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Key questions on larval transport

- Where do larvae go?
 - Dispersal distances
 - Dispersal-Retention mechanisms
- · Where do settling larvae come from?
 - Inter population connectivity
 - Source-Sink dynamics
- Why do we care?...

We care because:

 If we want to minimize interactions between wild and cultured stocks then

Understanding larval transport is crucial

- Genetic interactions
- Spread of diseases
- Spatial framework for assessing cultured areas
 - monitoring of impacts
 - informed management
 - resolution of user conflicts

Understanding population connectivity: approaches and methods

- Oceanographic modeling
 - Reef fishes, corals (Cowen et al. 2006)
 - Chesapeake Bay oysters (North et al. 2006)
- Genetic Studies
 - Oysters (Hare et al. 2006, Hedgecock, 2007)
 - Sea urchins (Edmands et al, 1996)
- Larval markers (chemical, environmental, genetic)

 Several fish and invertebrate larvae (reviewed in Levin 1990, 2006 and Thorroid et al. 2002, 2007)
- · Integration of methods
 - Mussels (Gilg and Hilbish, 2003)

Understanding population connectivity: lessons learned in other systems

- Oceanographic modeling
 - Larval behavior is important
 - Variability in time (within/between year) and space (local/regional)
- Genetic Studies (reviewed by Hedgecock et al. 2007)
 - Variety of methods but caution in interpretation of results: what are the appropriate methods, time and spatial scales?
- Larval markers (chemical, environmental, genetic)
 - Relatively new sets of techniques
 - Logistic challenges: role of scale, site dependent, dilution: low probability of detection and recovery rates
- · Integration of methods
 - Most powerful approach, interdisciplinary, more costly

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Case study: Chesapeake oyster restoration

- · Native eastern oyster decline
 - Overfishing, habitat loss, introduced diseases
- · Restoration efforts
 - Native oysters bred for disease tolerance
 - Potential introduction of Asian oysters
- · Genetic studies
 - Evidence of spatial genetic structure (Rose et al. 2006)
 - Assessing restoration success (Carlsson et al. 2006, Hare et al. 2006)
- Modeling larval dispersal of native and Asian oysters
 (North et al. 2006, University of Maryland, NOAA)







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- · Monitor impacts, predict recovery of areas/species impacted
- Scale up from local to regional dynamics
- · Include regional and temporal variability on interactions/impacts
- Provide framework for resolution of user conflicts and informed management

