



Interactions among dark false mussels, water clarity, and Submerged Aquatic Vegetation (SAV) abundance in mesohaline regions of Chesapeake Bay in 2004-2005

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Overview of talk

- Where dark false mussels (DFM) are usually found & where they expanded in 2004-2005, especially in the Magothy River
- Why did DFM “explode” in 2004-2005?
- Changes in water clarity in 2004-2005, and evidence that changes were caused by DFM
- Changes in Submerged Aquatic Vegetation (SAV) distribution in areas near DFM, 2004-2005

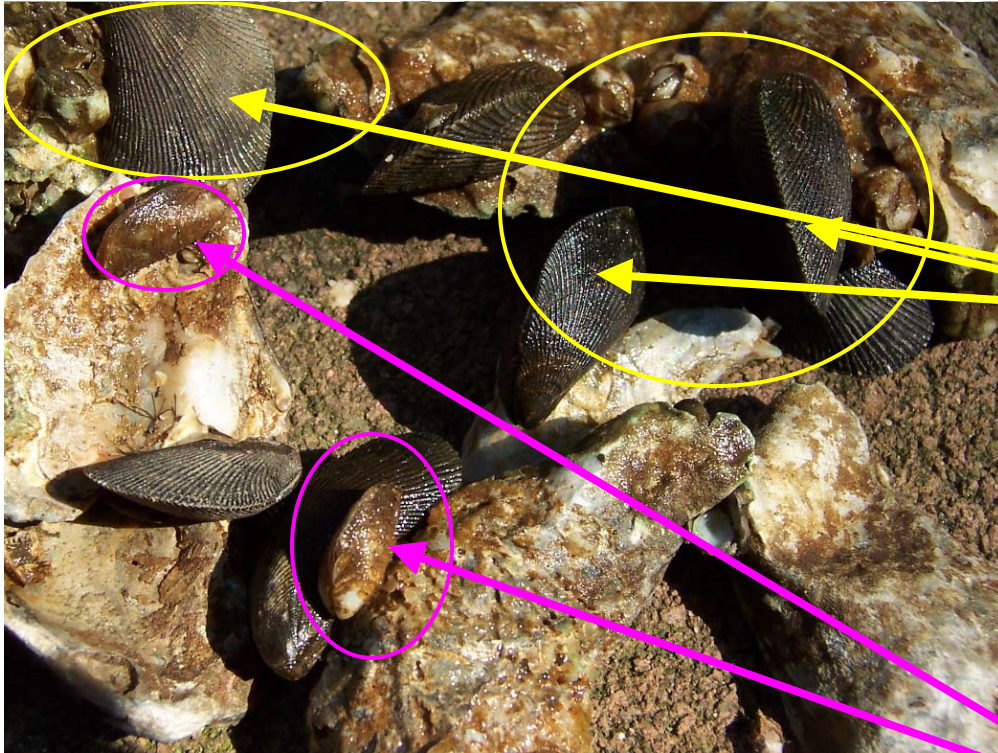


Dark False Mussels *Mytilopsis leucophaeata*



- It's actually a clam – note siphons
- Natural inhabitant of Chesapeake
 - In same family as zebra mussel
- Typical habitat is low salinity oyster bars, in low numbers, **but in 2003-2005 it greatly expanded to other hard substrates** (pilings, rocks, cages, branches, ropes, etc.)





2 mussels on oysters:



Bent (hooked) mussels

Ischadium recurvum

Most common mussel on oyster bars in low mesohaline Chesapeake;
Did **not** appear to change in abundance in these rivers in 2004

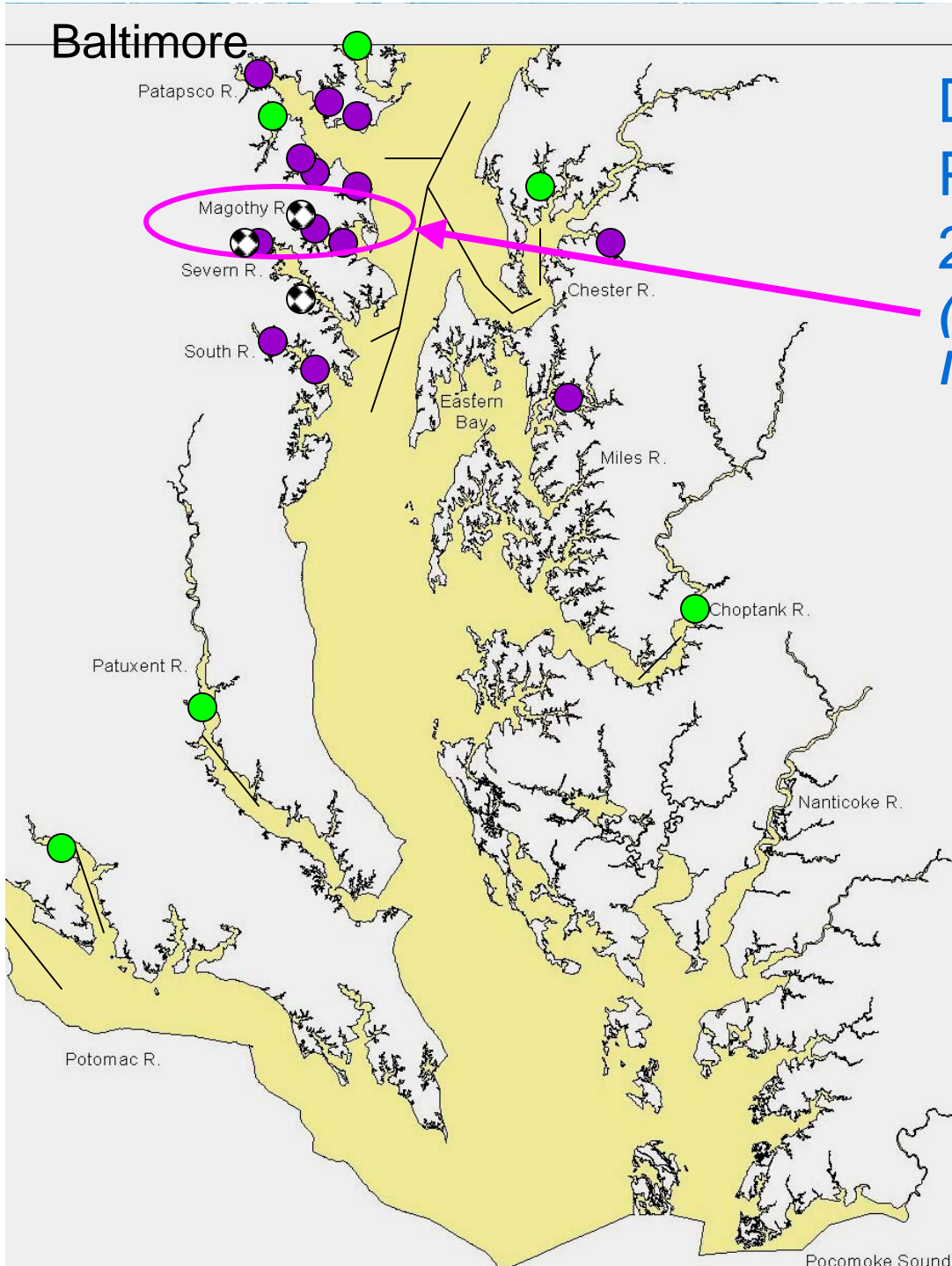
Dark False Mussels

Mytilopsis leucophaeata

Much smaller than bent mussel, and usually less abundant
Salinity tolerance is about 2-10 ppt



Baltimore



Distribution of DFM Populations, 2004-2005

(rest of talk will focus on Magothy River)

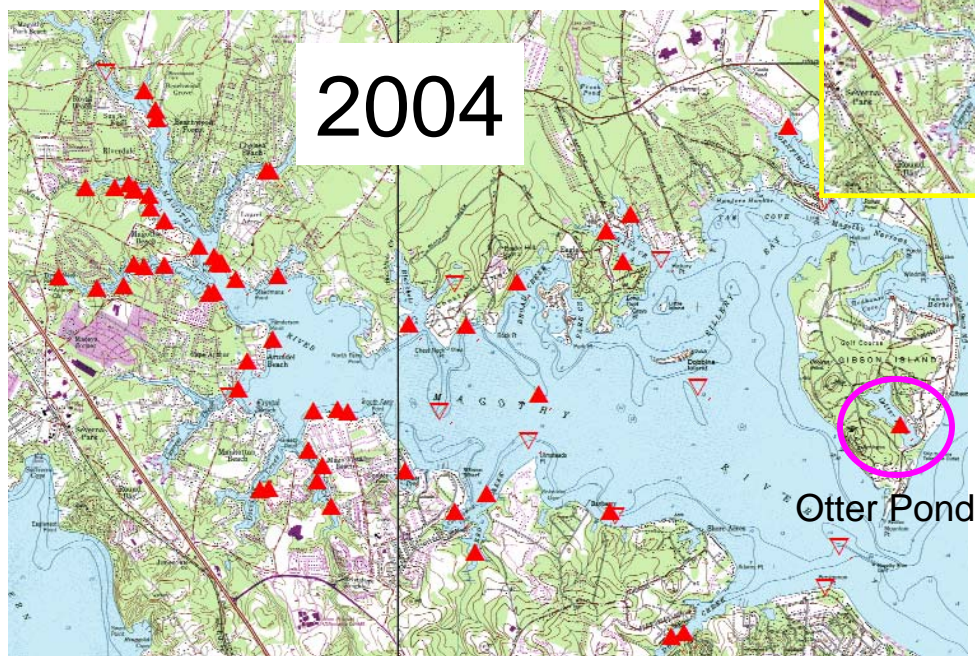
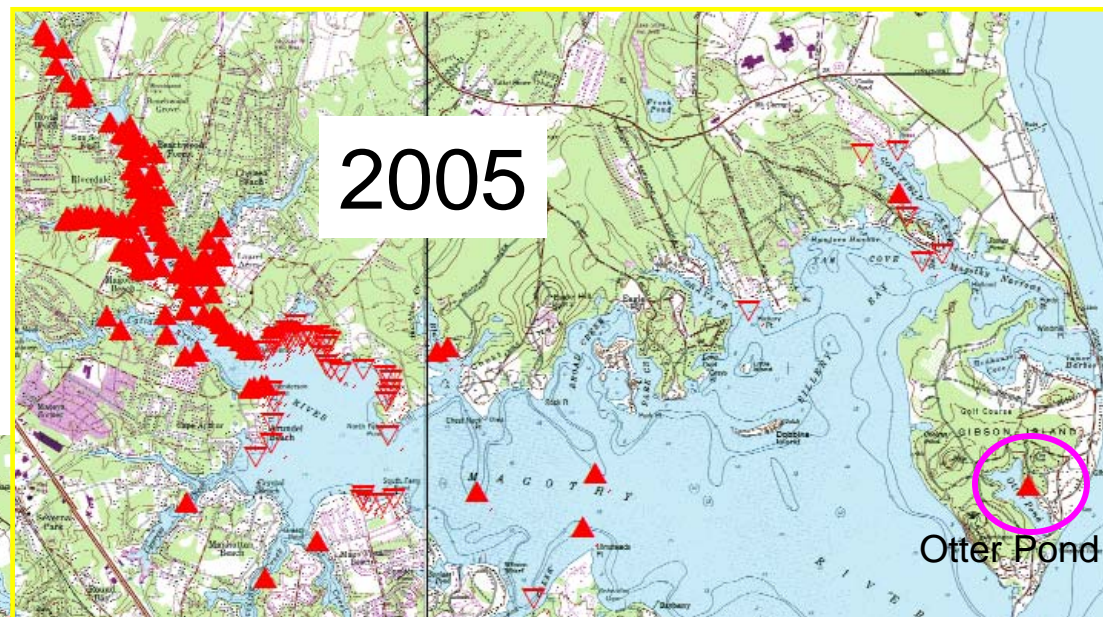


- Present-2005
- Known Abundance -2004
- Probable Abundance-2004
- Usual low level populations

Magothy DFM locations 2004-2005



- Solid: had DFM
- Open: No DFM
- Most reported by volunteer oyster gardeners



- Main change: DFM shifted farther upriver in 2005 (higher salinity)*
- Note presence in Otter Pond (nontidal) both years

DFM surveys done in Cattail Creek



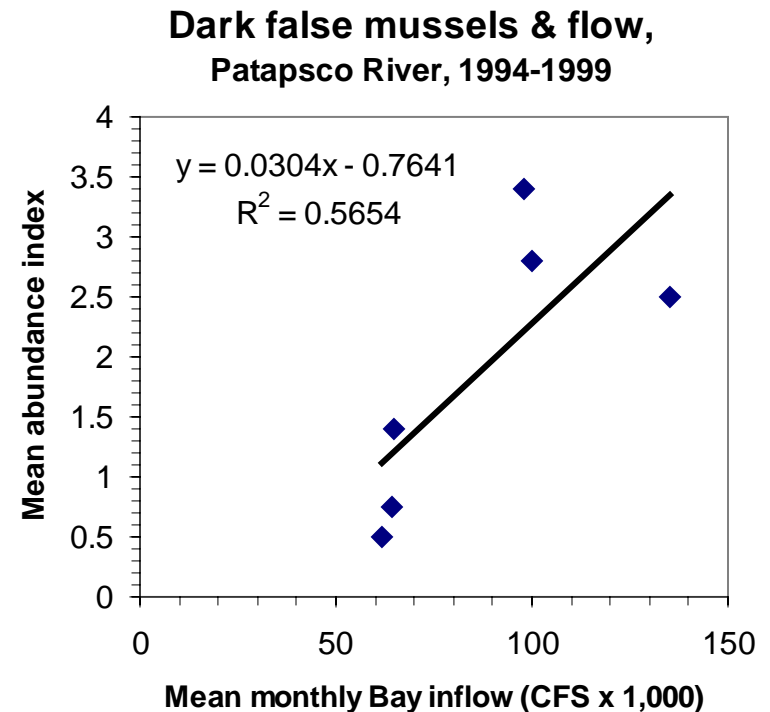
- Magothy River Association (MRA) volunteer divers & kayakers did surveys of DFM on pilings, directed by Dick Carey, in Sept. 2004 and 2005
- Samples were counted and measured, and used to calculate:
 - Total number of DFM in creek
 - Their mean length
- **Results:**
 - **2004: 380 million mussels, 14 mm mean length**
 - **2005: 69 million mussels, 12.8 mm mean length**



Why did DFM 'explode' in 2003-2004?



- They increased in the *Patapsco* in wet years in 1994-1999, but did not reach the same maximum density as in the *Magothy* in 2004 (a wet year)
 - Max. Patapsco density was > **55,000/m²** on one plate in 1998
 - Max. Magothy density was **148,000/m²** on one piling in 2004
- Did **Hurricane Isabel** (Sept. 2003) bring larvae or adults?
 - Evidence: DFM in **Otter Pond**, could only have reached it on storm surge, all mussels there were large in 2005 (no sign of reproduction, too fresh?)



Increases in water clarity, and evidence that they were caused by DFM

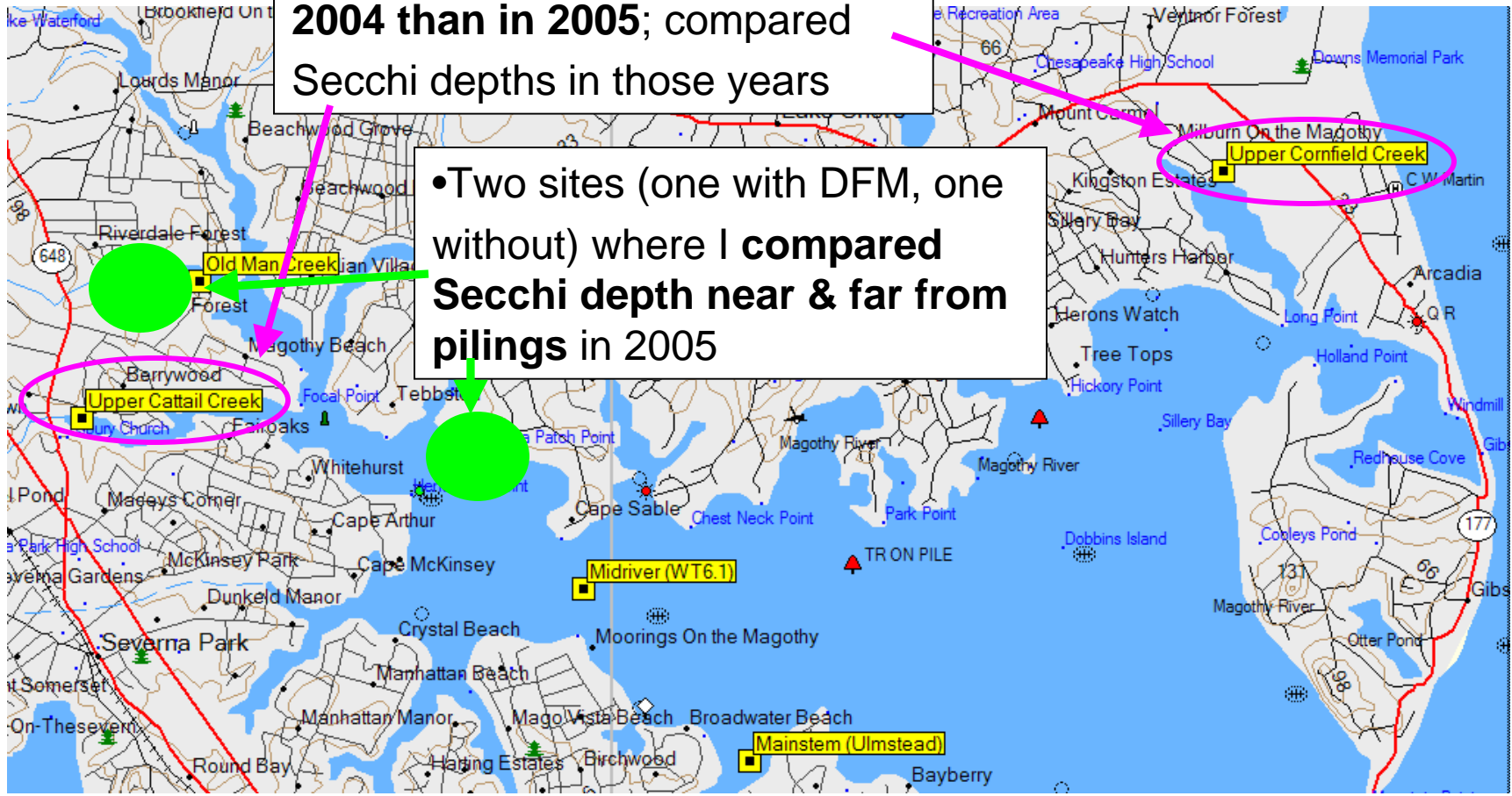


Evidence that DFM increased water clarity



• Two sites that had **more DFM in 2004 than in 2005**; compared Secchi depths in those years

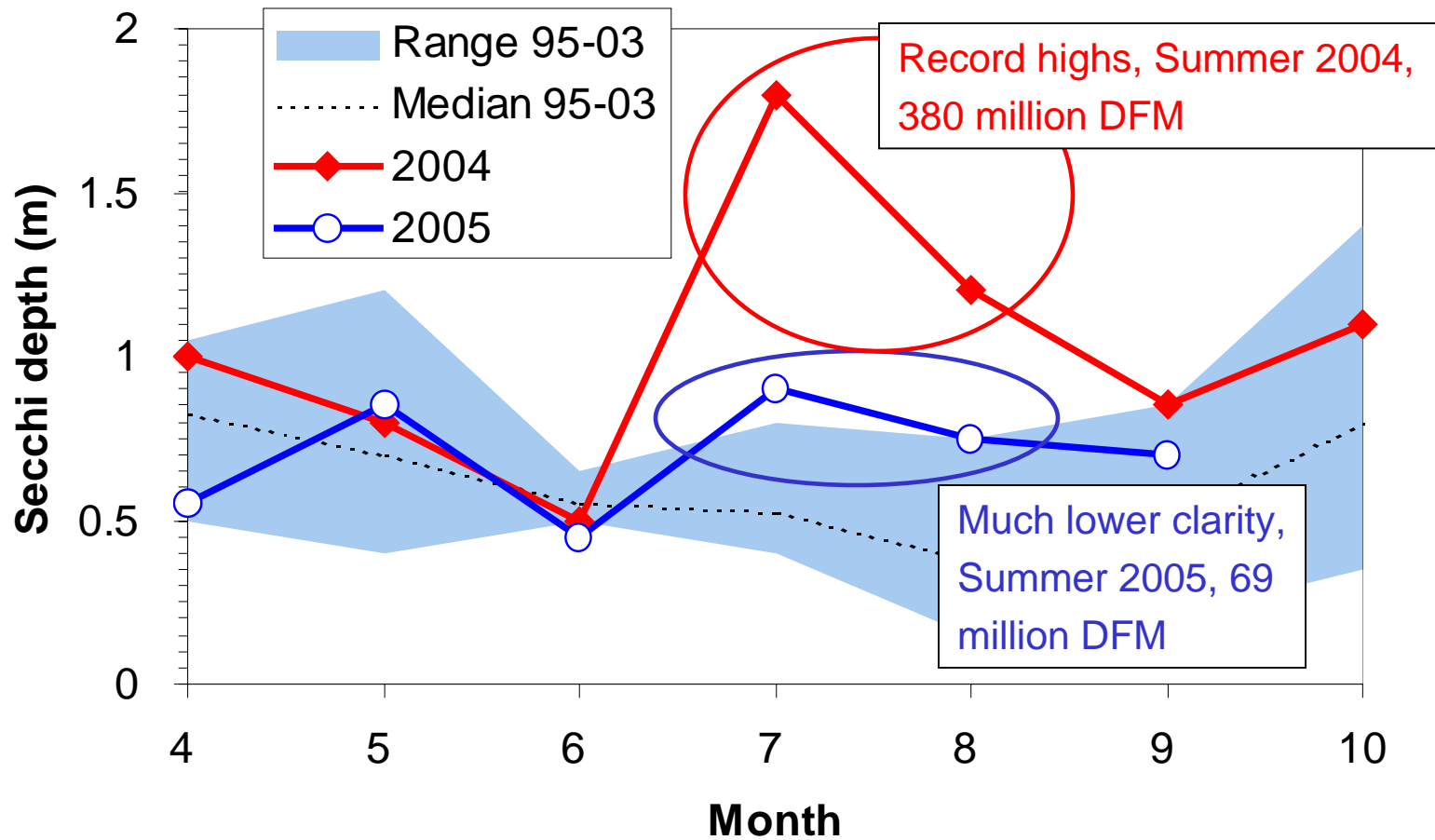
• Two sites (one with DFM, one without) where I compared Secchi depth near & far from pilings in 2005



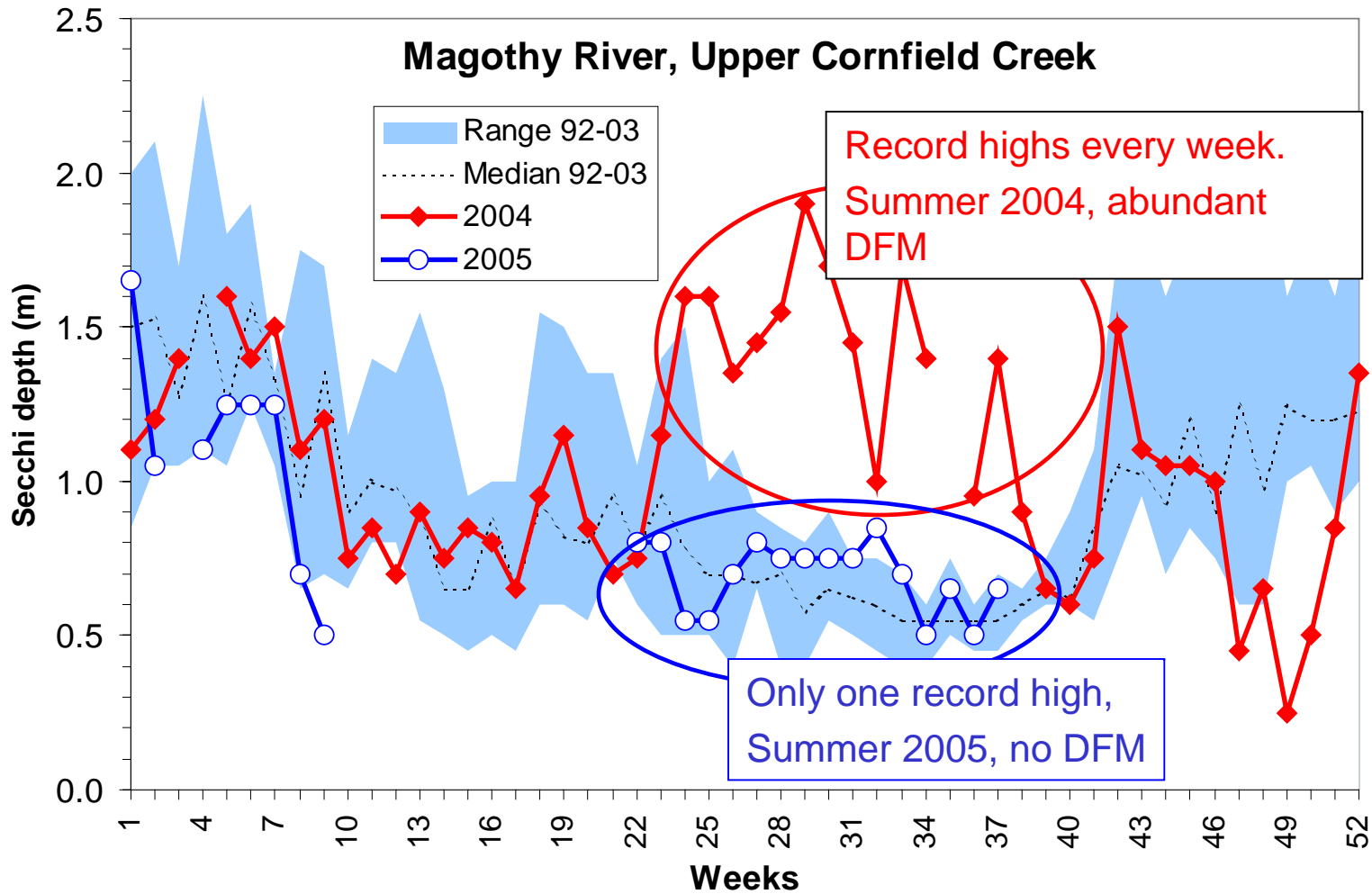
Cattail Creek Secchi depths, 2004-2005



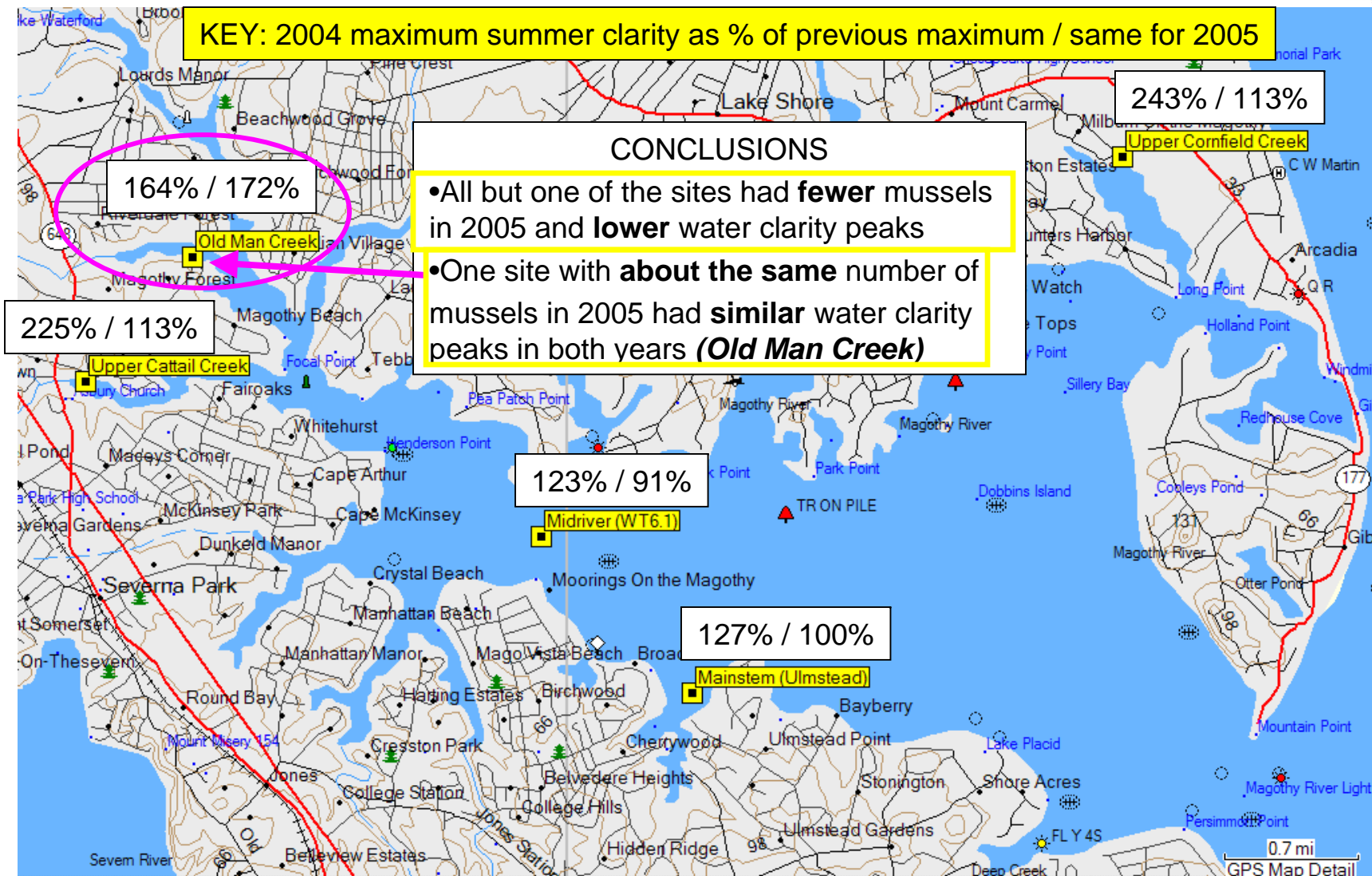
Magothy River, Upper Cattail Creek



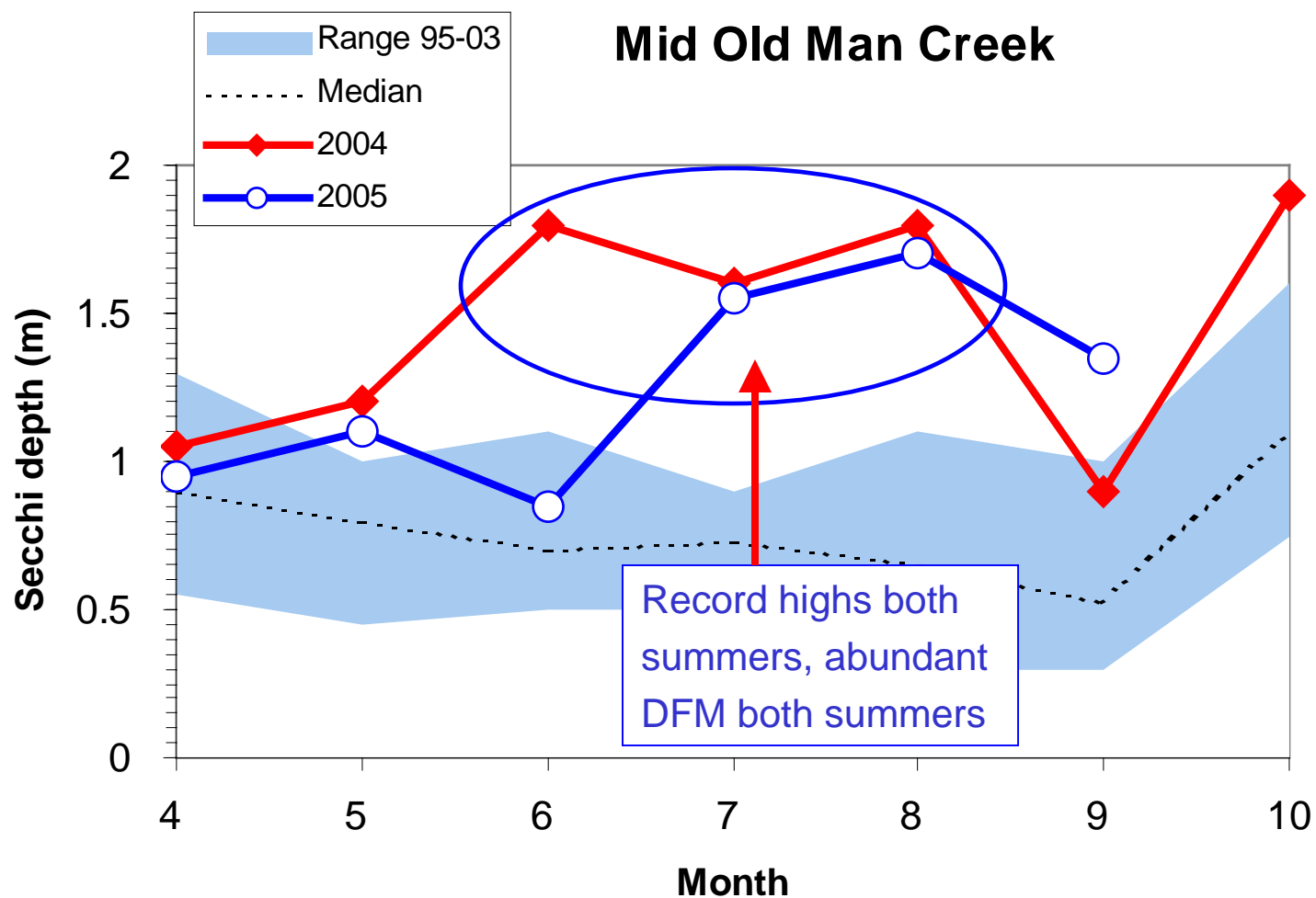
Cornfield Creek Secchi depths, 2004-2005



Water clarity changes summary, 2004-2005



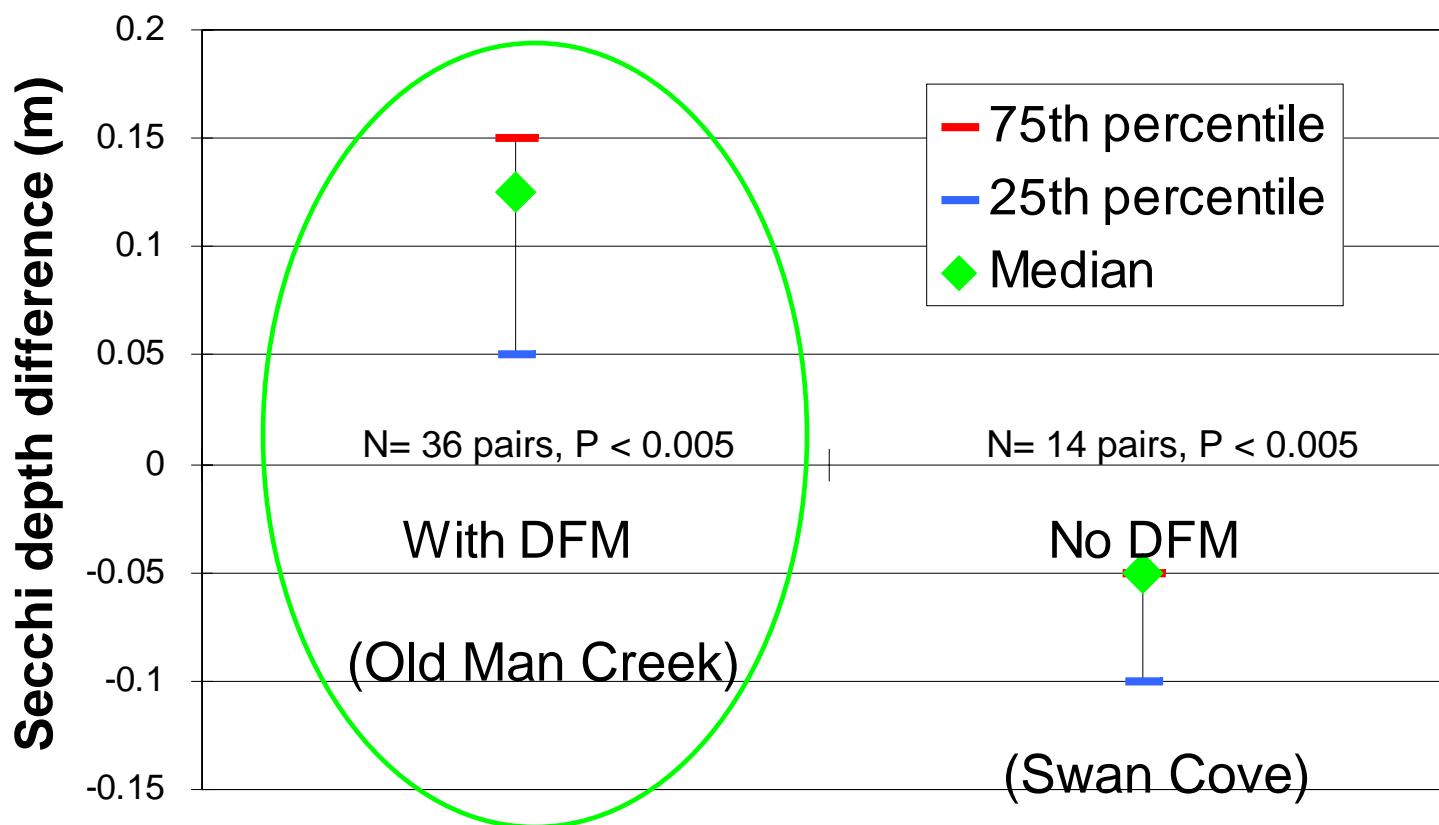
Water clarity in Old Man Creek



Water was clearer near piers only if DFM were present



Secchi depth difference, Near - Far

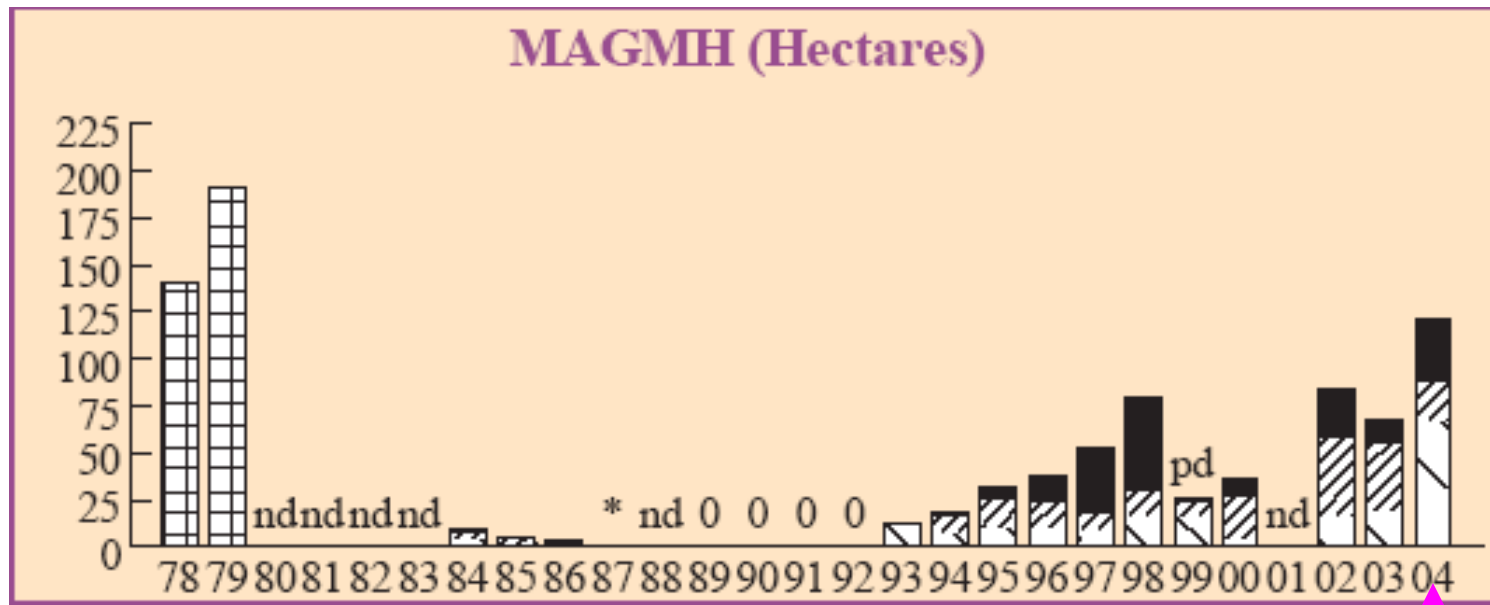


Increases in SAV in areas with DFM



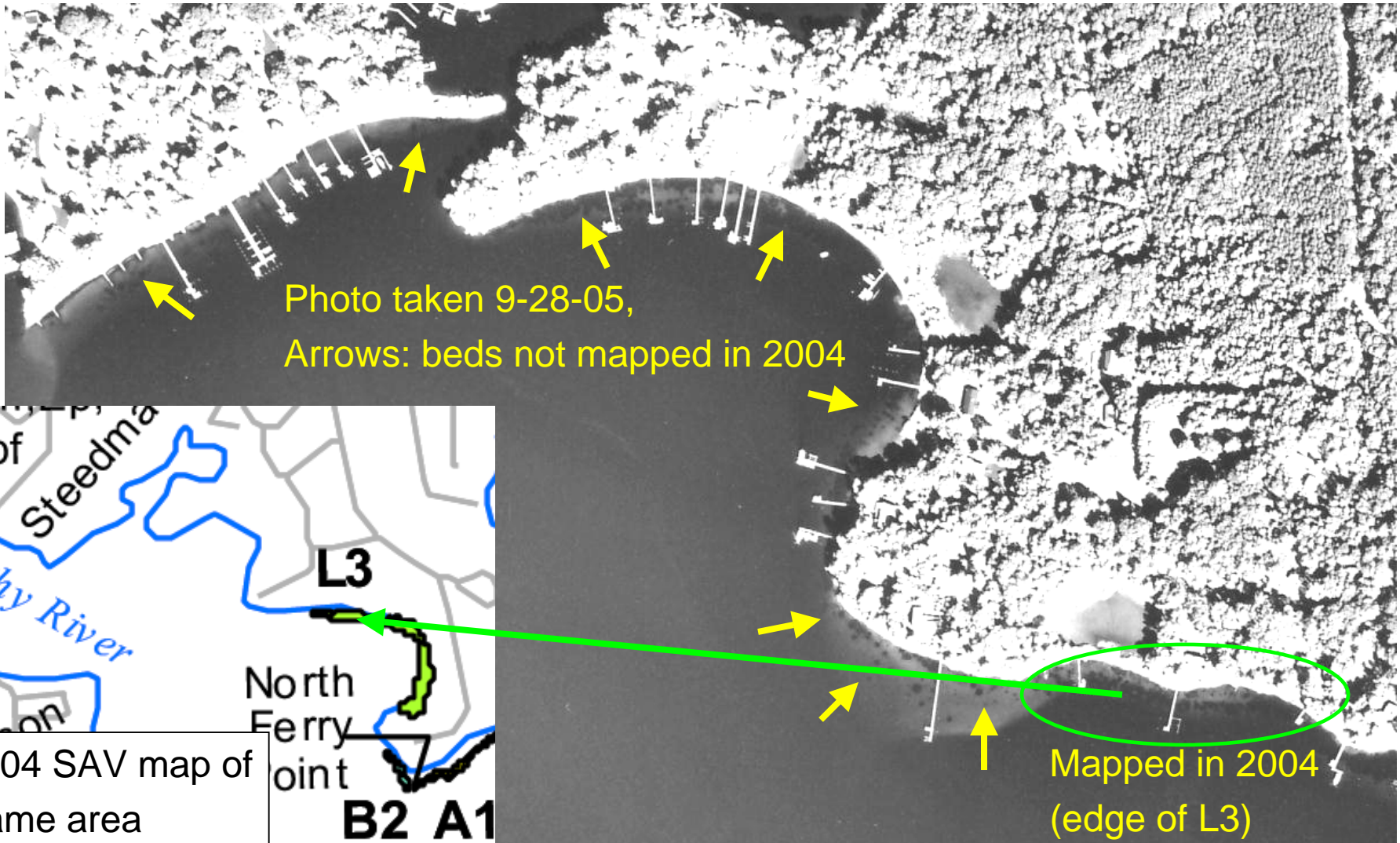


Magothy SAV did well in 2004

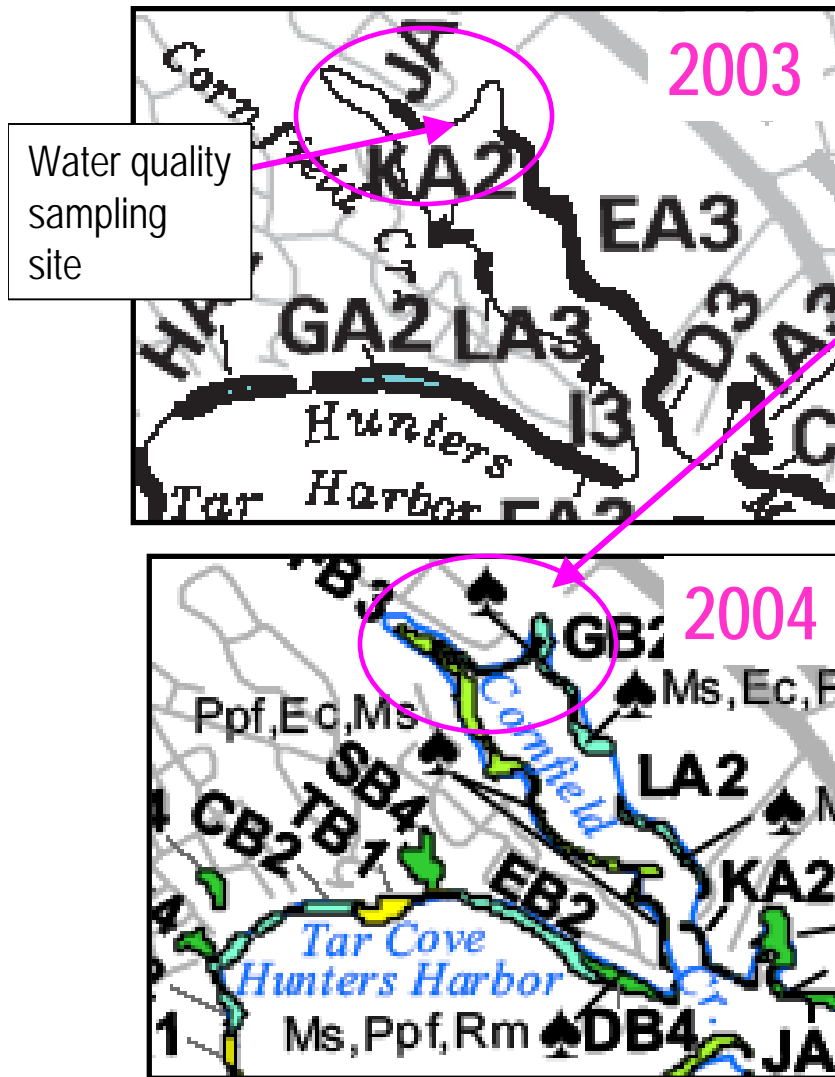


- Magothy SAV area rose 78% in 2004 in spite of the second high flow year in a row
 - SAV area often goes up in drought years (as it did in 2002) and down in high flow years (as it did in 2003)

More SAV in upper Magothy, 2005



More SAV in upper Cornfield Creek, 2004



- There was **more SAV** in upper Cornfield Creek in 2004 (compared to 2003) after the mussels increased water clarity there
- Based on ground surveys, in 2005 this area had **less SAV**; the mussels were gone and water clarity was back to average levels



Conclusions – Magothy River

- Dark false mussels usually increase during wet years in low mesohaline tributaries, but the increase in 2004 was unusual (3 times higher maximum density than previously)
 - Some evidence (Otter Pond mussels) that the 2004 increase was due to larvae that came on Sept. 2003 Isabel storm surge
- Mussels contributed to improved water clarity:
 - Creeks with more mussels had greater increases in water clarity
 - Clarity near pilings with mussels was consistently higher than clarity away from those pilings; reverse for pilings without mussels
- Areas that had more mussels & better water clarity had more SAV in 2004 and 2005, especially redhead grass

Acknowledgments

- Magothy River Association volunteers for providing DFM locations & doing counts
- Chris Judy, MD DNR, for mussel locations, photos, and text for the presentation
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