Jan 1st, 12:00 AM - 12:00 AM

Armoring on Puget Sound: Progress towards a better baseline

Hugh Shipman
WA Department of Ecology, hugh.shipman@ecy.wa.gov

Jennifer Burke
Puget Sound Partnership

Randy E. Carman
Washington (State). Department of Fish and Wildlfie

Kurt L. Fresh
Northwest Fisheries Science Center (U.S.)

Shoreline Armoring on Puget Sound: Progress towards a better baseline

Hugh Shipman WA Ecology

Jen Burke, PS Partnership

Kurt Fresh, NOAA NWSC

Randy Carman, WDFW

Salish Sea Ecosystem Conference

Vancouver BC
13-15 April 2016

Objectives

- **Accurate characterization of the extent and distribution of shoreline armoring on Puget Sound**
  - **Where is it occurring?**
  - **What does it look like?**

- **Improved ability to assess change in armor over time**

- **Better tools for supporting resource managers and restoration groups**

- *PS Partnership Vital Signs*
- *Restoration Groups*
- *State/local regulatory programs*
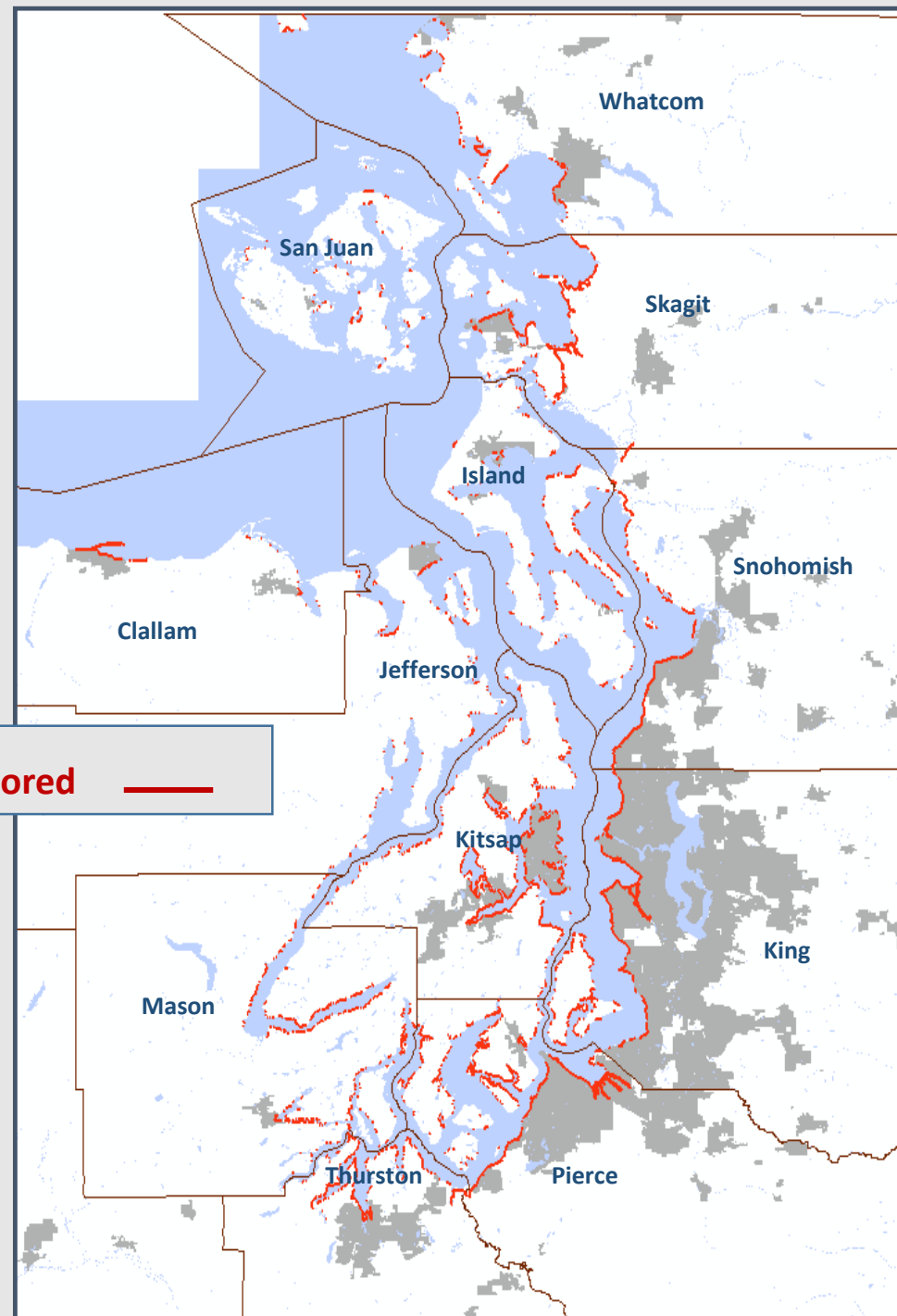
Shoreline Armoring on Puget Sound

- **Bulkheads, seawalls, revetments**

- **Widespread, common practice**
  - **Focus typically residential, but occurs in broad suite of contexts**

- **Purpose**
  - **Erosion control**
  - **Maintain coastal fill**
  - **Facilitate shoreline activities**

- **Wide range of Impacts:**
  - **Physical/Geologic**
  - **Ecologic/biologic**
  - **Human/social**

Armoring Extent:
What we think we know

- **Overall**
  - **About 27% armored**

- **Regional variability**
  - **Urban, rural, industrial**
  - **Transportation corridors**

- **Apples and Oranges**
  - **Beaches, Ports, Marshes**
  - **Wide variety of structures**

Source: PSNERP 2011

Armored ———

Landforms and Armoring

- **How we think about armor is different in different settings**
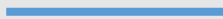

Bluff

Estuary

Artificial Shoreline
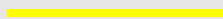
Landforms on Puget Sound

LEGEND

Bluffs   **BEACHES**

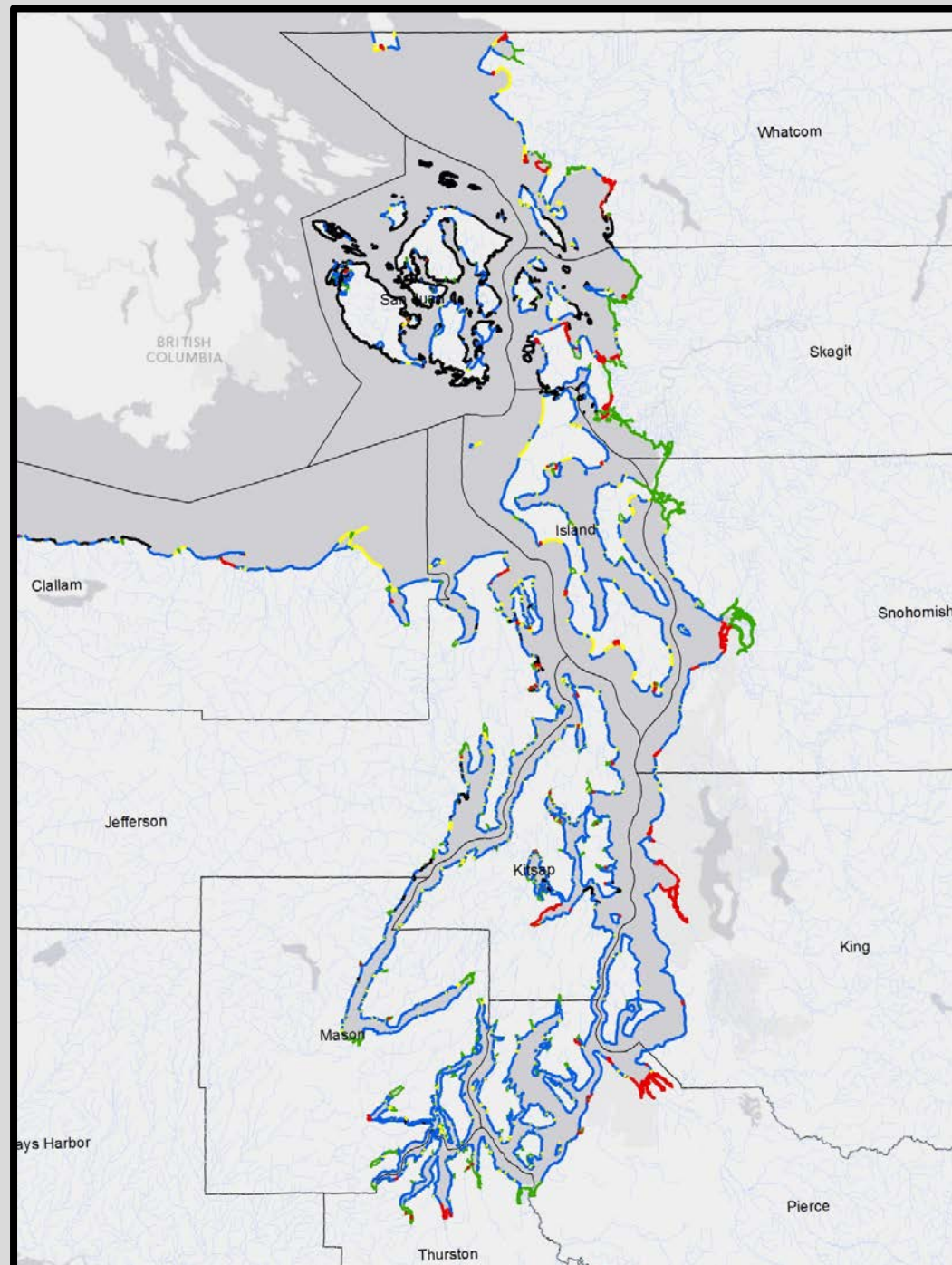**Spits and barrier beaches**

Rocky

Deltas and Estuaries

Artificial

Source: CGS 2013 (Feeder Bluff Dataset)

Two primary datasets

- **PSNERP[1] (Change Analysis, 2011)**
  - Based on low resolution datasets
  - Landforms interpretation based largely on GIS rules
  - Armor– from wide variety of local inventories

- **CGS[2] (Feeder Bluff/Social Marketing, 2013)**
  - Higher spatial resolution, much field-based
  - Shore type (geomorphic interpretation, often in field)
 - Armor (on beaches - observed; elsewhere - from PSNERP)

Camano Island

Camano Island
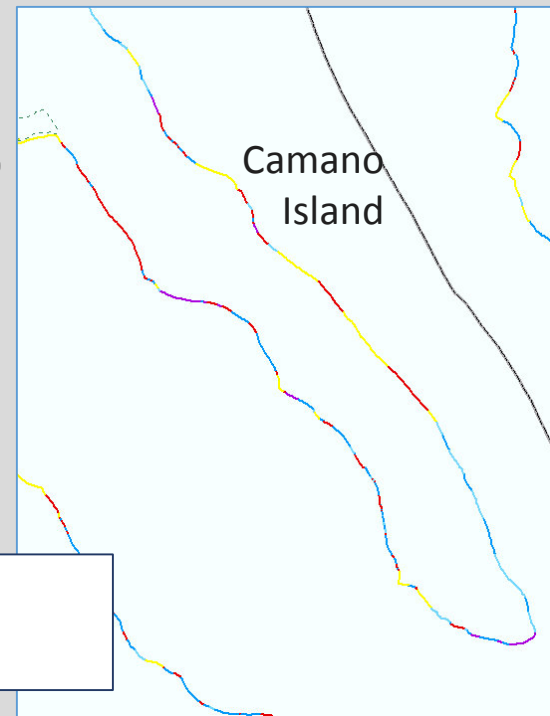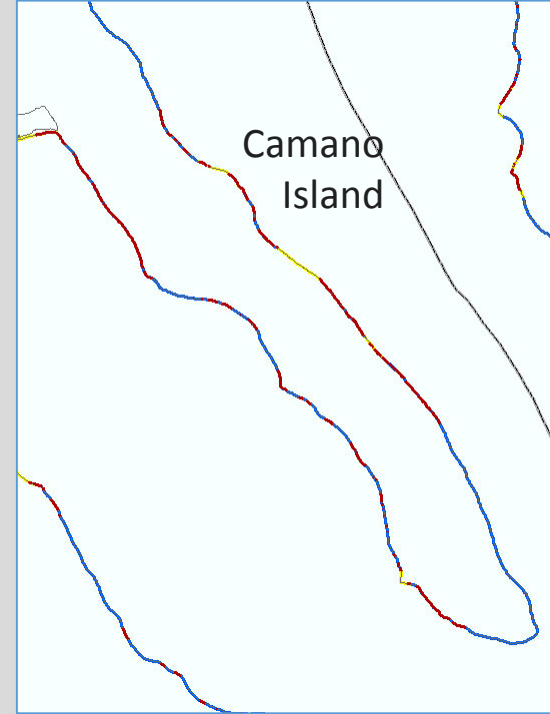
PSNERP[1] = **Puget Sound Nearshore Ecosystem Restoration Project**
CGS[2] = **Coastal Geologic Services**

Armoring Distribution (by Landform)

Preliminary summary based on combining PSNERP and CGS datasets

CGS 2013

	Length (km)	Armored (km)	Armor (%)
Beaches (Bluffs and Barriers)	2226	758	34.1
Rocky	684	18	2.6
Artificial	304	223	73.4
Low Energy (Lagoons and Estuaries)	462	78	16.9
Delta (Large Rivers)	299	54	18.1
TOTAL	3975	1131	28.4

CGS 2013

PSNERP 2011

Armored **Unarmored**

Beaches

Rocky

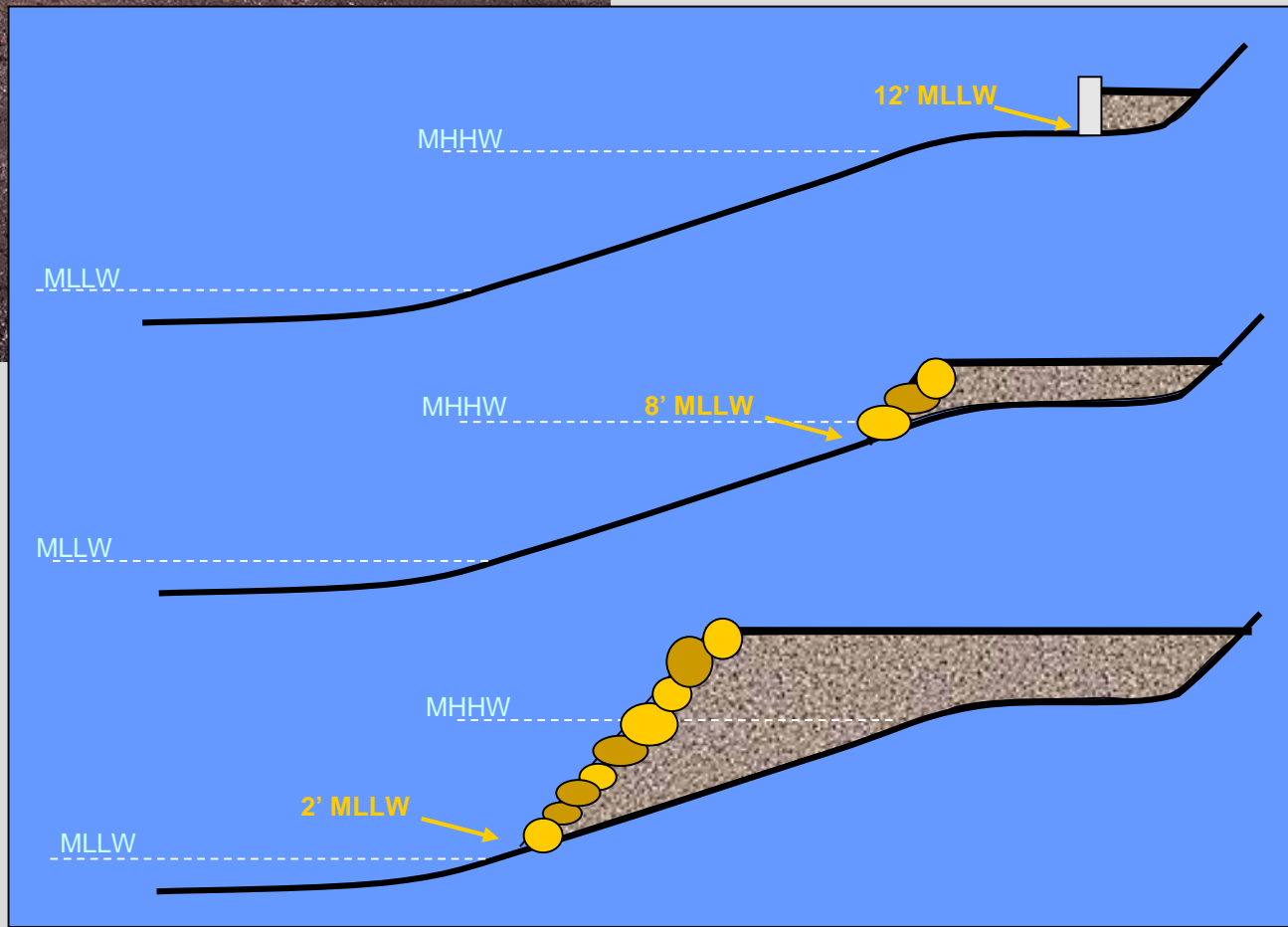Artificial

Low Energy

Delta

3975 km
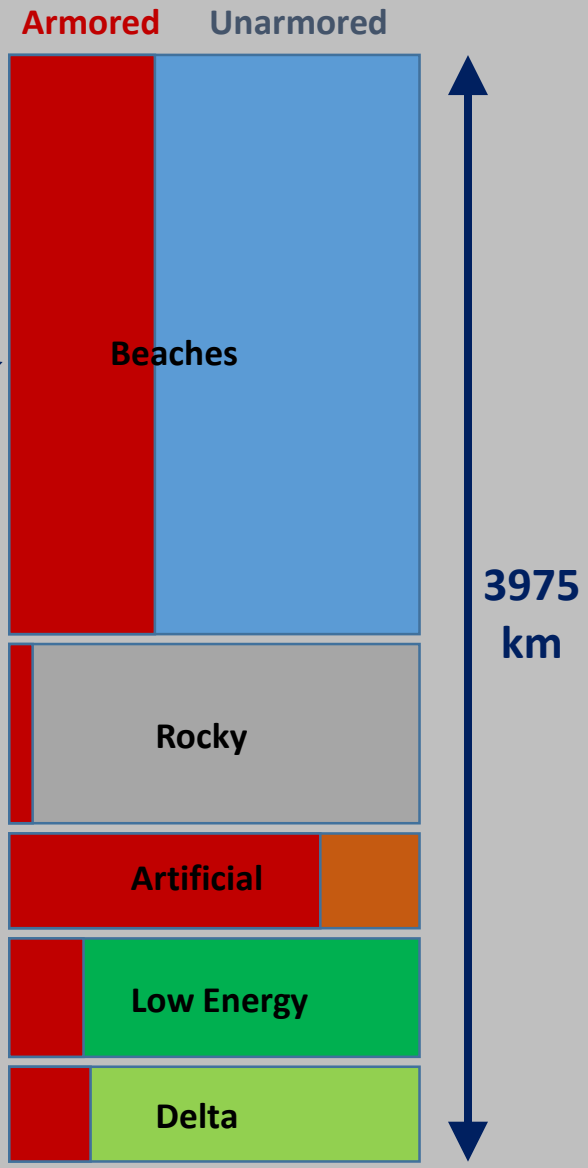
Characterizing Armor

- **Design/Construction**

- **Condition/Vintage**

- **Encroachment/Elevation of toe**

- *Soft or hybrid structures*

Not All Armor is Equal!

Encroachment

Glendale, South Whidbey

12' MLLW

MHHW

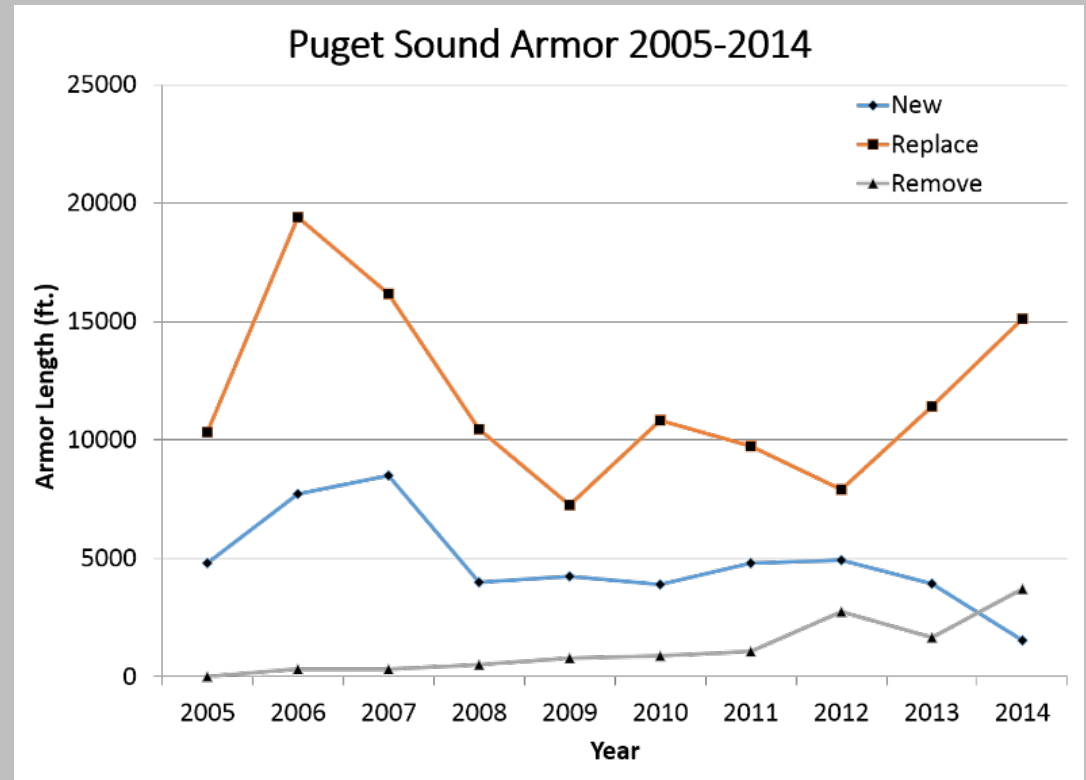MLLW

MHHW   8' MLLW

MLLW

MHHW

2' MLLW

MLLW

Developing a Baseline:
Observing Trends over Time

- Assess rates of:
  - **New armoring**
  - **Restoration**
  - **Adoption of softer stabilization**

- Limited by:
  - **Low rates of change**
    (requires precision)
  - **Lack of descriptive attributes**
    (Need measure of *quality*)

1 mile new armor per year =
0.1% of 1000 miles of shoreline

Baseline precision might be +/- 5% ??

Next Steps

- **Compile and evaluate current integrated geodatabase**
  - **Fill obvious gaps**
  - **Make data available**

- **Workshop in mid-2016**
  - **Involve tribes, local government, and restoration groups**
  - **Identify gaps, clarify needs and applications**

- **Develop recommendations**
  - **Monitoring protocols**
  - **Key Attributes**

Summary

- **Need better data**
  - **Understand distribution**
  - **Assess trends**

- **Improve characterization**
  - **Setting / Landform**
  - **Type / Attributes**

- ***Start moving towards a more comprehensive monitoring program***