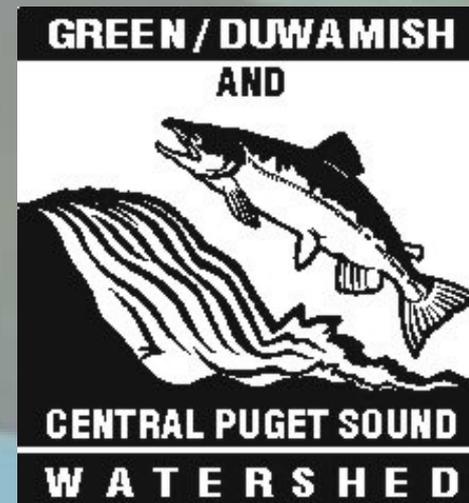


*(Watershed Resource Inventory Area)*

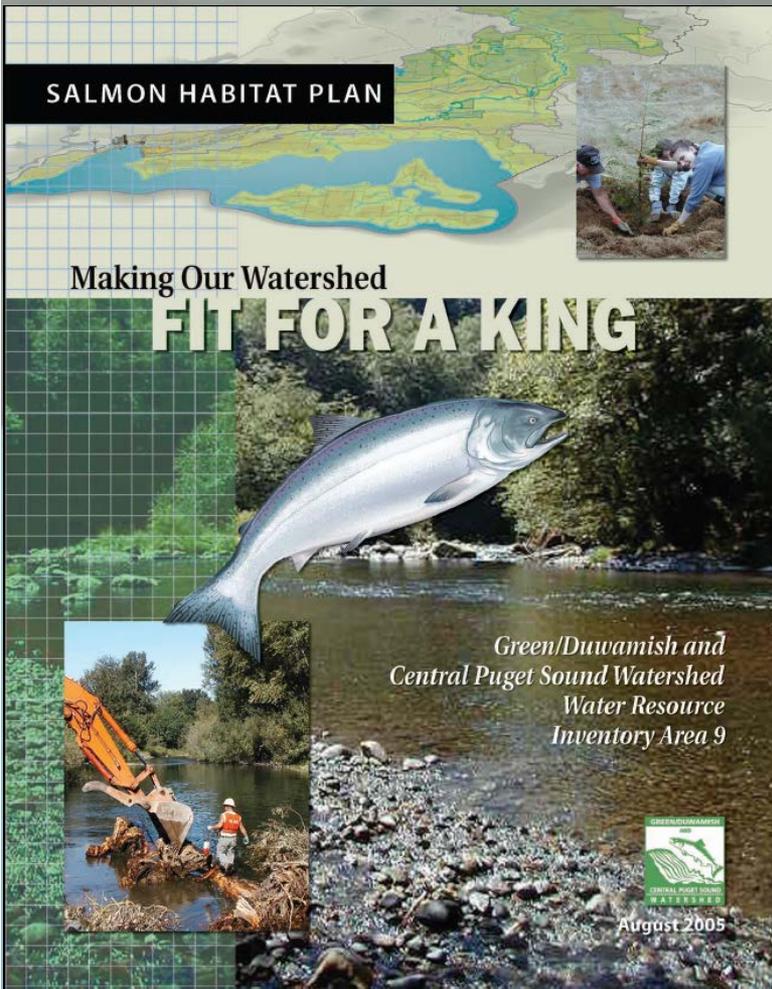
# The WRIA 9 Marine Shoreline Monitoring and Compliance Pilot Project



*“This project received funding from the EPA under an agreement with WDFW. The contents do not necessarily reflect the views and policies of the EPA. Mention of trade names or commercial products does not reflect endorsement”.*

# Why do this?

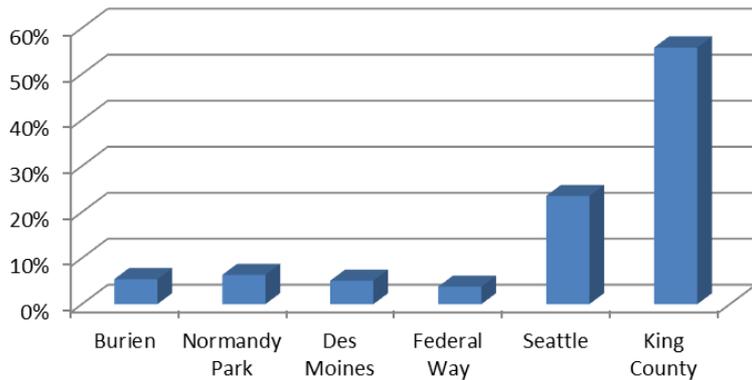
- WRIA 9 Salmon Plan calls for:
  - No new shoreline armoring
  - Monitoring shoreline condition
  - “Improve enforcement of existing land use and other regulations”
- WRIA 9—2010 Status and Trends monitoring report called for boat based surveys vs. aerial photo analysis



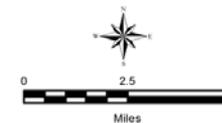
# Project Area

- 92 miles
  - 52 miles rural (48% armored)
  - 40 miles urban (83% armored)

% of WRIA 9 shoreline



## WRIA 9 Marine Shoreline Monitoring and Compliance Project





# Characterized changes

## Type of change

- Shoreline armoring
- Docks/overwater structures
- Groins
- Clearing/grading
- Structures (houses/sheds/stairs)
- Aquaculture operations
- Other changes

## Status

- New
- Major Repair
- Minor Repair

## Material

- Wood
- Rock
- Concrete

# In the office

QA/QC & verification of changes  
by comparing to other photos

## Vertical Aerial photos

2005  
2007  
2009 (2 sets)  
2010  
2012

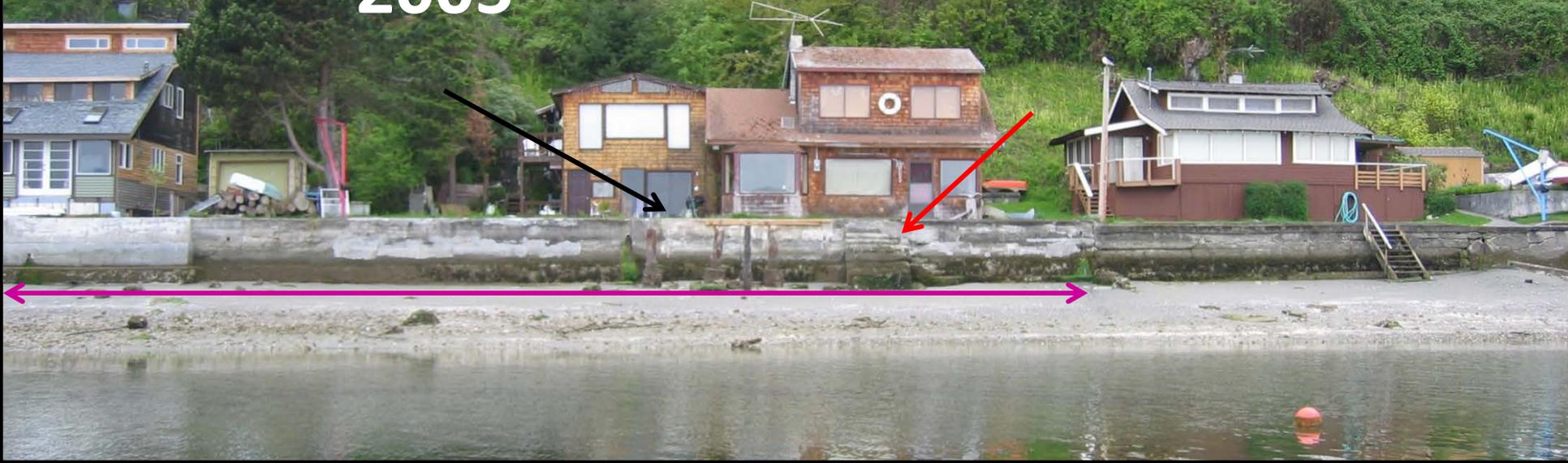
## Oblique photos

2001 }  
2006 } DOE  
2011 King County

## Field photos

2004  
2006  
2011 (Vashon only)

2005



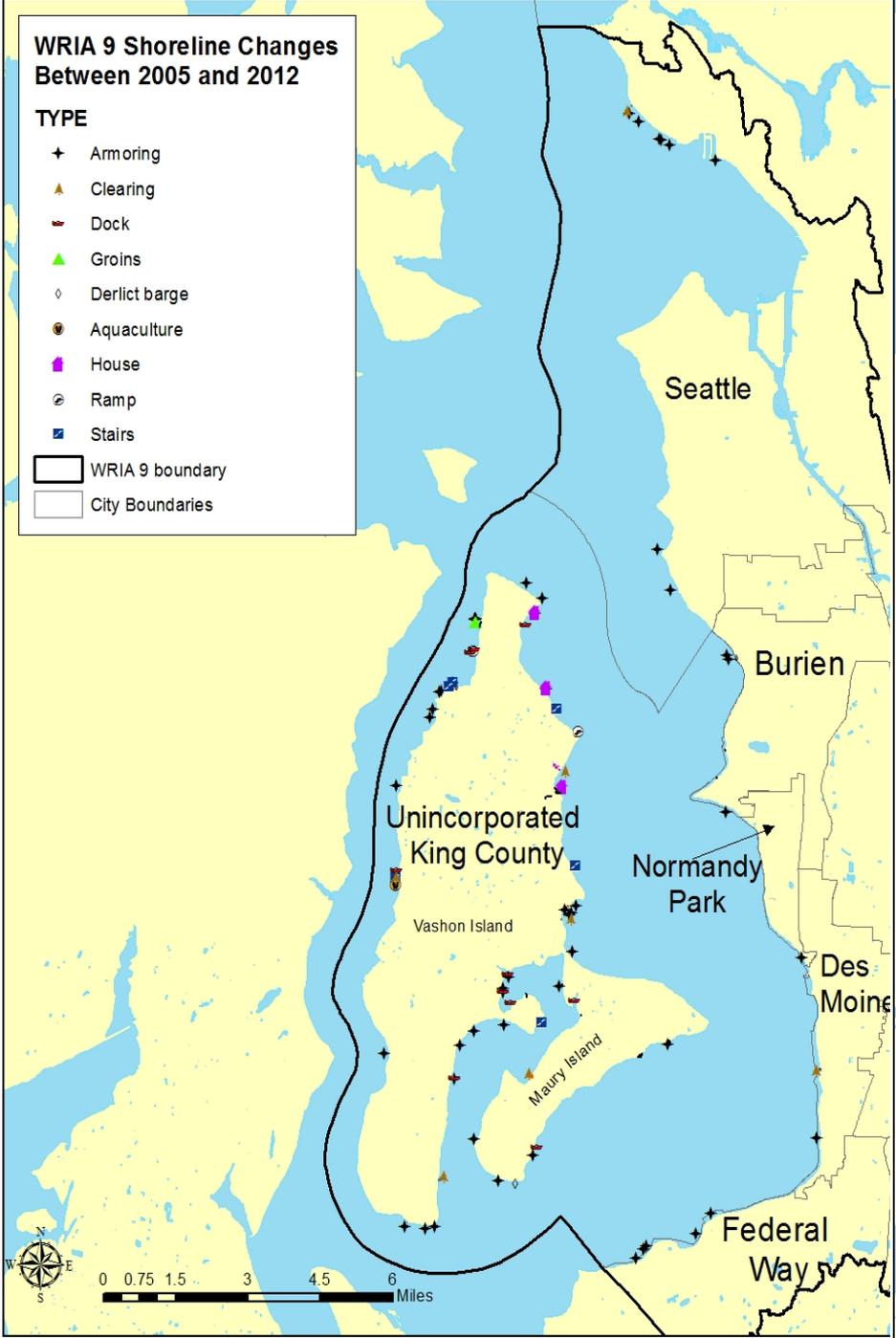
2012



### WRIA 9 Shoreline Changes Between 2005 and 2012

#### TYPE

- + Armoring
- ▲ Clearing
- ▬ Dock
- ▲ Groins
- ◇ Derlict barge
- Aquaculture
- House
- ⊗ Ramp
- Stairs
- ▭ WRIA 9 boundary
- ▭ City Boundaries



### WRIA 9 Shoreline Changes Between 2012 and 2013

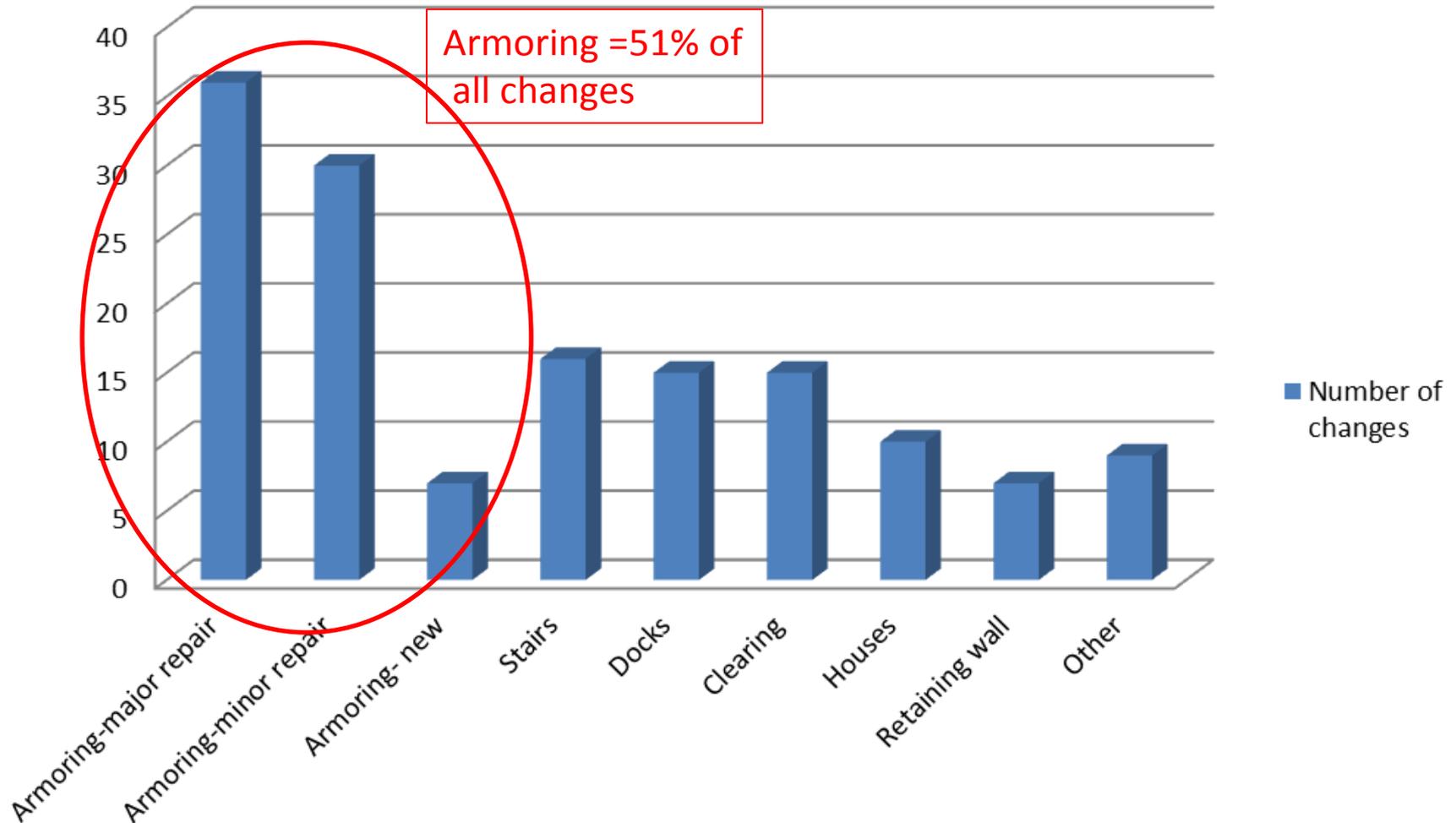
#### Change Type

- + Armoring
- ▲ Clearing
- ▬ Deck
- ▬ Dock
- House
- ⊗ Ramp
- ▭ Retaining wall
- Stairs
- Other
- ▭ City boundaries
- ▭ WRIA 9 boundary



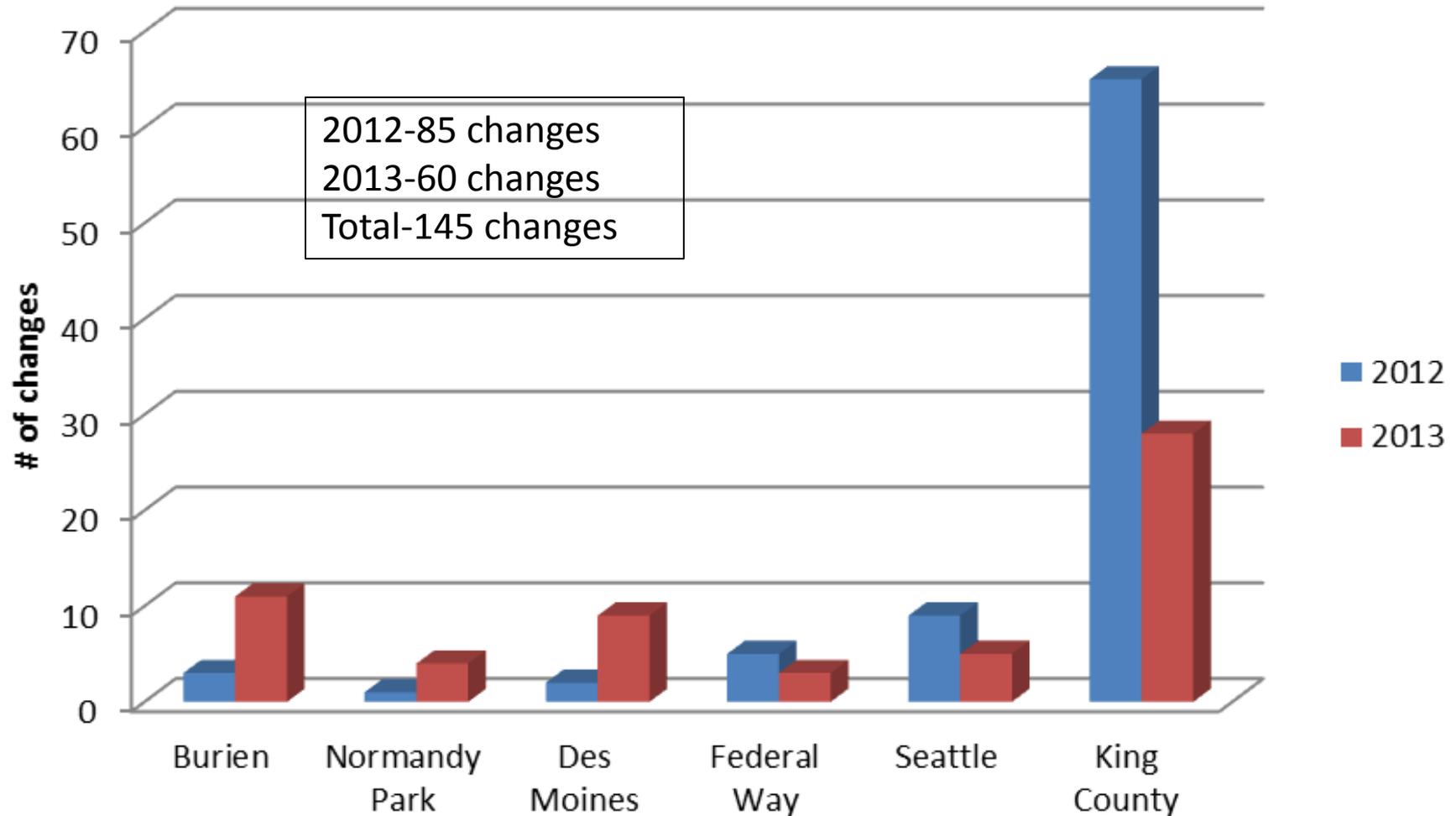
# What type of changes were seen?

## Number of different shoreline changes



# Where were they seen?

## Number of & where changes occurred



The 2012 survey looked at changes between 2004 and September of 2012 (~8 years)

The 2013 survey looked at changes between Sept 2012 and June of 2013 (less than a year)

2012-85 changes

2013-60 changes

*Why so many changes in both surveys?*

2013 survey

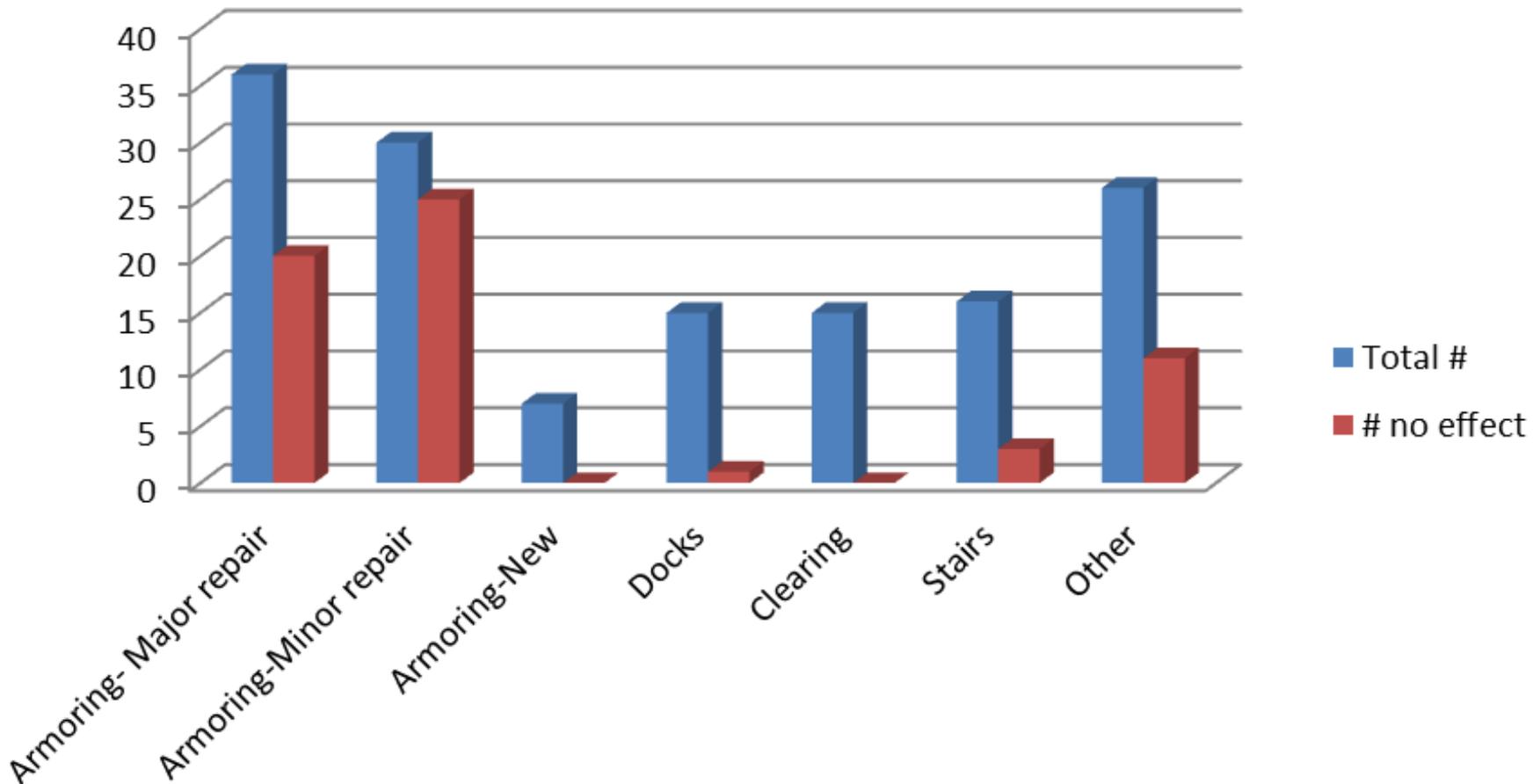
- ~10% were older, missed in the 2012 survey
- Highest tide on record between surveys
- Very wet fall/winter
- Changes easier to pick out due to newness

# Evaluated impacts to ecological & physical processes

- Sediment delivery to beach
- Sediment transport along the beach
- Light energy (day & night)
- Organic material accumulation (input & storage)
- Wave energy
- Water Quality
- Forage fish spawning habitat displacement
- Hazards to public safety

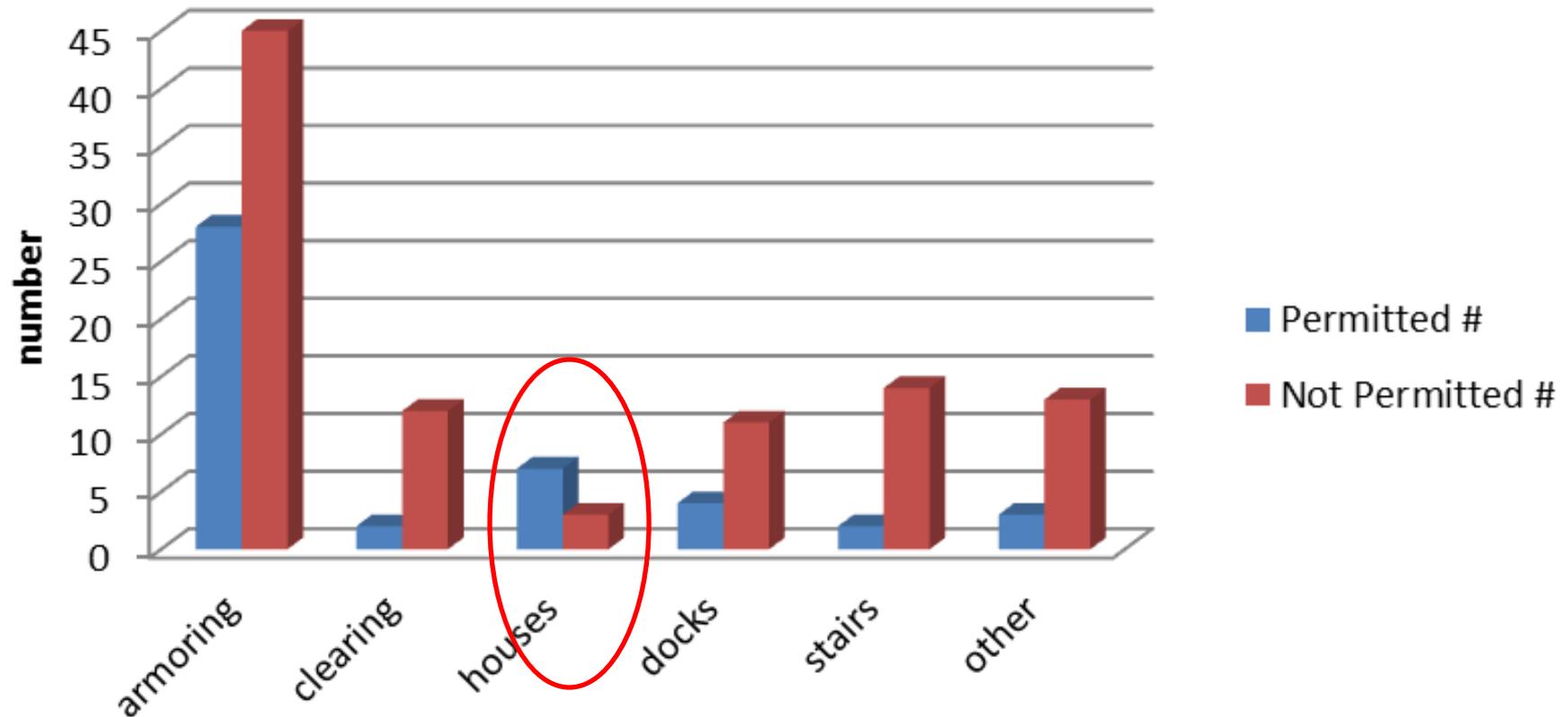
# How many and what type had no apparent effect?

## # of changes with no apparent effect



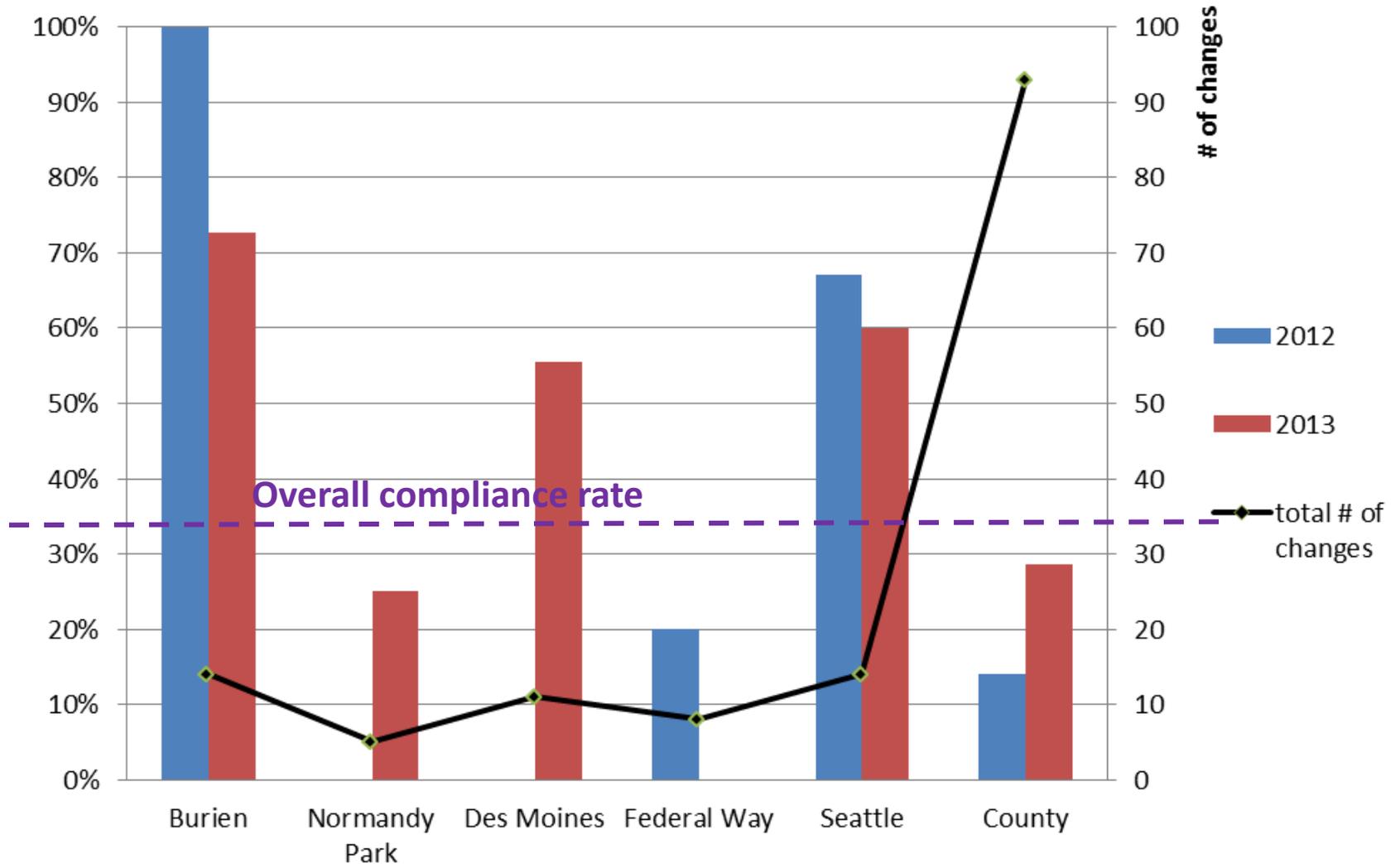
# Evaluated if changes in condition had a City or County permit for the change

## Compliance by type of change



# Evaluated if changes in condition had a local permit, *continued*

## Compliance by jurisdiction



# Enforcement

- Original intent was to track enforcement outcomes of unpermitted changes
- Time constraints did not allow a thorough evaluation of enforcement activities
- Of the 96 total unpermitted changes in shoreline condition, eight of them were already in enforcement process when they were encountered during the surveys



# Take Aways

- **Between 2005 and June 2013**
  - ~1500 feet of shoreline armoring was removed via restoration projects
  - ~1570 feet of new shoreline armoring was constructed

# PSP has a goal of a net decrease in shoreline armoring from 2011-2020 across Puget Sound

- In 2005-2010 permitted projects resulted in:
  - Net gain of 6 miles of new armoring
  - 14.5 miles of repair/replacement
- Assuming compliance rates similar to WRIA 9:
  - 60% for new armor—net gain actually = 8.5 miles
  - 40%\* for repairs—repairs would be around 23 miles

\* 40% is the approximate average compliance between minor and major repairs

# Take Aways

Between 2005 and June of 2013

- Even with CAOs that protect marine riparian areas, more trees and shrubs are being cleared than are being replanted/restored or naturally re-establishing

# Take Aways

- Most of the changes involved repairs to existing infrastructure



- Did not attempt to answer why people are or aren't getting permits

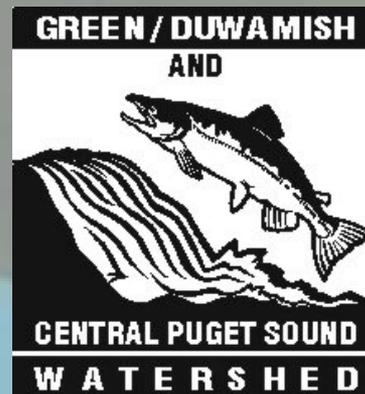
# Lower compliance rate compared to other areas of Puget Sound

- Bainbridge (80%) *Poster 433-Tim Quinn*  
&
- San Juan (50%)



09.10.2012

- To get entire report—google “WRIA 9 monitoring compliance”
- Thanks to the Puget Sound Marine and Nearshore Protection and Restoration Grant Program for selecting this project for funding
- Thanks to EPA and WRIA 9 for project funding and support



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