

(Watershed Resource Inventory Area)

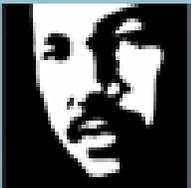


WRIA 9 Marine Shoreline Monitoring and Compliance Project Phase 2

Kollin Higgins

King County Department of Natural Resources and Parks

Science Seminar 2019



King County

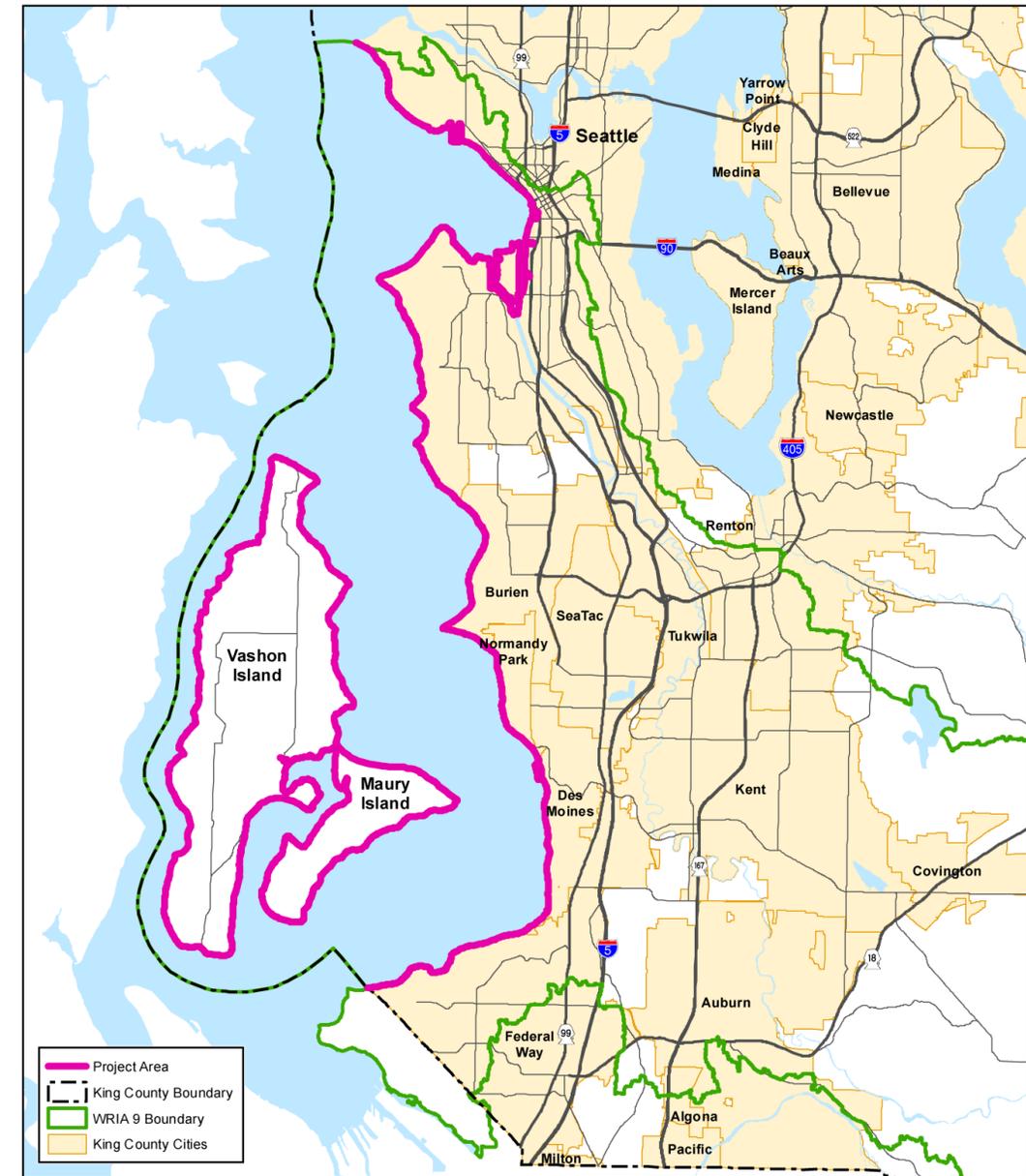
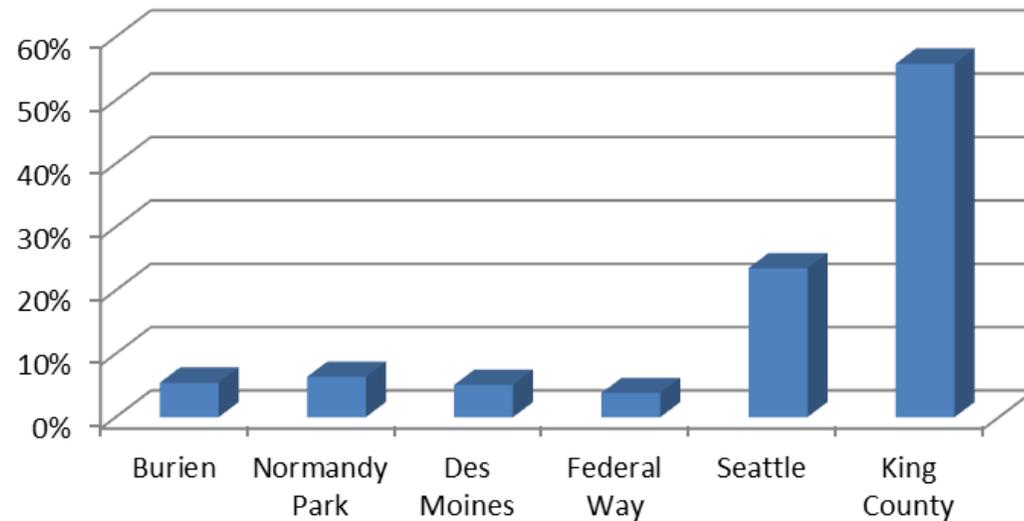
“This project received funding from the EPA under an agreement with WDFW. The contents do not necessarily reflect the views and policies of the EPA. Mention of trade names or commercial products does not reflect endorsement”.

Project Area

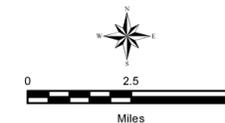
92 miles

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

% of WRIA 9 shoreline



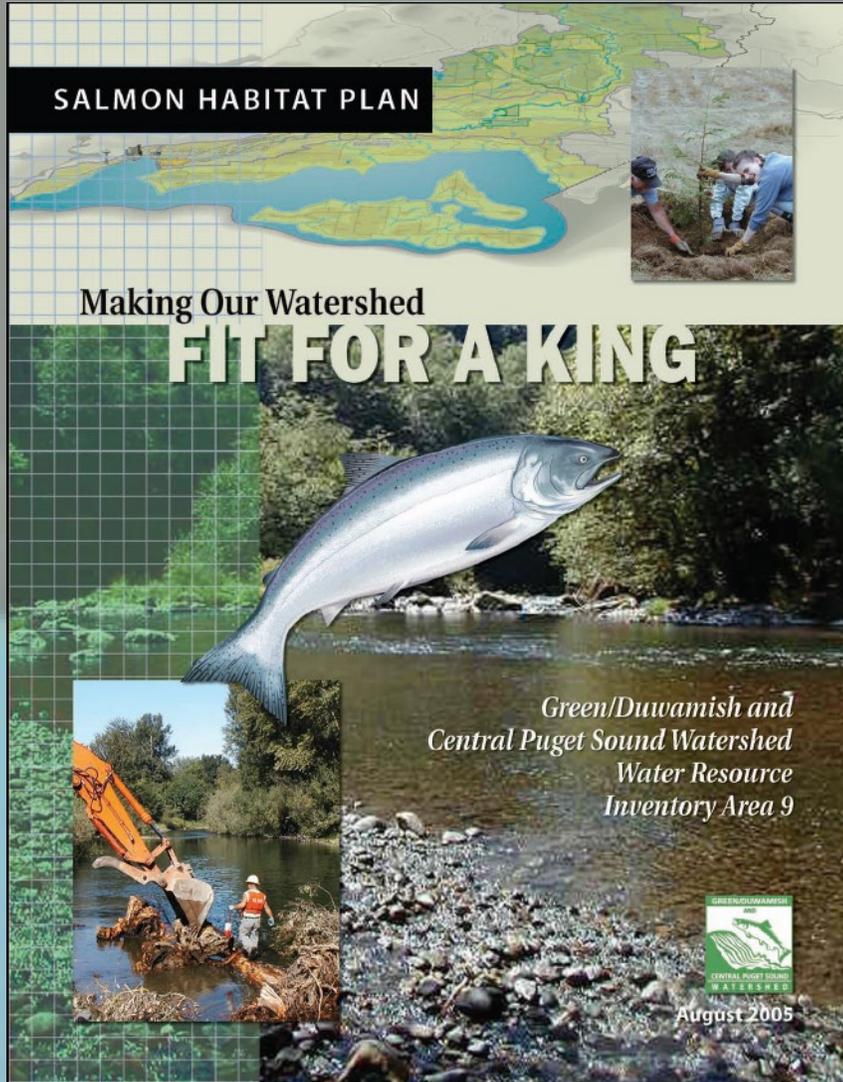
**WRIA 9 Marine Shoreline
Monitoring and
Compliance Project**



King County
Department of Natural Resources and Parks
Water and Land Resources Division

\\dnrpt1\Projects\WLRD\11095\WRIA9_grant.mxd KR

Why do this Project?



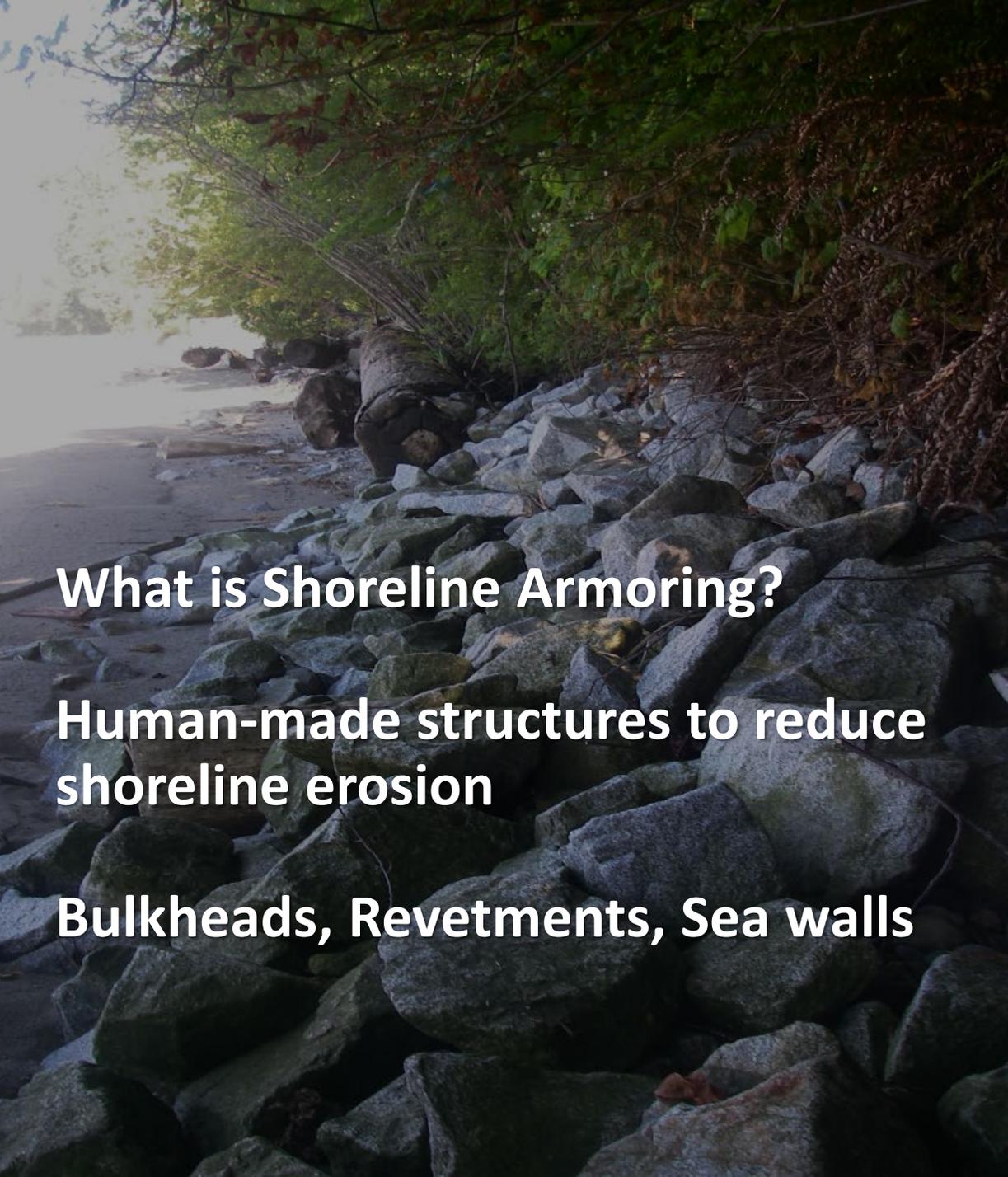
WRIA 9 Salmon Plan calls for:

- No new shoreline armoring
- Monitoring of shoreline condition
- “Improve enforcement of existing land use and other regulations”

PSP-Vital Sign Target-More armor removal than new by 2020

2012-2013 Pilot project found:

- Many repairs to existing armor
- Low compliance (no permits)
- New armor offset previous 10 years of restoration



What is Shoreline Armoring?

Human-made structures to reduce shoreline erosion

Bulkheads, Revetments, Sea walls



07.30.2015









07.14.20

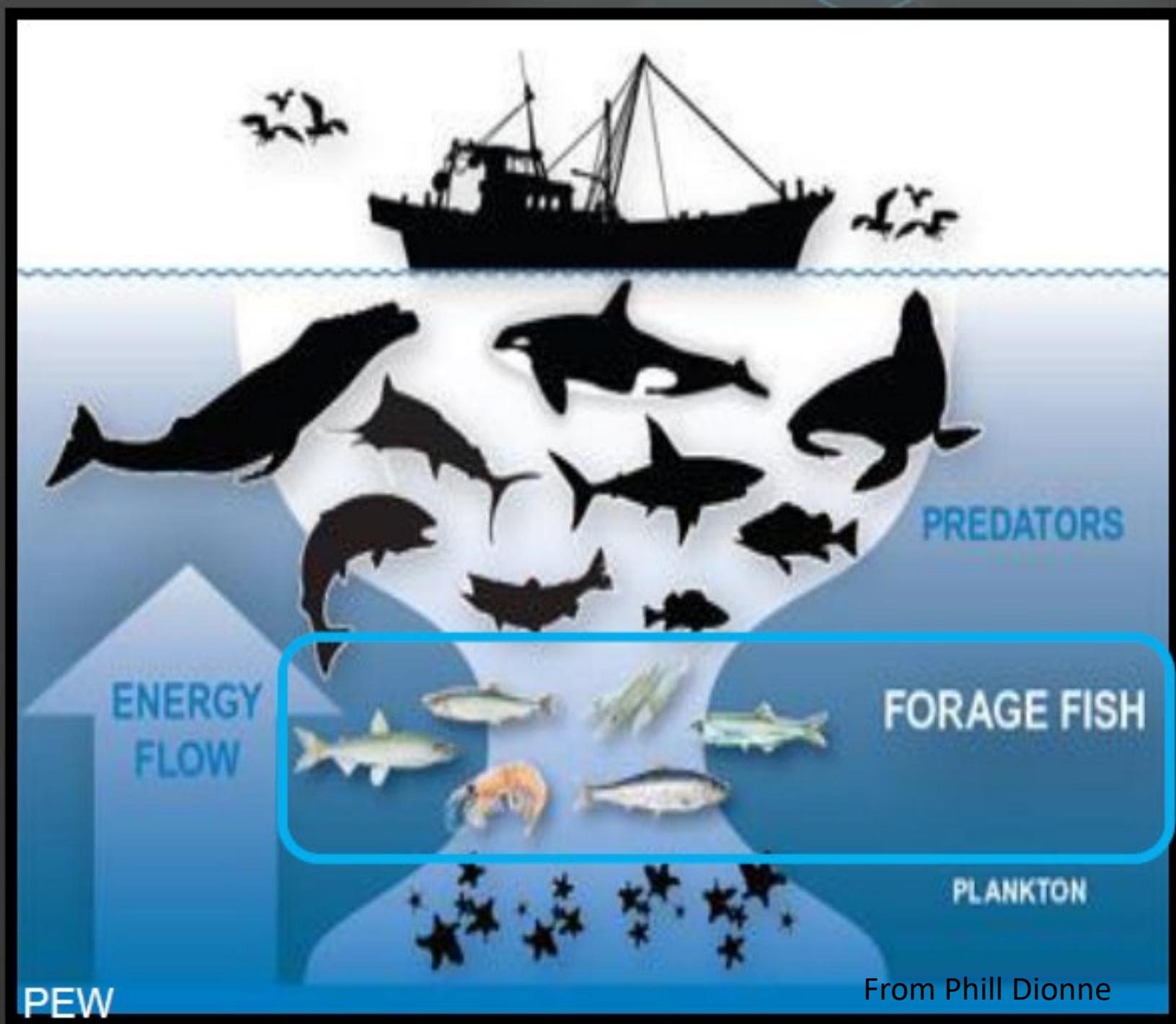




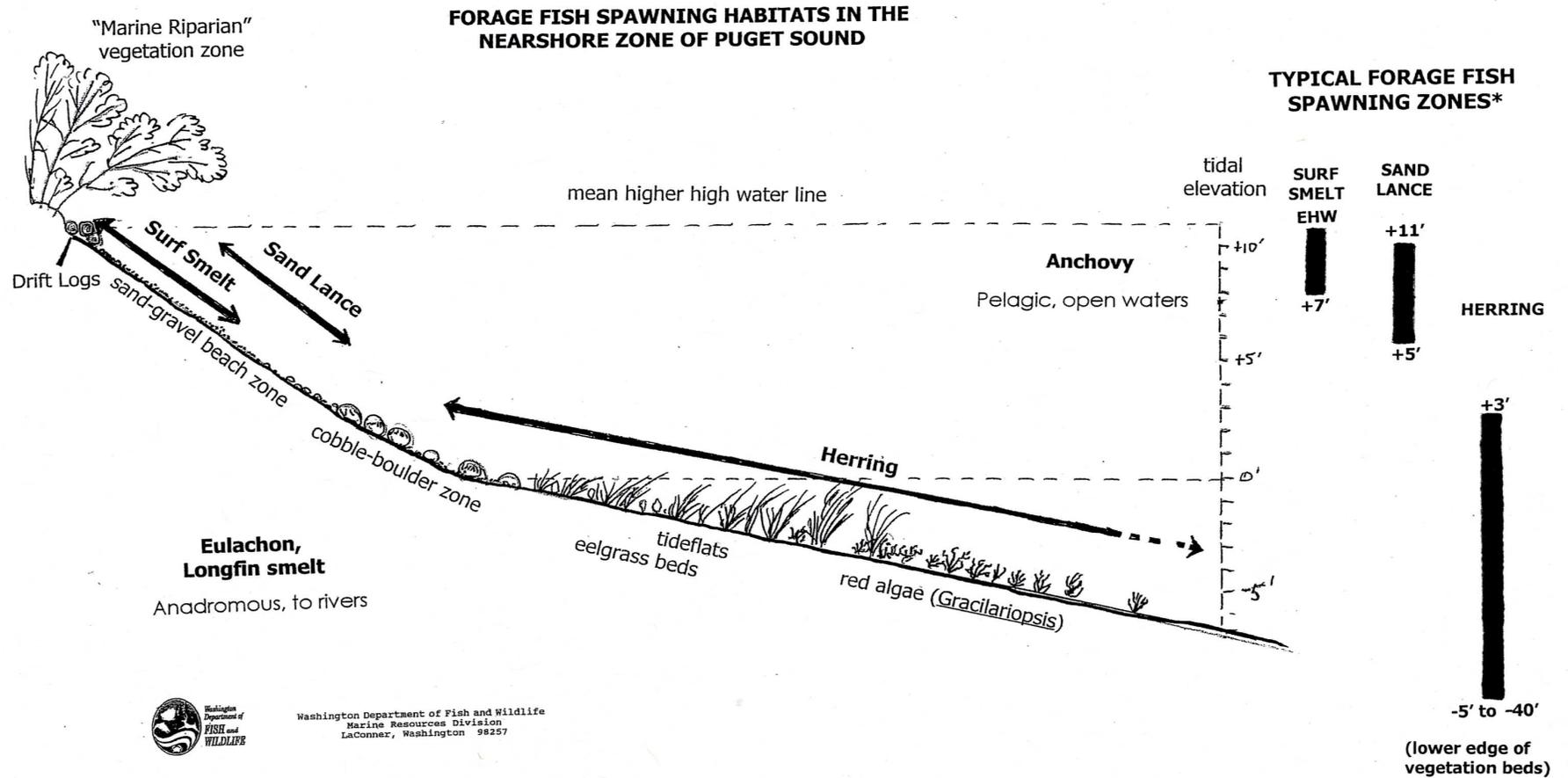
Why do we care?

Blocks *feeder bluffs* from feeding beaches





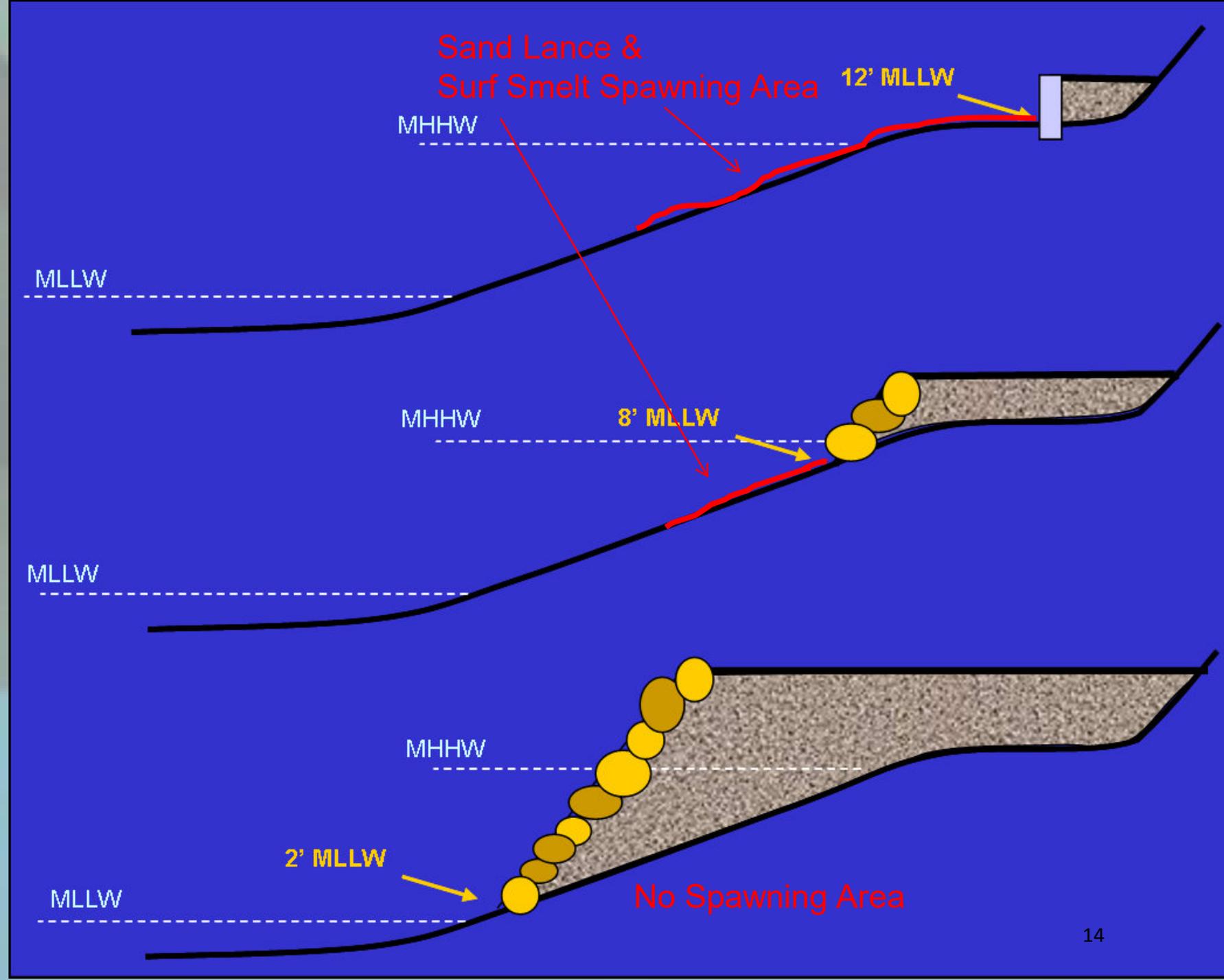
Forage fish spawn on upper beaches



Washington Department of Fish and Wildlife
 Marine Resources Division
 LaConner, Washington 98257

* Seattle District tidal elevations

Armor
displaces
forage fish
spawning
habitat &
juvenile
salmon
rearing
habitats

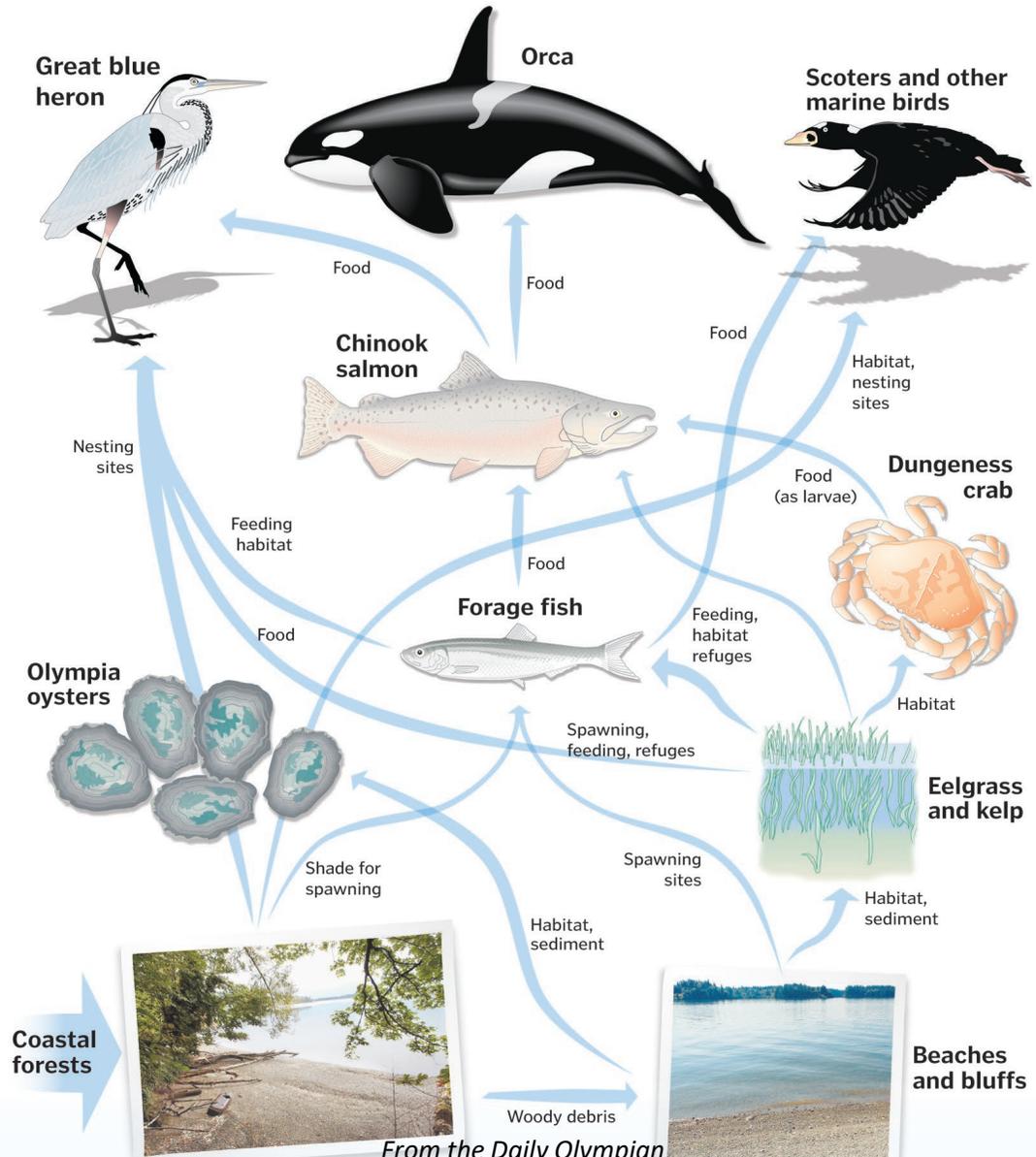


It's all connected

Puget Sound, with its rivers, estuaries and beaches, hosts a complex web of aquatic plant and animal life. Each part of this web is linked to every other part. Beaches are important spawning grounds for baitfish such as sand lance. They are home to clams and other shellfish, including the Olympia oyster. Young salmon and steelhead feed near beaches - or what biologists call the intertidal zone or the nearshore

environment. Clams, crabs and other shellfish burrow in and feed on healthy beaches. Eelgrass beds near beaches and estuaries are spawning and rearing grounds for important links in the food chain, such as herring and crabs. Young salmon, steelhead and cutthroat trout also hide and feed along the beaches, estuaries and eelgrass beds. Estuaries - where rivers and streams flow into Puget

Sound - often look like muddy, weedy messes, but they are really rich ecosystems and nurseries for many Puget Sound plants, fish and other animals. If the beaches and estuaries are barricaded with dikes and bulkheads, a reaction is set in motion that eventually leads to fewer eelgrass beds, fewer herring and sand lance, fewer salmon, fewer crabs and fewer orcas - in short, less of everything that defines what Puget Sound truly is.



From the Daily Olympian

Why do Phase 2?

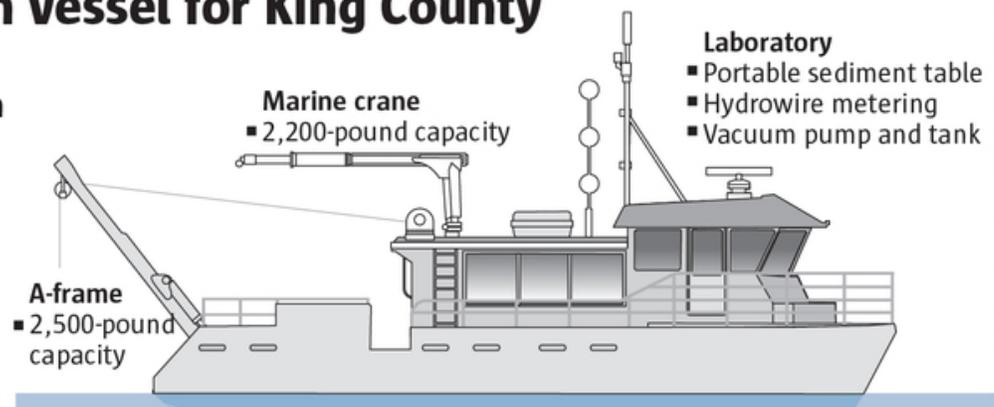
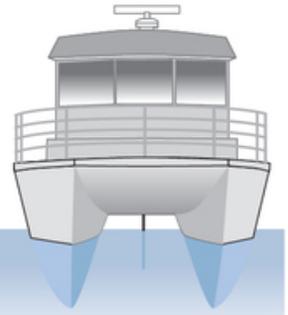
- Has the amount of shoreline armor gone \uparrow or \downarrow
- Pilot project-High visibility on Vashon, little to none in cities
- Anecdotally, some people changing their behavior



New research vessel for King County

**SoundGuardian
research catamaran**

▪ Cost: \$1.98 million



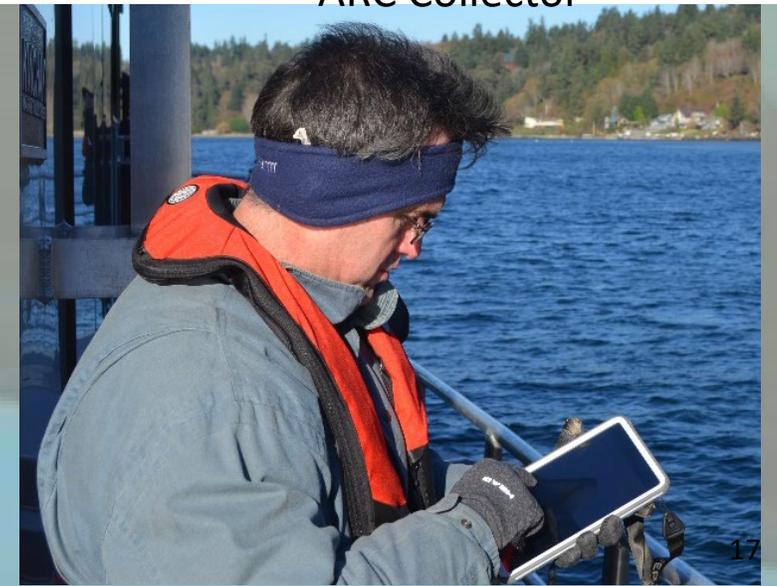
Length: 48 ft. Fuel capacity: 650 gallons
Beam: 18.8 ft. Fresh water capacity: 100 gallons
Draft: 3 ft. Passengers: 4 crew, 20 scientists



GPS capable camera



I-Pad mini with
ARC Collector



2016 Survey

- Initially 139 changes-
after QA/QC, 147

2018 Survey

- Initially 153 changes-
after QA/QC, 138





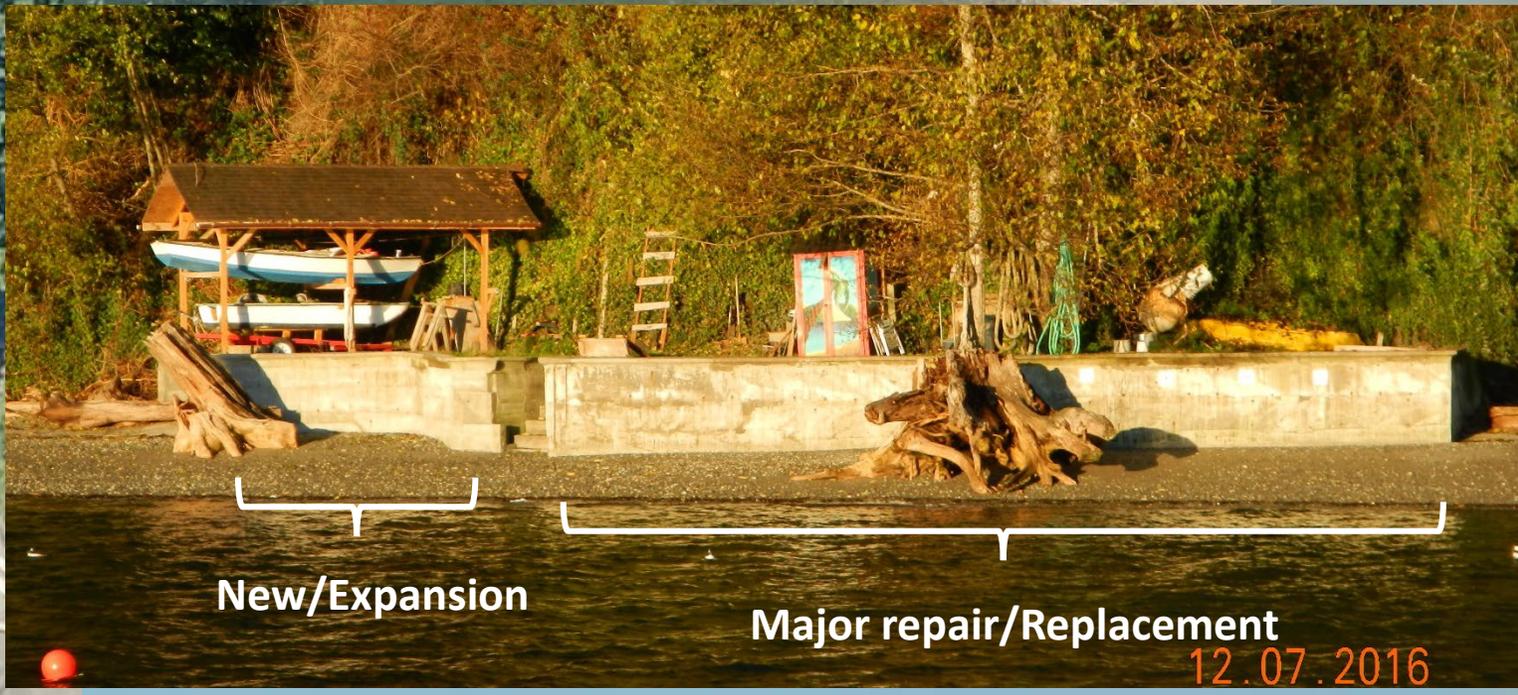
6-2-2013



3-7-2015



7-13-2013



New/Expansion

Major repair/Replacement

12.07.2016





12.06.2016



12.07.2016

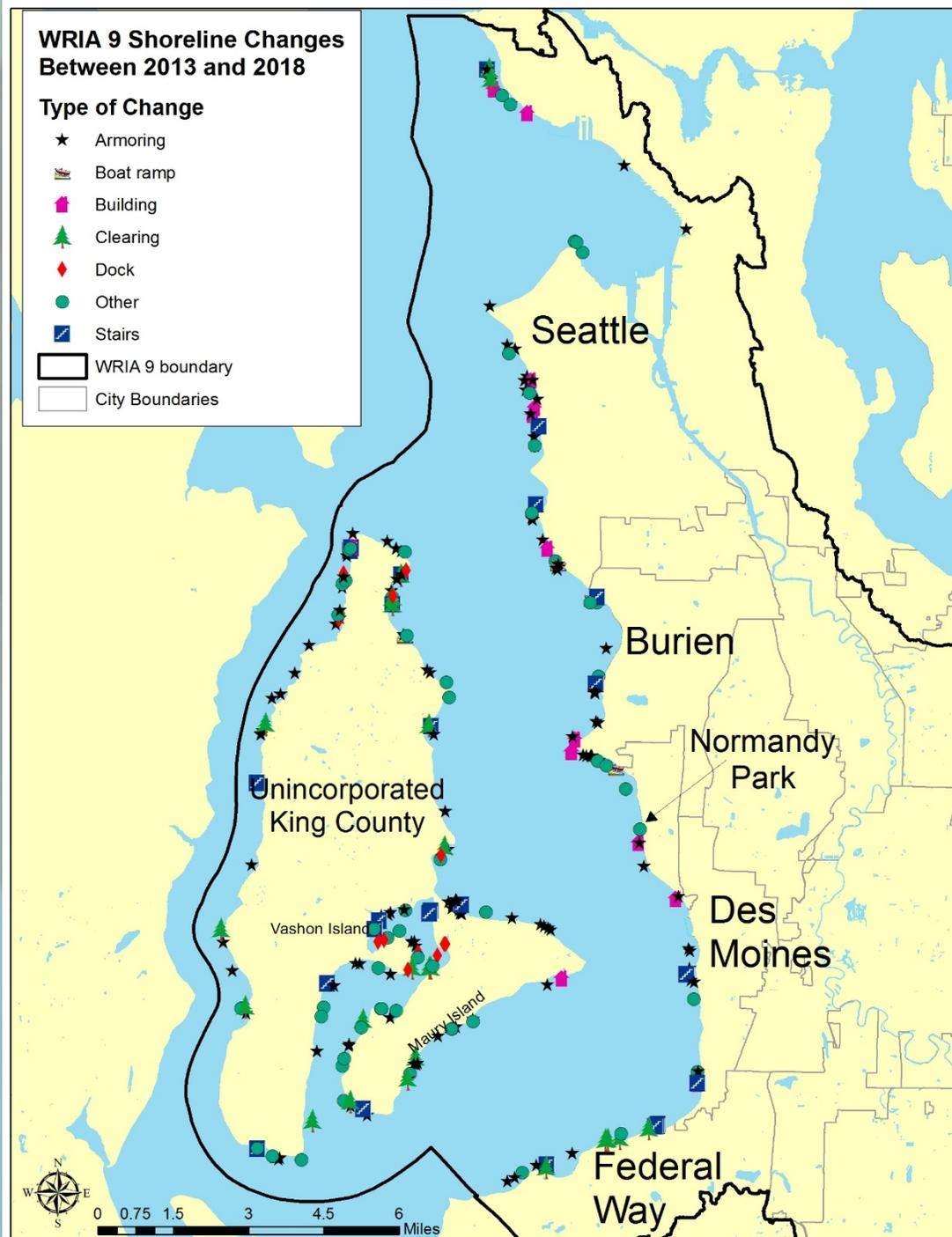
WRIA 9 Shoreline Changes Between 2013 and 2018

Type of Change

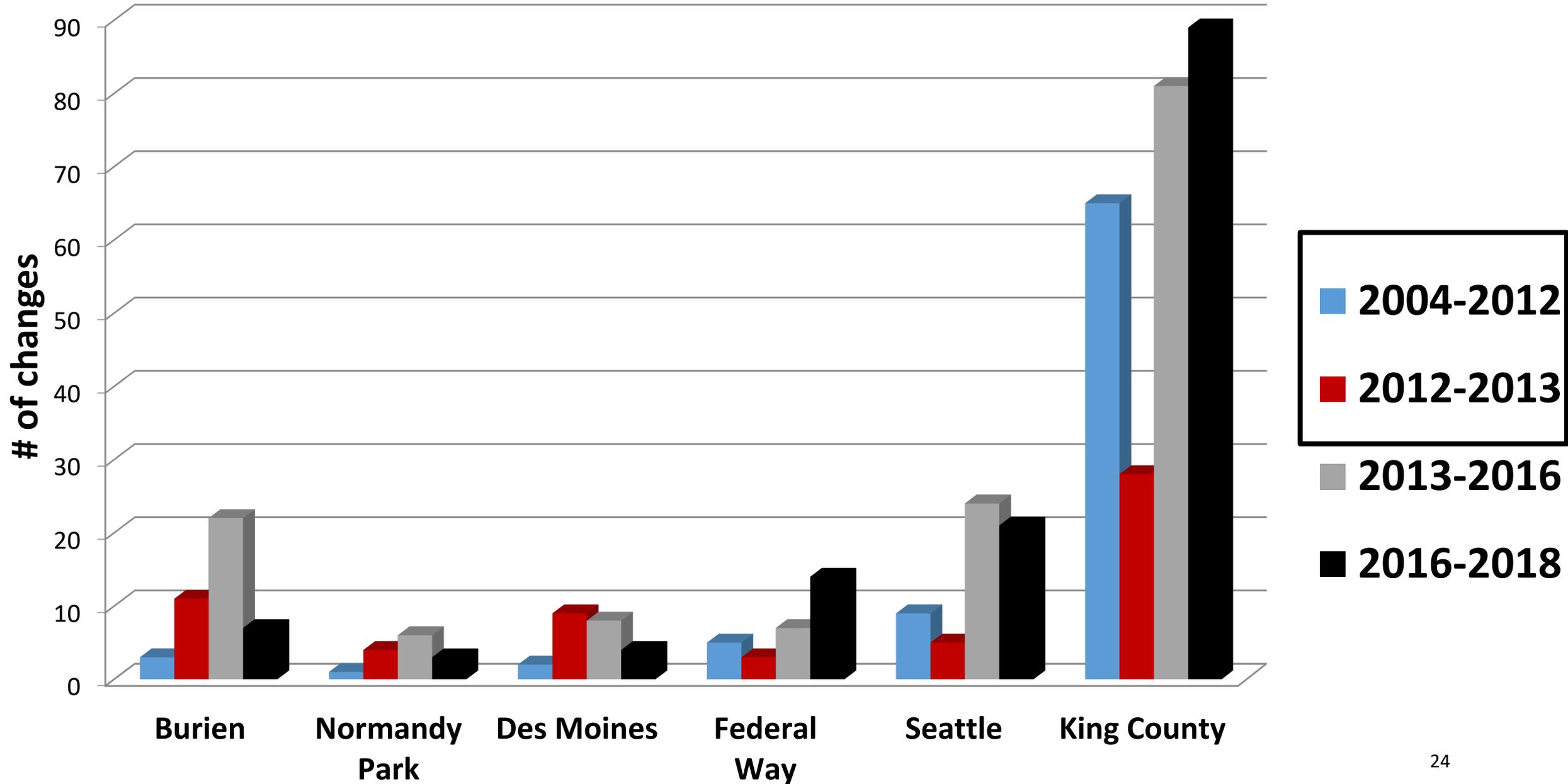
- ★ Armoring
- 🚤 Boat ramp
- 🏠 Building
- 🌲 Clearing
- 🔴 Dock
- Other
- 🏗️ Stairs

▭ WRIA 9 boundary

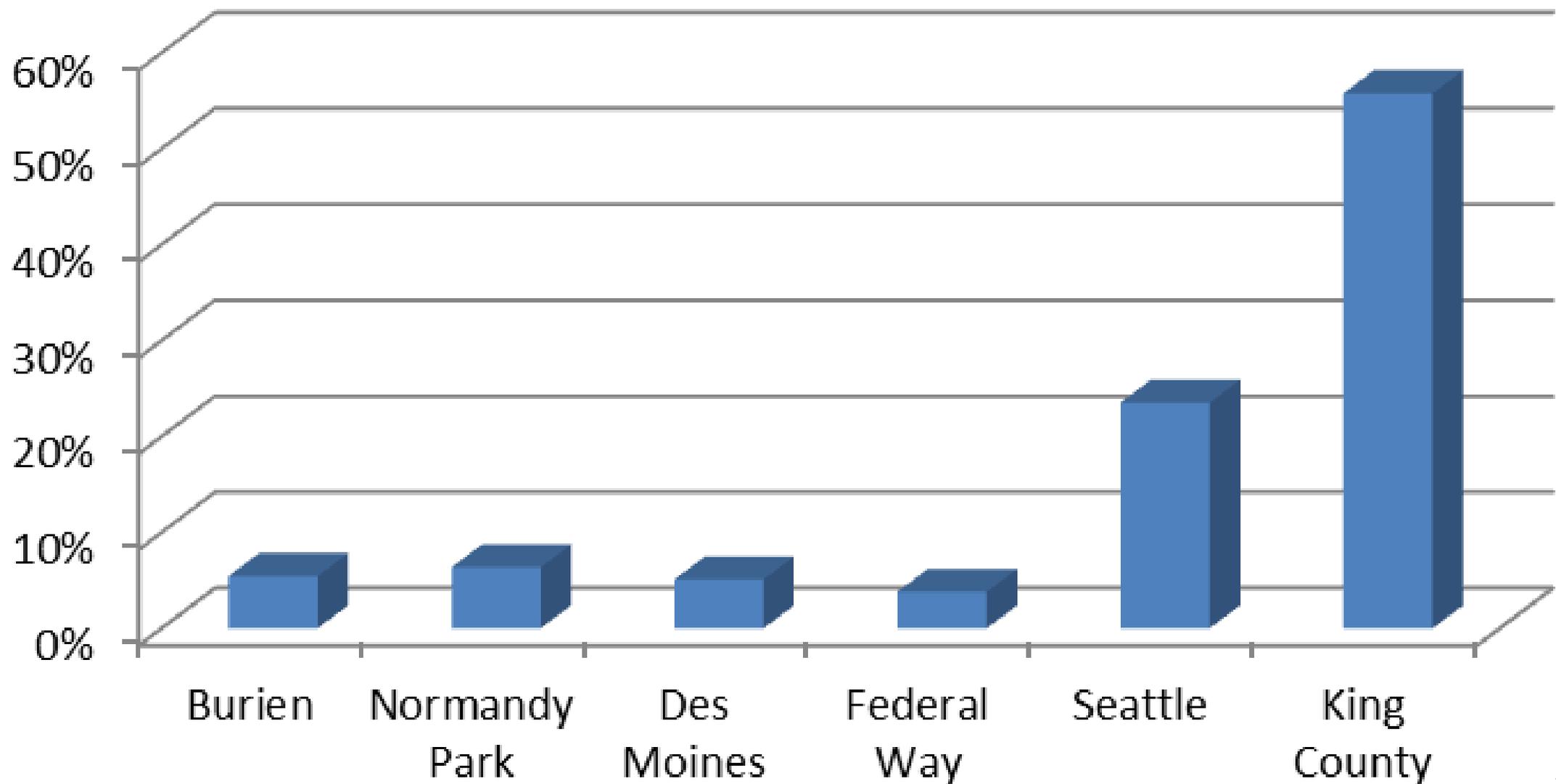
▭ City Boundaries



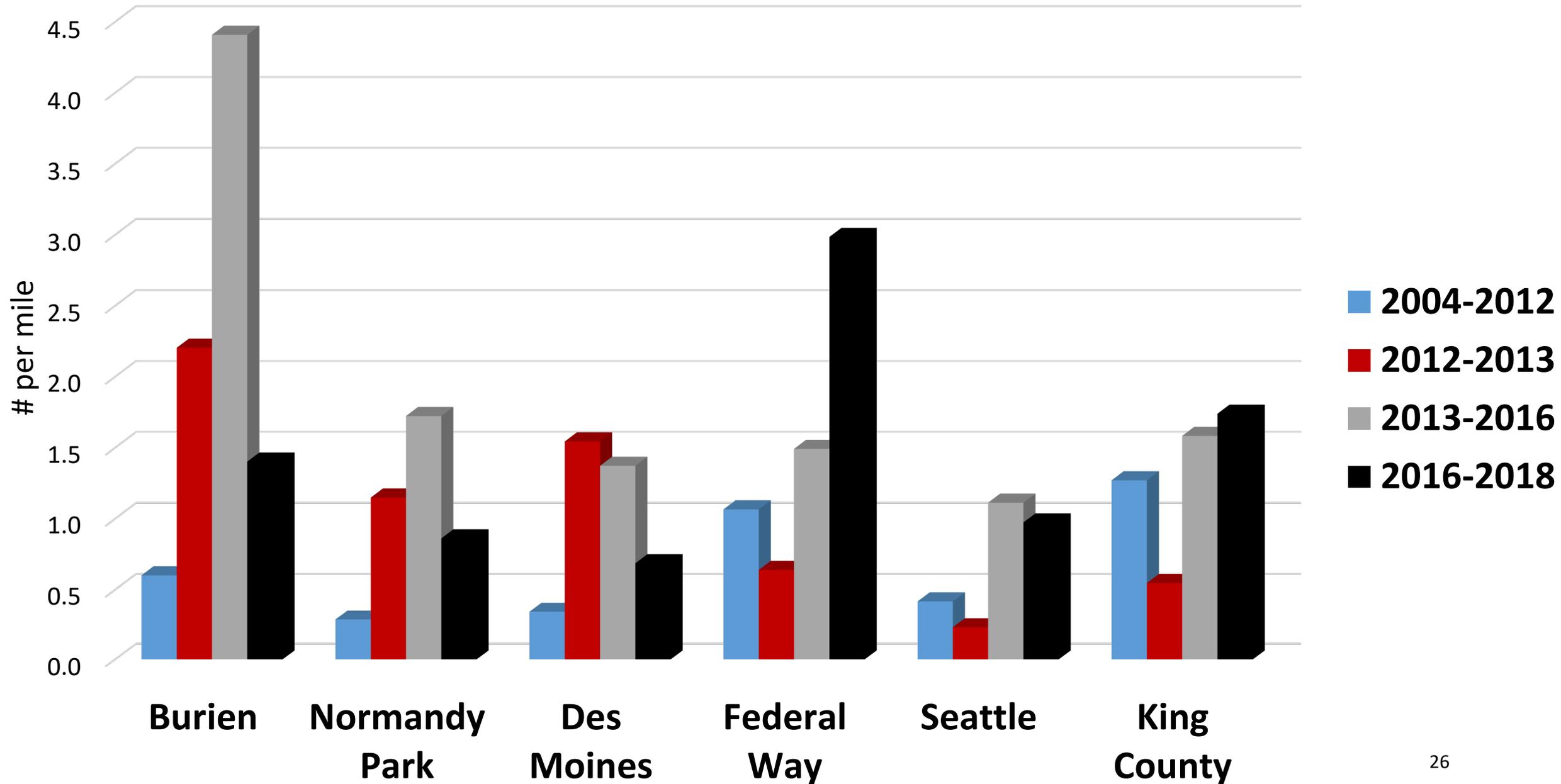
Number of & Where Changes Occurred



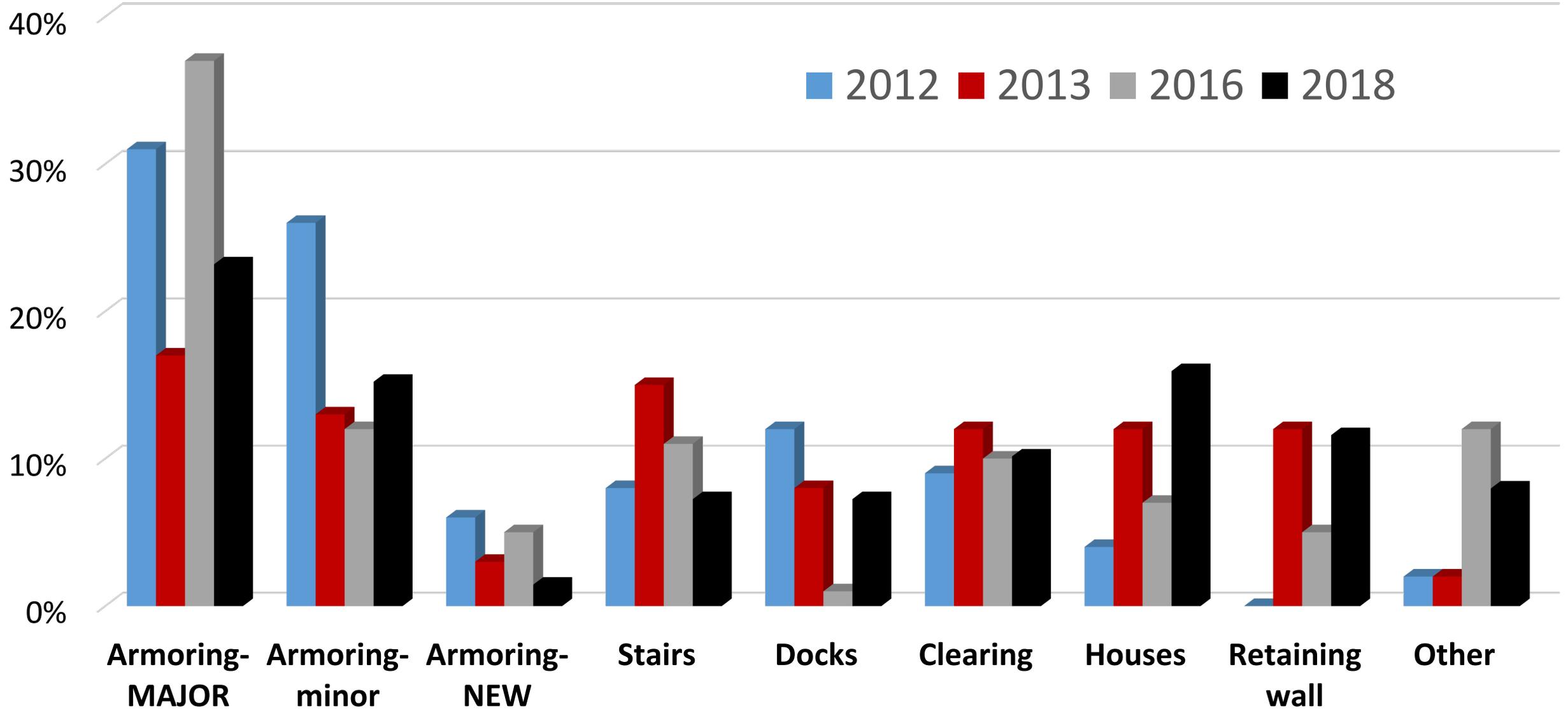
% of WRIA 9 shoreline



Changes per Mile by Jurisdiction & Study Period



% Change by Type & Year

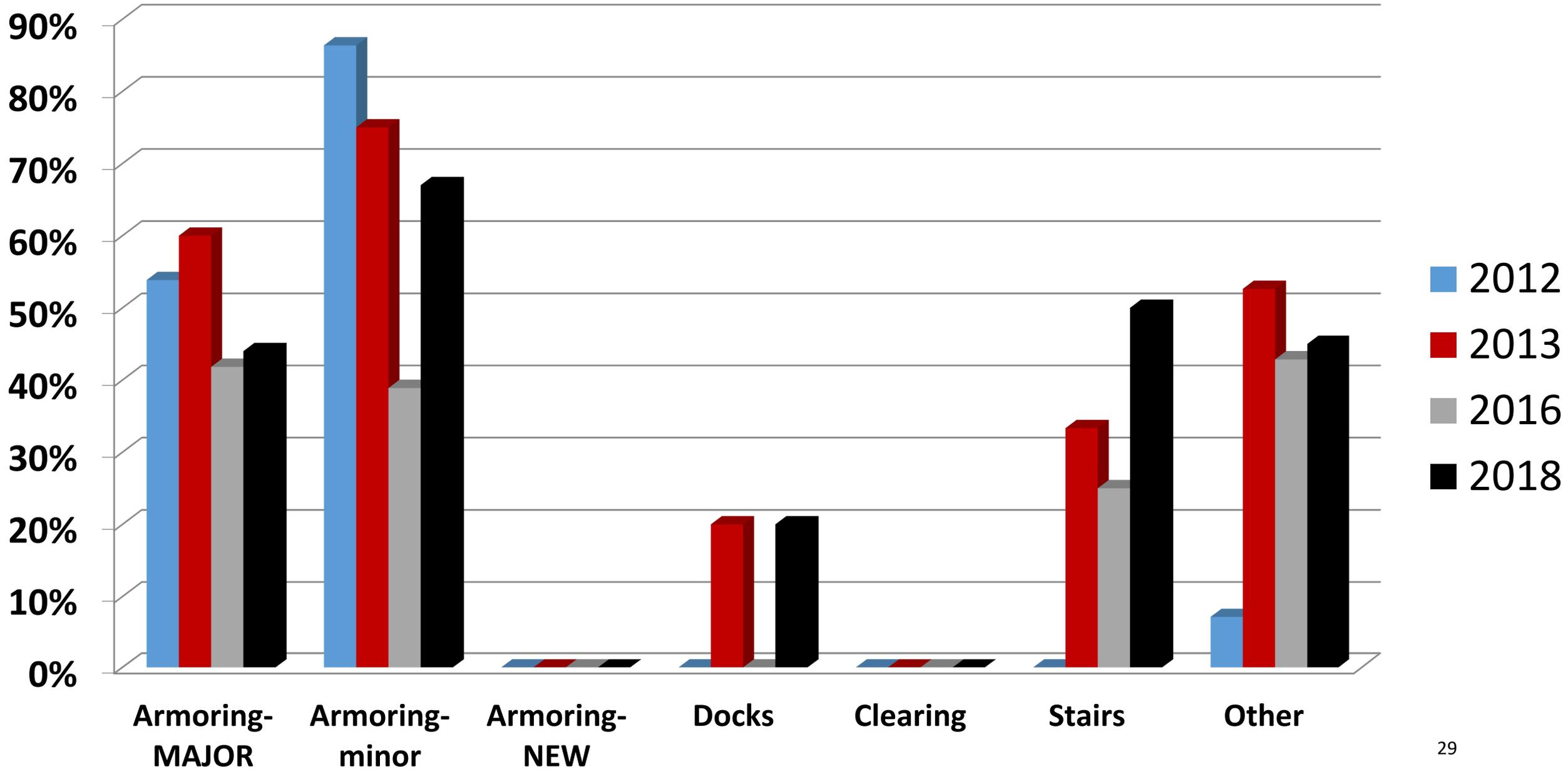


Evaluated impacts to ecological

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



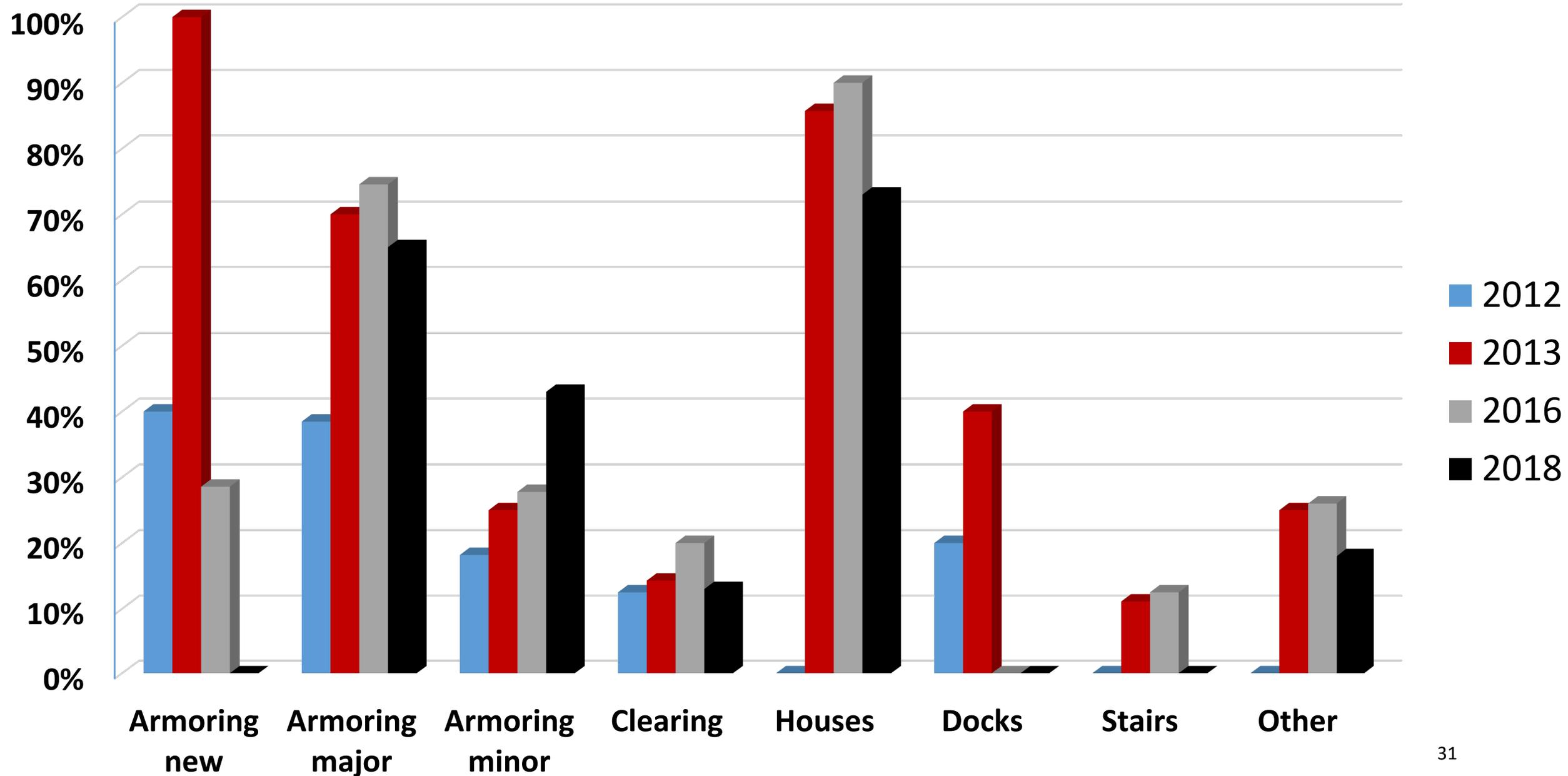
% of Changes by Type with no Apparent Effect



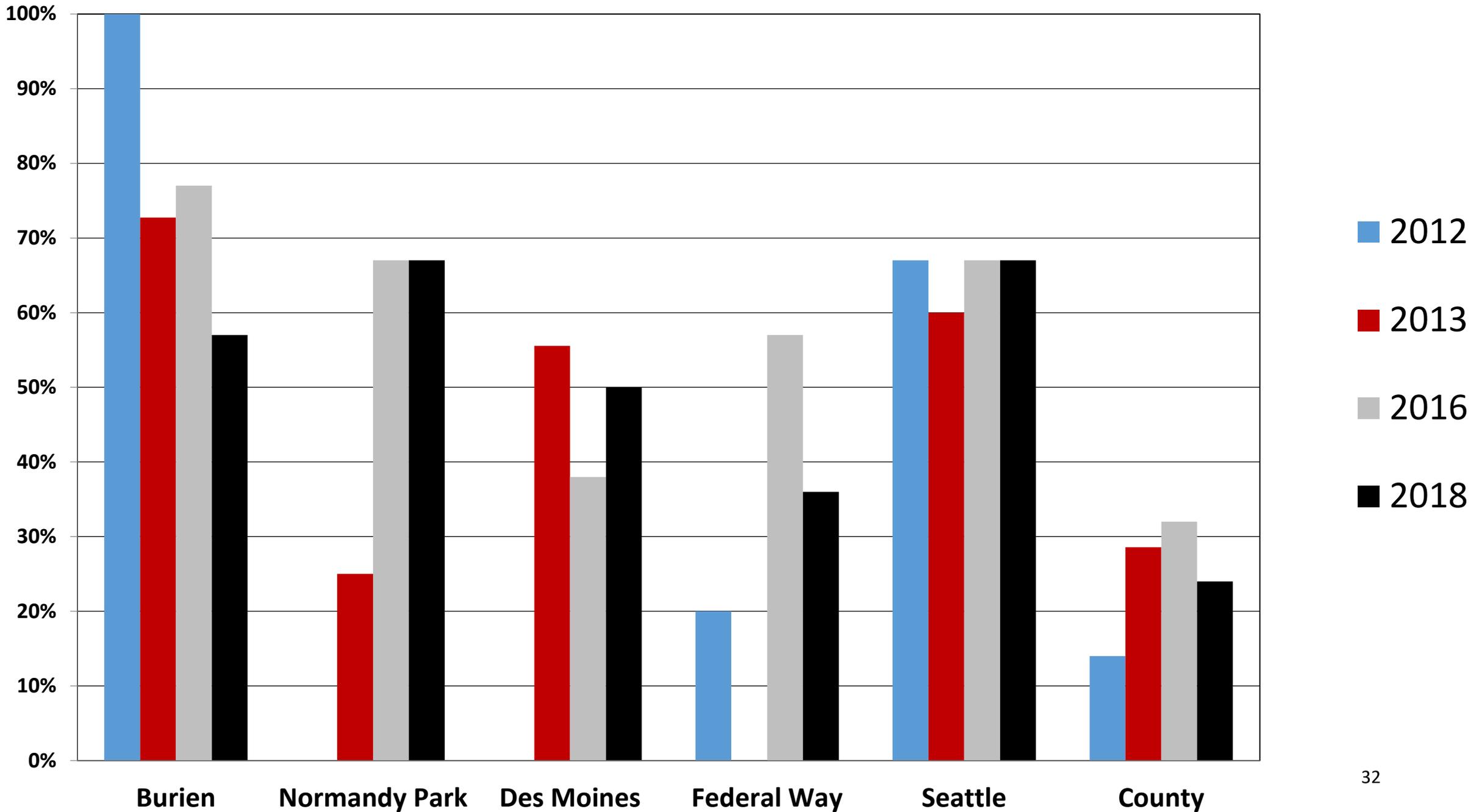
Compliance

- Compliance = getting a permit prior to undertaking a project
- **Not** evaluating if those who got permits followed the permit conditions

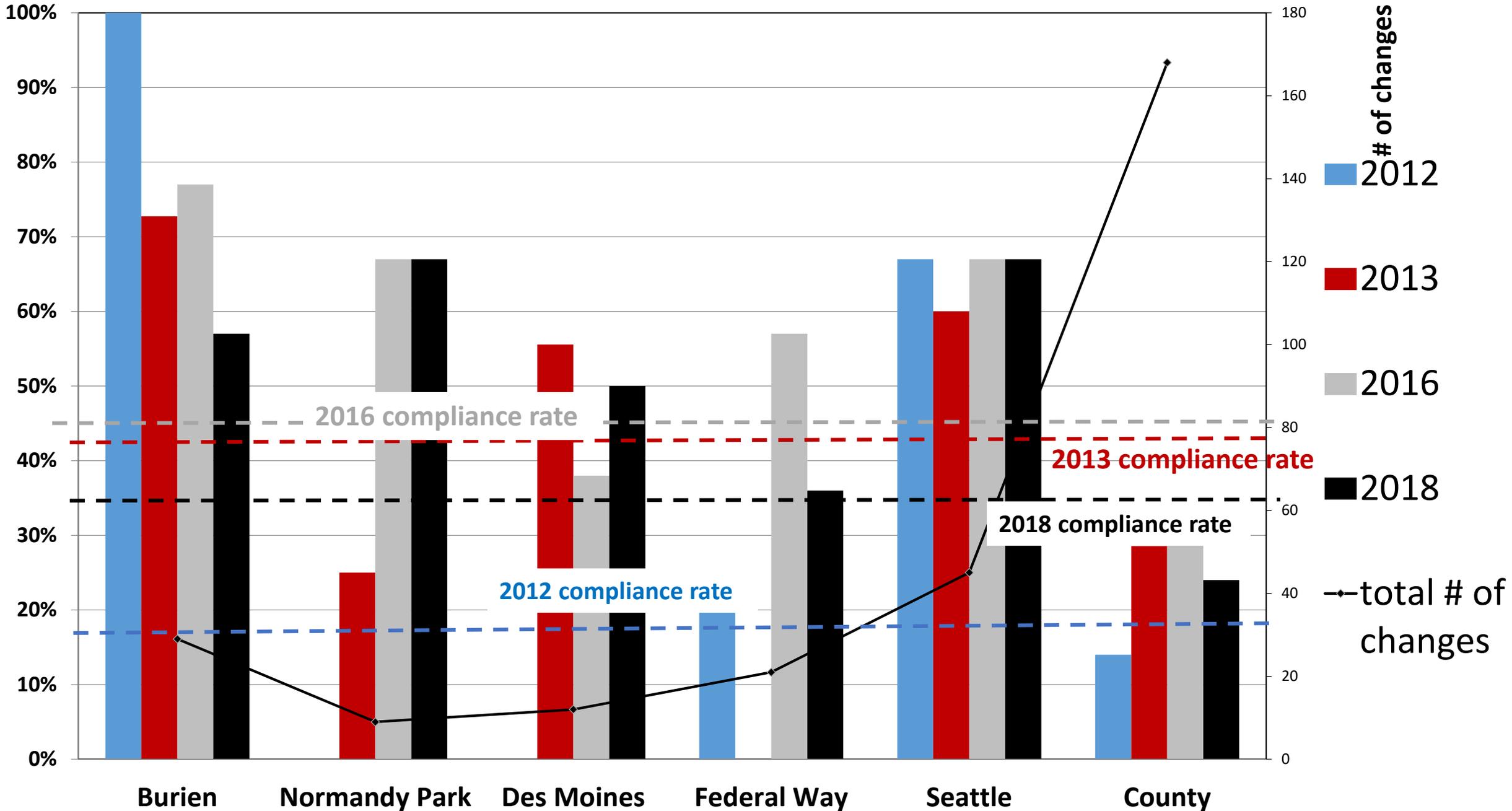
All Local Governments Compliance by Type of Change by Year



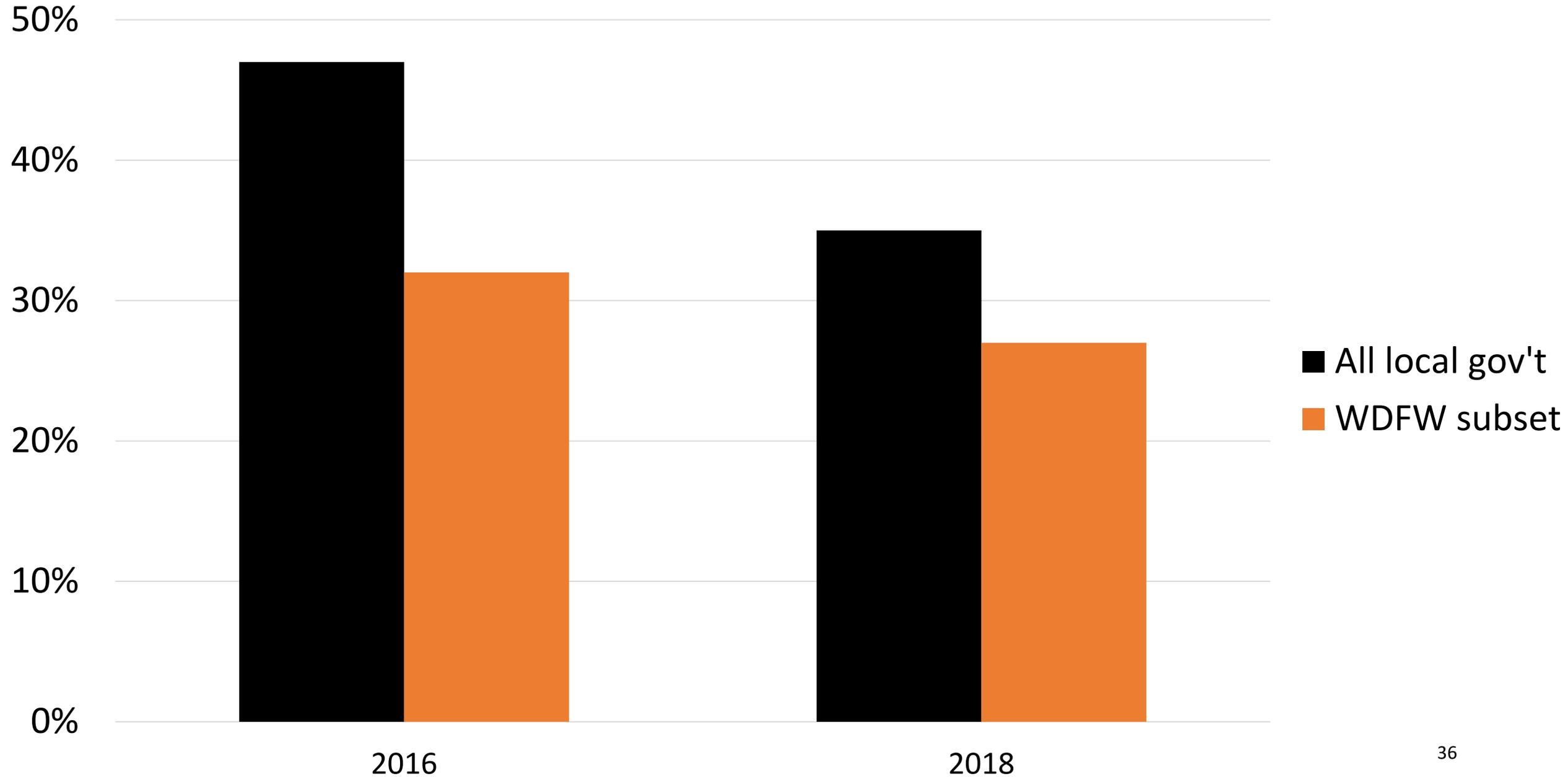
Compliance by Local Jurisdiction



Compliance by Local Jurisdiction



Compliance: WDFW vs local governments combined



Is Removal Out-pacing New Armor?



PSP-Shoreline Armor Vital Sign

Target

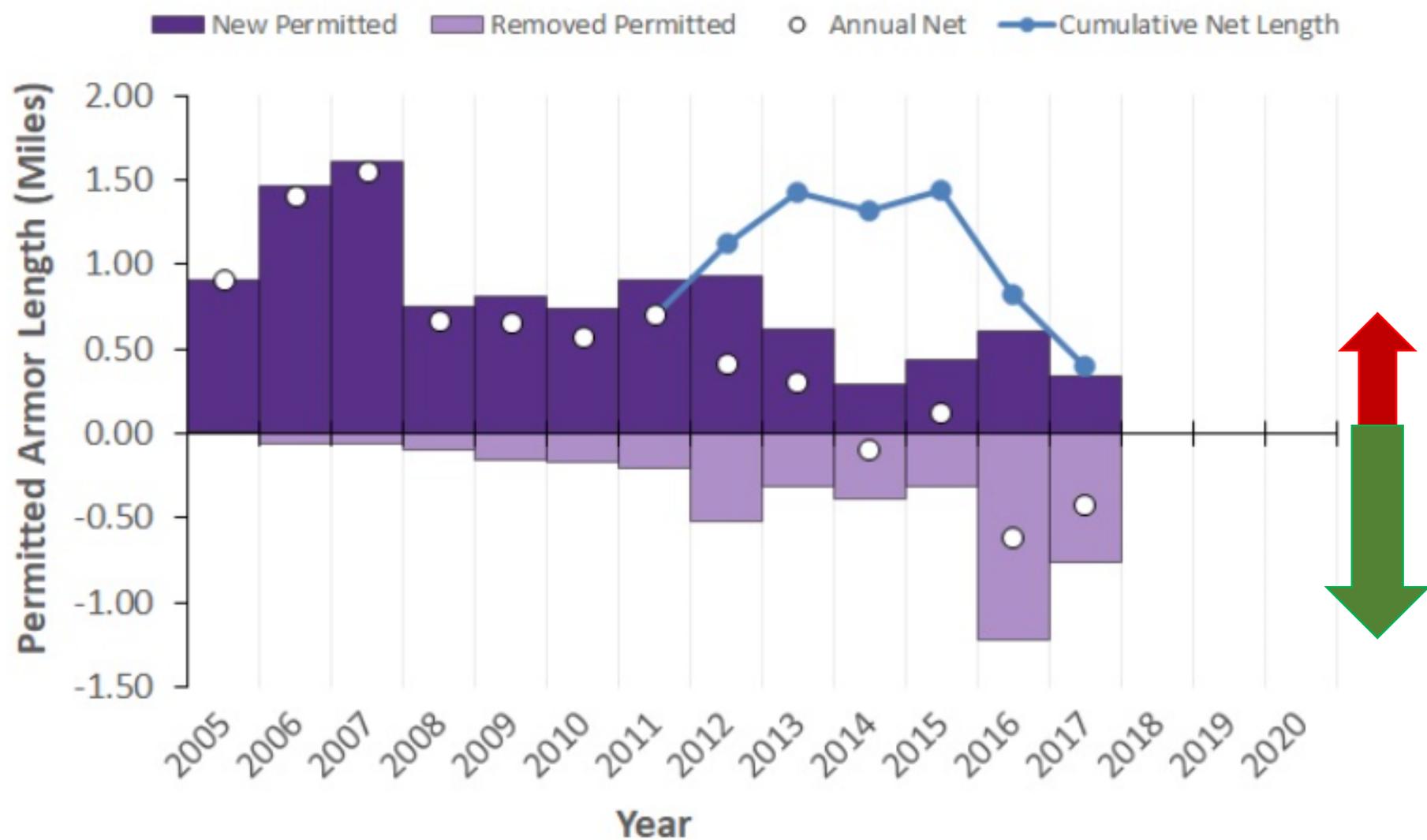
- From 2011 to 2020, the **total amount** of armoring removed is greater than the total amount of new armoring in Puget Sound (total miles removed > total miles added)

Indicator

- Net change in **permitted** shoreline armor

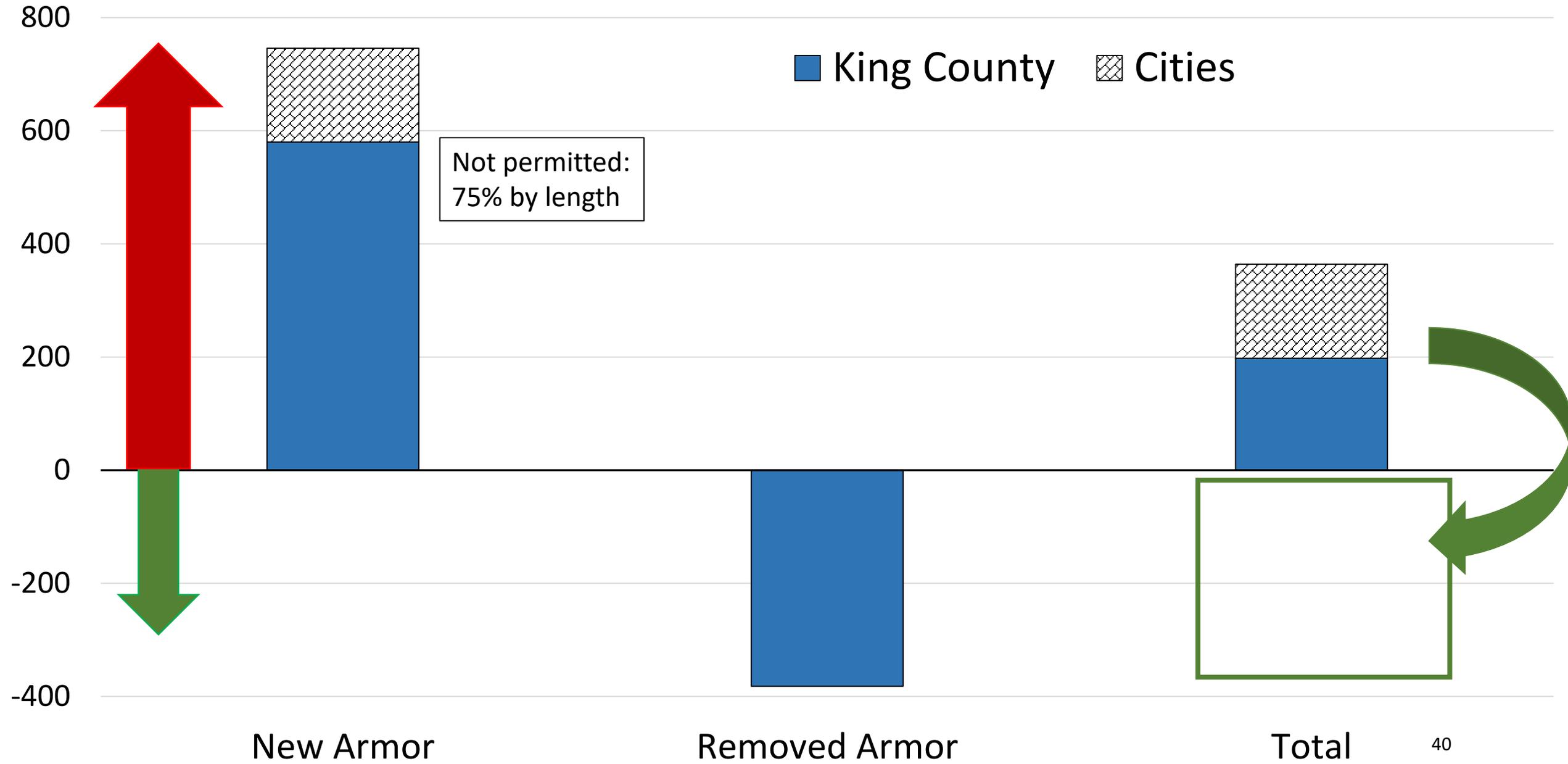
FIGURE 1. NEW, REMOVED, ANNUAL NET, AND CUMULATIVE NET ARMOR CHANGE PERMITTED IN PUGET SOUND

2005 – 2017



Source: Data compiled from Hydraulic Project Approvals issued by Washington Department of Fish & Wildlife, Habitat Program.

Removed versus restored: 2013-2018



Summary

- Most changes were associated with **repairs**
- **60%** of changes had **negative** ecological impacts
- Net **increase** in shoreline armor, mostly **unpermitted**, and mostly in unincorporated King County

Summary continued

- Compliance **high** in some cities, **low** on Vashon/Maury,
- WDFW permit compliance even **lower** than local government rates
- Compliance rate **lower** than seen in the few similar studies of Puget Sound shorelines

Recommendations?

- Study why permit compliance rates are so low
- Add new requirement that state and local permits cross reference each other's permit numbers
- Study larger portion of Puget Sound to see if WRIA 9's low compliance rates are typical or an aberration
- Research if there other land use enforcement frameworks that are more successful than complaint based

To get entire report

- <http://your.kingcounty.gov/dnrp/library/2019/kcr3021/kcr3021.pdf>
- OR, email Kollin.Higgins@kingcounty.gov
- **Thanks** to the Puget Sound Marine and Nearshore Protection and Restoration Grant Program for selecting this project for funding
- **Thanks** to everyone that helped make this project happen

