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Water quality in the salt ponds and effects of pond discharges on receiving waters

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U.S. Geological Survey

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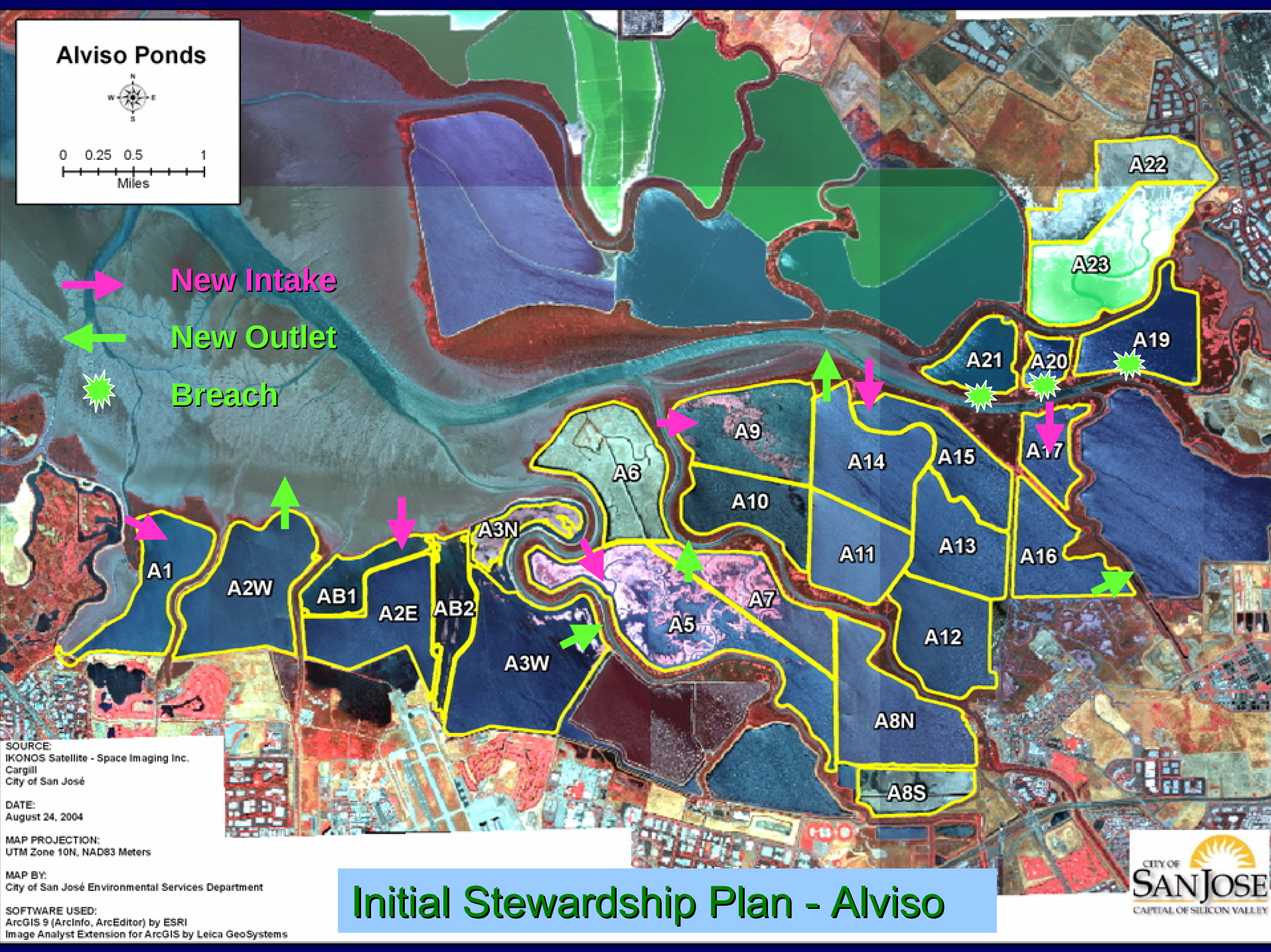
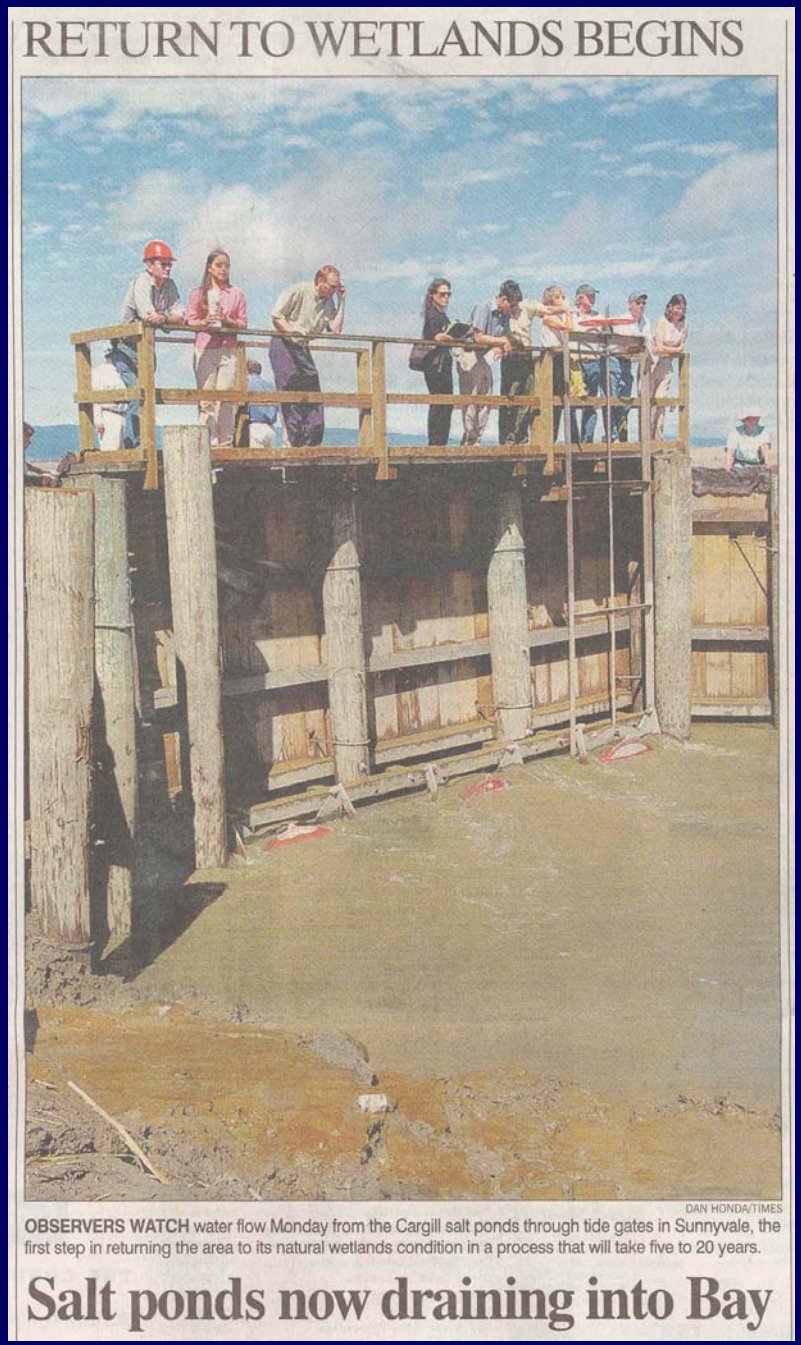

Alviso Ponds
0 0.25 0.5 1
Miles
New Intake
New Outlet
Breach
A1
A2W
AB1
A2E
AB2
A3N
A3W
A6
A9
A10
A14
A15
A17
A11
A13
A16
A5
A7
A12
A8N
A8S
A21
A20
A19
A22
A23
SOURCE:
IKONOS Satellite - Space Imaging Inc.
Cargill
City of San José
DATE:
August 24, 2004
MAP PROJECTION:
UTM Zone 10N, NAD83 Meters
MAP BY:
City of San José Environmental Services Department
SOFTWARE USED:
ArcGIS 9 (ArcInfo, ArcEditor) by ESRI
Image Analyst Extension for ArcGIS by Leica GeoSystems
Initial Stewardship Plan - Alviso
CITY OF SAN JOSE
CAPITAL OF SILICON VALLEY

Water Control Structures

- 48” culverts
- Controlled with screw gates
- Allow controlled intake, discharge



RETURN TO WETLANDS BEGINS

DAN HONDA/TIMES

OBSERVERS WATCH water flow Monday from the Cargill salt ponds through tide gates in Sunnyvale, the first step in returning the area to its natural wetlands condition in a process that will take five to 20 years.

Salt ponds now draining into Bay

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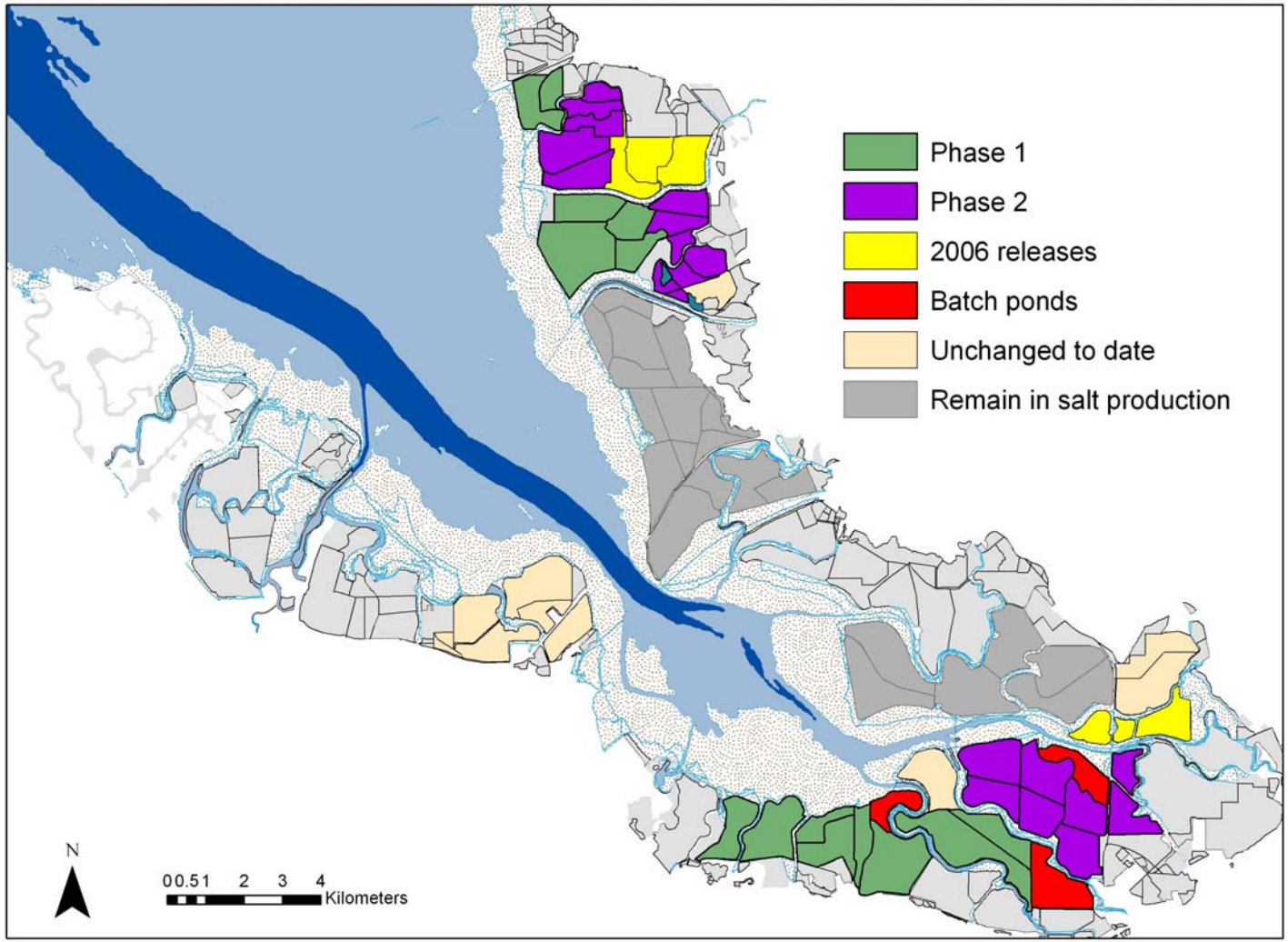
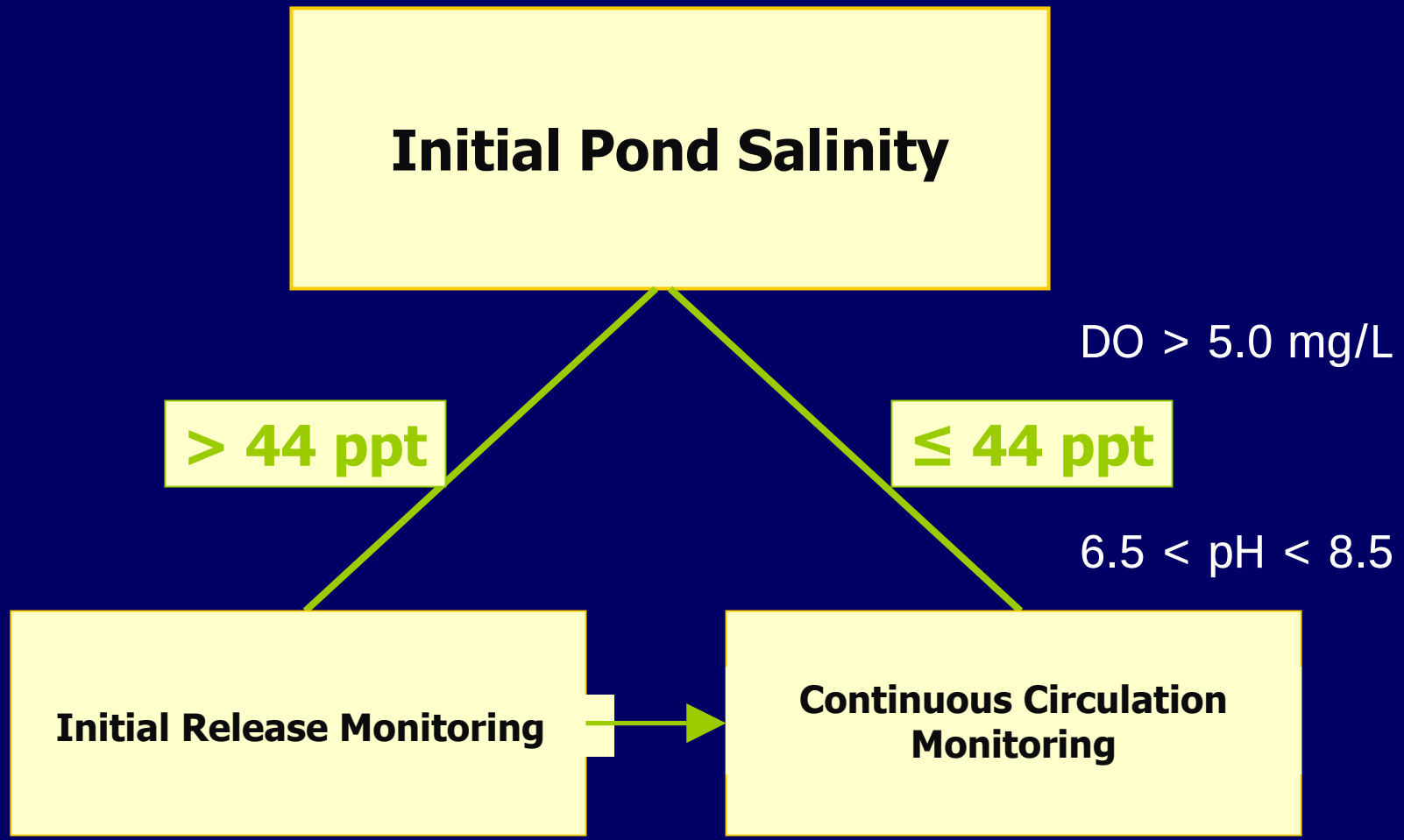
- **March 2003:** Salt pond purchase
- **July 2004:** Initiation of Phase 1 ISP
  - 5 ponds discharged
- **April 2005:** Phase 2 ISP
  - 4 additional ponds discharged
- **March 2006:** Alviso Island Ponds breached

Most ponds now affected by ISP changes!



Regulatory Monitoring Requirements



Discharge Samples
(In-pond monitoring)

- Data collected inside pond at discharge point
  - Specific conductance (salinity)
  - Dissolved oxygen
  - Temperature
  - pH
- Continuously logging meters (15 minute interval)

IRM

- Monitor at time of initial discharge regardless of season

CCM

- Monitor May through October while discharging

Receiving Water Samples
(Bay and Slough)

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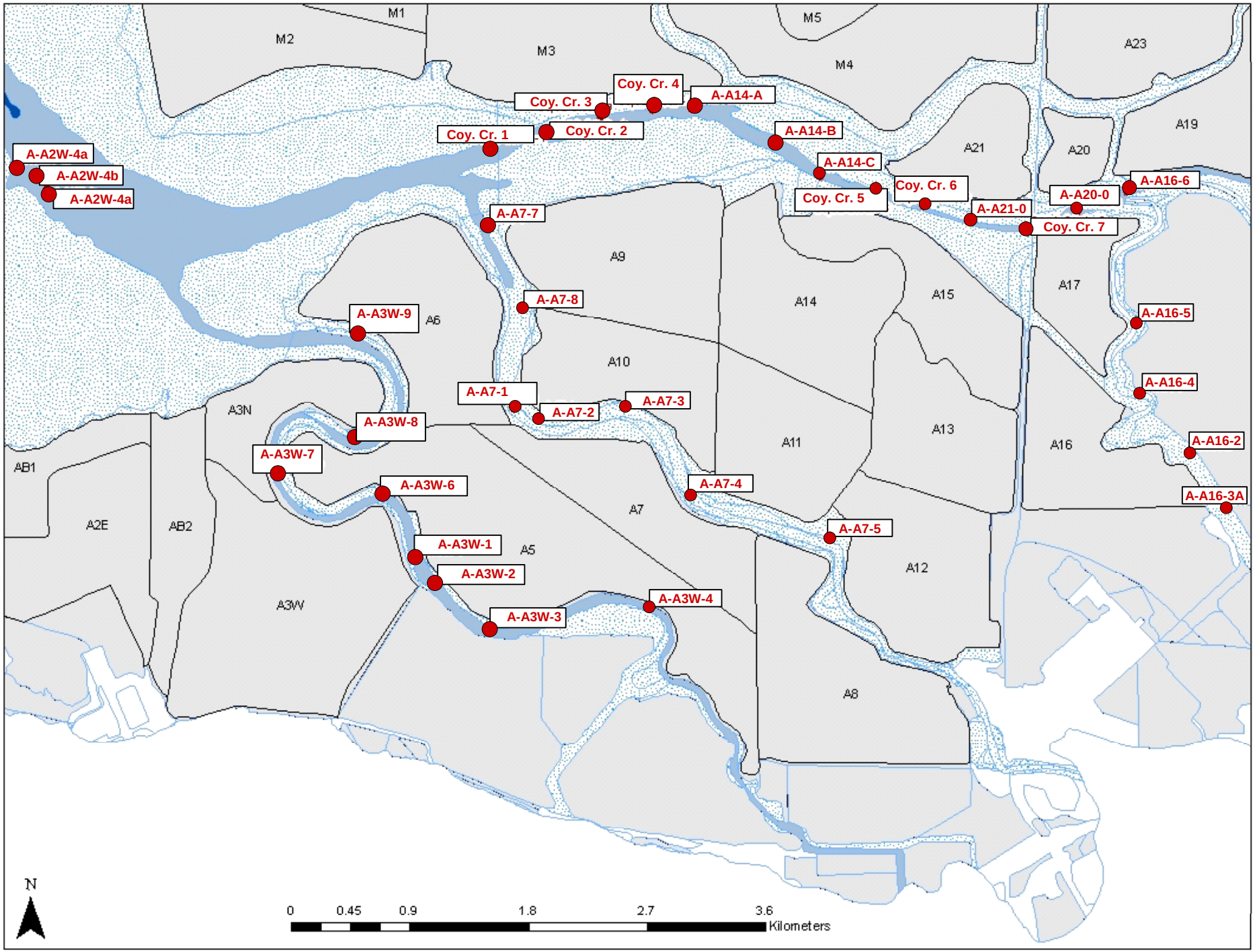
- Data collected outside pond
  - Slough or bay samples
- Samples collected upstream and downstream of discharge point
  - Point samples
  - 25cm below surface and at near-bottom
  - Average distance between samples 800m
- Standard Observations recorded
  - Water color, odors, floating material, wildlife & recreational uses, weather and tide stage

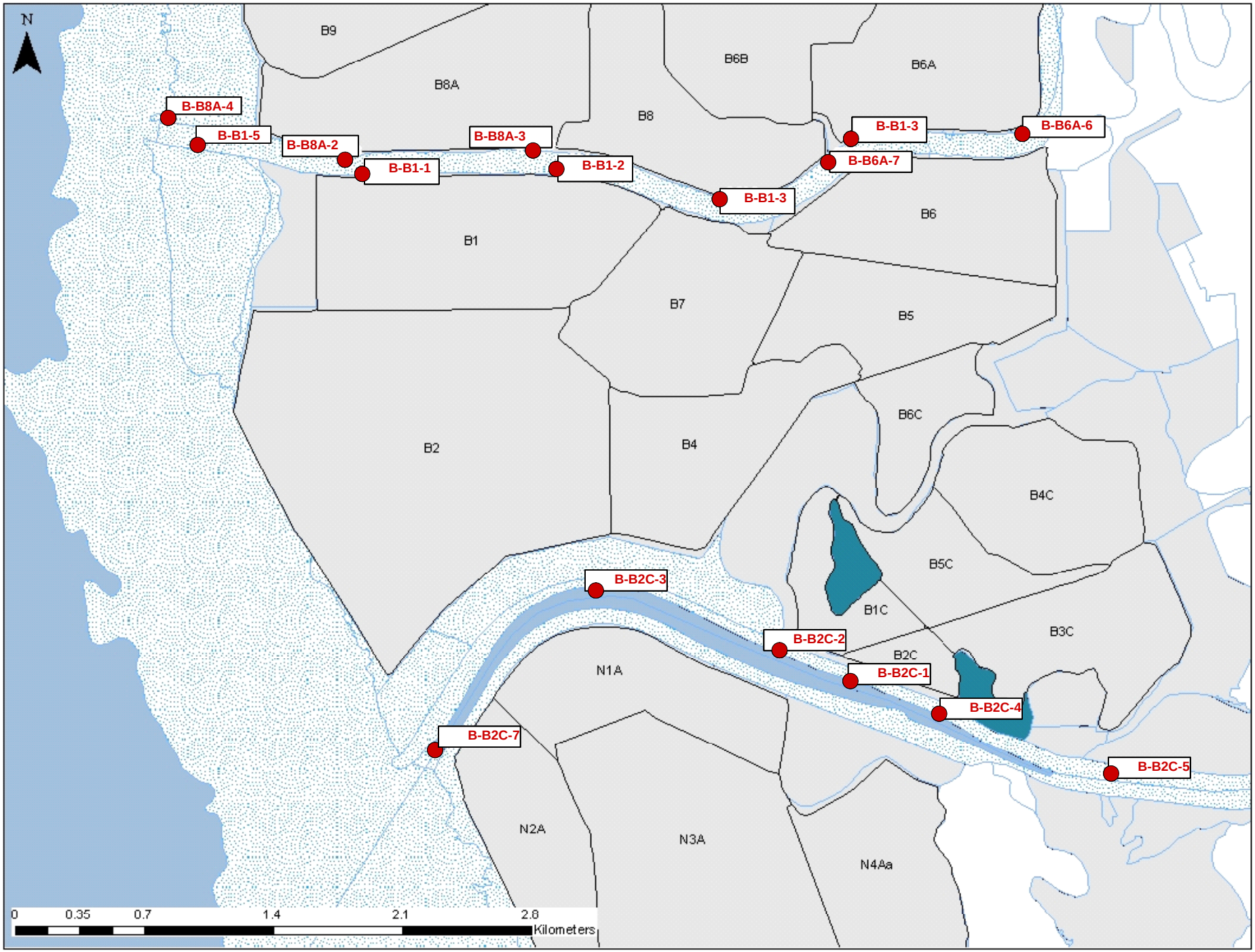
IRM

- Samples collected 7 days before discharge, then 1, 3, and 7 days after discharge, weekly thereafter

CCM

- Samples collected monthly, May through October


M1
M2
M3
M4
M5
A23
A19
A21
A20
A17
A15
A14
A9
A6
A10
A3N
A11
A13
A16
AB1
A2E
AB2
A7
A5
A3W
A12
A8
Coy. Cr. 4
Coy. Cr. 3
A-A14-A
Coy. Cr. 1
Coy. Cr. 2
A-A14-B
A-A14-C
Coy. Cr. 6
Coy. Cr. 5
A-A16-6
A-A20-0
A-A21-0
Coy. Cr. 7
A-A2W-4a
A-A2W-4b
A-A2W-4a
A-A7-7
A-A7-8
A-A3W-9
A-A16-5
A-A7-1
A-A7-2
A-A7-3
A-A16-4
A-A3W-8
A-A3W-7
A-A16-2
A-A3W-6
A-A7-4
A-A16-3A
A-A7-5
A-A3W-1
A-A3W-2
A-A3W-4
A-A3W-3
N
0
0.45
0.9
1.8
2.7
3.6
Kilometers


N
B9
B8A
B6B
B6A
B8
B-B8A-4
B-B1-5
B-B8A-2
B-B8A-3
B-B1-3
B-B6A-6
B-B1-1
B-B1-2
B-B6A-7
B-B1-3
B6
B1
B7
B5
B2
B4
B6C
B4C
B5C
B-B2C-3
B1C
B3C
B-B2C-2
B2C
N1A
B-B2C-1
B-B2C-4
B-B2C-7
B-B2C-5
N2A
N3A
N4Aa
0
0.35
0.7
1.4
2.1
2.8
Kilometers

Meter cleaning and calibration

(2+ days/week)

- Meters downloaded weekly
- Pre- and post-cleaning data consistency checks performed
- Winkler samples collected
- Batteries replaced

- Sensors calibrated every 1-2 weeks
- Sensors cleaned biweekly or as needed
- DO sensor membrane replaced as needed

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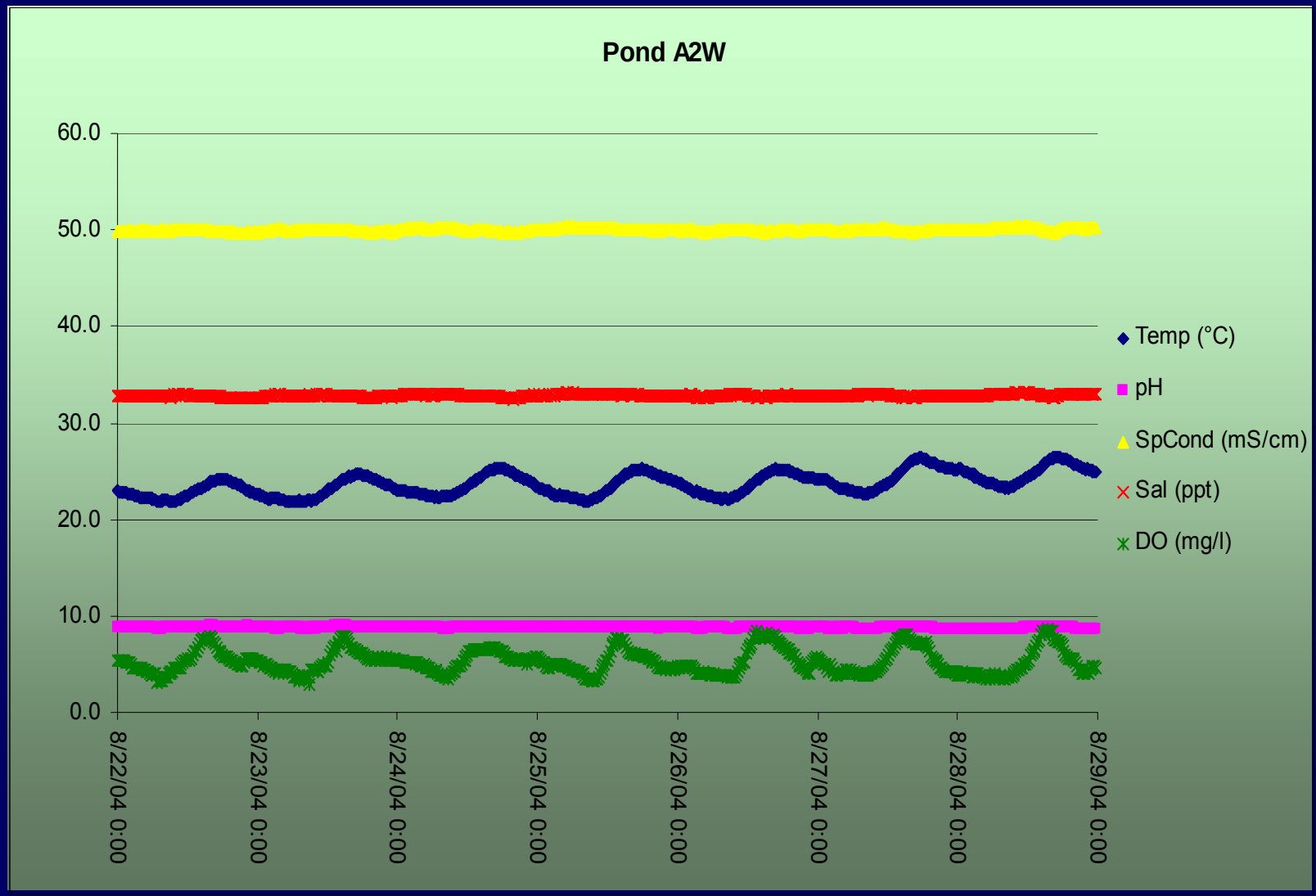
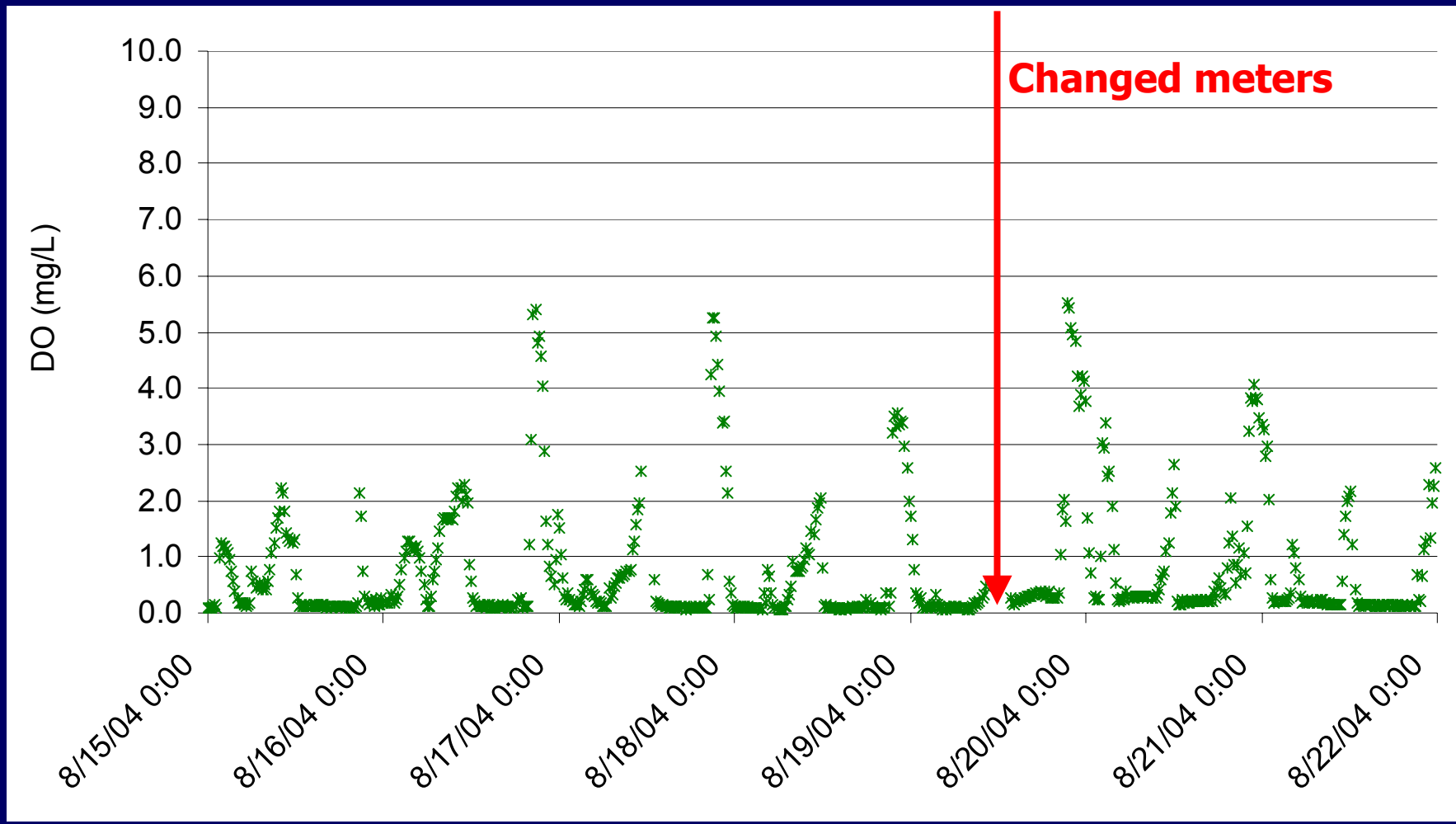
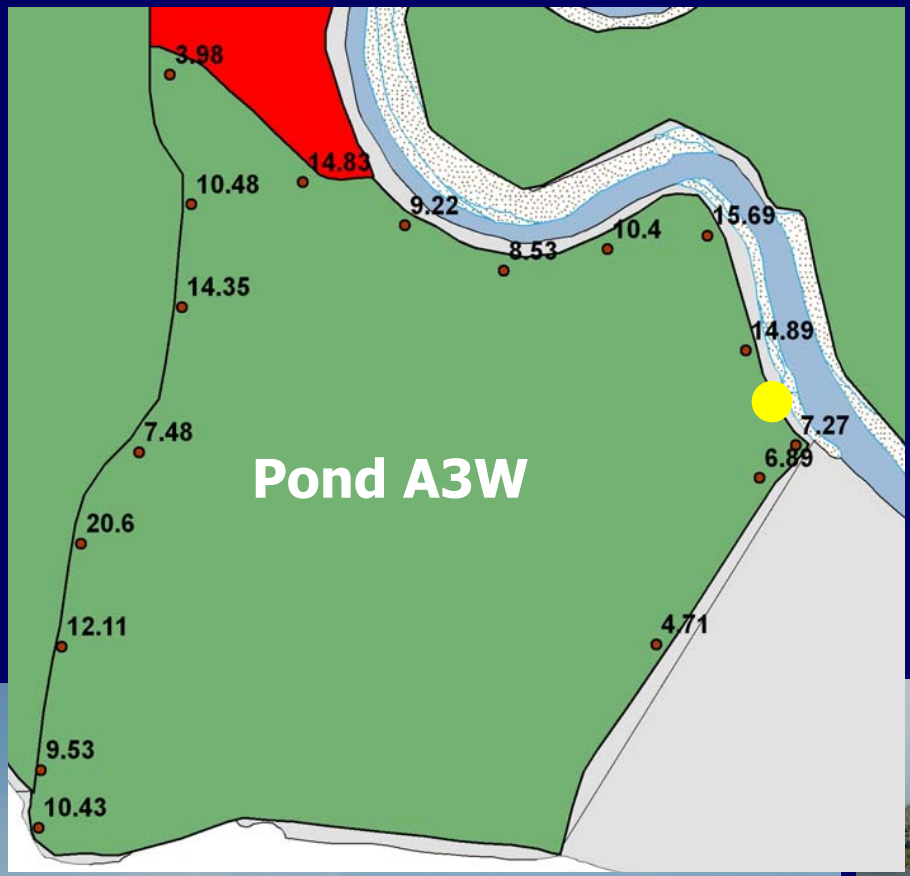
Continuous water quality data



Low DO in discharge ponds



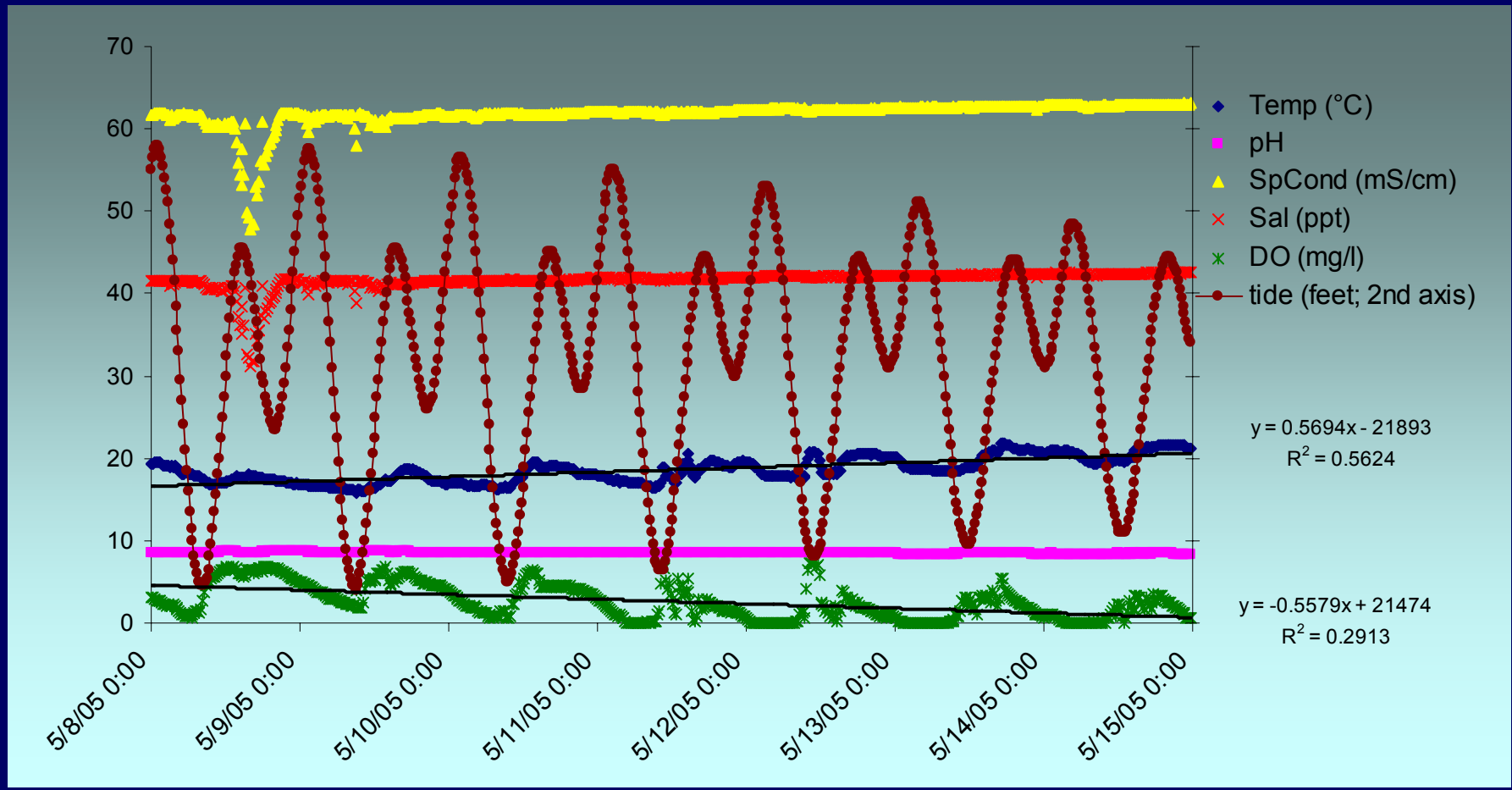
Pond A3W, August 2004



- Localized low DO in pond A3W
- Algal mat at water control structure location

Declining DO coincides with increased temperature

- Reduced capacity of warmer water to hold oxygen
- Higher temperatures cause higher rates of algal decomposition

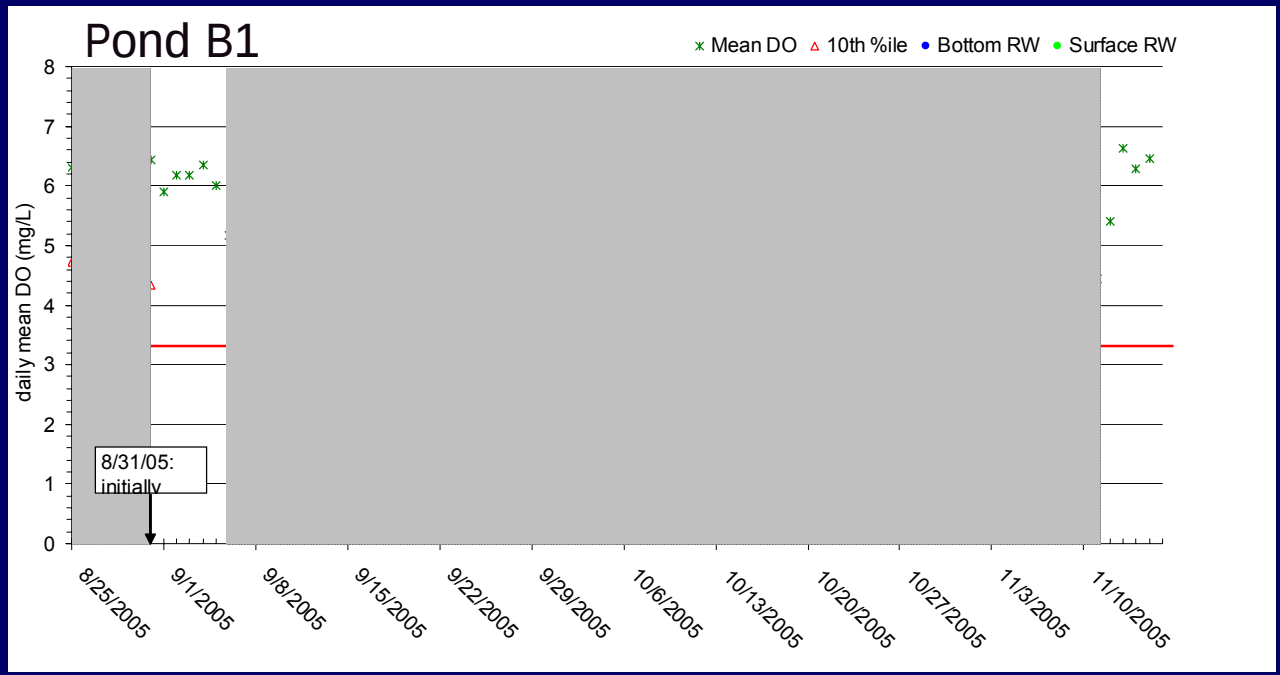


Attempts to control low DO water releases

Solar aerator

Baffles

Close the pond



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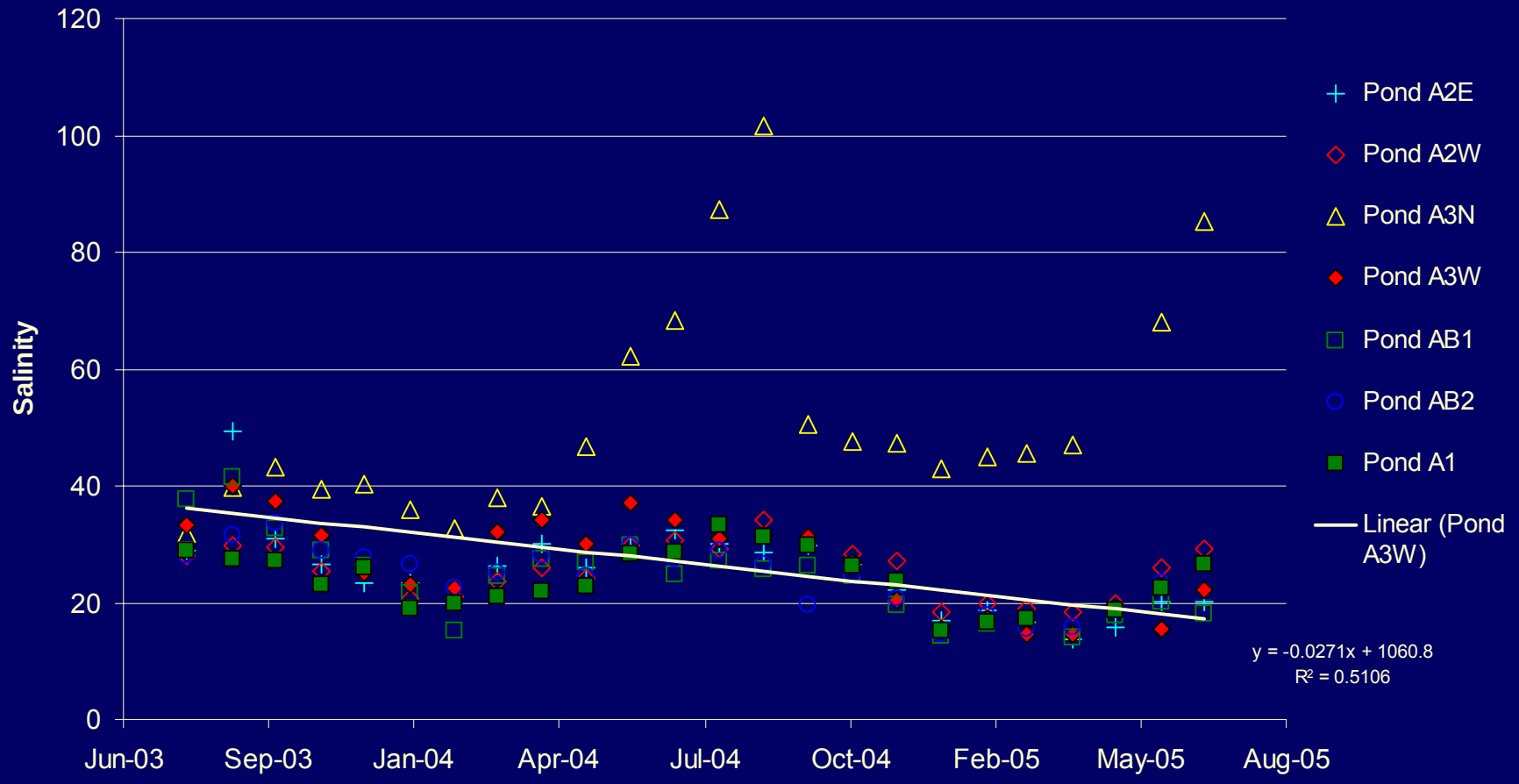
Salinity declined in pond systems open to circulation



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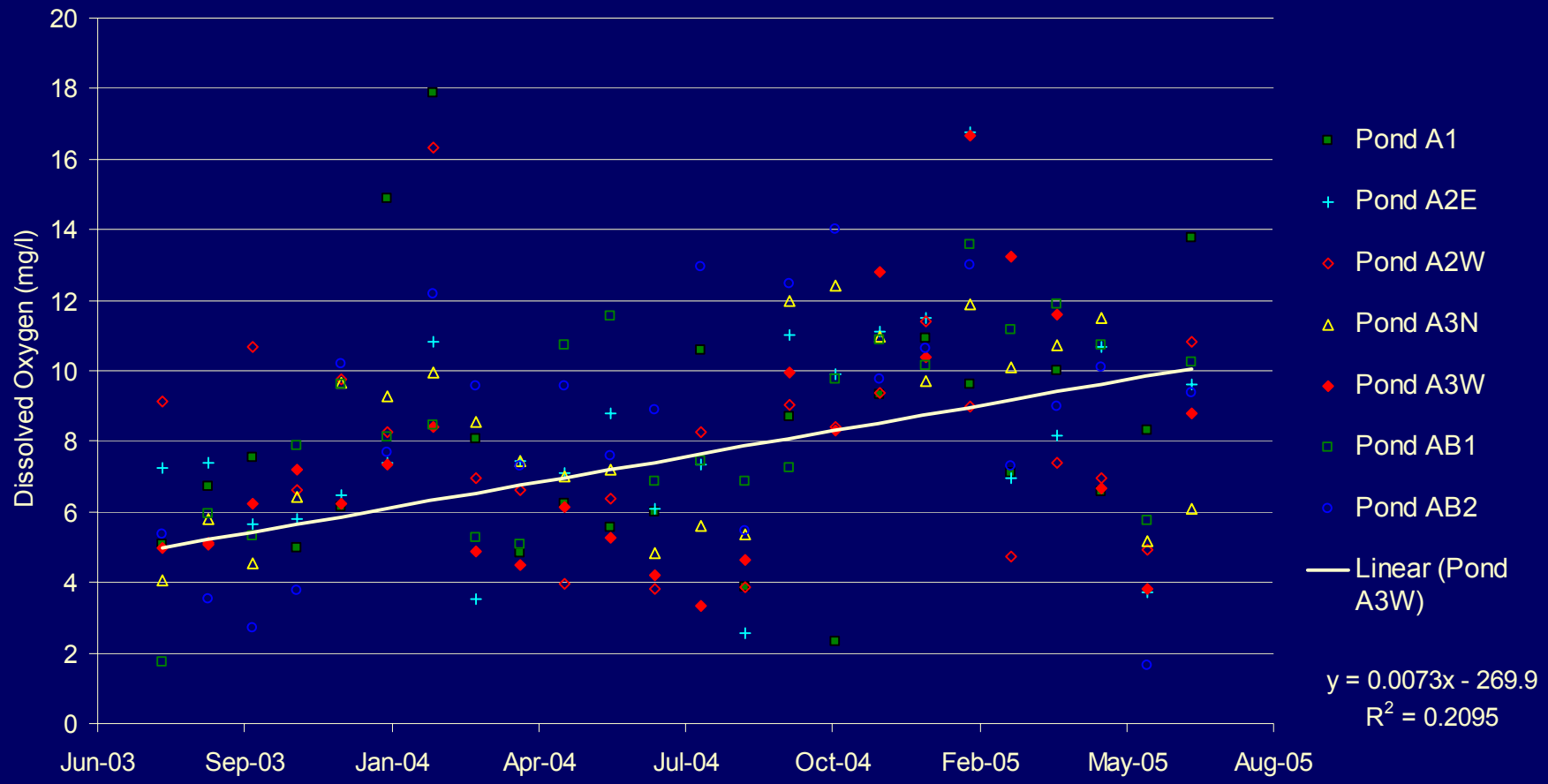
. . . and dissolved oxygen increased



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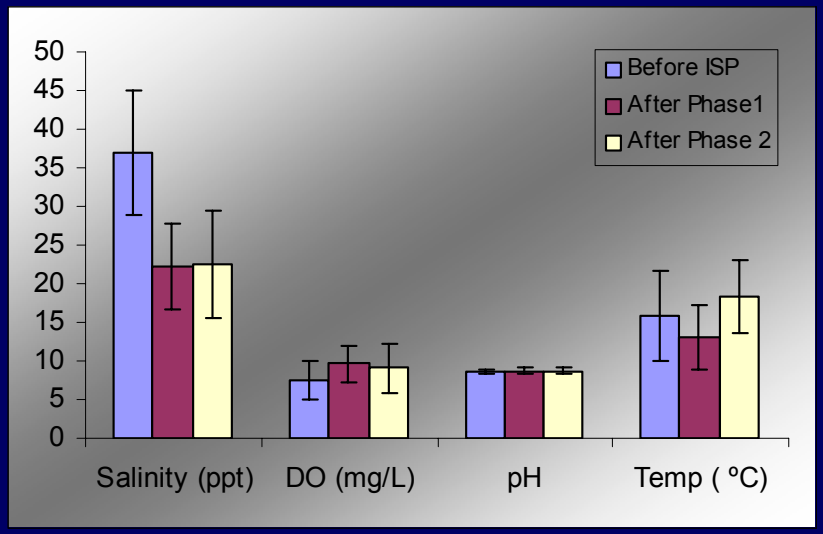
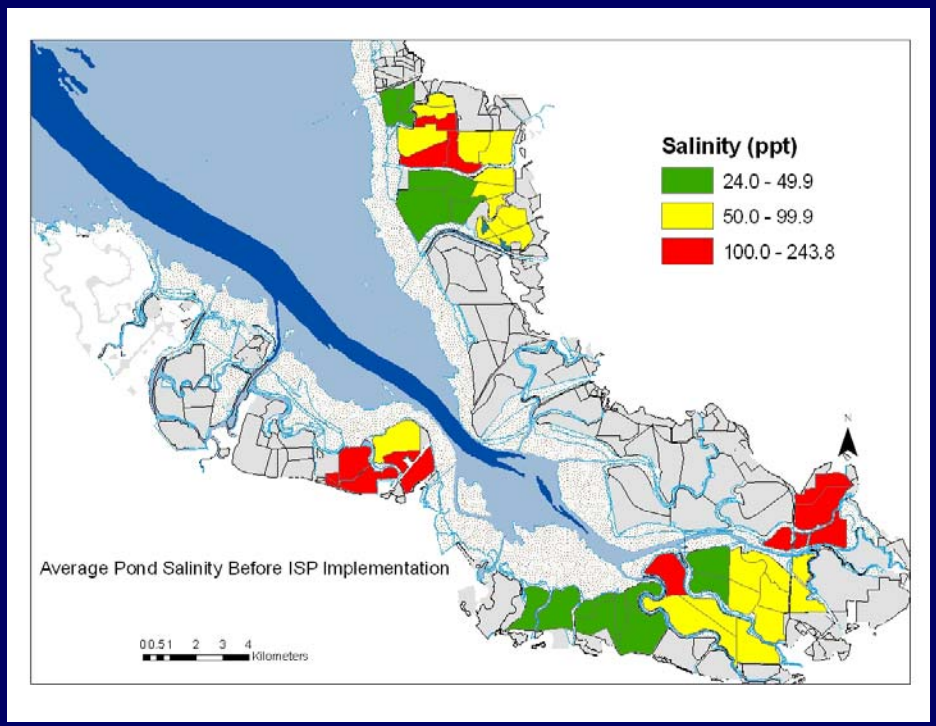
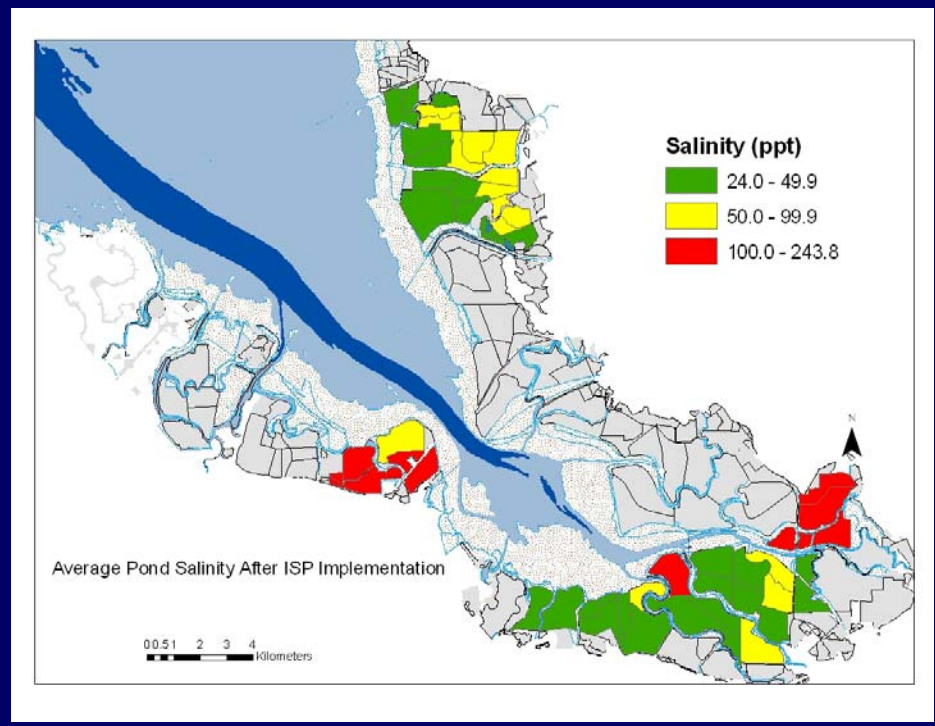


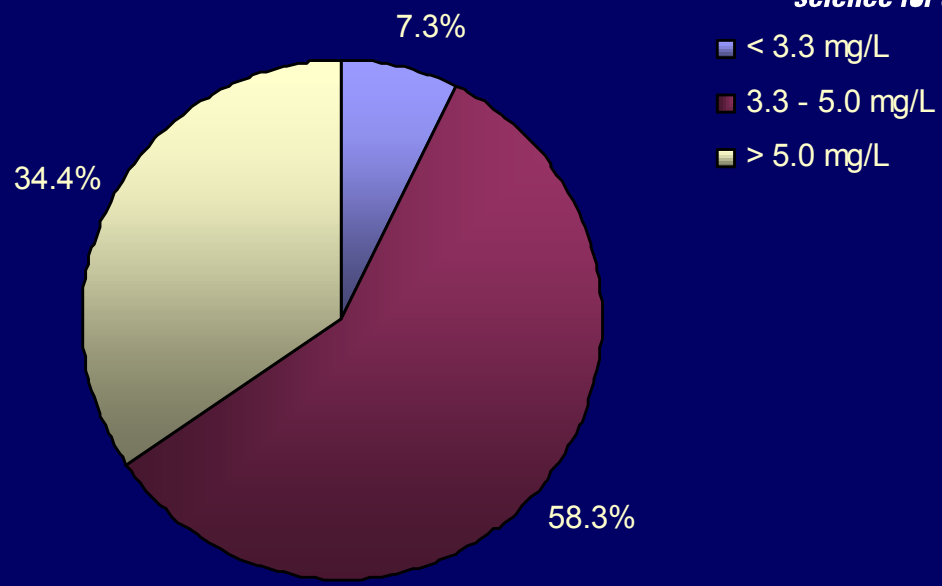
Salinity changes following Phase 1 ISP





A3W Receiving Waters

(Guadalupe Slough)



Flood Tide*

Upstream samples: 85% < 5.0 mg/L

Discharge samples: 100% < 5.0 mg/L

Downstream samples: 75% < 5.0 mg/L

Ebb Tide*

Upstream samples: 100% < 5.0 mg/L

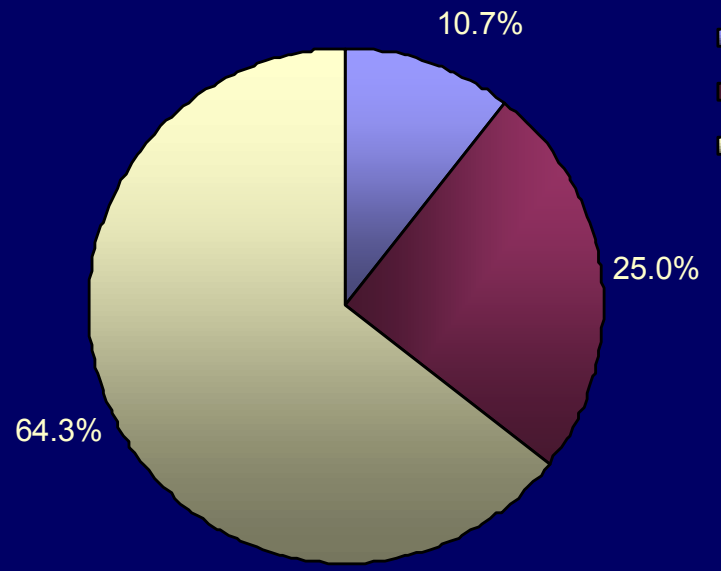
Discharge samples: 63% > 5.0 mg/L

Downstream samples: 75% < 5.0 mg/L

***Tide estimated from field notes; not the midpoint of tidal cycle.**

A16 Receiving Waters

(Artesian Slough)



Flood Tide*

Upstream samples: 95% > 5.0 mg/L

Discharge samples: 71% > 5.0 mg/L

Downstream samples: 61% < 5.0 mg/L

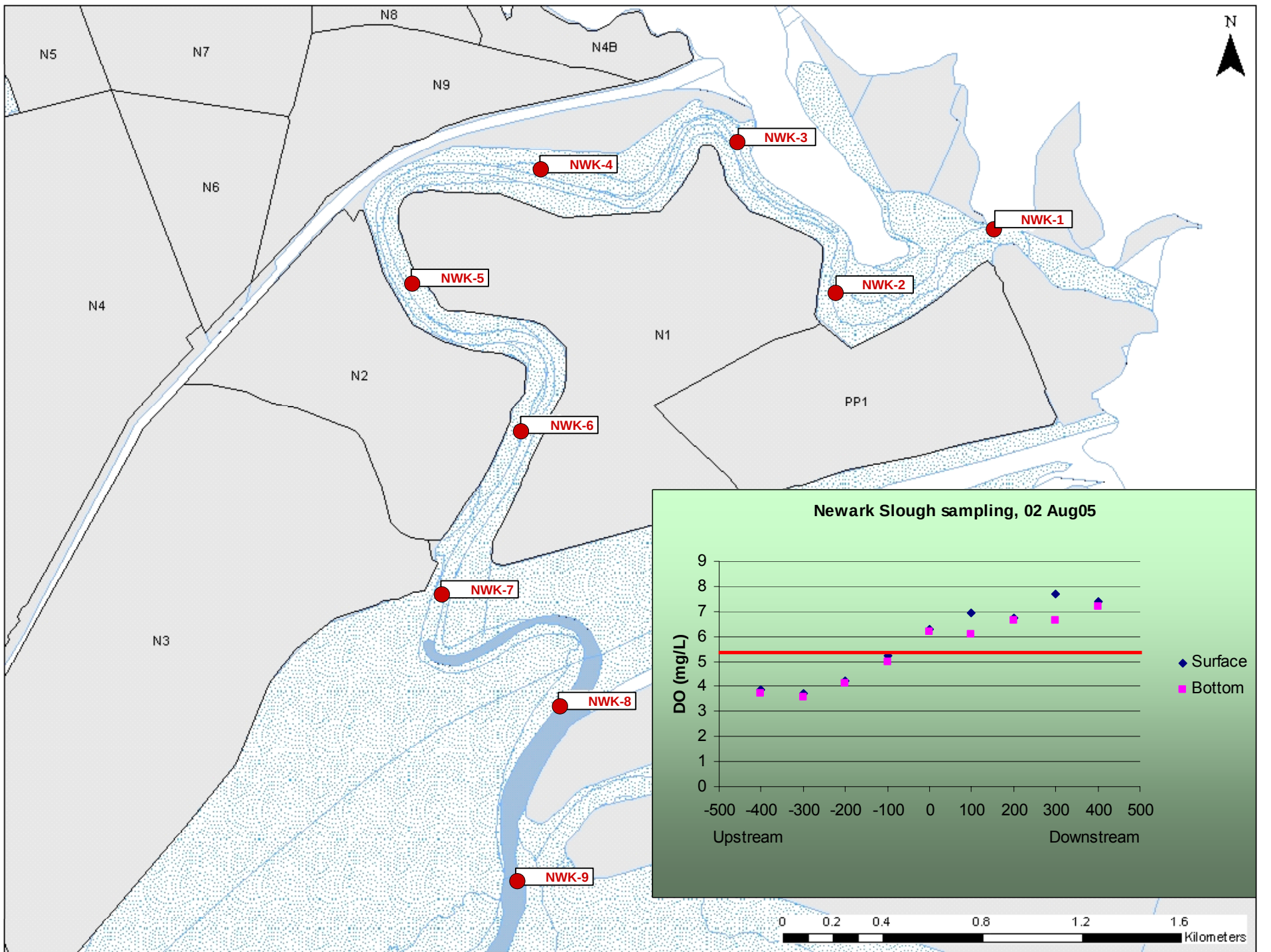
Ebb Tide*

Upstream samples: 95% > 5.0 mg/L

Discharge samples: 67% > 5.0 mg/L

Downstream samples: 58% > 5.0 mg/L

***Tide estimated from field notes; not the midpoint of tidal cycle.**


N
N5
N7
N8
N4B
N9
N6
N4
N2
N1
PP1
N3
NWK-1
NWK-2
NWK-3
NWK-4
NWK-5
NWK-6
NWK-7
NWK-8
NWK-9
Newark Slough sampling, 02 Aug05
DO (mg/L)
0
1
2
3
4
5
6
7
8
9
-500 -400 -300 -200 -100 0 100 200 300 400 500
Upstream
Downstream
Surface
Bottom
0 0.2 0.4 0.8 1.2 1.6
Kilometers

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Alviso Island Ponds breached in March 2006

Water Quality Data Inventory

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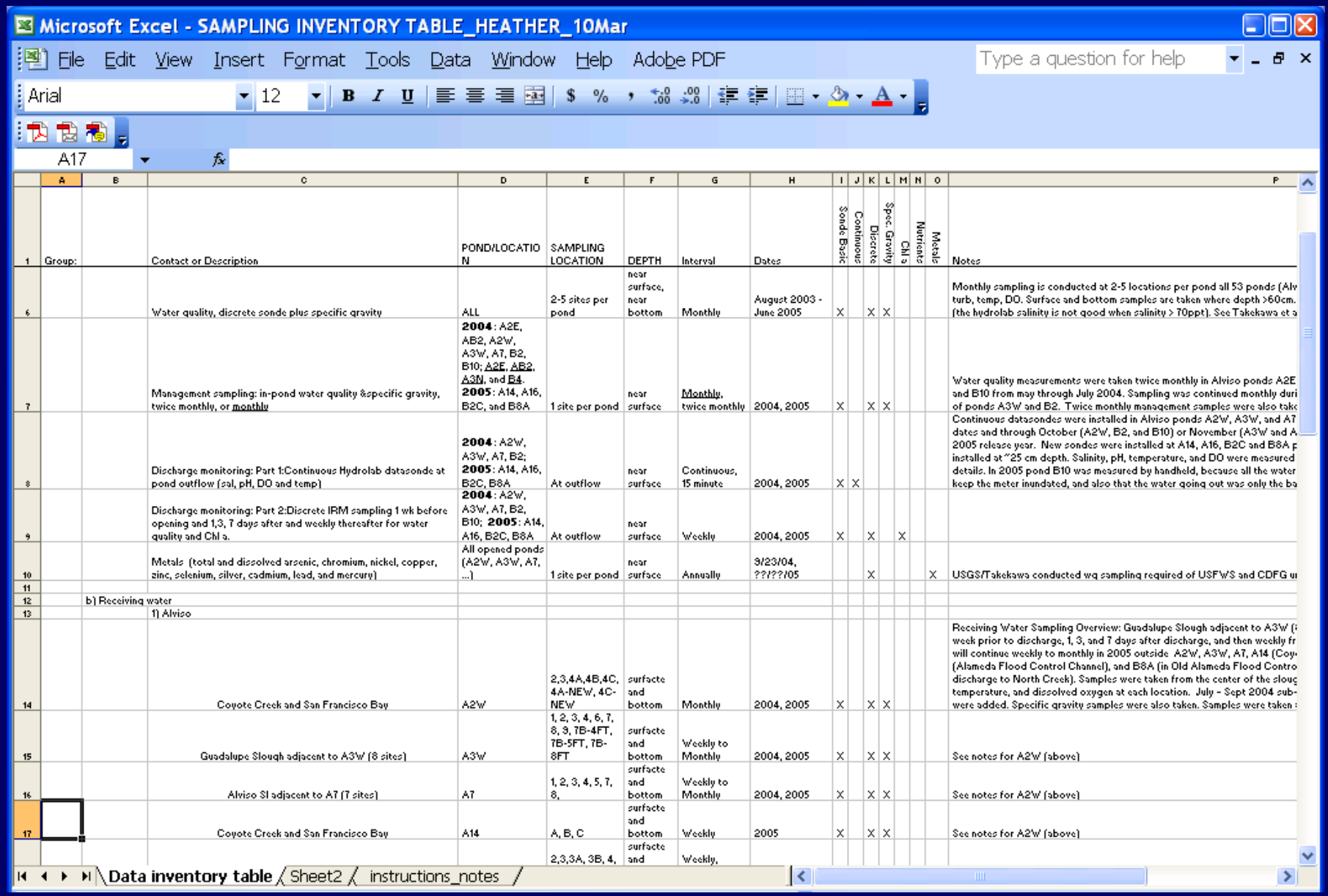

Microsoft Excel - SAMPLING INVENTORY TABLE_HEATHER_10Mar

File Edit View Insert Format Tools Data Window Help Adobe PDF

Type a question for help

Arial 12

A17

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	Group:		Contact or Description	POND/LOCATION	SAMPLING LOCATION	DEPTH	Interval	Dates	Sonde Basic	Continuous	Discrete	Spec. Gravity	Chl a	Nutrients	Metals	Notes
6			Water quality, discrete sonde plus specific gravity	ALL	2-5 sites per pond	near surface, near bottom	Monthly	August 2003 - June 2005	X		X	X				Monthly sampling is conducted at 2-5 locations per pond all 53 ponds (Alv turb, temp, DO. Surface and bottom samples are taken where depth >60cm. (the hydrolab salinity is not good when salinity > 70ppt). See Takekawa et a
7			Management sampling: in-pond water quality &specific gravity, twice monthly, or monthly	**2004**: A2E, AB2, A2W, A3W, A7, B2, B10; A2E, AB2, A3N, and B4. **2005**: A14, A16, B2C, and B8A	1 site per pond	near surface	Monthly, twice monthly	2004, 2005	X		X	X				Water quality measurements were taken twice monthly in Alviso ponds A2E and B10 from may through July 2004. Sampling was continued monthly duri of ponds A3W and B2. Twice monthly management samples were also take
8			Discharge monitoring: Part 1:Continuous Hydrolab datasonde at pond outflow (sal, pH, DO and temp)	**2004**: A2W, A3W, A7, B2; **2005**: A14, A16, B2C, B8A	At outflow	near surface	Continuous, 15 minute	2004, 2005	X	X						Continuous datasondes were installed in Alviso ponds A2W, A3W, and A7 dates and through October (A2W, B2, and B10) or November (A3W and A 2005 release year. New sondes were installed at A14, A16, B2C and B8A p installed at ~25 cm depth. Salinity, pH, temperature, and DO were measured details. In 2005 pond B10 was measured by handheld, because all the water keep the meter inundated, and also that the water going out was only the ba
9			Discharge monitoring: Part 2:Discrete IRM sampling 1 wk before opening and 1,3, 7 days after and weekly thereafter for water quality and Chl a.	**2004**: A2W, A3W, A7, B2, B10; **2005**: A14, A16, B2C, B8A	At outflow	near surface	Weekly	2004, 2005	X		X		X			
10			Metals (total and dissolved arsenic, chromium, nickel, copper, zinc, selenium, silver, cadmium, lead, and mercury)	All opened ponds (A2W, A3W, A7, ...)	1 site per pond	near surface	Annually	9/23/04, ??/??/05			X				X	USGS/Takekawa conducted wq sampling required of USFWS and CDFG u
11																
12		b) Receiving water														
13			1) Alviso													
14			Coyote Creek and San Francisco Bay	A2W	2,3,4A,4B,4C, 4A-NEW, 4C-NEW	surfacte and bottom	Monthly	2004, 2005	X		X	X				Receiving Water Sampling Overview: Guadalupe Slough adjacent to A3W (week prior to discharge, 1, 3, and 7 days after discharge, and then weekly fr will continue weekly to monthly in 2005 outside A2W, A3W, A7, A14 (Coy (Alameda Flood Control Channel), and B8A (in Old Alameda Flood Contro discharge to North Creek). Samples were taken from the center of the sloug temperature, and dissolved oxygen at each location. July - Sept 2004 sub- were added. Specific gravity samples were also taken. Samples were taken
15			Guadalupe Slough adjacent to A3W (8 sites)	A3W	1, 2, 3, 4, 6, 7, 8, 9, 7B-4FT, 7B-5FT, 7B-8FT	surfacte and bottom	Weekly to Monthly	2004, 2005	X		X	X				See notes for A2W (above)
16			Alviso Sl adjacent to A7 (7 sites)	A7	1, 2, 3, 4, 5, 7, 8,	surfacte and bottom	Weekly to Monthly	2004, 2005	X		X	X				See notes for A2W (above)
17			Coyote Creek and San Francisco Bay	A14	A, B, C	surfacte and bottom	Weekly	2005	X		X	X				See notes for A2W (above)
					2,3,3A, 3B, 4,	surfacte and	Weekly,									

Data inventory table | Sheet2 | instructions_notes

Acknowledgments

- Kathleen Henderson, USGS
- Juan Flores, USFWS
- Don Edwards San Francisco Bay National Wildlife Refuge
- California Department of Fish and Game
- State Coastal Conservancy
- Resources Legacy Fund
- Regional Water Quality Control Board