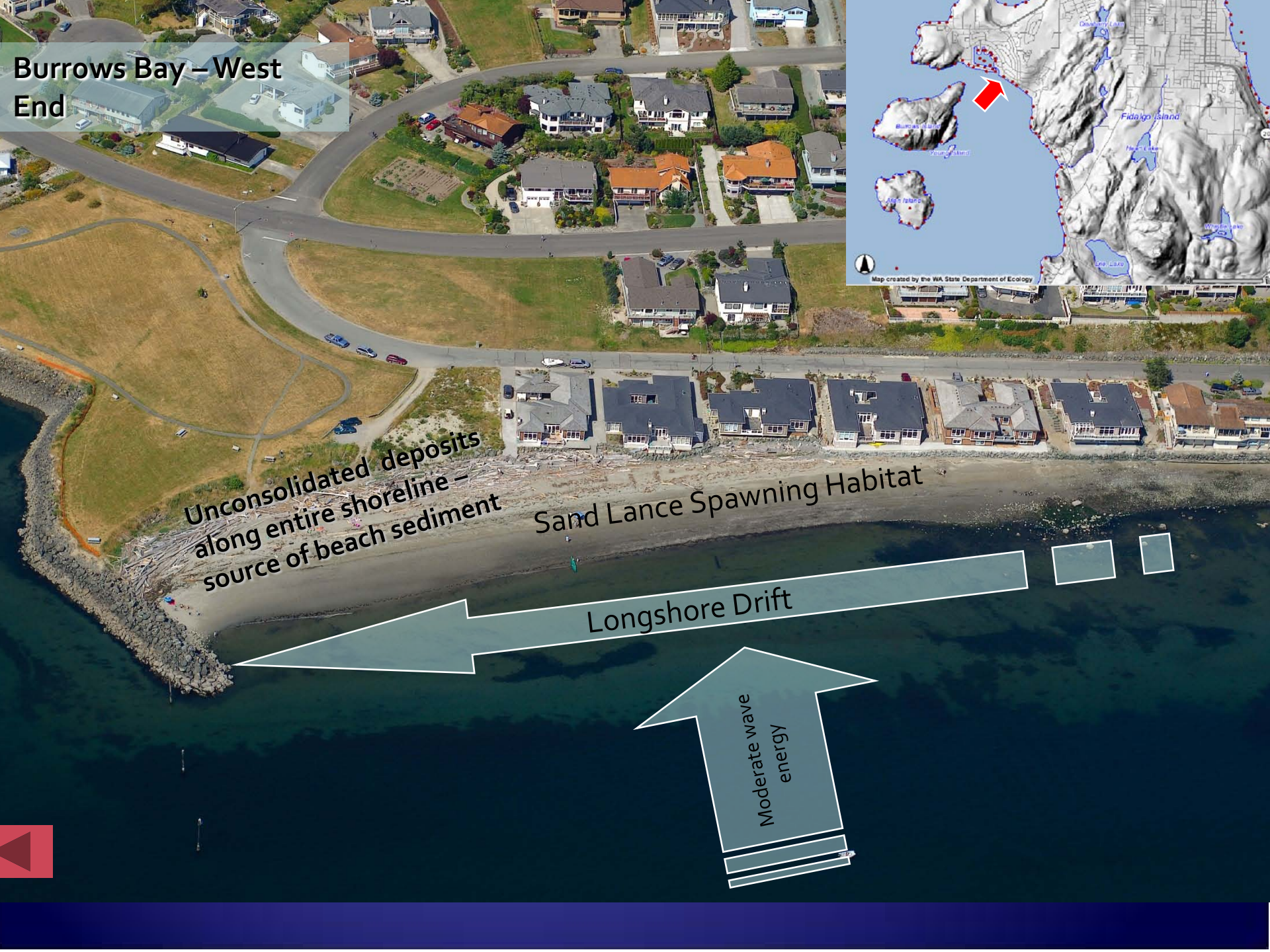
Reach: Burrows Bay

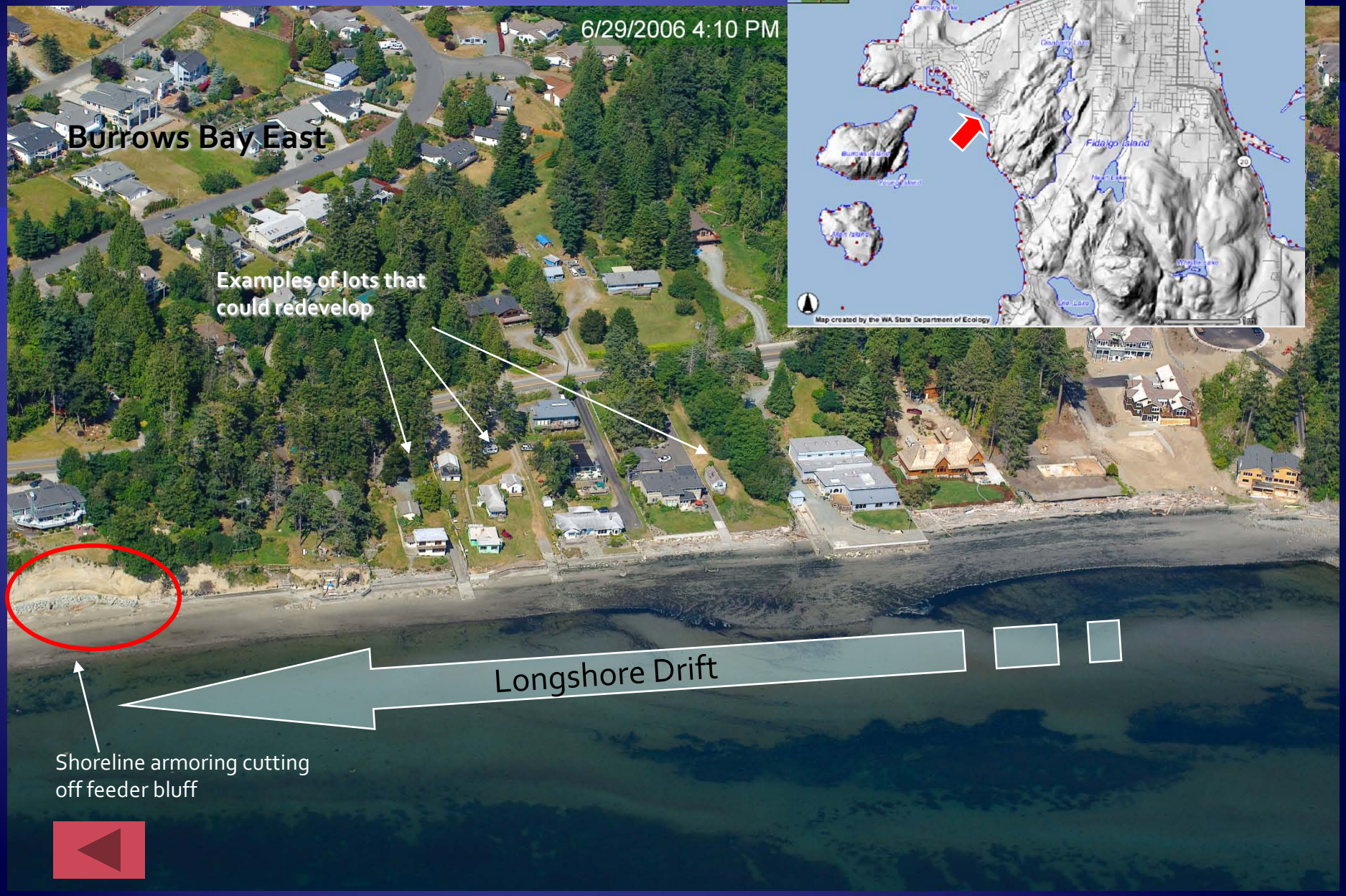
Designation: Shoreline Residential 1

Burrows Bay - Summary of Inventory & Characterization Analysis Protection & Restoration Measures

Reach Name and Existing Shoreline Designation	Assessment of processes & functions		
Burrows Bay – Shoreline Residential Shoreline Oblique Photo	**Ecosys** Partially with lov of unco with lor present Modera provide spawni **Shore** The eas shorelir spawning habitat . Intertidal area supports patchy eelgrass beds.	Shoreline Re 75 foot buffe setback/buff due to site c allowed. Co variance will replacement lieu fee asse linked to pro plan.		

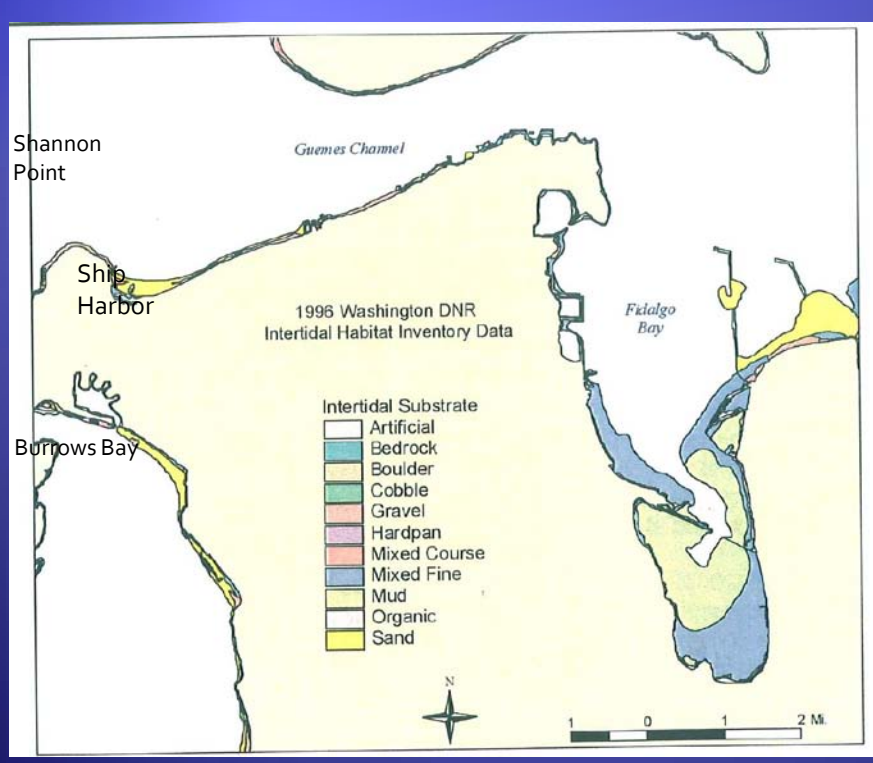
Burrows Bay - Anacortes

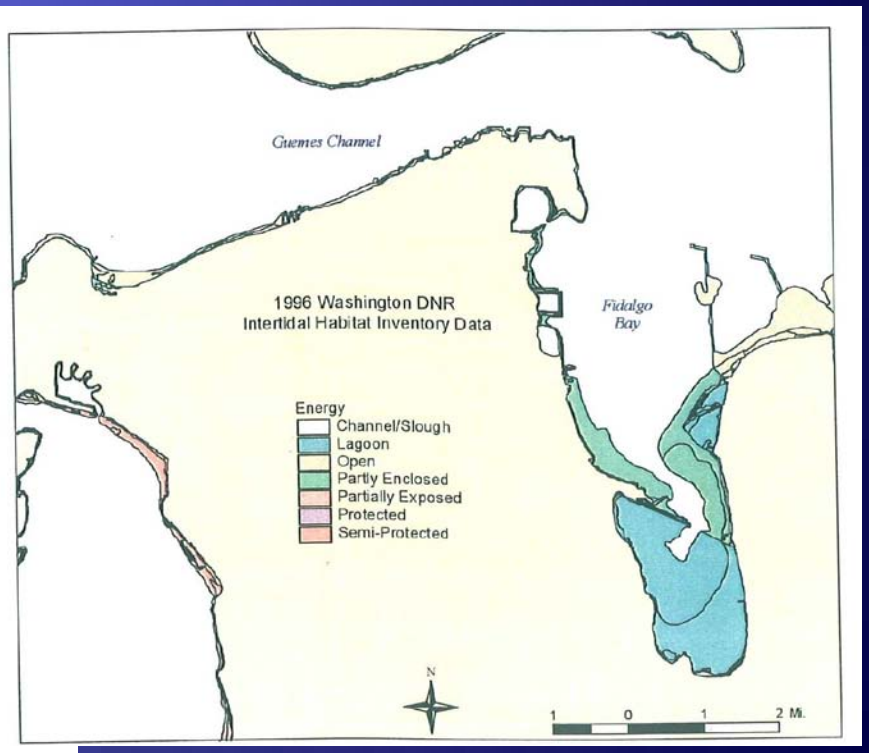

Burrows Bay – West End
Unconsolidated deposits along entire shoreline – source of beach sediment
Sand Lance Spawning Habitat
Longshore Drift
Moderate wave energy
Fidalgo Island
Map created by the WA State Department of Ecology


6/29/2006 4:10 PM
Burrows Bay East
Examples of lots that could redevelop
Longshore Drift
Shoreline armoring cutting off feeder bluff
Fidalgo Island
Map created by the WA State Department of Ecology


6/29/2006 4:08 PM
Shoreline Residential II
Urban
Hidalgo Island
Map created by the WA State Department of Ecology

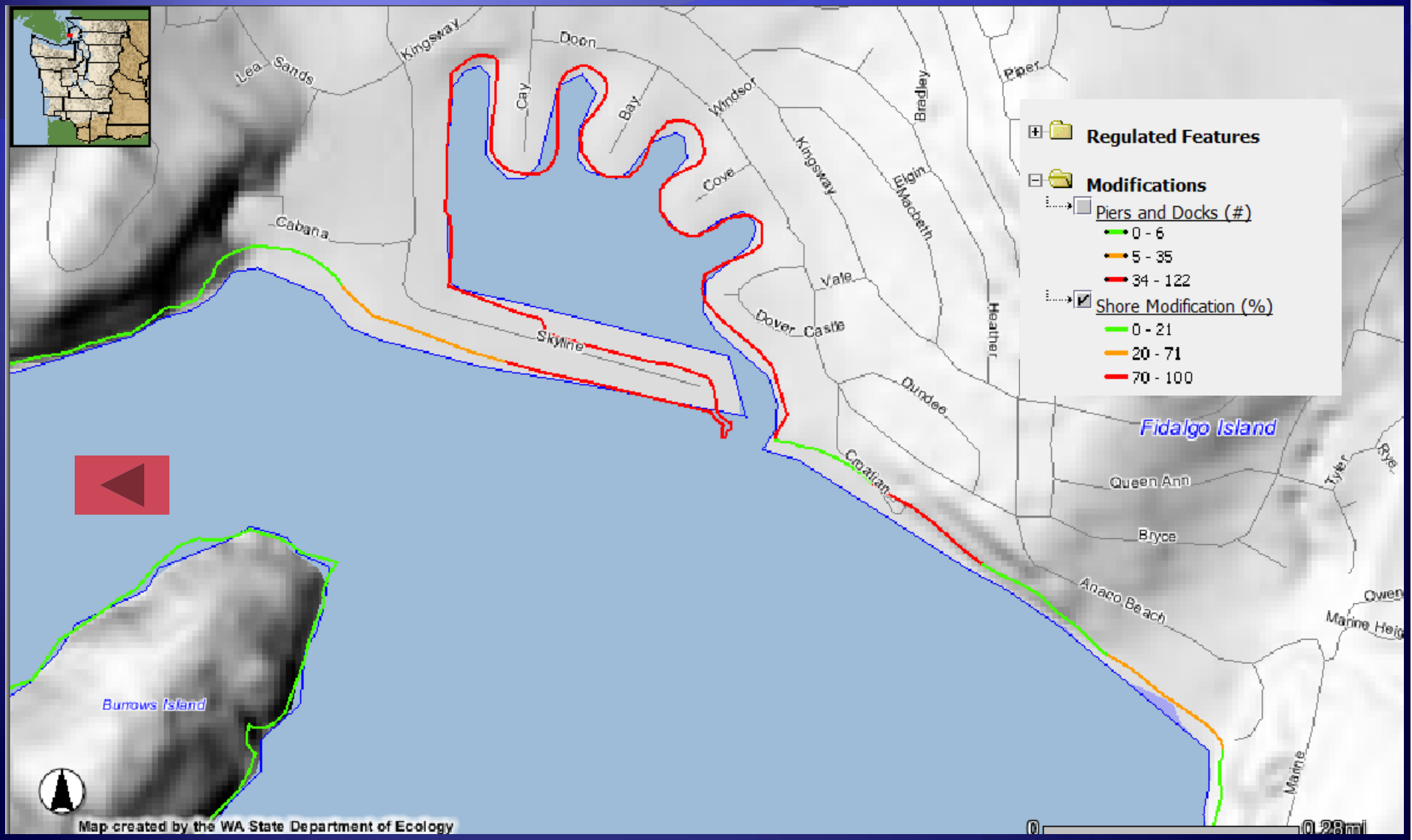
Shoreline Processes



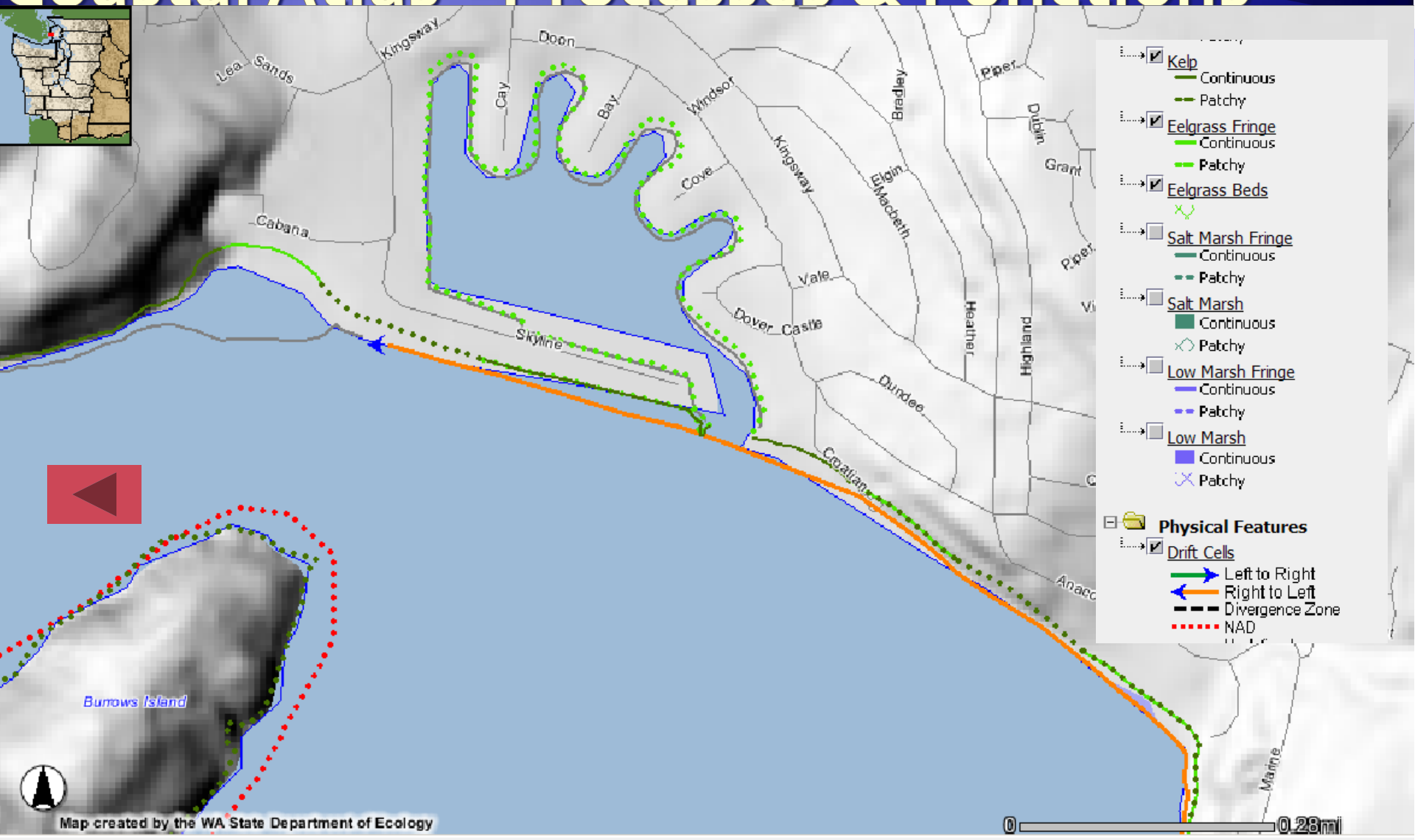


Source: DNR and Integrated Fidalgo Bay Plan and EIS

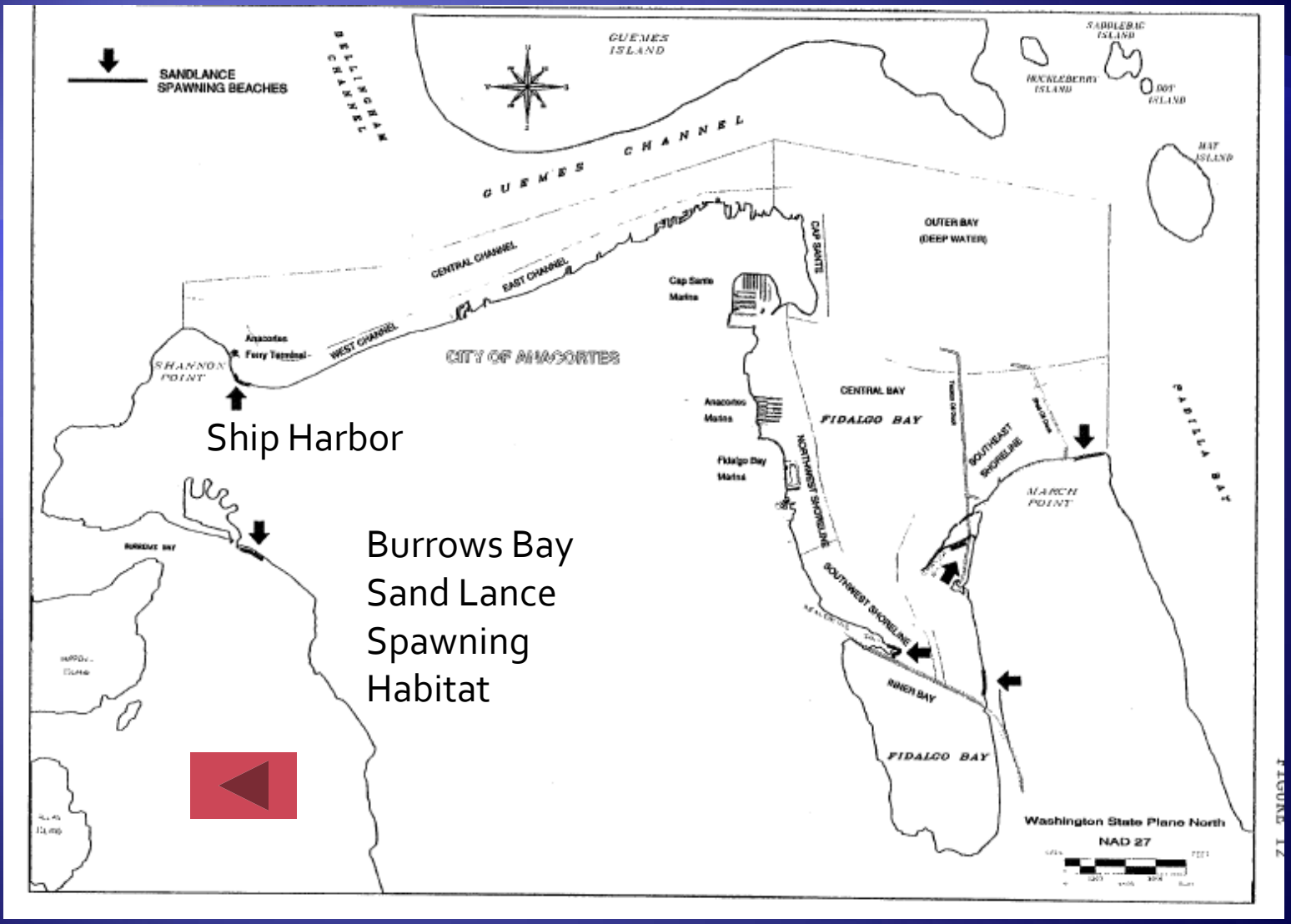
Coastal Atlas - Processes & Functions



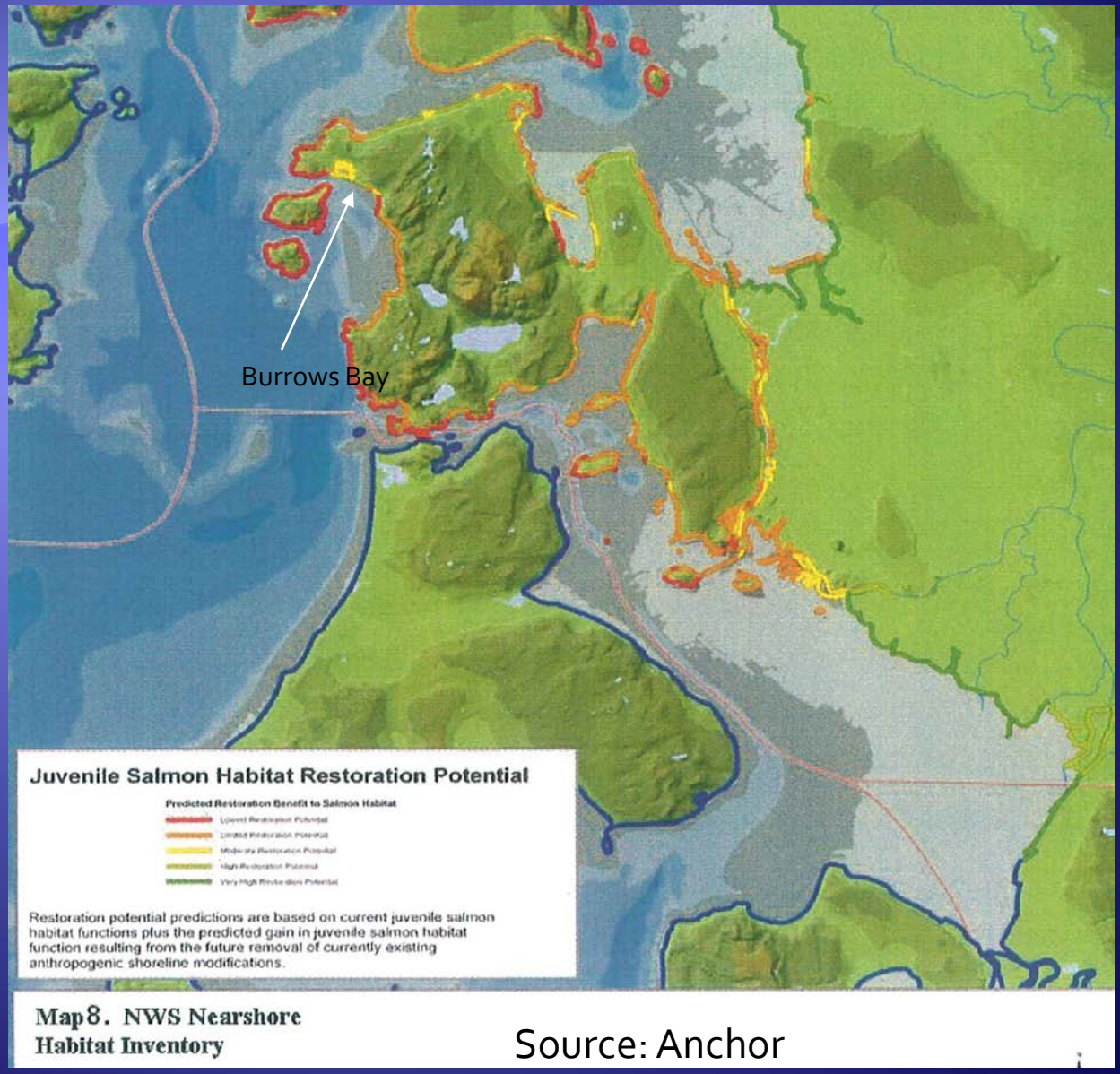
Coastal Atlas - Processes & Functions



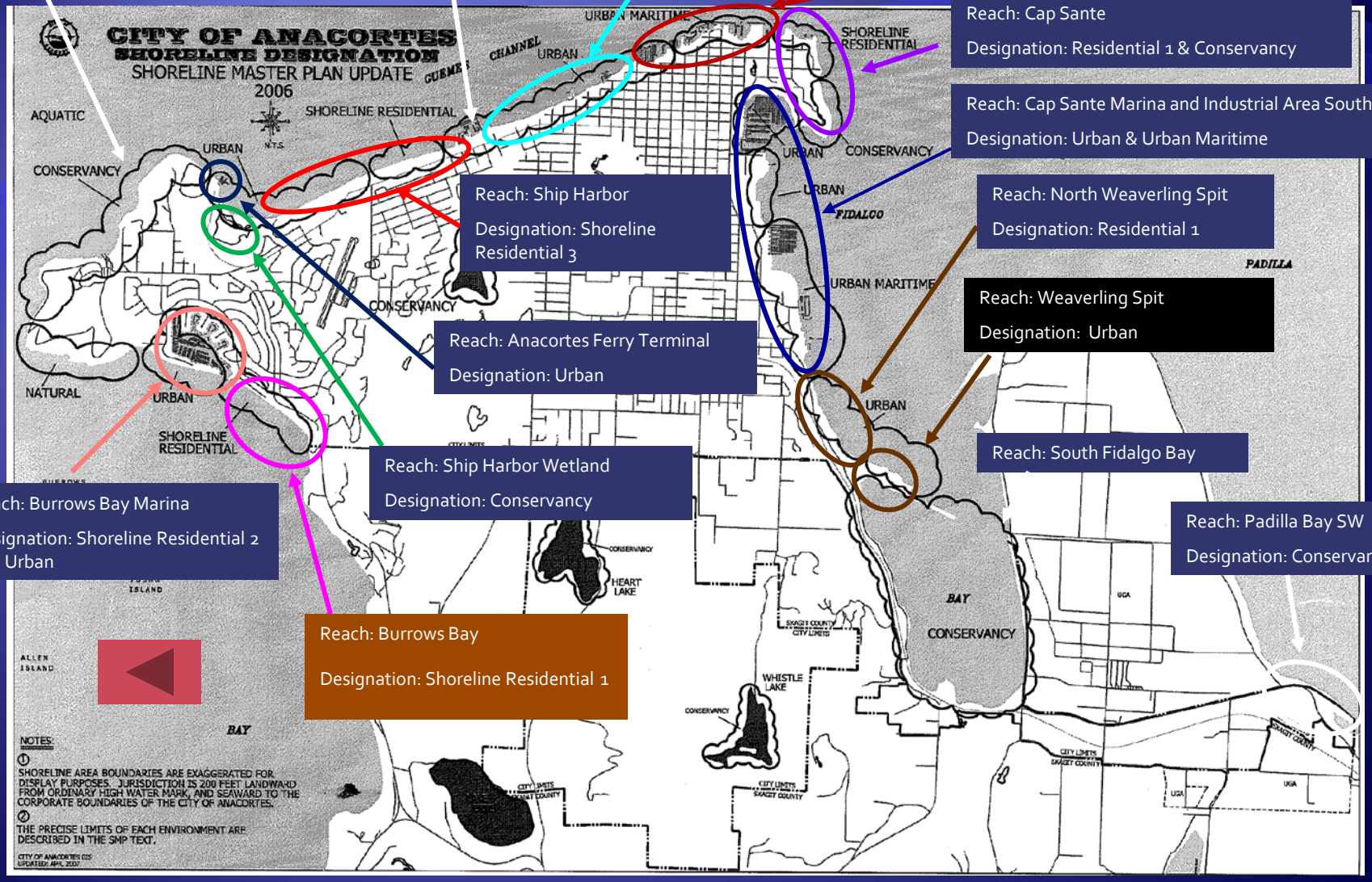
Zoom In Tool



Source: Figure 12, Revised Final Integrated Fidalgo Bay-Wide Plan and EIS



Source: Anchor Environmental



Reach: Shannon Pt. & Fidalgo Head

Designation: Natural/Conservancy

Reach: Lovric's Marina

Designation: Urban

Reach: East of Lovric's Marina

Designation: Shoreline Residential 1

Reach: Cap Sante North

Designation: Urban Maritime Expanded

Reach: Cap Sante

Designation: Residential 1 & Conservancy

Reach: Cap Sante Marina and Industrial Area South

Designation: Urban & Urban Maritime

Reach: Ship Harbor

Designation: Shoreline Residential 3

Reach: North Weaverling Spit

Designation: Residential 1

Reach: Weaverling Spit

Designation: Urban

Reach: Anacortes Ferry Terminal

Designation: Urban

Reach: South Fidalgo Bay

Reach: Ship Harbor Wetland

Designation: Conservancy

Reach: Padilla Bay SW

Designation: Conservancy

Reach: Burrows Bay Marina

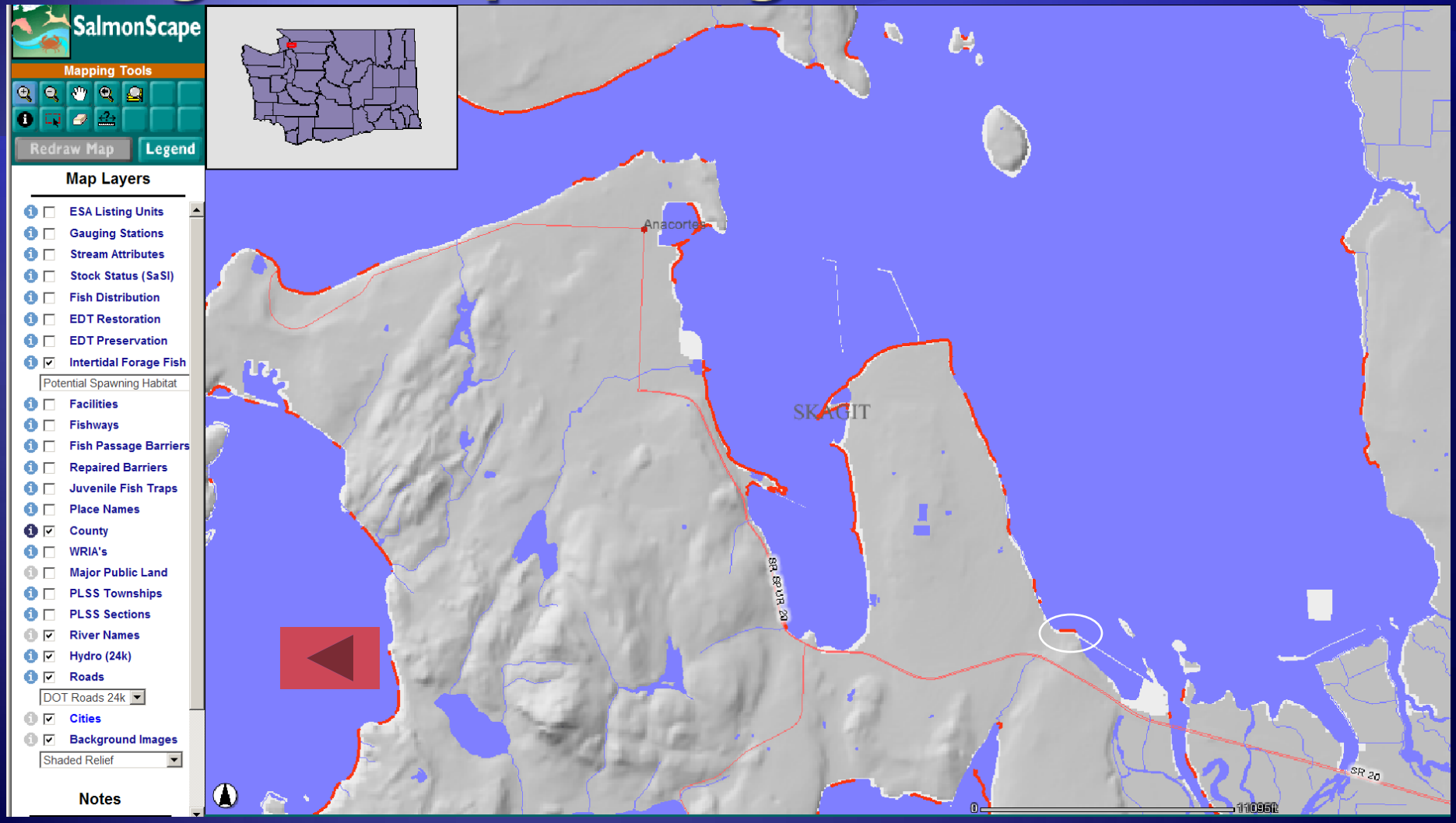
Designation: Shoreline Residential 2 and Urban

Reach: Burrows Bay

Designation: Shoreline Residential 1

Forage Fish Spawning Habitat

Forage Fish Spawning Habitat



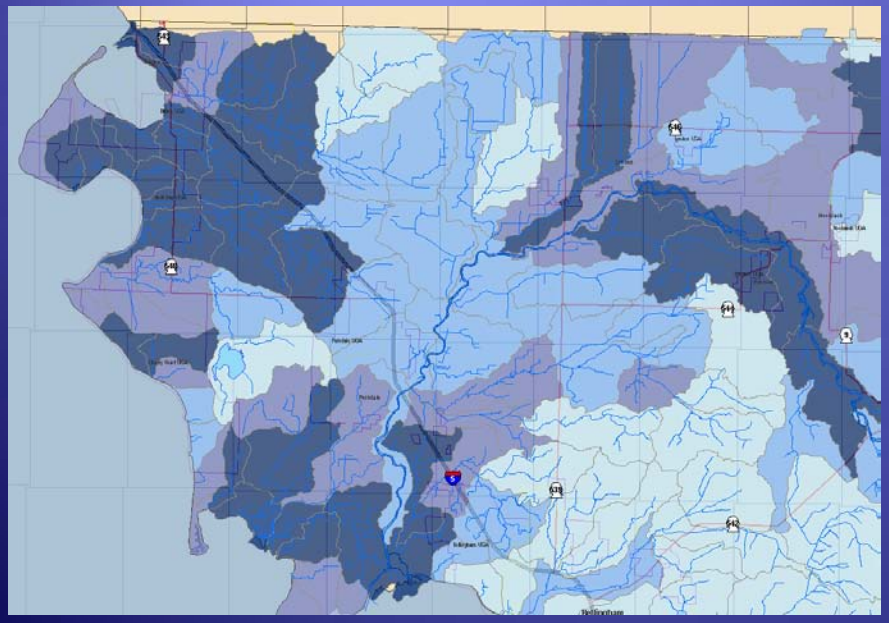
Burrows Bay: City of Anacortes SMP –Summary of Inventory/Characterization Analysis and SMP Designations and Regulations

Reach Name and Existing Shoreline Designation	Potential Ecosystem process and associated shoreline function	Assessment of processes & functions	Level of impairment to processes & functions	Recommended protection & restoration measures
Burrows Bay – Shoreline Residential Shoreline Designation with Proposed Changes Shoreline Oblique Photo West Shoreline Oblique Photo East	**Ecosystem process:** water movement (tidal and wave energy); sediment movement (inputs, longshore transport, deposition and loss); shoreline erosion; and movement of woody debris; organic inputs from shoreline; **Shoreline functions**: Water quantity – discharge from streams/rivers and groundwater at shoreline Water quality - temperature regulation (i.e. marine riparian vegetation, groundwater discharge at shoreline, freshwater inputs from streams/rivers); nutrient removal (denitrification), sediment retention (e.g. deposition in estuaries and intertidal mudflats), toxicant removal & temperature regulation Habitat: shoreline, intertidal, estuarine, subtidal habitats. Habitat structure and complexity for marine plants, macroalgae, diatoms, marine invertebrates, fishes, birds, mammals and anadromous fish species and terrestrial plants and animals.	**Ecosystem processes** : Rating: Importance is Moderate to High for this jurisdiction Partially exposed shoreline with low bluffs and berms of unconsolidated material with longshore drift present. Moderate wave energy provides for suitable beach spawning substrate. **Shoreline functions** Rating: Importance of habitat functions are Hgh for this jurisdiction The eastern portion of this shoreline is sand lance spawning habitat (Figure 12, Fidalgo Bay Plan 2000 and Salmonscape). Intertidal area supports patchy eelgrass beds. Majority of shoreline provides juvenile salmon habitat. Rating: Importance of water quality and quantity functions is Moderate. No significant inputs from stream systems for water quantity function; and no estuarine wetland systems present for water quality functions of sediment, toxicant, nutrient removal.	**Ecosystem processes:** Rating: Moderate to High Shoreline armoring occurs along the majority of this shoreline, which reduces movement of sediment from low feeder bluffs and berms into intertidal zone. **functions at shoreline**: Rating: Moderate Sand lance habitat is threatened from armoring of shoreline. Shoreline armoring has removed shoreline vegetation which may affect adjacent juvenile salmonid habitat. Majority of shoreline has moderate to high restoration potential for salmon habitat.	**Ecosystem processes:** Provide adequate setback/buffer for new structures so that shoreline armoring is not required for protection of structure over life of structure. Several lots along Barrows Bay will probably redevelop, so removal and restoration of shoreline armoring could occur. **Shoreline functions:** Protect existing sand lance habitat at northwest end of the bay by preventing additional armoring of shoreline. Restore old armored areas when redevelopment of lots occurs. Shoreline Residential 1, provides minimum 75 foot buffer (revegetated) and setback/buffer from OHWM. If not possible due to site constraints variance will be allowed. Cost of buffer area lost under variance will be calculated (based on replacement cost elsewhere in city) and in-lieu fee assessed. Fee will be specifically linked to projects described in restoration plan. Cap and plant existing rip rap to provide marine riparian vegetation in order to protect and restore juvenile salmonid habitat. **Consistency of Environment Designation** with assessment of processes and functions and degree of impairment. Residential zone and development standards/regulations will protect existing processes and functions and help to partially restore altered processes and functions.

Overall Results for Water Flow Process

Importance Map

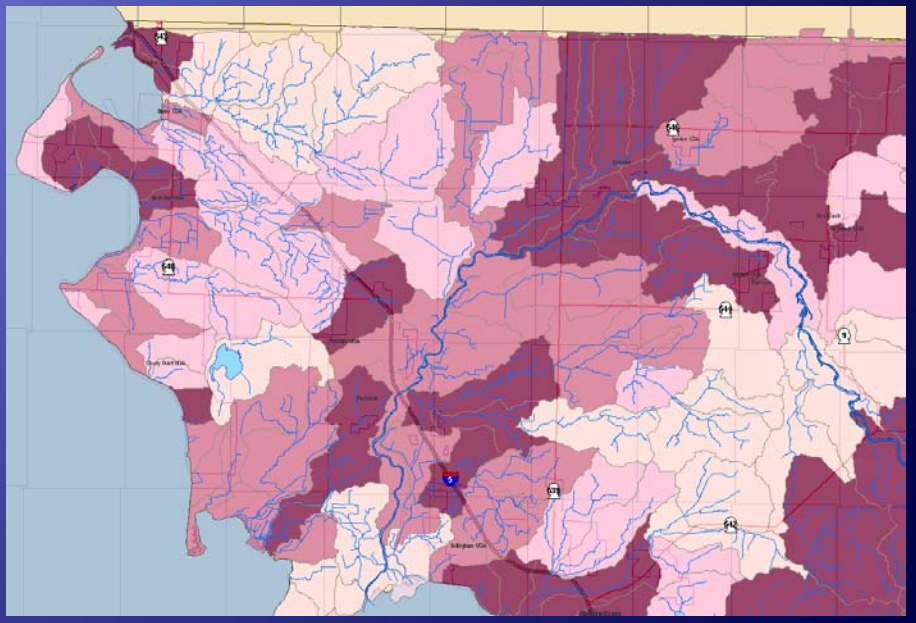
Based on precipitation type and quantity, and area contributing to storage, recharge, and discharge processes



Darker Blue = Higher Importance to Water Flow Process

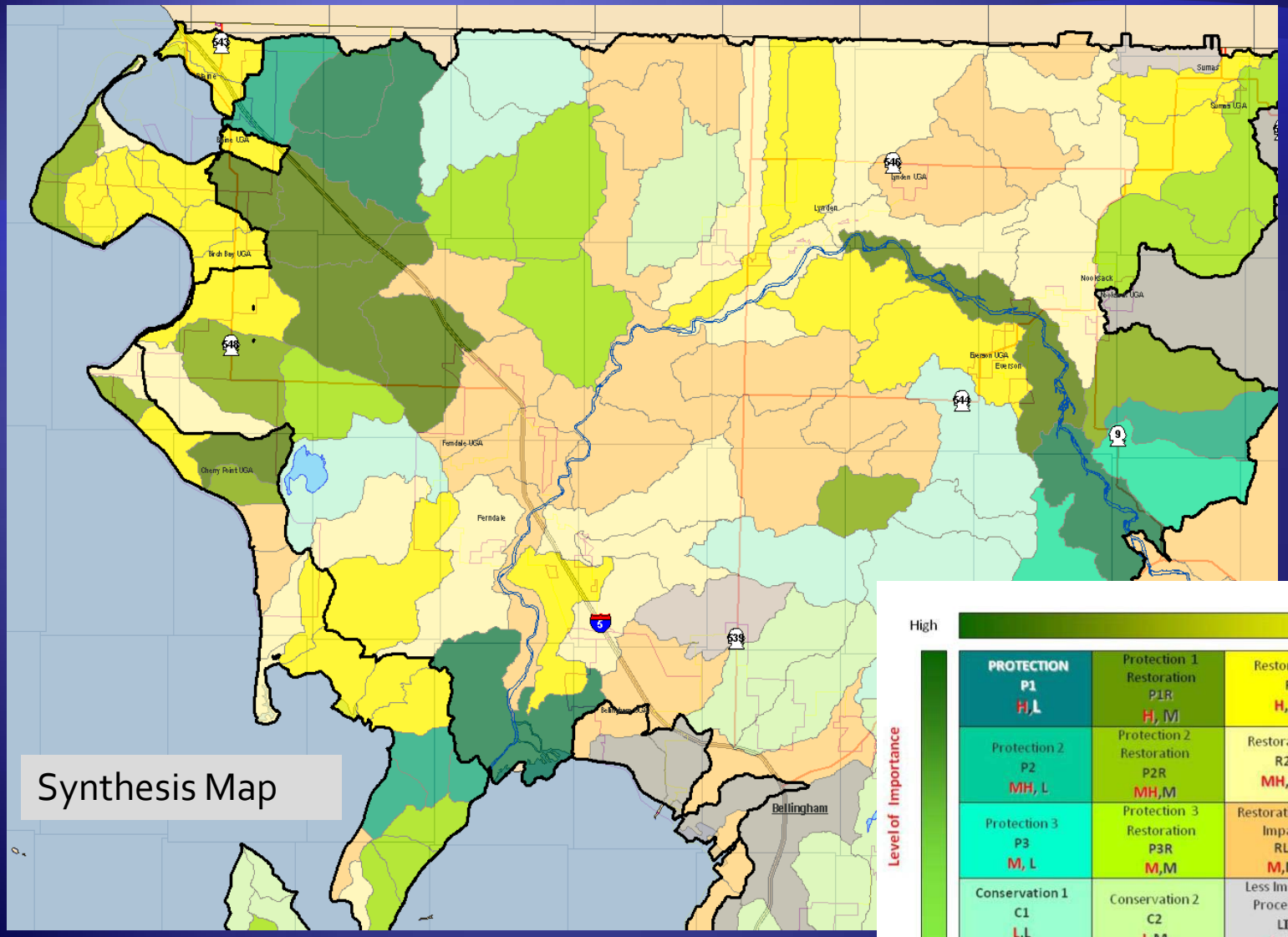
Impairment Map

Based on loss of forest , reduction in storage, recharge, and discharge and increase in impervious cover



Darker Red = Greater Impairment to Water Flow Process

Overall Results for Water Flow Process



Broad Scale

PROTECTION P1 H,L	Protection 1 Restoration P1R H, M	Restoration 1 R1 H,MH	**RESTORATION** R H,H
Protection 2 P2 MH, L	Protection 2 Restoration P2R MH,M	Restoration 2 R2X MH,MH	Restoration 2 R2 MH,H
Protection 3 P3 M, L	Protection 3 Restoration P3R M,M	Restoration Least Impact 2 RLI2 M,MH	Restoration Least Impact 1 RLI1 M,H
Conservation 1 C1 L,L	Conservation 2 C2 L,M	Less Impact to Processes 2 LI2 L,MH	Less Impact to Processes LI1 L,H

High

Level of Importance

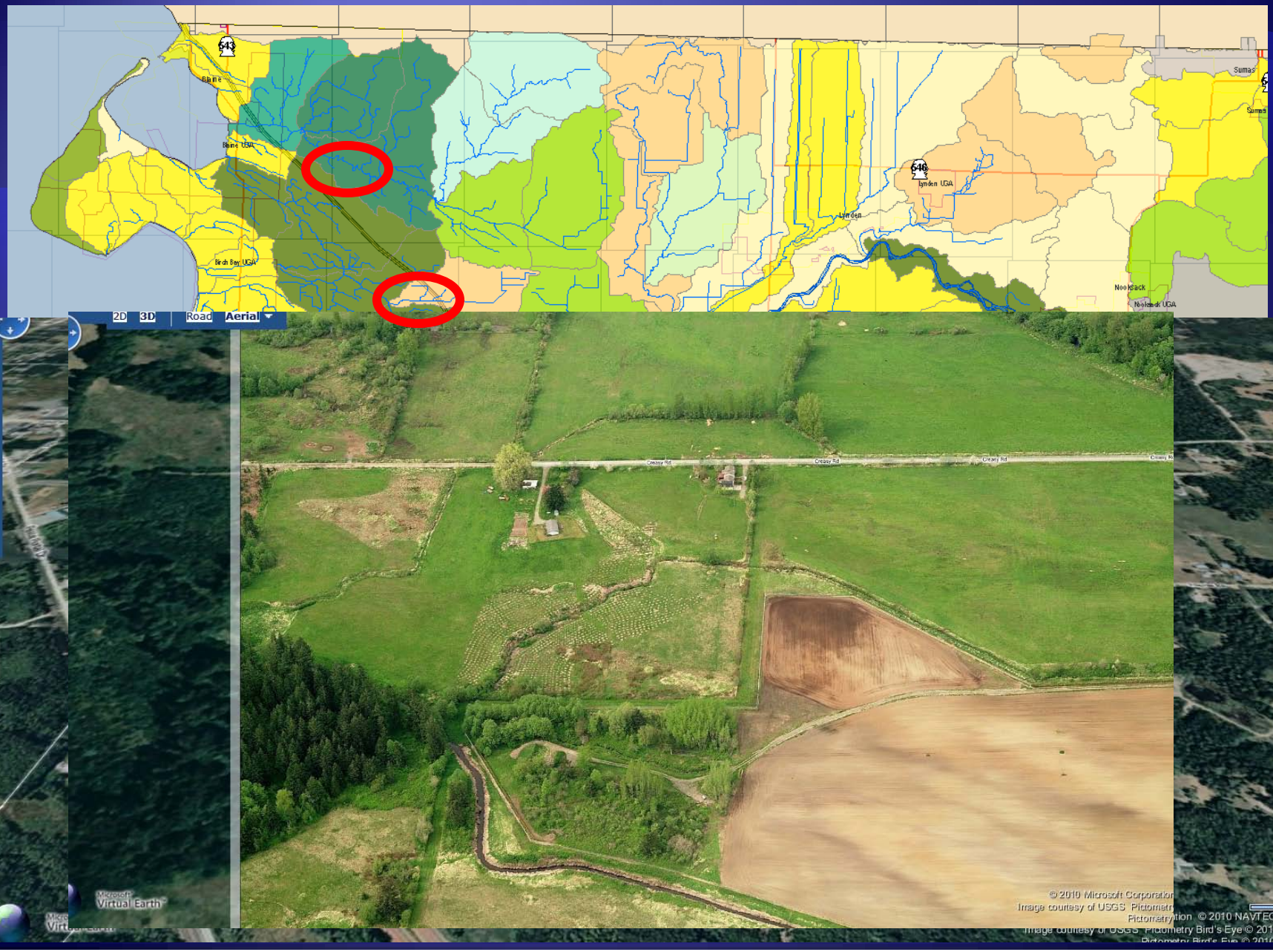
Low

Level of Impairment

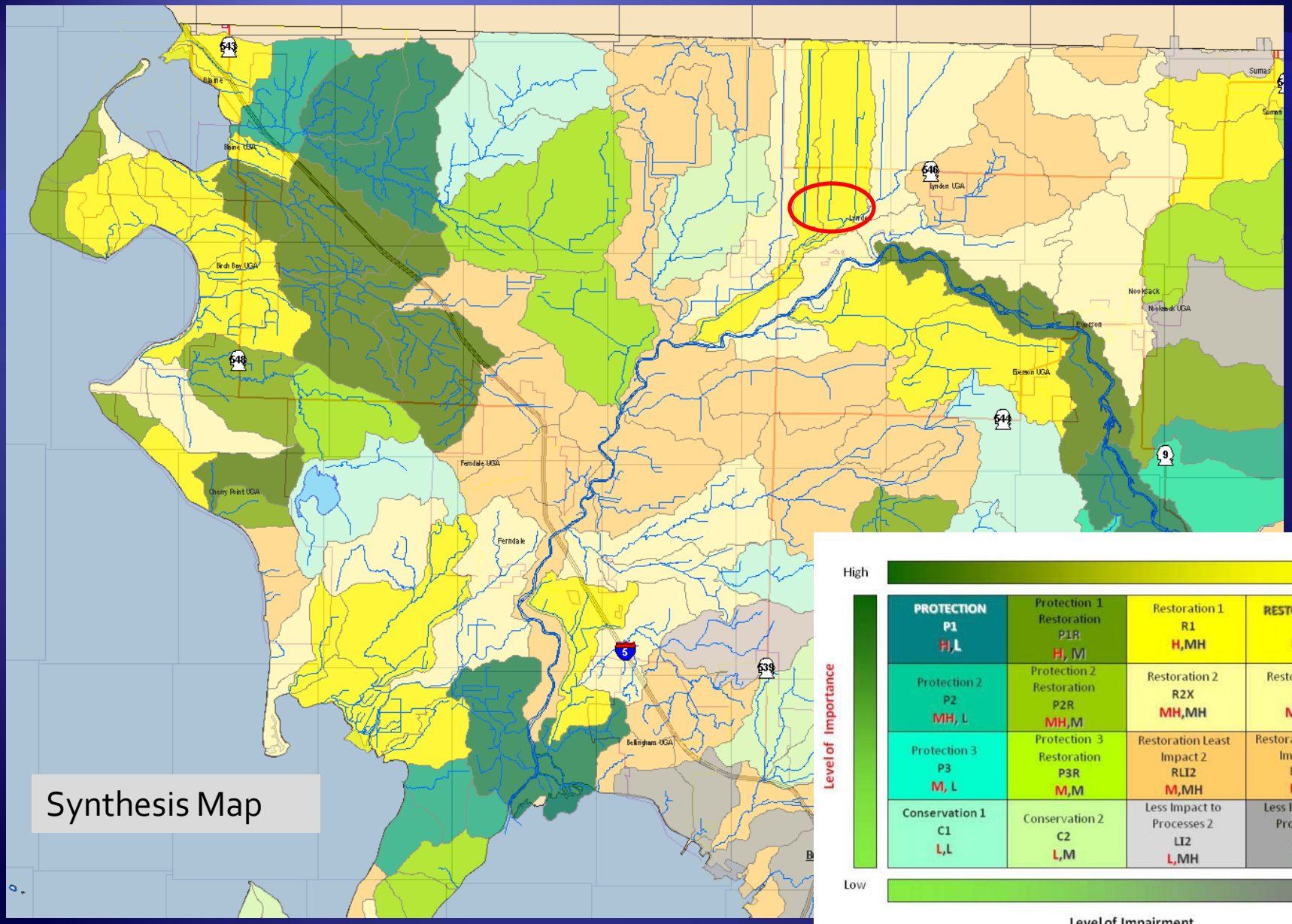
High

WRIA 1, Whatcom County

Overall Results for Water Flow Process



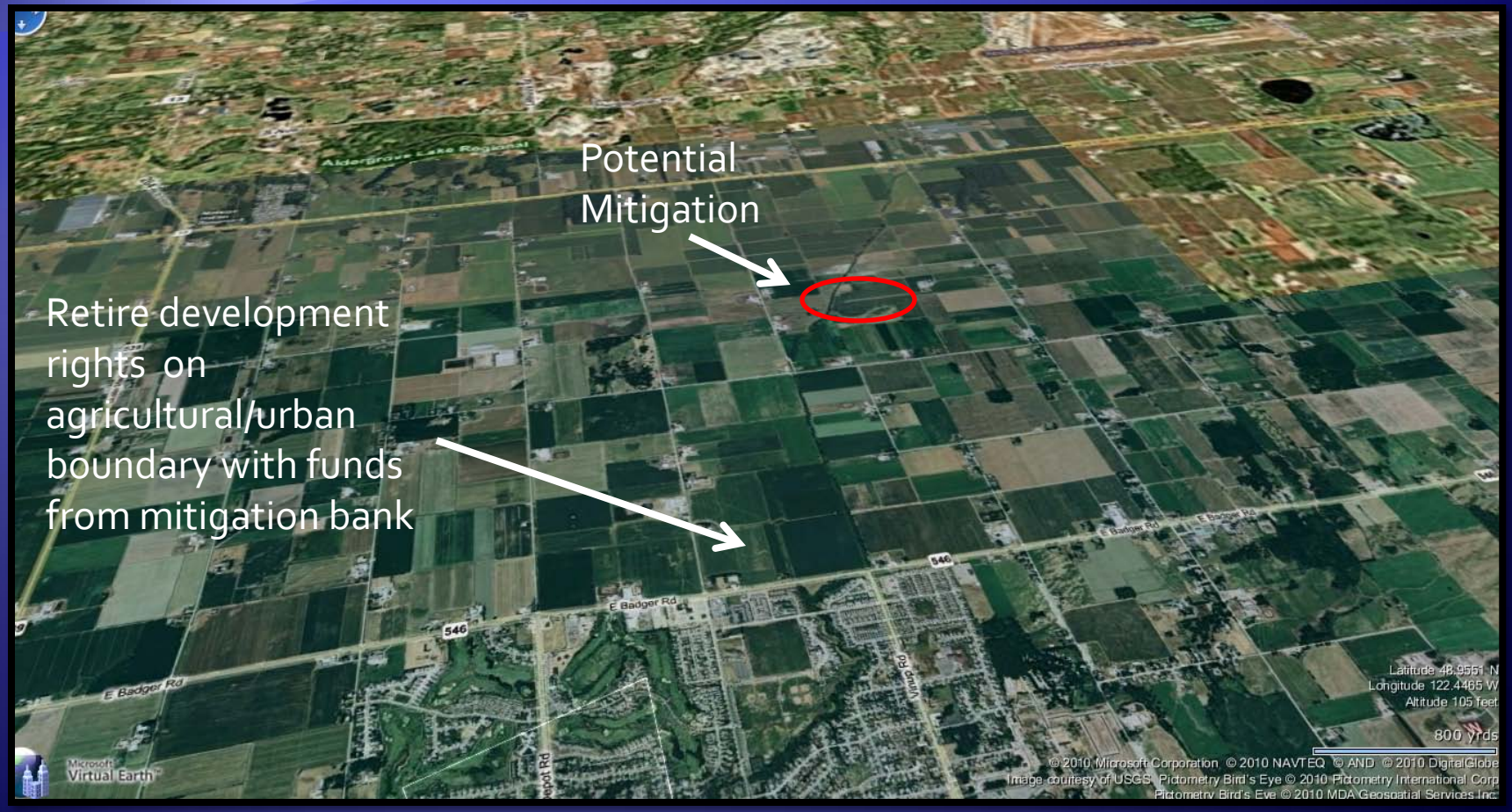
Overall Results for Water Flow Process



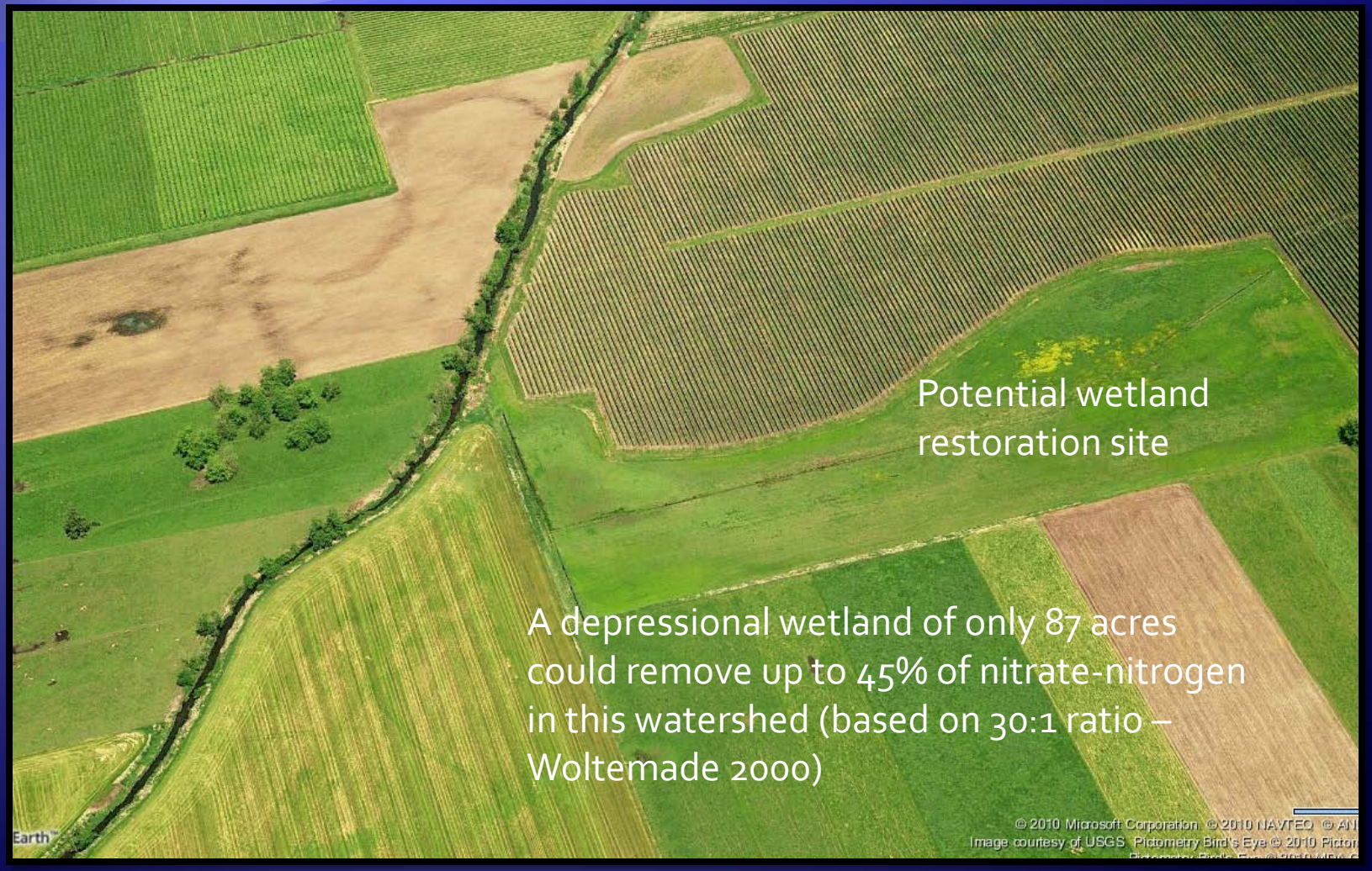
Ecosystem wide characterization – Fishtrap Creek

Ecosystem Issue Fishtrap Creek and Tributaries	How have ecosystem processes been changed relative to issue?
Low Dissolved Oxygen. On 303 (d) list.	Channelization results in greater movement of sediment and phosphorous into aquatic systems. Increases Biological Oxygen Demand Ditching & draining affects storage and discharge which reduces denitrification processes

Potential Restoration Area Fishtrap Creek Tributaries



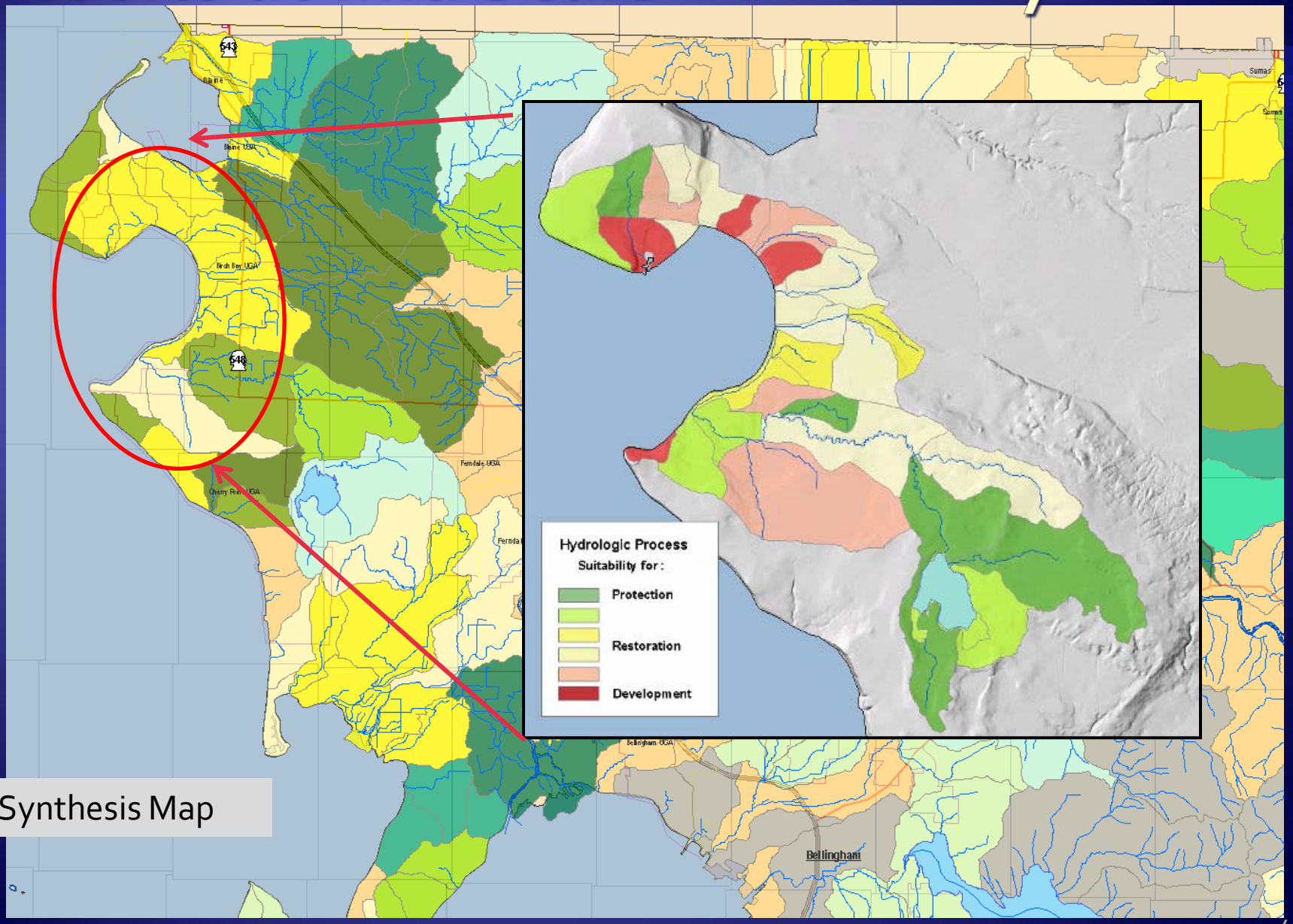
Potential Restoration Area Fishtrap Creek Tributaries



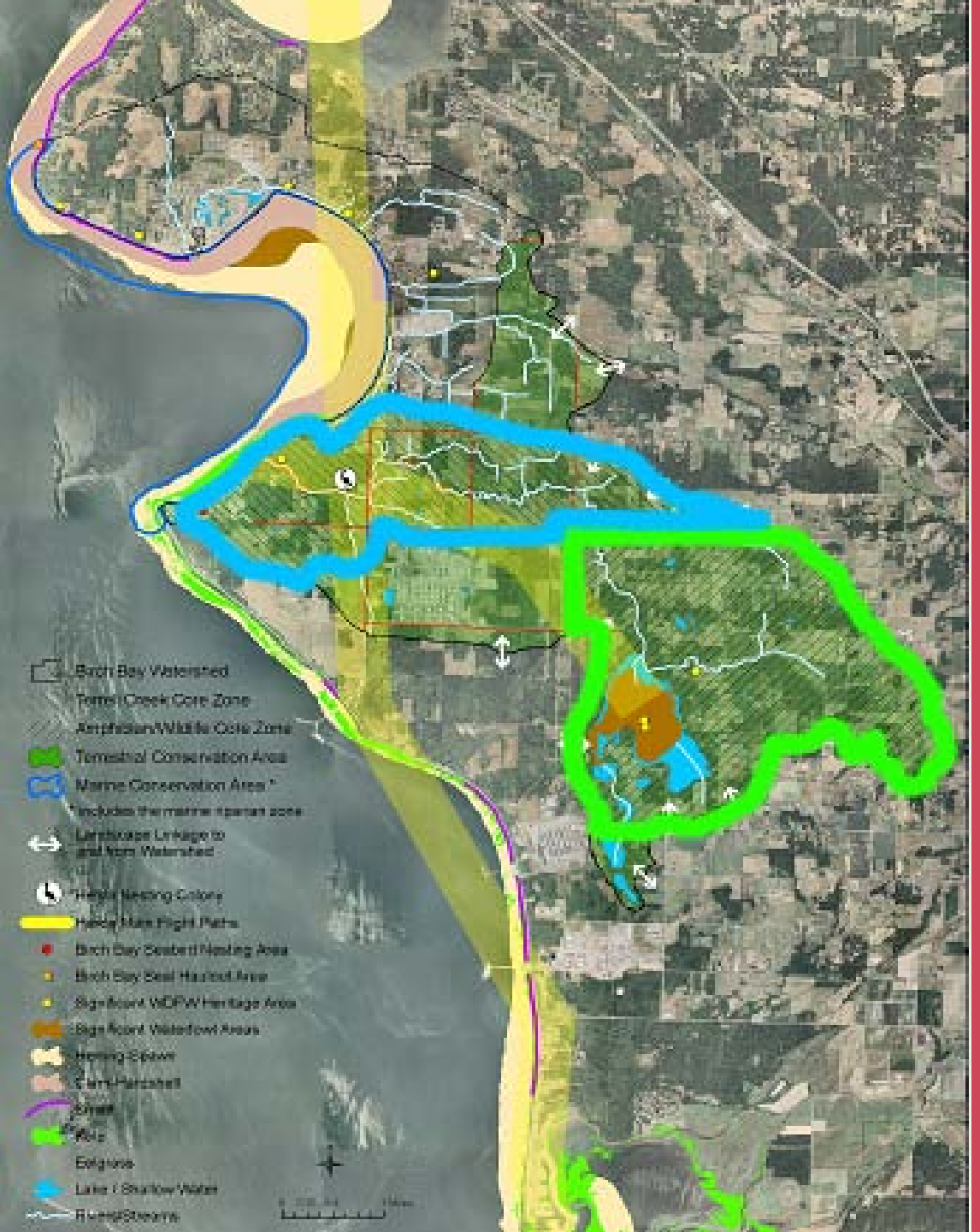
Ecosystem wide characterization – Fishtrap Creek

Solution	Actions: Recommended protection & restoration measures and environment designations
Restore depressional wetland areas downstream of agricultural lands.	Develop mitigation bank run by agricultural community. Proceeds from sale of credits would be used to retire development rights in agricultural lands at highest risk of development.

Results at Mid Scale – Birch Bay



Synthesis Map



Results of Fish & Wildlife Analysis

Local Habitat Assessment – Broad Scale and Mid Scale

Synthesis of Fish & Wildlife/Water Flow Assessments:

Identifying Solutions

- **Concentrate development** in "red" management units
- Allow use of **mitigation credits** in "yellow and green" zones for impacts in "red zone."
- **Cluster development** in "yellow and green" zones.
- Use **low impact development** measures
- Provide for **habitat protection** overlay