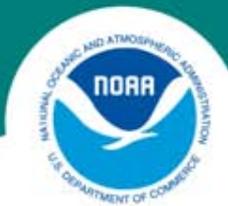




What we know & don't know about ESA-listed Rockfish

Dan Tonnes, NMFS Protected Resources Division

June 29, 2011



NOAA Technical Memorandum NMFS-NWFSC-108

Status Review of Five Rockfish Species in Puget Sound, Washington

Bocaccio (*Sebastes paucispinis*),
Canary Rockfish (*S. pinniger*),
Yelloweye Rockfish (*S. ruberrimus*),
Greenstriped Rockfish (*S. elongatus*),
and Redstripe Rockfish (*S. proriger*)

Jonathan S. Drake, Ewann A. Bernston, Jason M. Cope,
Richard G. Gustafson, Elizabeth E. Holmes, Phillip S. Levin,
Nick Tolimieri, Robin S. Waples, Susan M. Sogard,
and Gregory D. Williams

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December 2010

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service

NOAA FISHERIES SERVICE



Photo by Tony O'Connell, ADF&G

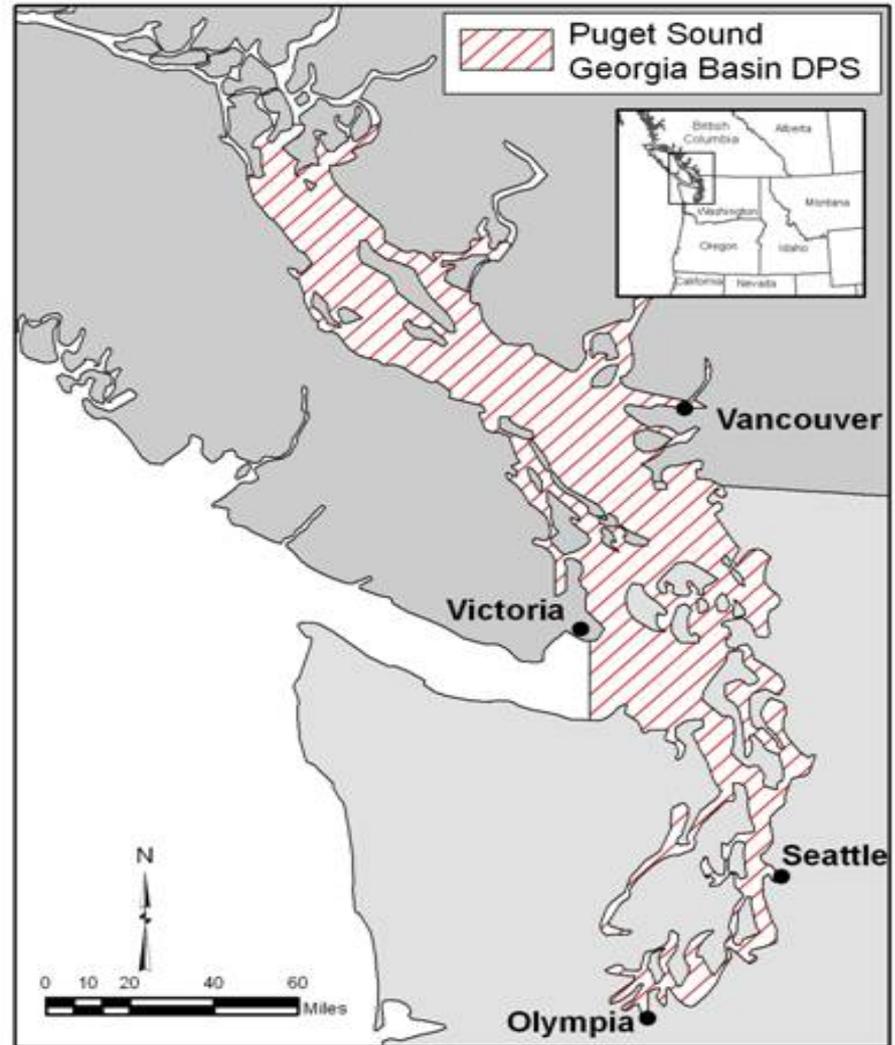
Tony O'Connell



Mary Yoklavich



Stan Shebs





Overview

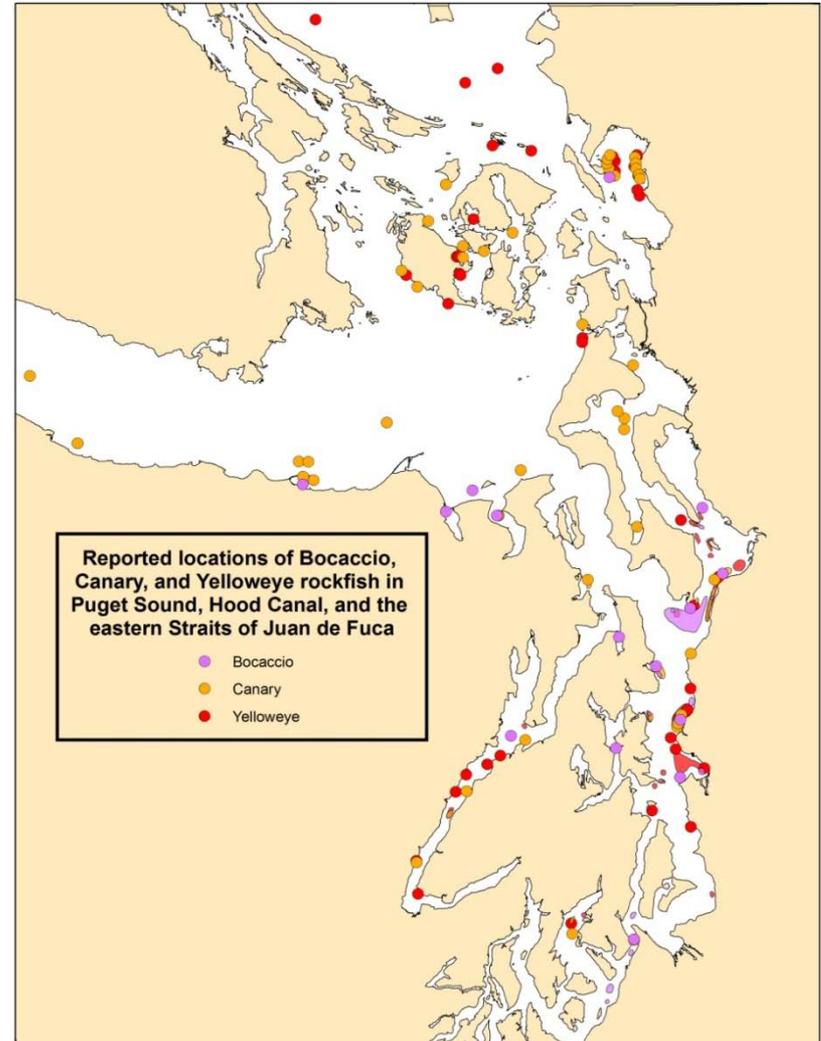
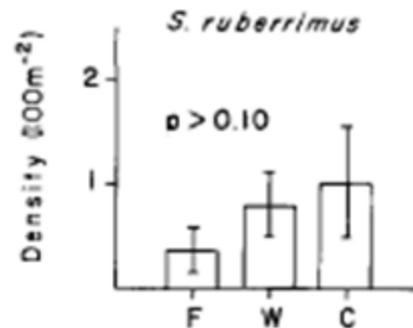
- Habitat Use
Habitat Mapping
&
Habitat Threats
- Discussion of ~~VSP~~ VRP parameters
- What's Next



Adults use rocky/complex habitat, however.....

Each species has been documented in habitats with unconsolidated sediments (i.e. non-rocky, but usually steep).

Particularly in Puget Sound proper.



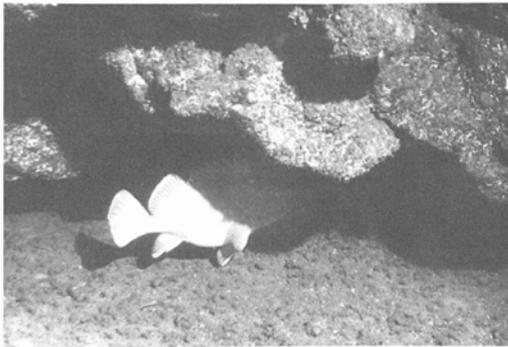


Figure 3
An adult yelloweye rockfish in a typical "refuge space."

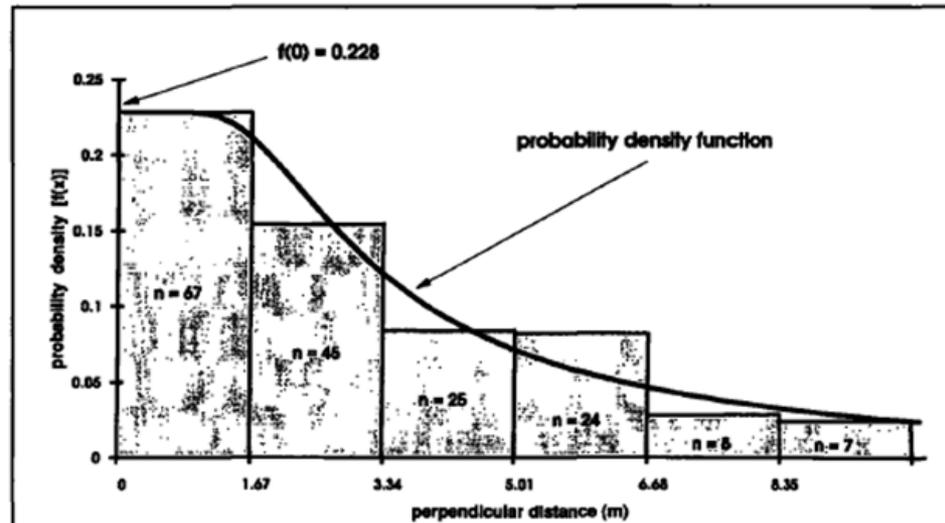


Figure 2

Representative probability density function (pdf) and histogram of relative frequencies ($n_i/\Delta_i n$) of yelloweye rockfish observed for 5 distance intervals over boulder habitat in the Sitka study area, 1990. For relative frequencies, n_i = number of fish observed in interval i , Δ_i = size of class interval (in this case, 1.67m), and n = total number of yelloweye observed (in this case, 176).



Benthic Habitats Maps

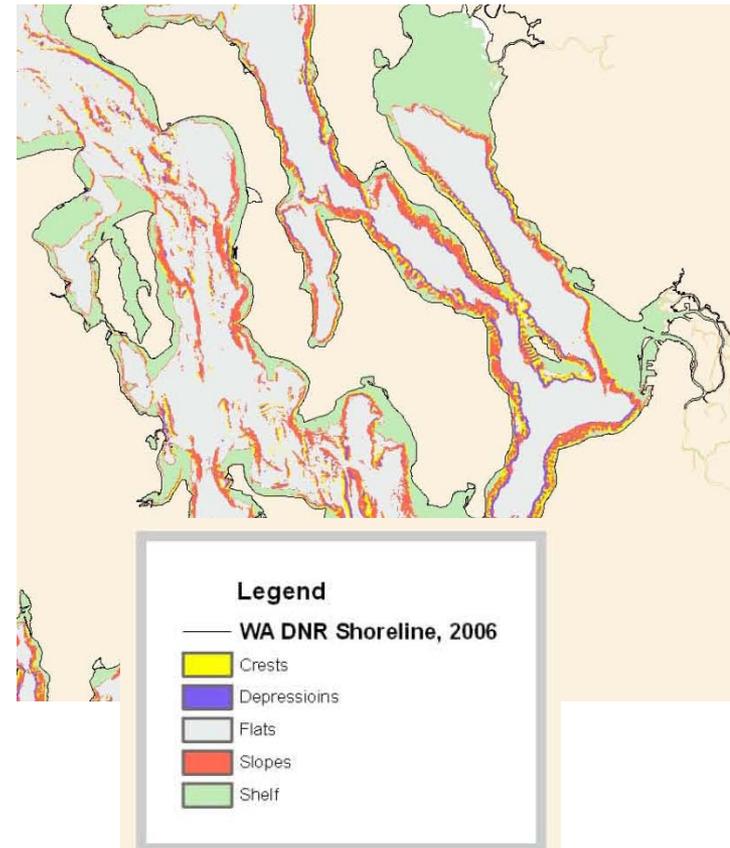
**San Juan Area:
Benthic Terrain Model**

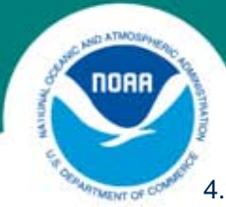
**Puget Sound proper:
Benthic Terrain Model**



**Detailed Substrate
Classifications from
SeaDoc/Tombolo**

(see <http://www.seadocsociety.org/sea-floor-maps>)





NOAA Status Review -- Habitat Threats

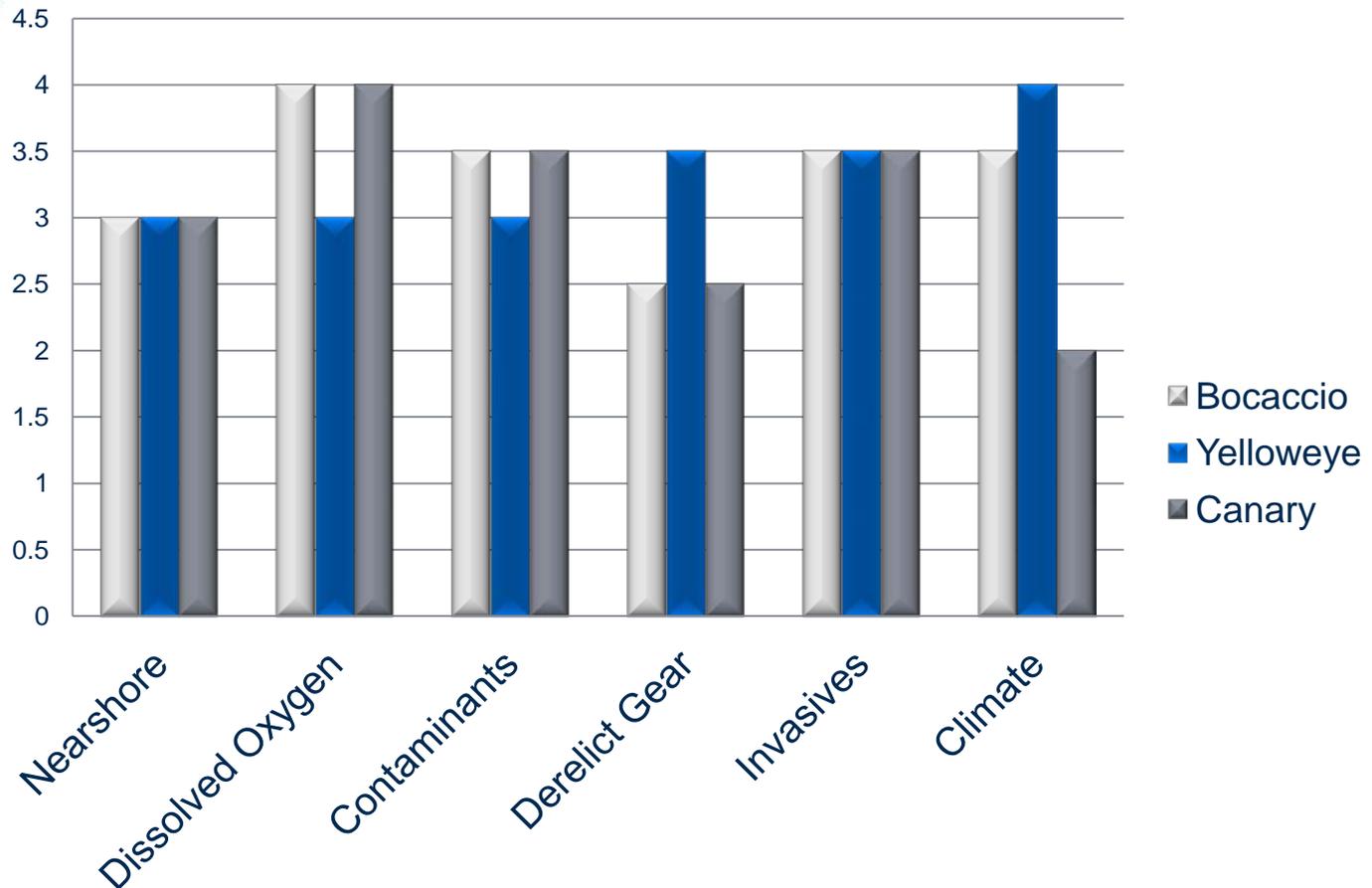


Chart developed from data within Drake et al. 2010



Rockfish Viability Parameters

Abundance: Indicator of whether the population can sustain itself in the face of environmental fluctuations and small-population stochasticity. Abundance in a declining population is an indicator of the time expected until the population reaches critically low numbers (McElhaney et al., 2000).

Productivity: Naturally influenced in rockfish as they are long-lived; mature slowly, with sporadic episodes of successful reproduction.

Diversity: Examples include fecundity, timing of the release of larva and their condition, morphology, age at reproductive maturity and physiology and molecular genetic characteristics.

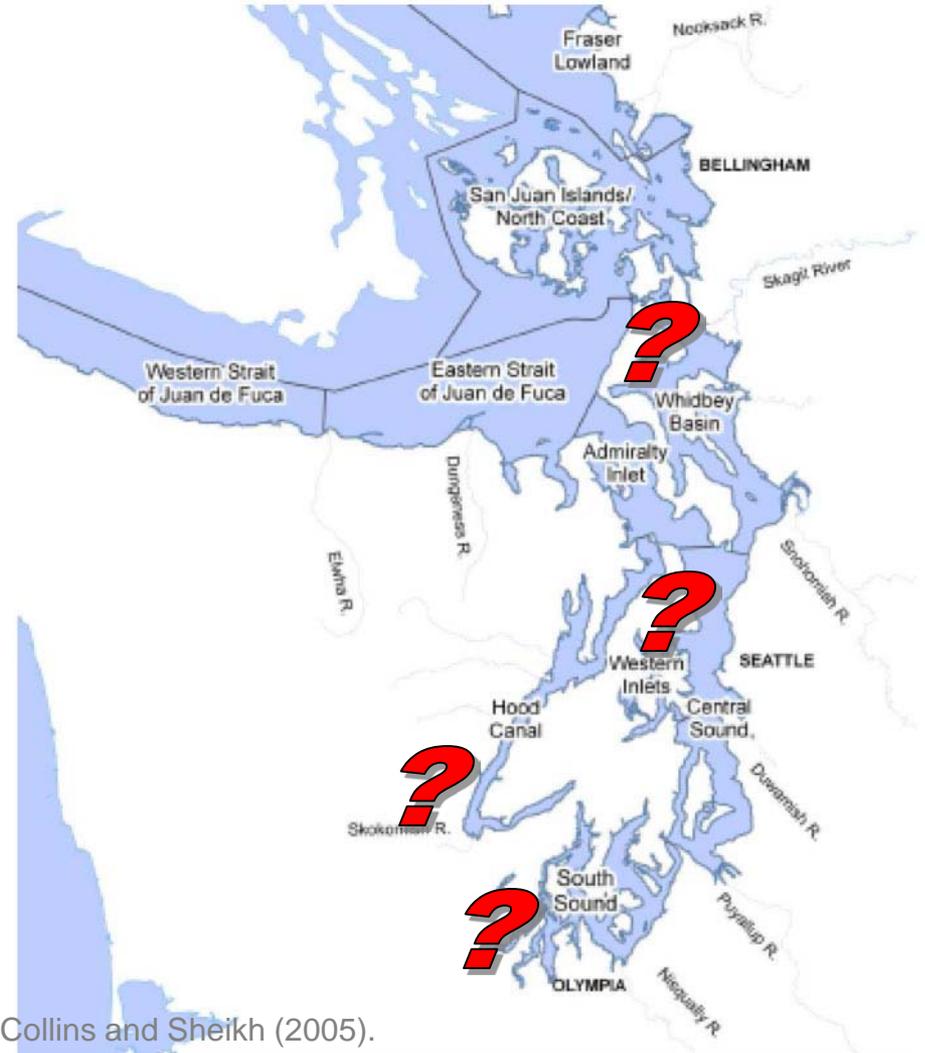
Spatial Structure & Connectivity: Consists of a population's geographical distribution and the processes that generate that distribution (McElhaney et al., 2000).



Estimates from the San
Juan/Straits Only.

No systematic surveys
over all habitat types within
Puget Sound Proper.

Abundance

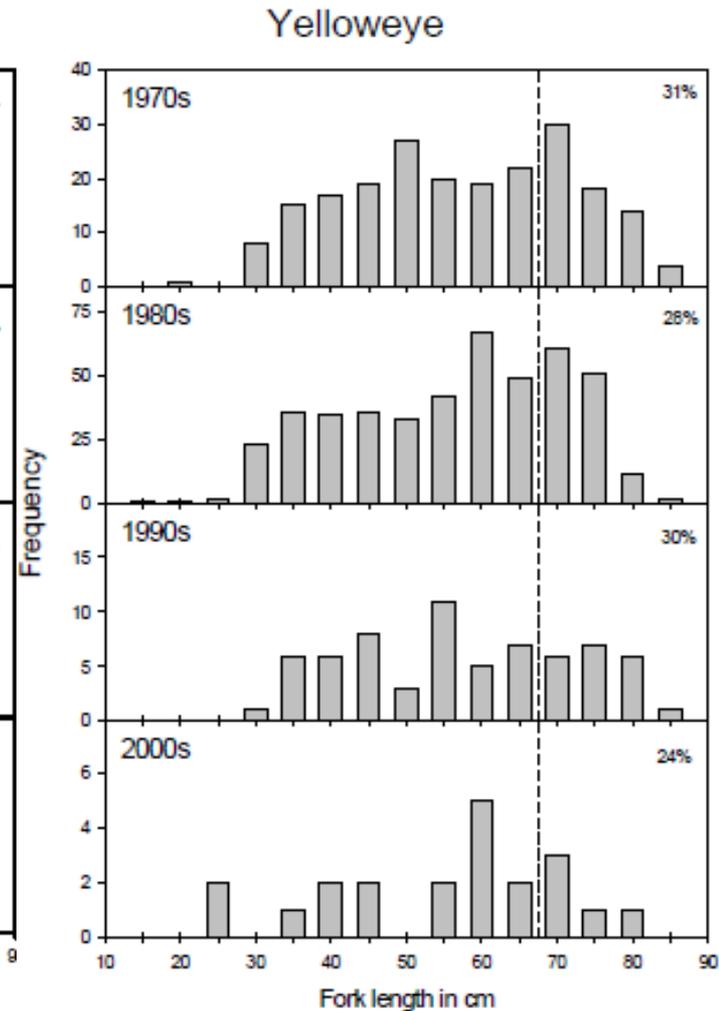
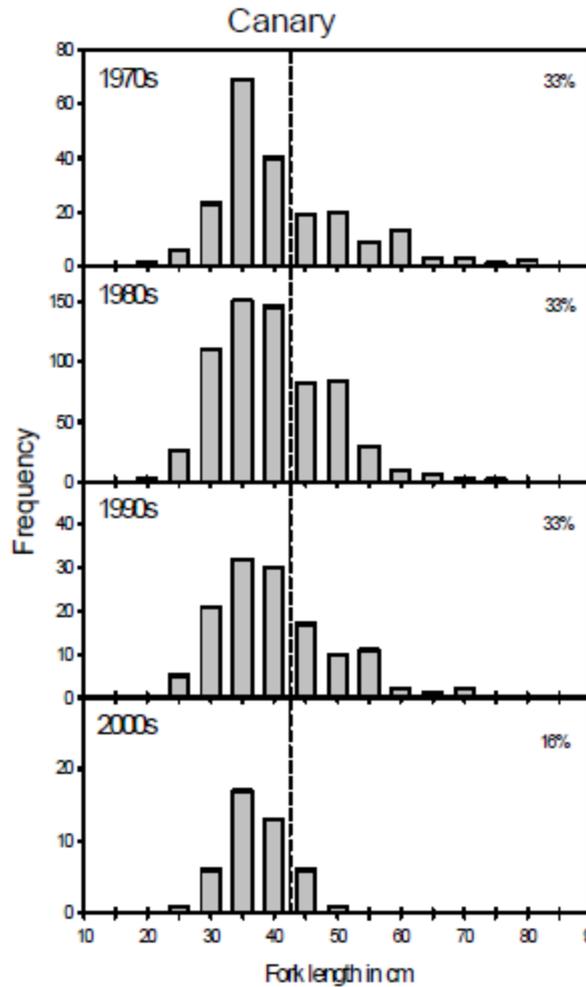
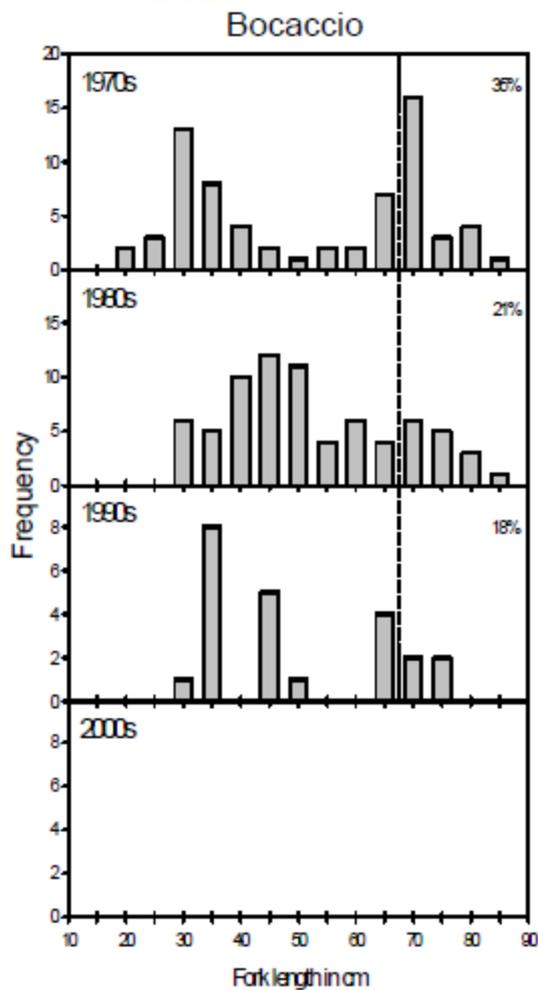


Collins and Sheikh (2005).



Evidence of Size Truncation

(Image from Drake et al., 2010)

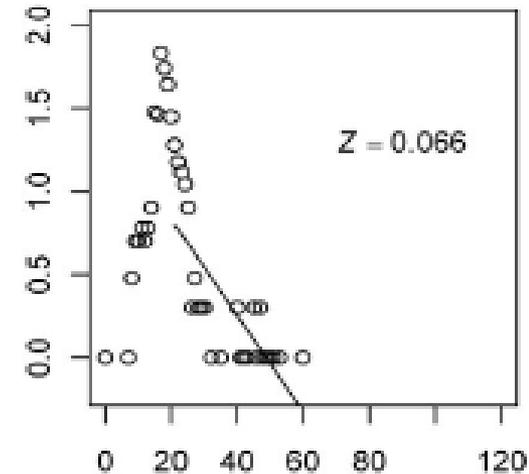
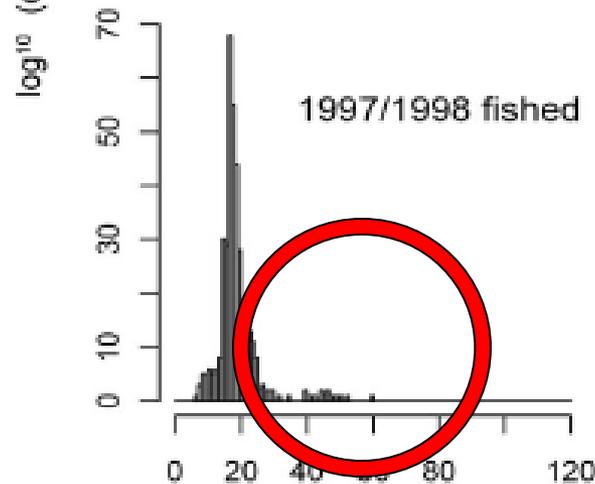
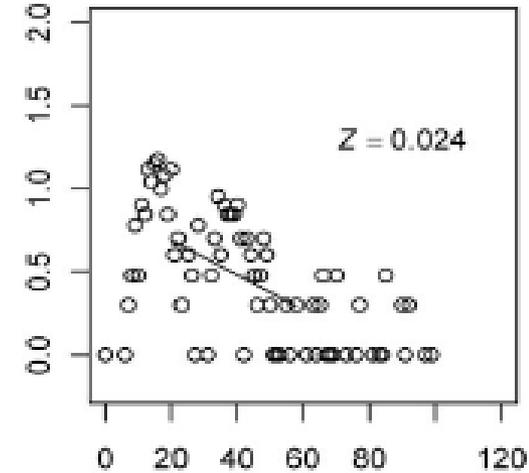
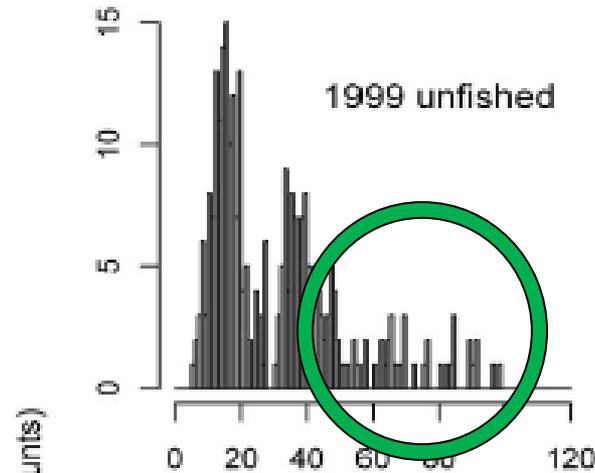




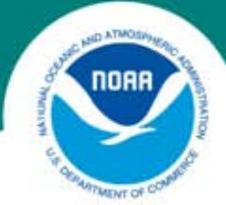
Productivity/Diversity

Implications of fewer/smaller adults:

- Less larval output
- Changed timing of larval release
- Changed condition of larvae



yelloweye rockfish age in years



Spatial Structure & Larval Dispersal

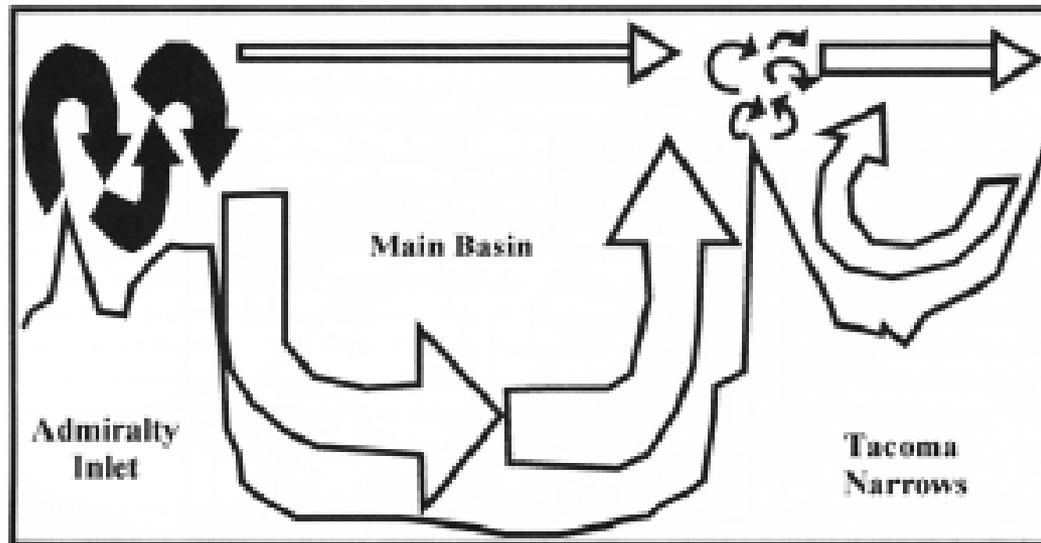
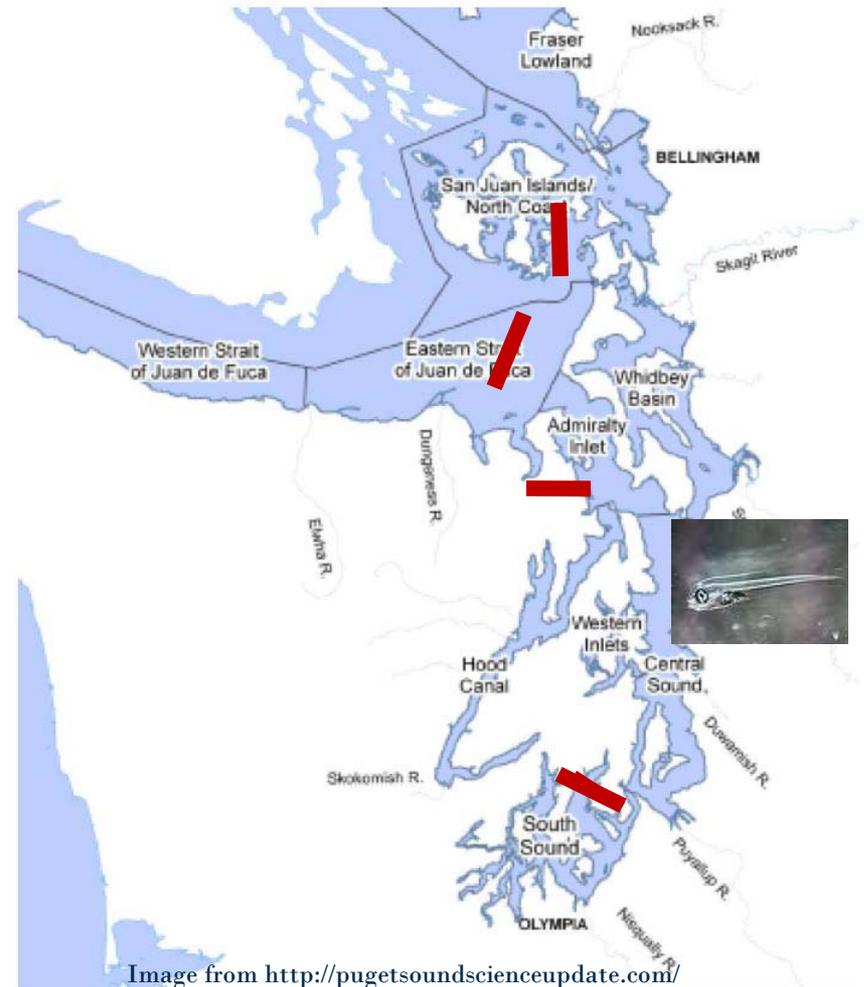


Image from Stout et al., 2001



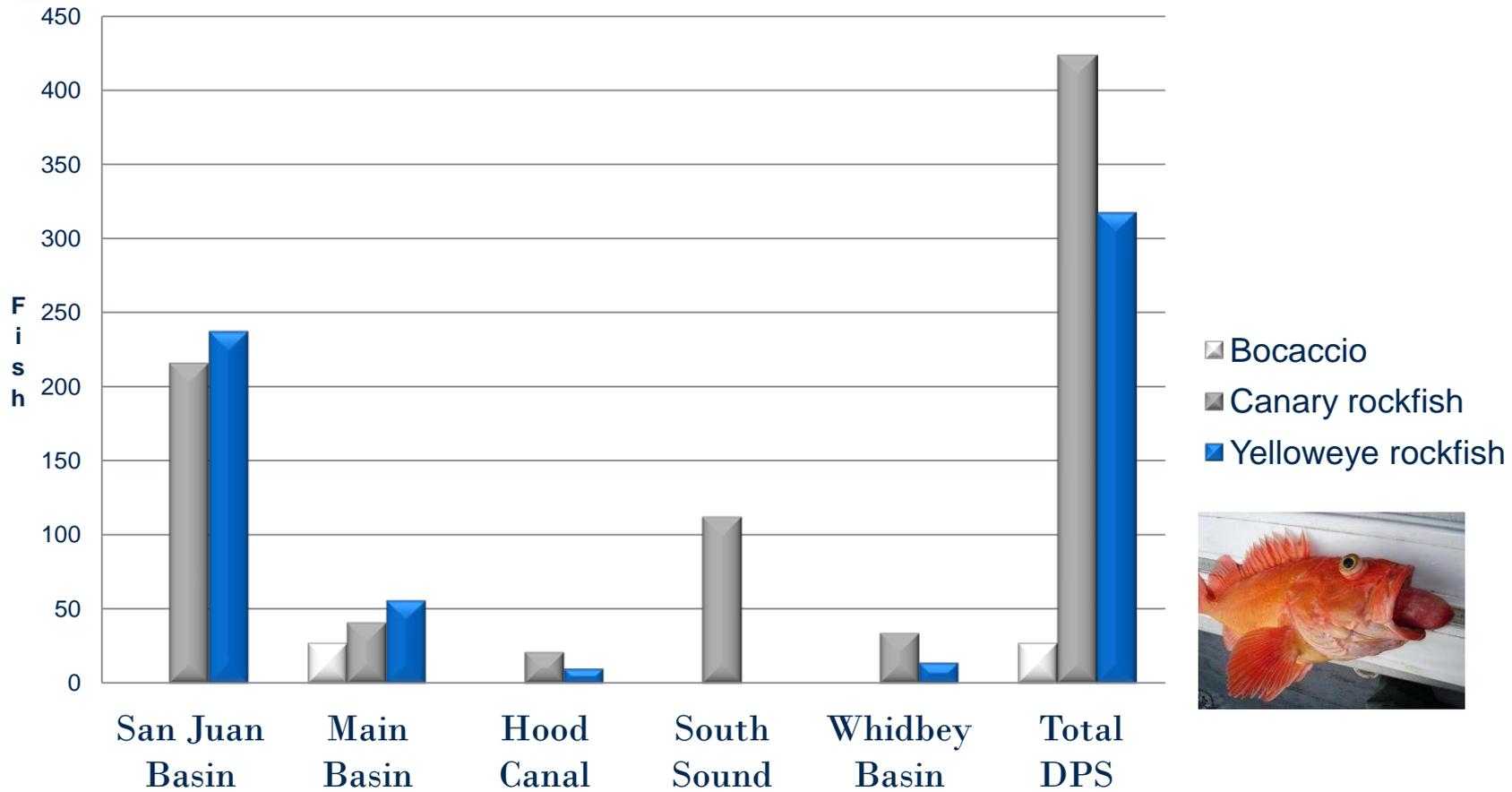
Spatial Structure & Larval Dispersal

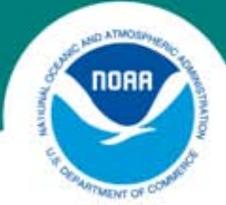
Basin	Time for turnover (months)
San Juan/Straits	na
Whidbey Basin	5.4
Main Basin	1
Southern Basin	1.9
Hood Canal	9.3





Annual Bycatch Estimates by Basin





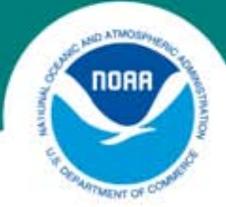
Summary

Abundance: Estimates for one of the five basins of the DPSs.

Productivity: Naturally constrained, & likely exacerbated by the dearth of adult fish/size truncation.

Diversity: Likely impacted by fewer mature fish.

Spatial Structure: Natural constraints of larval dispersal exacerbated by localized loss of fish (probably most acute for yelloweye rockfish).



What's Next for ESA Listed Rockfish?

Critical Habitat Designation & Recovery Planning



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