

An Evaluation of Native Oyster
Restoration in Chesapeake Bay
1990-Present

By the
Oyster Restoration Evaluation Team

The Team

- ***Owners (Funding agencies)***
 - **NOAA Chesapeake Bay Office**
 - **Campbell Foundation**
 - **Maryland Sea Grant College Program**
 - **US Fish and Wildlife Service**
- ***Coaches (Facilitators)***
 - **Dr. Jonathan Kramer, Maryland Sea Grant College Program**
 - **Dr. Kevin Sellner, Chesapeake Research Consortium**

The Team

- *Trainers*
 - *Data Compilation and Database Construction*
 - **Ms. Jodi Dew-Baxter**, Versar, Inc.
 - *Data analysis*
 - **Dr. Cherie Keller**, University of Florida

The Team

- *Players*

- **Dr. Denise Breitburg**, Smithsonian Environmental Research Center
- **Dr. Mary Christman**, University of Florida
- **Dr. Victor Kennedy**, University of Maryland Center for Environmental Science
- **Dr. Mark Luckenbach**, Virginia Institute of Marine Sciences
- **Dr. Roger Mann**, Virginia Institute of Marine Sciences
- **Dr. Kennedy Paynter**, University of Maryland

Oyster-Saving Efforts a Wash In Chesapeake

Fewer Bivalves in the Bay After \$58 Million Campaign

By David Fahrenthold

Washington Post Staff Writer
Monday, June 2, 2008; Page A01

"You've got fewer oysters and fewer oystermen and fewer oyster-related businesses," when the goal was to help all three, said Robert Glenn of the Coastal Conservation Association of Maryland. "Clearly, your money was not well spent."



In fact, \$41 M were spent to support a put-and-take commercial fishery with actions that by definition could not have resulted in restoration.

\$17 M spent over 14 years on restoration activities.

Database Overview

- >72,000 separate records
- 17 years of data (1990-2007)
- Data contributed from 8 sources
- MS Access database (compatible with other software — Excel, SAS, ArcGIS *etc.*)
- Compatible with other datasets
- Geo-referenced

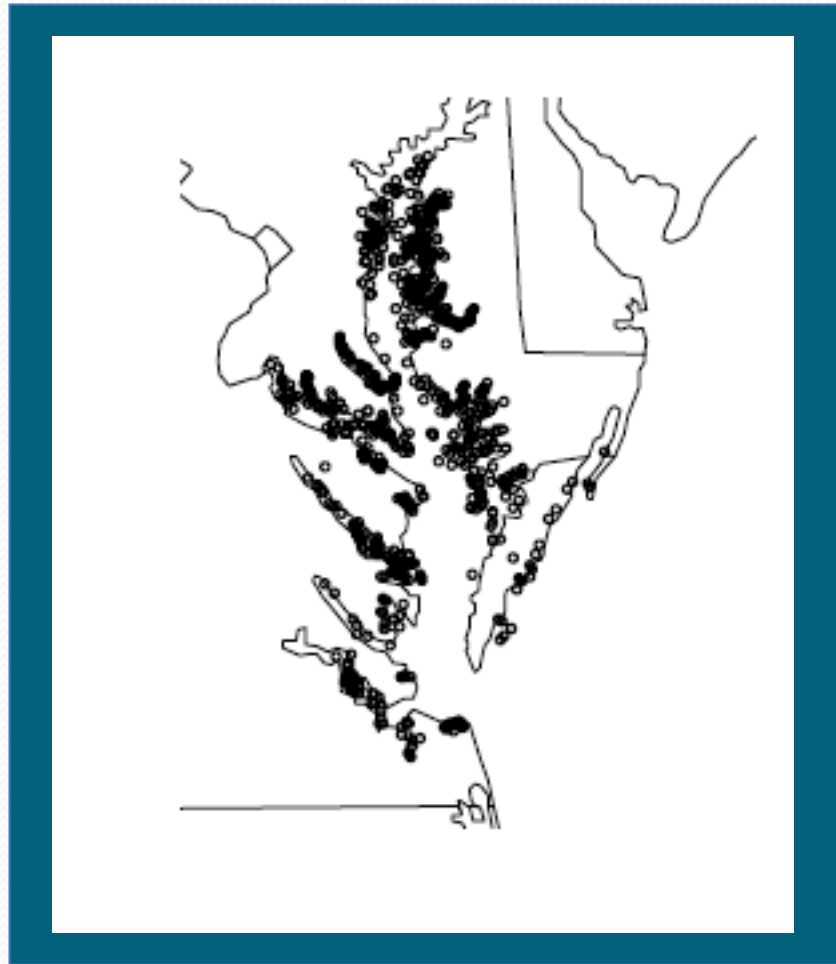
Oyster Restoration Inventory: What efforts have been made? Where, when, by whom and how (placement of shell, seed, adults; bed configuration, etc.)?

Activity Type	State	# Sites
Monitoring	MD	447
Monitoring	VA	438
Restoration	MD	370
Restoration	VA	217

• *Both restoration and monitoring data from many sites in Maryland and Virginia*

Oyster Restoration Inventory: What efforts have been made? Where, when, by whom and how (placement of shell, seed, adults; bed configuration, etc.)?

- *Significant spatial coverage*
- *1035 sites with restoration and/or monitoring*

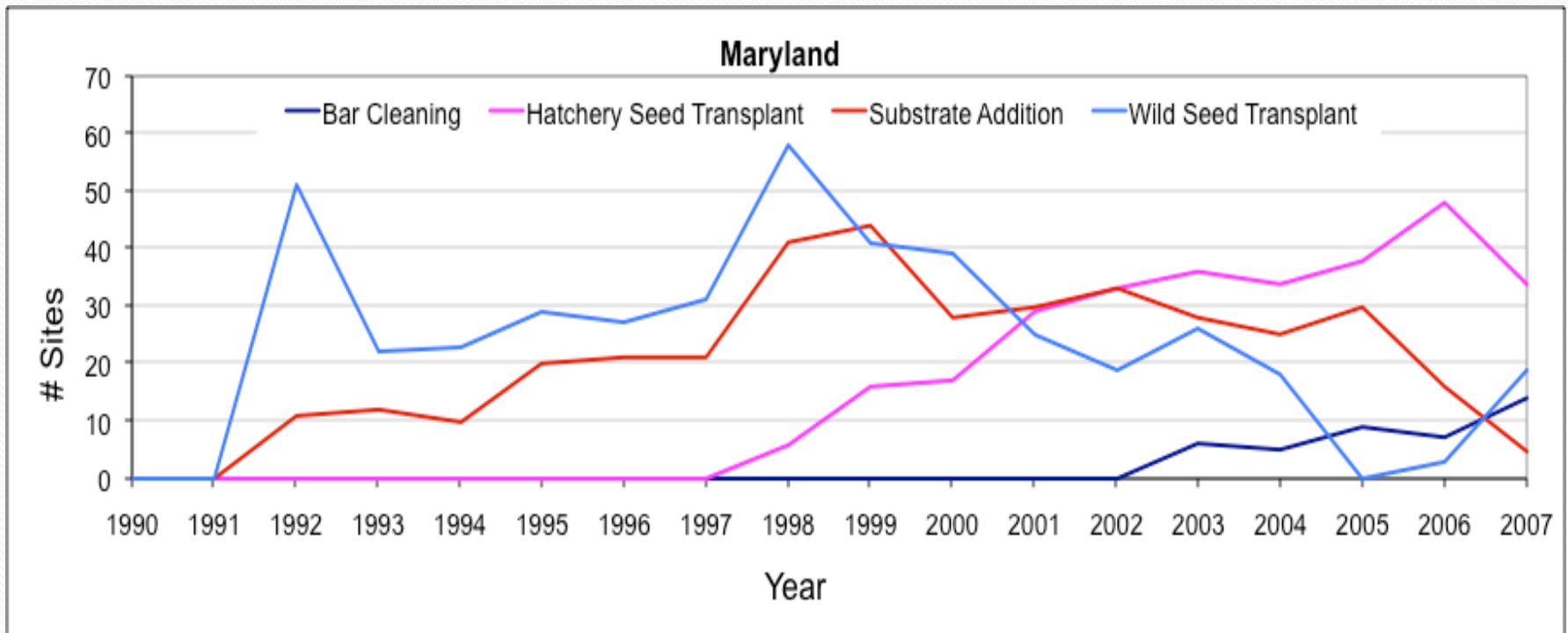


Oyster Restoration Inventory: What efforts have been made? Where, when, by whom and how (placement of shell, seed, adults; bed configuration, etc.)?

State	Area	Bagless Dredging	Bar Cleaning	Hatchery Seed Transplant	Substrate Addition	Wild Seed Transplant	Total of Restoration Activities	Monitoring
MD	None Given	0	0	2	7	0	9	2
	Mainstem	0	0	10	21	22	53	56
	Seaside	0	1	13	12	2	28	12
	Tribs	0	37	107	192	132	468	377
	Total	0	38	132	232	156	558	447
VA	None Given	0	0	0	1	0	1	2
	Mainstem	4	0	5	26	6	41	70
	Seaside	0	0	0	33	2	35	83
	Tribs	11	13	25	117	33	199	283
	Total	15	13	30	177	41	276	438
Baywide Total		15	51	162	409	197	834	885
% Sites		2	6	19	49	24	81	86

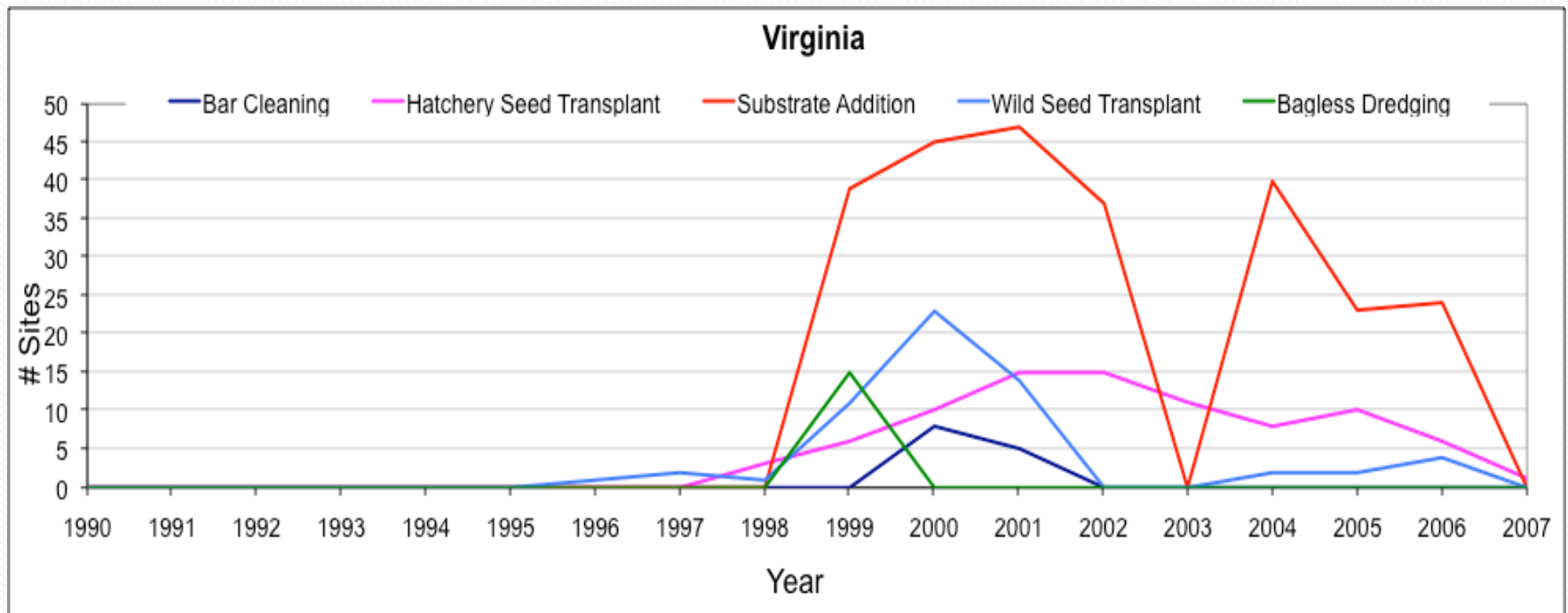
•Of the 1035 sites, 81% have restoration activities, 86% have monitoring activities, 67% have both restoration and monitoring

Oyster Restoration Inventory: What efforts have been made? Where, when, by whom and how (placement of shell, seed, adults; bed configuration, etc.)?



• *A shift in activity away from wild seed transplant to hatchery seed transplant*

Oyster Restoration Inventory: What efforts have been made? Where, when, by whom and how (placement of shell, seed, adults; bed configuration, etc.)?



Data Availability: Are these monitoring or ancillary data analyzed or available to be analyzed? If analyzed, what do they tell us about the outcome of the restoration effort (spat set, revived fishery)? If not analyzed but available, what can be learned?

State	Organization	Bagless Dredging	Bar Cleaning	Hatchery Seed Transplant	Substrate Addition	Wild Seed Transplant	All Activities	Monitoring
MD	ANS	0	0	1	1	0	2	0
	CBF	0	0	73	65	2	140	0
	USACE	0	0	0	8	0	8	0
	LCF	0	0	1	0	0	1	0
	MDDNR	0	0	6	174	154	334	409
	MSU	0	0	0	0	0	0	25
	ORP	0	38	68	6	0	112	0
	PRF	0	0	0	1	0	1	0
	SRF	0	0	0	1	0	1	0
	UMD	0	0	0	0	0	0	87
VA	CBF	0	0	29	0	3	32	0
	USACE	0	0	1	9	0	10	9
	VIMS	0	0	0	0	0	0	188
	VMRC	15	13	0	168	40	236	339

- 72,000 data records from multiple organizations
- Few have been analyzed from the perspective of evaluating restoration activities
- There are data limitations that impact our ability to answer certain questions

Key Observations

72,000 records of all activities to enhance oyster populations locally or regionally since 1990 were collected.

- Records indicate very few activities were undertaken with explicitly stated goals/objectives.
- Most activities on open bars (fished). Open/closure data were difficult to obtain – impacts of fishing are unknown.
- In MD, most data came from qualitative sampling – few measures of oyster density allowing estimates of oyster abundance. In VA, most data were quantitative, but taken by varying sampling methods, thus not necessarily compatible.

Key Observations

- Lack of clearly stated goals/objective and the qualitative nature of the data make it difficult to discern “success or failure” of many efforts.
- Lack of enforcement of closures, and secondary (unplanned) manipulations compromised the data collected and the establishment of rigorous conclusions.
- Recent efforts in both states have generated more quantitative data sets:
 - Stock assessment by VIMS in James River
 - Restoration efforts by ORP/UMD

Recommendations

- Define goals/objectives clearly and explicitly
 - Must quantify progress toward a defined endpoint
- Ecological Restoration
 - Reestablishment of oysters for the provision of ecological services
- Fishery Restoration
 - Maintaining a population for the provision of a sustainable economic resource
- Recognize the challenges are many and complex.
 - Discipline in execution and assessment is critical

Ecological Restoration

- Necessarily experimental
 - Must create hypothesis-driven projects that specify expected outcomes
 - Must collect data in such a way as to be able to support or refute the hypothesis
 - Must be multi-faceted and may be conducted on many geospatial levels

Fishery Restoration

- Accepted standards of fishery management already exist and should be applied to oysters in the Bay
 - Sound stock assessment including estimates of:
 - Abundance
 - Recruitment
 - Mortality
 - Natural
 - Fishing
- Establishment of reference points and the use of modeled populations should be considered.

Communication and Coordination

The team recommends implementation of a coordination protocol:

- An advisory committee composed of scientists and managers from MD and VA should be established that reviews and coordinates all oyster restoration efforts.
- All efforts should be permitted, linked to explicit goals and made public to protect the activity from other impacts.
- Activities should meet minimum standards with respect to design and integrated monitoring
- Sufficient data for critical parameters should be obtained at relevant sites and in an agreed upon manner to ensure data quality
- Data should be collected and reported in a timely manner to a collaborative database administered by the governing committee or a technical subcommittee.

The Way Forward

- Rigorous and disciplined restoration, stock assessment and monitoring are needed.
- All efforts must be defined by clear goals and objectives.
- Manipulation and monitoring should be integrated so that effort and outcome can be clearly assessed.
- A sound Bay-wide stock assessment program should be established that can detect local, regional and system-wide changes in oyster populations.
- Data collection should be organized and shared across a common foundation so that measures and assessments can be compared or combined. A common database should be established.

Whatever is done....

- Steps must be undertaken to accurately assess changes in the oyster population in the Chesapeake Bay.
 - Our analysis has shown that *wholesale change* in oyster monitoring and stock assessment is needed to fully measure the health and growth of a recovering oyster population.

Chesapeake Oyster Database

- ORET effort revealed lack of coordination between some groups resulting in duplication of efforts
- Chesapeake Oyster Database (COD) will build upon ORET efforts
 - Capable of integrating data from all groups
 - Provide efficient means of reporting restoration and research results
 - Formal data access and sharing agreements
 - Shared and accessible to oyster restoration community

Chesapeake Oyster Database

- **Participants already include:**

- George Abbe (MSU),
- Stephan Abel (ORP),
- Stephanie Tobash Alexander (UMCES),
- Steve Allen (ORP),
- Linda Barker (MDNR),
- Denise Breitburg (SERC),
- David Bruce (NOAA),
- Nancy Butowski (MDNR),
- Lee Daniels (MDNR),
- Julie Defilippi (ACCSP),
- Jodi Dew (Versar),
- Mike Fritz (EPA),
- Kelly Greenhawk (MDNR),

- Chris Judy (MDNR),
- Lisa Kellogg (UMD),
- Jonathan Kramer (MDSG),
- Mark Luckenbach (VIMS),
- Don Meritt (UMCES),
- Tom O'Connell (MDNR),
- Claire O'Neill (USACE – Baltimore District),
- Ken Paynter (UMD),
- Stephanie Reynolds (CBF),
- Harley Speir (MDNR),
- Mitch Tarnowski (MDNR),
- Howard Townsend (NOAA).

Chesapeake Oyster Database

- **Establishment of a common database will guide sample and data collection, protocols, and design of restoration and stock assessment efforts.**
 - **As examples:**
 - **Samples intended to measure oyster abundance must be expressed as oysters/m².**
 - **Dermo and MSX diagnoses must be reported on a single agreed upon scale.**

Chesapeake Oyster Database

- **Funding**
- **Coordination/management**
- **Governance**
 - **Data sharing agreements**
 - **Public access**
 - **Ownership**
 - **Publication**