May 2nd, 1:30 PM - 3:00 PM

High connectivity among brown rockfish (Sebastes auriculatus) populations in Puget Sound: evidence from genetic parental identification, otolith microchemistry and oceanographic models

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Dispersal in brown rockfish (*Sebastes auriculatus*) in Puget Sound: evidence from genetic parental identification, otoliths and oceanographic models

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Why are connectivity and dispersal important?

• Marine Protected Areas
  - Self recruitment
  - Export
  - Connectivity

• Population resilience
  - Does local perturbation affect other stocks?

• Evolution
  - Inbreeding and local adaptation
  - How important are local populations?

• Problem
  - Larval dispersal
  - Low genetic differentiation
Evidence for limited dispersal
Brown rockfish

- **Adults**
  - Small home ranges
  - Long lived (~20 y)
  - Live bearing

- **Larvae**
  - 3 months pelagic

- **Genetic differentiation in CA**
  - Buonaccorsi et al 2005
    - Isolation by distance
    - Mean dispersal ~ 10 km
    - 40% of larvae should settle within 5 km

![Graph showing genetic distance vs geographic distance with a linear regression line and equation: y = 3E-05x - 0.0041, R² = 0.90.]

![Graph showing probability of settlement vs distance from parent with percentage settled on the right axis.]
How to find Nemo

Genetics
Otoliths
Oceanography

otolith
(SrCl)
Sampling

- 1835 fish sampled
  - 874 adults, 961 offspring
- 3 years, 18 sites
- Pt Heyer
  - 464 adults (50%)
  - 816 juveniles
Drifter experiments
Cameron Sparr & Mitsuhiro Kawase, Oceanography
mean = 16km
Sources and sinks

Import

Export

Distance (km)

Connectivity (% particles)
Genetic Analyses

• 16 microsatellites
  - $H_E = 0.87$
  - ~1% error rate

• Simulations
  - Cervus 3 and Christie (2010)
  - # false pairs in data set: 0.01

• Matching pairs
  - 8 parent-offspring pairs
  - 1 with two parents

• None from injected parents
  - No positive otoliths
We found Nemo!

- **8 offspring from known parents**
  - 4 from parents at Point Heyer
    - 1 with both parents
    - 4 from elsewhere

- **816 juveniles sampled**
  - 0.5% of juveniles
  - 50% parents sampled
  - 1% locally produced

- **40% self-recruitment expected within 5 km**
  - Random recruitment in PS
  - Pt Heyer is a sink population
  - Lots of rockfish nearby
Random recruitment?

- 10 sites with $N>20$
  - $F_{ST} = 0$

- No evidence for sweepstakes recruitment
  - Genetic variation within and between samples similar between adults and offspring

- Proportion of full sibs in pairwise comparisons
  - Isolation by distance

![Graph showing the proportion of full sibs against distance (km).](image)

- $R^2 = 0.1043$
- $P = 0.013$
Conclusion

- **Low self recruitment**
  - 40% expected vs 1% observed

- **Oceanography**
  - Low mean dispersal distance
  - Sources and sinks

- **Population structure**
  - No sign differentiation
  - But some evidence for isolation by distance from kinship

- **Implication**
  - Some evidence for limited dispersal

- **To do**
  - Oceanographic predictions vs suitable settlement habitat
  - Oceanographic model: newer and better
  - Demographic model including adjacent habitats
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• **Otoliths**
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• **Laboratory**
  - James Rhydderch, Lindsay Newton, Melissa Baird, Daniel Peterson