# Population Ecology of Sacramento Splittail

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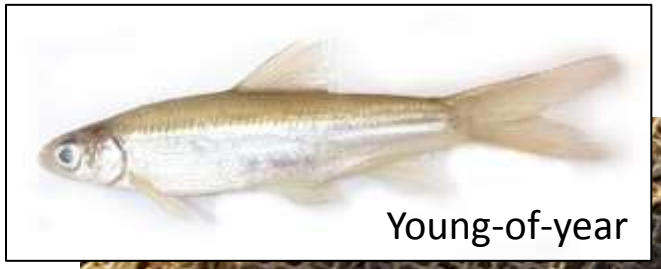
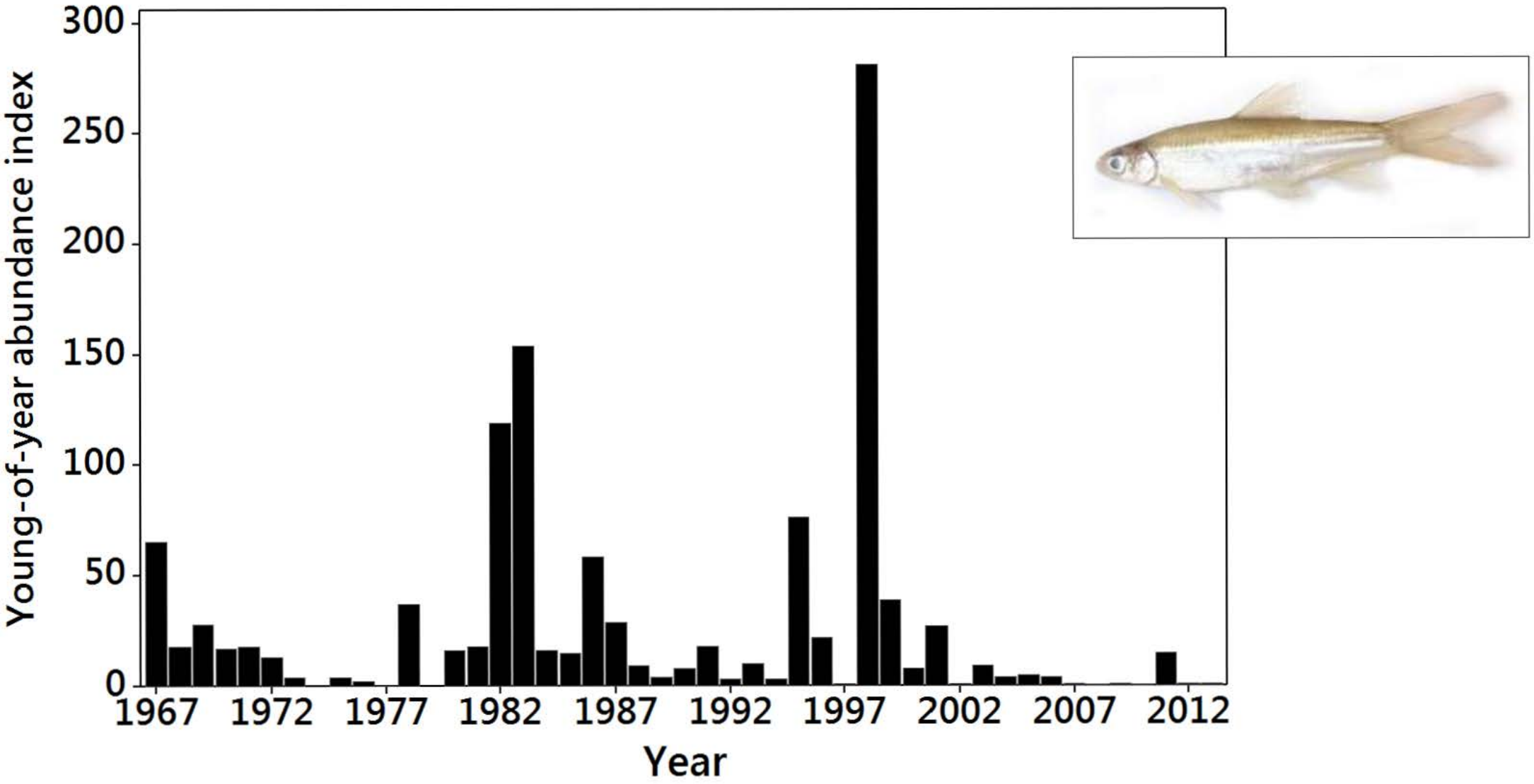
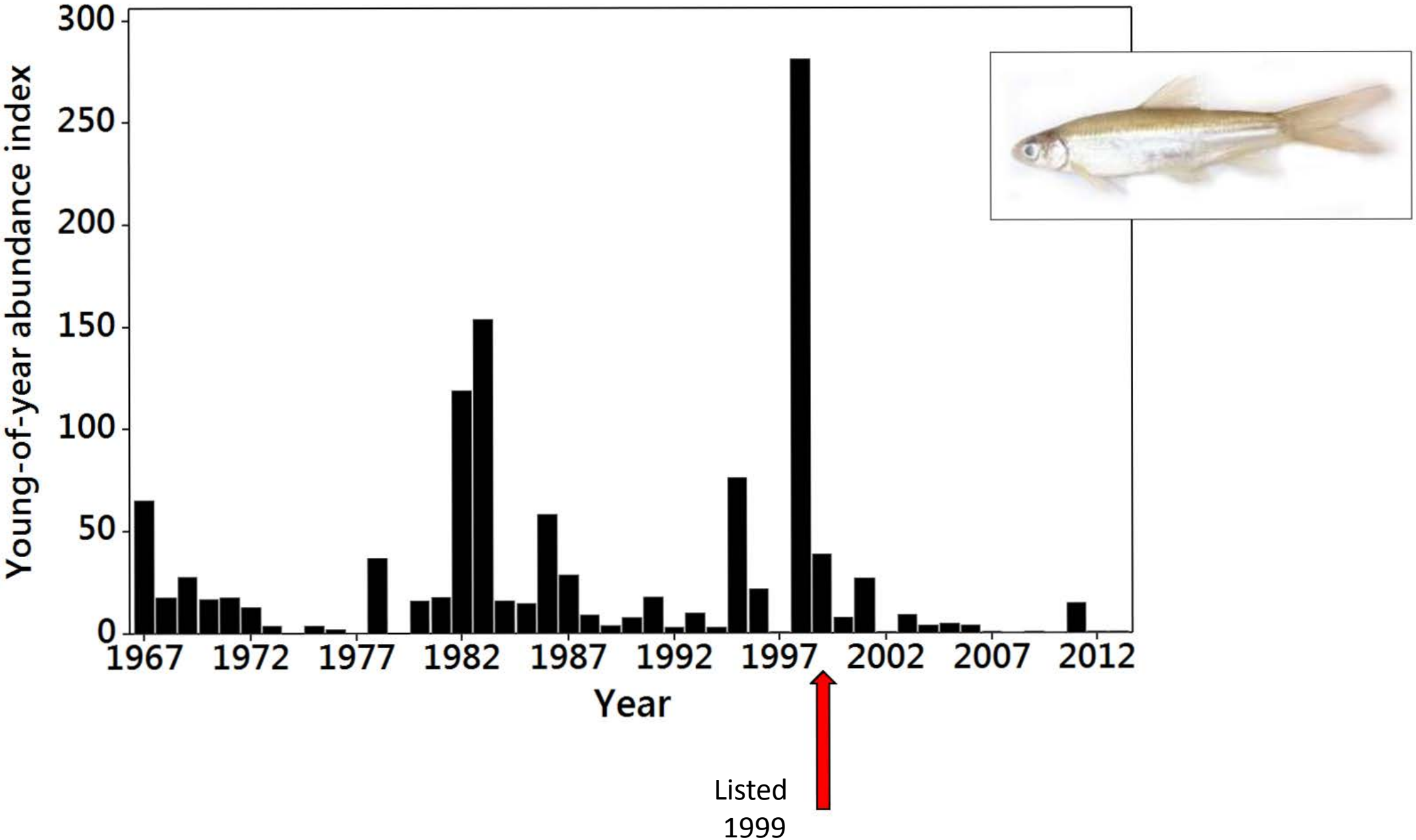
# Sacramento Splittail *Pogonichthys macrolepidotus*

- Large migratory cyprinid with broad environmental tolerances
- Endemic to the San Francisco Estuary and tributaries
- Only surviving member of genus
- Formerly listed as threatened by US Fish and Wildlife Service


Young-of-year


Adult


Young-of-year abundance index
300
250
200
150
100
50
0
1967
1972
1977
1982
1987
1992
1997
2002
2007
2012
Year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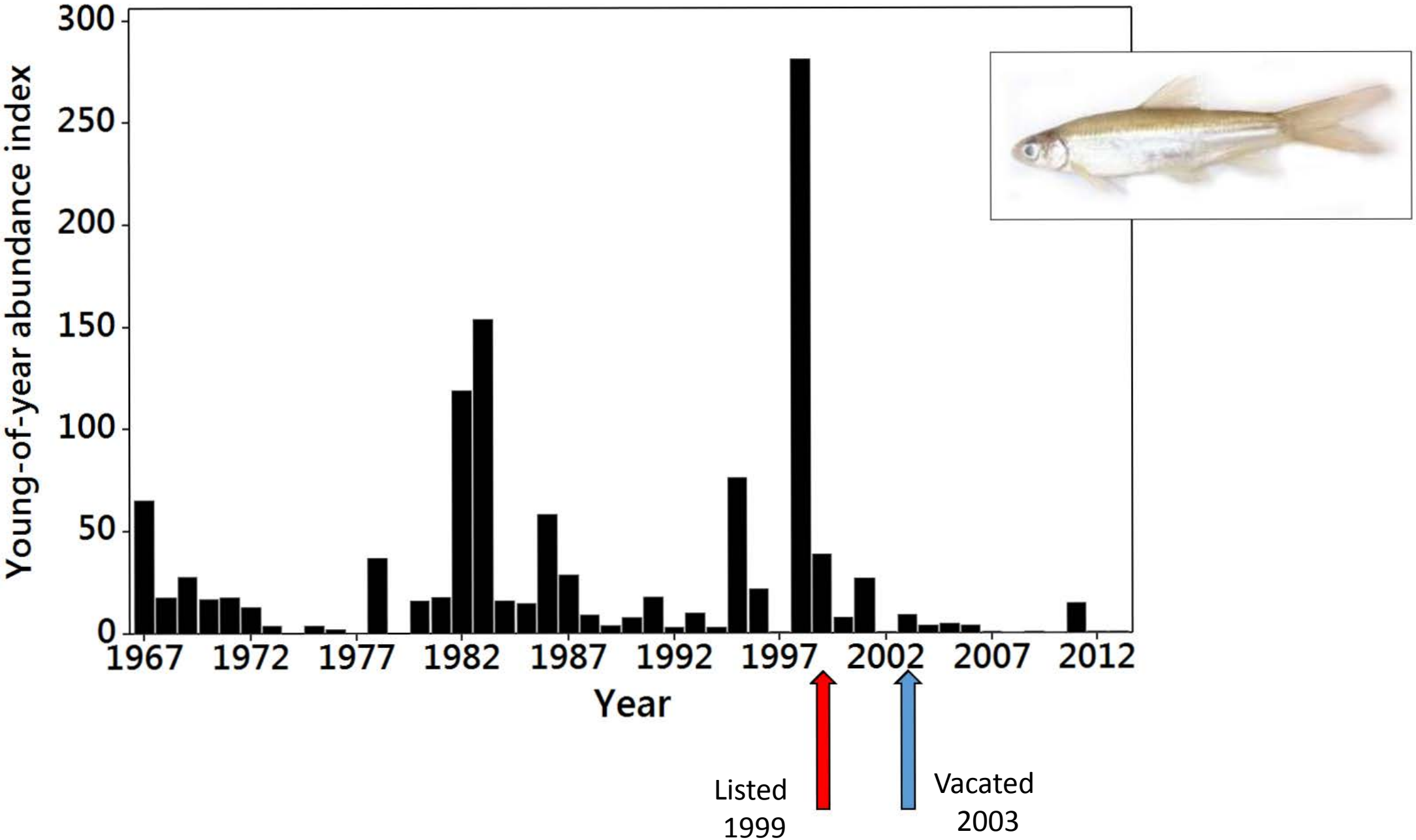
2012
Year
Listed
1999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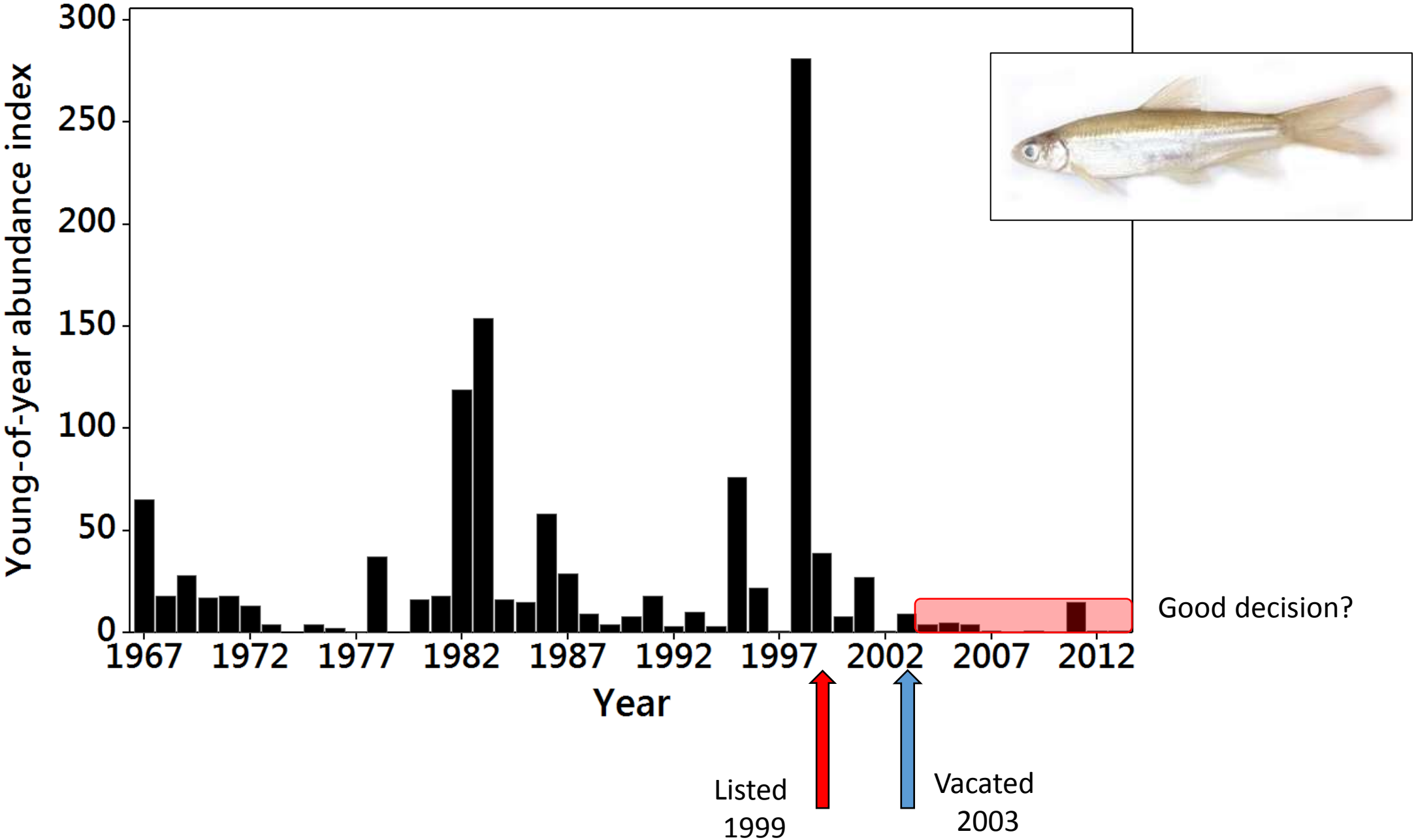
0
1967
1972
1977
1982
1987
1992
1997
2002
2007
2012
Year
Listed
1999
Vacated
2003


Young-of-year abundance index
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1967
1972
1977
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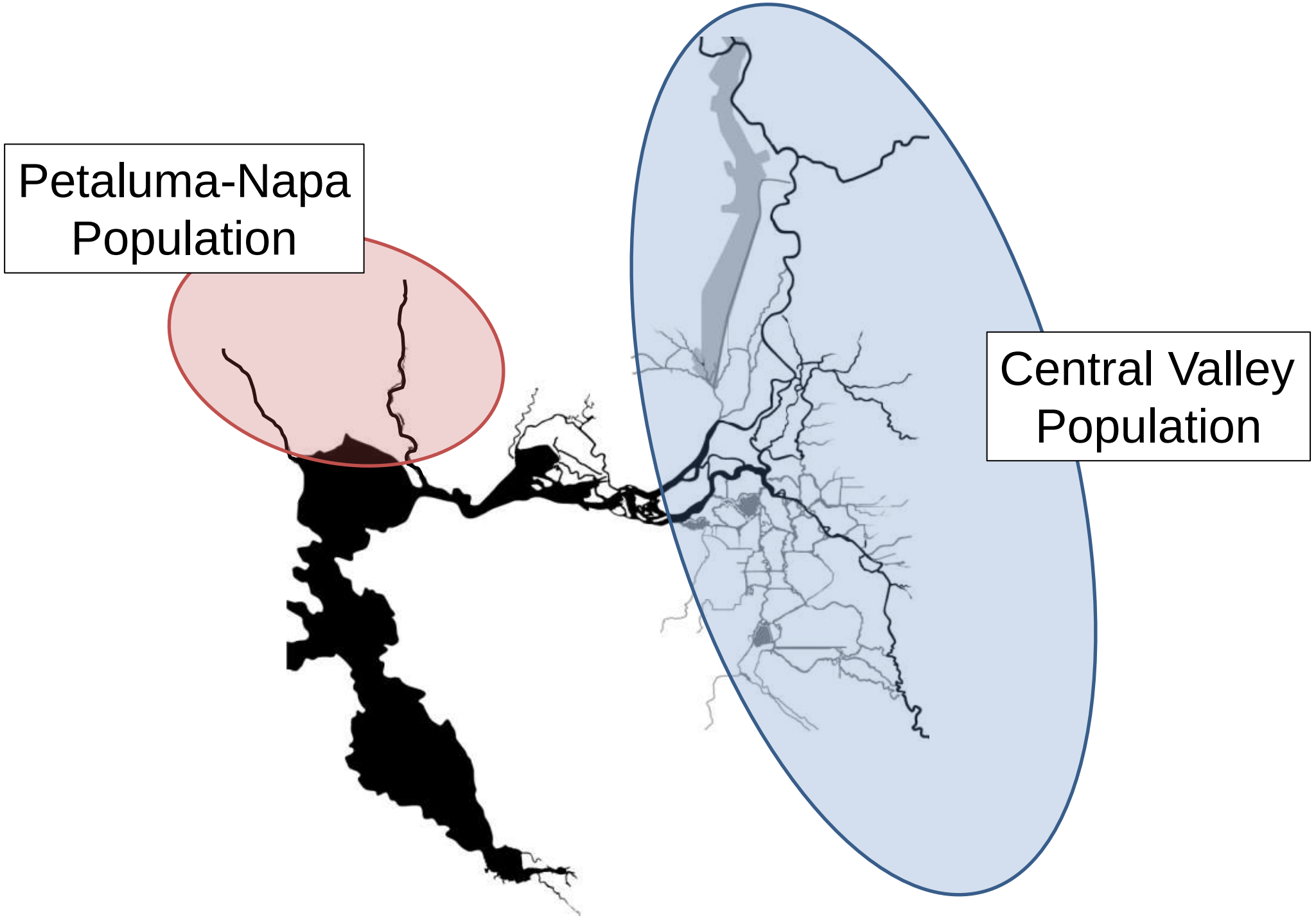
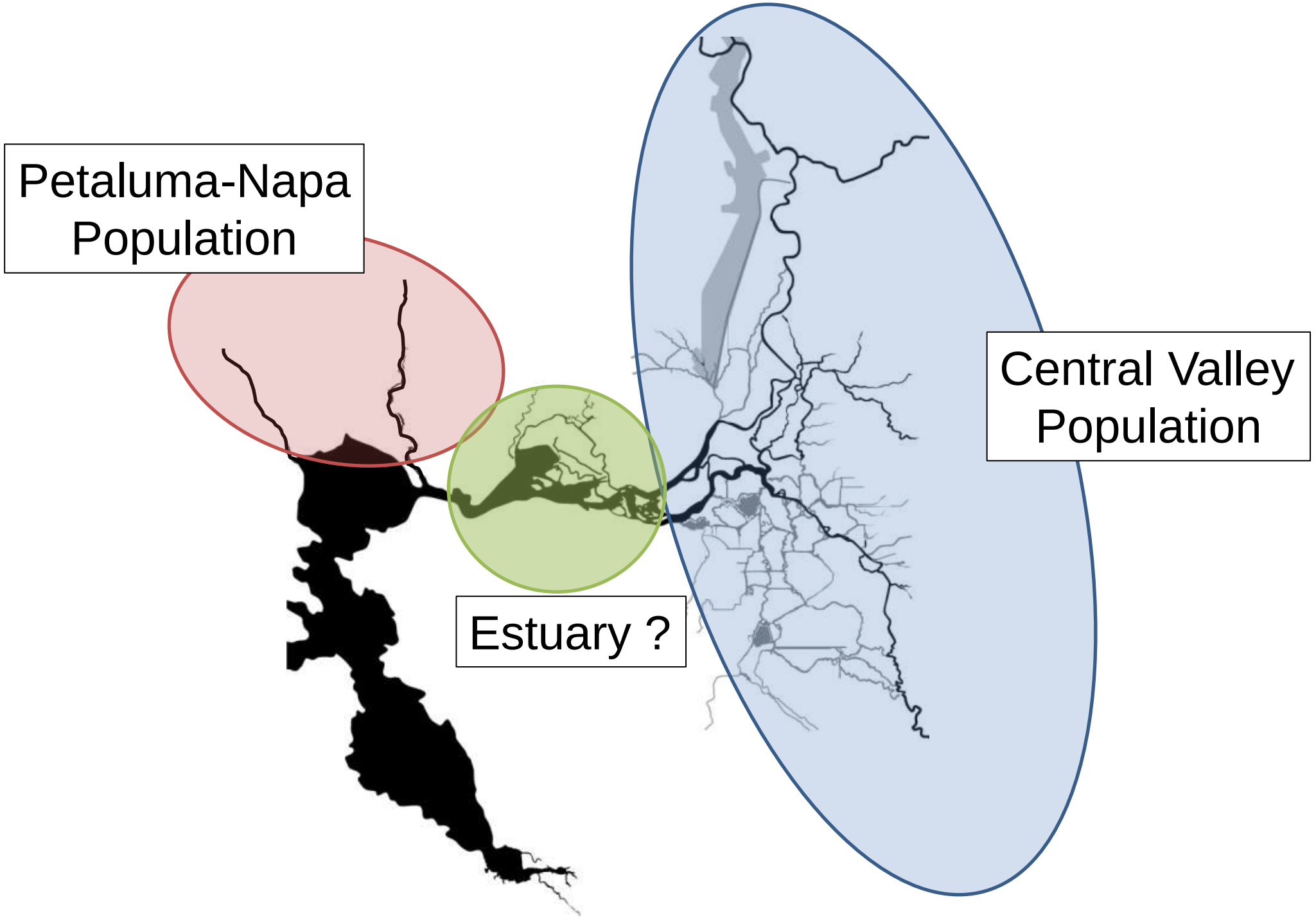
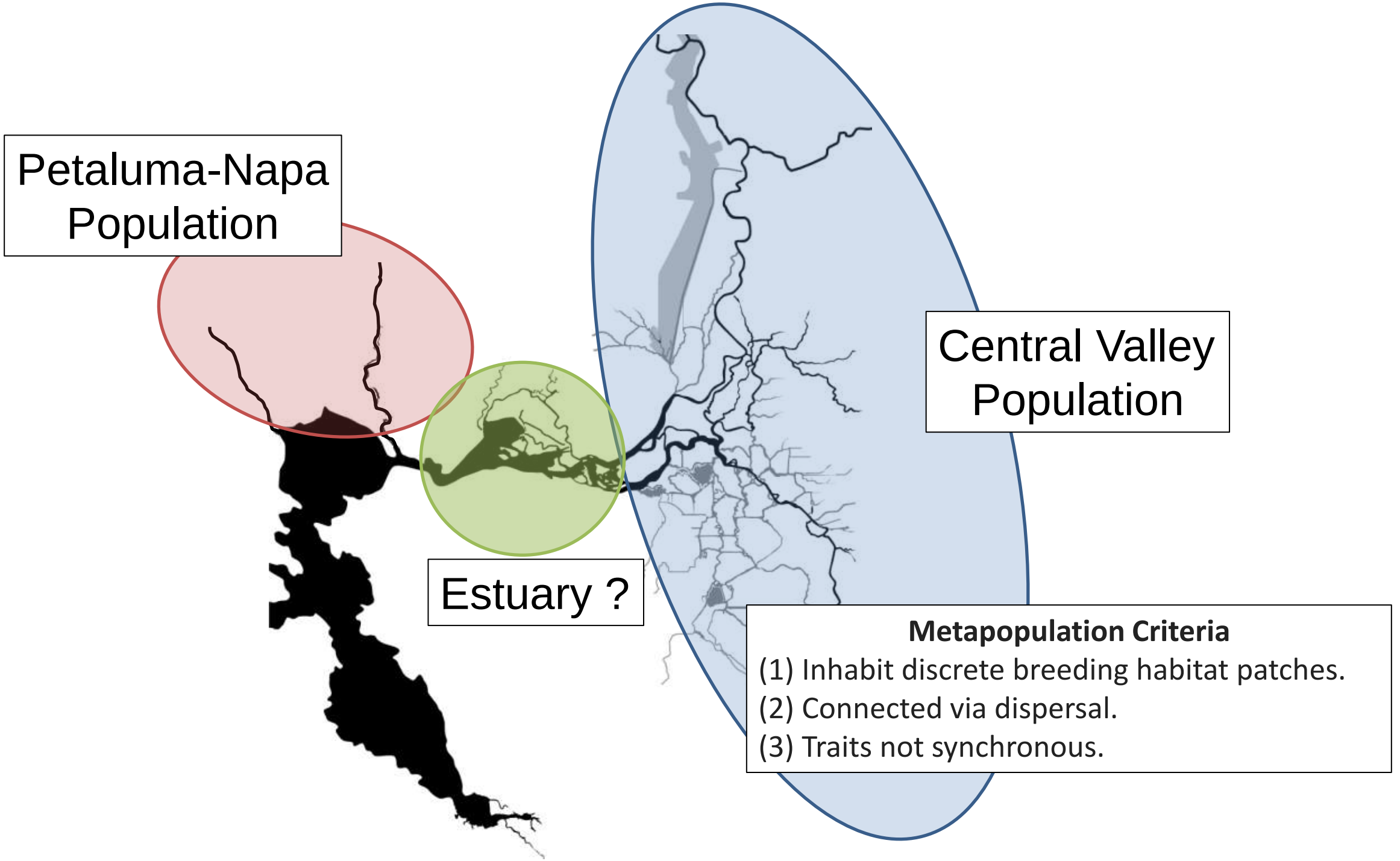
1997
2002
2007
2012
Year
Good decision?
Listed
1999
Vacated
2003


Petaluma-Napa Population
Central Valley Population


Petaluma-Napa Population
Estuary ?
Central Valley Population


Petaluma-Napa Population
Central Valley Population
Estuary ?
Metapopulation Criteria
(1) Inhabit discrete breeding habitat patches.
(2) Connected via dispersal.
(3) Traits not synchronous.

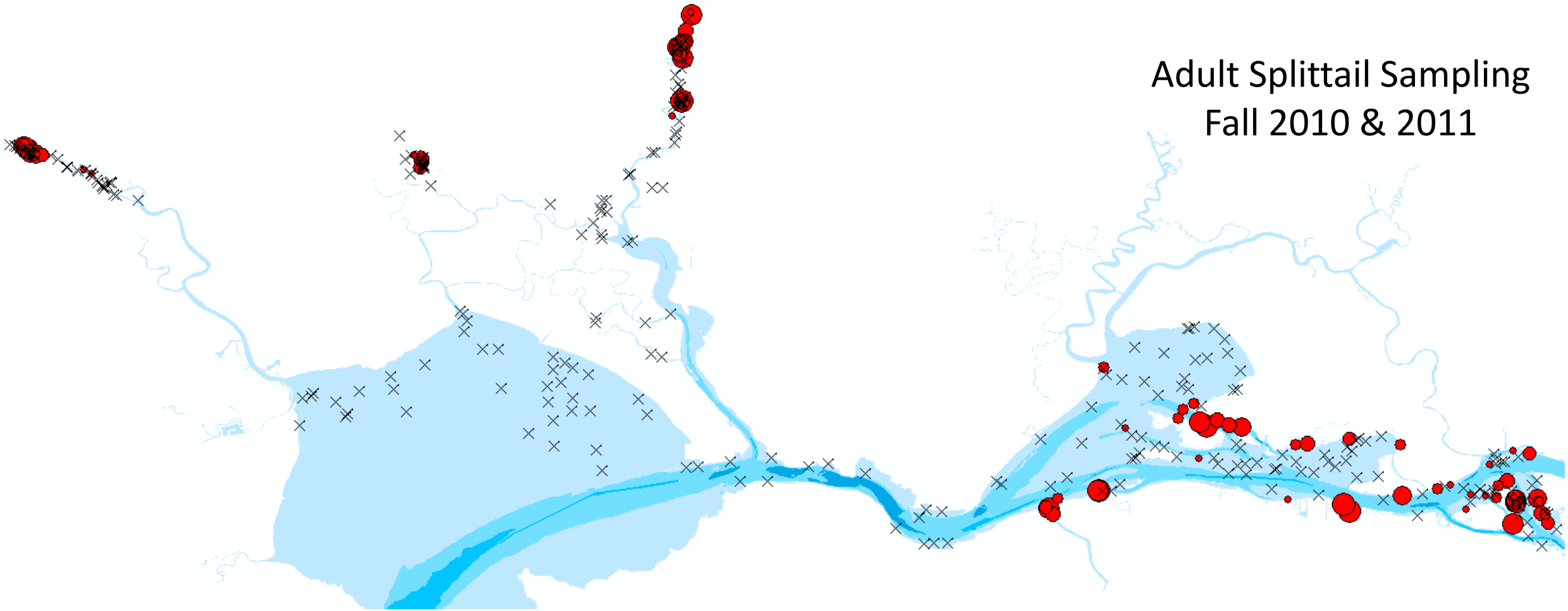
# Key Research Questions

(i) Are individuals from the two populations found disproportionately in specific geographic regions or habitats of the estuary?

(ii) Do individuals within aggregations/schools originate from the same population?

(iii) Do individuals within a population or within a geographic region exhibit differences in demographic or health metrics relative to others?

# Splittail Distribution



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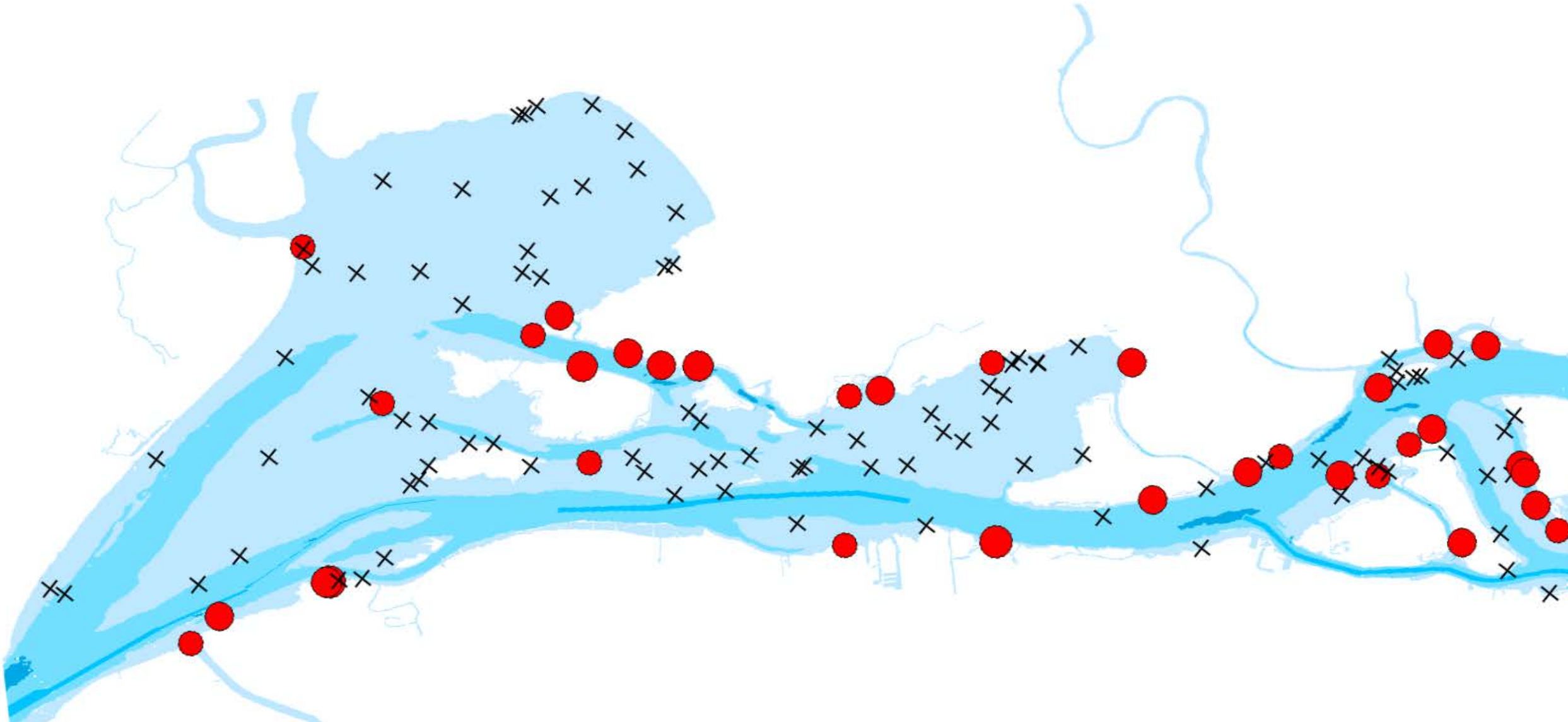
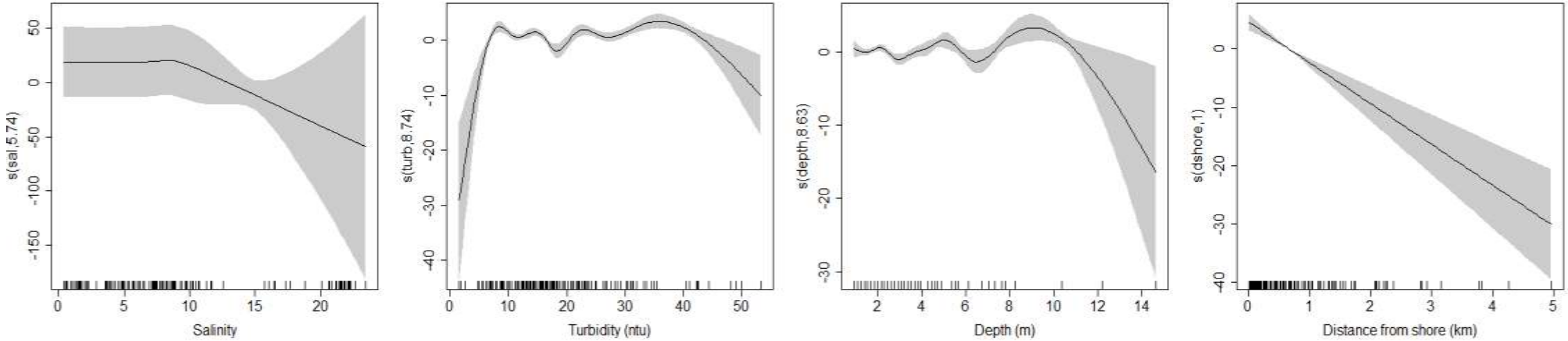
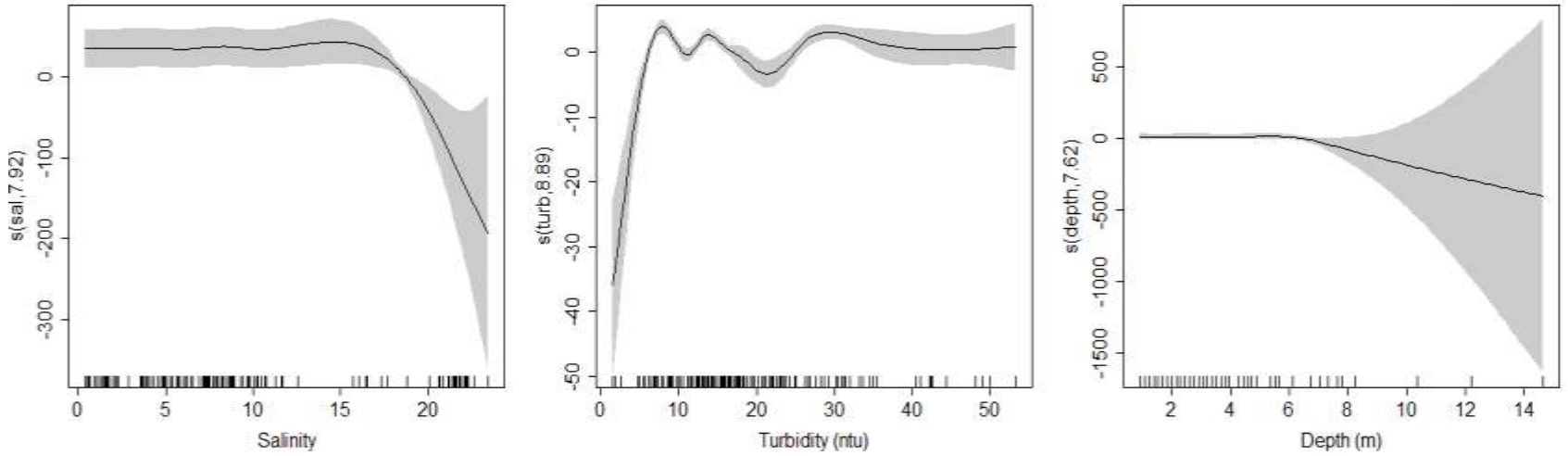


# Splittail Habitat Affinities

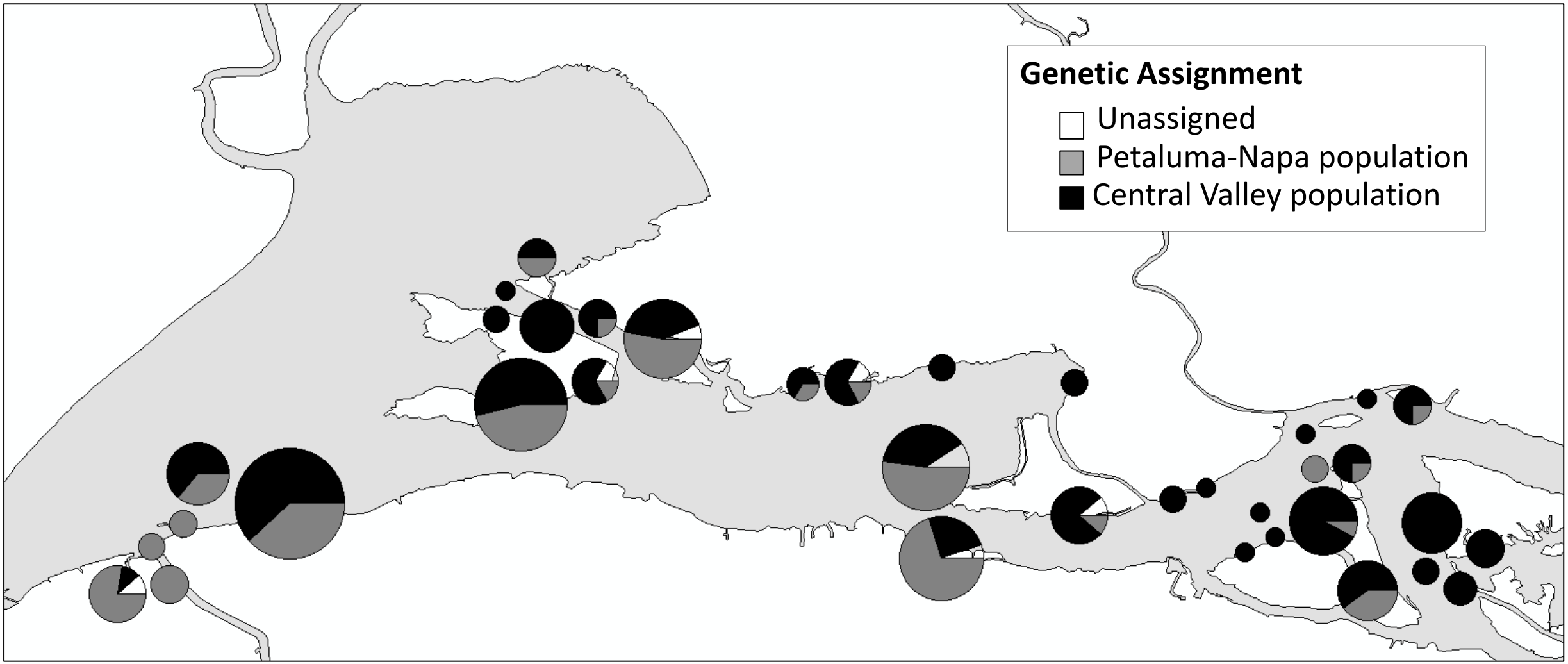
**Central Valley subpopulation GAM: 80% deviance explained**



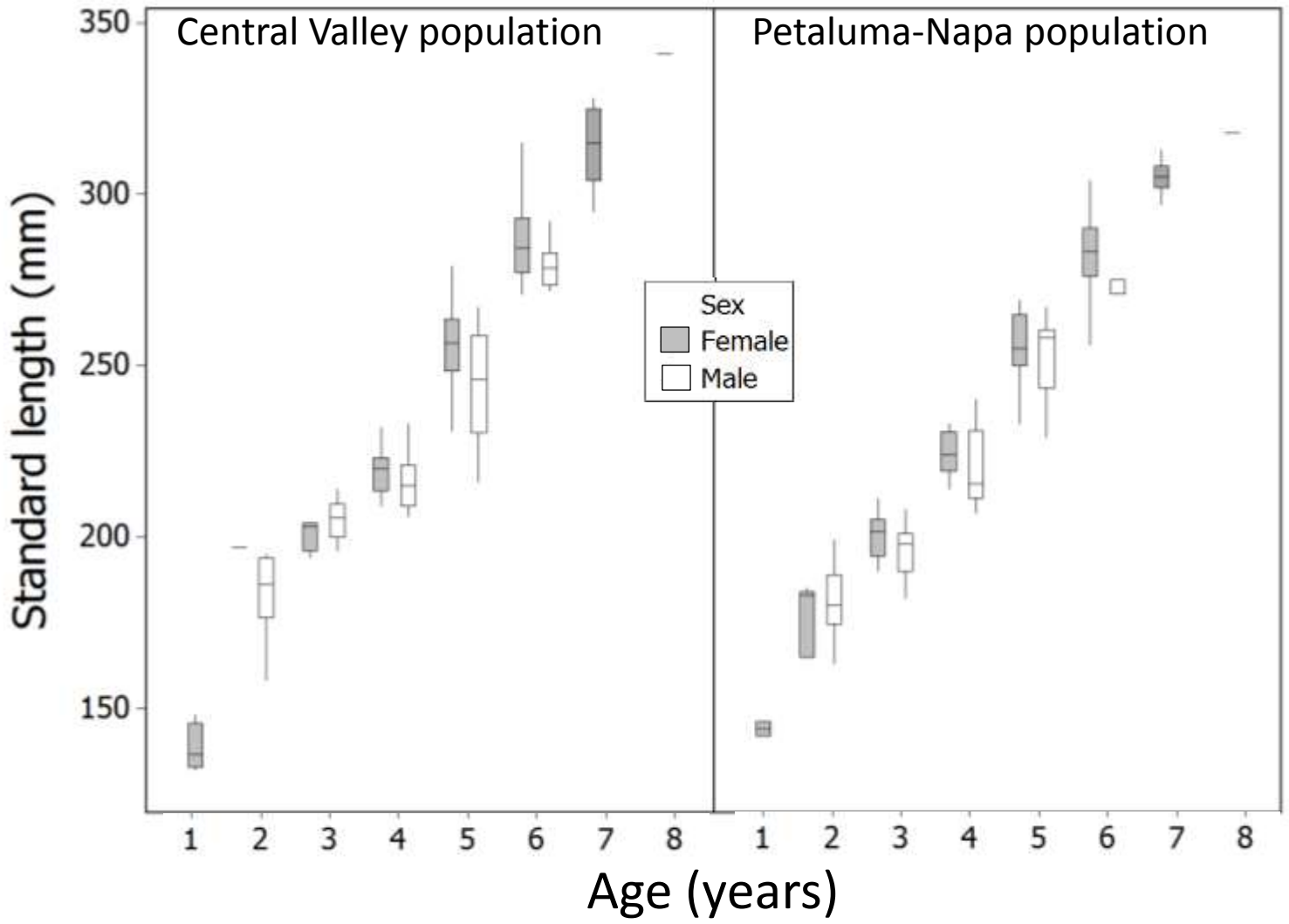

**Petaluma/Napa subpopulation GAM: 61% deviance explained**



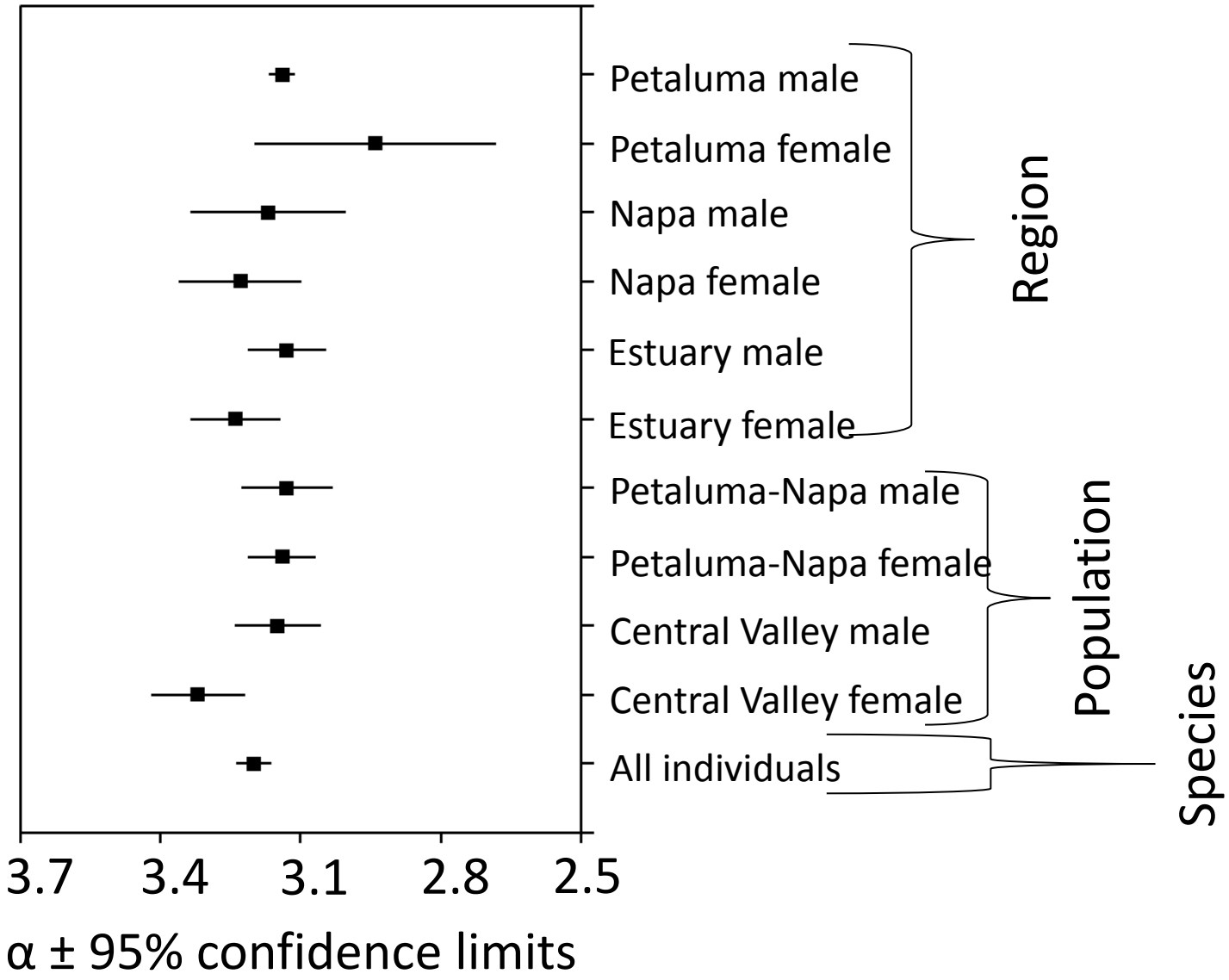
# Splittail Population Distribution



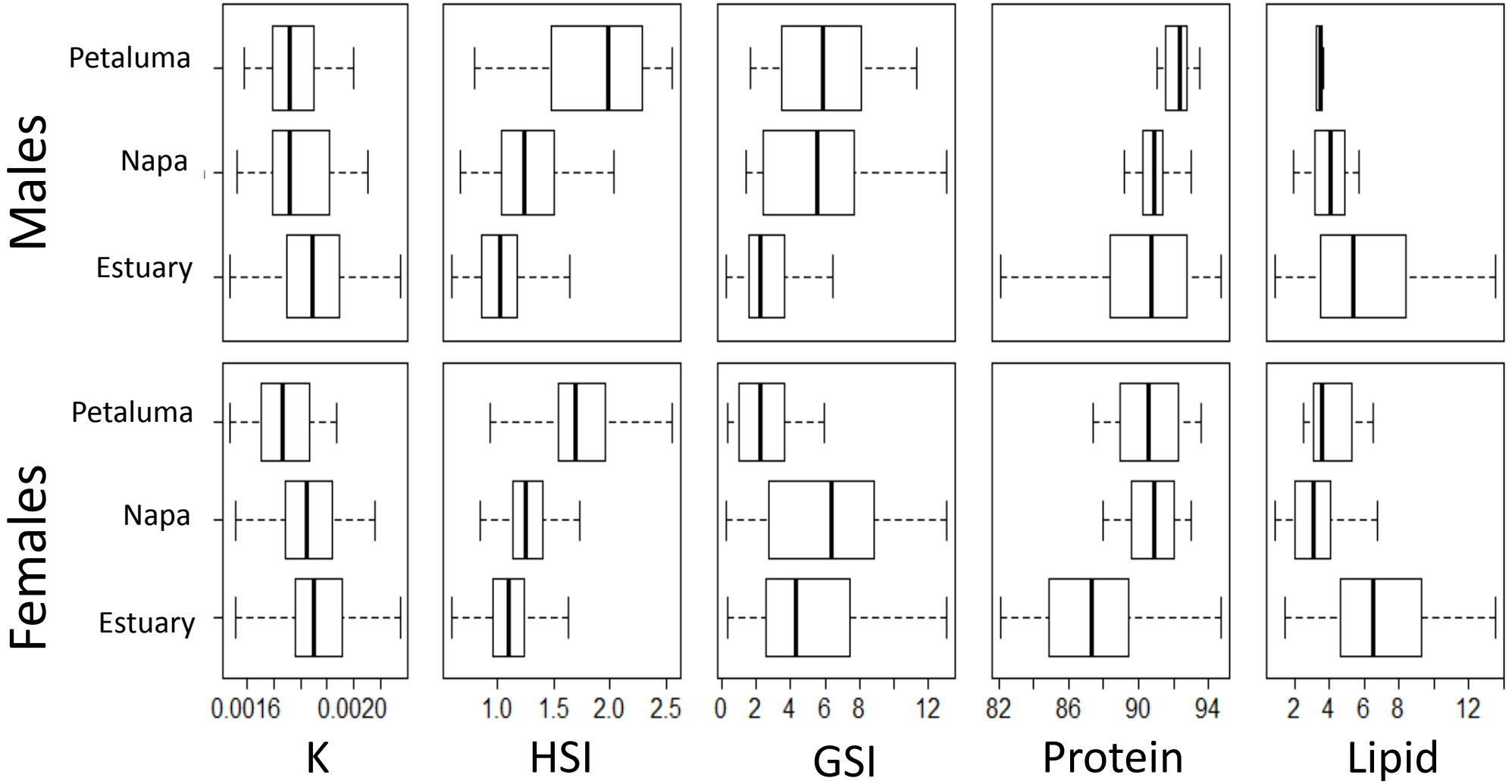
# Splittail Age and Growth



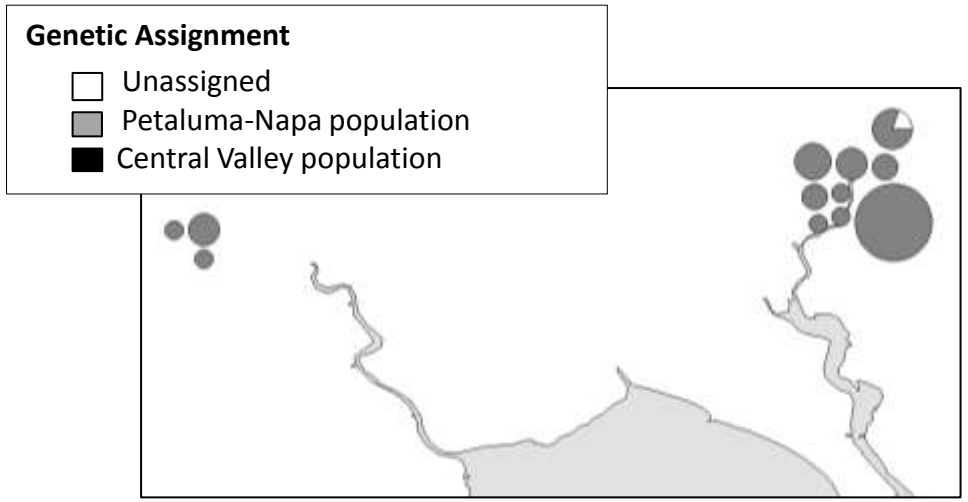
# Splittail Growth Rate



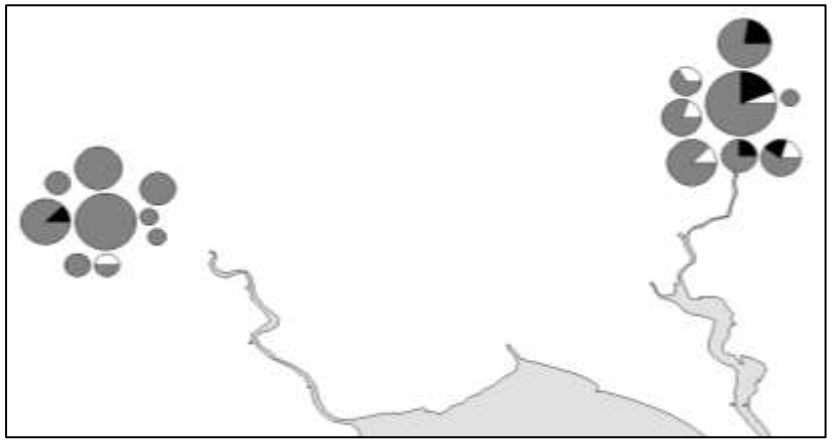
# Splittail Health and Condition



# Splittail Population Connectivity




**2010**
**Dry** Winter/Spring
Central Valley population **not observed** in Petaluma-Napa breeding habitat



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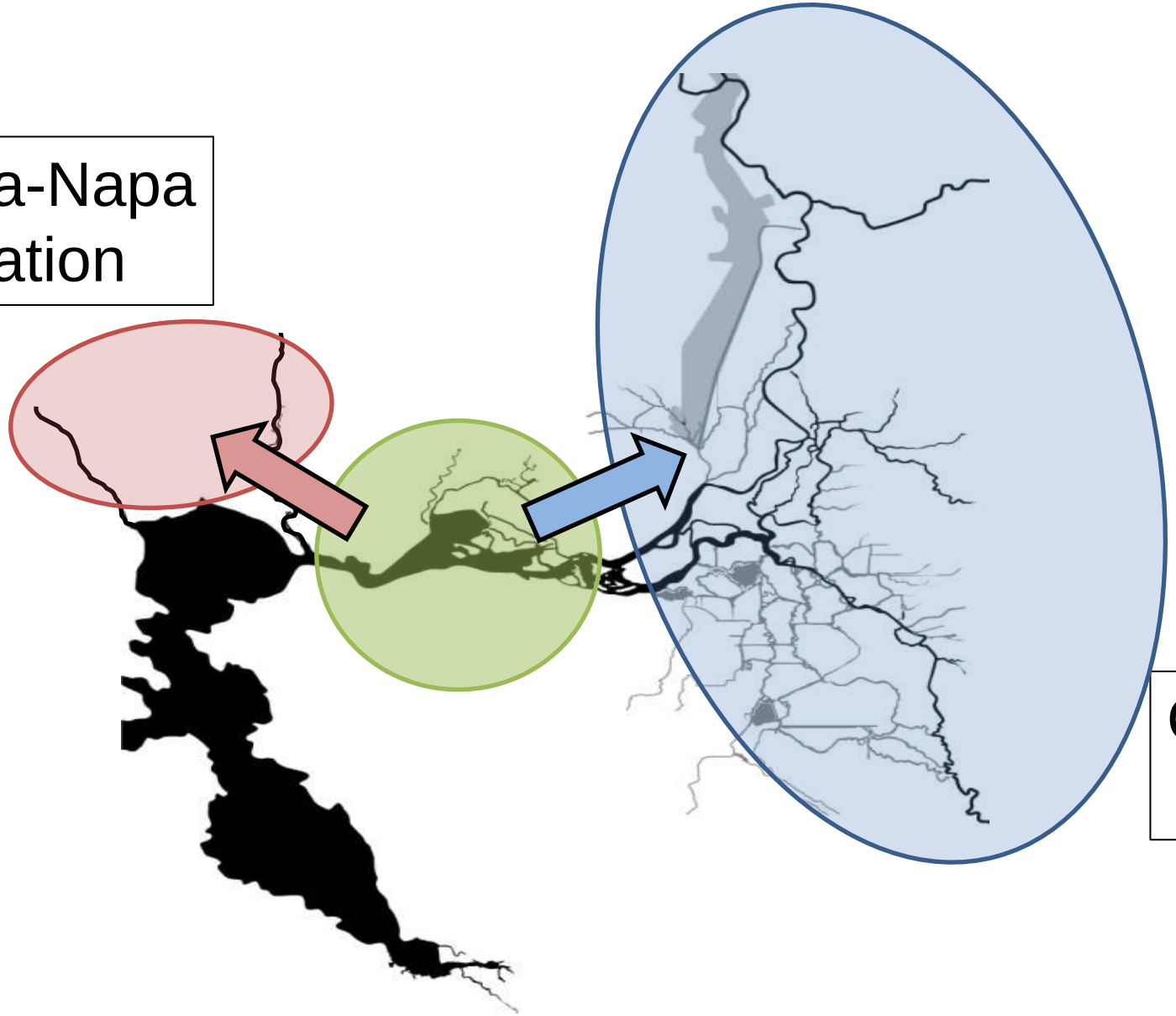

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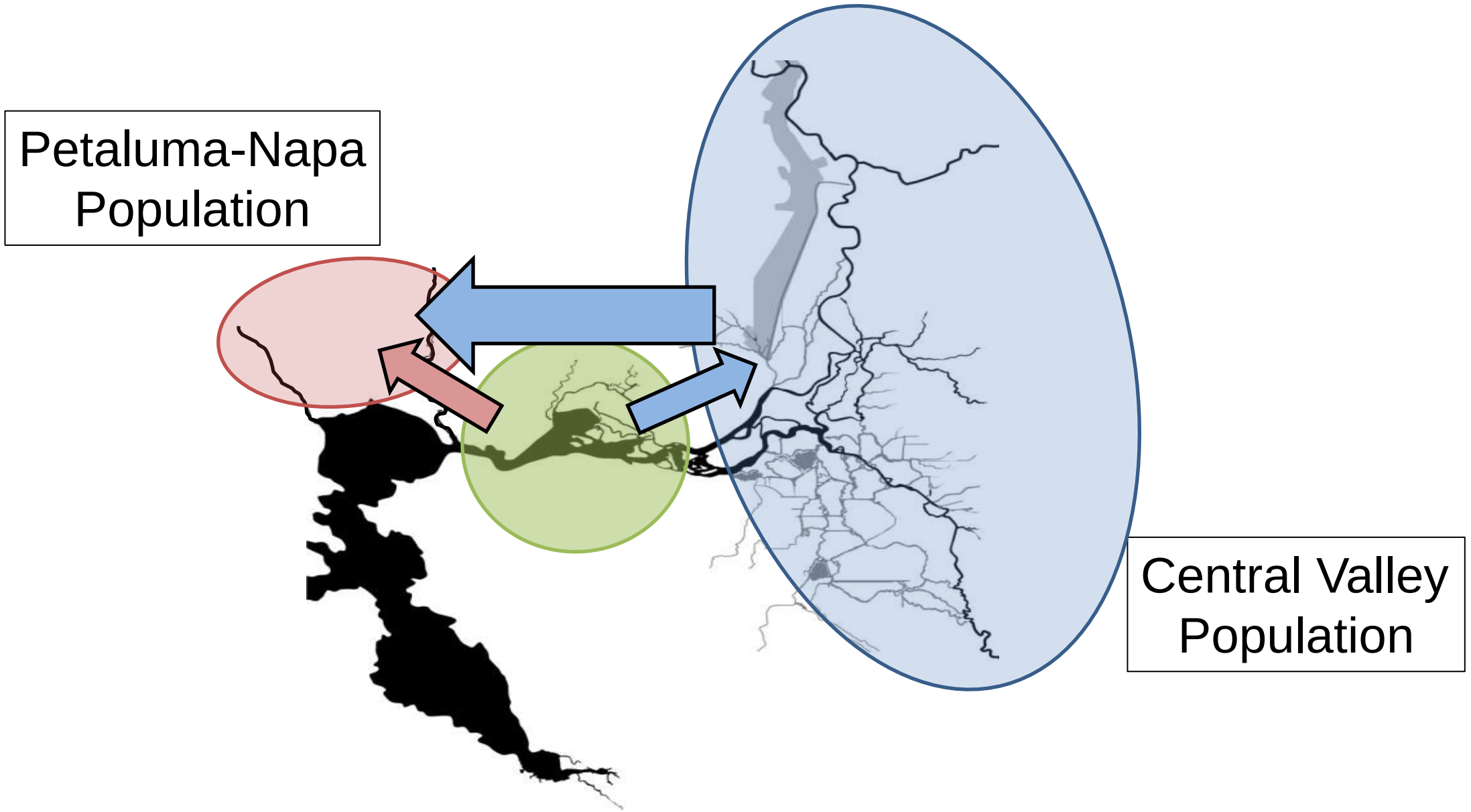
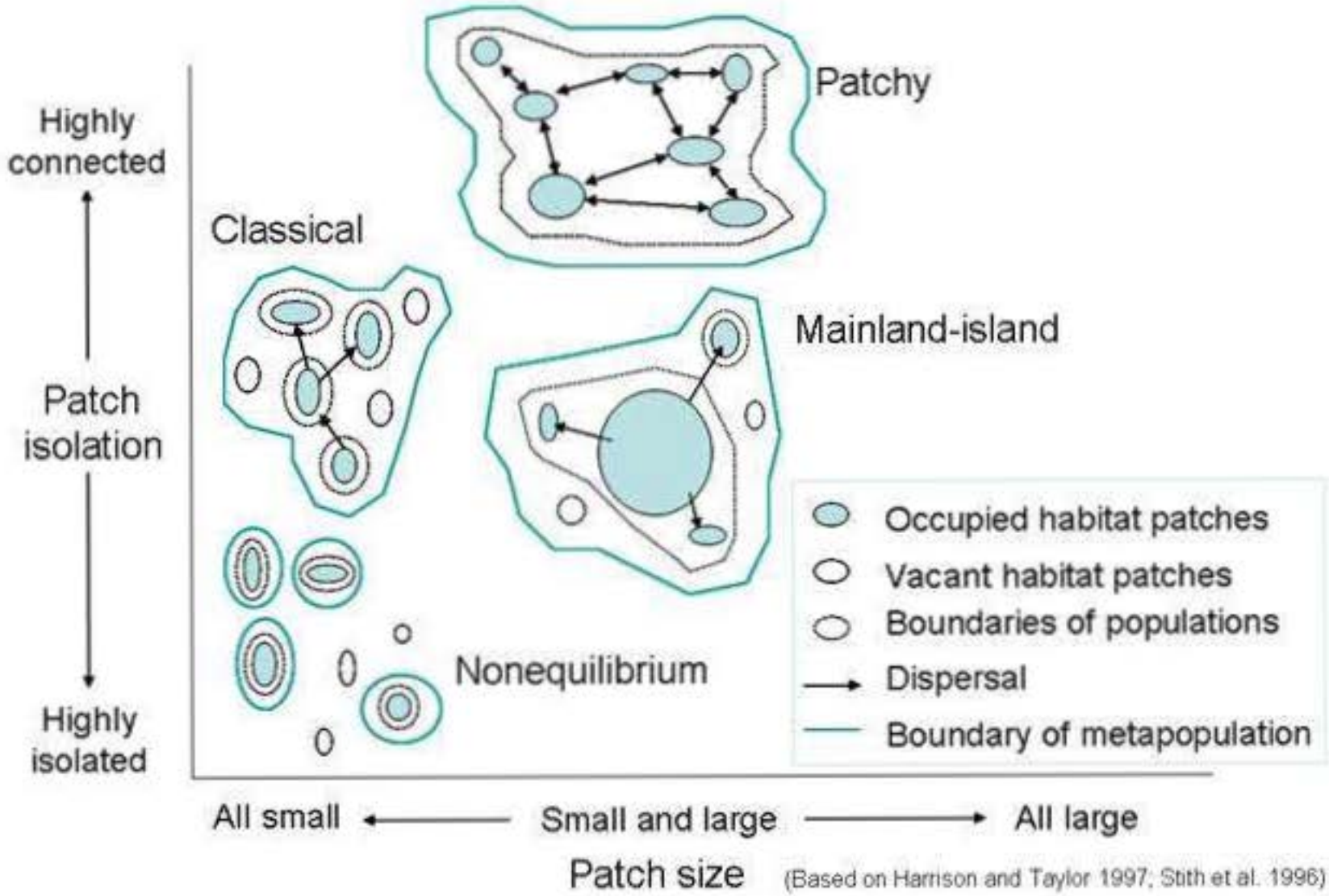


# Metapopulation structure




(Based on Harrison and Taylor 1997; Stith et al. 1996)

# Conclusions

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(v) Climate variability drives connectivity and therefore possibly gene flow.

(vi) Implications for management in a changing climate and landscape.

Connecting Fish Tissue Selenium Concentrations to Sources and Exposure in a Dynamic Estuary: The Case of Sacramento Splittail

**Robin Stewart, USGS**

**Thursday 3:40**
**Room 308-310**

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