A Brief History of Bay Scallop Restoration in Florida: People, Places and Strategies

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SARASOTA BAY
ESTUARY PROGRAM
Restoring Our Bays

The Main Cast

- Norm Blake: University of South Florida
- Bill Arnold & Steve Geiger: Florida Fish and Wildlife Research Institute
- Jay Leverone/Jim Culter: Mote Marine Laboratory
- Peter Clark: Tampa Bay Watch
- Curt Hemmel: Bay Shellfish Company

Supporting Cast

Present

- Sarah Stephenson
- Melanie Parker
- Janessa Cobb
- Anthony Vasilis
- Michael Drexler
- Lindsey O'Hern
- Peter Klocksein / Tiffany Black
- Chris Metcalf – John Heming (SABRMA)
- Kim Wren (SJB)
- Mark Thompson / Loren Coen(SCCF)

Past (incomplete)

- Jaime Greenawalt
- Melissa Harrison
- Joel Bickford
- Lisa Gentile
- Keri Ferenc
- Brett Pittinger
- April Granholm
- Jennifer Stone…

The Resource

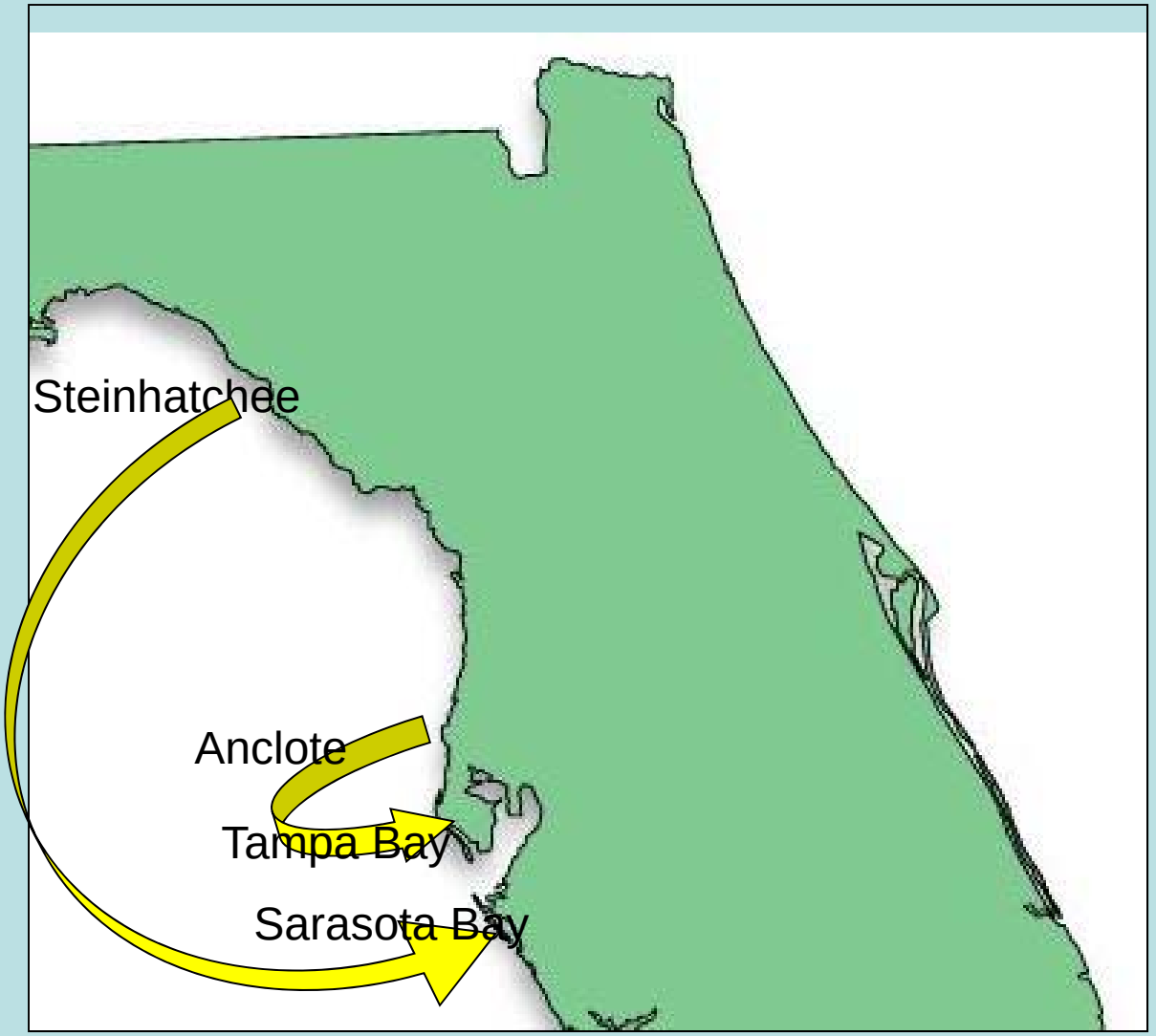
Stable source sub-populations re-supply marginal subpopulations after declines

The Strategies

- Direct Translocation of Native Stock from Stable Populations
- Planting of Hatchery-Produced Seed
- Release of Hatchery-Reared Larvae
- Collection of wild spat; grow-out; seeding areas with limited recruitment

Translocation of Adult Scallops: Donor and Recipient Sites

- **1972: Anclote to Tampa Bay (USF)**
- **1980: Anclote to Mullet Key Bayou (USF)**
- **1993: Steinhatchee to Sarasota Bay (MML)**
- **1995: Steinhatchee to Tampa Bay (TBW)**
- **2002-05: Anclote to Tampa Bay (FWRI/TBW)**



Scallop Related Activities During the 1990's

- 1995 Workshop: Status and Future of the Florida Bay Scallop
- Question: How do we integrate aquaculture into sustaining Florida scallop populations?
- Results: Developed first bivalve research hatchery in Florida at USF dedicated to restoration of native species, most notably the bay scallop

- MML Study: Environmental Requirements of the Bay Scallop, *Argopecten irradians*, in Tampa Bay. Tampa Bay Estuary Program (1993)
- Results: Water quality and habitat in Tampa Bay supported the survival,growth, reproductive development and spawning of bay scallops

Planting of Hatchery-Produced Scallop Seed

1991: Free release at two sites in Tampa Bay (USF)

1997-99: Major restoration effort from Crystal River to Tampa Bay (USF/FWRI)

- Scallops planted on an aquaculture demonstration raft off Crystal River (USF)
- Cage plantings in TB, AN, HO, CR (FWRI)

1999: First seeding effort in Sarasota Bay (MML)

2000-01: Second, larger seeding project in Sarasota Bay (FWRI)

2003-05: SB, AN, CR, HO (FWRI)

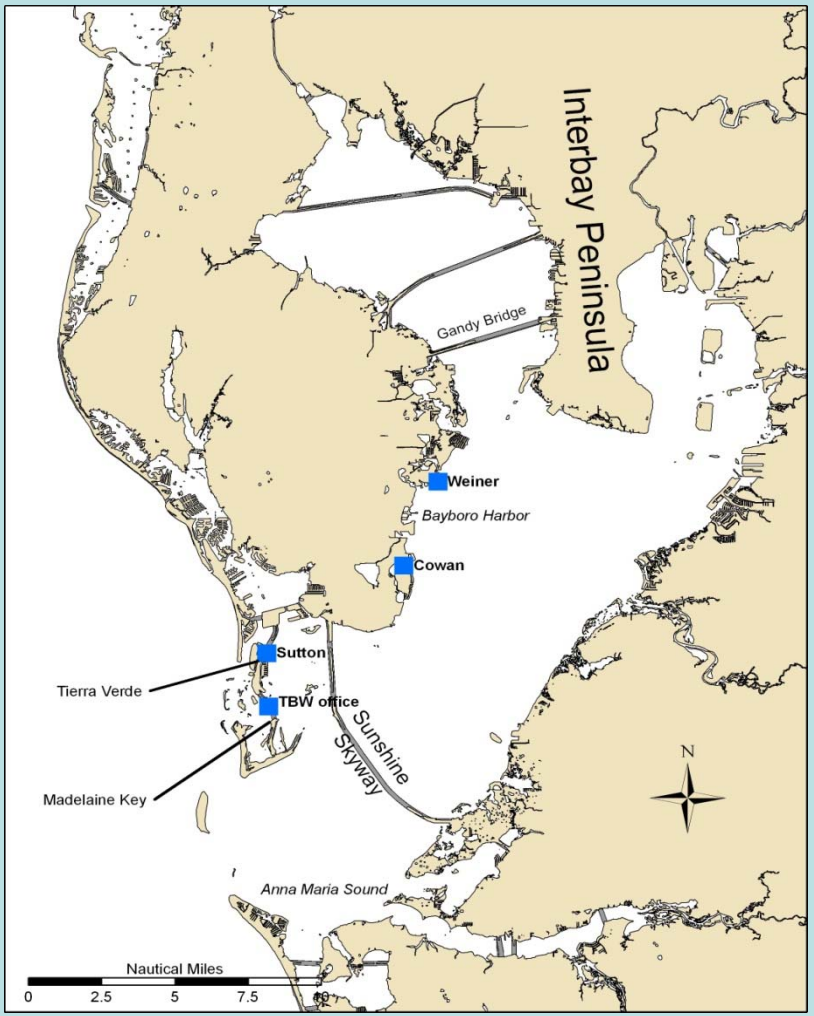
2004: Seven locations within Tampa Bay (FWRI)

Aquaculture Raft at Crystal River

Planting Scallop Seed in Cages

- Very Labor Intensive
- Field Monitoring is Expensive
- Usually Less Than Ideal Conditions

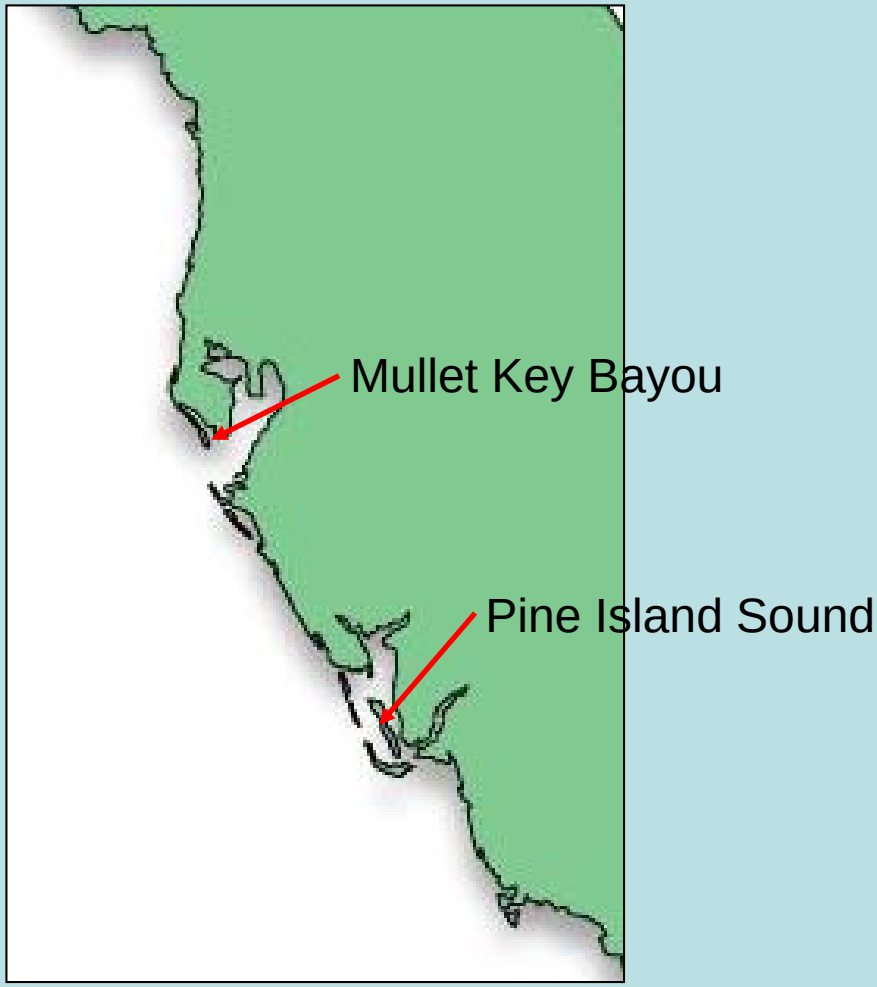
Community-Based Restoration Projects: Location of Suspended Scallop Cages



Release of Hatchery-Reared Scallop Larvae

- 2003-present: Pine Island Sound
- 2005-present: Mullet Key Bayou, Boca Ciega Bay, lower Tampa Bay
- 2005: St. Andrews Bay

Location of Sites for Larval Release Projects

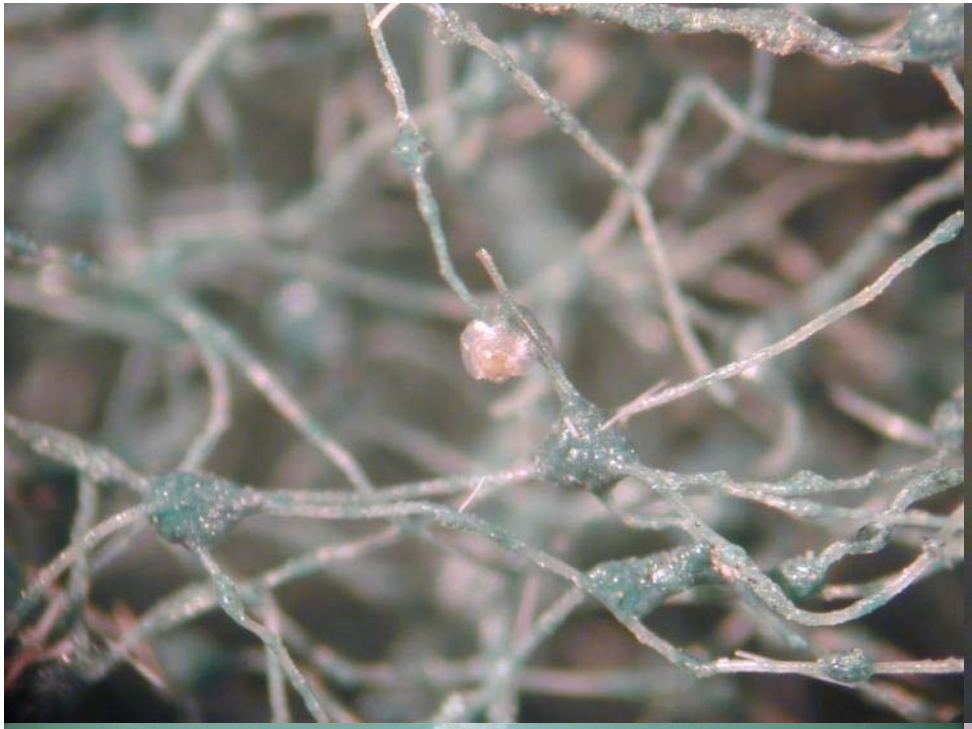


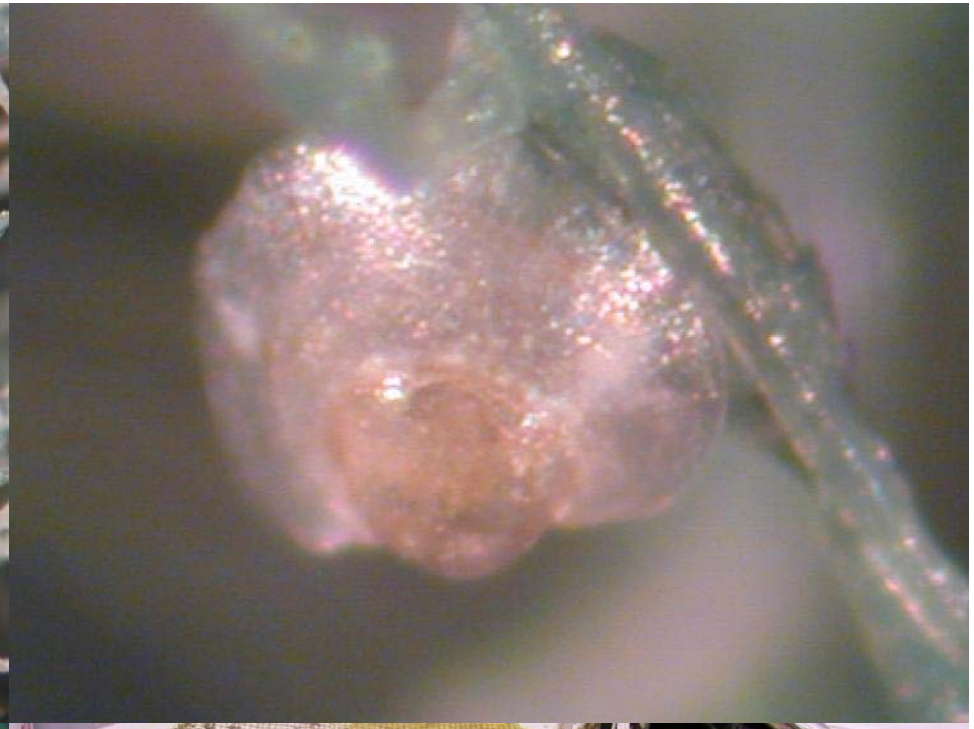

Set up enclosures

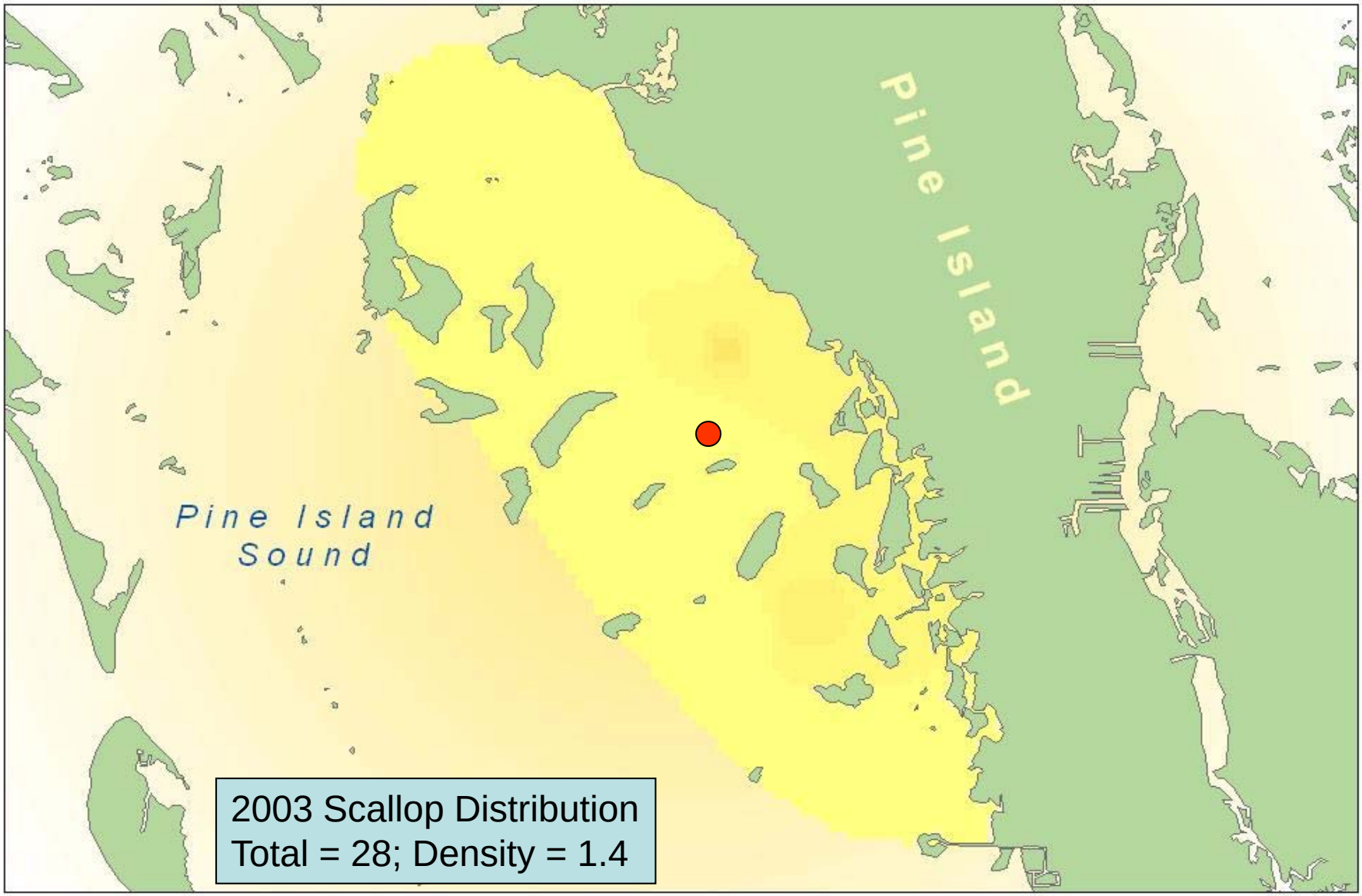

Release larvae

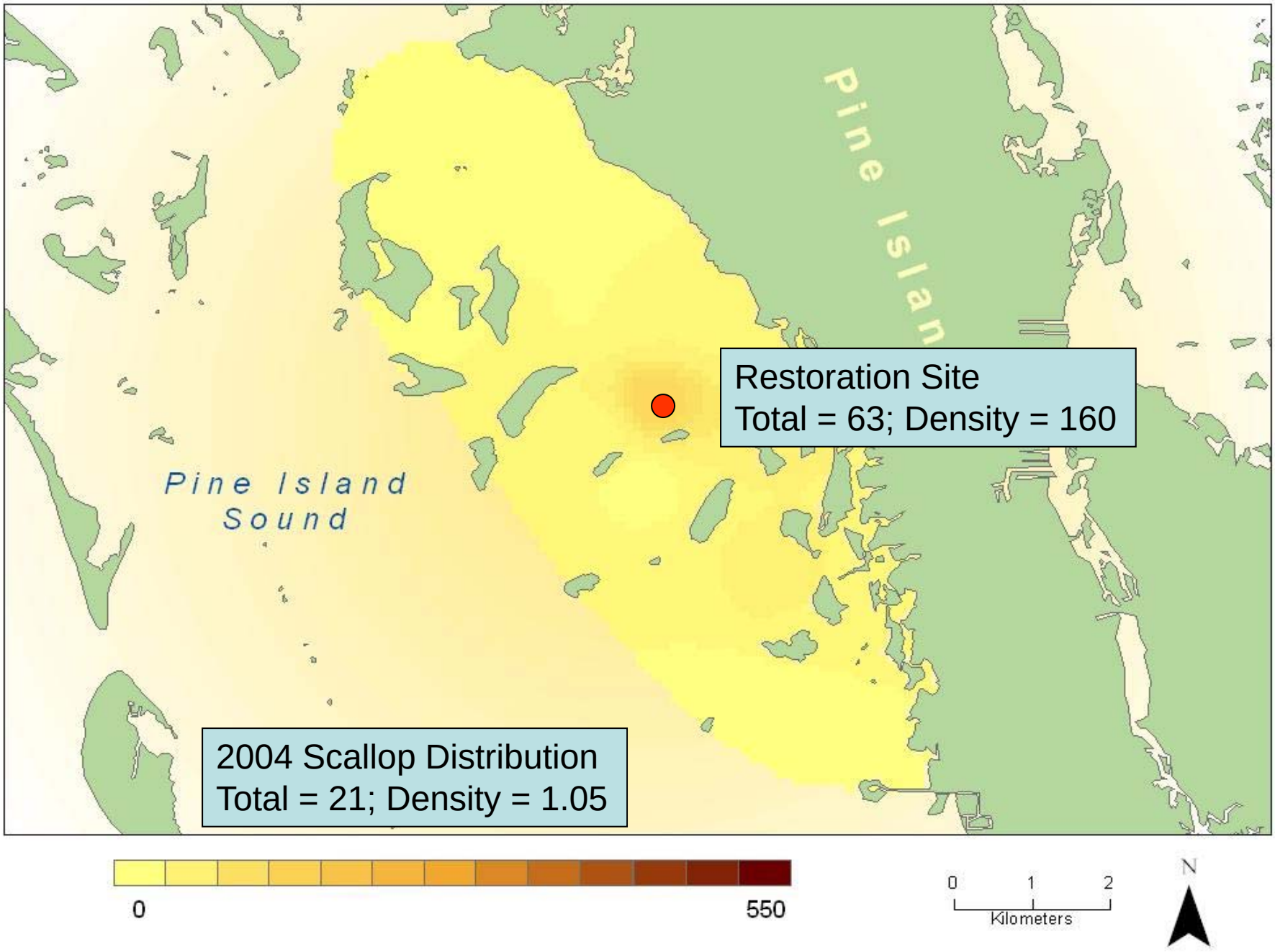

Monitor larval
settlement 2-3 days

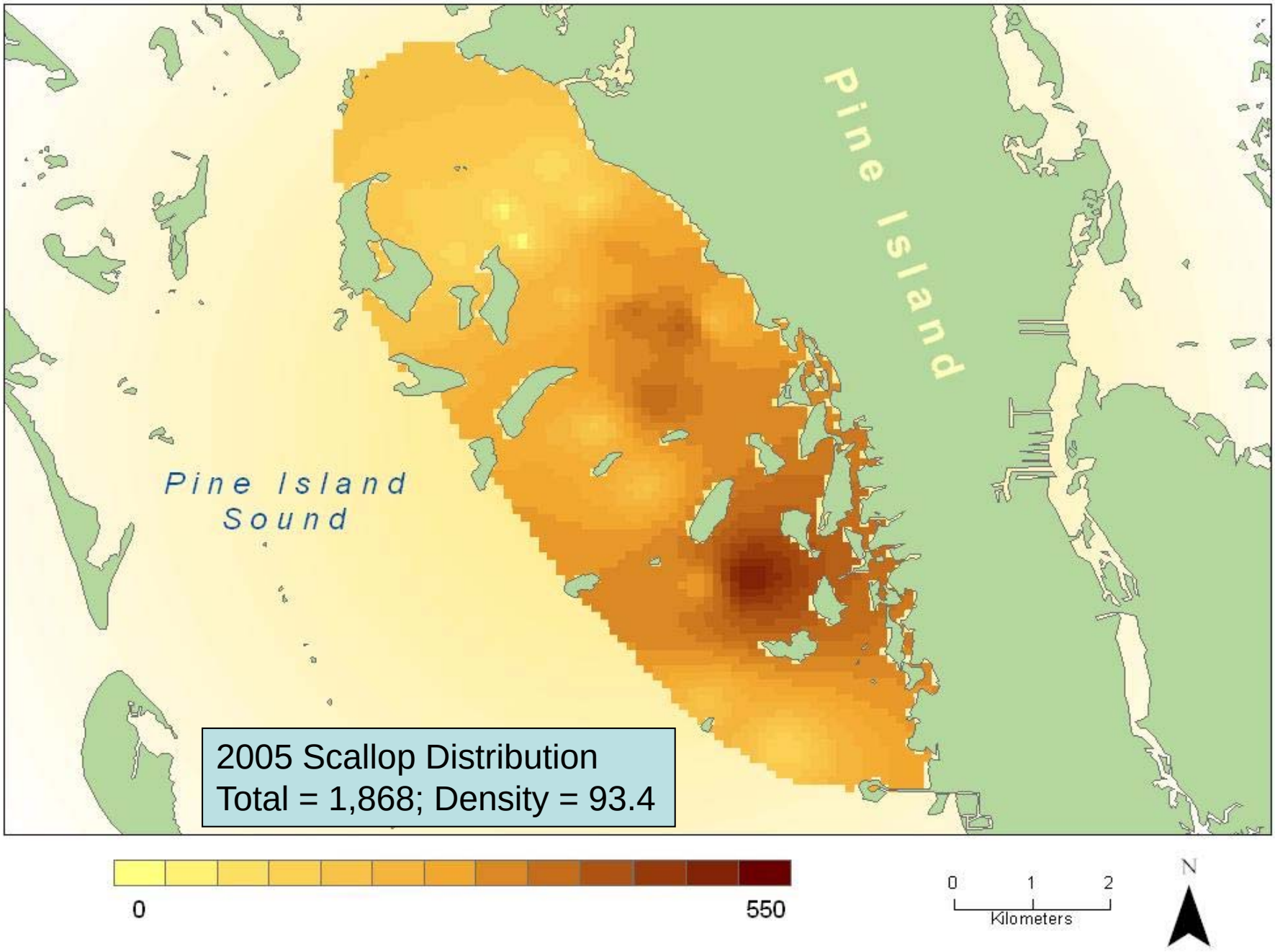

Remove enclosures;
clean up

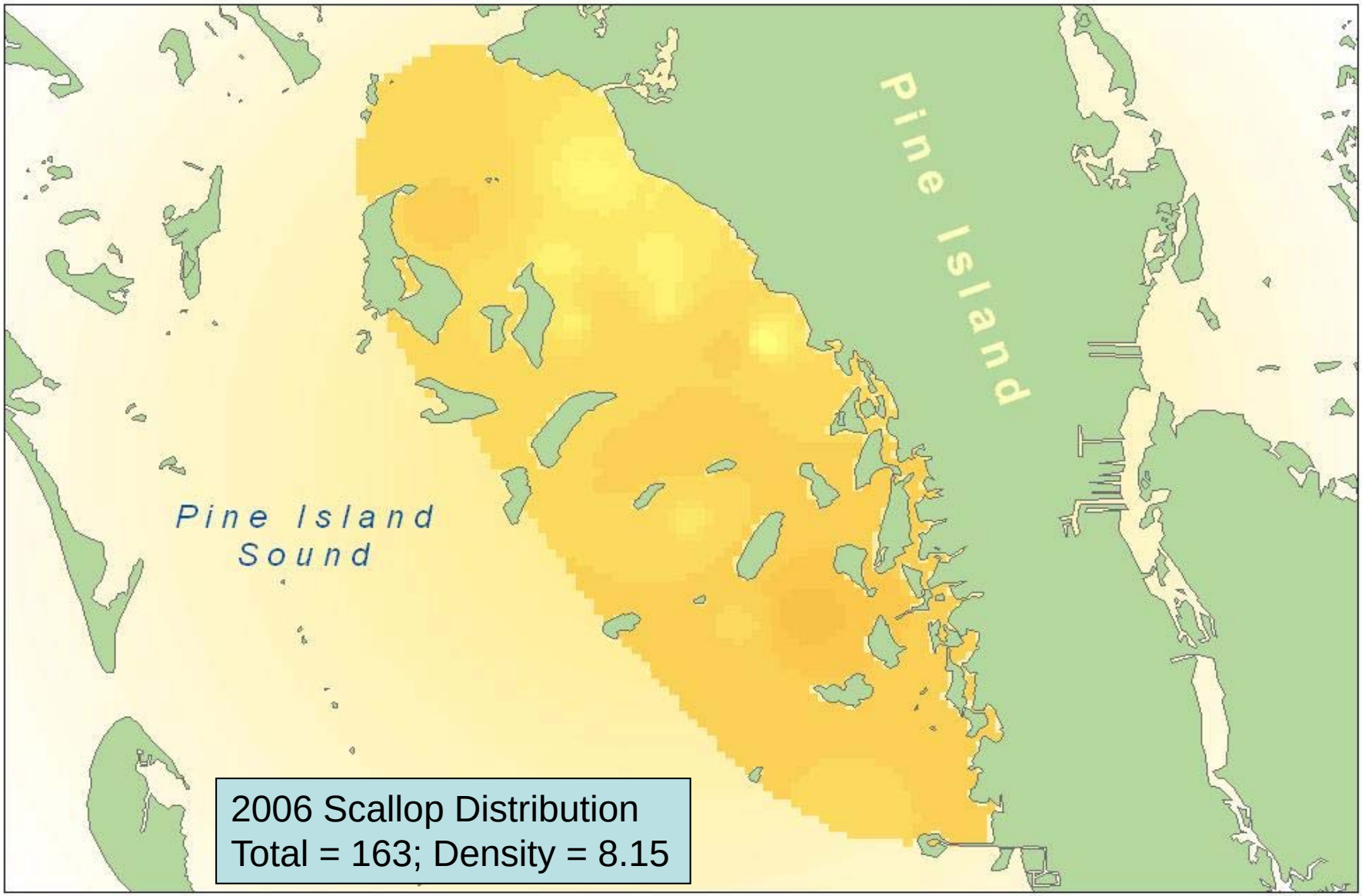


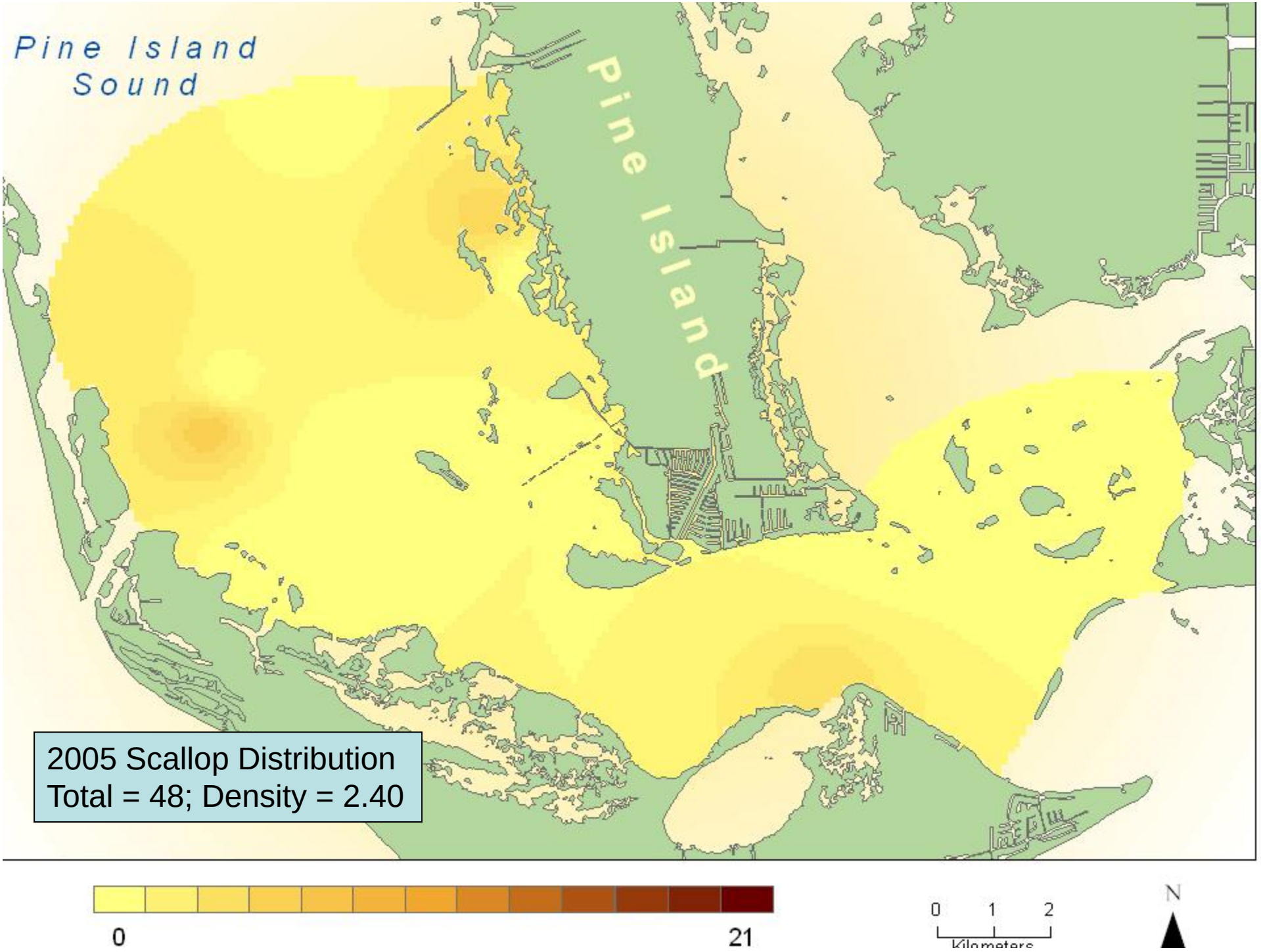



Pine Island
Pine Island Sound
2003 Scallop Distribution
Total = 28; Density = 1.4
0
550
0
1
2
Kilometers
N


Pine Islan
Restoration Site
Total = 63; Density = 160
Pine Island
Sound
2004 Scallop Distribution
Total = 21; Density = 1.05
0
550
0
1
2
Kilometers
N

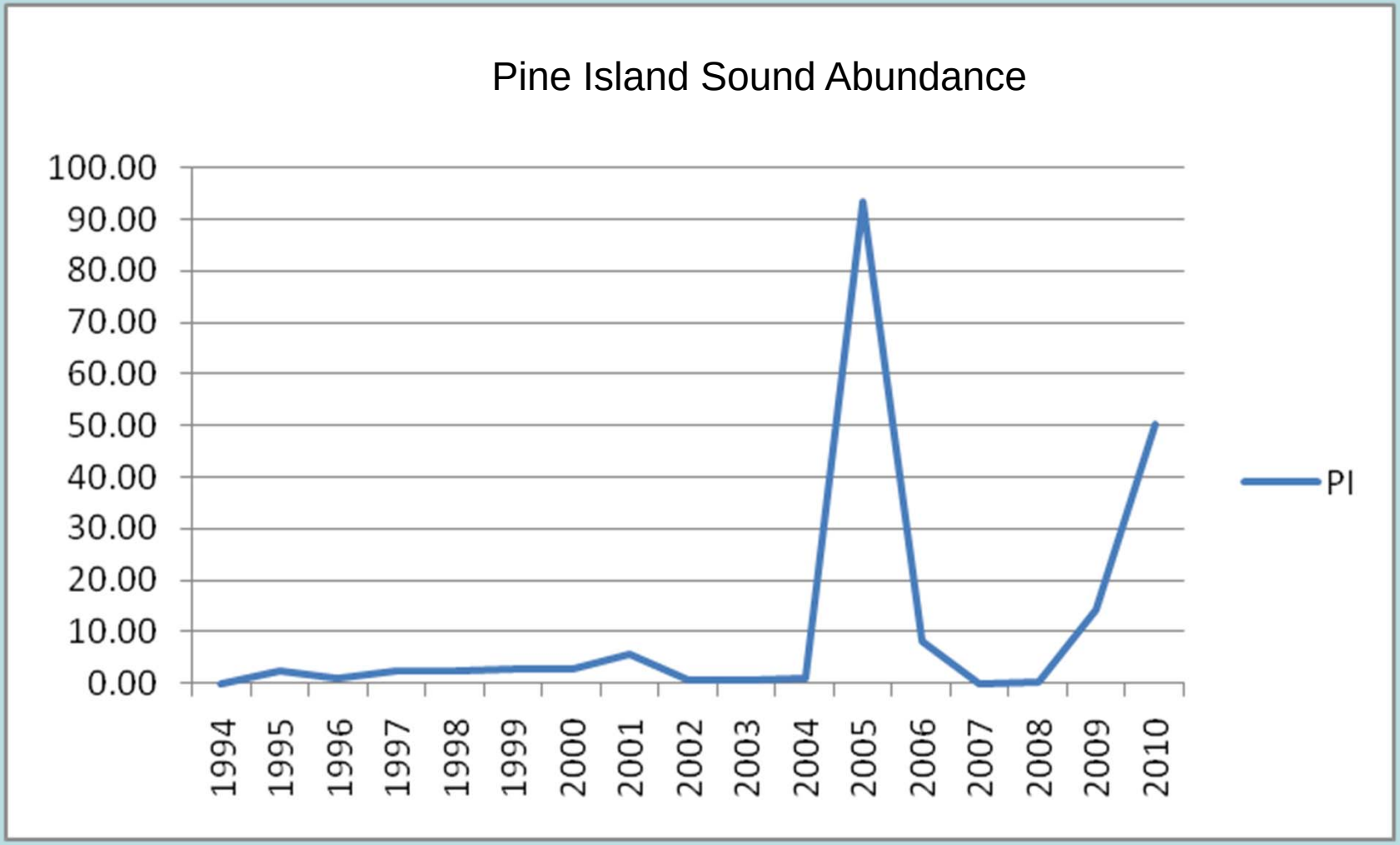

Pine Island
Pine Island Sound
2005 Scallop Distribution
Total = 1,868; Density = 93.4
0
550
0
1
2
Kilometers
N

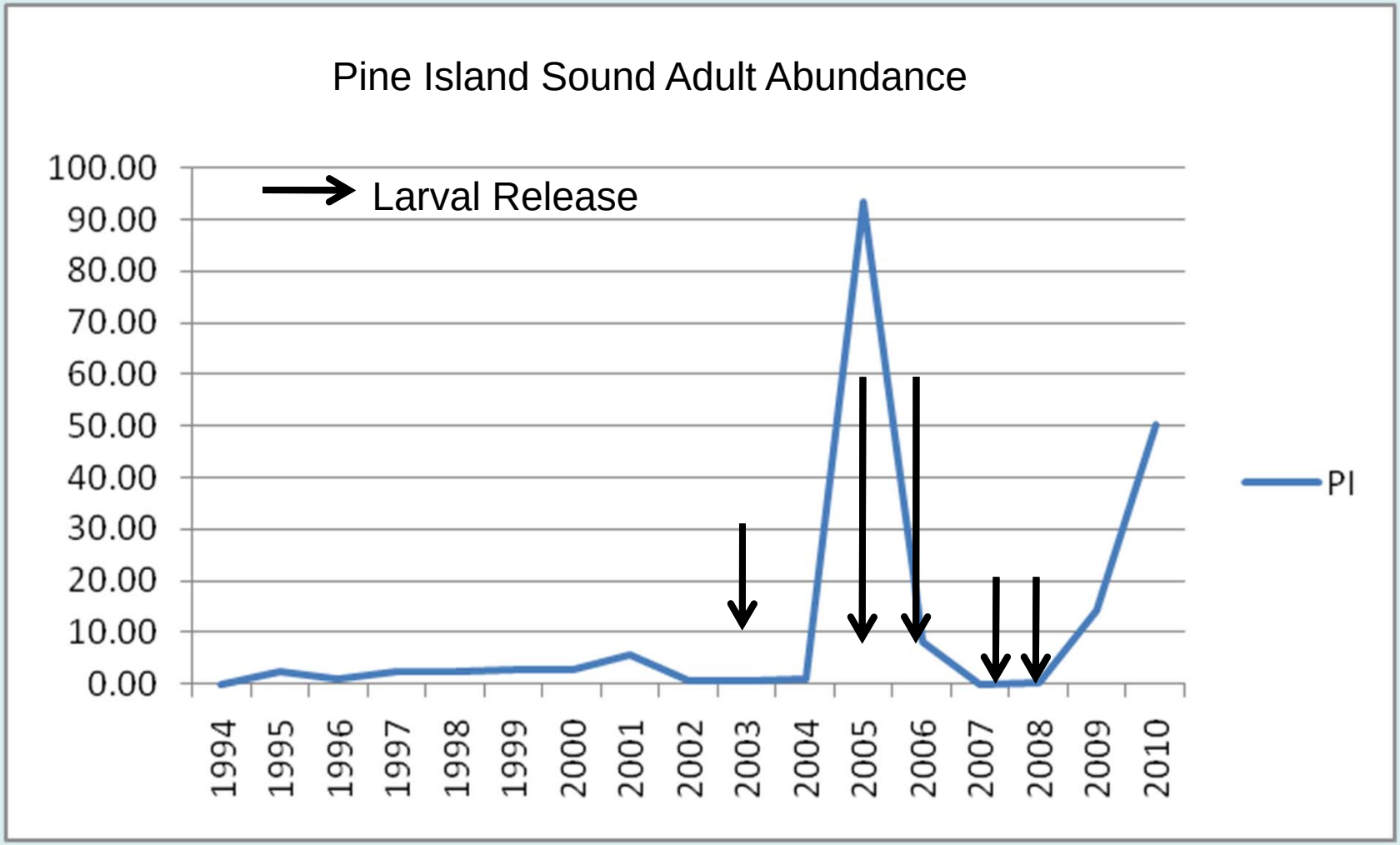

Pine Island
Pine Island Sound
2006 Scallop Distribution
Total = 163; Density = 8.15
0
550
0
1
2
Kilometers
N


Pine Island Sound
Pine Island
2005 Scallop Distribution
Total = 48; Density = 2.40
0
21
0 1 2
Kilometers
N

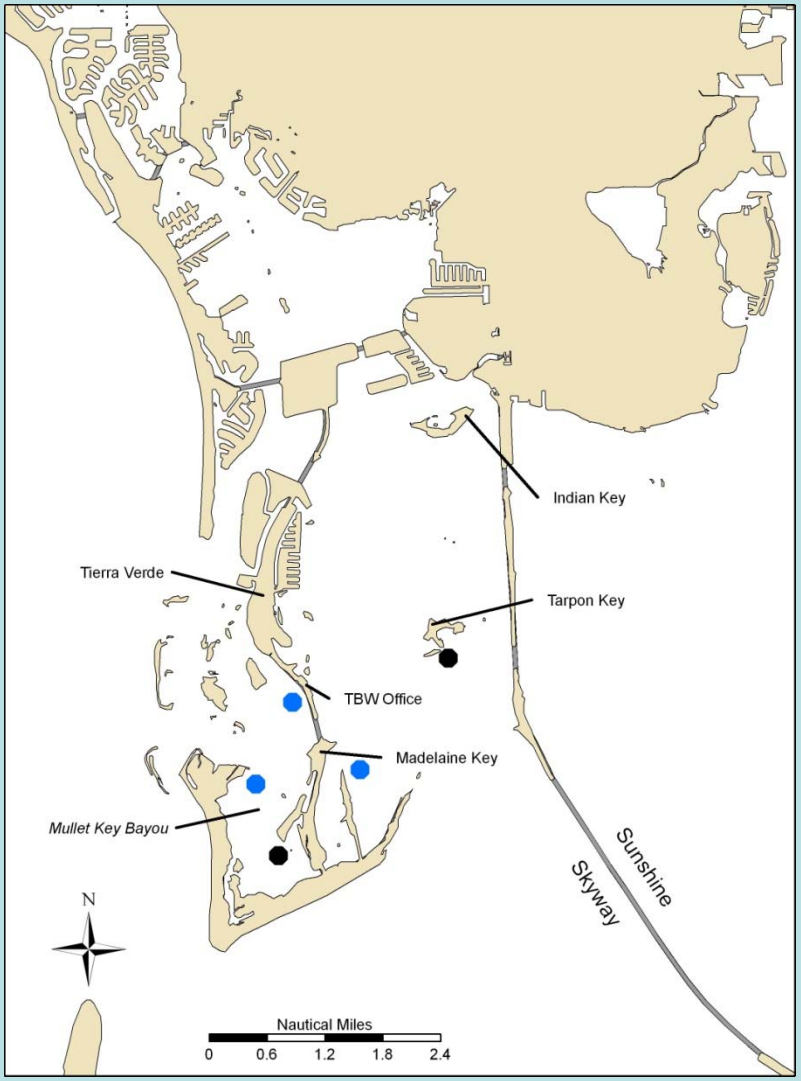
Summary of Pine Island Sound Scallop Restoration Activities

Oct, 2003	~ 1.5 million larvae
Oct, 2005	~ 4.8 million larvae
Jun, 2006	~ 4 million larvae
Oct, 2007	~ 1.5 million larvae
Dec, 2007	510 juveniles
Nov, 2008	~ 3 million larvae + 85 adults
Spring, 2009	780 adults (volunteer cages)
Aug, 2009	~ 200 juveniles
Apr, 2010	300 adults (volunteer cages)
Jun, 2010	1,250 juveniles

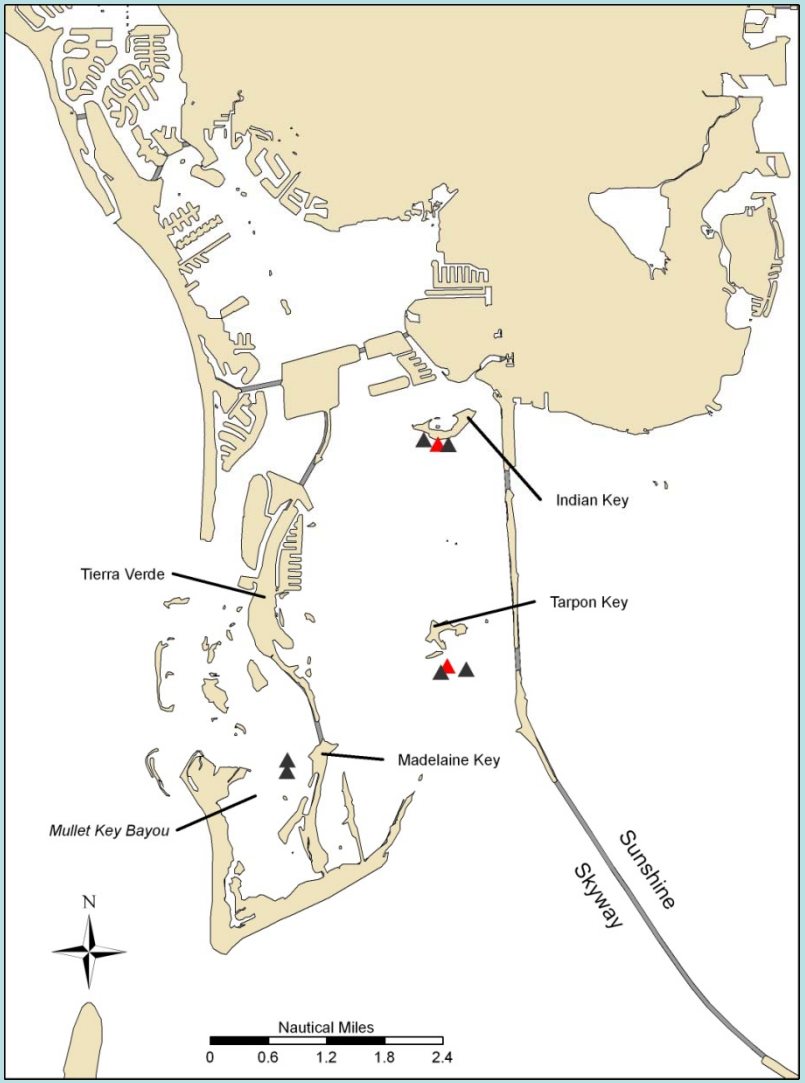

Pine Island Sound Abundance
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
PI


Pine Island Sound Adult Abundance
Larval Release
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
PI

Tampa Bay Larval Release Sites (Black = 2005; Blue = 2007)



Post-restoration recruitment stations



Some Tampa Bay Findings

- Recruitment from different larval releases was quite variable
- Recruitment since 2007 has shown signs of recovery (highest since monitoring began in 1995)
- Adult abundance since 2007 has also shown signs of recovery (highest since monitoring began in 1998)

Adaptive Management Strategies

1985	Shortened harvest season; Commercial fishery closed
1994/1995	Further shortened season;
	Fishery closed south of Suwannee River
2002	Fishery closed west of Mexico Beach

Levy, Citrus and Hernando Counties have been reopened!

Conclusions

- Direct transfer of scallops has not been successful
- Transplanting hatchery-cultured scallops has been partially successful
- Releasing hatchery-seed shows most promise for successful restoration

Conclusions (cont.)

- Restoring and stabilizing the Florida bay scallop metapopulation will require a long-term comprehensive approach tied to adaptive resource management
- Best approach should incorporate all three restoration strategies

Final Considerations

- Development of an appropriate marker to provide the necessary links between broodstock, larvae, recruits and adult populations
- Consider restoration success or failure in context with existing hydrological, oceanographic and/or HAB conditions at the time of the restoration

Funding

- National Sea Grant
- National Oceanographic and Atmospheric Administration
- Tampa Bay Estuary Program
- Sarasota Bay Estuary Program
- Pinellas County Environmental Fund
- Florida Department of Environmental Protection
- National Fish and Wildlife Foundation (Pinellas County Environmental Fund)
- Charlotte Harbor National Estuary Program
- Ocean Trust Foundation
- South Florida Water Management District
- Mote Scientific Foundation