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Local Government Needs and Approaches to Shoreline Armoring

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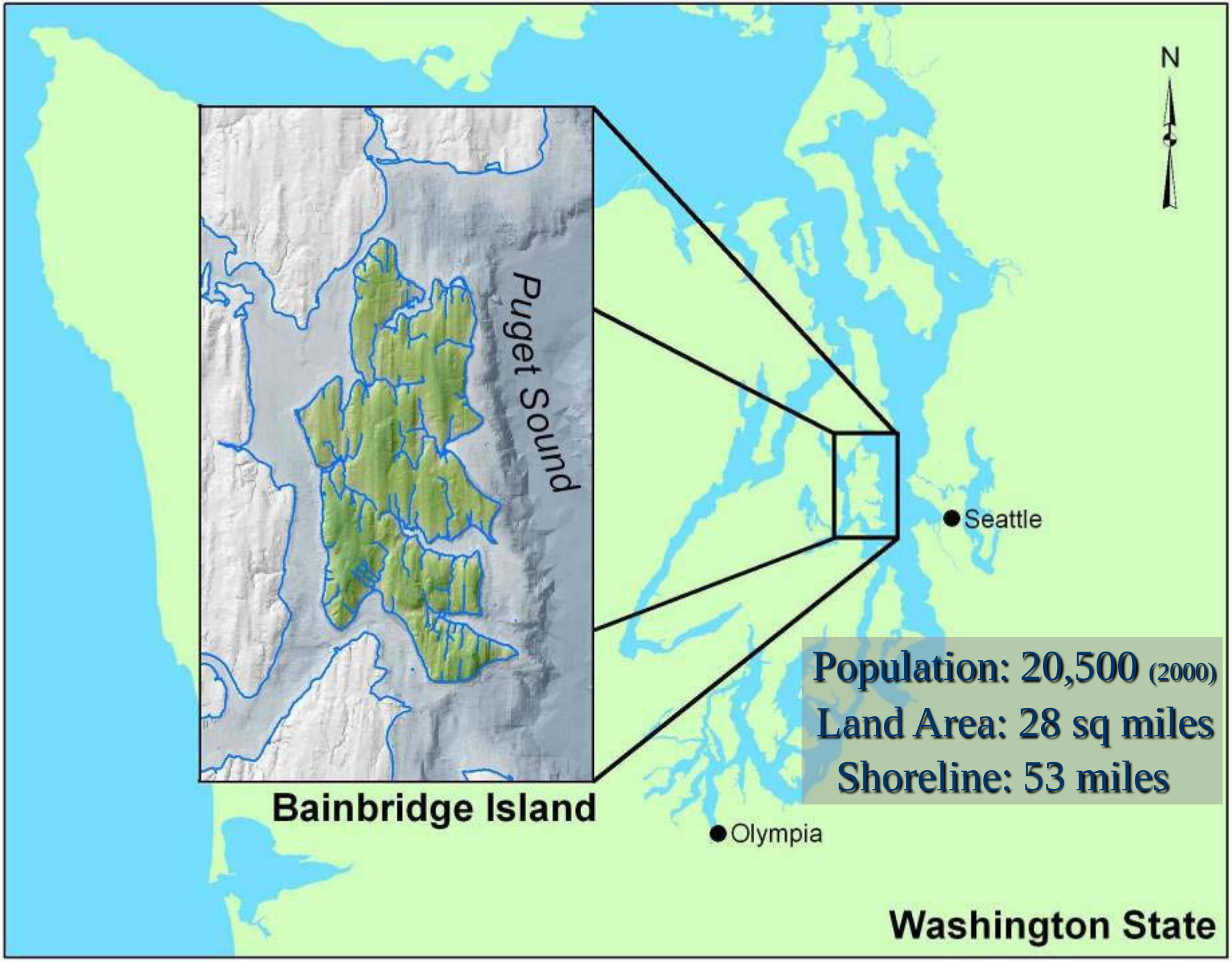
“Ecosystem Management is…

- driven by explicit [objectives];
- executed by policies, protocols, and practices, and;
- made adaptable by monitoring and research based on our best understanding of the ecological interactions and processes necessary to sustain ecosystem composition, structure, and function.

Ecosystem Management must include the following:

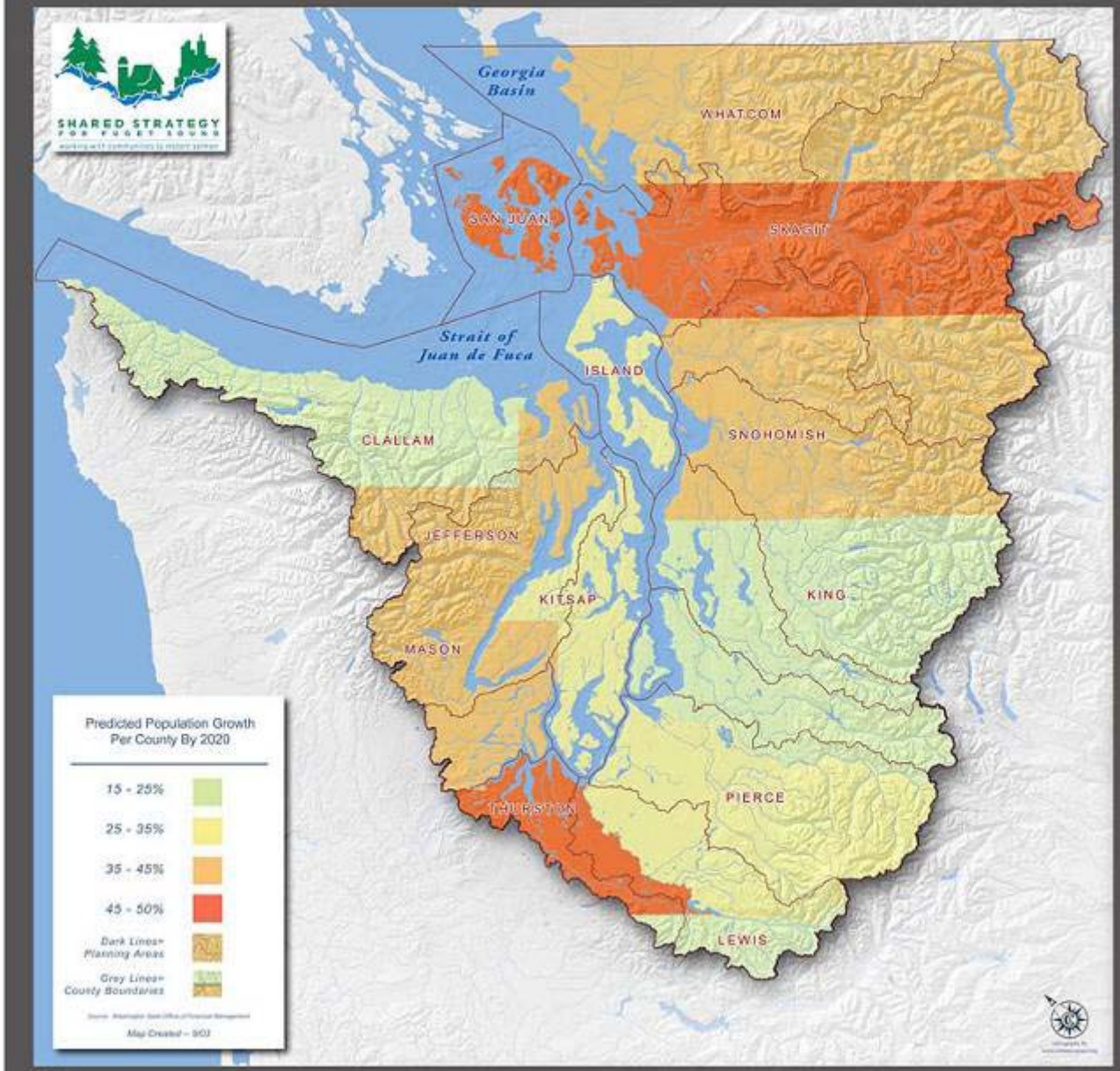
1. Long-term sustainability as [a] fundamental value,
2. Clear, operational [objectives],
3. Sound ecological models and understanding,
4. Understanding complexity and interconnectedness,
5. Recognition of the dynamic character of ecosystems,
6. Attention to context and scale,
7. Acknowledgment of humans as ecosystem components,
8. Commitment to adaptability and accountability.”

The Report of the Ecological Society of America Committee on the Scientific Basis for Ecosystem Management (Christianson et al. 1996);



Population: 20,500 (2000)
Land Area: 28 sq miles
Shoreline: 53 miles

Predicted Population Growth by County



>80%
Shoreline Parcels
Developed

50%
Shoreline
Armored

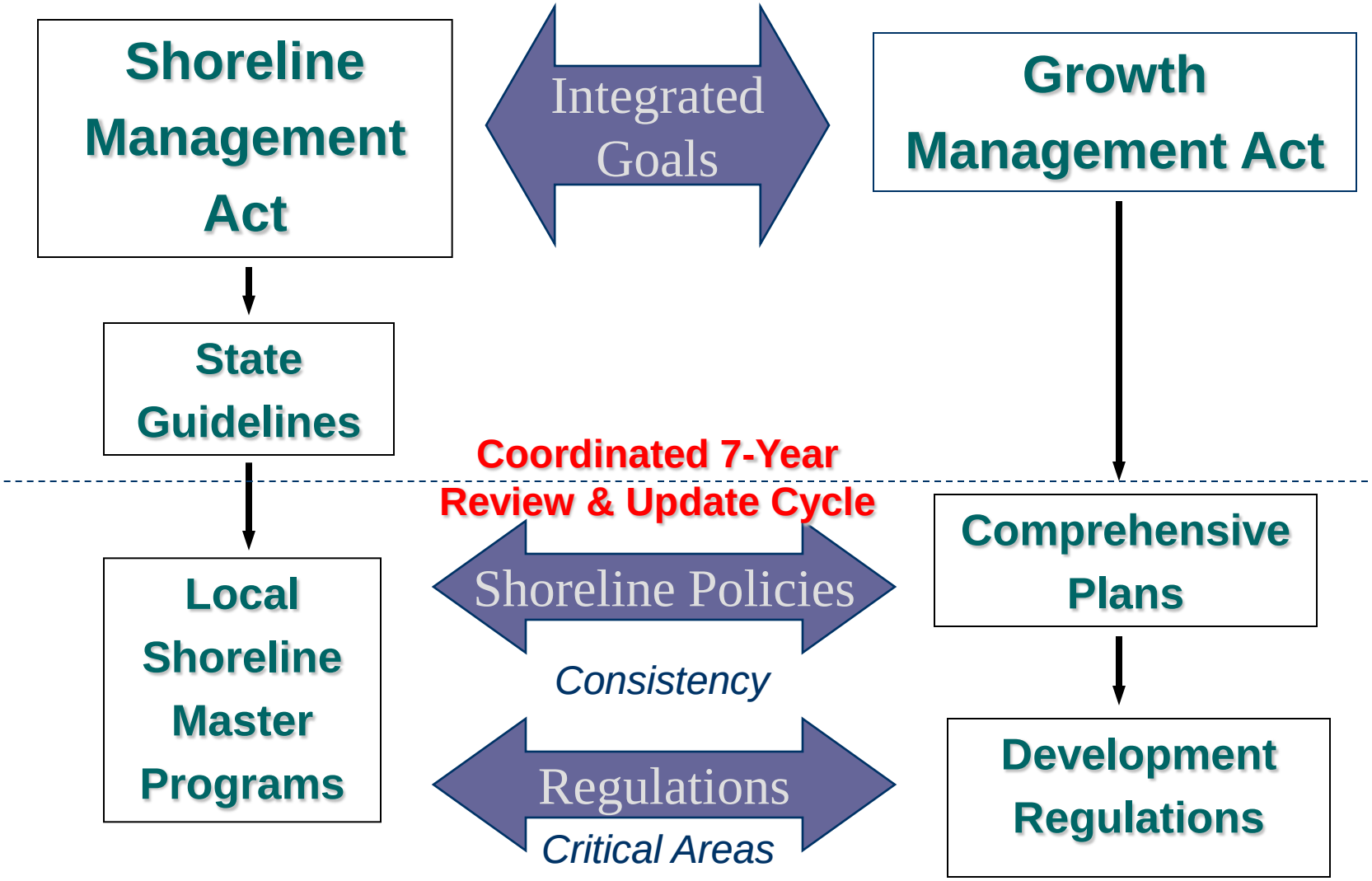
Shoreline Armoring Players

- **Elected Officials**
- **Courts**
- **Agencies**
  - Local, Tribal, Regional, State, Federal
  - Staff, Management
- **Non-Governmental Organizations (NGOs)**
- **General Public**
- **Property Owners**
- **Consultants**
- **Contractors**
- **Attorneys**
- **Researchers**

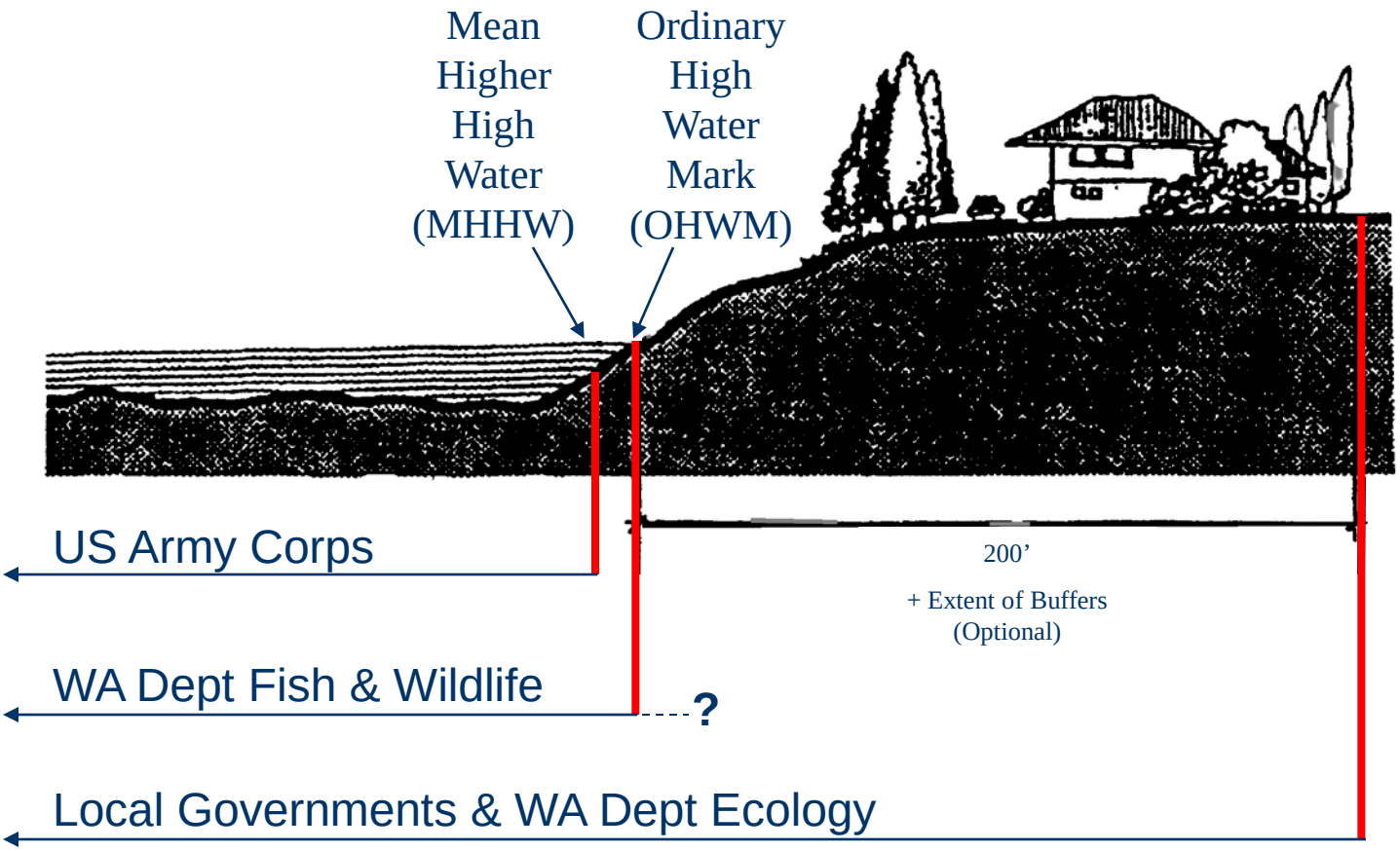
Issues Affecting Good Management

- **Political Will**
- **Public Awareness**
- **Qualified Practitioners**
- **Fragmented/Uncoordinated Management System**
  - Not Really Ecosystem Based
    - Jurisdictional Boundaries
    - Scope of Jurisdictional Mandates
  - Specialization vs. integration
- **Ecosystem Knowledge**
- **Effects Knowledge**
- **Funding & Time**
- **Regulatory Takings**

Simplified Legislative Overview



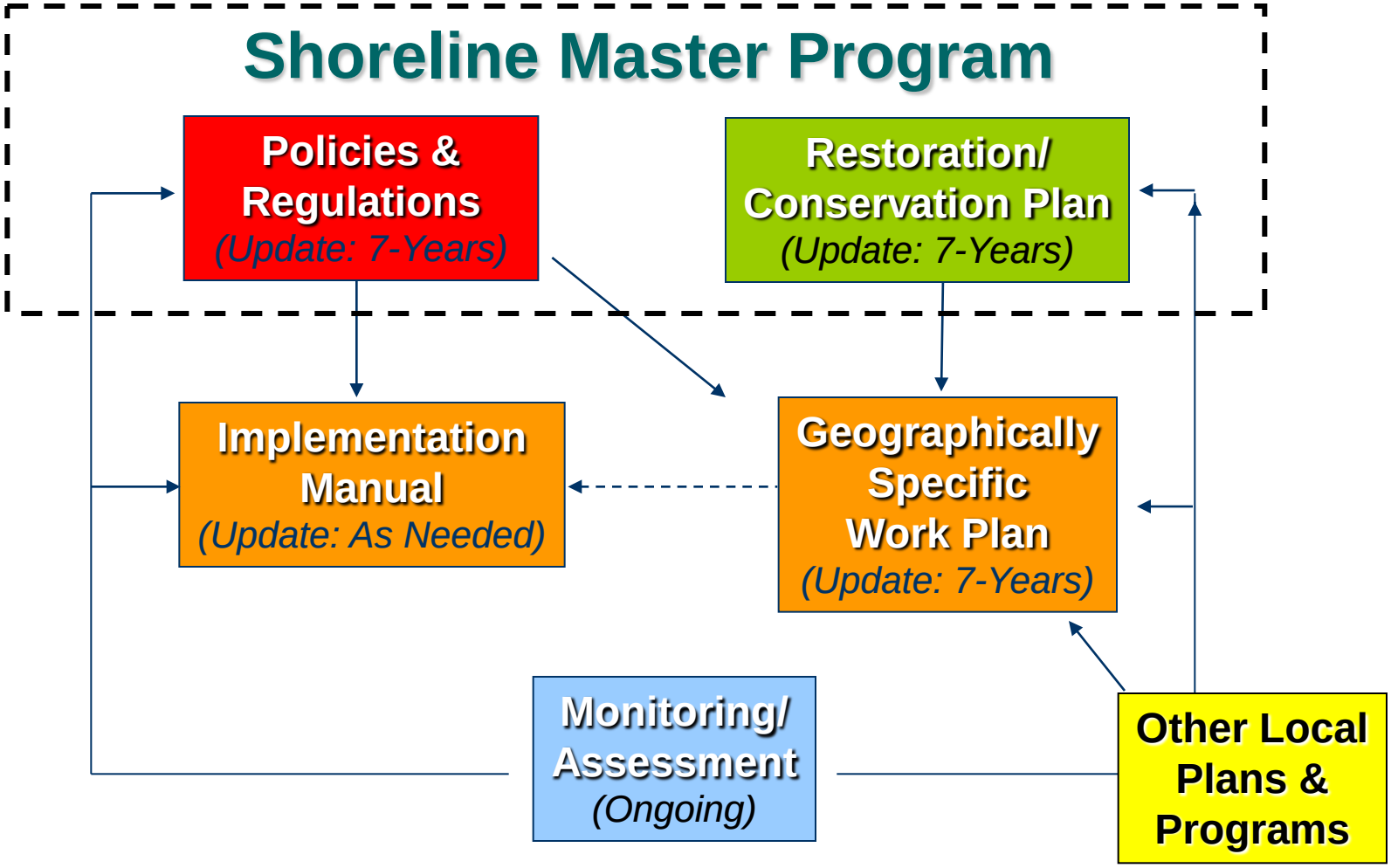
Coastal Shoreline Jurisdiction

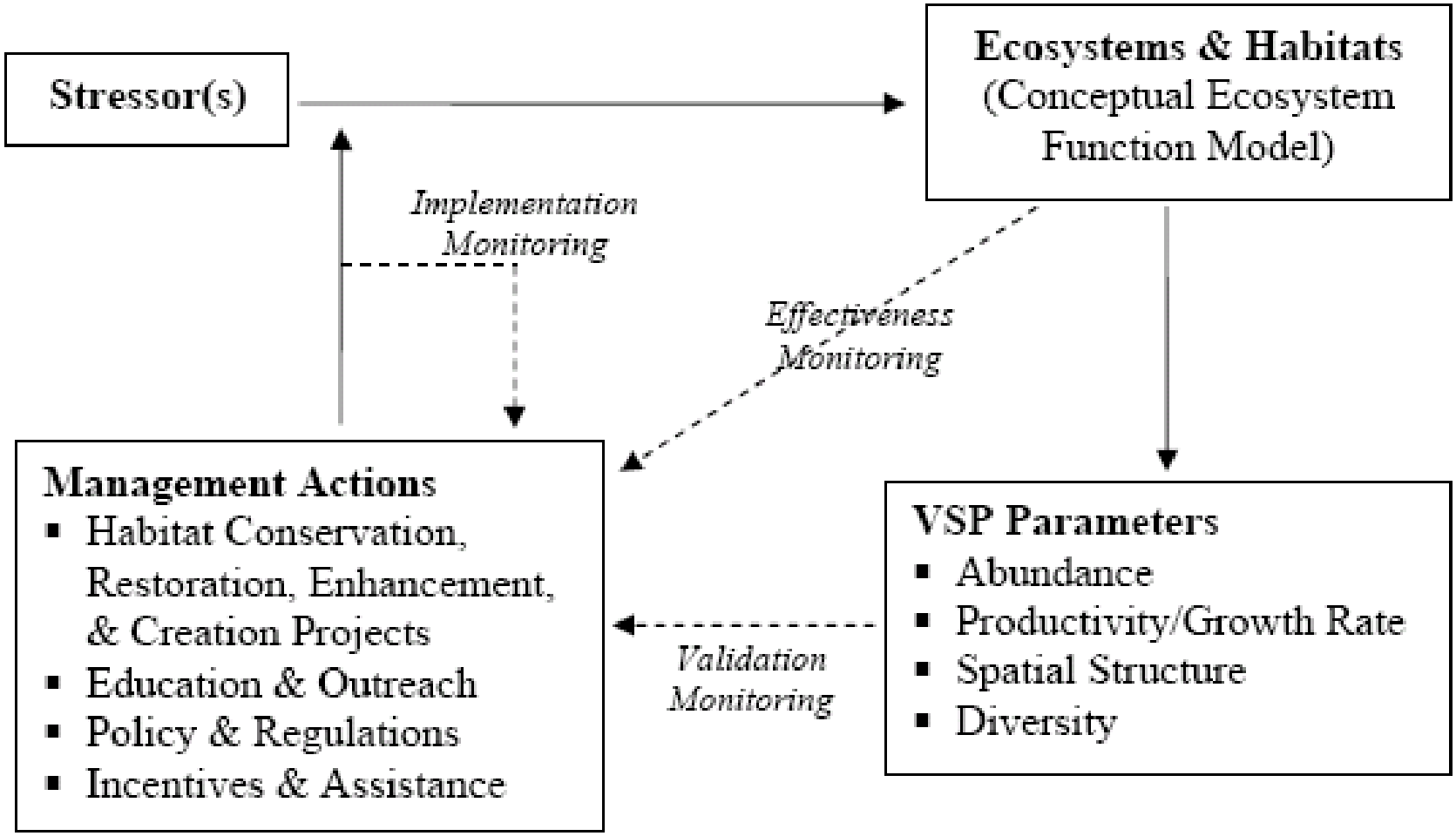


New Shoreline Master Programs

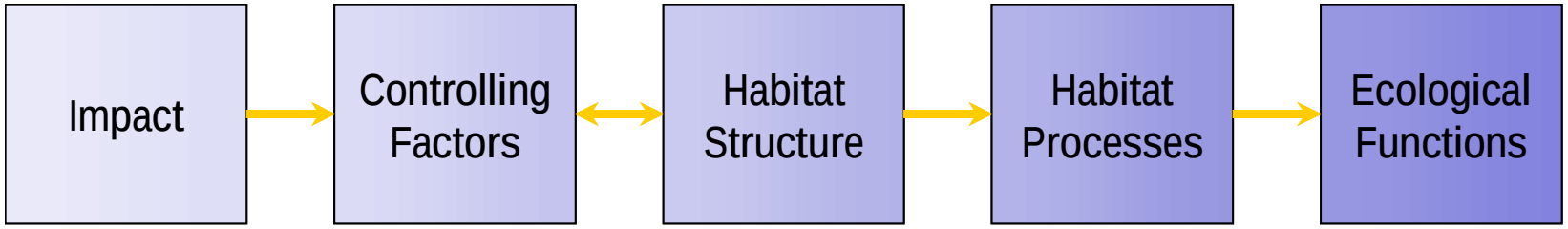
- **Goals & Policies**
  - Environmental Protection
  - Economic Development
  - Public Access
  - Etc
- **Shoreline Environment Designations** (zoning)
- **Regulations**
  - No net loss
- **Restoration Plan**
  - Voluntary implementation
- **Monitoring & Adaptive Management**

New Management Framework




Stressor(s)
Ecosystems & Habitats
(Conceptual Ecosystem
Function Model)
Implementation
Monitoring
Effectiveness
Monitoring
Management Actions
Habitat Conservation,
Restoration, Enhancement,
& Creation Projects
Education & Outreach
Policy & Regulations
Incentives & Assistance
Validation
Monitoring
VSP Parameters
Abundance
Productivity/Growth Rate
Spatial Structure
Diversity

Assessment: Conceptual Model

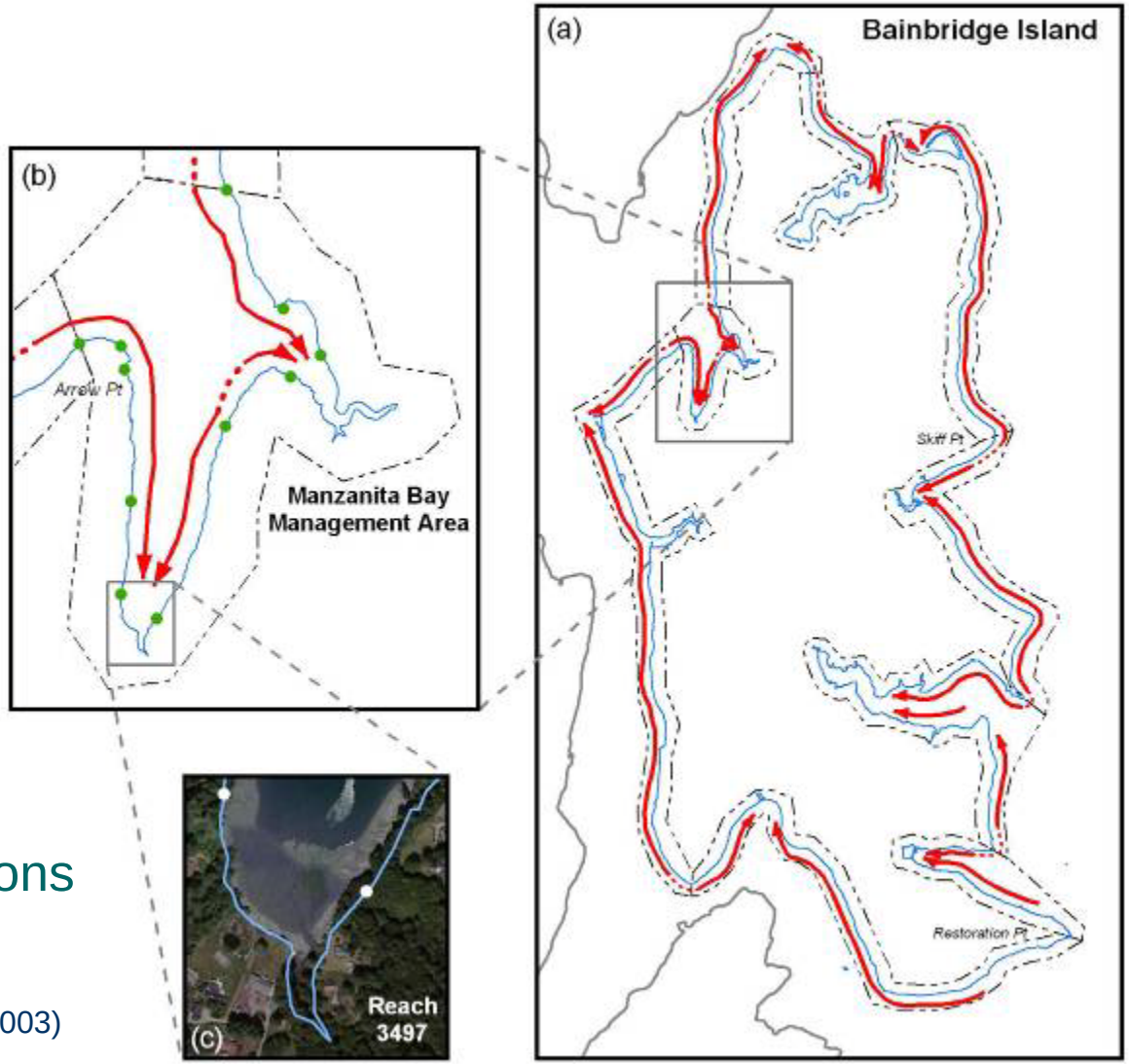


CONTROLLING FACTORS	HABITAT STRUCTURE	HABITAT PROCESSES	ECOLOGICAL FUNCTIONS
• Wave Energy • Sediment Supply • Slope/Depth • Light (Shading) • Light (Increase) • Hydrology • Pollution/Nutrients • Physical Disturb • Substrate	• Density • Biomass • Individual Lengths • Diversity • Patch Size • Patch Shape • Landscape Position	• Production • Sediment Flux • Nutrient Flux • Carbon Flux	• Prey Production • Reproduction • Refuge • Carbon Sequestration • Maintenance of Biodiversity • Disturbance Regulation

From: Williams, et al. 2001.

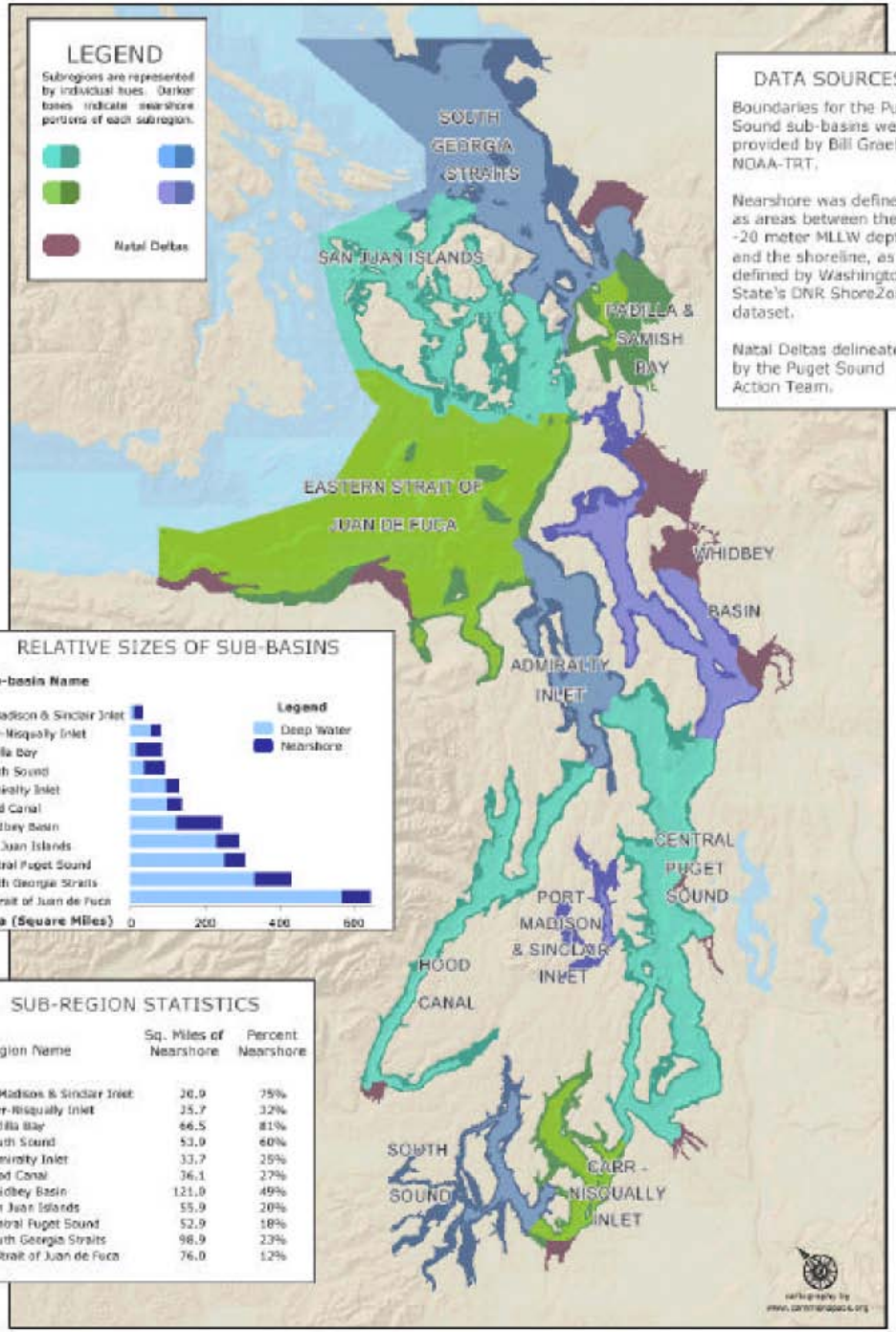
Management Landscapes

- Reaches
  - Homogenous Geomorphic Shoreline
- Management Areas
  - Aggregations of Drift-Cells
- Scalable
  - Reaches to Regions



Published: Puget Sound Notes (Sept 2003)

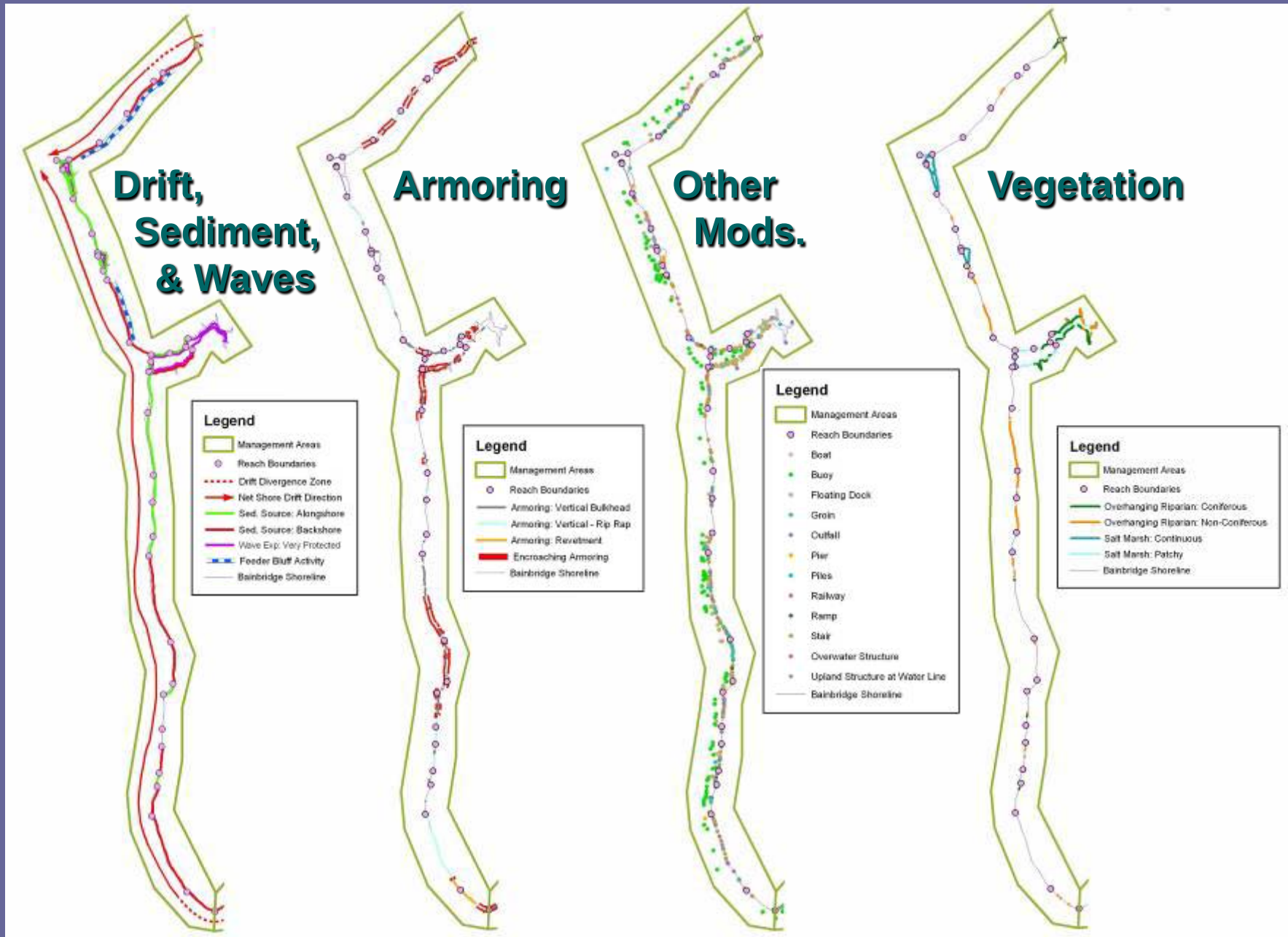
PUGET SOUND NEARSHORE & SUB-BASINS

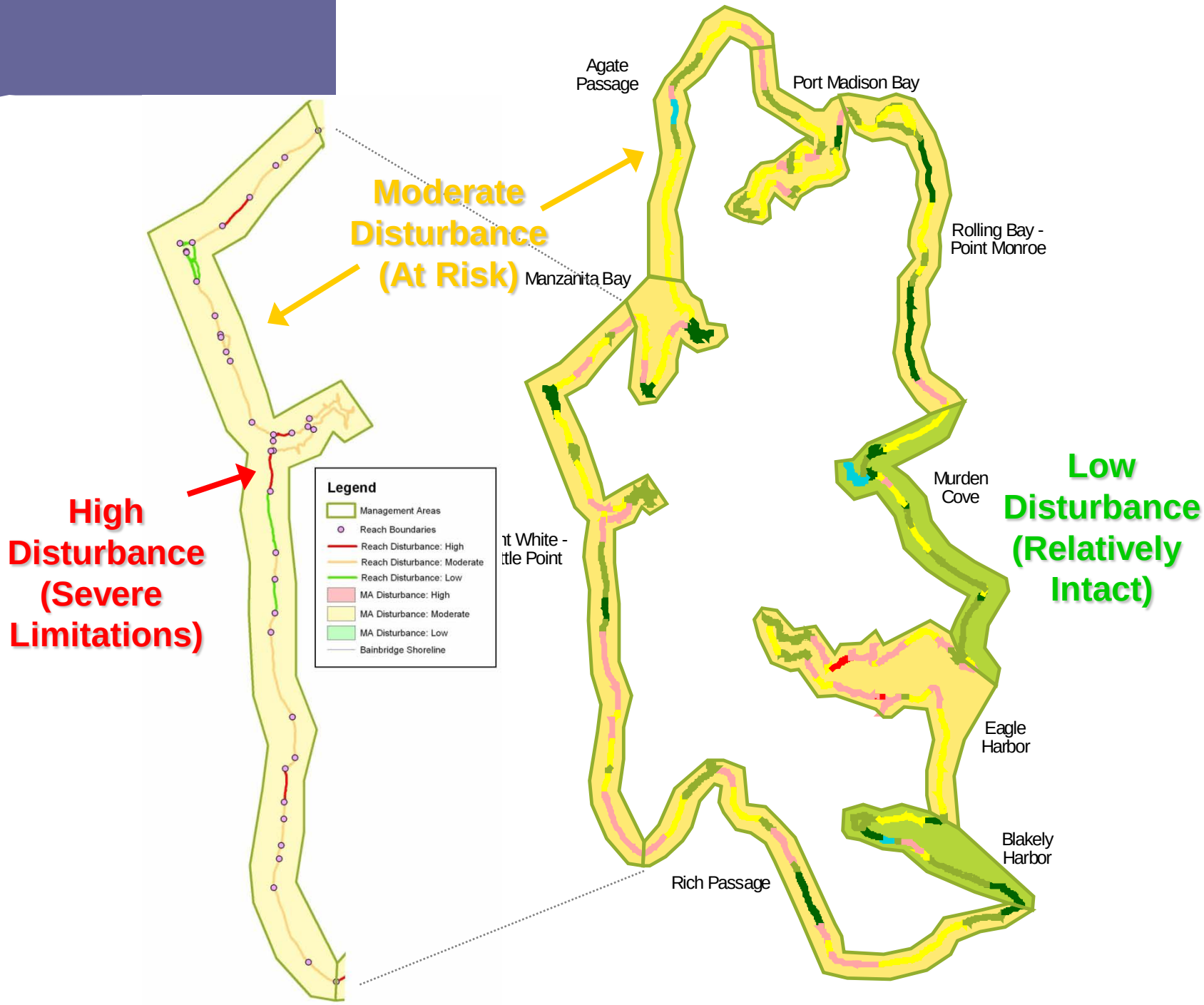


SUB-REGION STATISTICS

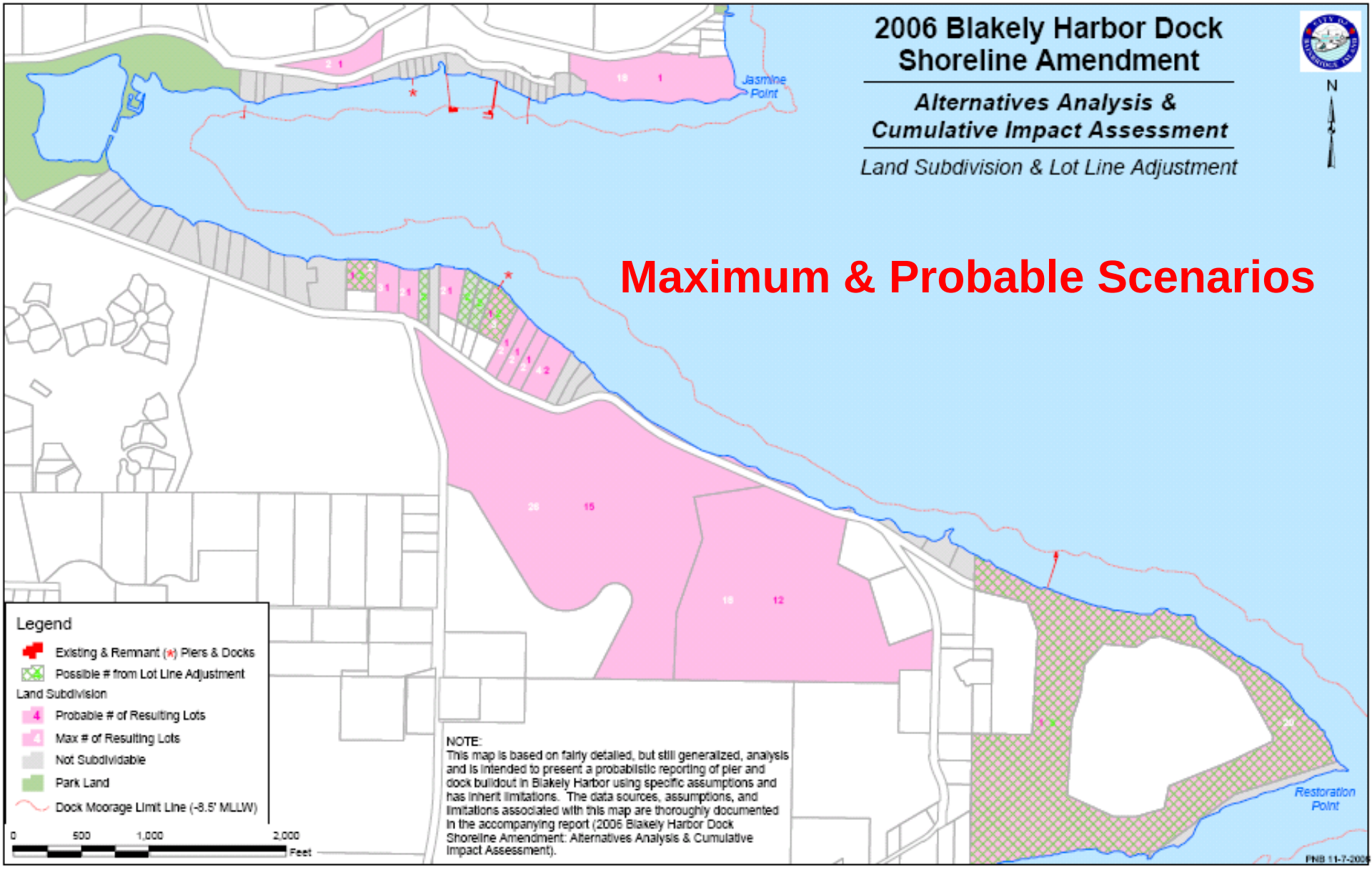
Region Name	Sq. Miles of Nearshore	Percent Nearshore
Pt Madison & Sinclair Inlet	20.9	75%
Carr-Nisqually Inlet	35.7	32%
Padilla Bay	66.5	81%
South Sound	53.0	60%
Admiralty Inlet	33.7	25%
Hood Canal	36.1	27%
Whidbey Basin	121.0	49%
San Juan Islands	55.9	20%
Central Puget Sound	52.9	18%
South Georgia Straits	98.9	23%
E Strait of Juan de Fuca	76.0	12%

Inventory & Characterization

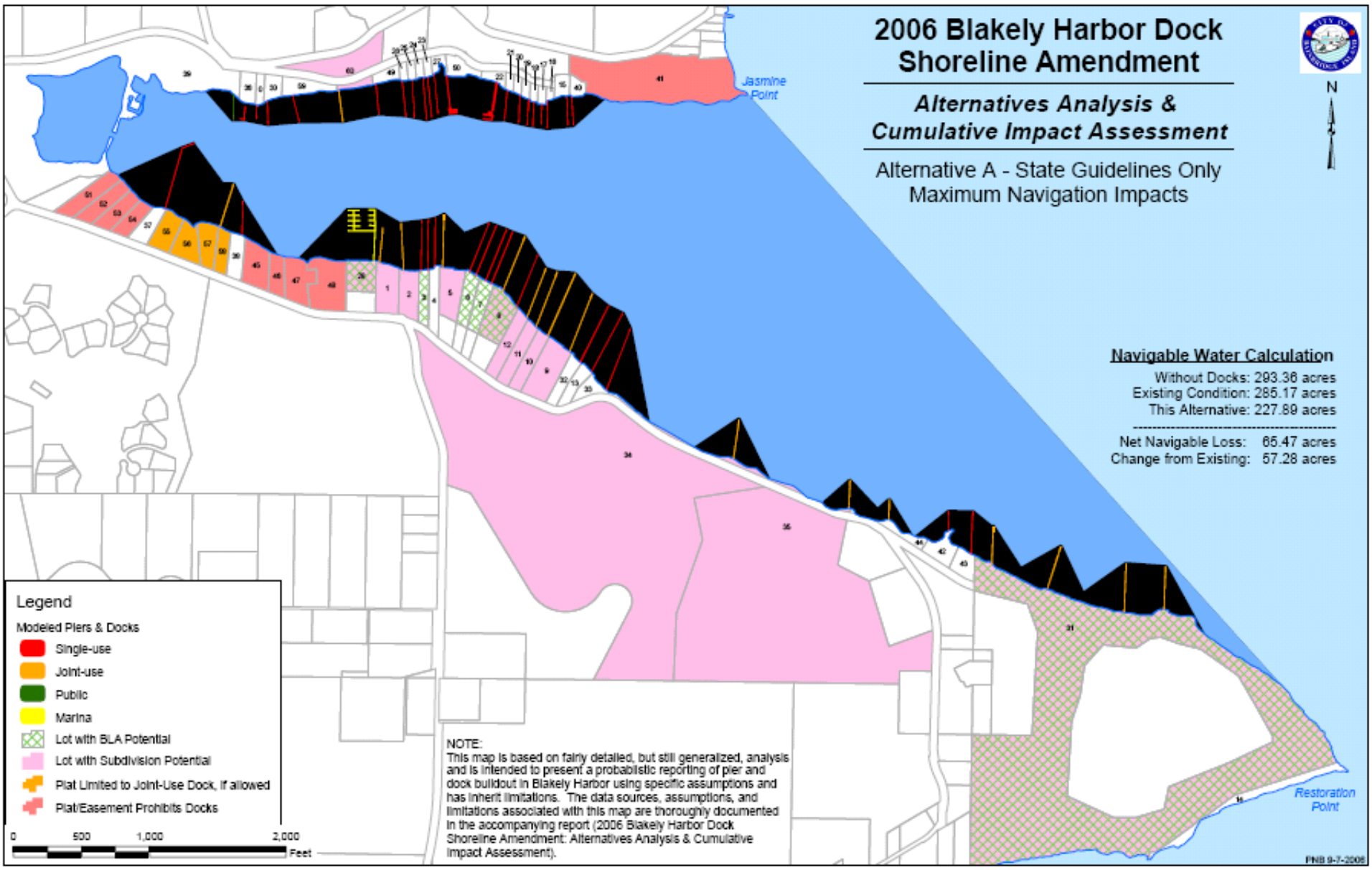



Moderate Disturbance (At Risk)
High Disturbance (Severe Limitations)
Low Disturbance (Relatively Intact)
Legend
Management Areas
Reach Boundaries
Reach Disturbance: High
Reach Disturbance: Moderate
Reach Disturbance: Low
MA Disturbance: High
MA Disturbance: Moderate
MA Disturbance: Low
Bainbridge Shoreline
Agate Passage
Port Madison Bay
Manzanita Bay
Rolling Bay - Point Monroe
Murden Cove
Eagle Harbor
Blakely Harbor
Rich Passage

Buildout Analysis

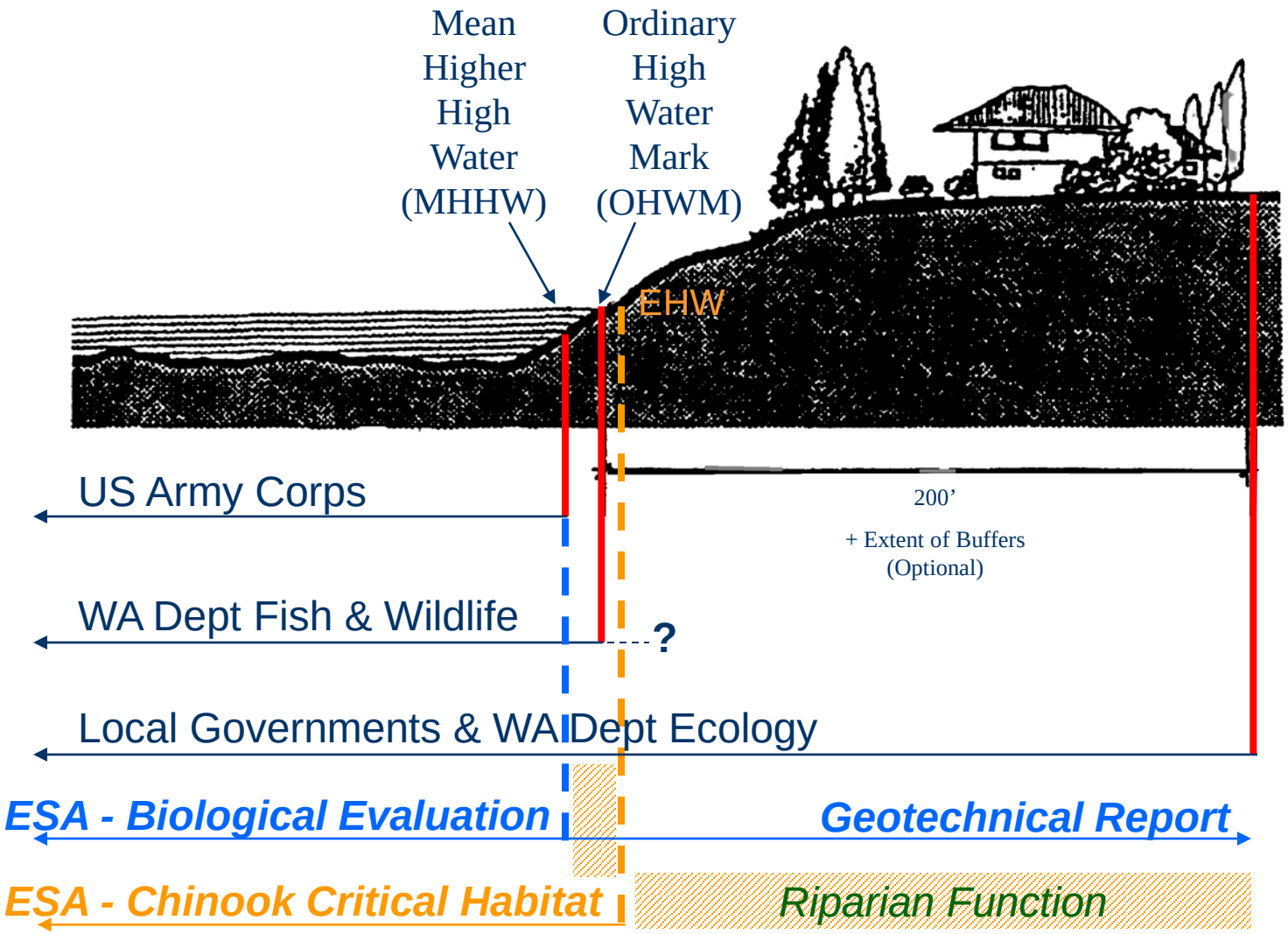


Cumulative Impacts Analysis



Restore
Prohibit new docks and dredging
Conserve
Legend
Management Areas
Reach Boundaries
Reach Disturbance: High
Reach Disturbance: Moderate
Reach Disturbance: Low
MA Disturbance: High
MA Disturbance: Moderate
MA Disturbance: Low
Bainbridge Shoreline
Enhance or Create
Restore
Remove bulkheading & Groins
Relocate shoreline road

Coastal Shoreline Jurisdiction



Typical Permits Required

- **Local**
  - Exemption
    - New bulkhead to protect SFR (single-family residence) and appurtenant structures from loss or damage by erosion
    - Repair & Maintenance
  - Substantial Development
    - Protect land
- **Local + Ecology**
  - Conditional Use Permit
    - New armoring > 200 feet from existing bulkhead
    - Beach enhancement for non-SFR property
- **WDFW**
  - Hydraulic Project Approval

Possible Permits Required

- **Ecology**
  - Section 401 (CWA)
  - CZMA Concurrence
- **US Army Corps**
  - Section 404 (CWA)
  - ESA Consultation
  - Section 106 (Historic Preservation)

Typical City Exemption/Permit Process

- Pre-application
- Application
- SEPA determination (optional process)
- Request for additional information
- Further request for additional information
- Staff report
- Director or Hearing Examiner decision
- Ecology decision, if conditional use permit
- Appeal
- Legal decision or settlement

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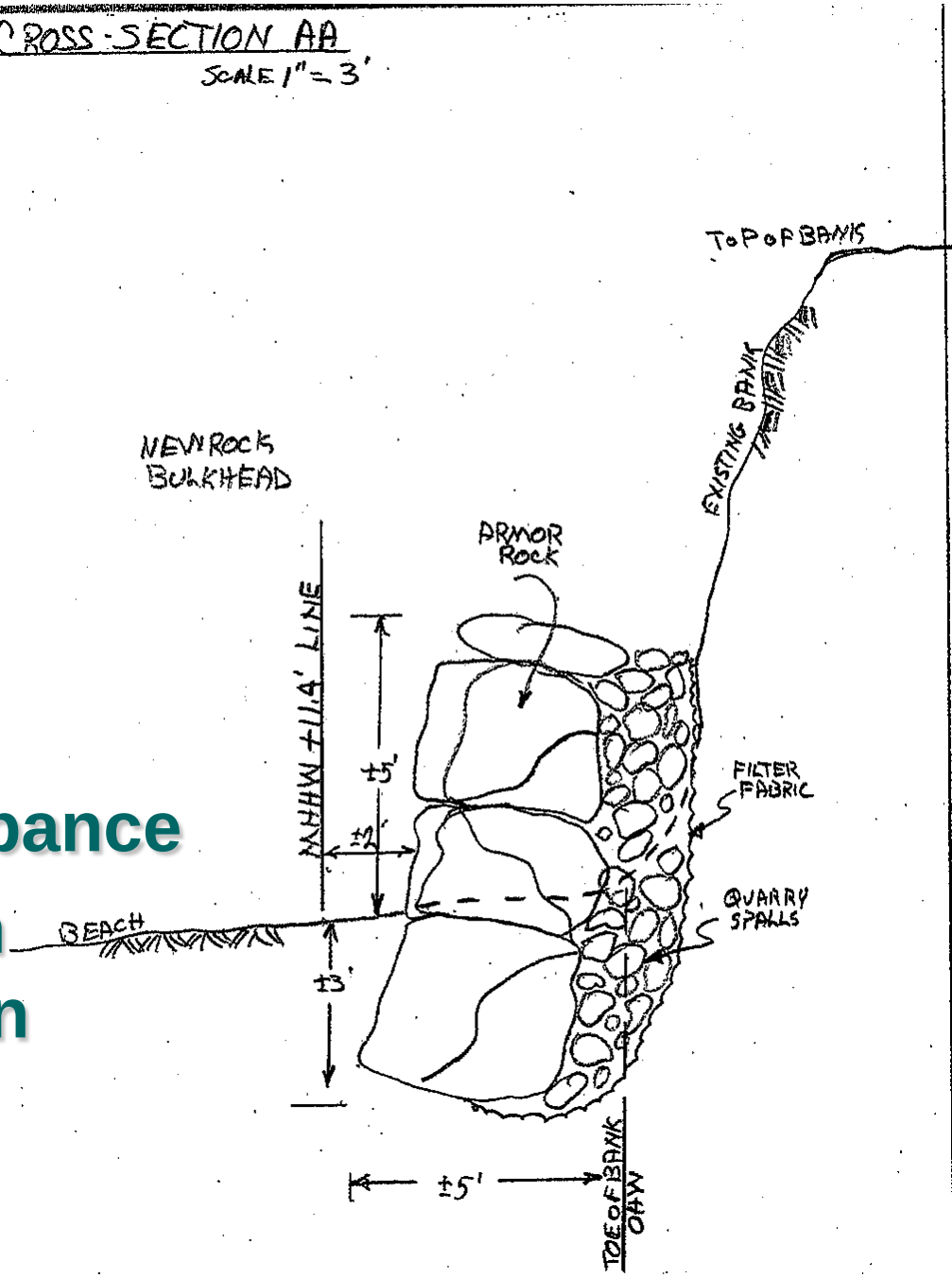
- New Bulkhead
- Repair
- Emergency

HITACHI

Typical Design

- Accuracy?
- One size fits all?
- Geotech Report?
- Alternatives?
- Bank / Veg. Disturbance
- Construction often looks different than design



Geotechnical Reports

- **Significant driver for decision makers**
- **No formal standards**
  - Need to be developed
- **Highly variable**
- **Typical issues**
  - Clear problem statement
  - Thorough review of all factors of influence
  - Erosion rate estimates
  - Factor of safety calculations and figures
  - Evaluation of alternatives

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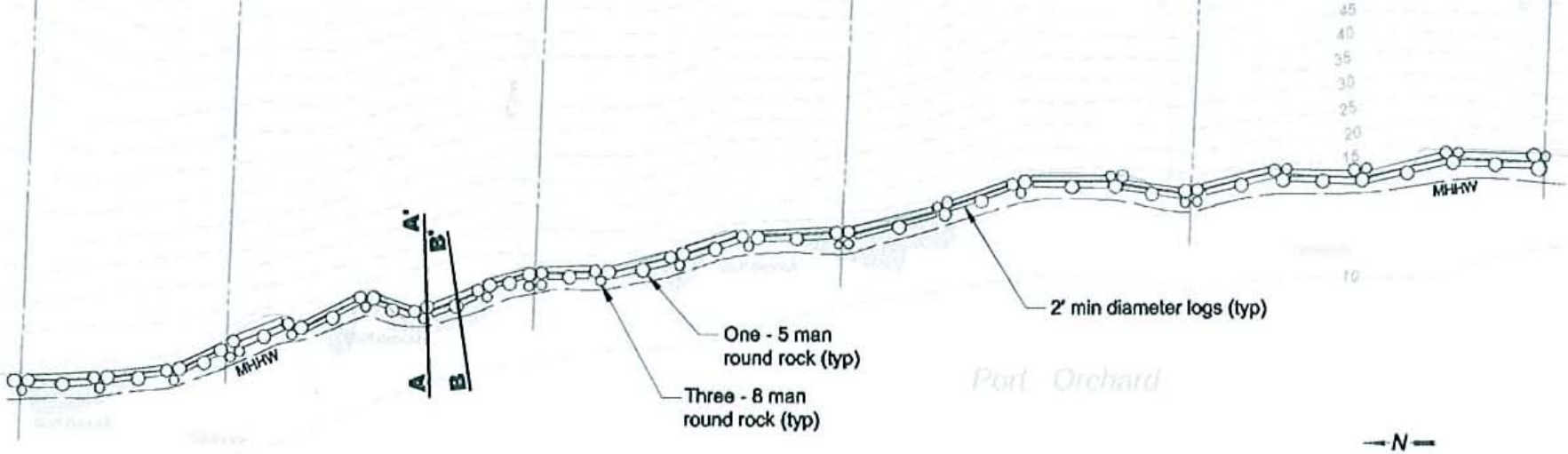
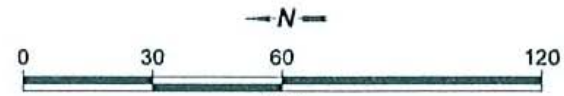
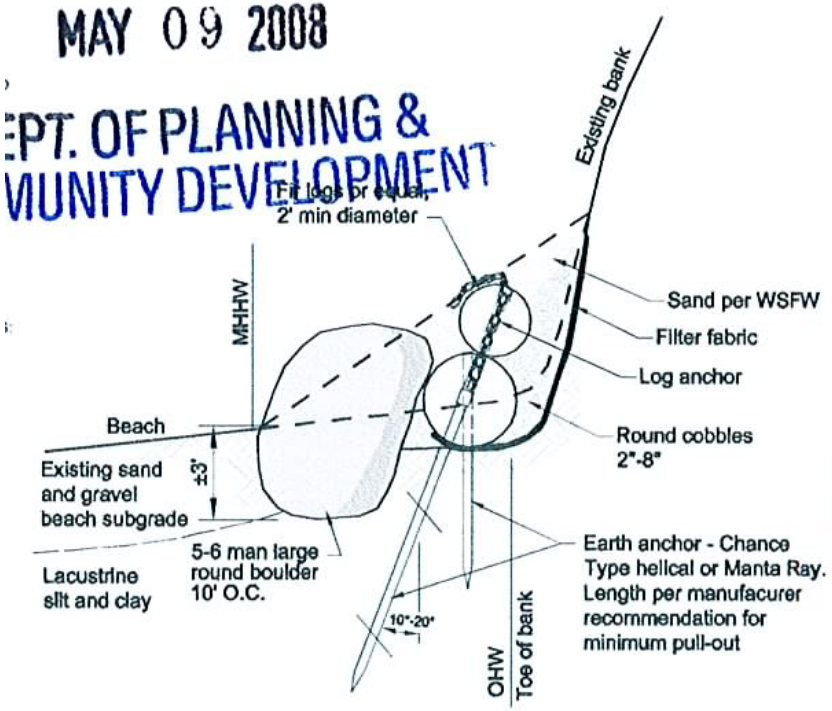


Site Plan

Scale: 1" = 30'-0"

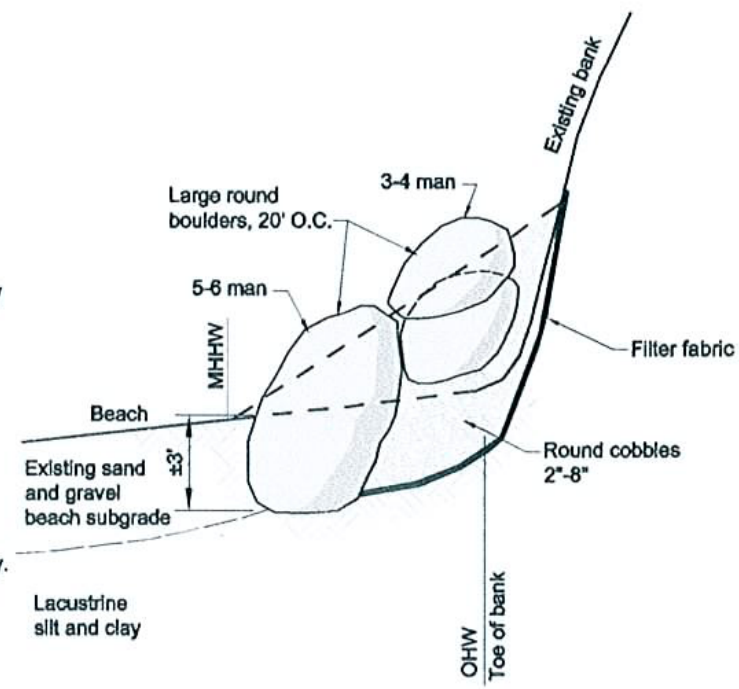


RECEIVED
MAY 09 2008
EPT. OF PLANNING &
MUNITY DEVELOPMENT



Cross Section A-A'

Not to scale



Cross Section B-B'

Not to scale

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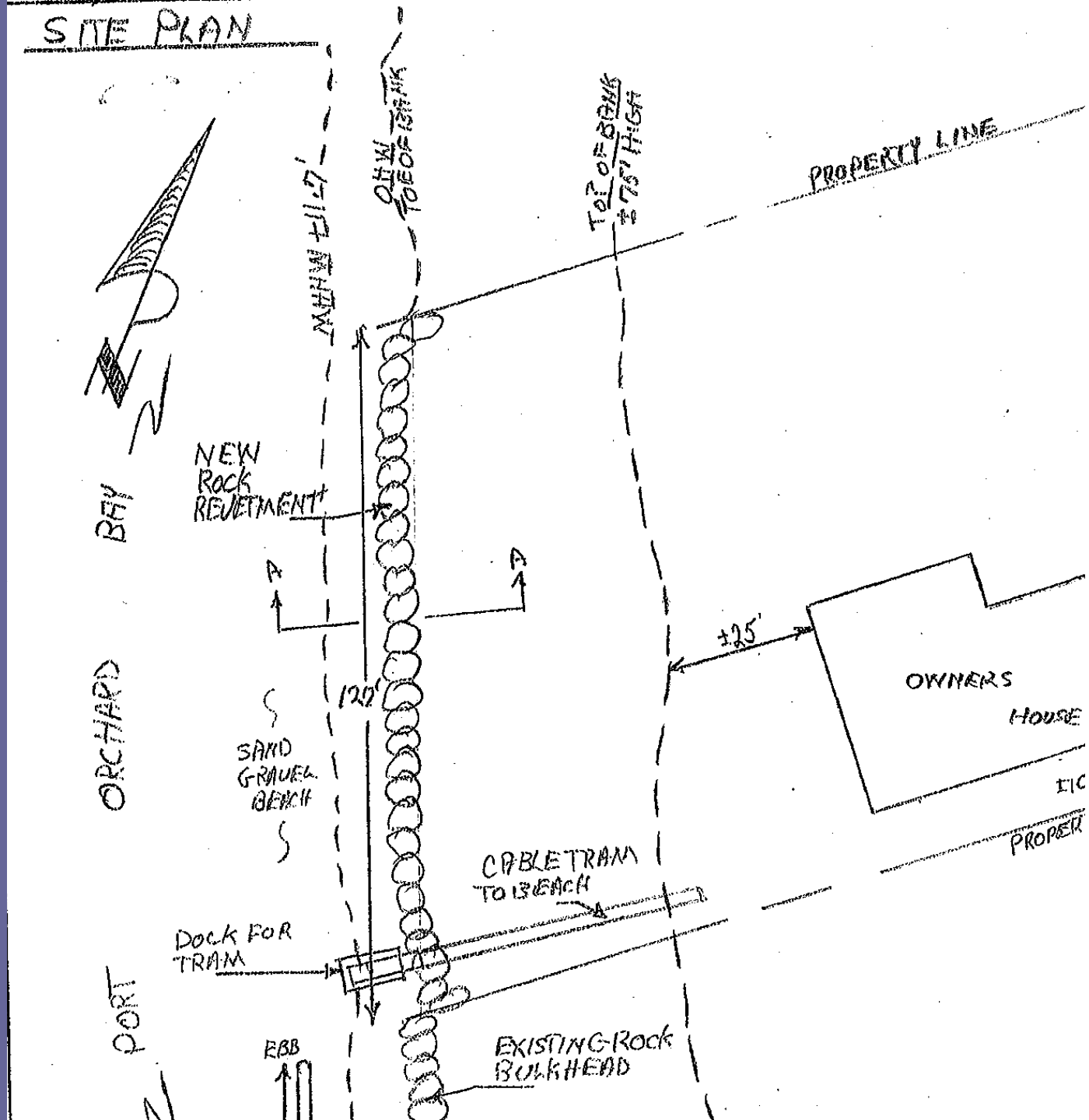
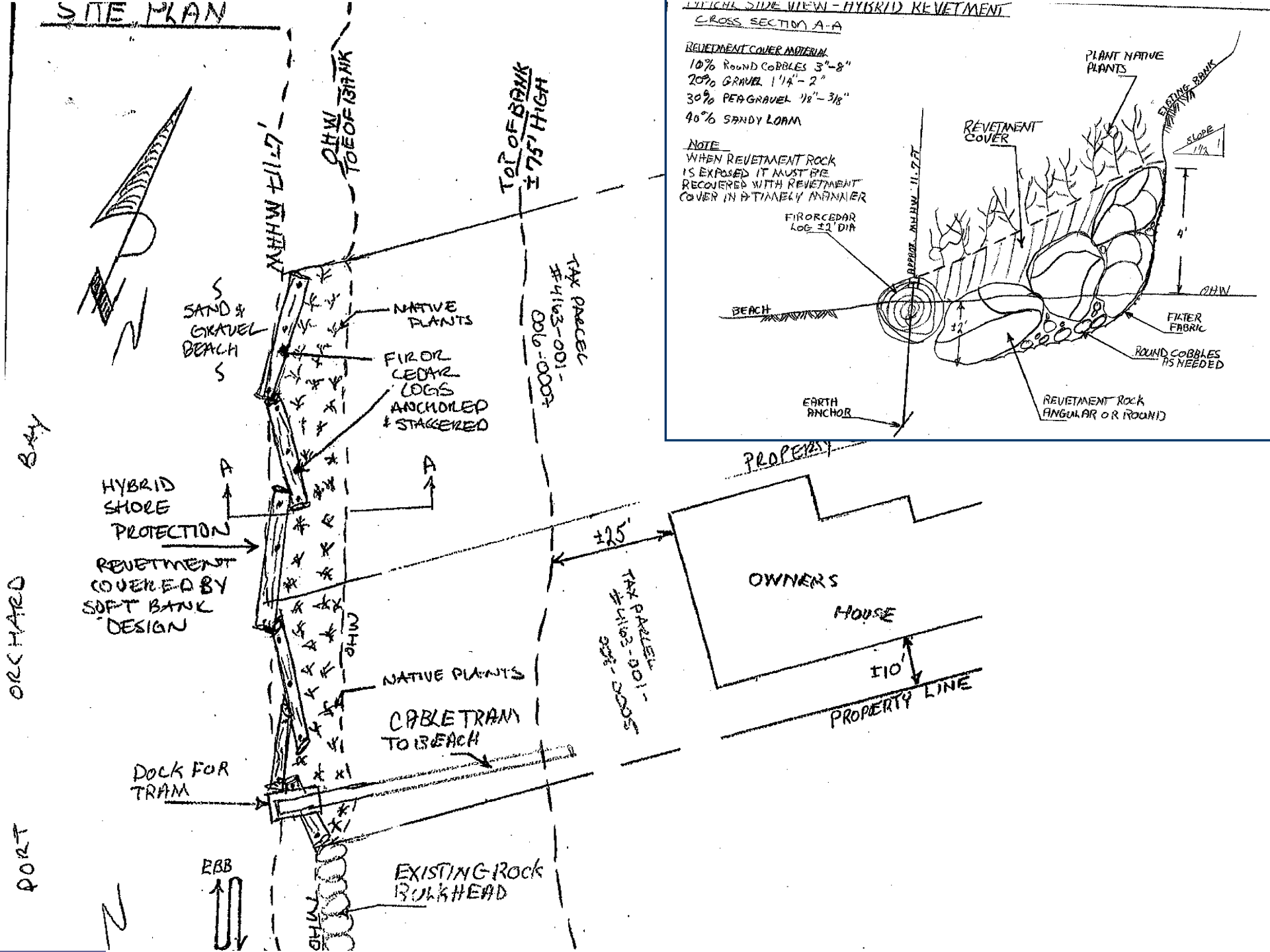
SITE PLAN


MHHW ±11.7'
OHW TOE OF BANK
TOP OF BANK ±7.5' HIGH
PROPERTY LINE
NEW ROCK REVETMENT
A
A
122'
±25'
OWNERS HOUSE
SAND GRAVEL BEACH
CABLE TRAM TO BEACH
DOCK FOR TRAM
EXISTING ROCK BULKHEAD
EBB
BAY
ORCHARD
PORT

SITE PLAN



TYPICAL SIDE VIEW - HYBRID REVETMENT

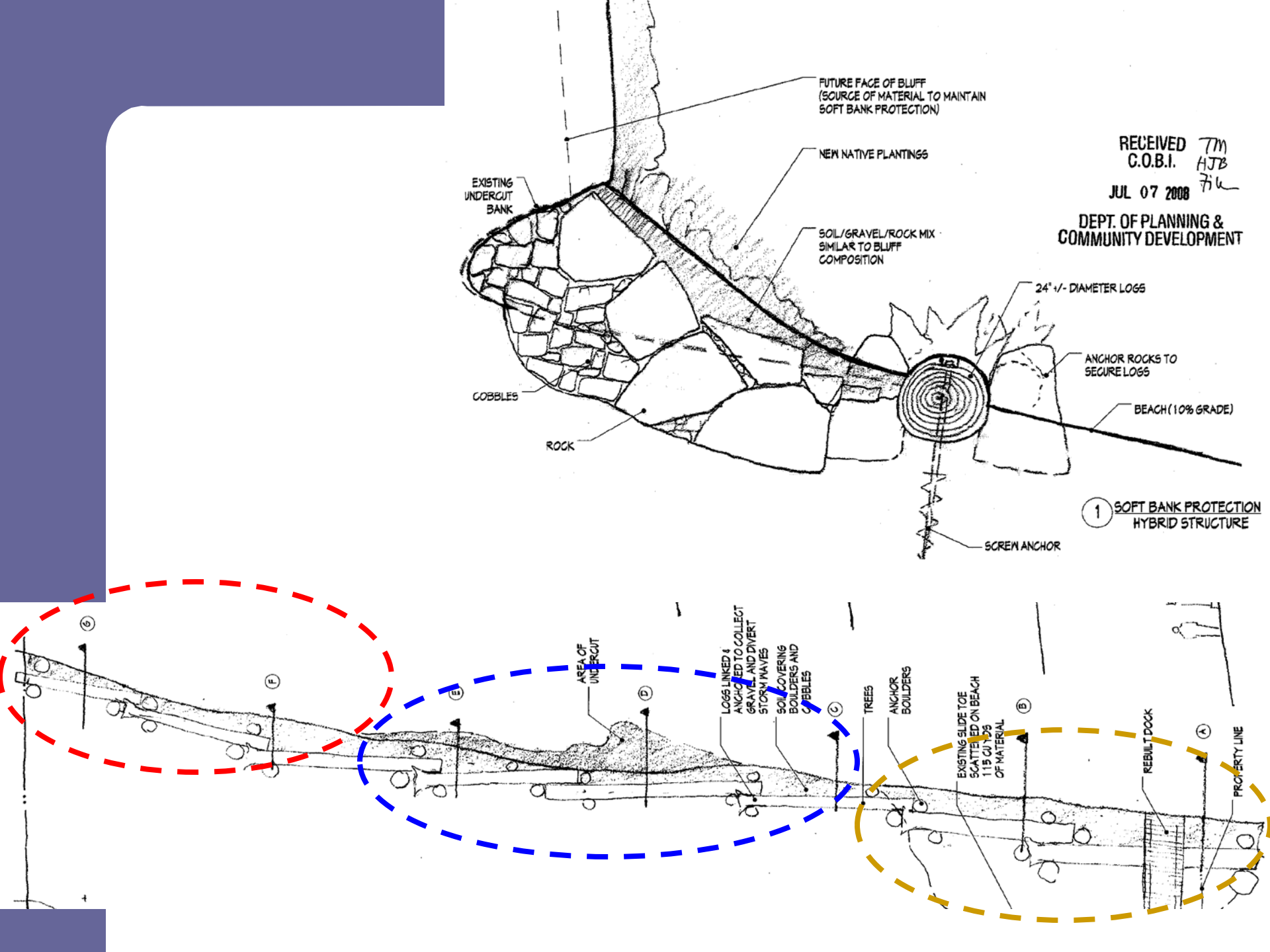
CROSS SECTION A-A

REVETMENT COVER MATERIAL

10% ROUND COBBLES 3"-8"
20% GRAVEL 1 1/4"-2"
30% PEA GRAVEL 1/8"-3/8"
40% SANDY LOAM

NOTE

WHEN REVETMENT ROCK IS EXPOSED IT MUST BE RECOVERED WITH REVETMENT COVER IN A TIMELY MANNER


FUTURE FACE OF BLUFF (SOURCE OF MATERIAL TO MAINTAIN SOFT BANK PROTECTION)
NEW NATIVE PLANTINGS
EXISTING UNDERCUT BANK
SOIL/GRAVEL/ROCK MIX SIMILAR TO BLUFF COMPOSITION
24" +/- DIAMETER LOGS
ANCHOR ROCKS TO SECURE LOGS
COBBLES
BEACH (10% GRADE)
ROCK
SCREW ANCHOR
1 SOFT BANK PROTECTION HYBRID STRUCTURE
RECEIVED C.O.B.I. JUL 07 2008
DEPT. OF PLANNING & COMMUNITY DEVELOPMENT
AREA OF UNDERCUT
LOGS LINKED & ANCHORED TO COLLECT GRAVEL AND DIVERT STORM WAVES
SOIL COVERING BOULDERS AND COBBLES
TREES
ANCHOR BOULDERS
EXISTING SLIDE TOE SCATTERED ON BEACH 115 CU YDS OF MATERIAL
REBUILT DOCK
PROPERTY LINE

Local Needs & Recommendations

- **Increase capacity & expertise** (funding, training & retention)
- **Network of available experts**
- **Integrated permitting across agencies**
- **Standards for technical analysis**
  - Geotechnical & Mitigation
- **Compliance and performance monitoring**
- **Streamline restoration permitting**
  - Beware of wolfs in sheep's clothing
- **Strong influences on decision makers to say "yes"**
  - Need clear guidance
  - Support when tough decisions are challenged
- **Reduce the degree of separation between property owners and managers** (intermediaries?)

Local Needs & Recommendations

- **Ecosystem based management guidance (planning) & BMPs (implementation)**
  - Avoiding creating bad rules that are hard to change
  - Putting parcel-specific decisions in landscape context (cumulative effects)
  - Precautionary Principle
- **Eco-Geographical based planning**
  - Nested & scalable management landscapes
  - Understanding of value within larger regional domains
  - Socio-economically strategic
    - Development Cycles (upland land use & armoring)
    - Legacy vs. new development
- **Adaptive management**
  - Integrated/coordinated and scalable
- **Brutal honesty about unknowns and uncertainties**