

Kelp forests in South Puget Sound: past and present

Nearshore Habitat Program

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Special thanks to the Squaxin Tribe!



WASHINGTON STATE DEPARTMENT OF
NATURAL RESOURCES
HILARY S. FRANZ | COMMISSIONER OF PUBLIC LANDS

Photo: Aaron Barna



kelp is a
powerhouse
of primary
production


bull kelp bed,
Pt Defiance,
August, 2018

Photo:
Aaron Barna



kelp beds
provide
critical
habitat

school of
surf smelt
in multi-species
kelp bed,
Squaxin Island,
July 2018

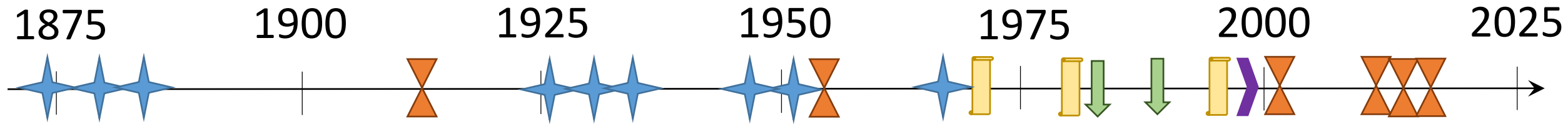


Research questions

What kelp species occur
in South Puget Sound?

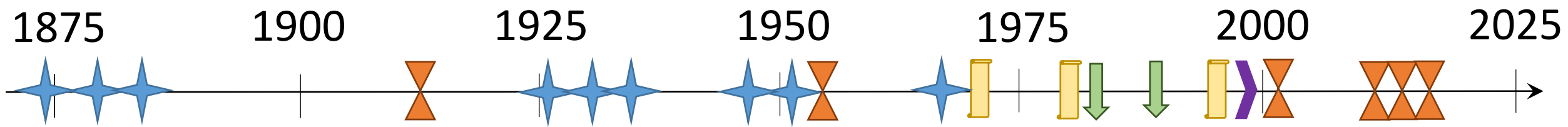
How has kelp distribution
changed in the last
century?

In the last 5 years?



Timeline of major kelp data sources in South Puget Sound

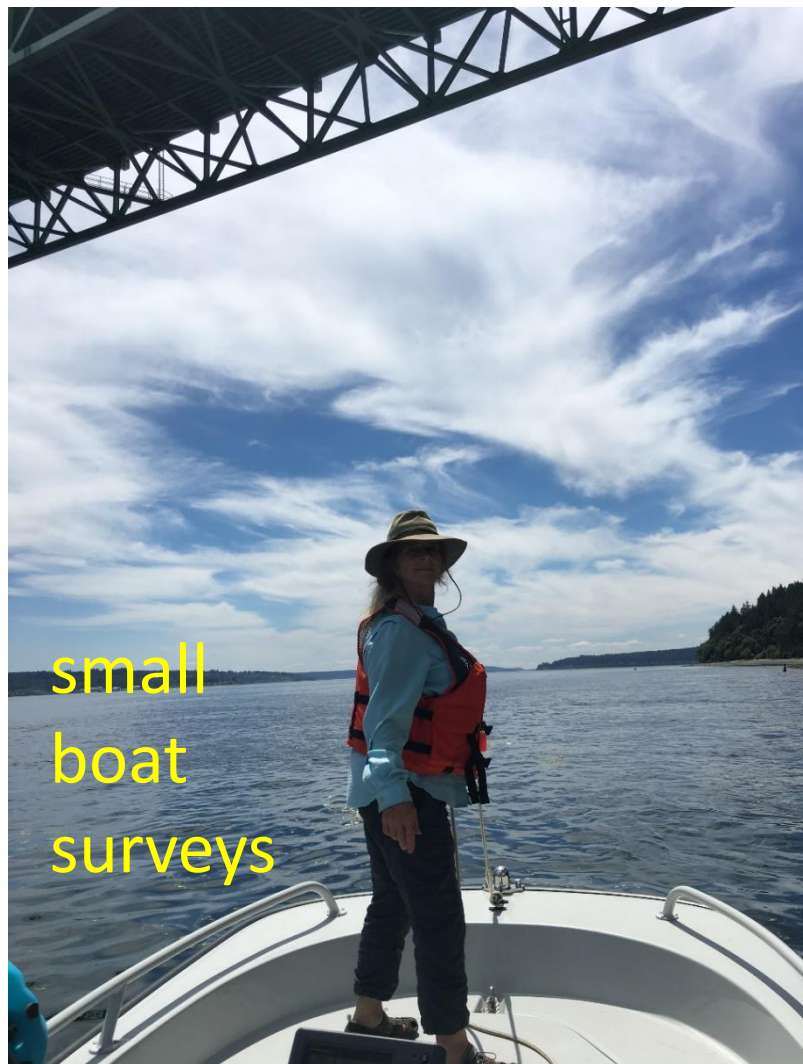
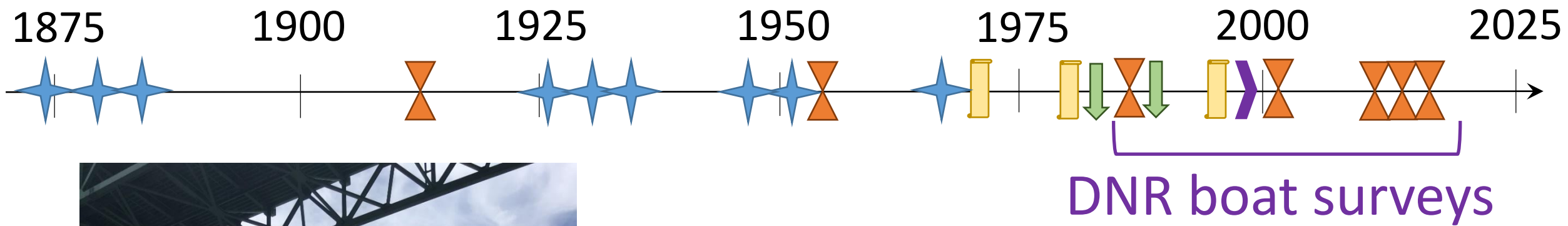
- ⌂ kelp survey – Rigg, PS Environmental Atlas, DNR
- ▮ phycological study – Harlin, Hodson & Waaland, Maxell & Miller
- ★ navigation book/chart – USCGS, US Geological Survey, Coast Pilot, NOAA
- habitat survey - ShoreZone
- ↓ site survey (for other species) – WDF herring and rockfish surveys



↑
T sheets (1873-1880)



surveying with a planetable (Shalowitz 1964)





What kelp
species
occur in
South
Puget
Sound?

Squaxin Island
June 2018



Saccharina complanata



Sieve Kelp
Neoagarum fimbriatum



Woody Kelp
Pterygophora californica

© USGS



Bull Kelp
Nereocystis luetkeana



Sugar Kelp / Split Kelp
Saccharina latissima or
Saccharina nigripes



Ephemeral Kelp
Laminaria ephemera



Winged Kelp
Alaria marginata



Seersucker kelp
Costaria costata

proportion of observations

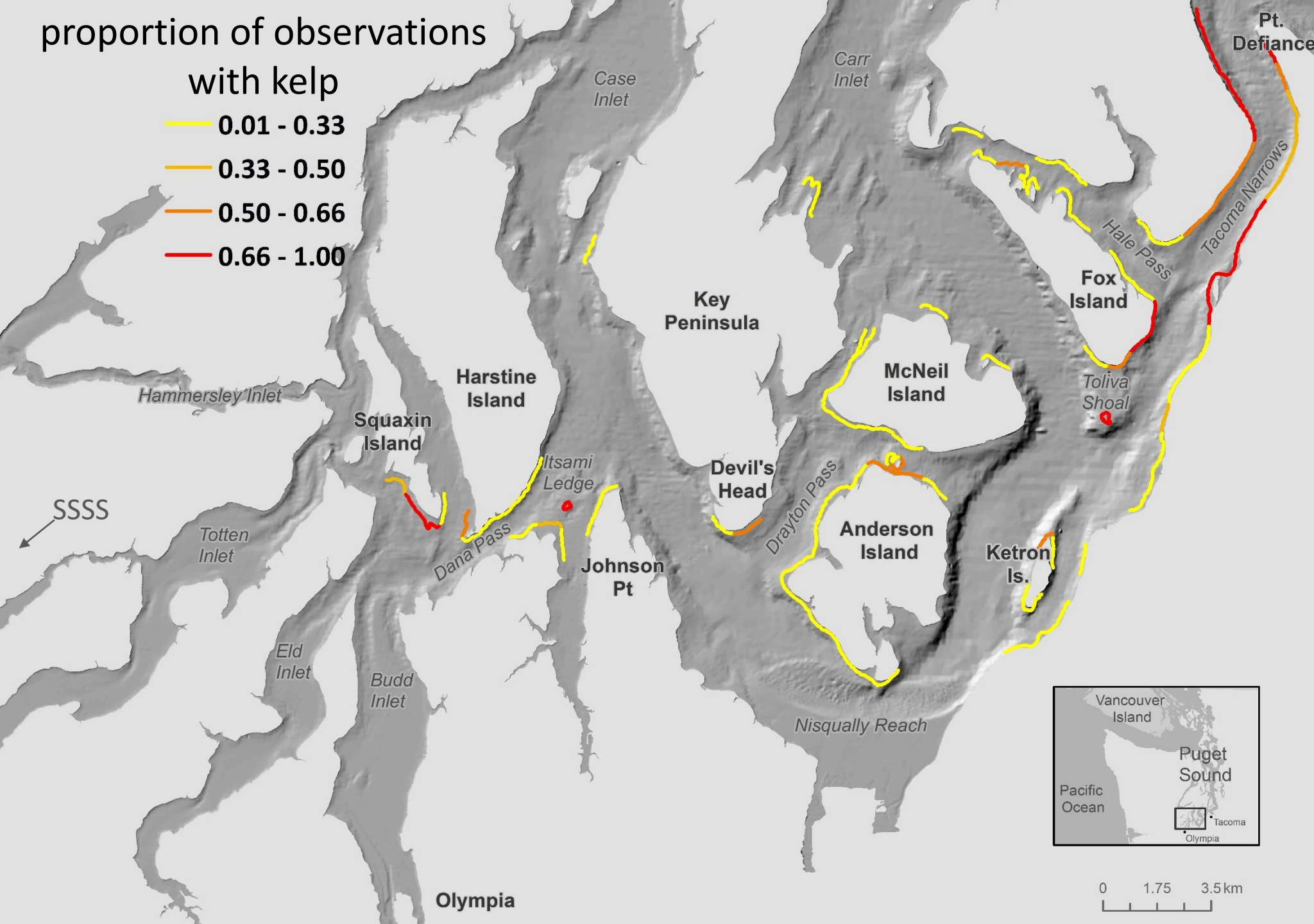
with kelp

0.01 - 0.33

0.33 - 0.50

0.50 - 0.66

0.66 - 1.00



bull kelp
observations
over
~150 years

~20% of shoreline

shoreline
summarized in
1000 m lengths
(-6m bathmetry
line)

proportion of observations

with kelp

0.01 - 0.33

0.33 - 0.50

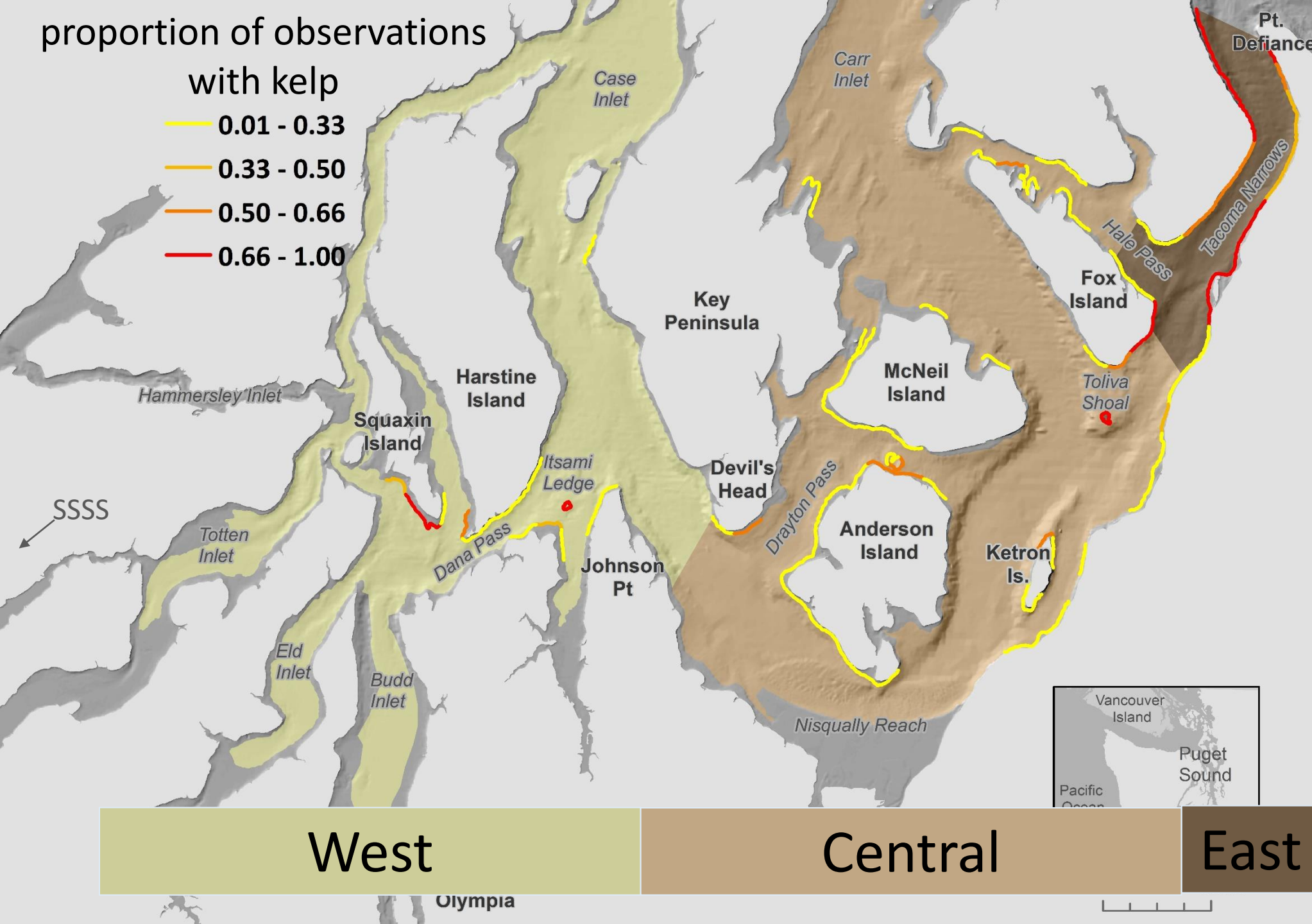
0.50 - 0.66

0.66 - 1.00

bull kelp
observations
over
~150 years

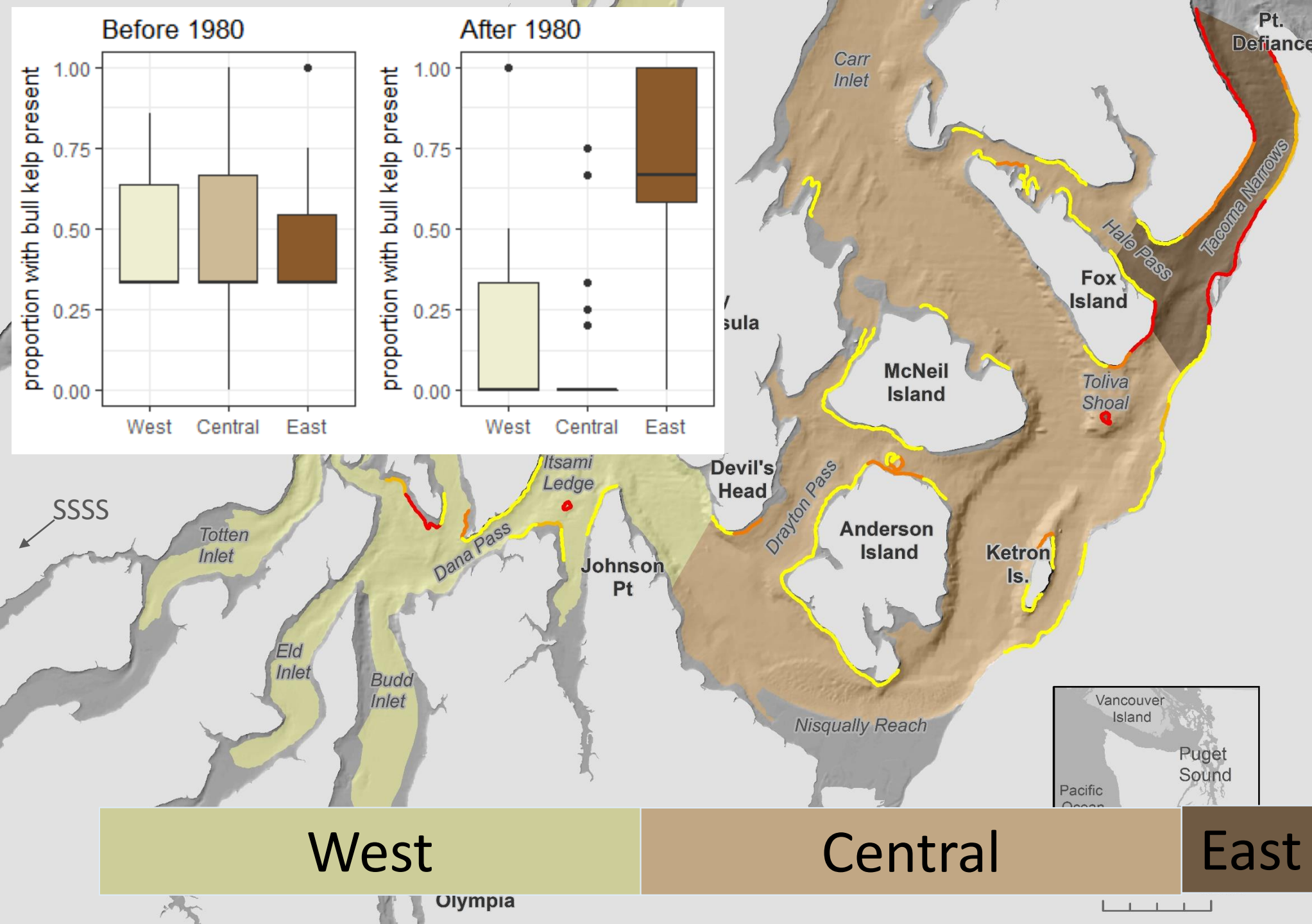
~20% of shoreline

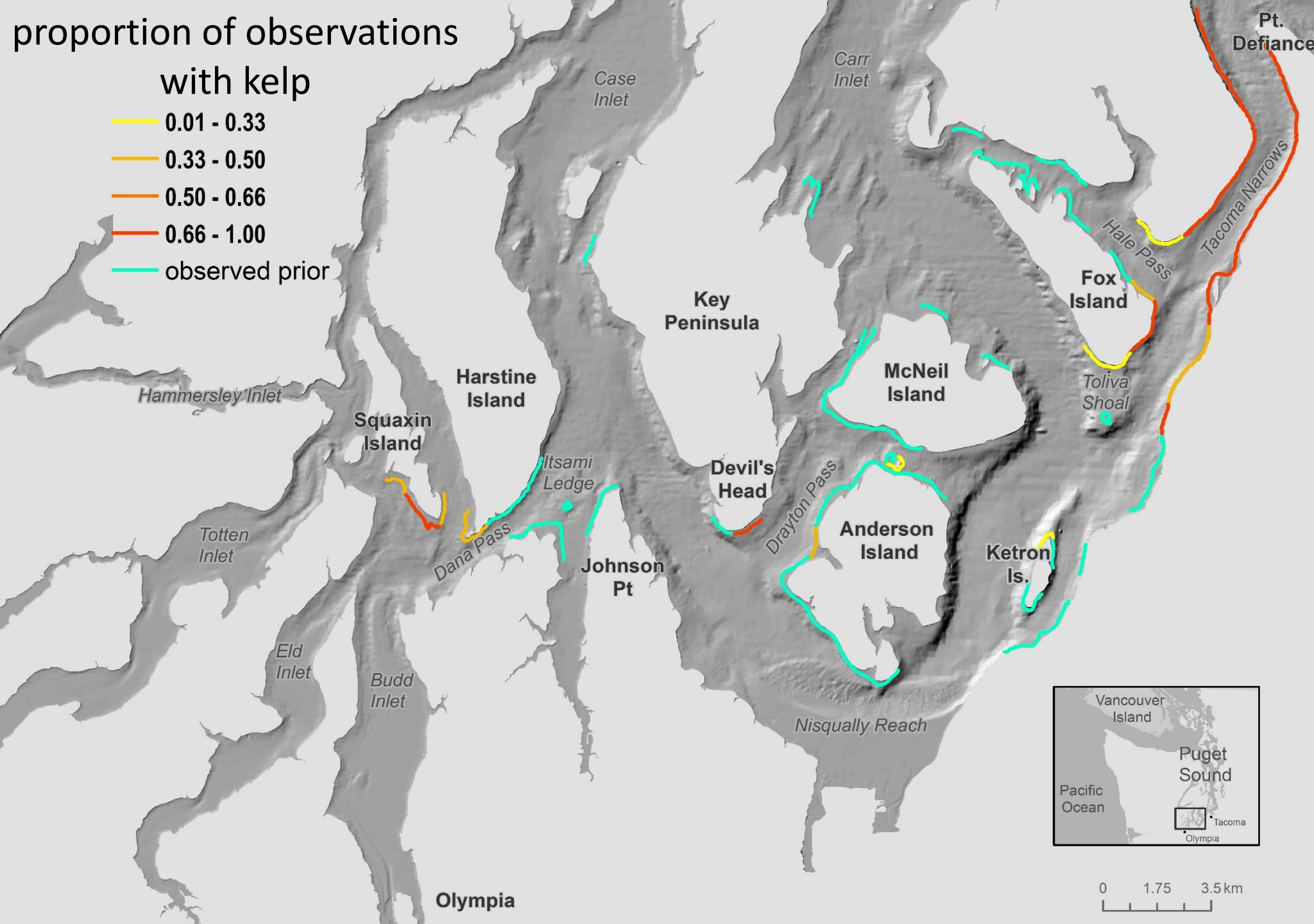
shoreline
summarized in
1000 m lengths
(-6 m bathmetry
line)



bull kelp
observations
over
~150 years

shoreline
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(-6 m bathmetry
line)



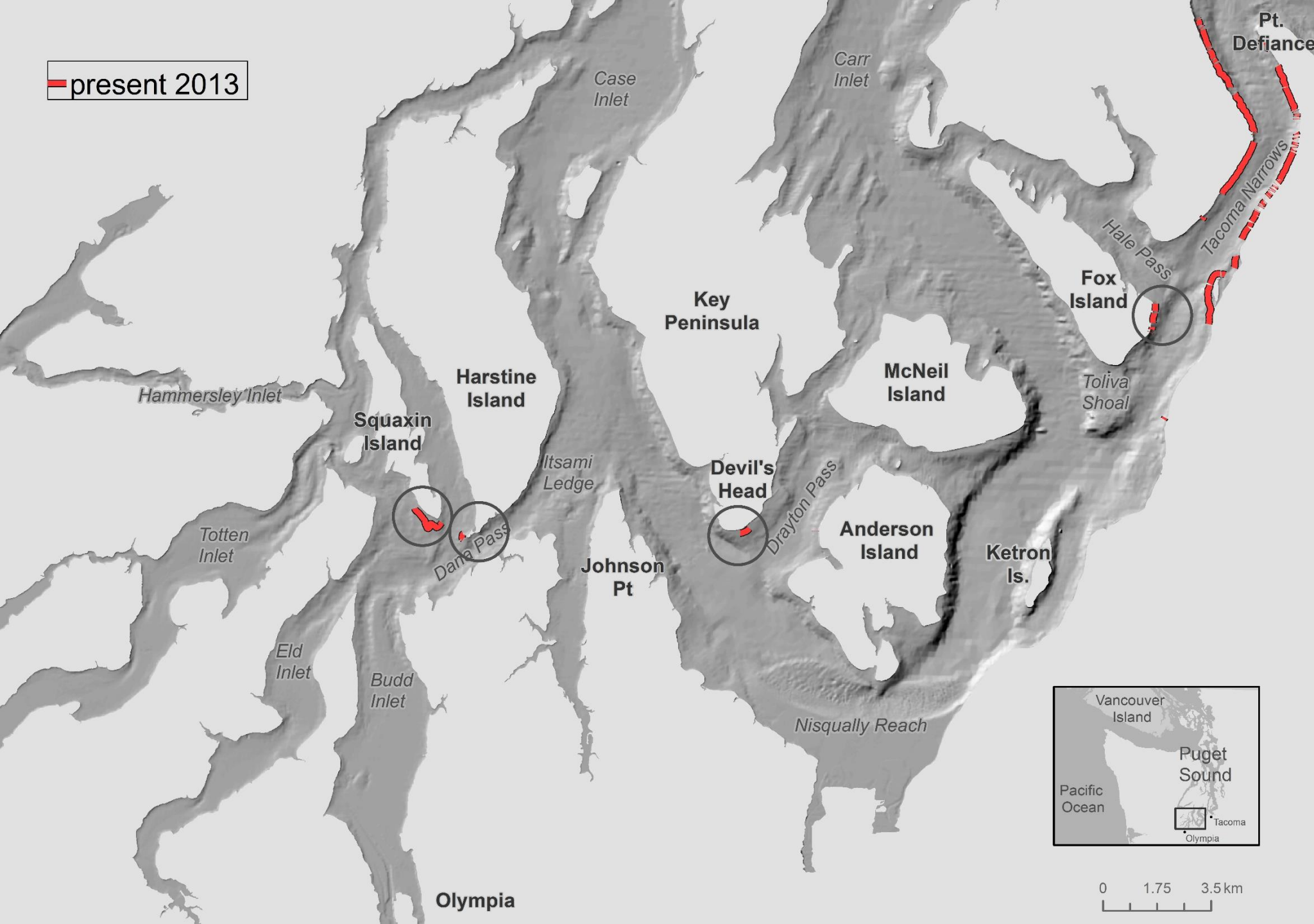


bull kelp
observations
after
1980

~10% of shoreline

resolution:
2013/2017=10 m
any time=1 km

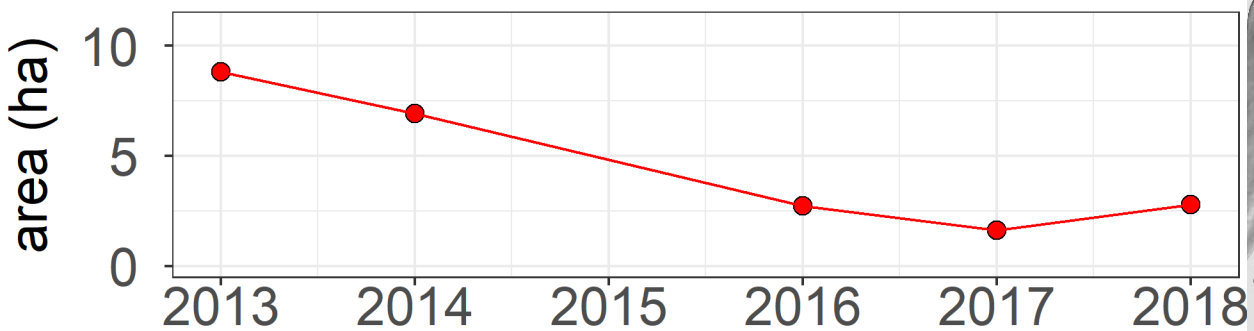
— present 2013



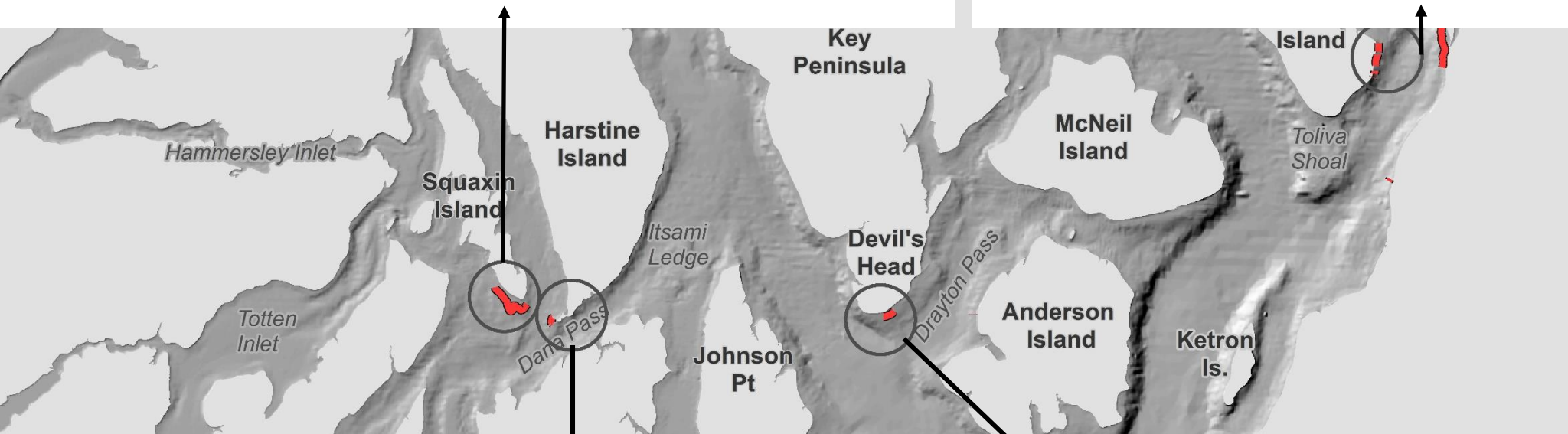
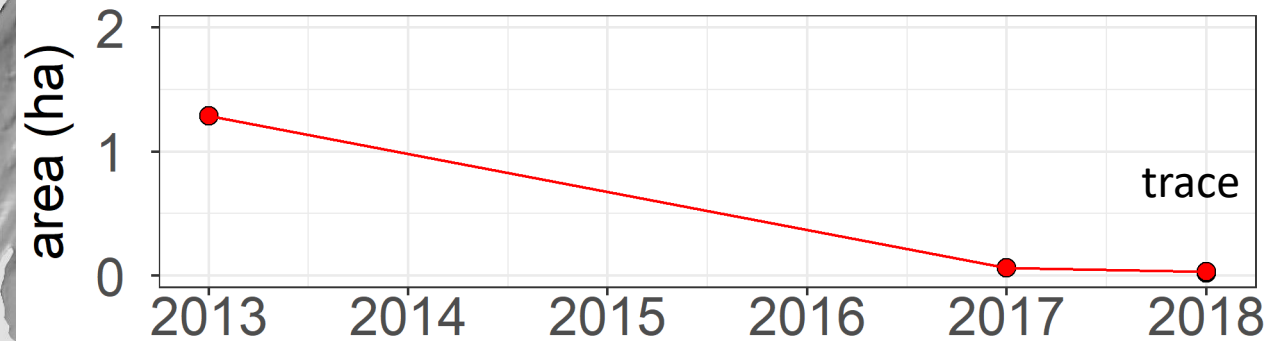
bull kelp
extent
2013

resolution:
2013/2017=10 m
any time=1 km

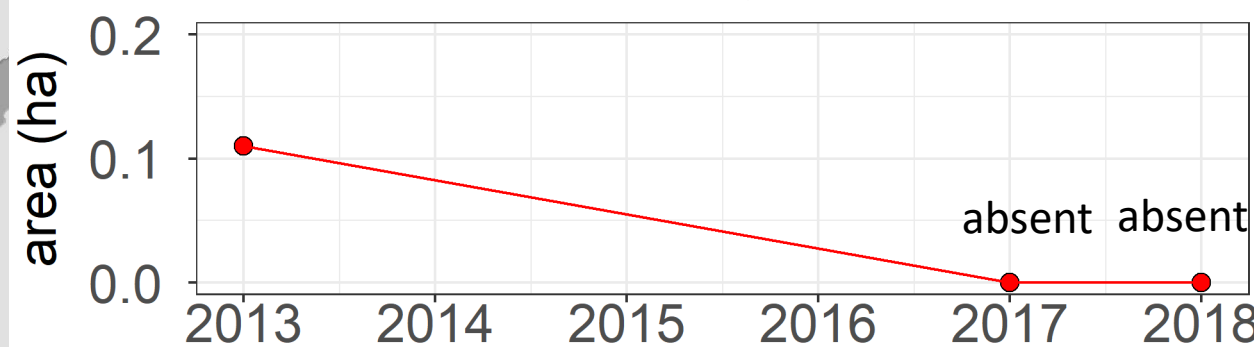
Squaxin Island



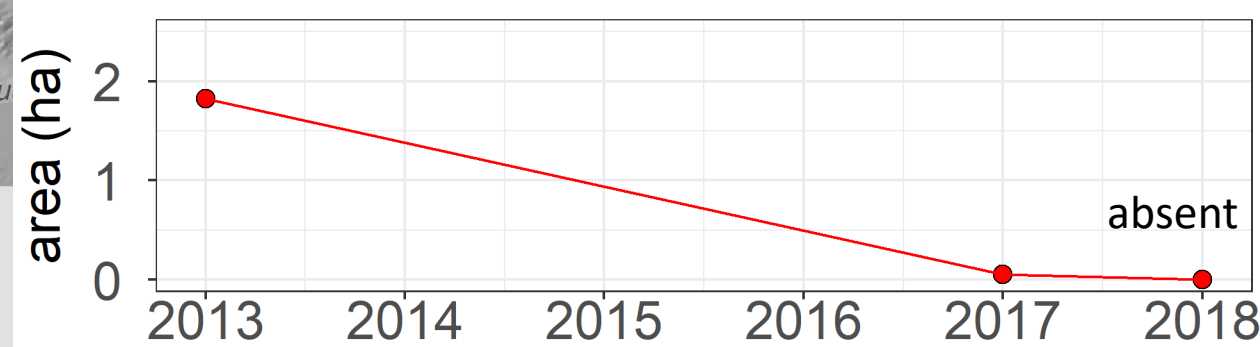
Fox Island

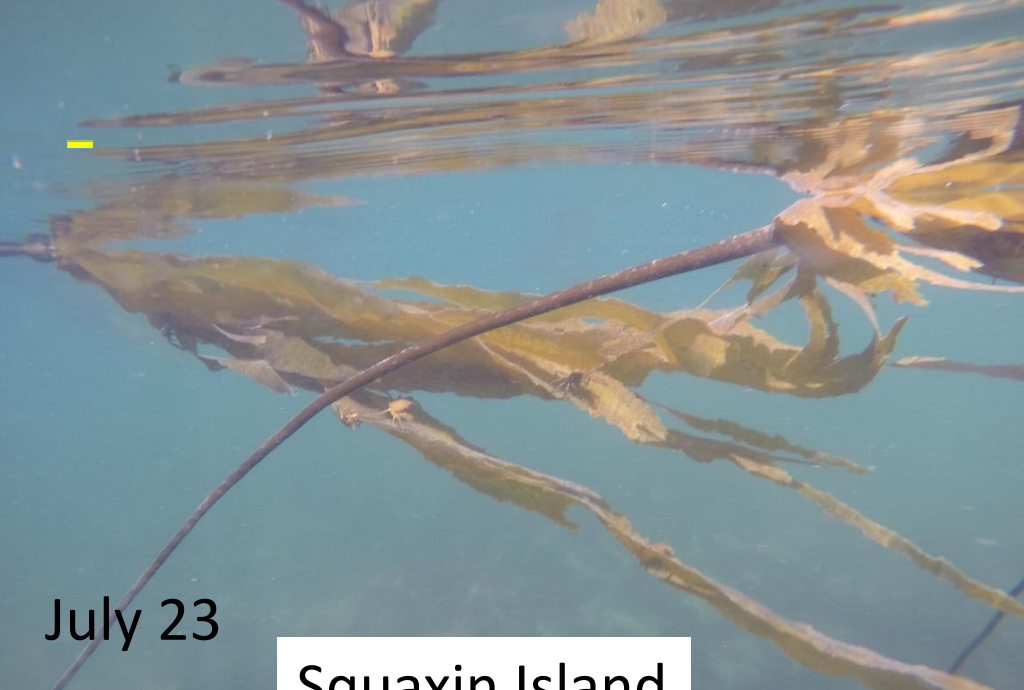


Brisco Point



Devils Head





July 23

Squaxin Island



July 27

Salmon Beach,
Tacoma Narrows



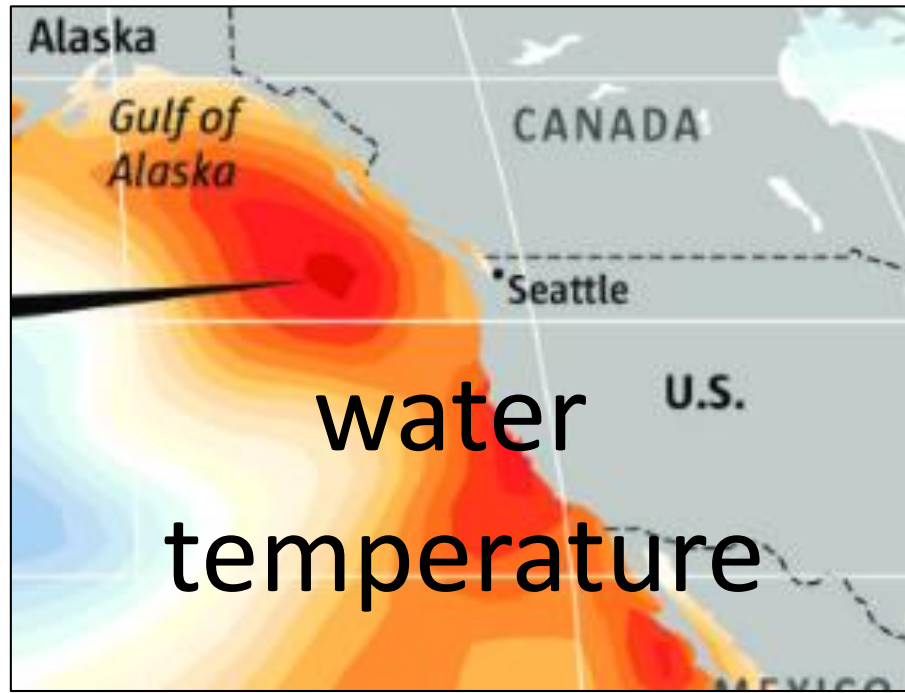
Sept. 5



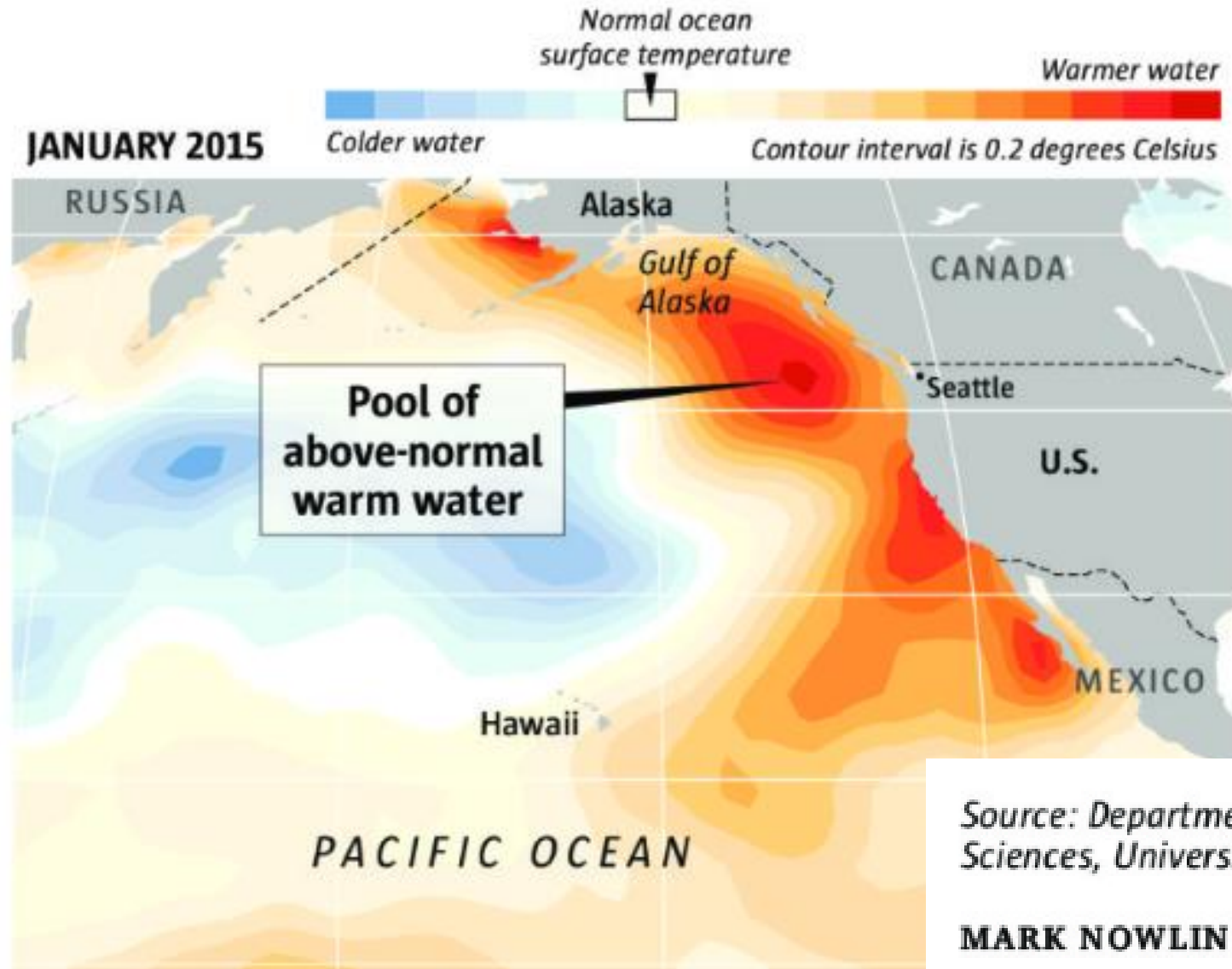
Sept. 6

Bull kelp
condition
summer
2018

Causes of kelp decline?



recent extreme warm water temperatures







native bull kelp

An aerial photograph of a coastal area. The upper portion of the image shows a shallow, clear blue water area with numerous dark, horizontal, segmented structures floating on the surface, identified as native bull kelp. A white, hand-drawn outline encloses a section of these kelp structures. The lower portion of the image shows a darker, more turbid area with dense, dark green/brown patches of algae, identified as introduced Sargassum. The text 'native bull kelp' is written in white in the upper left, and 'the introduced alga *Sargassum*' is written in white in the lower center.

the introduced alga *Sargassum*

water quality -
low light, sedimentation & competition



microscopic life stages are
particularly sensitive to siltation

Possible actions...

“Remove stressors, starting with kelp crabs and *Sargassum*.”

Test if removal improves bull kelp abundance and condition.

Develop effective control methods that don't damage beds.

“Restore the beds with bull kelp transplants.”

Low restoration success rate, generally.

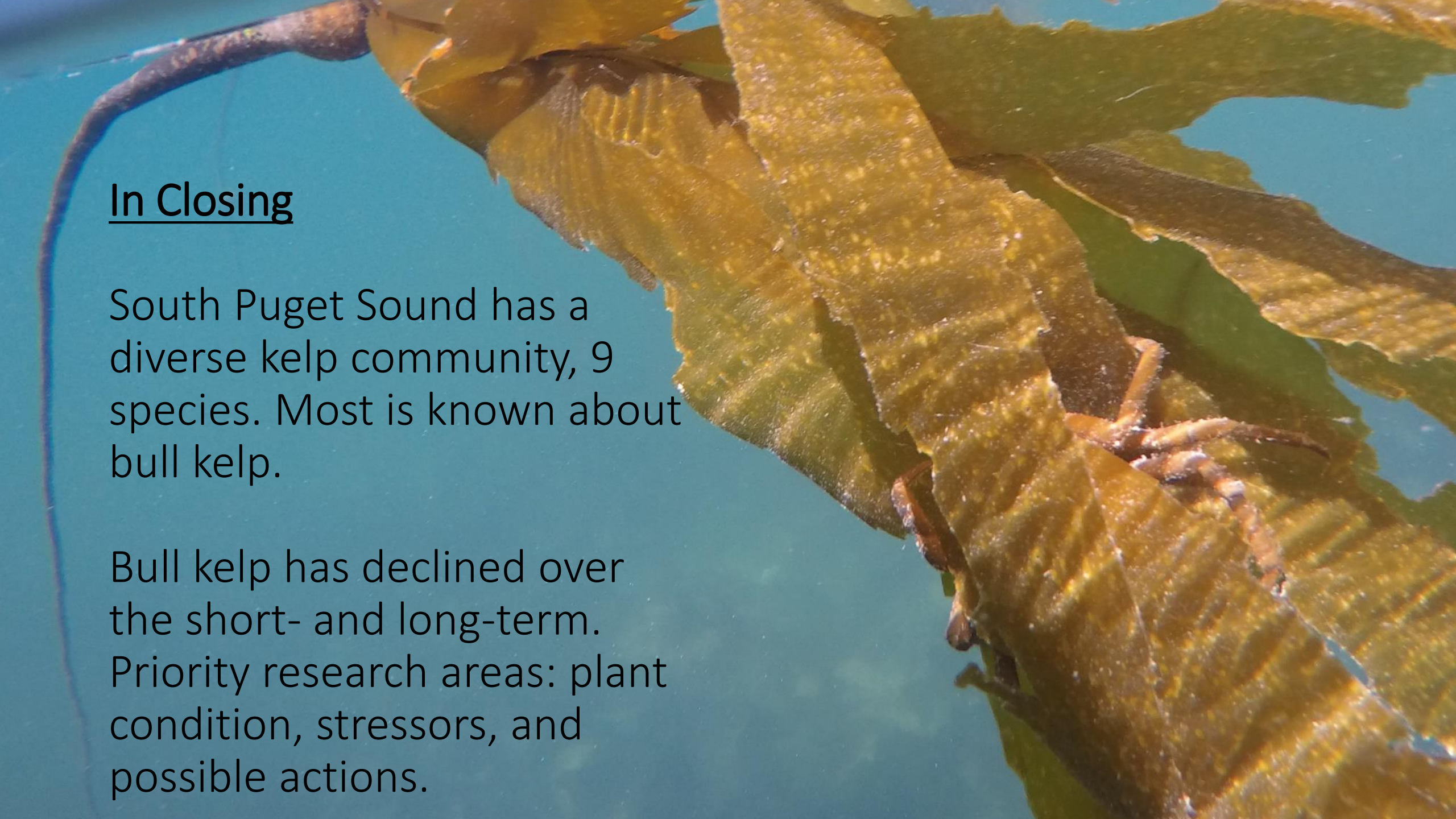
Squaxin Island has low genetic diversity (Gierke, pers comm),
transplants could:

Increase fitness

Dilute local adaptations

“Evaluate plant condition and stressors.”

Enhanced understanding could target future actions.

An underwater photograph showing a large, brownish-yellow kelp frond with a prominent midrib and lateral veins. A small crab is visible on the kelp. The background is a clear blue water.

In Closing

South Puget Sound has a diverse kelp community, 9 species. Most is known about bull kelp.

Bull kelp has declined over the short- and long-term. Priority research areas: plant condition, stressors, and possible actions.

