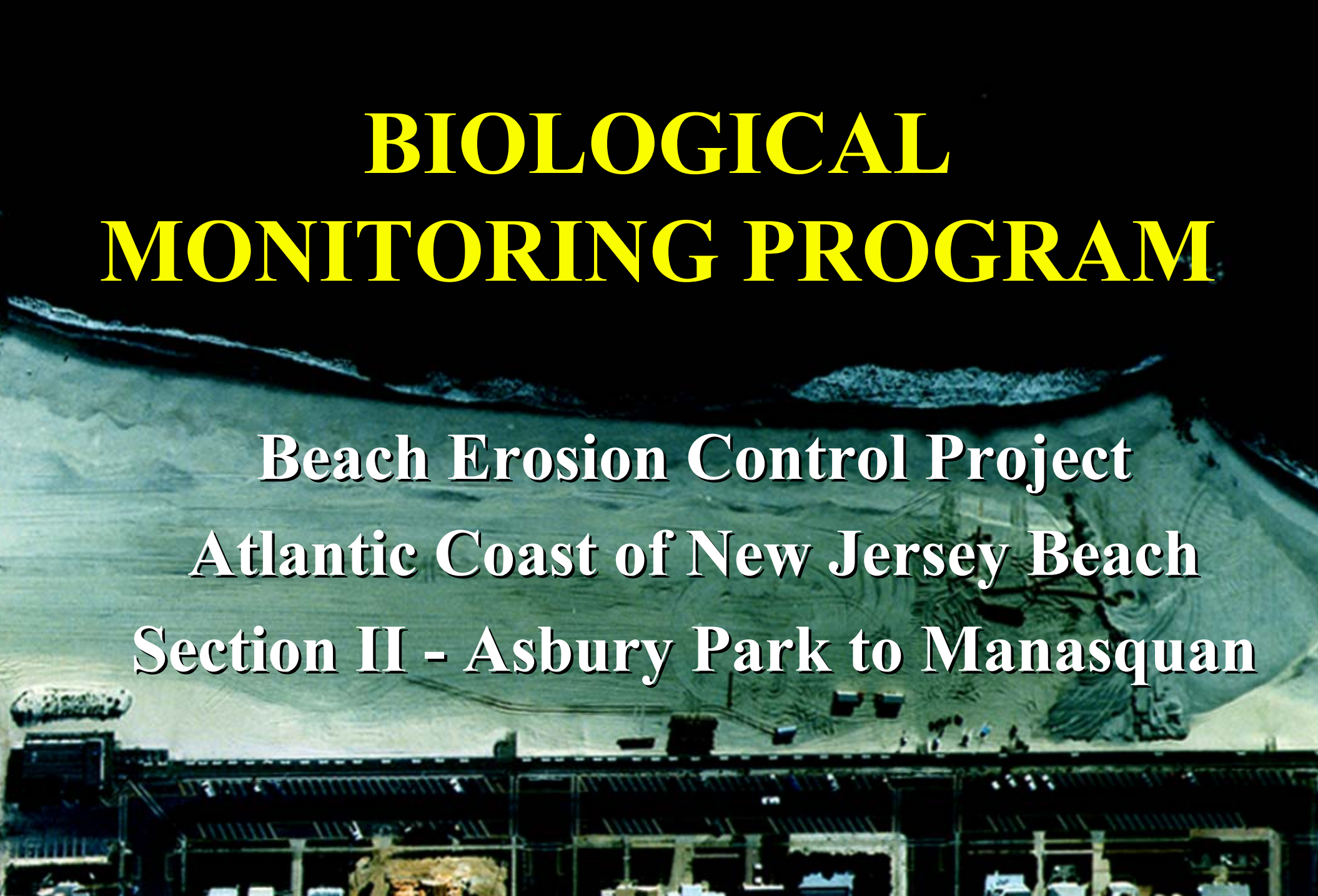
BIOLOGICAL MONITORING PROGRAM



Beach Erosion Control Project
Atlantic Coast of New Jersey Beach
Section II - Asbury Park to Manasquan

Rationale for Study

- Largest nourishment (in terms of volume) to date
- No published data on beach nourishment impacts in Northeast region
- Previous studies primarily from Southeast Atlantic and Gulf of Mexico and many do not note effect size
- Very little background data on surf zone fauna in northern New Jersey

Rationale for Study

- Little direct information on connections between impacts to forage base (intertidal benthos) and surf zone fish
- No information on habitat value of surf zone for larval fish
- No information on turbidity/suspended solids plume associated with placement
- Little long-term data on impacts to borrow areas

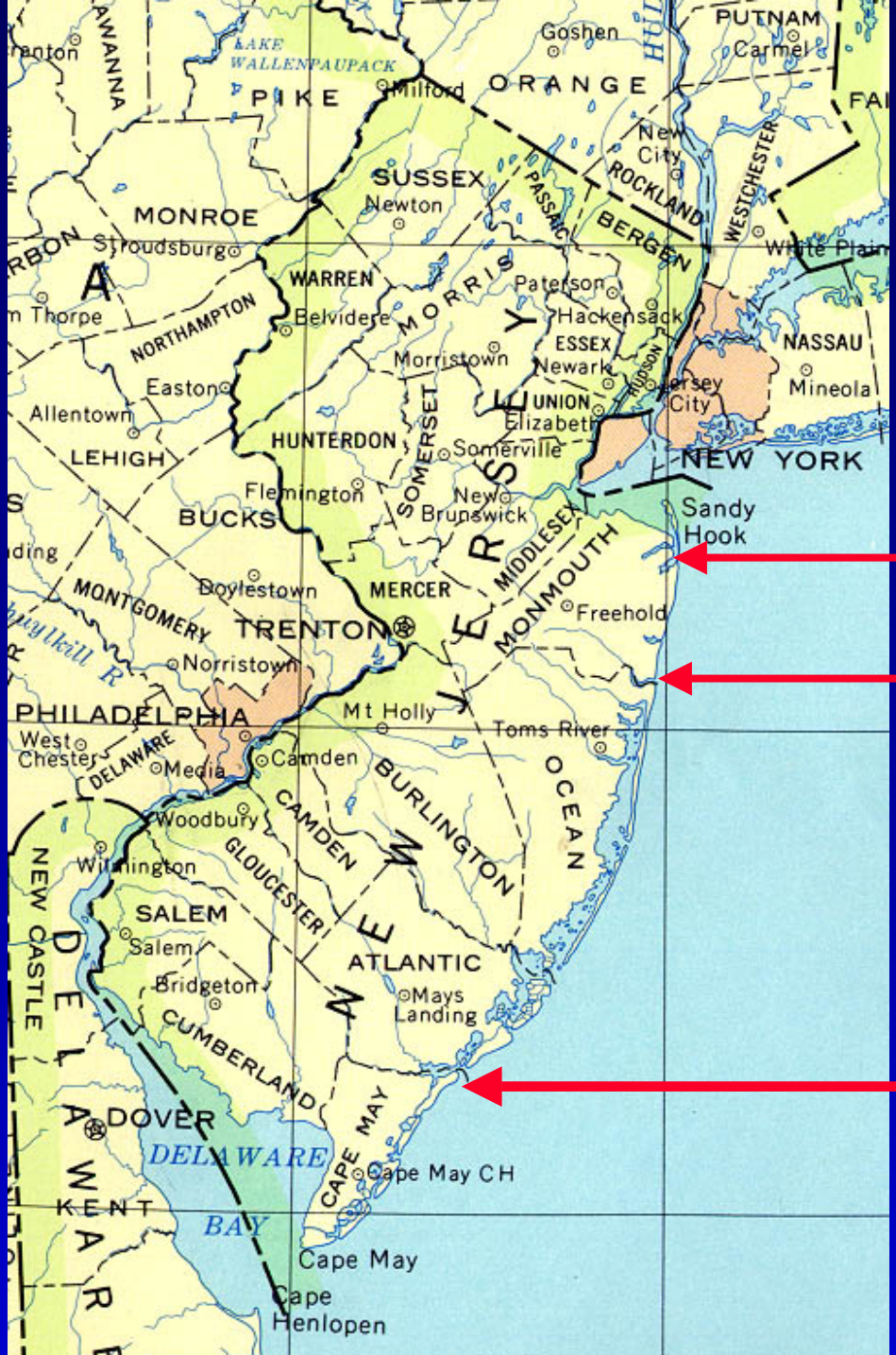
Study Goals

- Technical Goal: To detect changes in the physical environment that result from nourishment operations and relate observed changes to populations of offshore, nearshore, intertidal and surf zone fauna.

- Program Goal: Apply the results of these studies to future nourishment projects, to strike an effective balance between shoreline and biological resource protection.

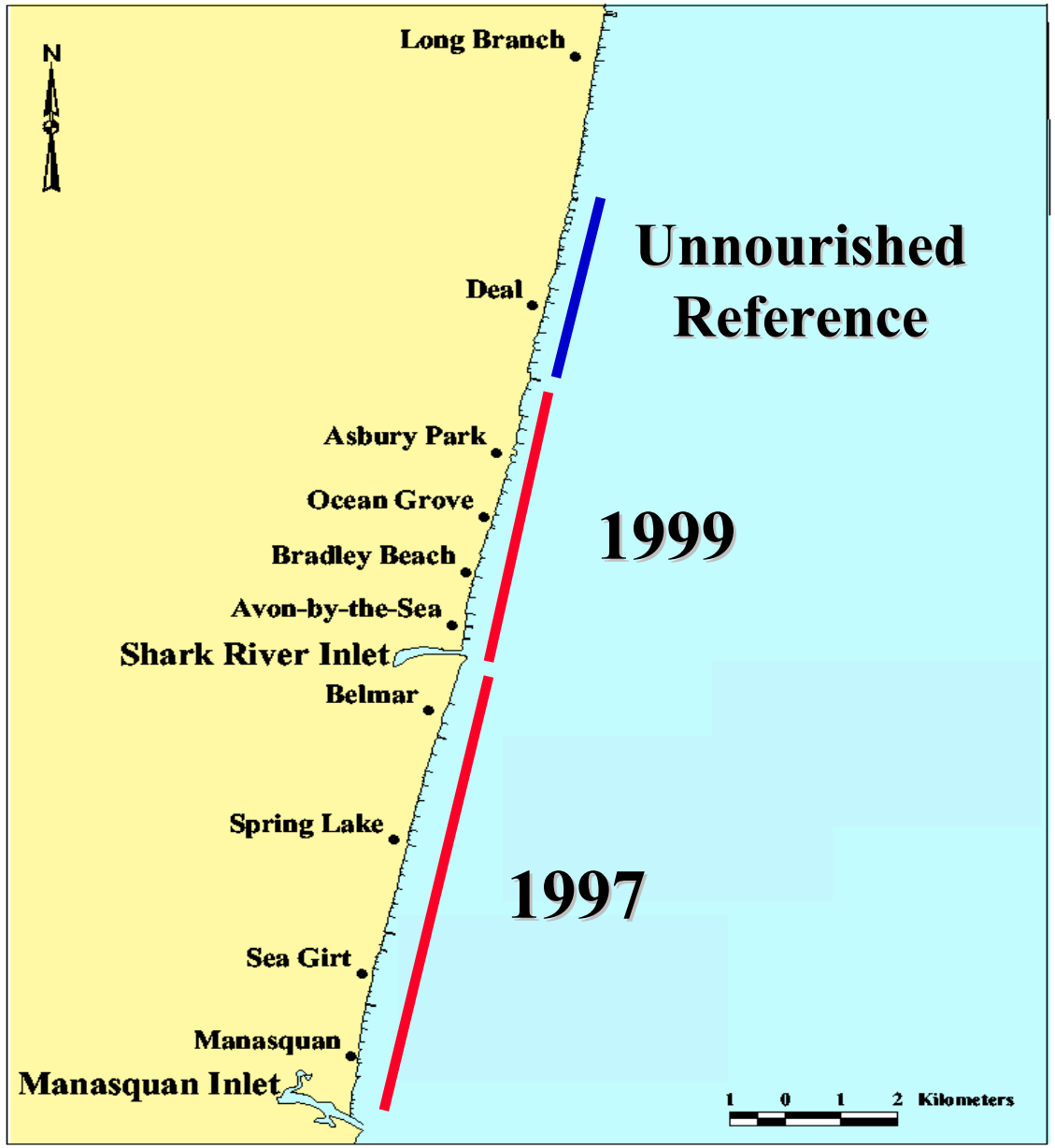
Cooperating & Participating Agencies

Scoping Process	Study Partner
CENAN	CENAN
CEERD	CEERD
USFWS	USFWS
NJDEP	NJDEP
NMFS	Rutgers Univ.
USEPA	

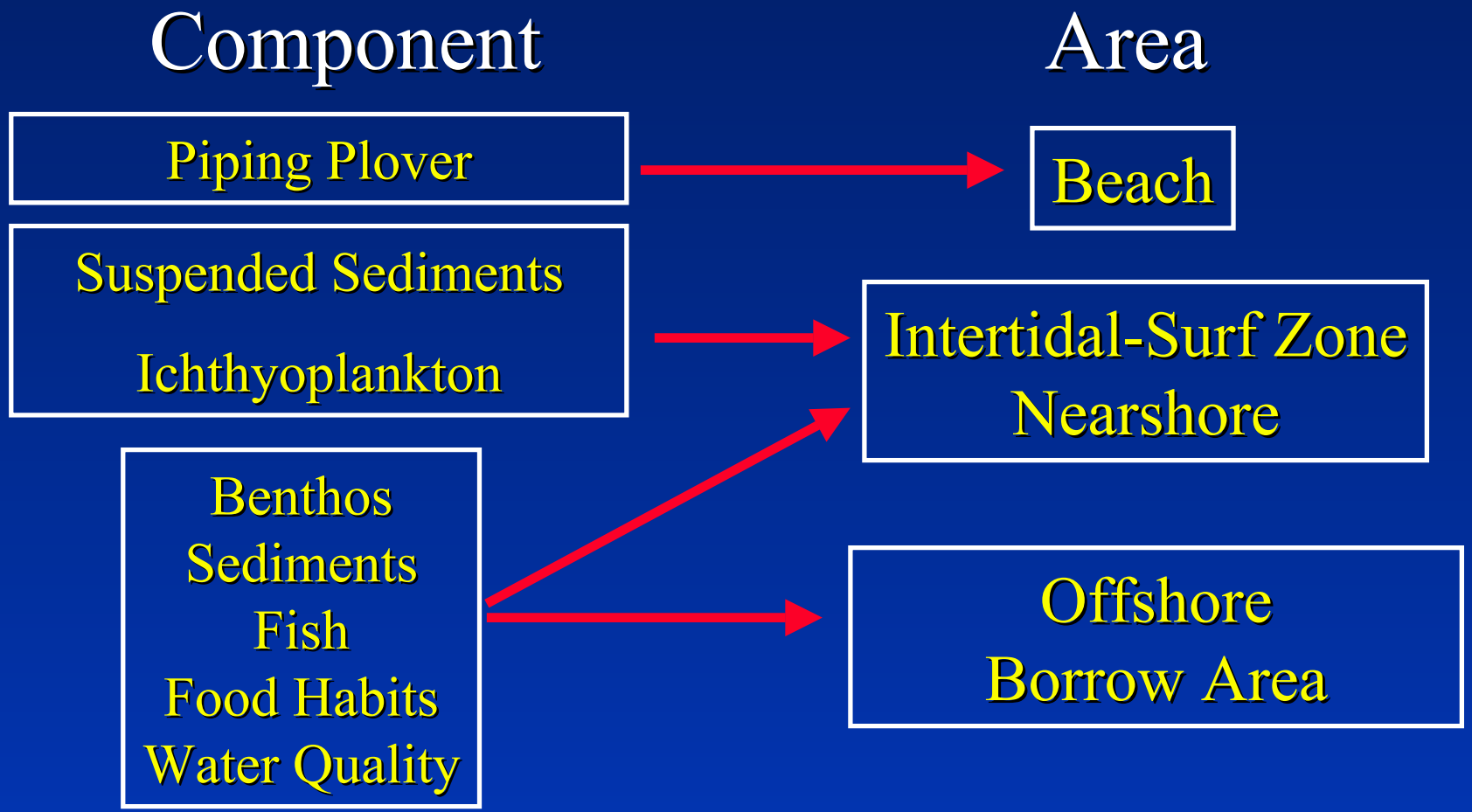

Project Area
Avalon, NJ
PUTNAM
Carmel
Goshen
ORANGE
PIKE
Milford
LAKE WALLENPAUPACK
SUSSEX
Newton
MONROE
Stroudsburg
WARREN
Belvidere
NORTHAMPTON
Easton
Allentown
LEHIGH
HUNTERDON
Flemington
BUCKS
Doylestown
MONTGOMERY
Norristown
PHILADELPHIA
West Chester
DELAWARE
Media
MORRIS
Morristown
Paterson
Hackensack
ESSEX
Newark
UNION
Elizabeth
SOMERSET
Somerville
New Brunswick
MIDDLESEX
MERCER
TRENTON
Mt Holly
Camden
Woodbury
Wilmington
GLOUCESTER
CAMDEN
BURLINGTON
Toms River
OCEAN
MONMOUTH
Freehold
Sandy Hook
NEW YORK
Jersey City
HUDSON
NASSAU
Mineola
White Plains
WESTCHESTER
ROCKLAND
BERGEN
PASSAIC
New City
SALEM
Salem
Bridgeton
ATLANTIC
Mays Landing
CUMBERLAND
CAPE MAY
Cape May CH
Cape May
Cape Henlopen
DELAWARE BAY
DOVER
KENT
NEW CASTLE

Project Area

- Total 47 km of beach
- 19.4 mil. m^3 sand
- BMP 15.9 km
- 6.2 million m^3 sand
- Placement
  - 1997
  - 1999



Monitoring Components



Monitoring Strategy

Schedule

- 1+Yr Pilot Study
- 3 Yrs Pre-Construction
- 2 Yrs Intensive During-Construction
  - 1997
  - 1999
- 2+Yrs Post-Construction

Frequency

- Benthos & Sediments
  - Spring & Fall
  - Monthly During Construction (1997 & 1999)
    - Intertidal (MLW) only
- Fish, Fish Feeding Habits, Water Quality
  - Bimonthly -Summer
- Ichthyoplankton
  - Monthly – Spring to Summer

Intertidal and Nearshore Benthos

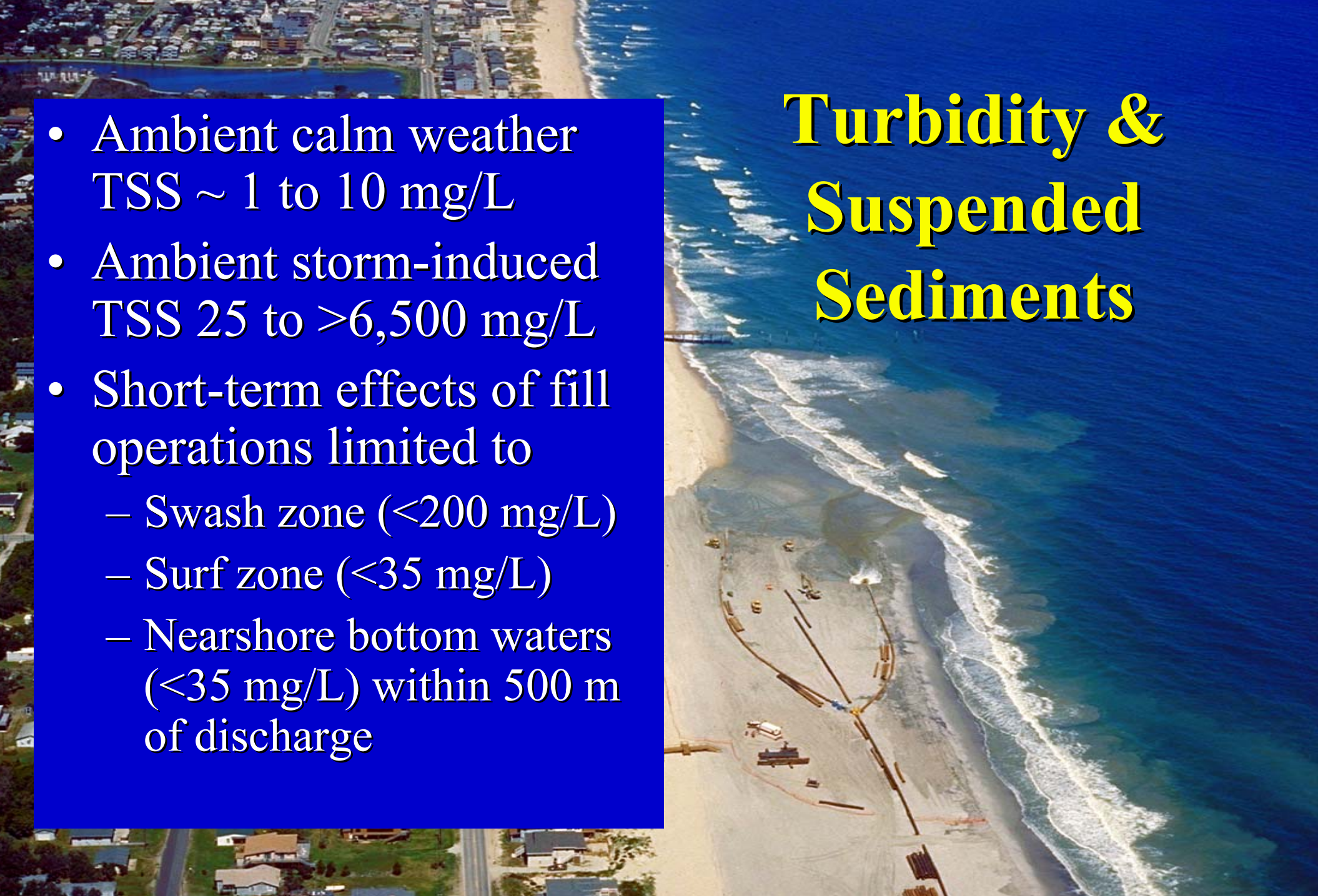
- Benthos similar to other Atlantic sandy beaches
- Intertidal recovery within 2-6.5 mo.
- No long-term impacts to intertidal benthos

- No impacts to nearshore in 1997
- Short-term impacts in 1999
- No long-term impacts to nearshore benthos

Benthic Recovery Rates

• Gorzelany & Nelson	FL	<1 mo.
• Saloman & Naughton	FL	2 mo.
• Van Dolah et al.	SC	2 - 3 mo.
• Jutte et al.	SC	6 mo.
• Present Study	NJ	2 - 6.5 mo.
• Reilly & Bellis	NC	>12 mo. sc
• Rakocinski et al.	FL	>12 mo. sc

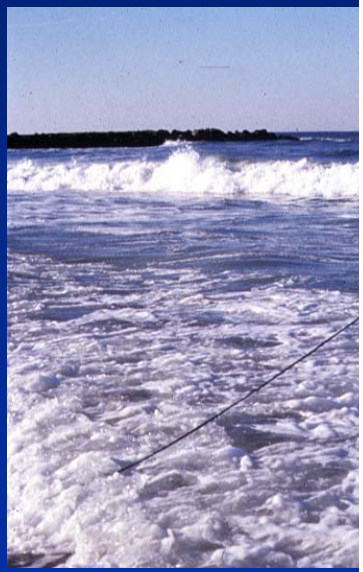
sc = Substantial Silts & Clays present

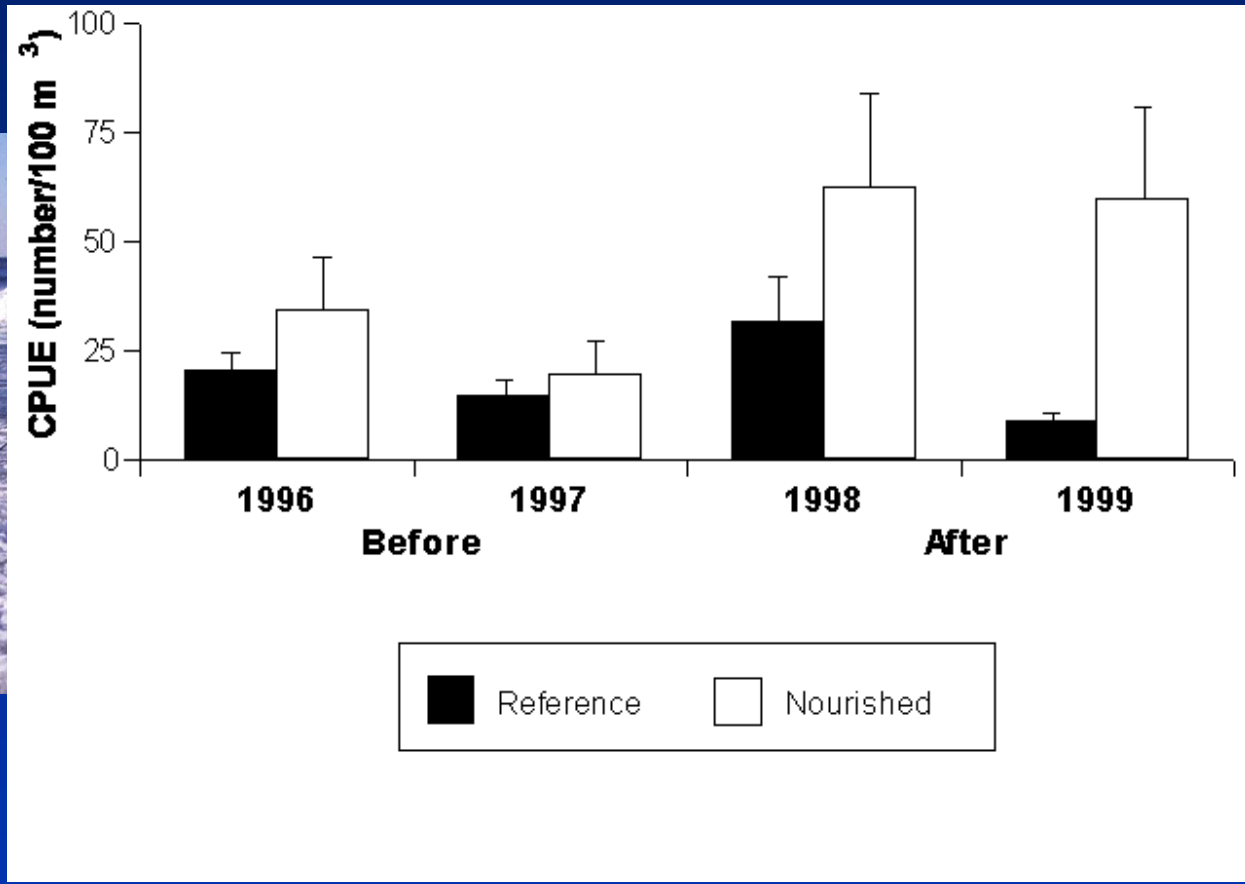


Turbidity & Suspended Sediments

- Ambient calm weather TSS ~ 1 to 10 mg/L
- Ambient storm-induced TSS 25 to >6,500 mg/L
- Short-term effects of fill operations limited to
  - Swash zone (<200 mg/L)
  - Surf zone (<35 mg/L)
  - Nearshore bottom waters (<35 mg/L) within 500 m of discharge

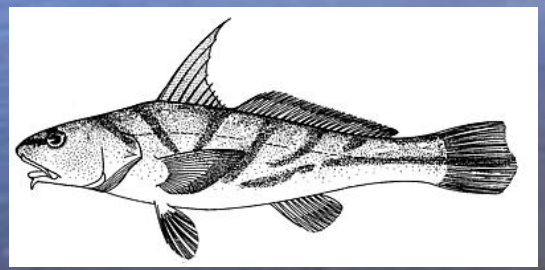
Ichthyoplankton (Larval Fish)

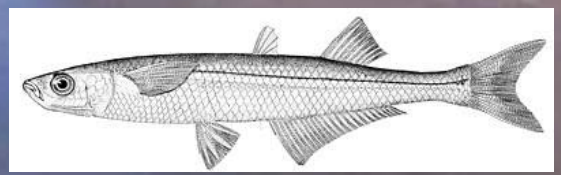


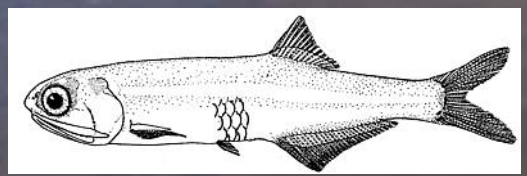


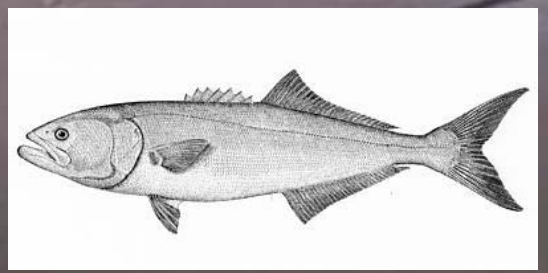
Surf Zone Fish Assemblages

- 300,000 fish collected
- Dominated by silversides, bluefish, and anchovies
- Higher diversity and abundance near groins



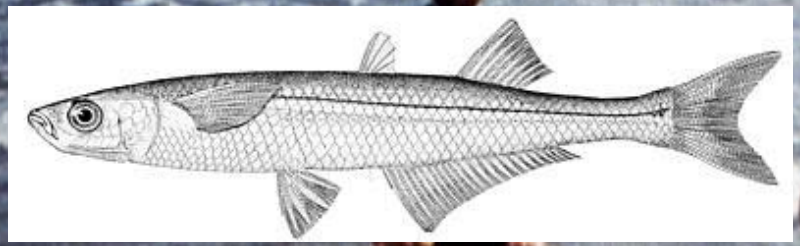


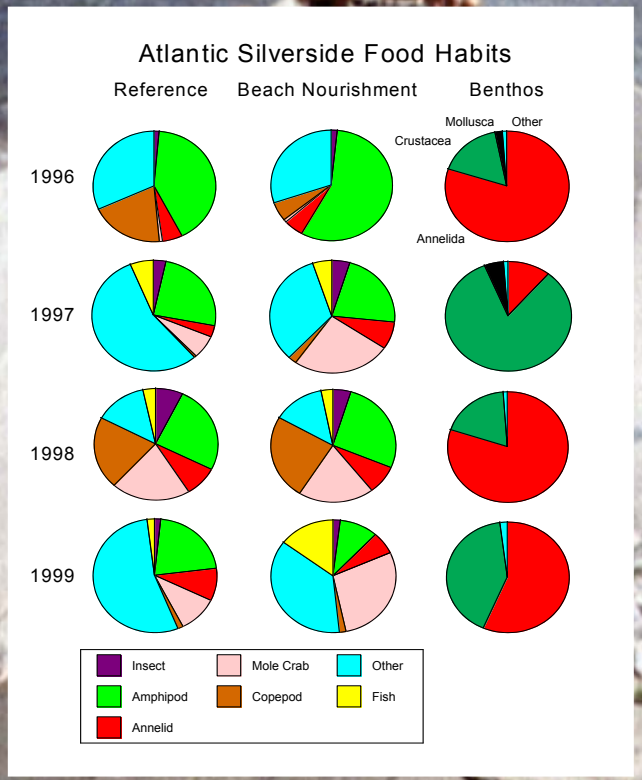




Surf Zone Finfish Seine Data

- Low juvenile bluefish abundance near active renourishment
- Increased abundance of northern kingfish near active renourishment
- No mortality or morbidity detected
- No major post-construction impacts detected





- **No changes in types or proportions of prey eaten**
- **No change in feeding success**

Surf Zone Fish Feeding Habits

Offshore Sediments and Benthos

- **Community typical of mid-Atlantic medium sands**
- **Diversity and abundance recovered in 8 months**
- **Biomass required 2-2.5 yrs (after 1997) for recovery**
- **Biomass impact due mostly to Sand Dollar size**
- **Recovery trend in 1999 similar to 1997**

Offshore Borrow Area Finfish Data



- Typical inshore shelf assemblage
- Seasonally and annually variable
- No obvious dredging-related changes



Finfish Feeding Habits

Summer Flounder

Winter Flounder

Offshore Borrow Area Finfish Feeding Habits

- Importance of anemones in winter flounder diets indicates these fish were not reliant on borrow area for trophic support
- Summer flounder diet primarily nektonic (Crabs & Shrimp)
- No major changes in diets after dredging

Project Summary

- No long-term impact to intertidal or nearshore infauna and sediments; recovery from short-term impacts in 2-6.5 months
- No obvious impacts to ichthyoplankton
- Limited turbidity/TSS plume
- Limited effects on surf zone fish assemblage
- No impacts to surf zone fish feeding habits

Project Summary

- Borrow area infaunal recovery takes 2-2.5 years with most of impact on abundance and size structure of sand dollar populations
- No impacts to offshore borrow area fish assemblages
- No detectable shifts in finfish food habits

Technology Transfer

- Scientific/Technical Meetings
  - Estuarine Research Federation
  - American Fisheries Society
- Scientific/Technical Publications
  - Estuarine, Coastal & Shelf Science (2)
  - Marine Ecology Progress Series (1)
  - J. Coastal Research (1)

Technology Transfer

- Management Meetings
  - NC Beach Preserv. Soc.
  - FL Beach Preserv. Soc.
  - CA Beach Preserv. Soc.
  - National Beach Preserv. Soc.
- Inter-Agency Meetings
  - USFWS Workshop
  - MMS Annual Meeting
  - NC (CESAW)
  - MA (CENAE)
- Public Information
  - Annual Spring Lake Meetings
  - Posters
- Internet
  - CENAN
  - HQ

RECOMMENDATIONS

- Apply results to similar projects
- Clearinghouse for study results
- Apply lessons learned from coastal processes monitoring
- Monitor sediment plumes
- Tie forage base with actual utilization
- Limited long-term monitoring

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