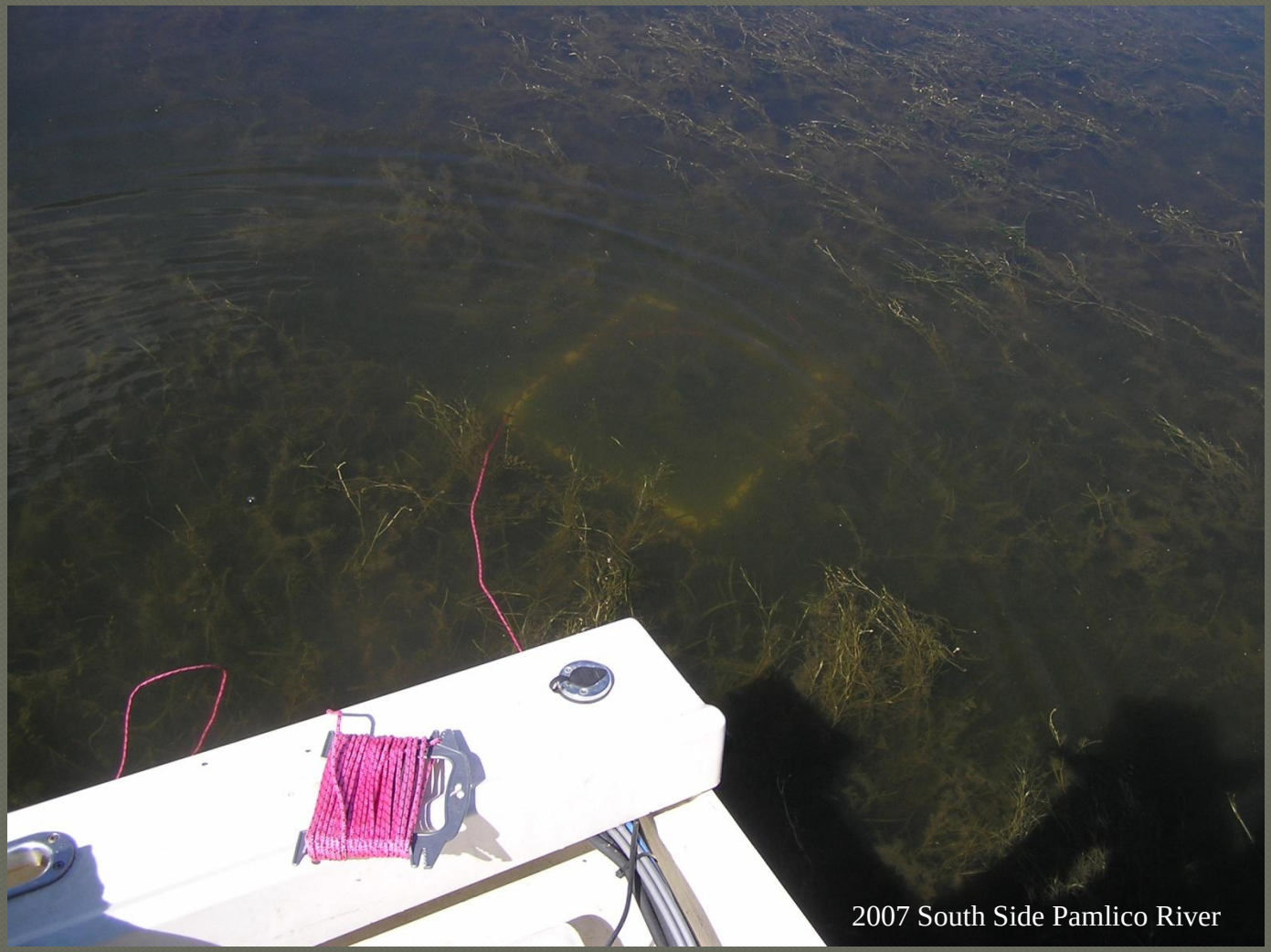
Mapping Low-Salinity SAV

In the Western Pamlico Sound



NC Division of Water Quality

Response Team Background

~1998, two 4-member teams in New Bern &Washington

- Responsibilities: Lower Neuse and Pamlico Basin sampling, fish kills, algal blooms, citizen concerns, Riparian Buffer rule determinations & compliance, EPA's Coastal Assessment, SAV surveys (*est. 2005*)

~2010, one team left of 3 (now *Estuarine Monitoring Team*)

- Responsibilities: same as above with 40% increase in ambient sampling to 70 sites in lower Neuse / Pamlico / Chowan / Roanoke / Pasquotank basins

Why is DWQ surveying SAV?

• The NCMFC rule [15A NCAC 31 (20)] designated SAV as a critical habitat in coastal waters; DMF's Coastal Habitat Protection Plan (CHPP) to protect and restore fisheries habitats

• SAV distribution important during permit review process

• last DWQ survey > 10 years old (TVA, NOAA, DWQ, EPA- Neuse River)

• staff of **8** with local knowledge, access to flat bottom boat, GPS

Materials

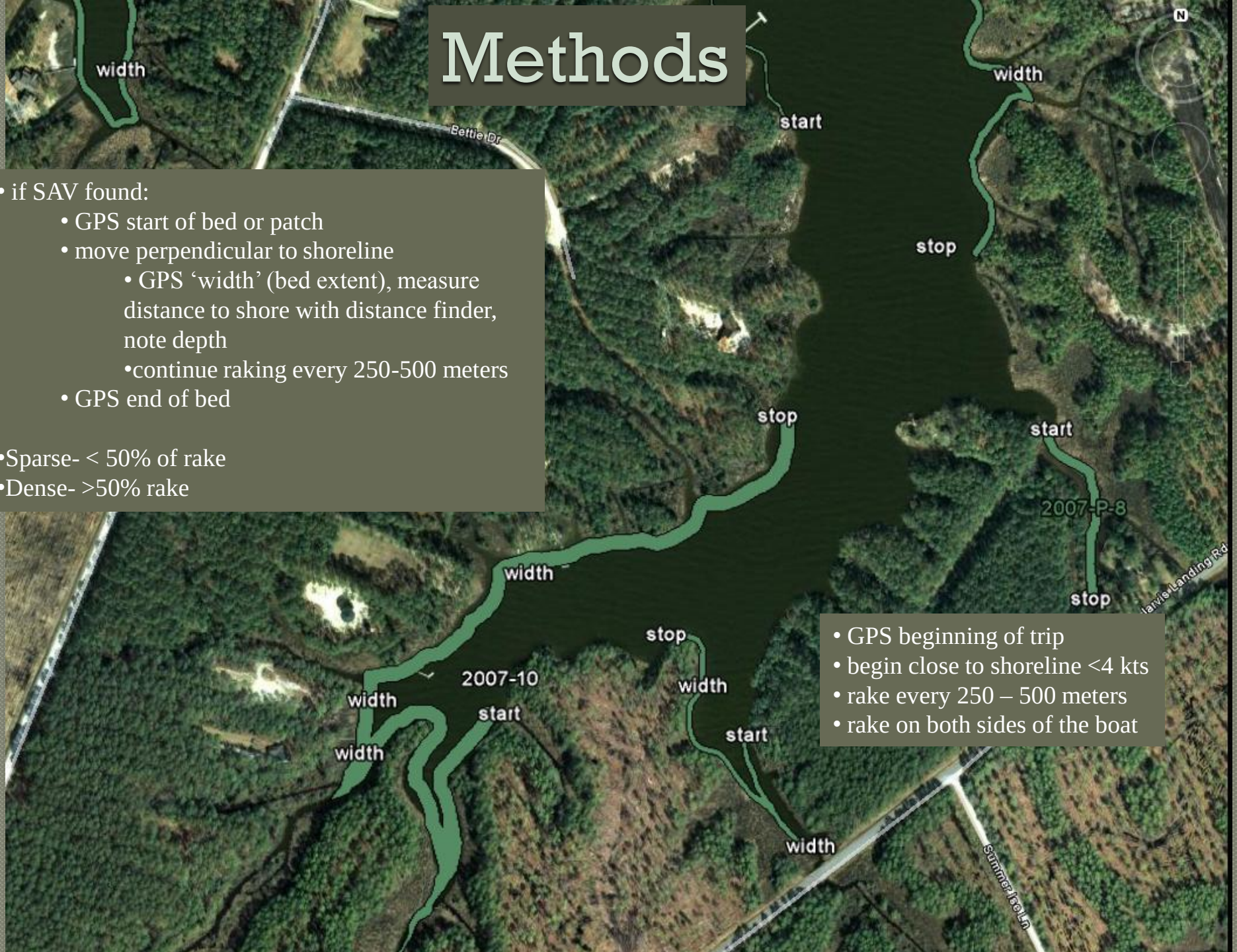
Material	Justification
17' flat bottom boat	Shallow creek access, fit 3 people
dGPS- Garmin 60CSx (WAAS enabled)	Sub-meter accuracy; helps define extents of beds
Fathometer	depths
Distance finder	Approximate distance the SAV bed is from shoreline
Rake retrofitted onto extendable paint pole	Brinson/Davis used a rake, we just 'enhanced' it a bit; instant depth reading

Methods

- if SAV found:
  - GPS start of bed or patch
  - move perpendicular to shoreline
    - GPS ‘width’ (bed extent), measure distance to shore with distance finder, note depth
    - continue raking every 250-500 meters
  - GPS end of bed

- Sparse- < 50% of rake
- Dense- >50% rake

- GPS beginning of trip
- begin close to shoreline <4 kts
- rake every 250 – 500 meters
- rake on both sides of the boat



Field sheet

Begin Trip

Start Bed

Width

Turnaround

Width

End Bed

Begin Bed

5/11/07 — UT east of Dawson Cr. — J. Green, J. Beckelhimer

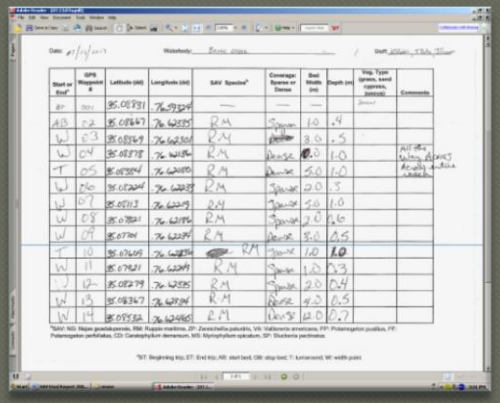
Start or End[a]	GPS Waypoint #	Latitude (dd)	Longitude (dd)	SAV Species[b]	Coverage: Sparse or Dense	Bed Width (m)	Depth (m)	Veg. Type (grass, sand cypress, juncus)	Comments
BT	1	35.0005	-76.73362	NA					
	2	35.00119	-76.73542	NA					
AB	3	35.00053	-76.73569	ZB	D	15	1	juncus/spart.	Red is on west side of creek
	4	34.99992	-76.73582	ZB	D	3	.8	← lawn	
T	5	34.99953	-76.73608	ZB	D	10	1	Juncus/spart	cattail.
	6	34.99981	-76.73608	ZB	D	2	.5	"	
	7	35.00113	-76.73550	ZB	D	21	1	"	all the way across crk
	8	35.00053	-76.73617	ZB	D	9	1	"	
	9	34.99961	-76.73658	ZB	D	11	1.2	"	
	10	34.99917	-76.73596	ZB	D	3	1	"	small basin turnaround
	11	34.99911	-76.73580	ZB	D	2	1	lawn	
OB	12	34.99857	-76.73449	NA					small basin turnaround
AB	13	34.99883	-76.73648	ZB	D	3	1.5	Juncus/spart	
	14	34.99949	-76.73666	ZB	D	12	1.5	wheat field ag.	

[a]BT: Beginning trip; ET: End trip; AB: start bed; OB: stop bed; T: turnaround; W: width point

[b]SAV: NG: Najas guadalupensis, RM: Ruppia maritima, ZP: Zannichellia palustris, VA: Vallisneria americana, PP: Potamogeton pusillus, PF: Potamogeton perfoliatus, CD: Ceratophyllum demersum, MS: Myriophyllum spicatum, SP: Stuckenia pectinatus.

5th worksheet modification

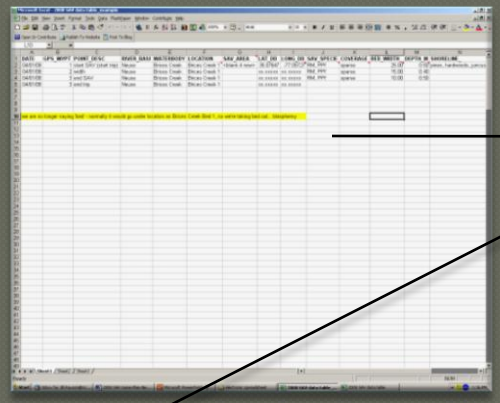
SAV field sheet



Assign unique Collection #

Assign waterbody name

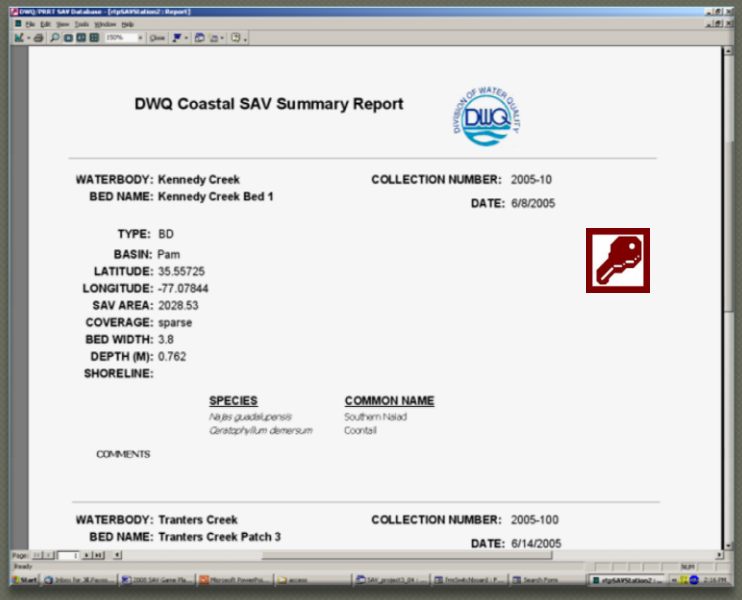
SAV data tables



ArcGIS

Digitize & Calculate SAV polygons

Merge datasets, Output SAV Reports



DWQ Coastal SAV Summary Report

WATERBODY: Kennedy Creek
BED NAME: Kennedy Creek Bed 1
COLLECTION NUMBER: 2005-10
DATE: 6/8/2005

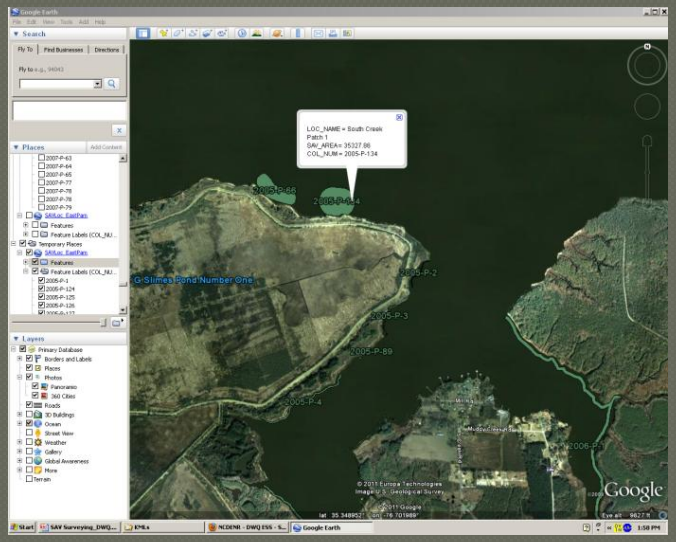
TYPE: BD
BASIN: Pam
LATITUDE: 35.55725
LONGITUDE: -77.07844
SAV AREA: 2028.53
COVERAGE: sparse
BED WIDTH: 3.8
DEPTH (M): 0.762
SHORELINE:

SPECIES	COMMON NAME
Najas guadalupensis	Southern Naiad
Ceratophyllum demersum	Coontail

COMMENTS

WATERBODY: Tranters Creek
BED NAME: Tranters Creek Patch 3
COLLECTION NUMBER: 2005-100
DATE: 6/14/2005

Export to web as KML (Google Earth)



KML Example


LOC_NAME = South Creek
Patch 1
SAV_AREA = 35327.86
COL_NUM = 2005-P-134
2005-P-66
2005-P-134
Slimes Pond Number One
2005-P-2
2005-P-3
2005-P-89
2005-P-4
Mill Rd
Muddy Creek Rd
2006-P-1

DWQ Coastal SAV Summary Report

WATERBODY: South Creek
LOCATION NAME: South Creek Patch 1
COLLECTION NUMBER: 2005-134
DATE: 8/30/2005
BASIN: Pam
LATITUDE: 35.34826
LONGITUDE: -76.70317
SAV AREA: 35327.88
COVERAGE: sparse
LOCATION WIDTH(M): 91.44
LOCATION DEPTH (M): 0.6096
SHORELINE:

SPECIES	COMMON NAME
Ruppia maritima	Widgeon Grass, Duckweed

COMMENTS

For more information contact:
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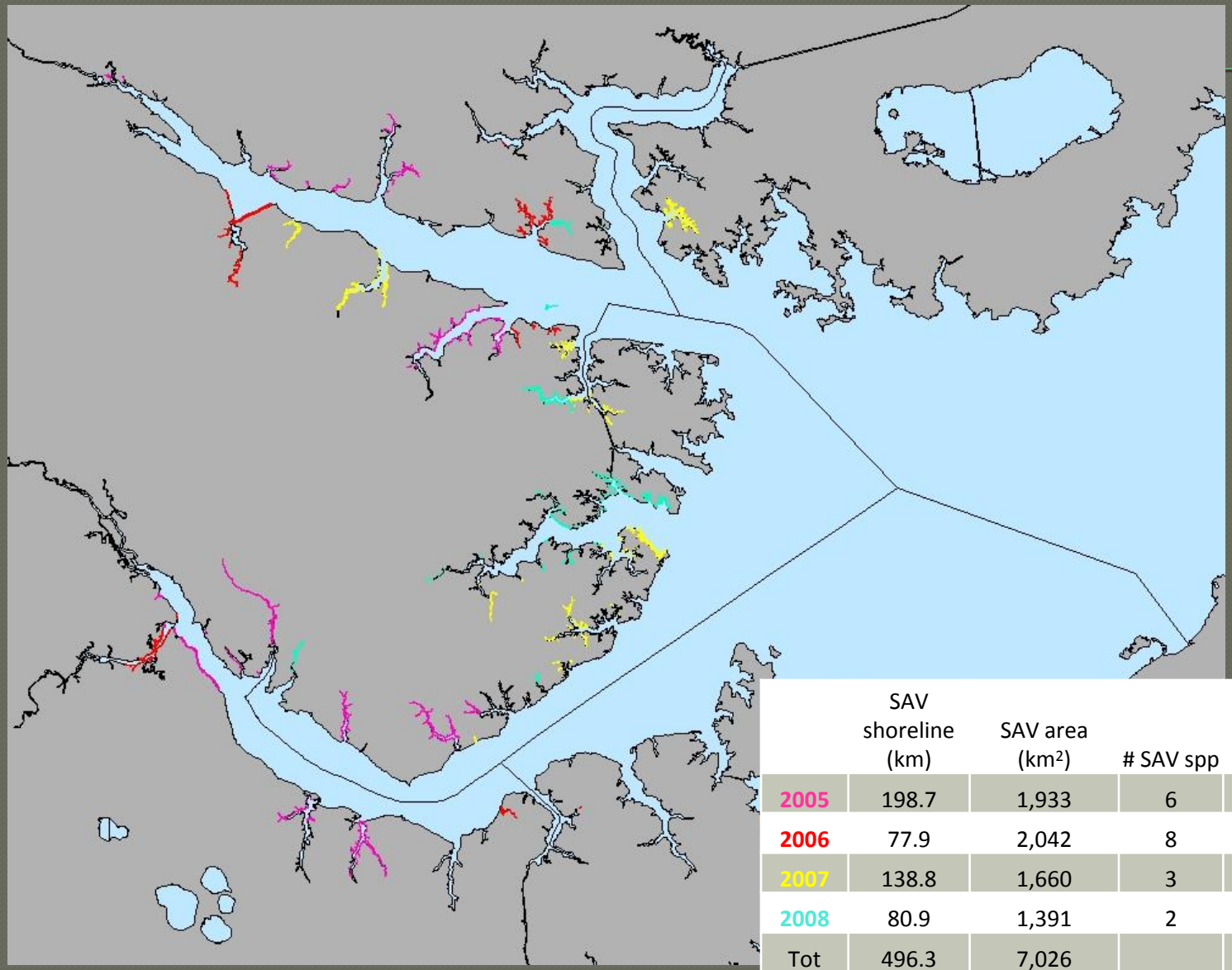
Pamlico Rapid Response Team
NCDENR Division of Water Quality
(252) 948-3999

Jill.Paxson@ncmail.net

DWQ SAV Results- 2005-2008



	SAV shoreline (km)	SAV area (km^2)	# SAV spp	# Creeks Surveyed	# Creeks w/o SAV
2005	198.7	1,933	6	27	5
2006	77.9	2,042	8	18	1
2007	138.8	1,660	3	11	1
2008	80.9	1,391	2	11	2
Tot	496.3	7,026			

SAV Inventory

Zannichellia palustris * * * *
(Horned Pondweed)

Ruppia maritima * * * *
(Widgeon/ditch grass)

Potamogeton pusillus ***
(Slender Pondweed)

Vallisneria americana **
(Tape/Celery grass)

Potamogeton perfoliatus **
(Redhead Pondweed)

Ceratophyllum demersum ***
(Coontail)

Myriophyllum spicatum *
(Watermilfoil)

Najas guadalupensis **
(Southern Naiad)

• 2005 • 2006 • 2007 • 2008

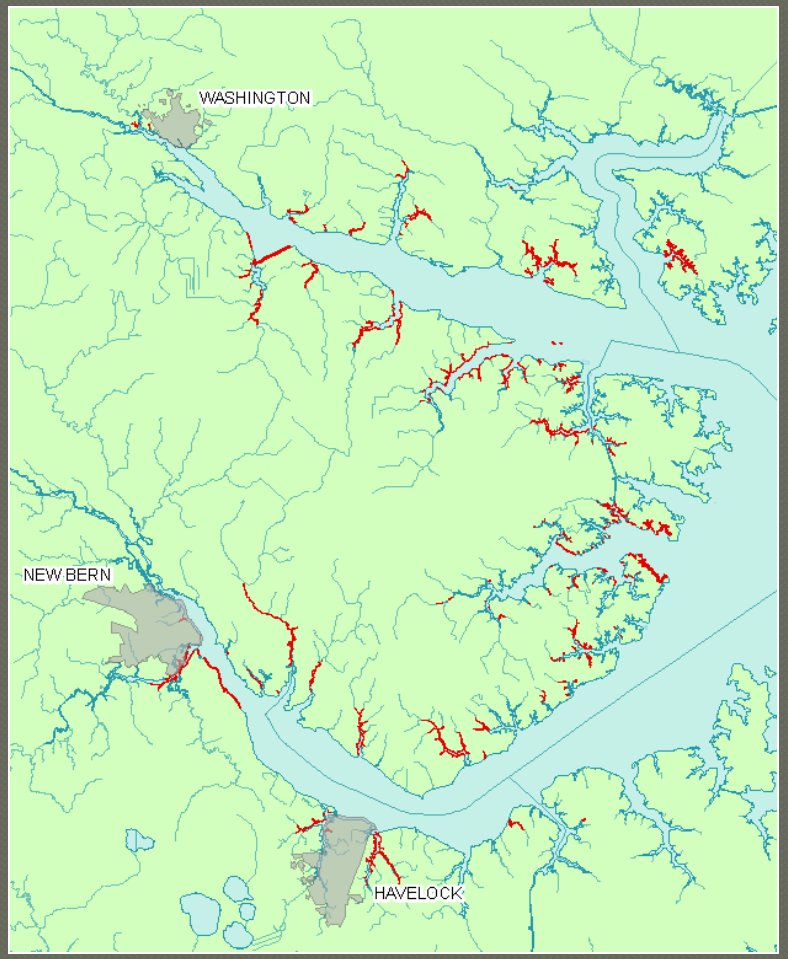
General Result Comparisons

- Historical
- APNEP SAV Flights 2007
- Blounts Bay – local area showing temporal / spatial changes?
- Survey Expenses/Costs

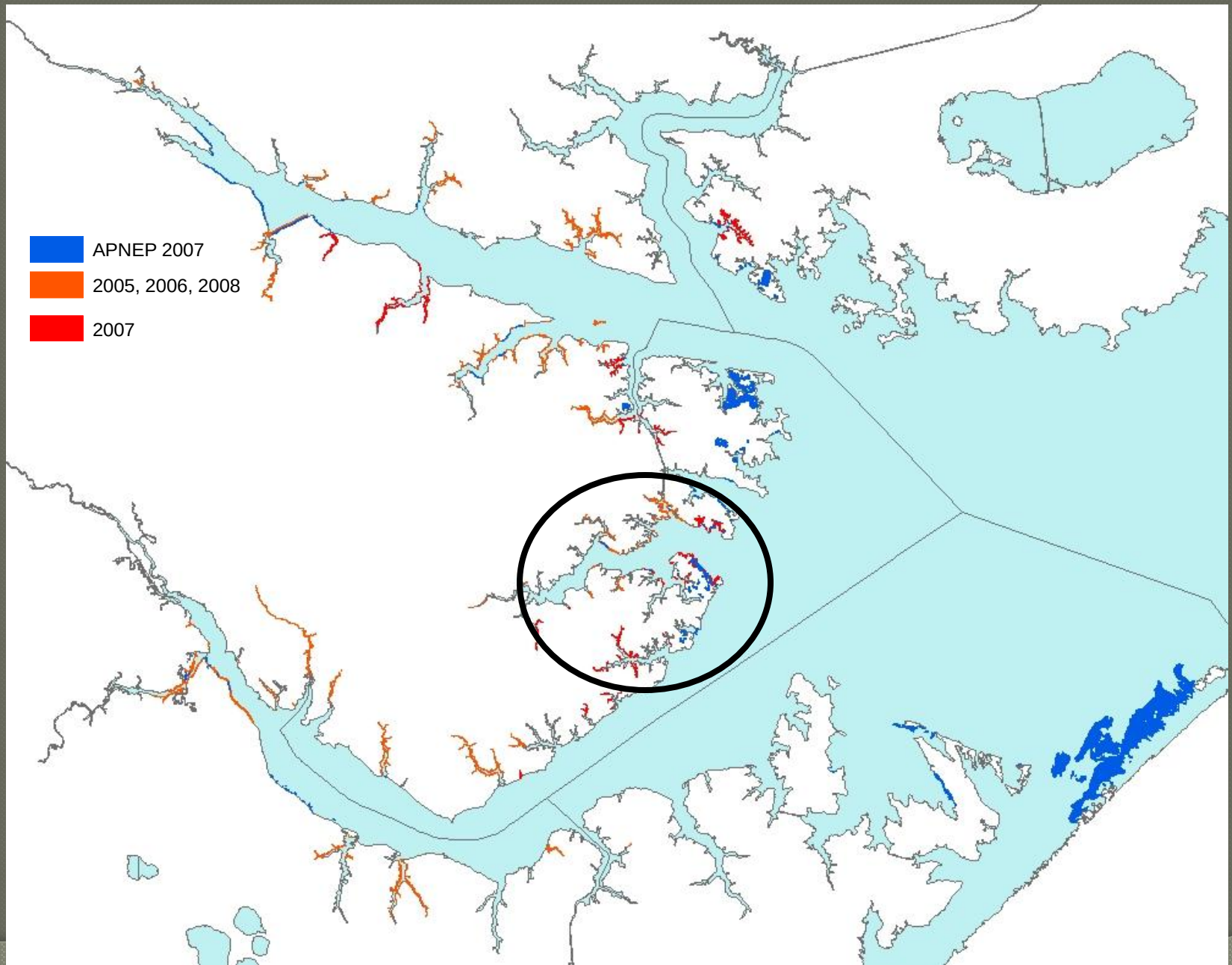
General Historical Comparison

Aerial Imagery-late '80's and mid 90's

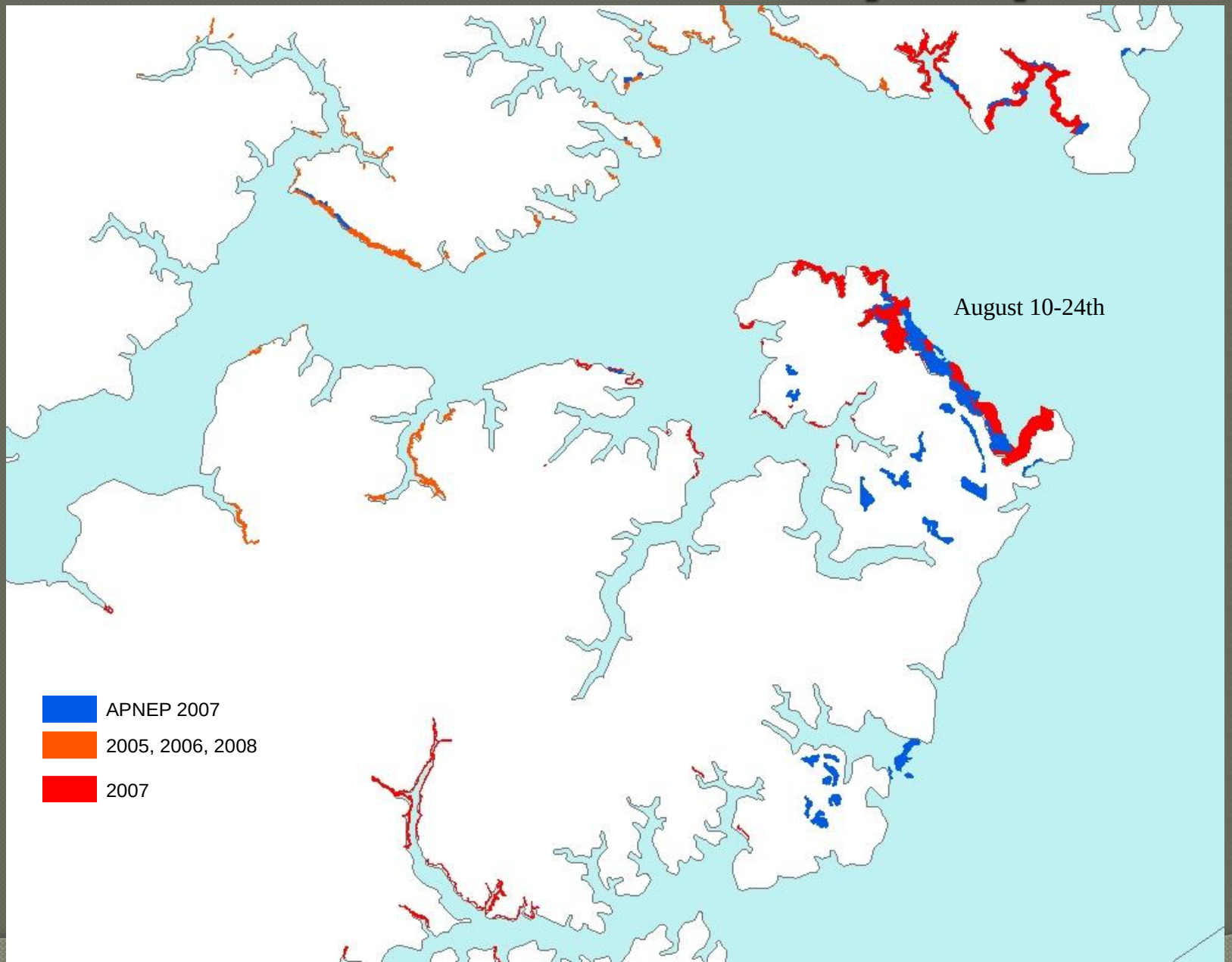
DWQ SAV Surveys 2005-2008



APNEP- 2007

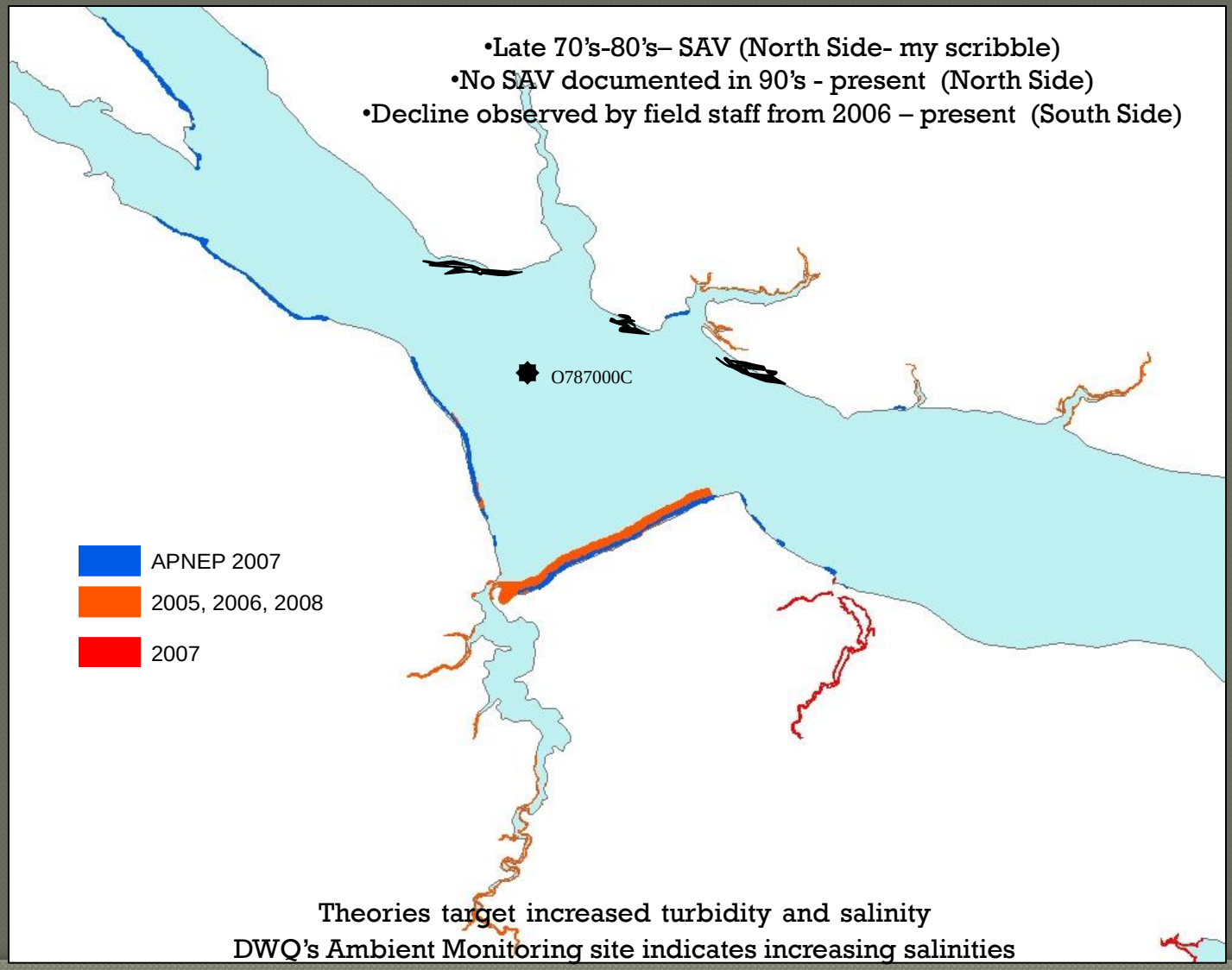


APNEP / DWQ- Bonner Bay/Bay River

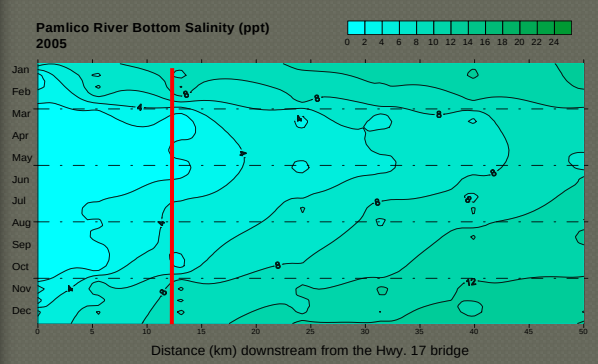


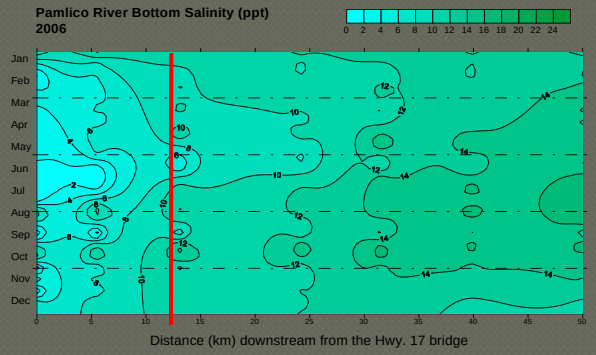
Bonner Bay (Bay River and Pamlico Sound confluence)

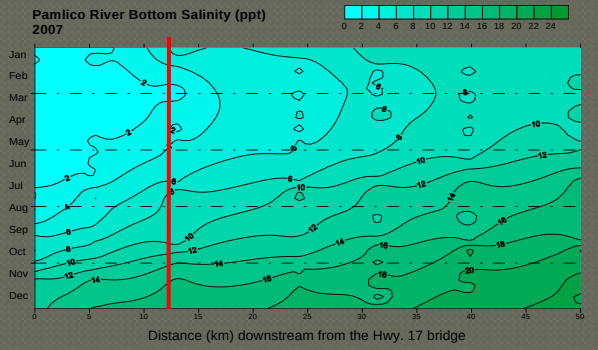
Blounts Bay

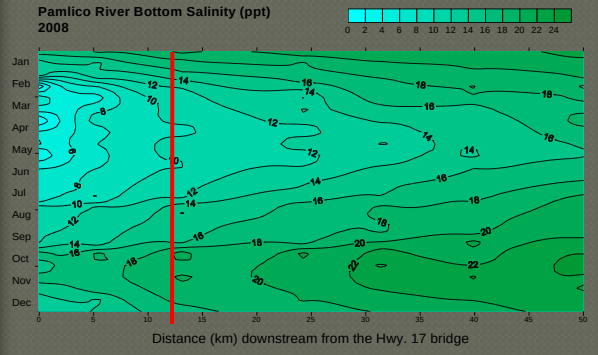

•Late 70's-80's– SAV (North Side- my scribble)
•No SAV documented in 90's - present (North Side)
•Decline observed by field staff from 2006 – present (South Side)
O787000C
APNEP 2007
2005, 2006, 2008
2007
Theories target increased turbidity and salinity
DWQ's Ambient Monitoring site indicates increasing salinities

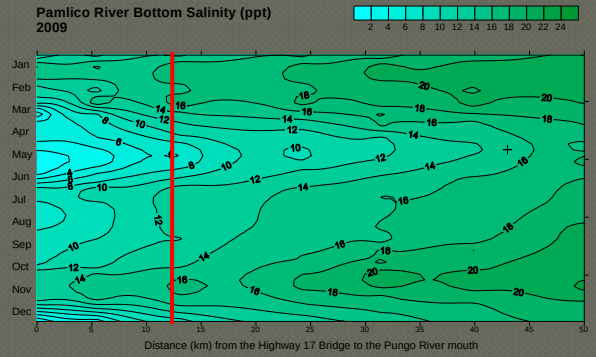
Pamlico River Bottom Salinities Blounts Bay 2005-2010

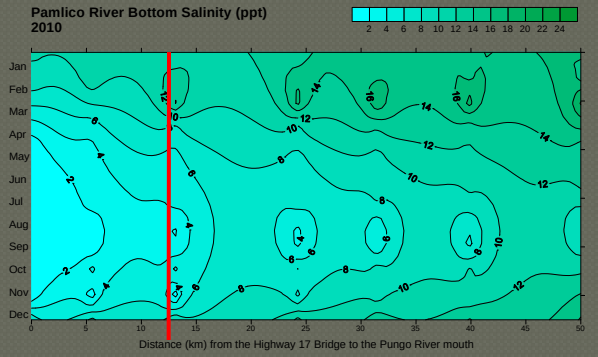












Red line indicates location of Blounts Bay AMS site -downstream of Hwy 17

Cost Example: Pungo Creek

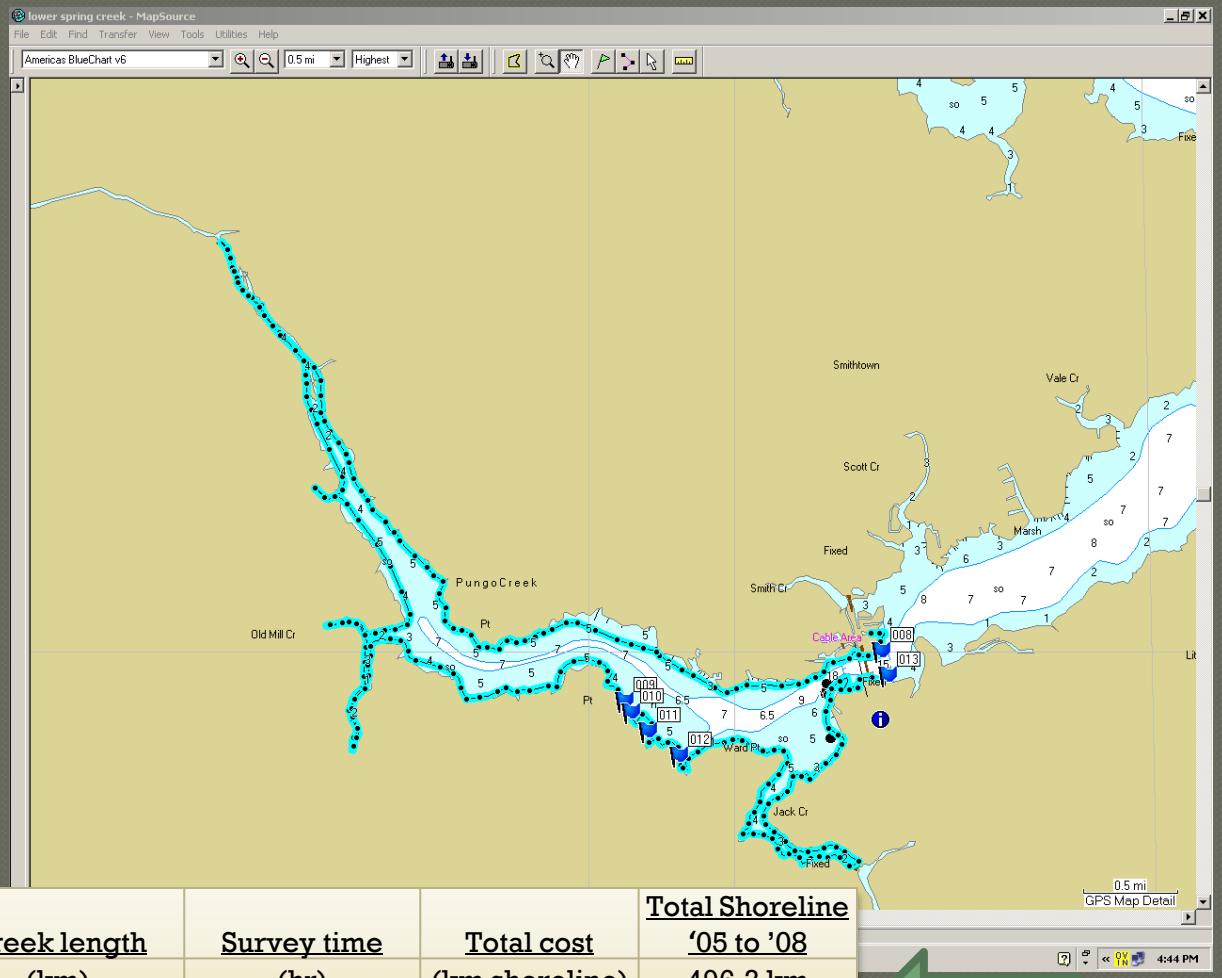
Shoreline
20.6 km

Cost
•3-Staff: $224
•Gas: $9.27

Time to complete
4:00 hrs

Total
$233.27

<$11/km staff
~$0.45/km gas



Boat burns Gas	Price of Gas	Cost	Creek length	Survey time	Total cost	Total Shoreline '05 to '08
(gal/hr)	$/gal	$/hr	(km)	(hr)	(km shoreline)	496.3 km
$0.66	$3.50	$2.31	20.6	4	$0.45	$5682.64

67 CREEKS

Contact Info and Link

http://portal.ncdenr.org/web/wq/ess/savmapping

- KML's available online
- Summary Reports, shapefiles available upon request

•Many thanks to the ESS Crew for their assistance over the years. Mark Hale has been invaluable with assisting on the IT/Web side

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