

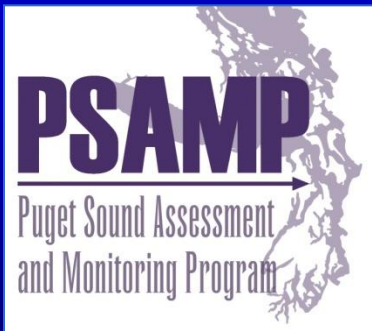


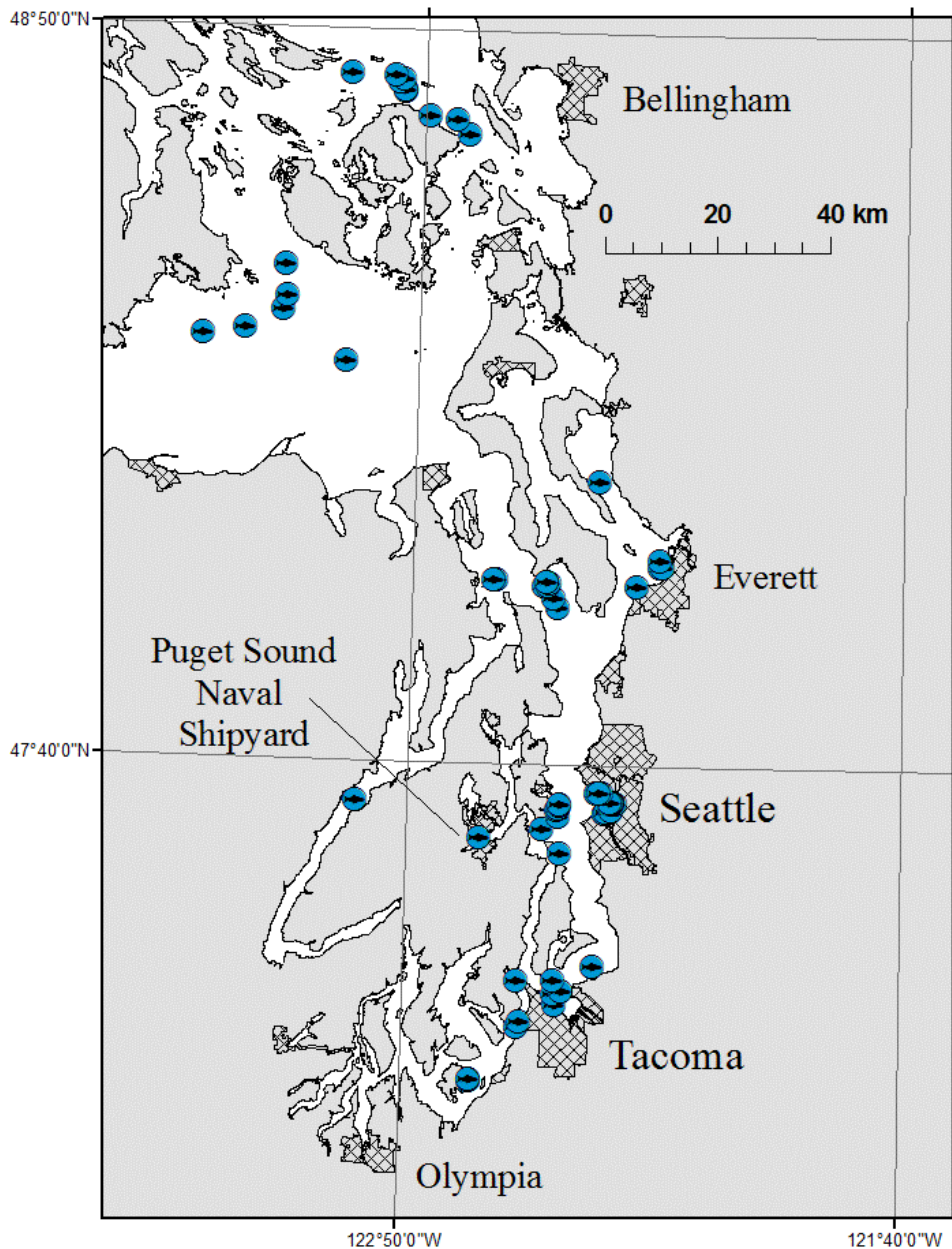
# Toxic contaminants as a stressor in demersal rockfishes (*Sebastes* spp) from Puget Sound



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*Sandie O'Neill*, NOAA Fisheries, Northwest Fisheries Science Center





## PSAMP rockfish samples 1989-2006

Species	n (age)	n (chemistry)
Copper	691	52
Brown	303	52
Quillback	1789	285
Splitnose	37	0
Yelloweye	28	2
Idiot	20	0
<b>Total</b>	<b>2868</b>	<b>391</b>

# Risk factors for exposure to persistent bioaccumulative toxic (PBT) chemicals

- Location: exposure occurs with proximity to contaminated habitats (or prey)
- Age: longer lifespan means greater exposure time
- Trophic level: biomagnification
- Sex: gender specific accumulation patterns
- Tissue lipid levels: many contaminants are lipophilic

# Trophic level effects (using PCBs in fish from Elliott Bay as an example)

62 ng/g

English sole  
(*Parophrys vetulus*)



121 ng/g

Quillback rockfish  
(*Sebastes maliger*)



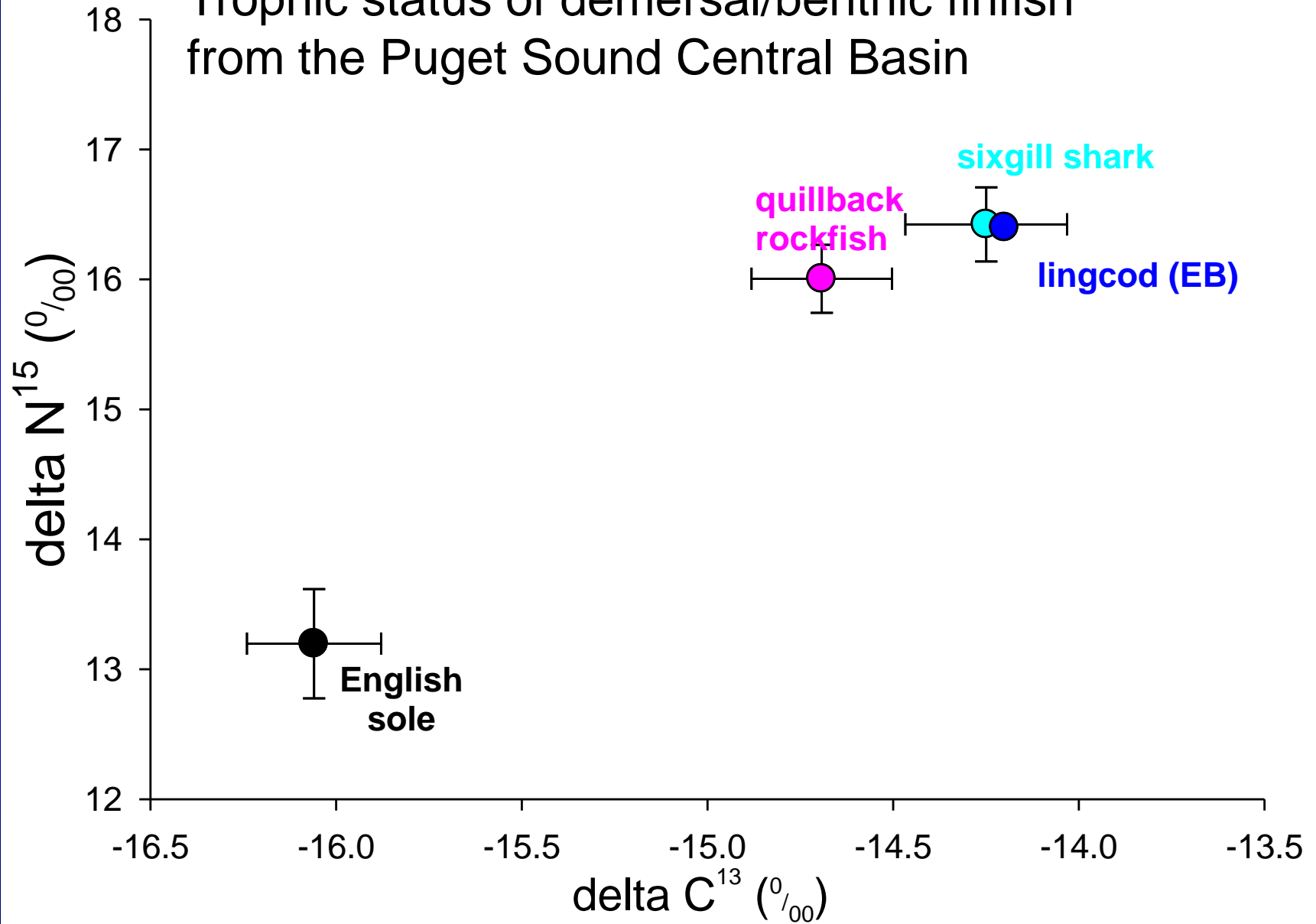
Photo by T. Quinn

Lingcod  
(*Ophiodon elongatus*)

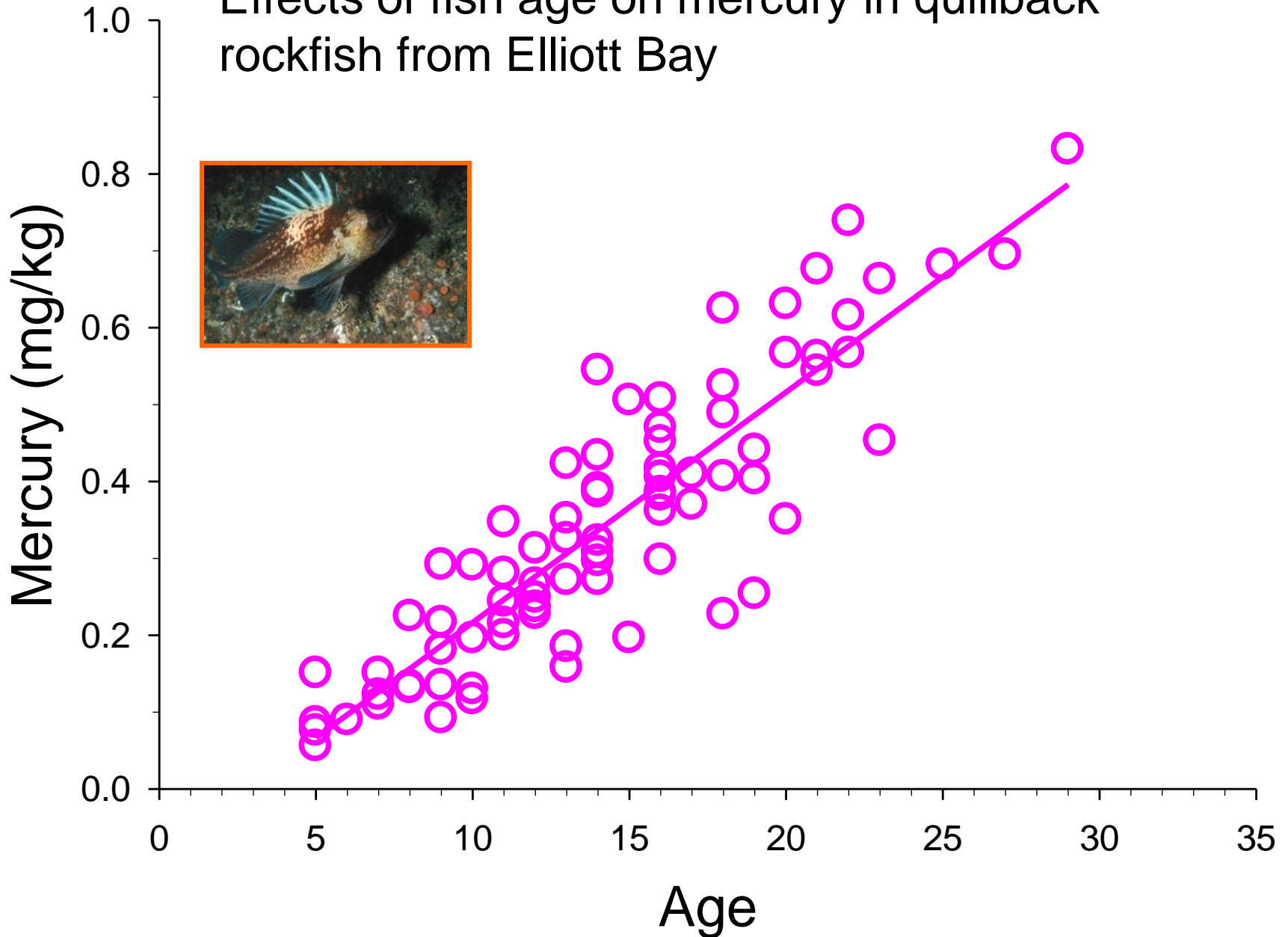
270 ng/g

measured as Aroclor (ww)

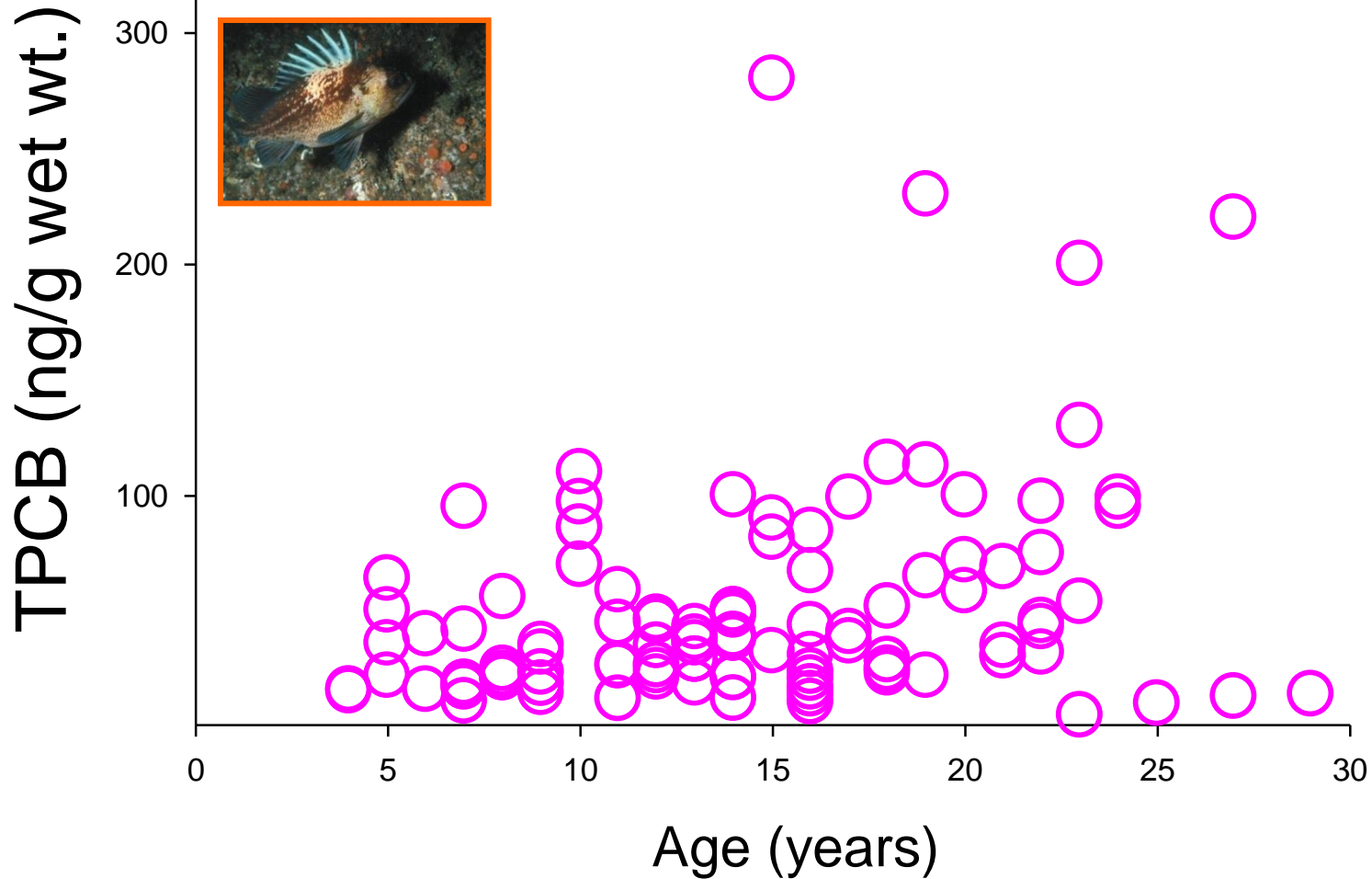
# Trophic status of demersal/benthic finfish from the Puget Sound Central Basin



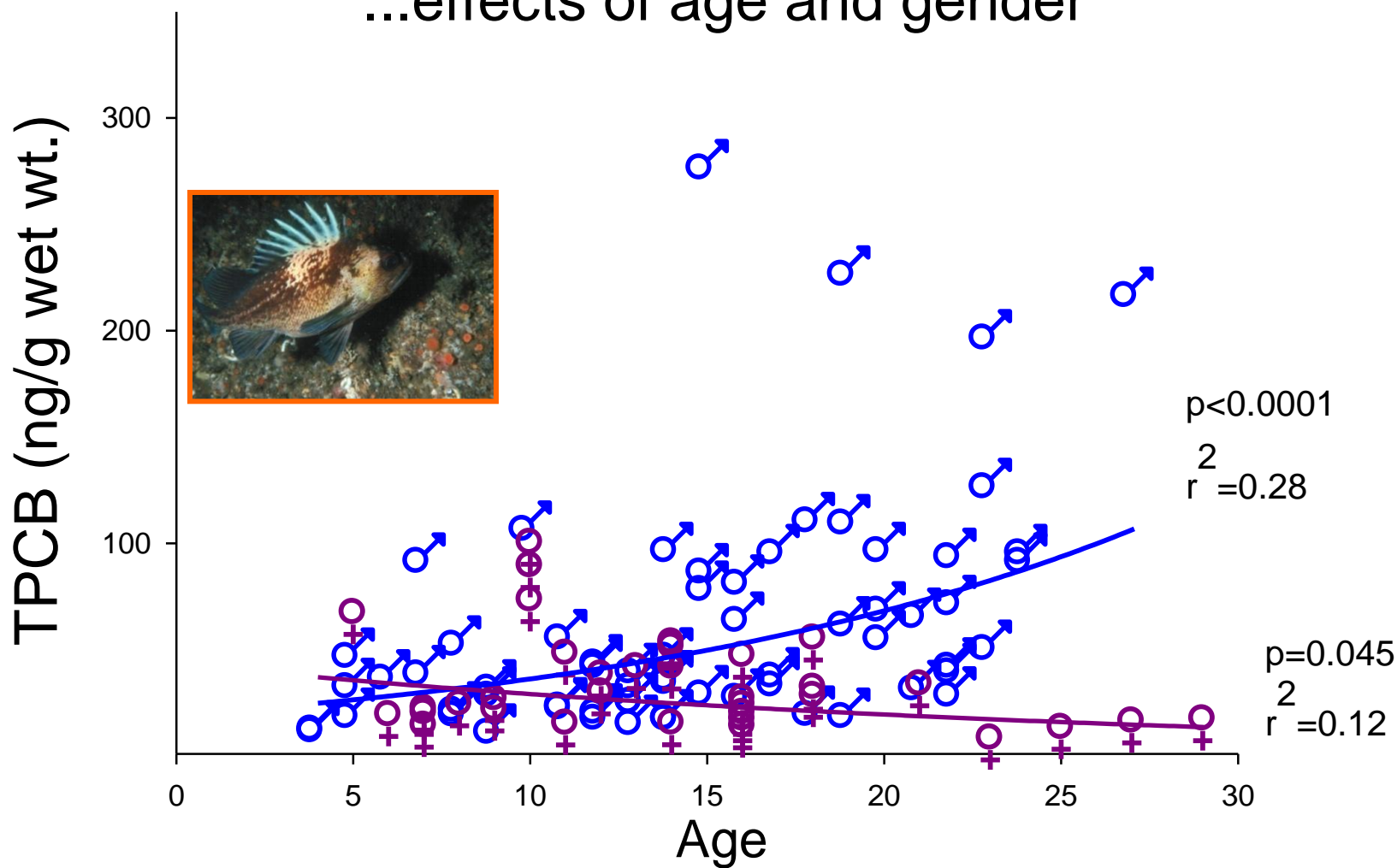
# Effects of fish age on mercury in quillback rockfish from Elliott Bay



# Effects of age on PCBs in quillback rockfish from Elliott Bay

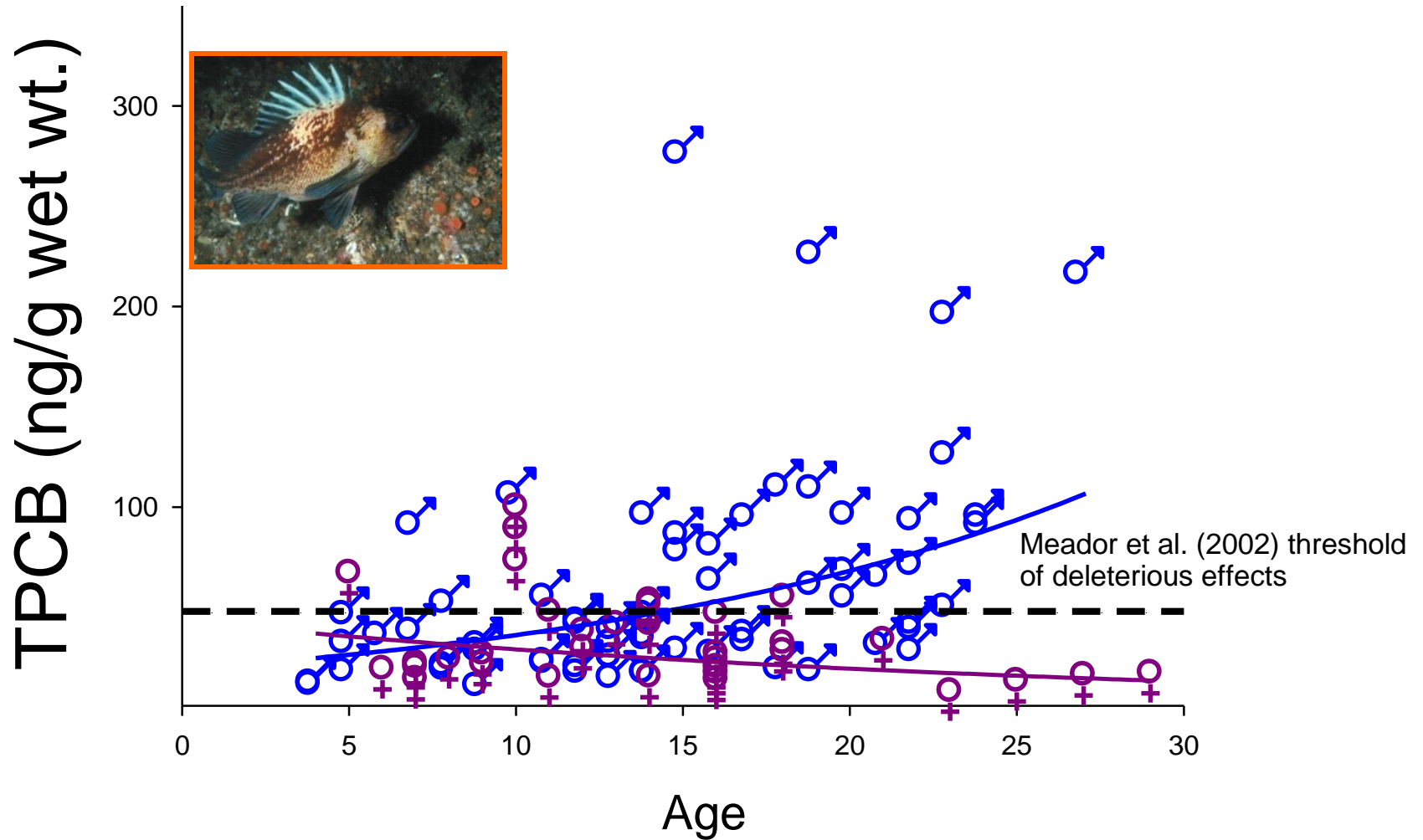


# ...effects of age and gender

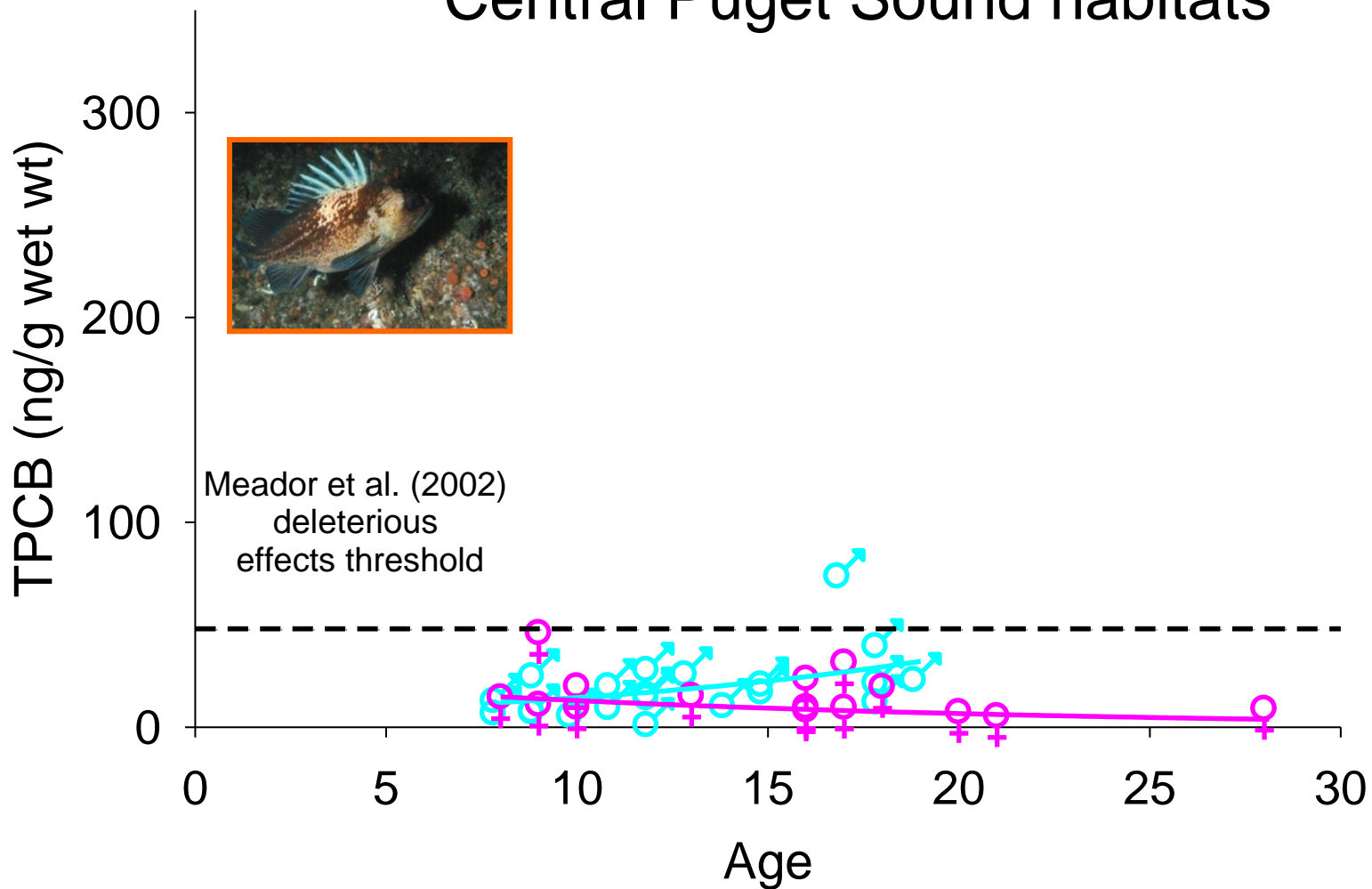


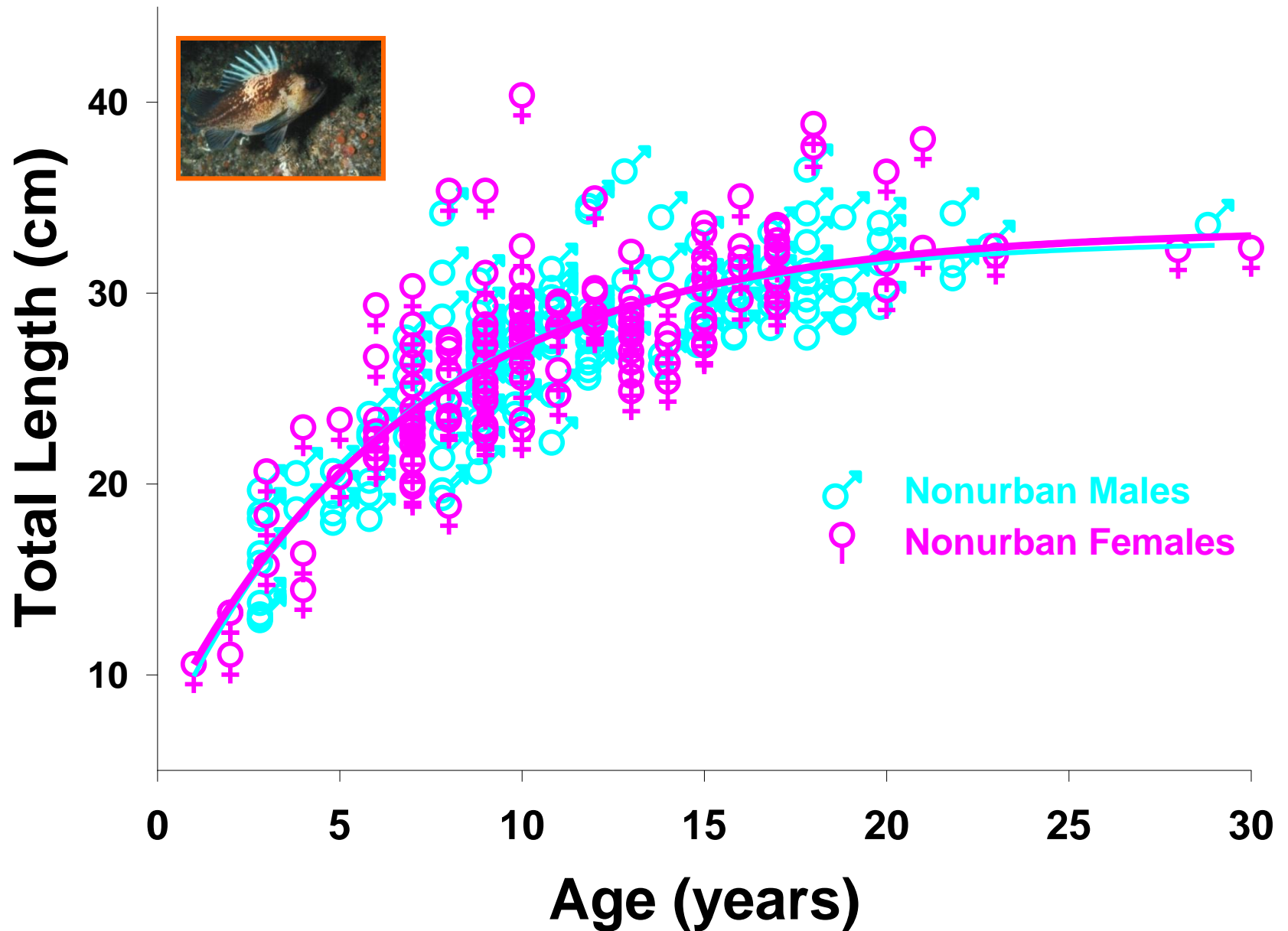


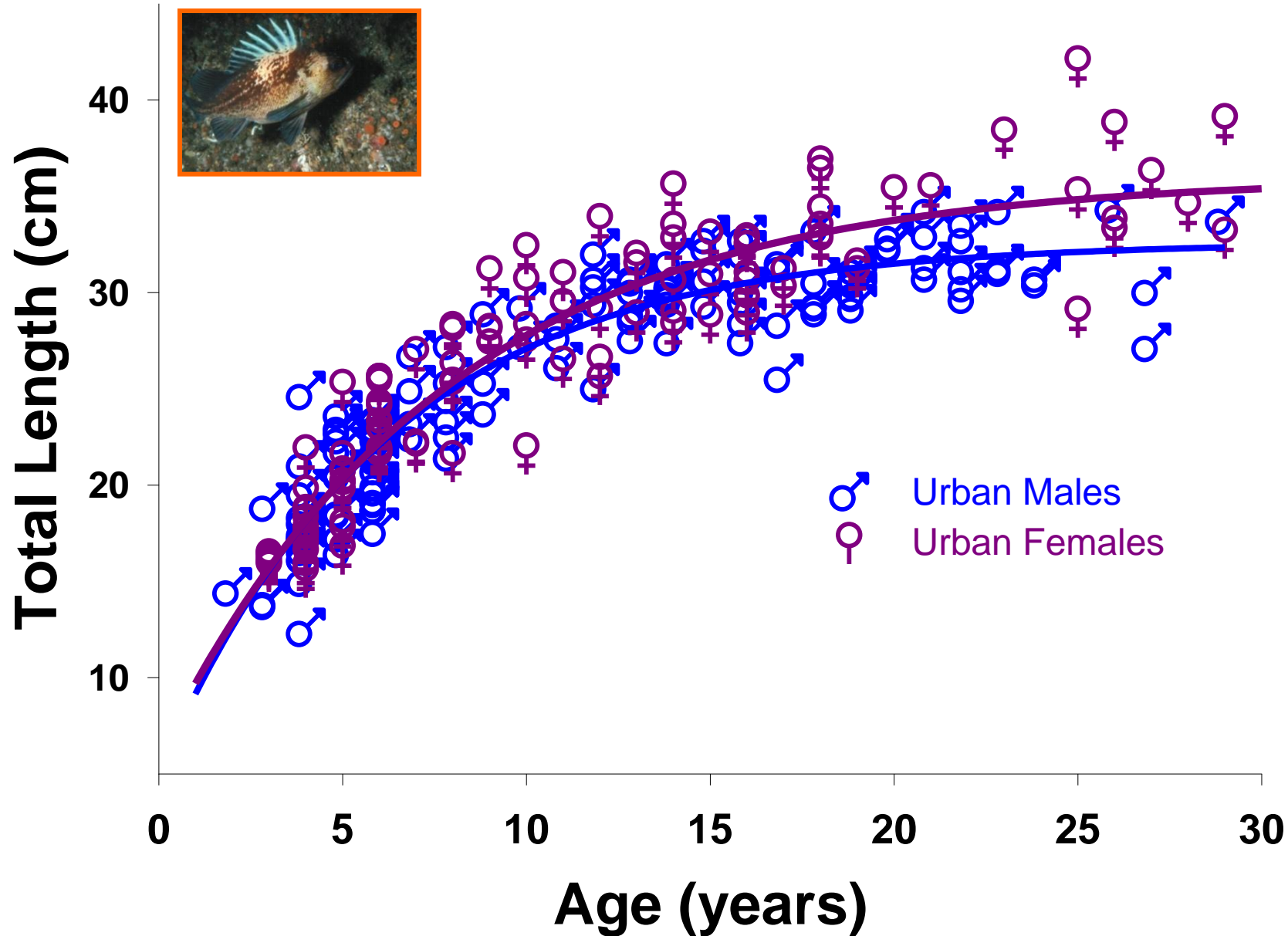
# Quillback rockfish from Elliott Bay



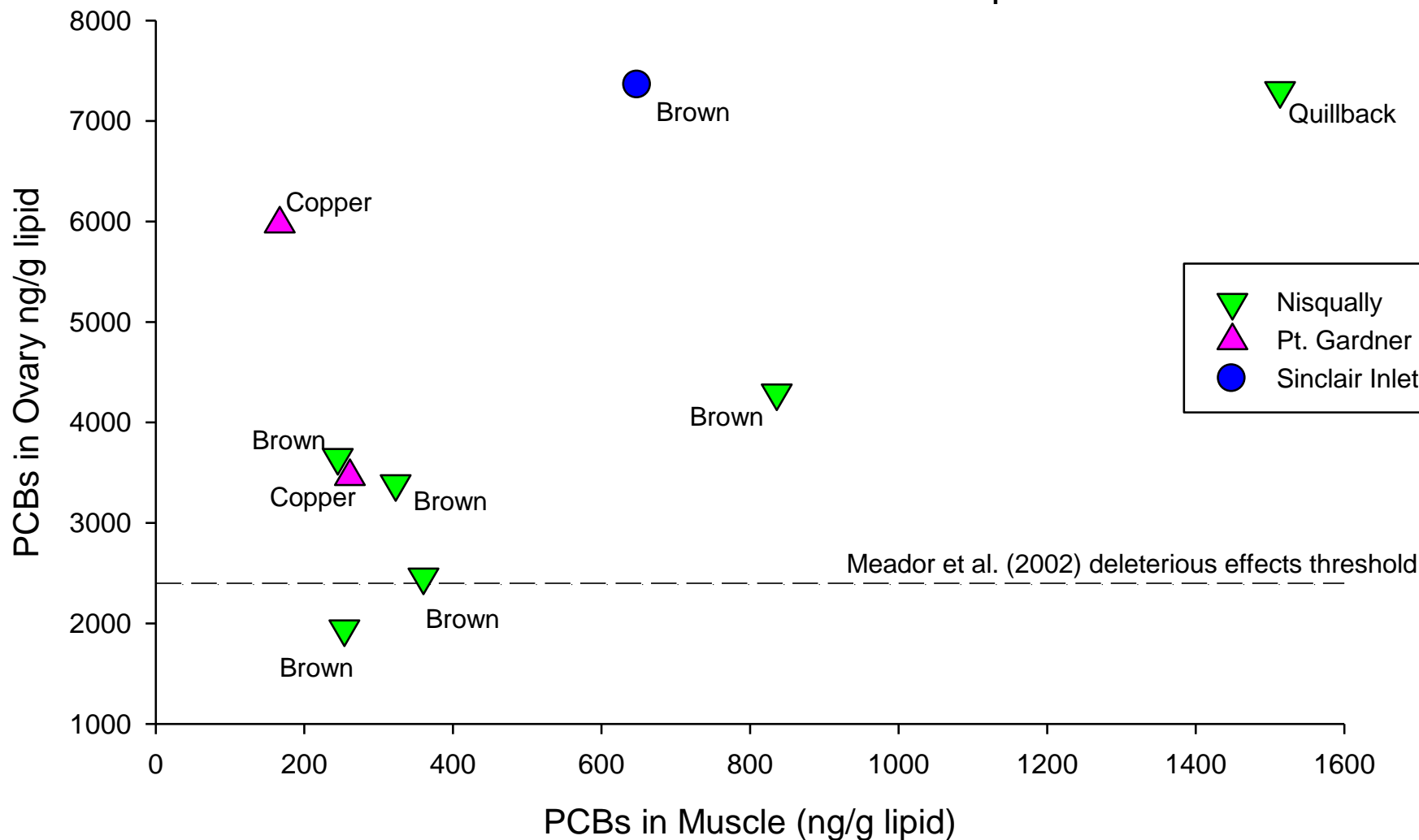
# Quillbacks from non-urban Central Puget Sound habitats





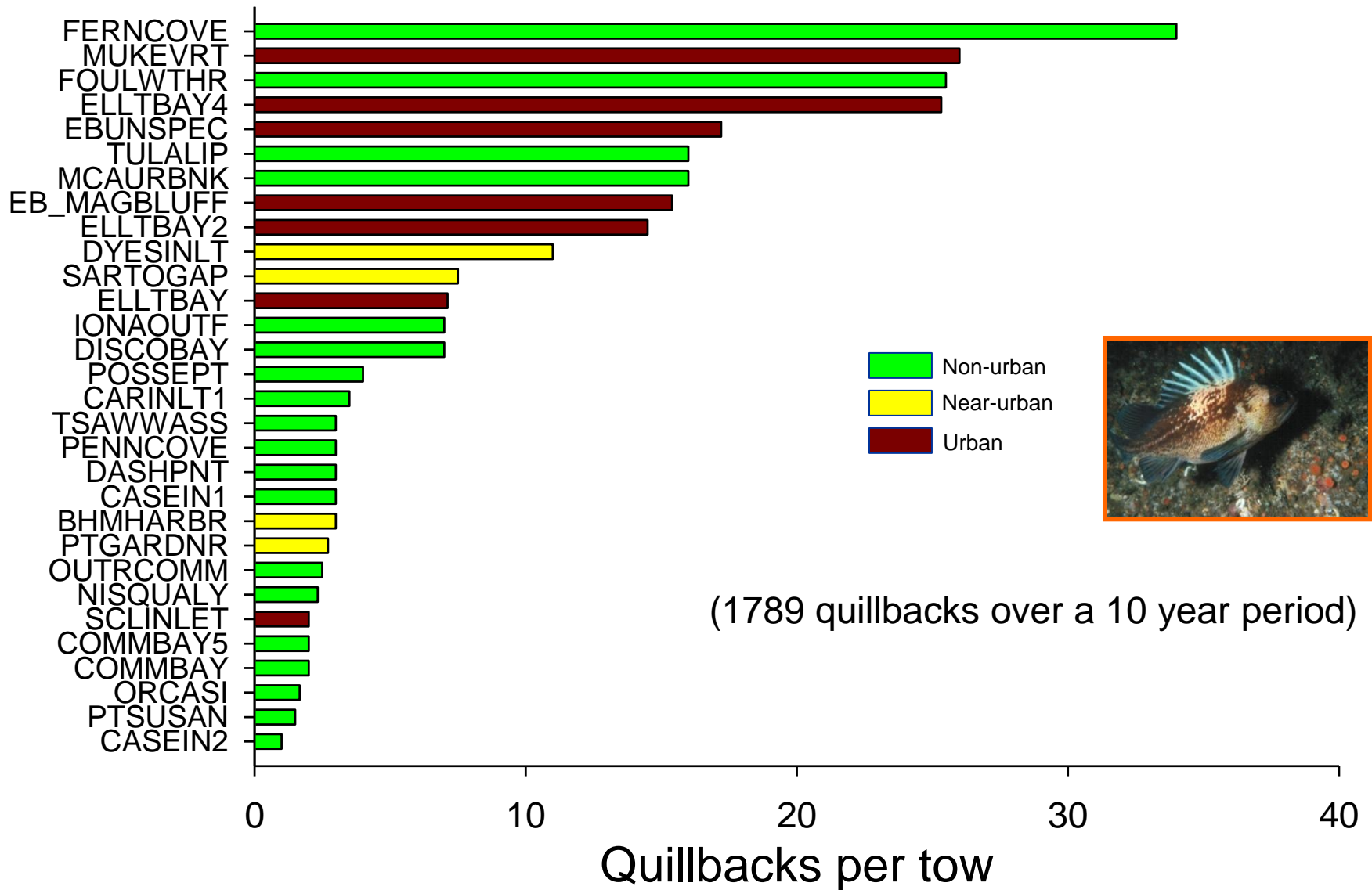


# Evidence for Maternal Transfer of PCBs in 3 species of Rockfish



So what?

Most of Puget Sound is not urban....



# Conclusions

- Demersal rockfish in Puget Sound are exposed to chemical contaminants in concentrations great enough to cause deleterious effects
- Urban bays may serve as a *de facto* “protected areas” for *Sebastes*
- If so, recovery potential may be impacted

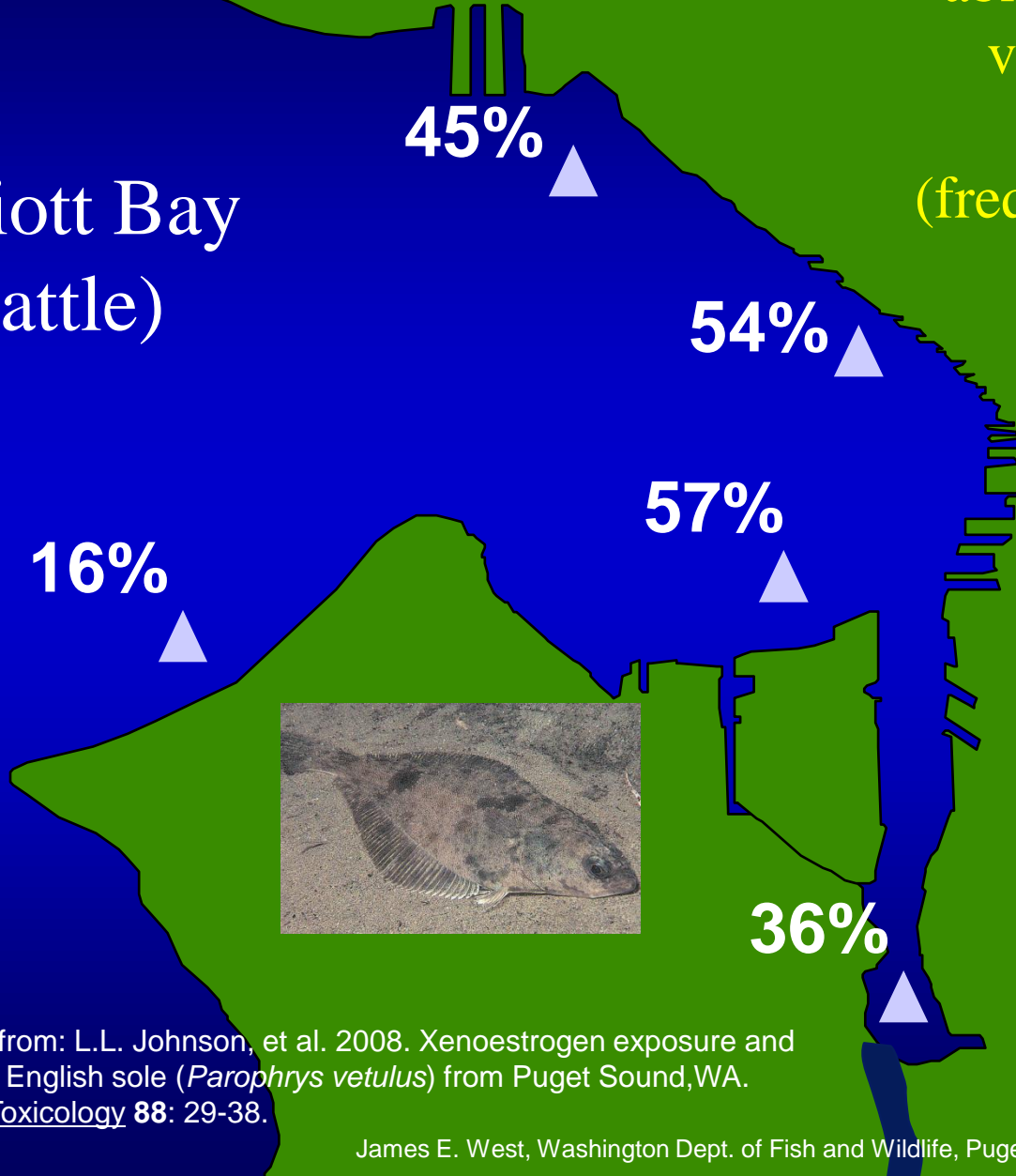


# What about other chemicals?

- PCBs
- Metals
- Flame retardants (PBDEs)
- PAHs
- Endocrine disrupting compounds

Feminization of male fish:  
abnormal production of  
vitellogenin in male  
English sole  
(frequency of occurrence)

Elliott Bay  
(Seattle)



0-19% in other  
Puget Sound  
locations

Adapted from: L.L. Johnson, et al. 2008. Xenoestrogen exposure and effects in English sole (*Parophrys vetulus*) from Puget Sound, WA. *Aquatic Toxicology* **88**: 29-38.

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Washington  
Department of  
Fish and  
Wildlife