



CAPE COASTAL CONFERENCE

*Linking Science with Local
Solutions and Decision-Making*

State of Cape Cod Ponds and Lakes

Ed Eichner

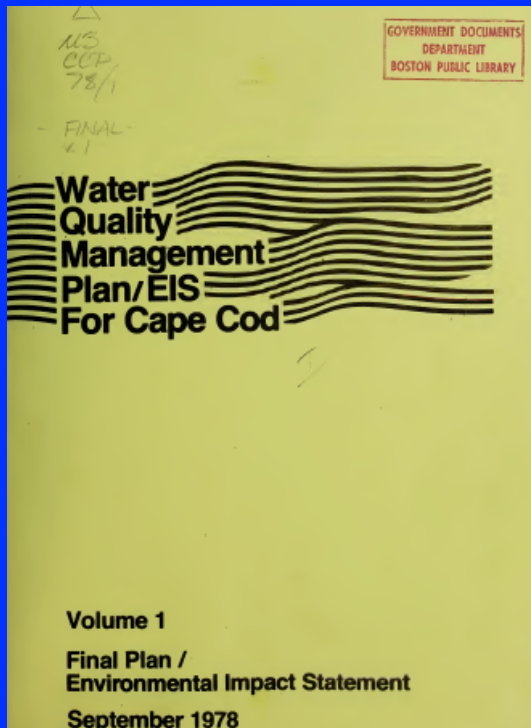
Coastal Systems Program

School for Marine Science and

Technology

University of Massachusetts Dartmouth

1978 – REGIONAL WATER QUALITY PLAN



RESULT:

~90% of wastewater treated by septic systems and adoption of 1 acre zoning

208 Plan for Cape Cod Recommends:

- 1) Rely on septic systems
- 2) Limit sewerage ("Decentralized approach of avoiding future sewer needs is compatible with the area's economic, social and political structure.")
- 3) Towns retain authority for comprehensive wastewater planning
- 4) CCPEDC responsible for regional water quality planning & monitoring
- 5) Monitor of ponds, lakes, and estuaries with review every 5 years
- 6) Limit density to protect drinking water quality; federal \$ provided for contributing area modeling/nitrogen loading

1990 - CAPE COD COMMISSION CREATED

Regional Policy Plan Water Goal:

Maintain the overall quality and quantity of Cape Cod's groundwater to ensure a sustainable supply of high quality untreated drinking water and to preserve and improve the ecological integrity of marine and fresh water surface bodies.

Five year review and revision required



2000 - Massachusetts Estuaries Project

This project will provide water quality, nutrient loading, and hydrodynamic information for 89 estuaries in Southeastern Massachusetts. This information will be combined through the use of a linked watershed/estuary model that will predict the water quality changes that will result from land use management decisions.

Estimated cost for project: \$12 million

Coordination and funding among:

UMASS-Dartmouth, School of Marine Science and Technology
Department of Environmental Protection

Regional Planning Agencies: CCC, MVC, SRPEDD, NPEDC
US Geological Survey

Towns

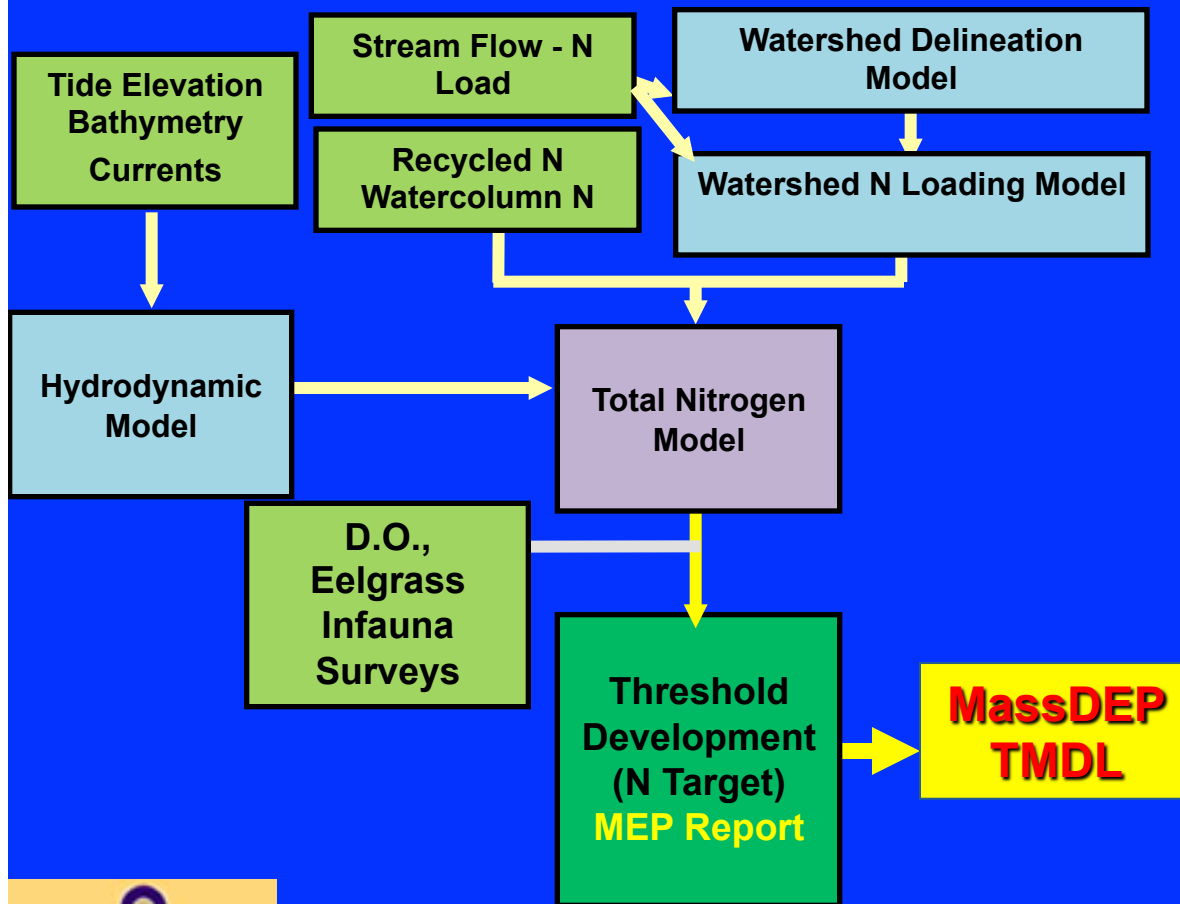
Citizen volunteers collecting monitoring data



QAPP approved by state and EPA

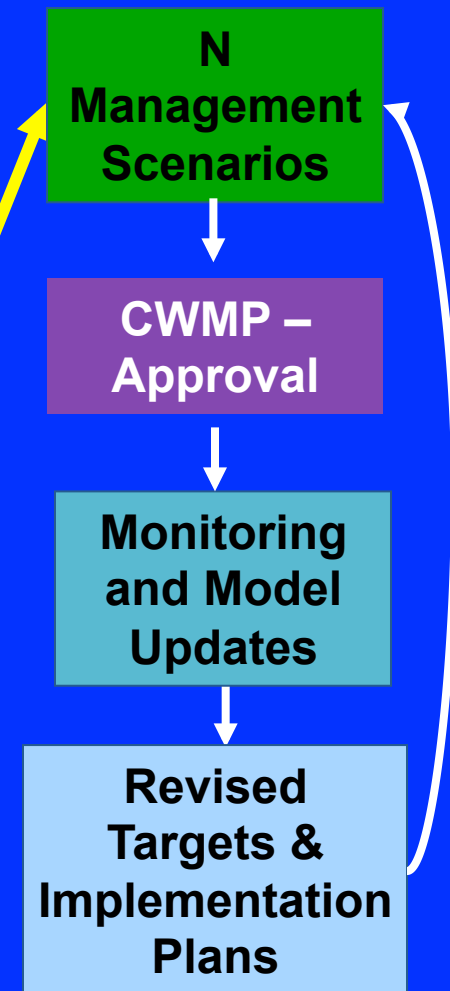
Linked Watershed-Embayment Approach

MEP Assessment and TMDL



Implementation

(20-30 yr phased process)



2000 - Pond and Lake Stewards (PALS)



Concerns:

1. Pond water quality worsening
2. Need coordinated regional effort to address
3. Needs to be part of comprehensive water quality management
4. Actively involve citizens



COMMUNITY FOUNDATION OF CAPE COD



Compact for Cape Cod
Conservation Trusts





What's Next for PALS?



1st Ponds in Peril

Overflow crowd of concerned citizens

Start of citizen monitoring for freshwater ponds

- Secchi Disk give away and Dip In: summer 2000
- partnered with SMAST to evaluate monitoring program





PALS Snapshots

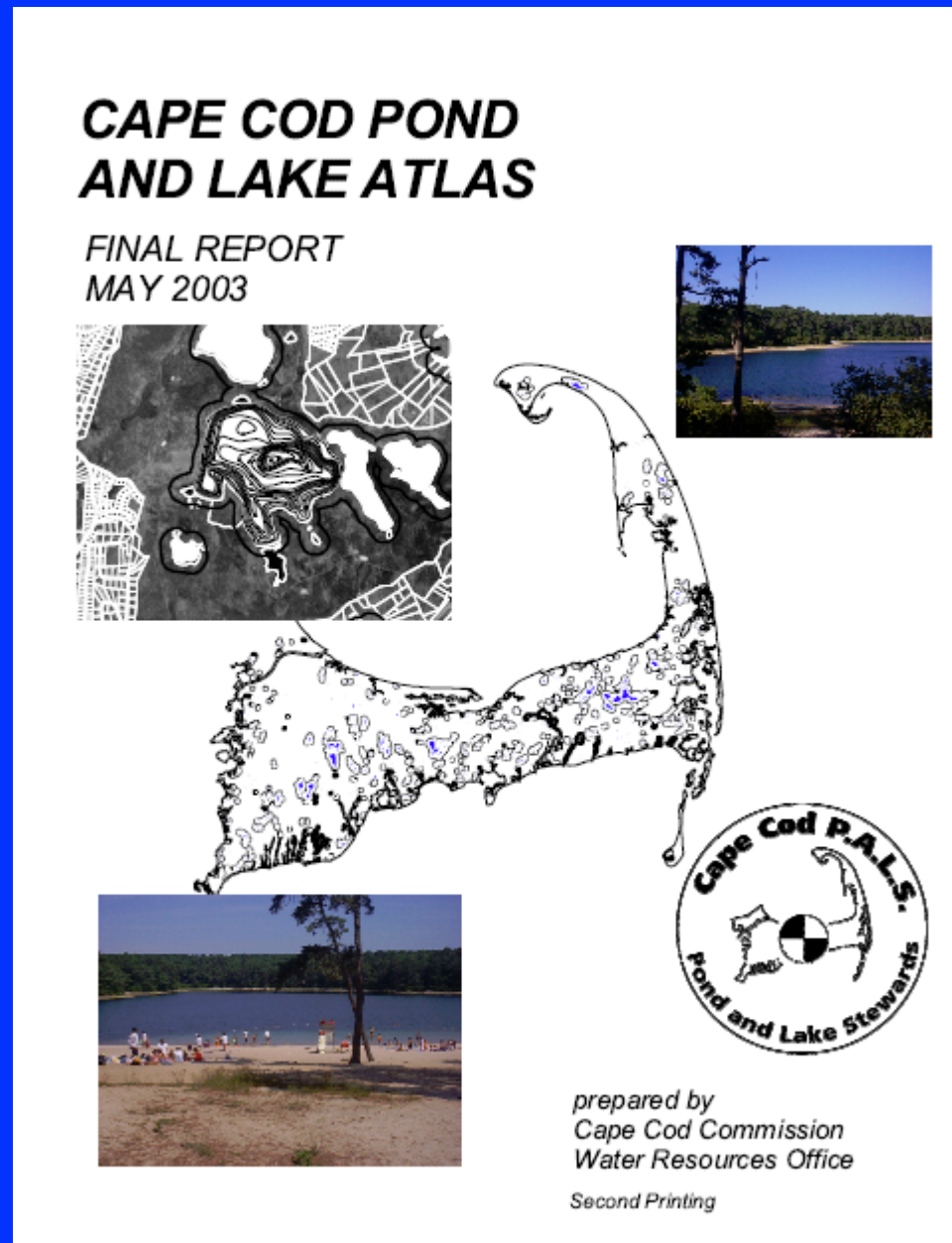


- 1st PALS Snapshot in 2001
- SMAST donated lab services
- 196 ponds sampled in the first year
- consistent depth-dependent sampling protocol
- August 15 – September 30



Cape Cod Pond Atlas 2003

- 1st identification of all ponds on Cape Cod
- Review and summary of 2001 PALS Snapshot data
- Development of proposed Cape-specific nutrient limits





Town Sampling

2002 - present



- Selected towns developed citizen monitoring programs
- Sampled ponds over whole summer using PALS protocol
- funding from towns and regional grants





Town-wide Data Review



- 2003 Chatham reviews two years of data for CWMP effort
- 2005-2009 Citizens/Towns lobby county to have CCC review collected pond water quality data:

Brewster Orleans Harwich Dennis Eastham

- 2007-2008 Barnstable contracted with CCC to organize and review all existing pond data



Individual Pond Assessments



- 1979 Barnstable: Red Lilly
- 1980 Mashpee: Johns
- 1987 Eastham: Great
- 1989 Barnstable: Wequaquet, Long
- 1989 Falmouth/Mashpee: Ashumet
- 1991 Eastham: Herring
- 1993 Barnstable: Hamblin, Shallow
- 1993 Brewster: Sheep
- 1997 Barnstable: Lovell's
- 1999 Harwich/Brewster: Long
- 2000 Orleans: Crystal
- 2000 Falmouth/Mashpee: Ashumet
- 2001 Harwich/Brewster: Long
- 2001 Orleans: Baker
- 2006 Barnstable: Mystic, Middle, Hamblin
- 2008 Chatham: Stillwater, Lovers
- 2009 Barnstable: Wequaquet
- 2010 Mashpee: Santuit
- 2012 Harwich: Hinckleys
- 2012 Dennis: Scargo



Lessons Learned Pond Assessments



- A. Development of successful management strategies often require development of additional refined data about the pond
- B. Holistic assessments/management strategies are needed
- C. Education about pond ecosystems, functions, and management strategies is an on-going need
- D. Advocates are needed to address pond water quality



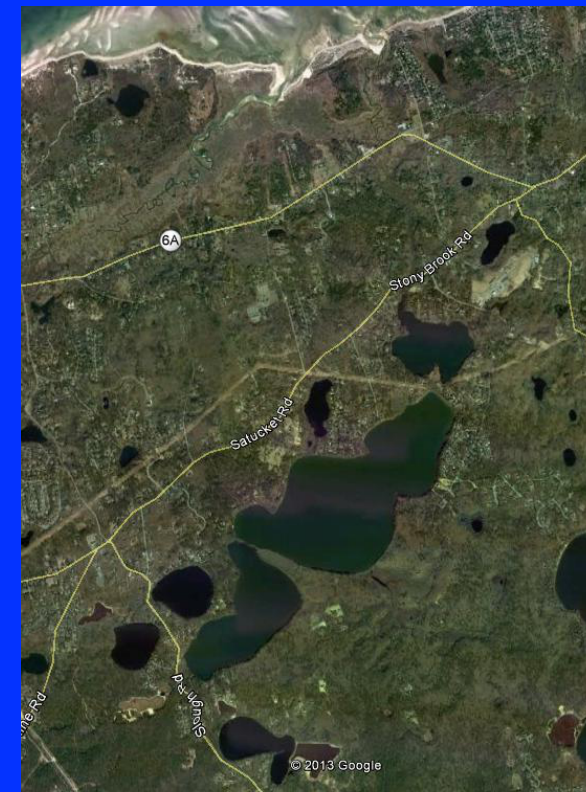
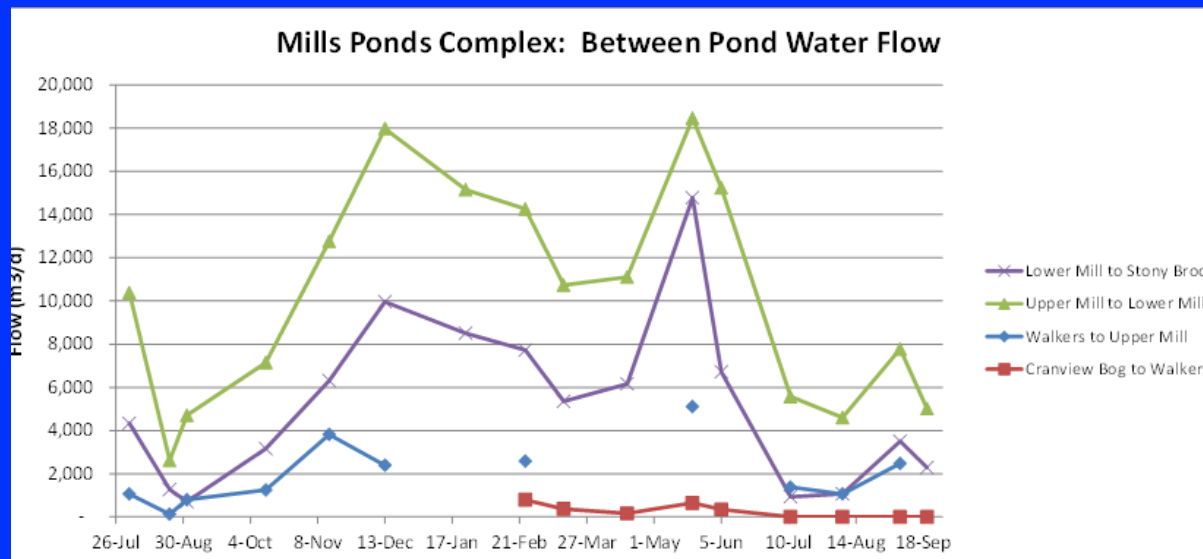
Lessons Learned Pond Assessments



A. Development of successful management strategies often require development of additional refined data

Mills Ponds Complex in Brewster

Measurement of hydroconnections showed that most of upper watershed input moves through connections except for transfer to Stony Brook





Lessons Learned Pond Assessments



B. Holistic assessments/management strategies are needed

Mystic Lake in Barnstable: significantly impaired; only 22% of the water column clear; high hypolimnetic oxygen demand; TP in surface waters 16 ppb

2007 - Alum treatment proposed and rejected by regulators based on concern that alum would harm protected mussel species by reducing food sources

2009 – Blue-green algal bloom/rise of anoxia into mussel habitat results in killing of 94% of the protected mussels





Lessons Learned Pond Assessments



C. Education about pond ecosystems, functions, and management strategies is an on-going need

- Ponds in Peril meetings
- PALS Snapshots
- Regular review of volunteer data

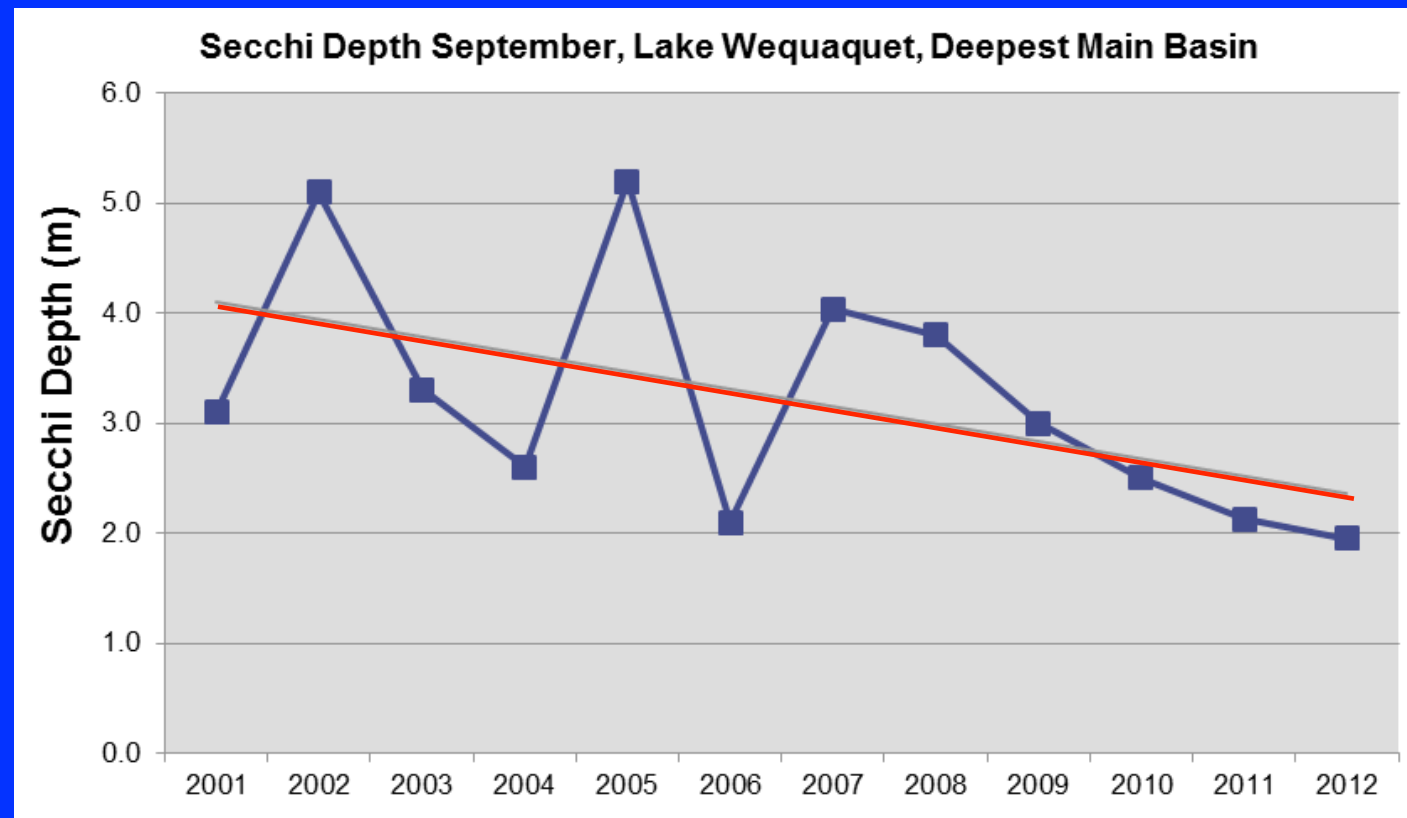




Lessons Learned Pond Assessments



- Regular review of volunteer data
- Statistically significant ($p < 0.05$) decreasing trend
- Trend = -0.6 ft every year





Lessons Learned Pond Assessments



D. Advocates are needed to address pond water quality

State regulations specify requirements for pond water quality

Federal law specifies actions for impaired waters

County laws and regulations include responsibilities for pond water quality

- Barnstable: Wequaquet Lake Protective Association
- Barnstable: Indian Ponds Association
- Barnstable: Red Lilly Pond Association
- Falmouth/Mashpee: Ashumet Pond Citizens Committee
- Harwich/Brewster: Long Pond Advisory Committee
- Harwich: Harwich Water Quality Task Force
- Mashpee: Friends of Santuit Pond
- Orleans: Orleans Pond Coalition



Pond Management Implemented

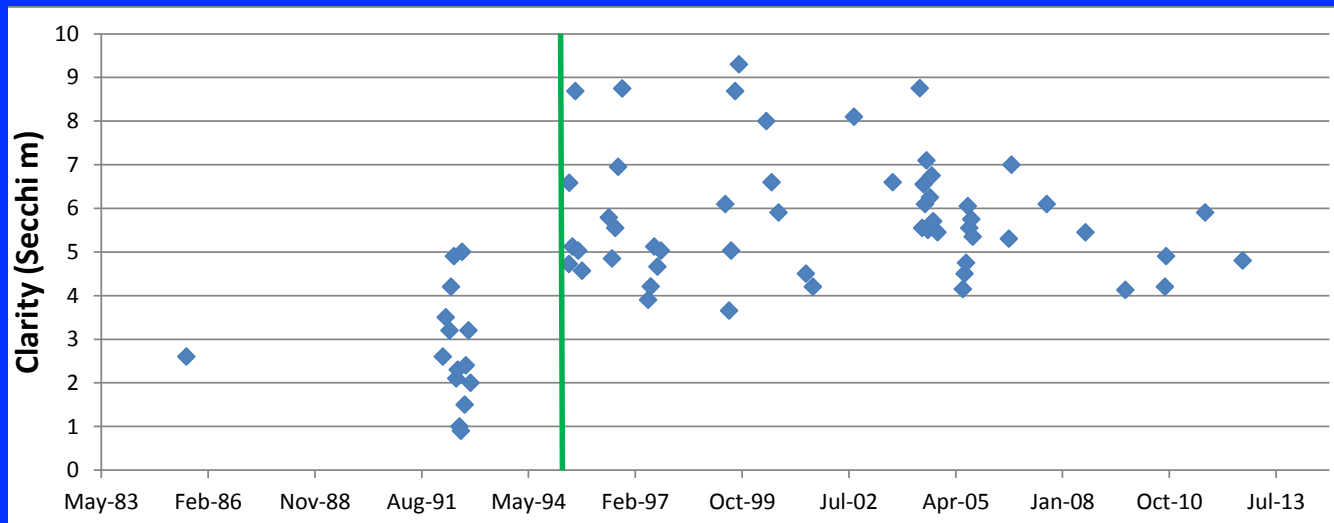
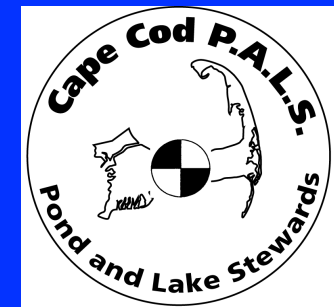


- 1995 Barnstable: Hamblin: Alum Treatment
- 2001 Falmouth/Mashpee: Ashumet: Alum Treatment
- 2004 Falmouth/Mashpee: Ashumet: Iron Barrier
- 2007 Harwich/Brewster: Long: Alum Treatment
- 2010 Chatham: Stillwater, Lovers: Alum Treatments
- 2010 Barnstable: Mystic: Alum Treatment
- 2010 Falmouth/Mashpee: Ashumet: Alum Treatment
- 2012 Eastham: Herring: Alum Treatment
- 2012 Mashpee: Santuit: Whole Lake Circulators

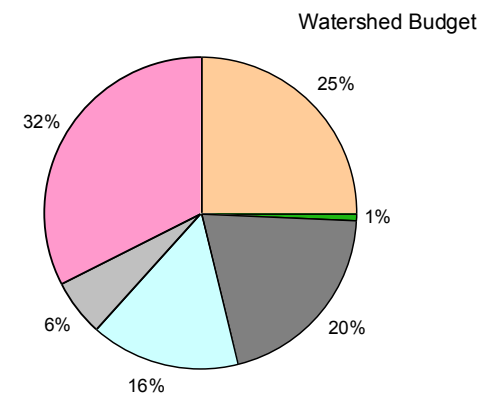
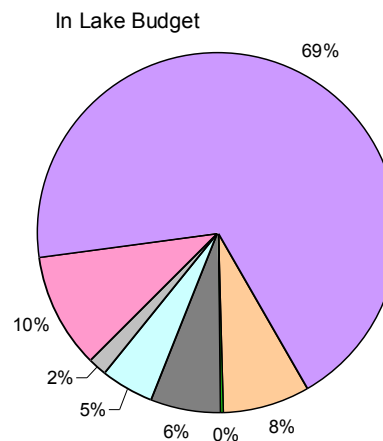
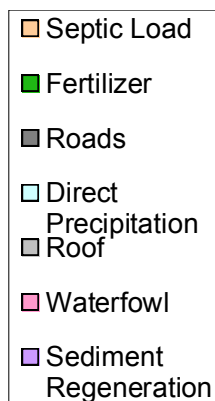


Alum Treatments

1995 Barnstable: Hamblin Pond



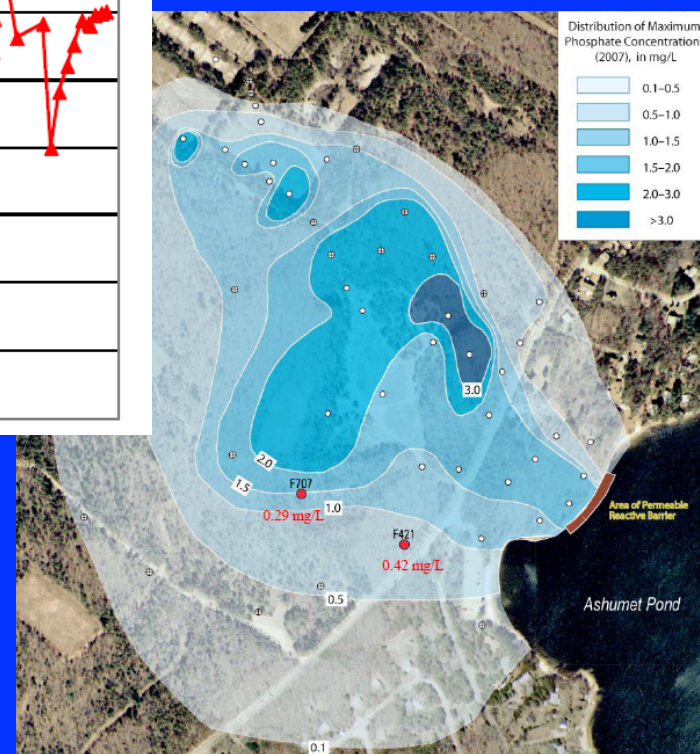
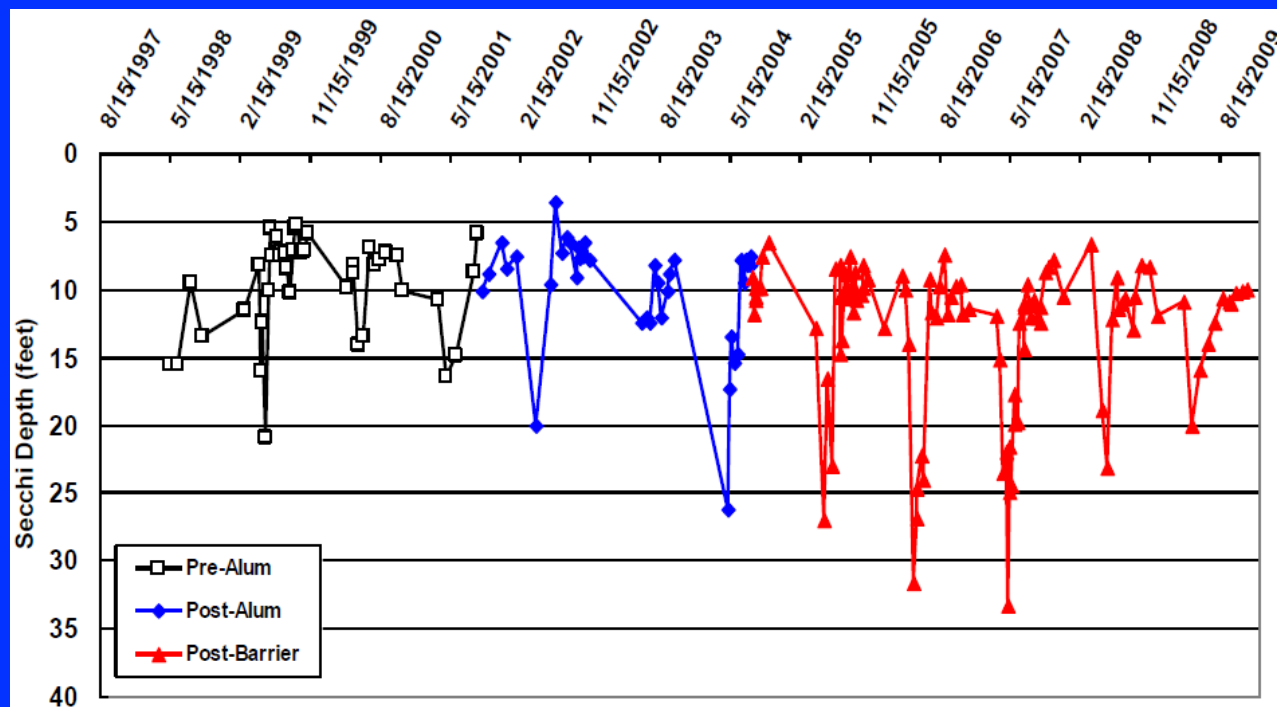
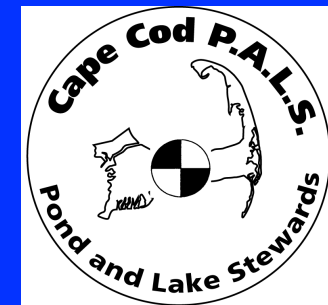
Hamblin Pond





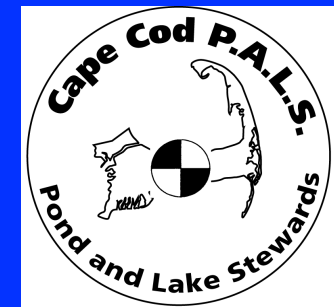
Alum Treatments

2001 Falmouth/Mashpee: Ashumet Pond





Implementation and Assessment: Lessons Learned



Town	#	Area >10 ac	Ponds Assessed	Ponds Mgmt Implemented	PALS Ponds Monitored
Barnstable	184	27	7	2	34
Bourne	73	7			4
Brewster	76	22	2	1	29
Chatham	44	7	2	2	17
Dennis	57	6	1		11
Eastham	23	5	2	1	11
Falmouth	142	23			7
Harwich	63	20	1		12
Mashpee	56	9	2	2	19
Orleans	63	4	2		16
Provincetown	31	3			6
Sandwich	63	10			3
Truro	20	4			7
Wellfleet	29	8			15
Yarmouth	70	10			13
TOTAL	994	165	19	8	204
GREAT PONDS		100%	12%	5%	
ALL PONDS	100%	17%	2%	1%	21%

- Internal nutrient loading from pond sediments appears to be a consistent problem
- Watersheds changes are generally not pursued
- 89% of 19 assessed ponds were impaired



Where do we go from here?



- A. Assessments of ponds needs to be addressed comprehensively and individually
- B. Incorporate pond water quality needs into CWMPs
- C. Recognize PALS and town monitoring data as valid for DEP's integrated/TMDL listing
- D. Integrate regular monitoring and data review into TMDLs/town/state functions



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Science for Management

Questions & Discussion

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