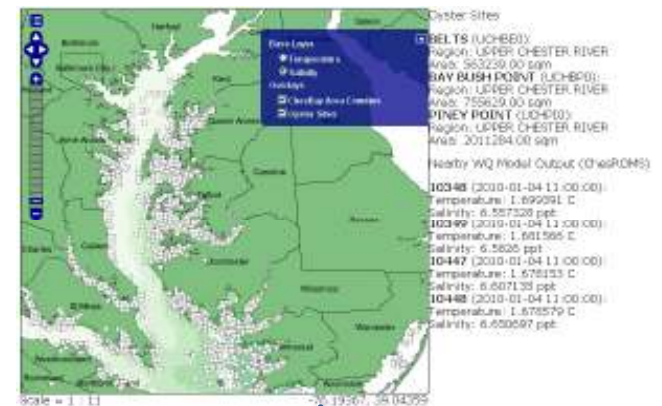


# Data Integration and Reporting in Support of Spatial Management of Oysters

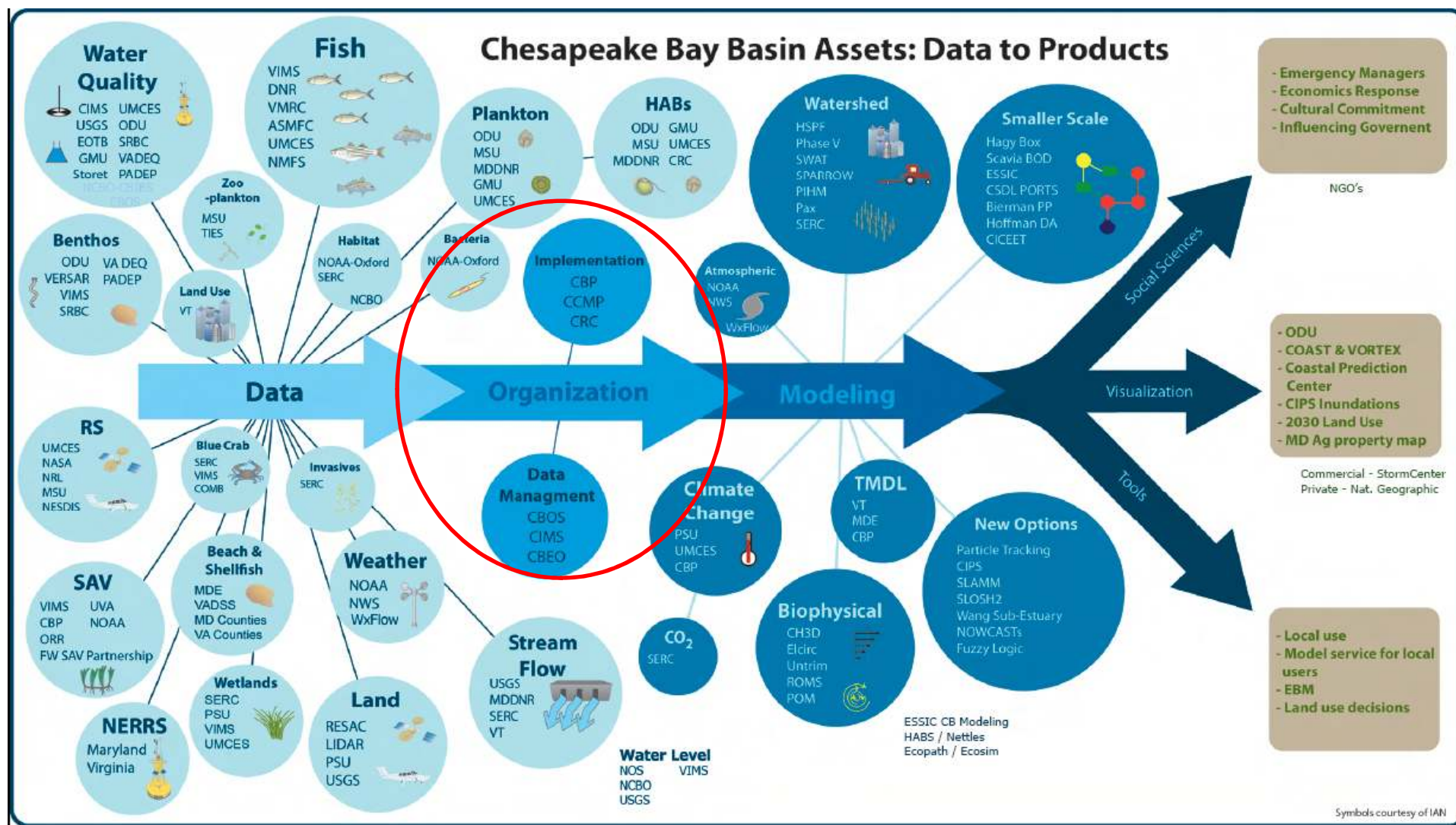
Comprehensive Chesapeake Oyster Database (COD) and  
Chesapeake Bay Ecosystem Integrated Information System (CBEIIS)



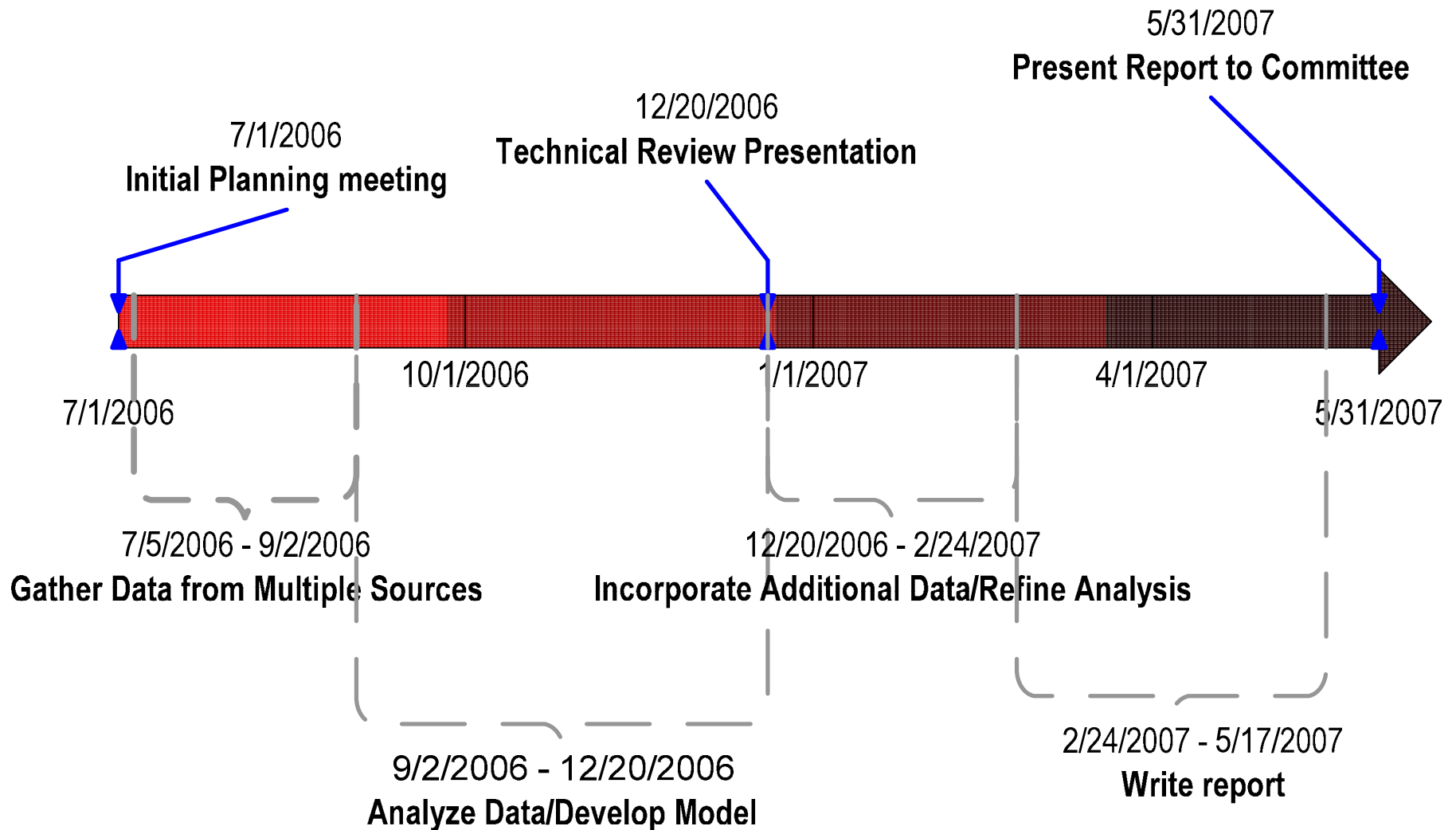
Date	# Bushels	Gear	Bar Name	Solid To	Landing Area	Comments
10/7/2009	8	Patent Tong	GREAT ROCK	99912	Crisfield	
10/8/2009	10	Patent Tong	GREAT ROCK	99912	Crisfield	
10/9/2009	2	Patent Tong	GREAT ROCK	99912	Crisfield	
10/12/2009	9	Patent Tong	GREAT ROCK	99912	Crisfield	
10/13/2009	10	Patent Tong	GREAT ROCK	99912	Crisfield	
10/20/2009	8	Patent Tong	GREAT ROCK	99912	Crisfield	
10/21/2009	8	Patent Tong	GREAT ROCK	99912	Crisfield	
10/22/2009	9	Patent Tong	GREAT ROCK	99912	Crisfield	

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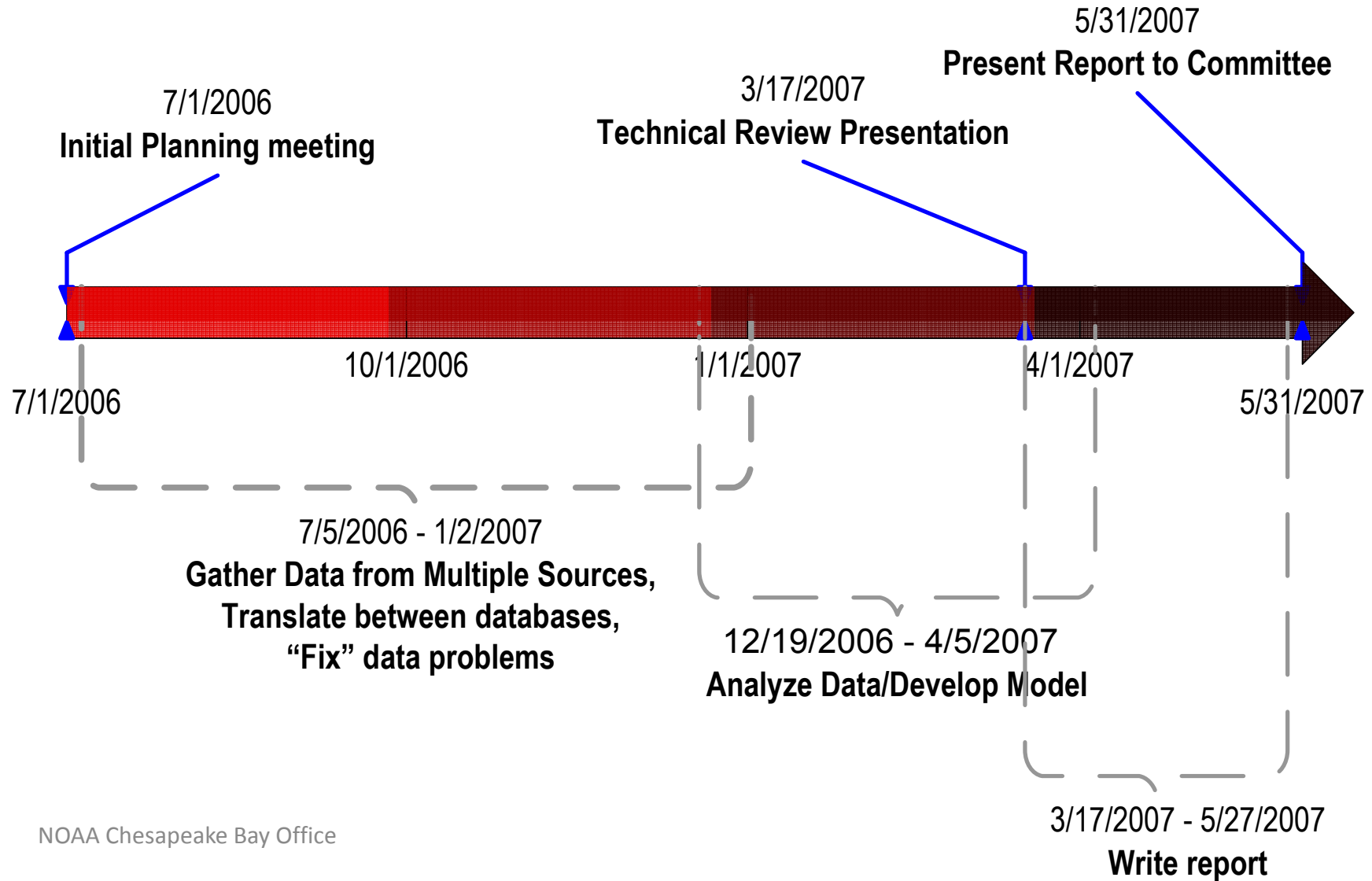
# Ideal View of Providing Science For Ecosystem-based Management



# Ideal timeline for completing analysis/modeling project



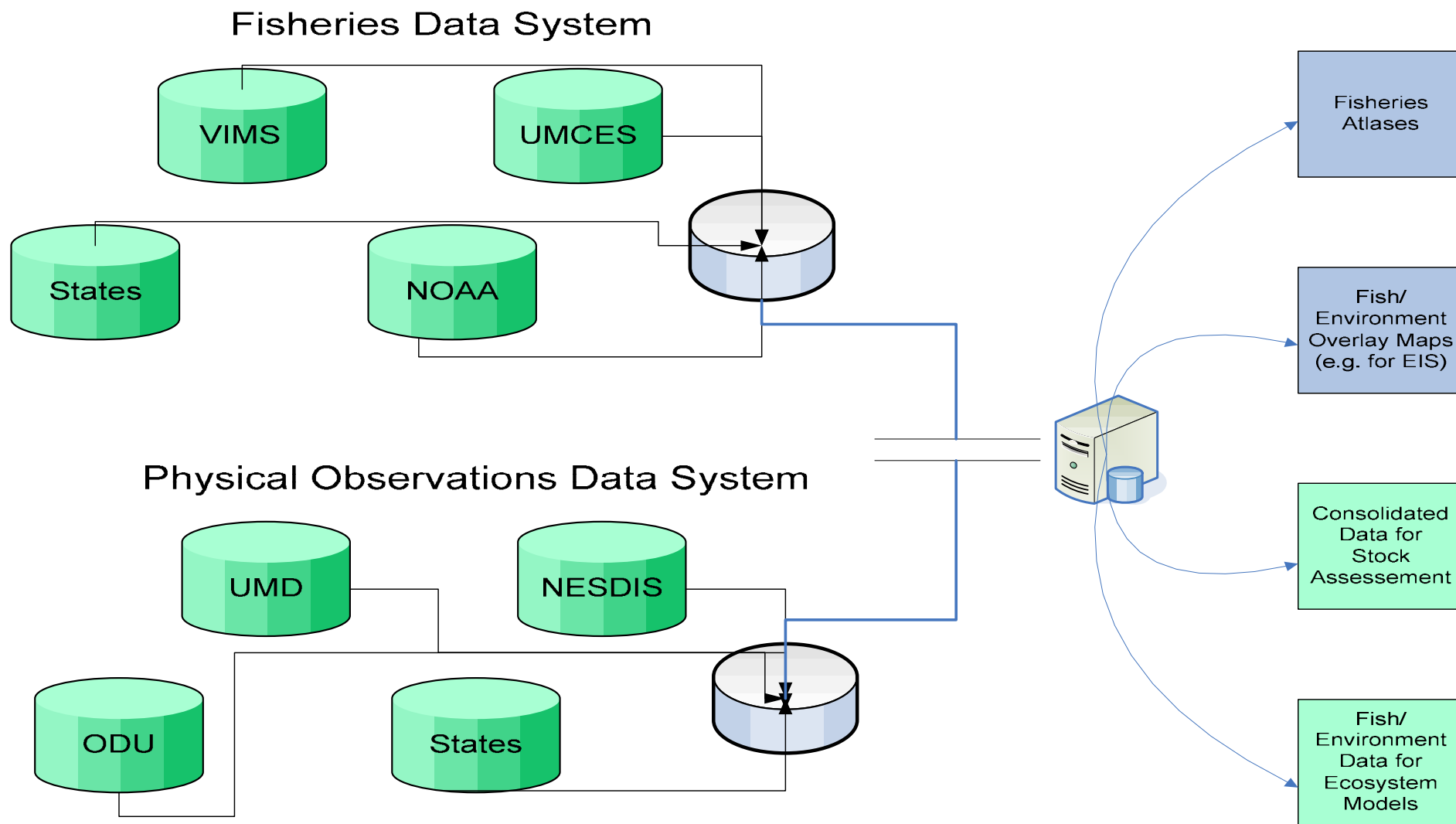
# Real timeline for completing analysis/modeling project



# Reasons we ought to be integrating data

- International Council for the Exploration of the Seas – “By maximizing the availability of data to the community at-large, ICES promotes the use of these data, thereby ensuring that their maximum value can be realized and thus contribute to an increased understanding of the marine environment.”
- National Research Council Report 2006 Dynamic Changes in Marine Ecosystems- “Fisheries data currently are fragmented and dispersed, thus slowing the use of these data in comprehensive analysis...Better data management is fundamental to implementing ecosystem-based management of fisheries.”
- NOAA- Key Science needs to support EAM - “Modeling, experimental ecology, and observation systems linked to support adaptive approaches to human uses of marine ecosystems consistent with goals of sustainable use”

# Chesapeake Bay Ecosystem Integrated Information Systems (CBEIIS) – Expediting Data delivery and Integration



# First steps towards expedited and integrated data delivery

- Chesapeake Bay Ecosystem Integrated Information Systems (CBEIIS) – Incorporating Oysters
  - Comprehensive Chesapeake Oyster Database
  - Oyster Data Tool

# Comprehensive Chesapeake Oyster Database (COD)

- Working with Versar, DNR, and VMRC, NCBO is developing improved methods for entering and integrating all facets of oyster data
  - Including harvest, disease, survey and restoration

**Maryland Department of Natural Resources**  
**Oyster Harvest Database**

Enter Shellfish Buy Ticket Data  
Enter Monthly Oyster Landings Data

Search for Oyster Bar Names  
Search for Watermen  
Search for Oyster Buyers

QAQC Data Entry  
View All Data in Table Format

Export Data to Master Database

Total Harvest By Year and

- By Month
- By NOAA Code
- By River System
- By Bar
- By Watermen
- By Watermen and Month
- By Waterman License Type
- By Gear Type
- By Buyer

**Maryland DNR Annual Fall Oyster Survey**

Sample Year: 2008 Date: 10/16/2008 Bar ID: BARBA0  
Bar Name: BIG ANNESSESSEX Bar Region: BIG ANNESSESSEX RIVER  
Sub Area Name of the Bar: Replicate: 1 Gear: Dredge Gear Area: 0.8362  
Bar Type: Nat Planting Seed (Year): Planting DSH (Year): Planting FSH (Year):  
Temperature (C): 22.7 Salinity (ppt): 19.8 Depth (ft): 15 Tow Distance (ft): 107  
Volume (bushels): 0.6 2.1 bushels = Full dredge Sub Sample Volume: 1/5 MD Bushel

	Market	Small	Spat	Total
Number of Live Oysters	0	6	44	50
Number of Dead Oysters				
Recent Box	0	0	0	
Old Box	0	6	2	
All Boxes	0	6	2	8
Observed Mortality	50.00	4.35	13.79	
Average Size	37.00	20.00		

Latitude Degrees: 38 mm.mmm 3.27 Decimal Degrees 38.0545  
Longitude Degrees: 75 mm.mmm 51.362 Decimal Degrees -75.86603333333333

☐ Check if a sample was taken for disease testing

Comments:

First Sample Next Sample Previous Sample Last Sample Add New Find Sample

Year	River	Area Planted (Acres)	New Area Planted (Acres)	# Spat Planted (millions)	# Tanks	Bushels of Shell Planted
2009	EASTERN BAY NORTH	33.0165102077	9.39	42.72	27	4320
2009	HONGA RIVER	13.33117294854	11.11767080964	20.66	18	2880
2009	HOOPER STRAITS	15.4412663812	8.22752172825	34.47	14	2240
2009	LOWER ANNE ARUNDEL SI	16.19660860754	8.12725581101	28.34	13	2080
2009	LOWER CHESTER RIVER	60.31075581751	20.48135481923	124.12	62	9920
2009	MAGOTHY RIVER	3.66436222487	0	4.33	4	640
2009	MANOKIN RIVER	7.6359337823	7.6359337823	10.24	7	1120
2009	MIDDLE CHOPTANK RIVER	85.5770438783	64.33129973746	105.37	67	10720
2009	NANTICOKE AND WICOMI	9.92466597949	9.92466597949	19.81	7	1120
2009	SERNY RIVER	4.80708012962	4.80708012962	18.17	9	1440
2009	SOUTH RIVER	3.67942271513	2.95	3.53	3	480
2009	TRED AVON RIVER	6.91895799554	6.91895799554	14.07	8	1280
2009	UPPER CHESTER RIVER	25.6610829703	6.8	45.94	23	3680
2009	UPPER CHOPTANK RIVER	66.9450966668	18.759058196	115.25	76	12160
2009	UPPER PATUXENT RIVER	23.630920262	14.7171596953	34.86	23	3680
2009	WICOMICO RIVER	3.99289960366	2.98	19.5	9	1440

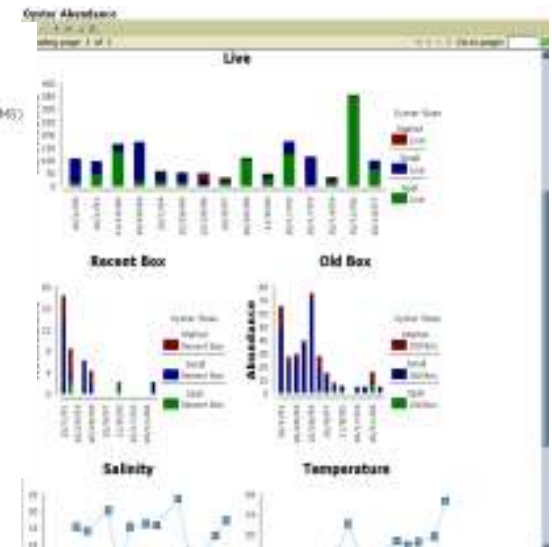
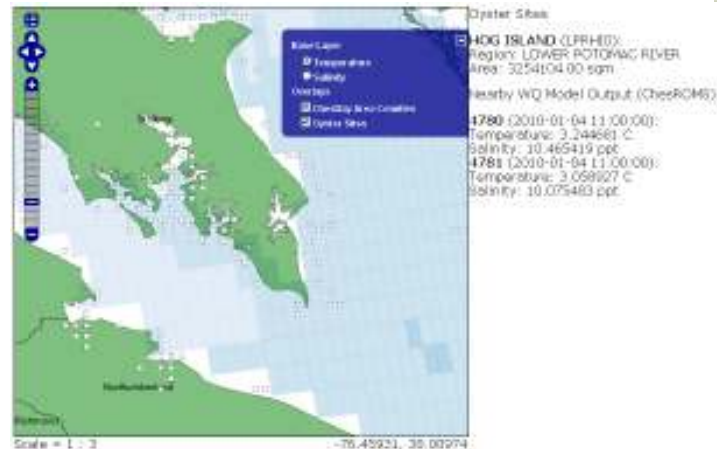


# COD Plans and Status

- A Master Database will house all data from individual databases
  - The Master Database structure is dependent upon individual database development – which is dependent on academic PIs and agency project leads
  - Each agency will have a master database with the agency's integrated individual databases.
  - Each project lead will have individual databases housed in their labs. The individual databases will feed into the Master database.
- Individual databases will be focused on surveys, harvest, disease monitoring, and restoration activities, individually.
  - Individual databases have convenient data entry forms and built in error checking for data entry.
  - Individual databases are able to generate some standardized reports for use by the PIs/
- The Master Database for data integrated across jurisdictions will be hosted by NOAA for incorporation into CBEIs . All PIs and agencies will have web-based, password-protected access.
  - Data QA/QC procedures will be developed for data transfers to the Master system
  - Custom queries will be developed for online data summary options
- Integration of geo-referenced oyster data enable spatial visualization of all facets of oyster management
  - Managers will be able to pull up information on disease, harvest, restoration, and mortality for a given bar at the click of a mouse.

# Chesapeake Bay Ecosystem Integrated Information System (CBEIIS) – Oyster Data Tool

- Working with Versar, NCBO has developed methods for integrating oyster data (and other living resource data) with water quality (physicochemical data) and displaying data on maps and generating reports. All this can be done from a web browser.
  - For example, the system will allow temperature, salinity, and bathymetry data to be overlaid on a map with restoration and disease data. This will help make decision on where to invest restoration funds



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 - NCBO with Versar

# CBEIIS Status

- Comprehensive COD data for Maryland has been brought into the system.
- Much of the data and modeled output on water quality/physico-chemical properties, bottom-mapping, bathymetry, have already been pulled together—Eyes on the Bay, CBOS. NCBO has integrated these data sets so that they will be accessible for CBEIIS
- Beta version of the oyster data reporting tool has been developed and a workshop for MD users and suppliers (November 30). A VA workshop will be scheduled once VA data in COD has been finalized.
- Integration of geo-referenced oyster data with other water quality /physico-chemical and habitat data will facilitate making connections between water quality, habitat, and living resources.
  - It will facilitate science-grounding of ecosystem-based management, with at-a-glance environmental info.
  - It will facilitate research and understanding. Scientists and managers will be able to spend more time on analysis and modeling and less time on searching for data and integrating it.

# CBEIS-COD Next Steps

- CBEIS-Oyster Data Tool workshops for beta version of the tool.
- Revise tool based on suggestions by beta testers.
- Incorporate VA Oyster data into data reporting tool
- Work with partners to ensure future data will be uploaded to COD and new data structures can be incorporated as necessary.
- Make tool accessible (via the web) to all partners with password protection
- Begin incorporating data for other living resources from existing and new monitoring programs (e.g., zooplankton, blue crab).