Panel 3: Project Evaluation and Monitoring

The Value of Standardized Approaches Within and Among Projects, Programs, Regions and Species: Why Monitoring Is Not a Bad Word!

FAU FLORIDA ATLANTIC UNIVERSITY

Loren D. Coen, HBOI, FAU

NC Oyster Reef Workshop

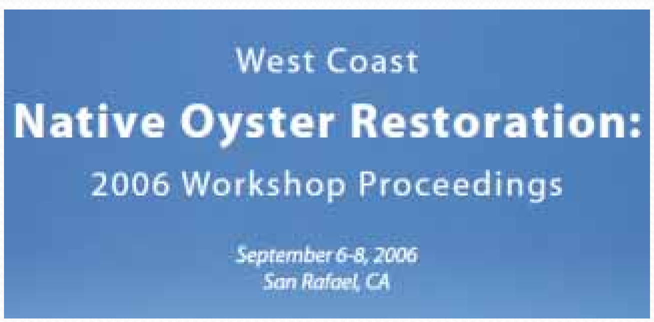
March 2014

HARBOR BRANCH FLORIDA ATLANTIC UNIVERSITY

Overview/Summary Talk Presented at First West Coast Oyster Workshop: 2006

C. virginica Lessons Learned or Potentially Lost:

1. Minimize restoration related user conflicts on the front-end and understand your restoration partners, their ‘constituencies’ and constraints (e.g., missions, monetary, expectations, time-frames)
2. Invest in solid science and develop rigorous data to assess related success/failure
3. Develop clear goals and relevant metrics. Get the biology right early-on
4. Educate grant agencies that monitoring is a critical phase for restoration, often requiring periods >3-5 years
5. Design monitoring, along with your restoration research programs so that the two are seamless and rigorous. Be open to new ideas and learn from failures. Use monitoring information for adaptive management (understand/discuss failures)
6. Focus on a few sites, collaborate and if successful, scale-up
7. Don’t succumb to early failures that others use to ‘demonstrate’ restoration is a losing strategy



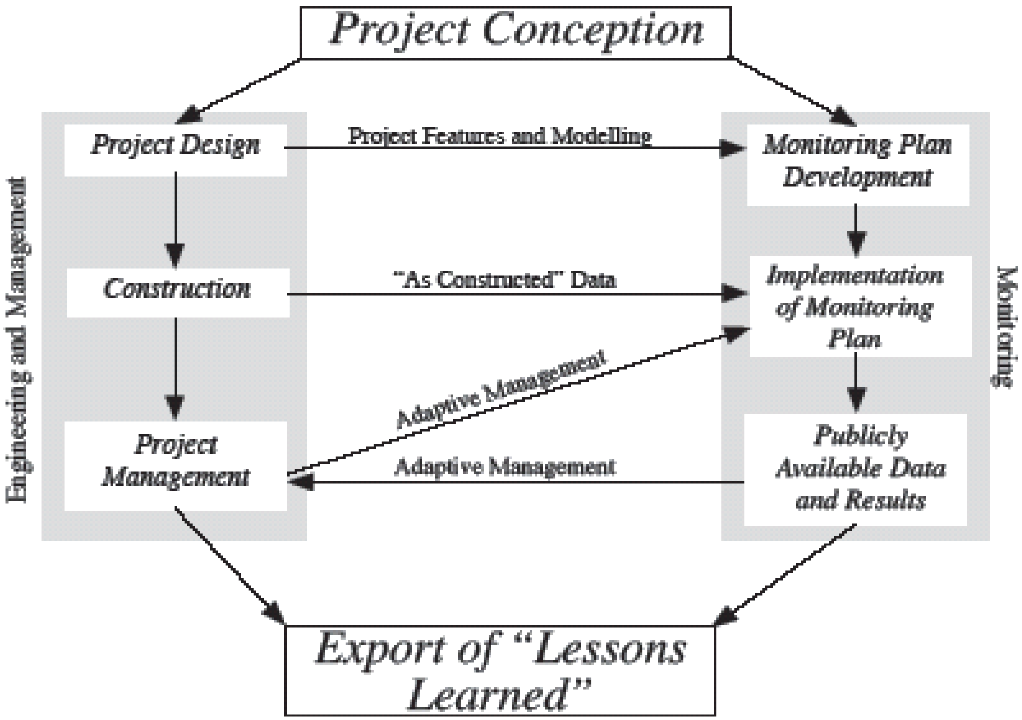
http://www.oyster-restoration.org/wp-content/uploads/2012/06/2006oysterproceedings_web_regular1.pdf

Overview/Summary From First West Coast Oyster Workshop: 2006 (Cont.)

C. virginica **Lessons Learned or Potentially Lost:**

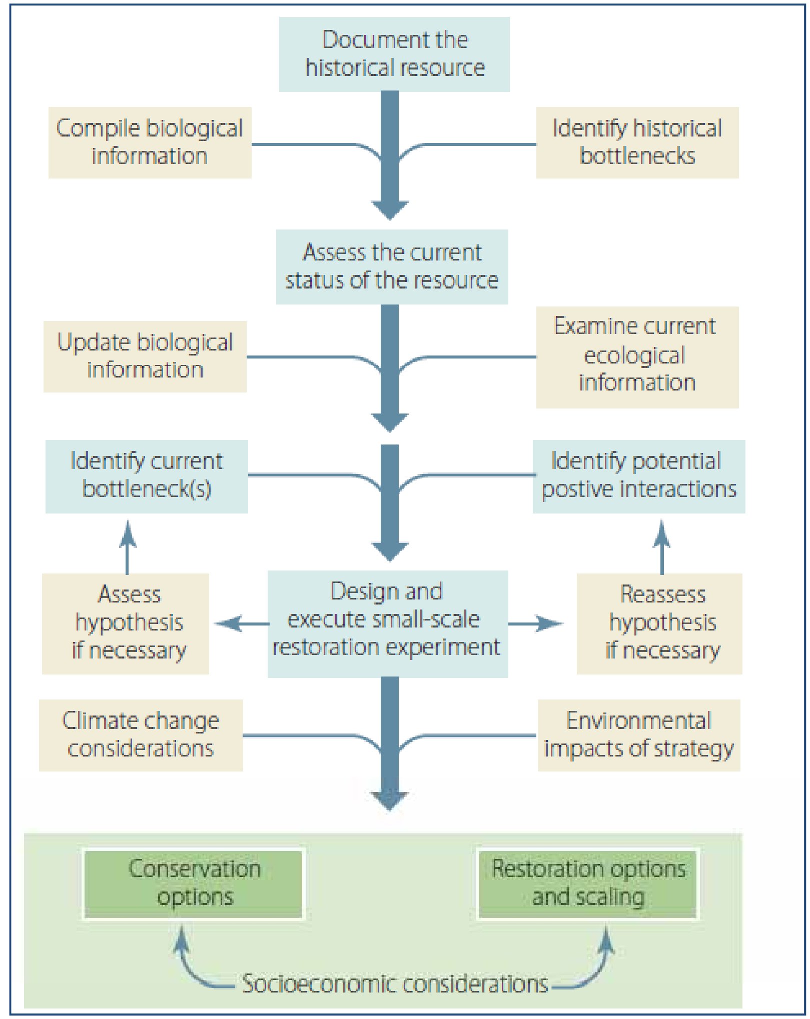
8. Have workshops early-on and often and communicate both positive and negative results
9. Don't oversell the 'services' (water-quality improvements)
10. Be careful how the media/public are fed information and avoid misperceptions
11. Early-on, invest in and understand potential population genetic structure; choose stocks carefully. Natural disease resistance vs. terraforming (CROSBreeds, DEBIs)
12. Capture/use community interest (e.g., novel involvement, gardening, shell recycling), to help with restoration and to address larger issues
13. Look at non-traditional approaches, settlement substrates (think 'out of the box')
14. Start looking early on for potential native or non-native diseases, species interactions (e.g., predators)
15. Use shellfish Harvesting Classifications to your advantage (Closed areas as 'sanctuaries')

Specific Monitoring and Data Inventory Protocols for Funded Efforts



Thayer et al., 2003. Vol. 1, Restoration Monitoring, NOAA

Stages for the Development and Assessment of a Restoration Plan



Powers and Boyer, 2014. Ch. 22. Marine Restoration Ecology. In: Bertness, et al., Eds., Marine Community Ecology and Conservation

Need For Consistency (MD/VA, 2011)

Inability to evaluate success of a given restoration project for a given goal or compare among projects near and far

Journal of Shellfish Research, Vol. 30, No. 3, 719–731, 2011.

LESSONS LEARNED FROM EFFORTS TO RESTORE OYSTER POPULATIONS IN MARYLAND AND VIRGINIA, 1990 TO 2007

TABLE 11.

Recommendations for future oyster restoration and monitoring activities.

1. Clearly articulate goals of restoration efforts.
2. Use scientifically valid designs for restoration and monitoring.
3. Collect repeated measures of oyster sizes, abundances, and disease status as well as other goal-specific data.
4. Use georeferencing technology to ensure that all measurements are spatially explicit so that sites can be identified accurately and easily in the future.
5. Organizations doing restoration and monitoring must collaborate, including identifying bars each will restore before manipulations, with all entities agreeing on common variables to be monitored and committing to rigorous quality control for all monitoring efforts.
6. Post data to a central collaborative database governed by clear guidelines for how and when data are to be provided and by clear agreements regarding data availability, sharing, and use.
7. Restored bars must remain unharvested so that monitoring of growth and the progression of disease can continue for a sufficient duration to assess completely the efficacy of the restoration activity.

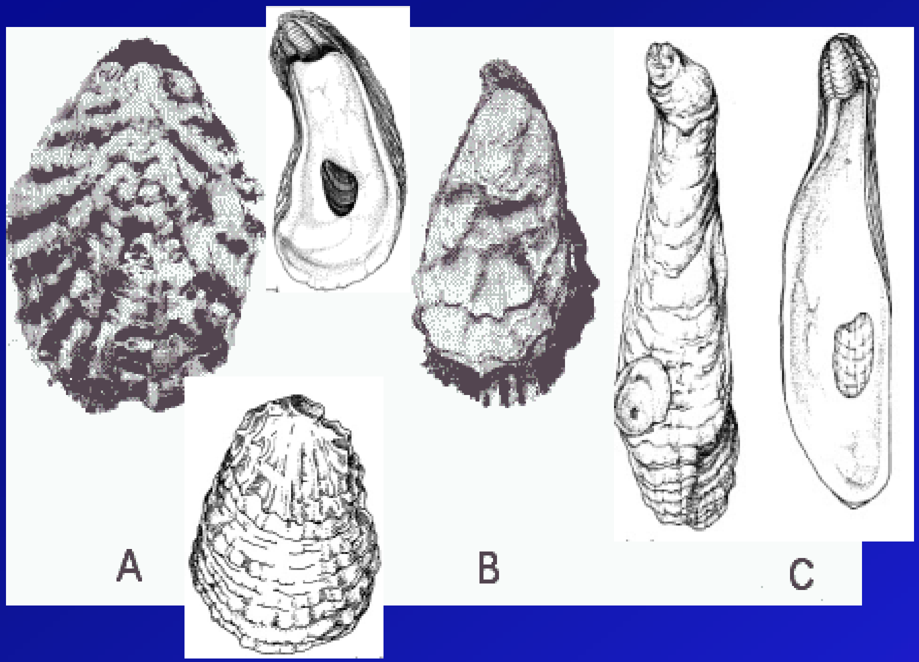
Oyster Shell “Plasticity”

Eastern oyster, *C. virginica*) has a very “plastic growth” form reflected in different shell ‘shapes’ from:

A) hard gravel, coarse sediments, fast flows (fluted)

B) softer sediments (subtidal)

C) muddy/shell or crowded (=intertidal)



Galstoff 1964

Midden *C. virginica*

Intertidal *C. virginica*

REEF TYPE	INTERSTITIAL VOLUME
Oyster shell	70%
Coal Ash	58%
Clam shell	45%

From M. Luckenbach

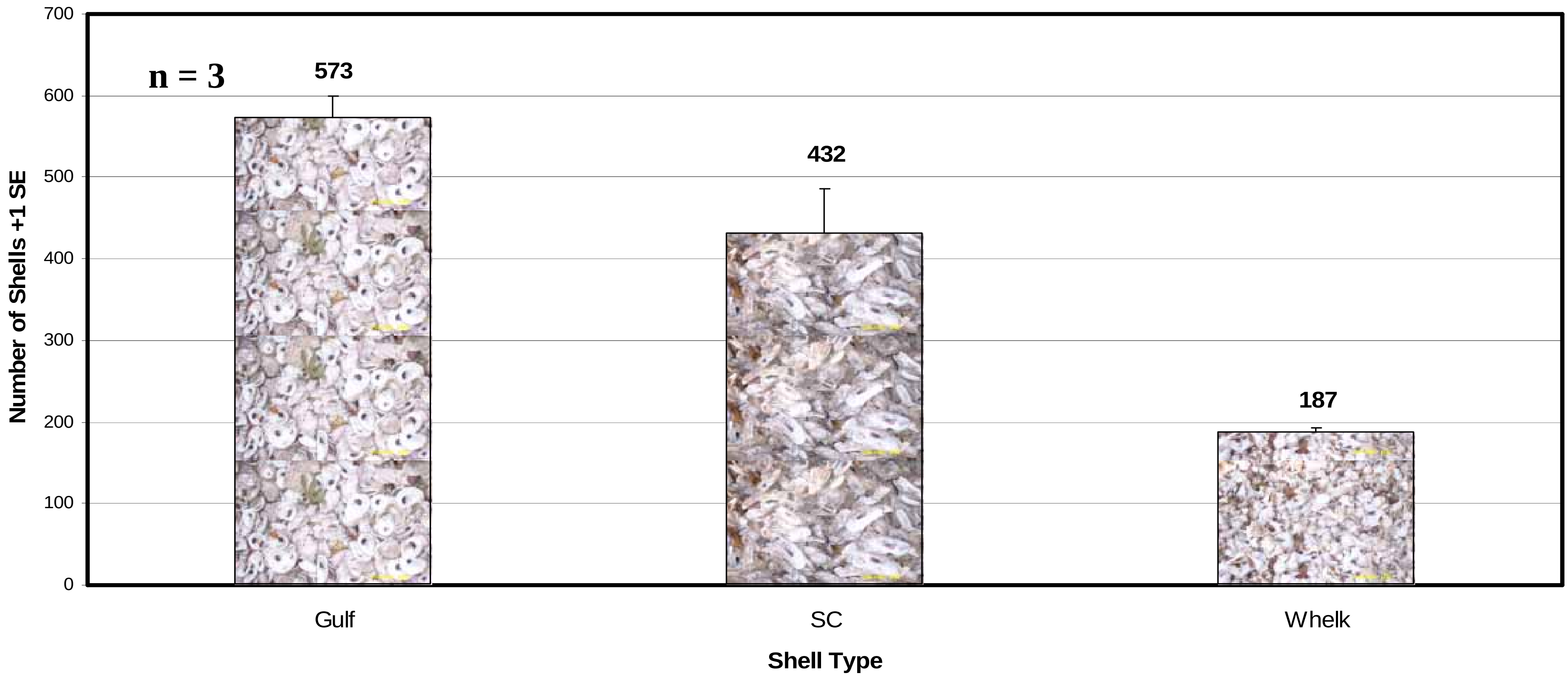
Some of the Materials We Have Used For Reef-Construction

Replicate layouts for Trays Deployed at Folly Cr to Study Shell Type Recruitment Difference

Rep 1	**SC**	**Gulf**	**Whelk**
Rep 2	**SC**	**Whelk**	**Gulf**
Rep 3	**Gulf**	**SC**	**Whelk**

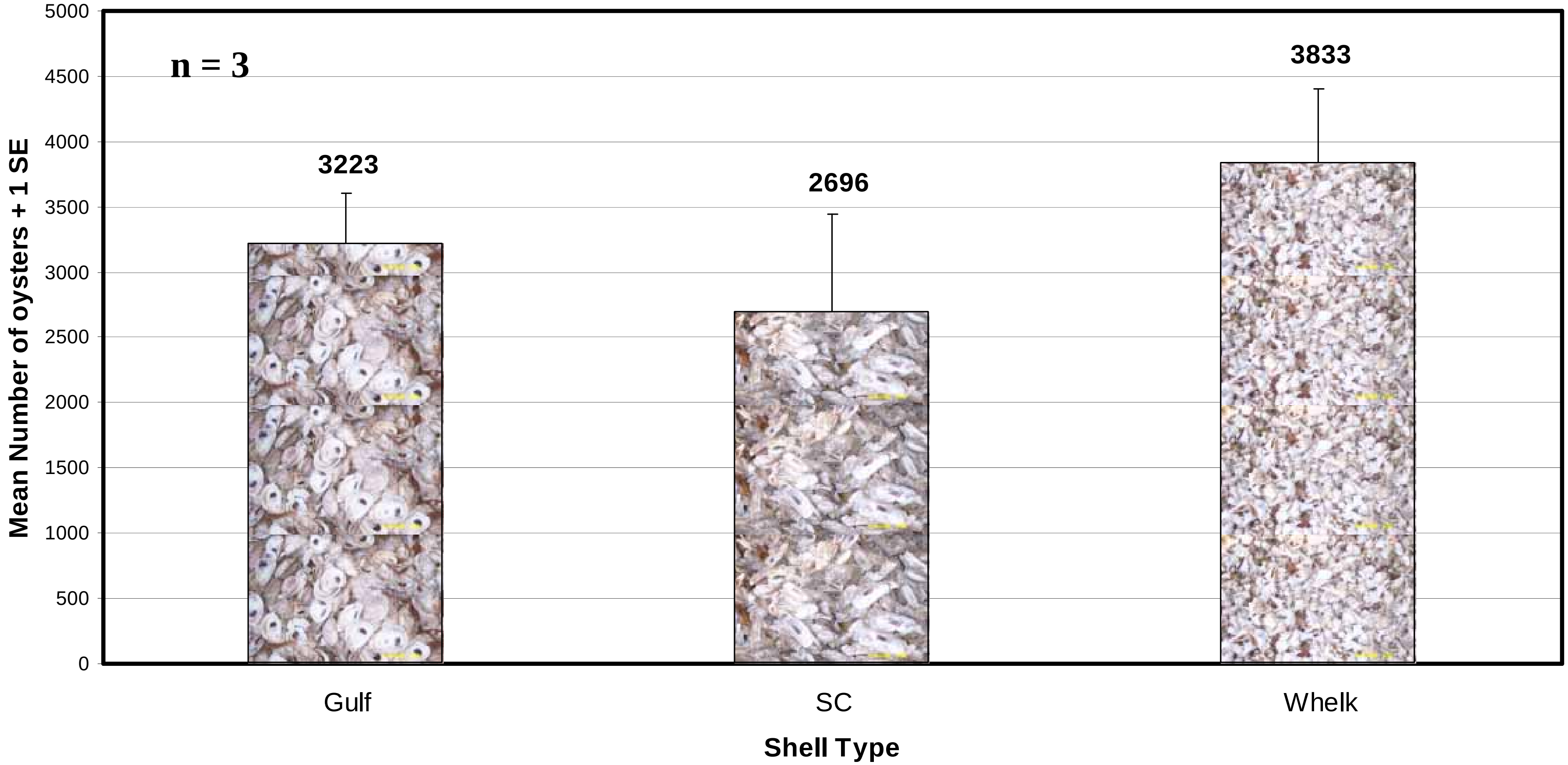
Replicate Trays Assessing Recruitment Among Different Shell Types (SC, Gulf, and Whelk). Trays Deployed for 15 mo. later

Alternative Shell Experiments: Mean Shells By Shell Type (Standardized Vol. Shell/Treatment)



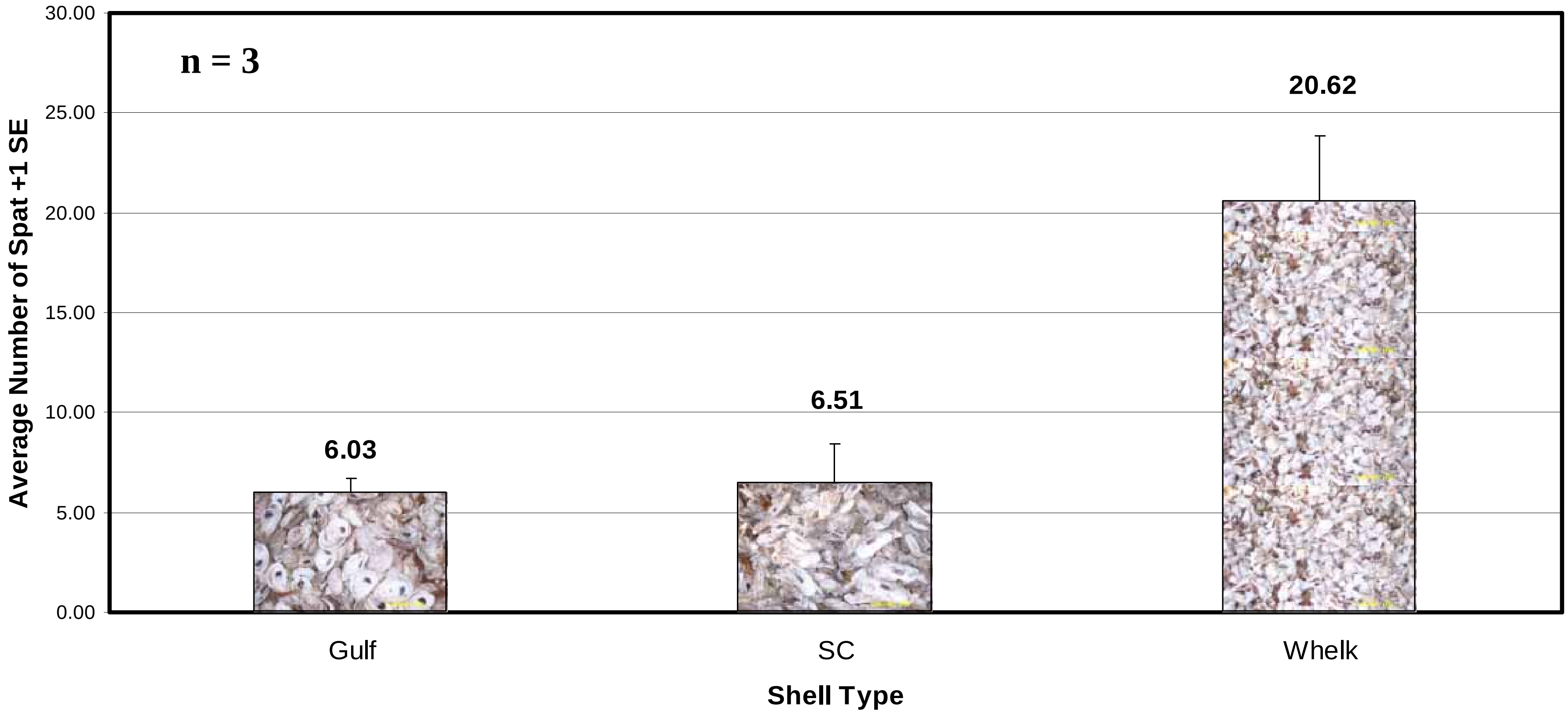
Mean number of shells/tray filled with one of the three shell types. SC intertidal shells are not single shells and do not nest as well as Gulf subtidal shells.

Alternative Shell Experiments: Mean Recruits By Shell Type (after 15 mo.) Folly River



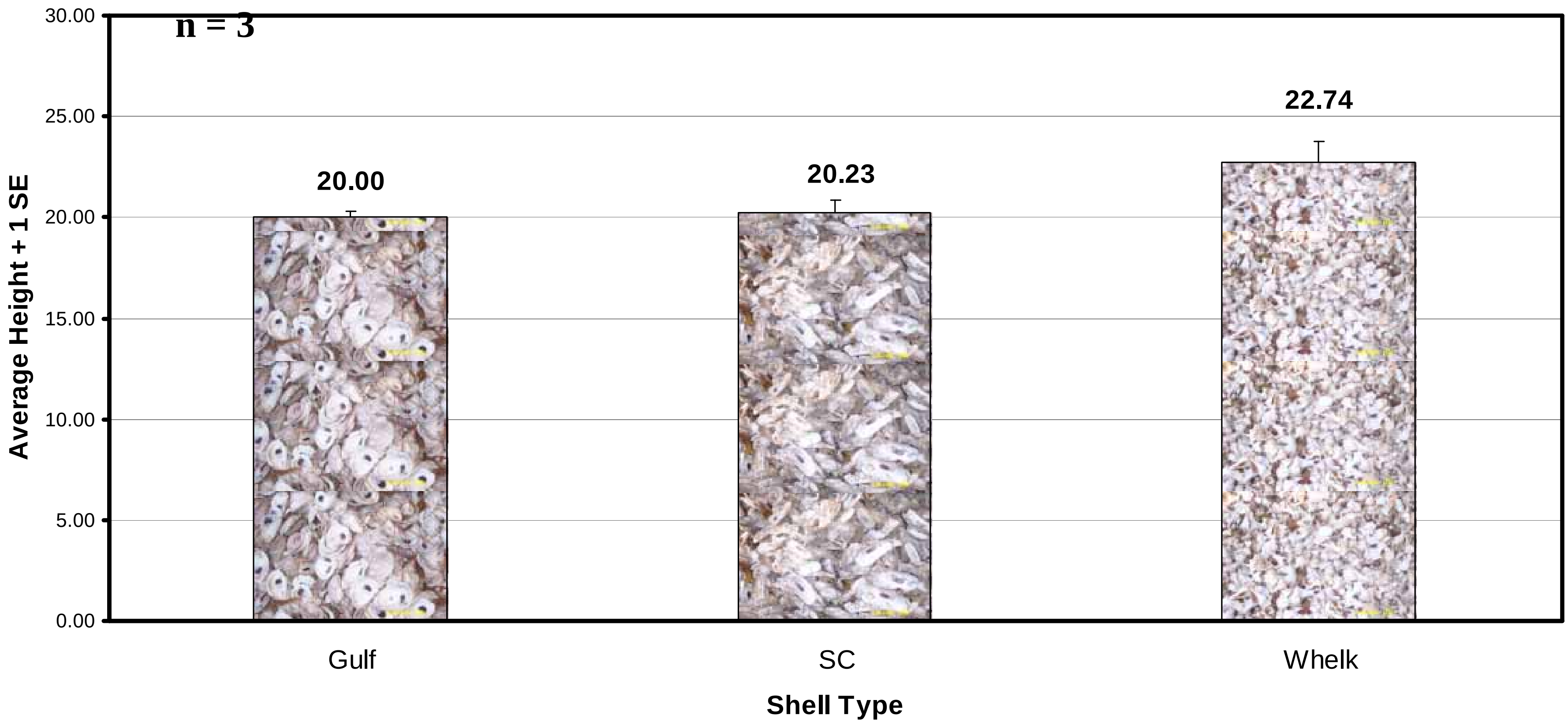
Mean number of oyster recruits in replicate trays with one of the three different shell types.
No significant difference among shell type.
Whelk treatment had is the highest mean number of recruits.

Alternative Shell Experiments: Adjusted Mean # of Recruits By Shell Type (15 mo. Trials)



Mean number of oyster recruits/shell . Whelk shell had the highest number of recruits/shell but also the largest of the three shell types.

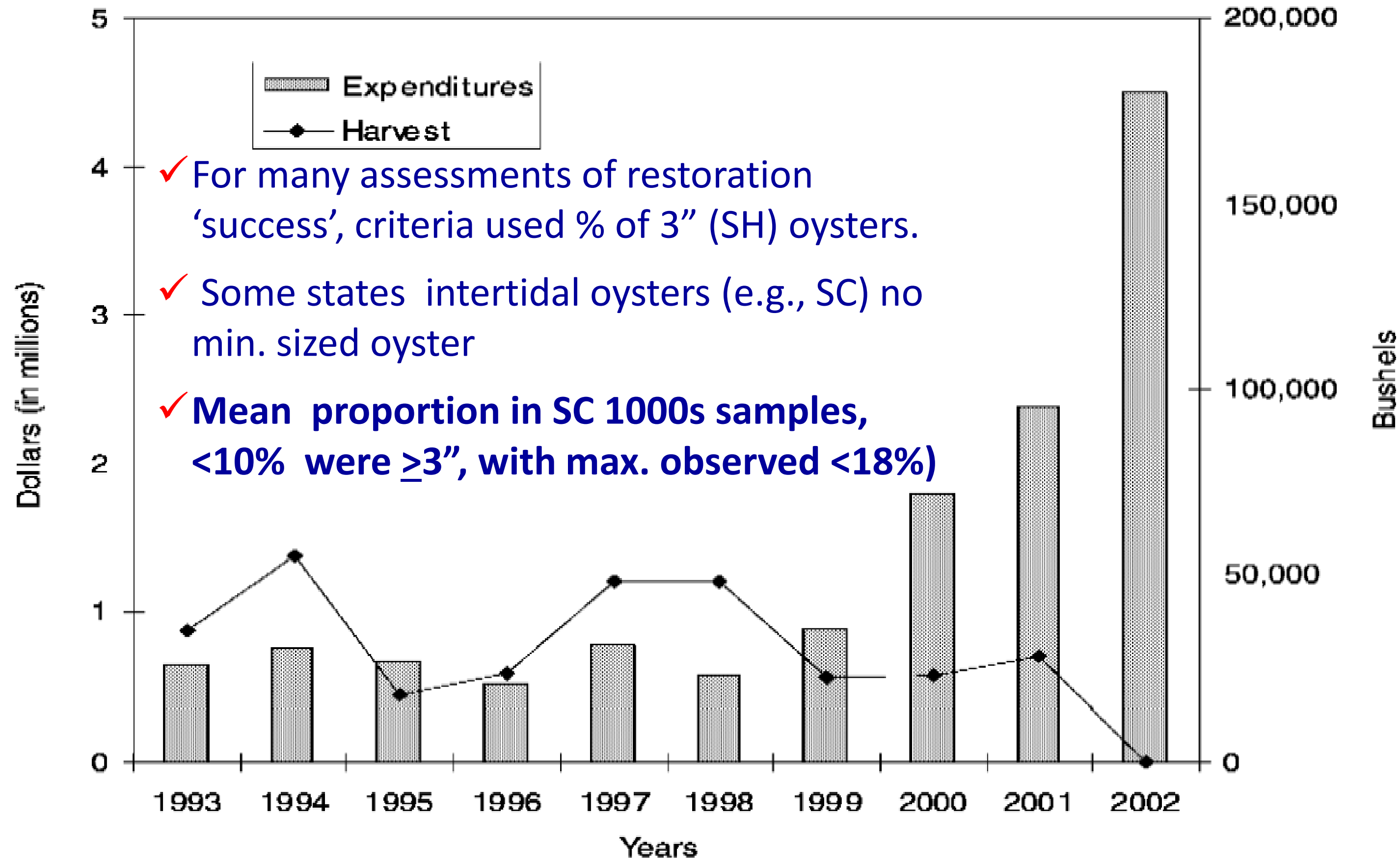
Alternative Shell Experiments: Mean Oyster Size By Shell Type (15 mo. Trials)



Mean shell heights by shell treatment. No significant difference between shell treatments, though whelk shell recruit size was largest.

Legal Sized (≥3") Oysters as Success Measures: Unrealistic Expectations/Inappropriate Success Criteria?

What is Your Goal??



- ✓ For many assessments of restoration 'success', criteria used % of 3" (SH) oysters.
- ✓ Some states intertidal oysters (e.g., SC) no min. sized oyster
- ✓ **Mean proportion in SC 1000s samples, <10% were ≥3", with max. observed <18%)**

FIGURE 6.1 Virginia expenditures on oyster restoration and oyster landings. SOURCE: Data from J. Wesson, VMRC, Newport News, personal communication, 2003.

National Research Council, 2004

"Shoreline management" is defined as any tidal shoreline practice that prevents and/or reduces tidal sediments to the Bay.

From: S. Drescher, EPA

Novel Approaches for Wave Attenuation in TX, AL, LA: ReefBLKs

Units deployed for shoreline 'stabilization' in TX (Mad Island Reefs) along the GIW. Amazing recruitment and growth (< 1 year).

The Nature Conservancy
SAVING THE LAST GREAT PLACES ON EARTH

For LS Efforts: Too Often Data Collection is Problematic
Need to Develop Rigorous Sampling Methods

www.tampabaywatch.org

Stormwater Waterfront Protection Project Sold as Living Shoreline/Habitat Restoration

Jan. 3, 2013, permitted man-made barrier islands (12 total) south of Fort Pierce Inlet in the Indian River Lagoon (IRL). Tern Island (center), largest of the islands constructed to protect the Fort Pierce City Marina and adjacent downtown shoreline from future storm damage.

http://www.tcpalm.com/news/2013/jan/09/no-headline---marina_islands/

Authorization (Permitting) "Challenges" in FL

- Oyster Restoration not specifically defined
- Living Shorelines not specifically addressed
- Limited allowance for work below the MHW line without extensive review
- Additional criteria for work in the FL's Aquatic Preserves
- Additional criteria for work in Class II shellfish harvesting waters

From: Lucy Blair (Submerged Lands and Environmental Resource Permitting, FLDEP)

Need FL Dept. Ag. Consumer Serv. (DACS) Involvement

Florida Department of Agriculture and Consumer Services
Division of Aquaculture


Oyster Restoration Workgroup

HOME MEMBERS RECENT & NEW INFO RESOURCE CENTER RESTORATION PRACTICES SPONSORS

Search for: Search

Suppliers, Sources & Protocols

A Resource Guide to Relevant Materials, Suppliers and Sources for Shellfish Research, Sampling and Restoration Efforts (please send your additions: it will be updated regularly by L. Coen)

Pdf

The Title Says It All (Methods for monitoring that are simple, quick and cheap)

Aronson, R. B., P. J. Edmunds, W. F. Precht, D. W. Swanson and D. R. Levitan. 1994. Large-scale, long-term monitoring of Caribbean coral reefs: simple, quick, inexpensive techniques. Atoll Research Bulletin 421:1-19.

Pdf

BIOROCK

A Method of Enhancing the Growth of Aquatic Organisms, and Structures Created Using Electrodeposition of Minerals in Sea Water (Mineral Accretion Technology)

See http://Www.Biorock.Net/

http://www.globalcoral.org/Biorock%20%20Mineral%20Accretion%20Technology%20for%20Reef%20Restoration.html

http://www.oyster-restoration.org/suppliers-and-sources/