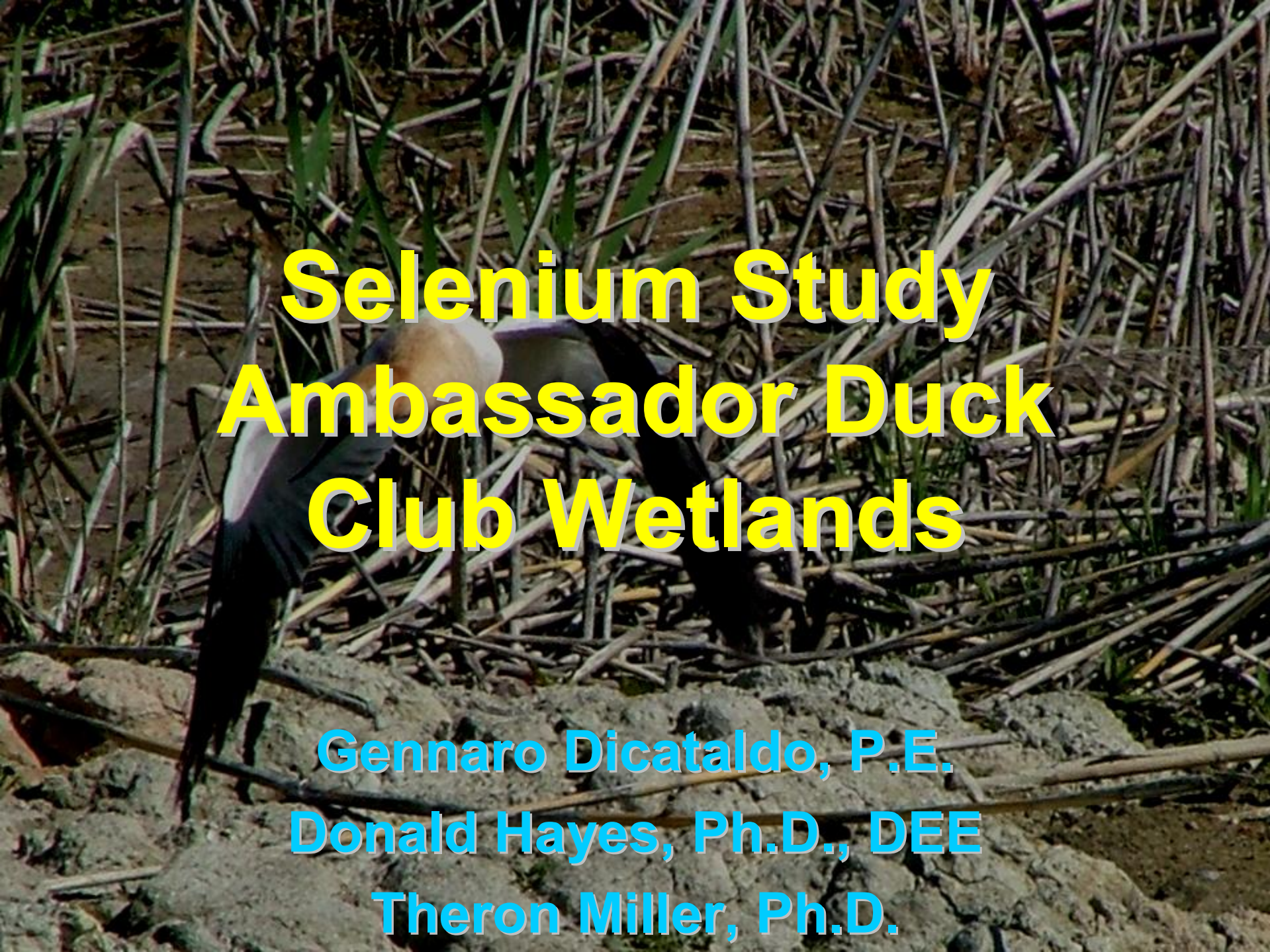
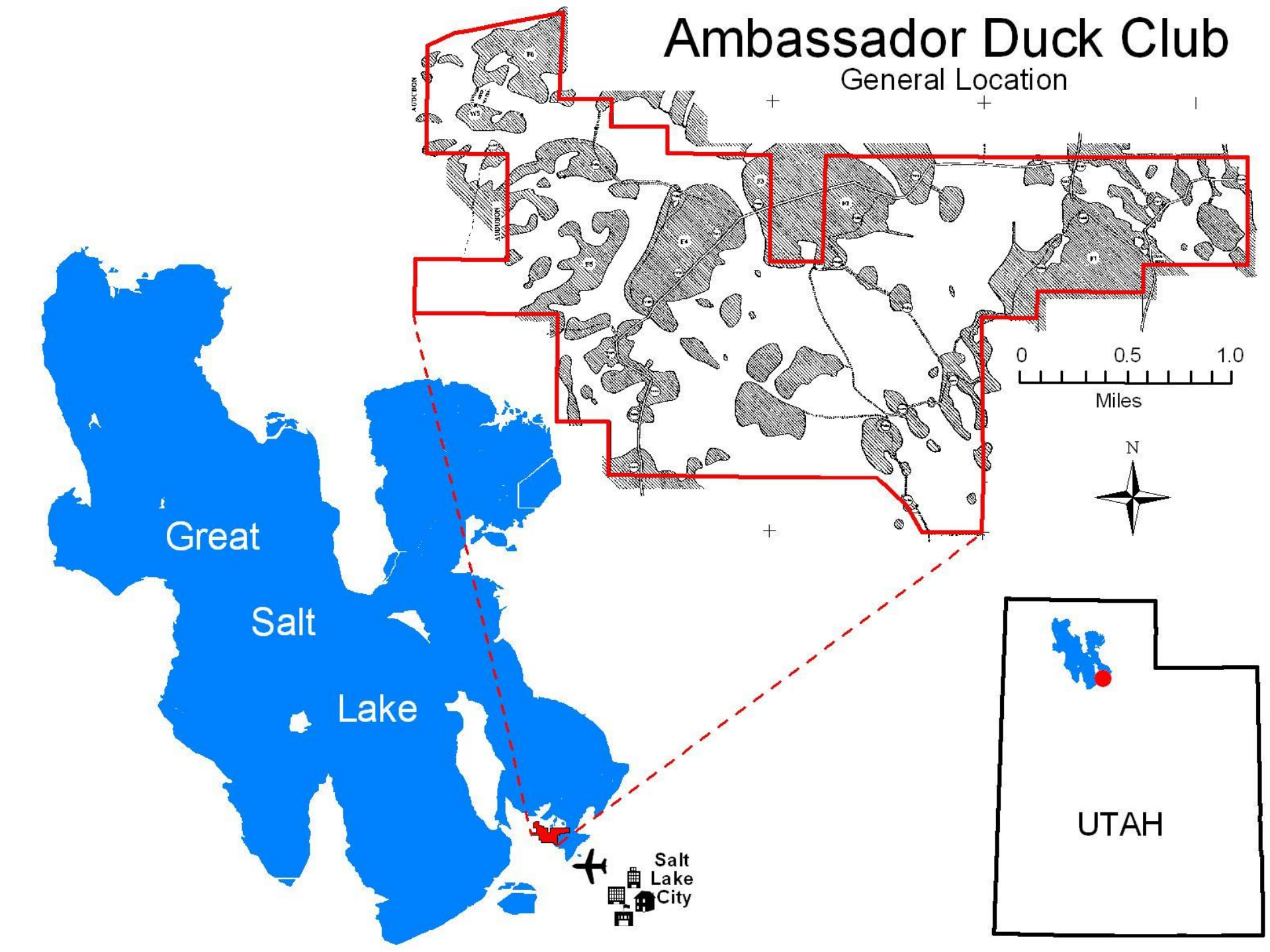
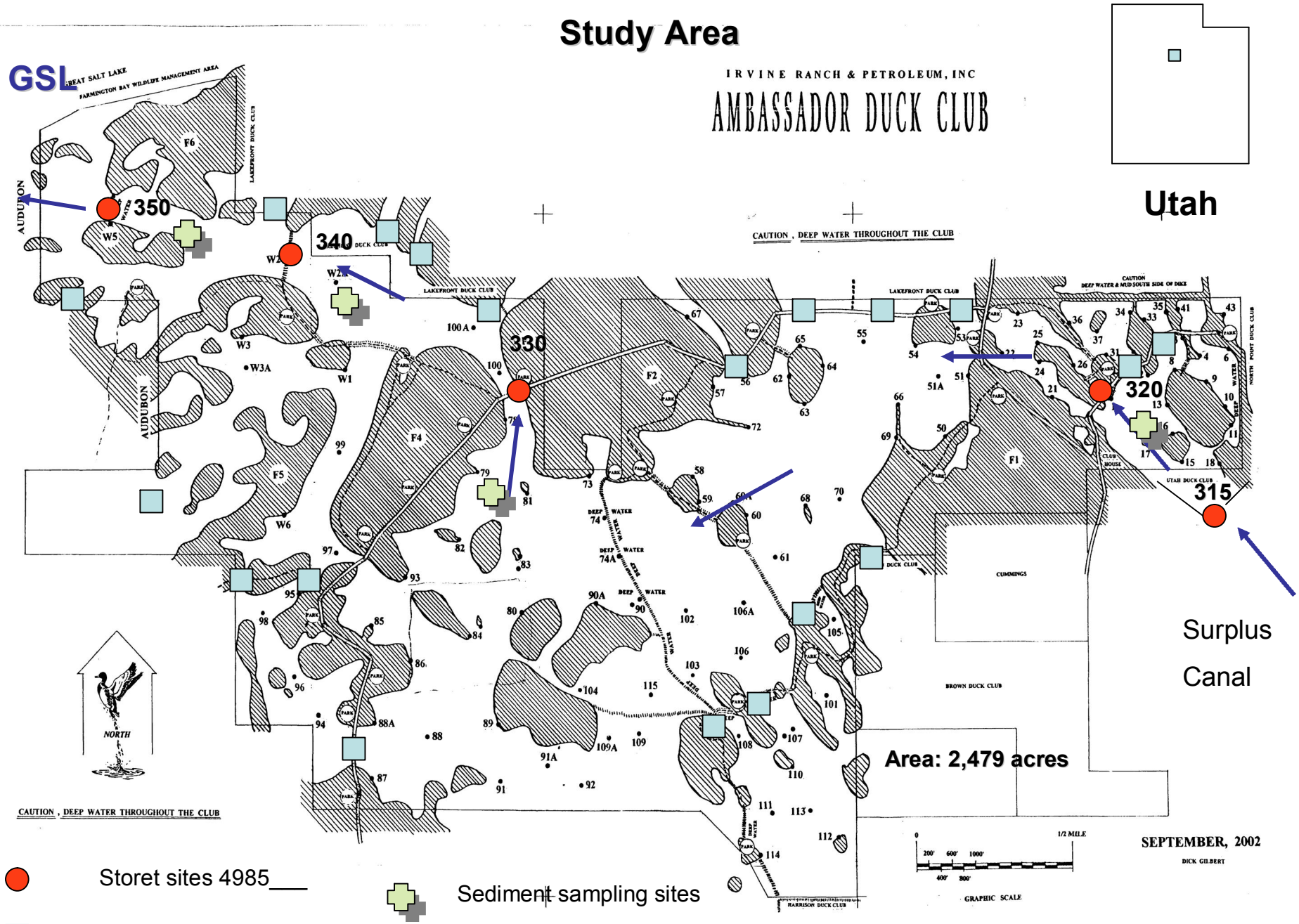


Selenium Study Ambassador Duck Club Wetlands

Gennaro Dicataldo, P.E.
Donald Hayes, Ph.D., DEE
Theron Miller, Ph.D.


Ambassador Duck Club
General Location
0
0.5
1.0
Miles
N
Great
Salt
Lake
Salt
Lake
City
UTAH

Study Area

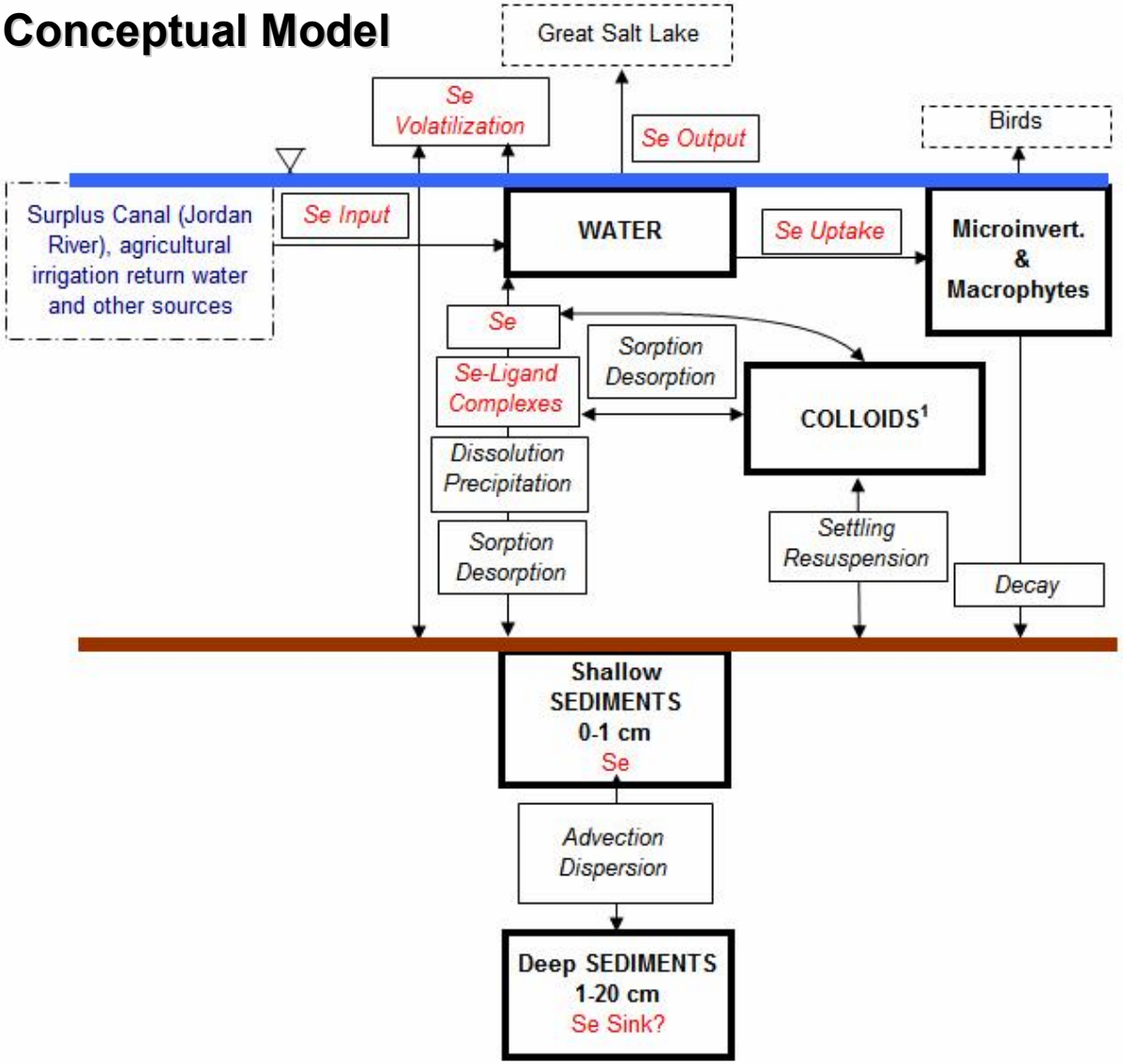

GSL
GREAT SALT LAKE
FARMINGTON BAY WILDLIFE MANAGEMENT AREA
IRVINE RANCH & PETROLEUM, INC
AMBASSADOR DUCK CLUB
Utah
350
340
330
320
315
AUDUBON
LAKEFRONT DUCK CLUB
CAUTION , DEEP WATER THROUGHOUT THE CLUB
NORTH POINT DUCK CLUB
UTAH DUCK CLUB
CUMMINGS
BROWN DUCK CLUB
HARRISON DUCK CLUB
NORTH
Surplus
Canal
Area: 2,479 acres
SEPTEMBER, 2002
DICK GILBERT
GRAPHIC SCALE
Storet sites 4985___
Additional sites
Sediment sampling sites

Overview

- Status of Contract
- Partitioning Conceptual Model
- Preliminary data
- HGAAS vs. ICP-MS
- Budget

Tasks	% Completion
1. Literature Review	100%
2. Wetland Water Budget	50%
3. Initial Field Studies	100%
4. Field Studies	50%
5. Biological Studies	50%
6. Creation of Model	90%
7. Validation of Model	0%

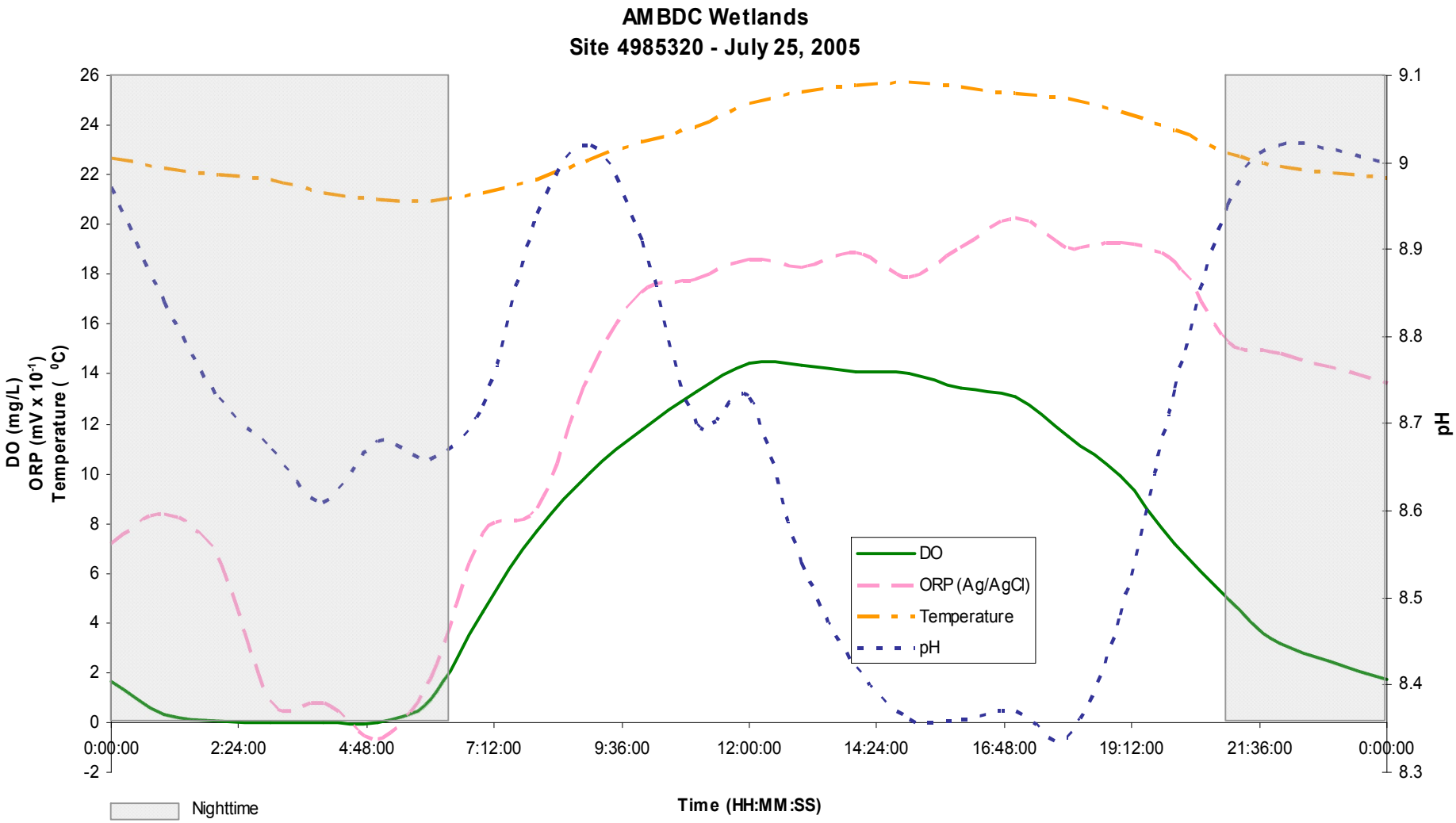
Conceptual Model



Legend:

→	Mass transfer
Bold	Compartment
Italicized	Biogeochemical Process
– – –	Inflow
------	Not Included
1	Particles ranging from 1E-3 μm to 0.45 μm

Water Quality Data
TROLL 9000



Pre-publication Data - Funding provided by USEPA and Utah DEQ

Preliminary Selenium Data
Water Samples Analyzed with HGAAS[1]

• SPECIES	μg/L
Se (+6), selenate	1 - 1.5
Se (+4), selenite	0 - 0.2
Se(0), elemental selenium + Se (-2), organic selenium	0 - 0.4

[1]Pre-publication Data. Funding provided by USEPA and Utah DEQ.

Preliminary Selenium Data[1]

Water Samples Analyzed with HGAAS & ICPMS (ug/l)
[Comparison of Methods]

	HGAAS[2]	ICPMS
• Total Selenium	0.2 - 1.5	1-13[2]
• Dissolved Selenium	0.2 – 1.5	1-12[2]

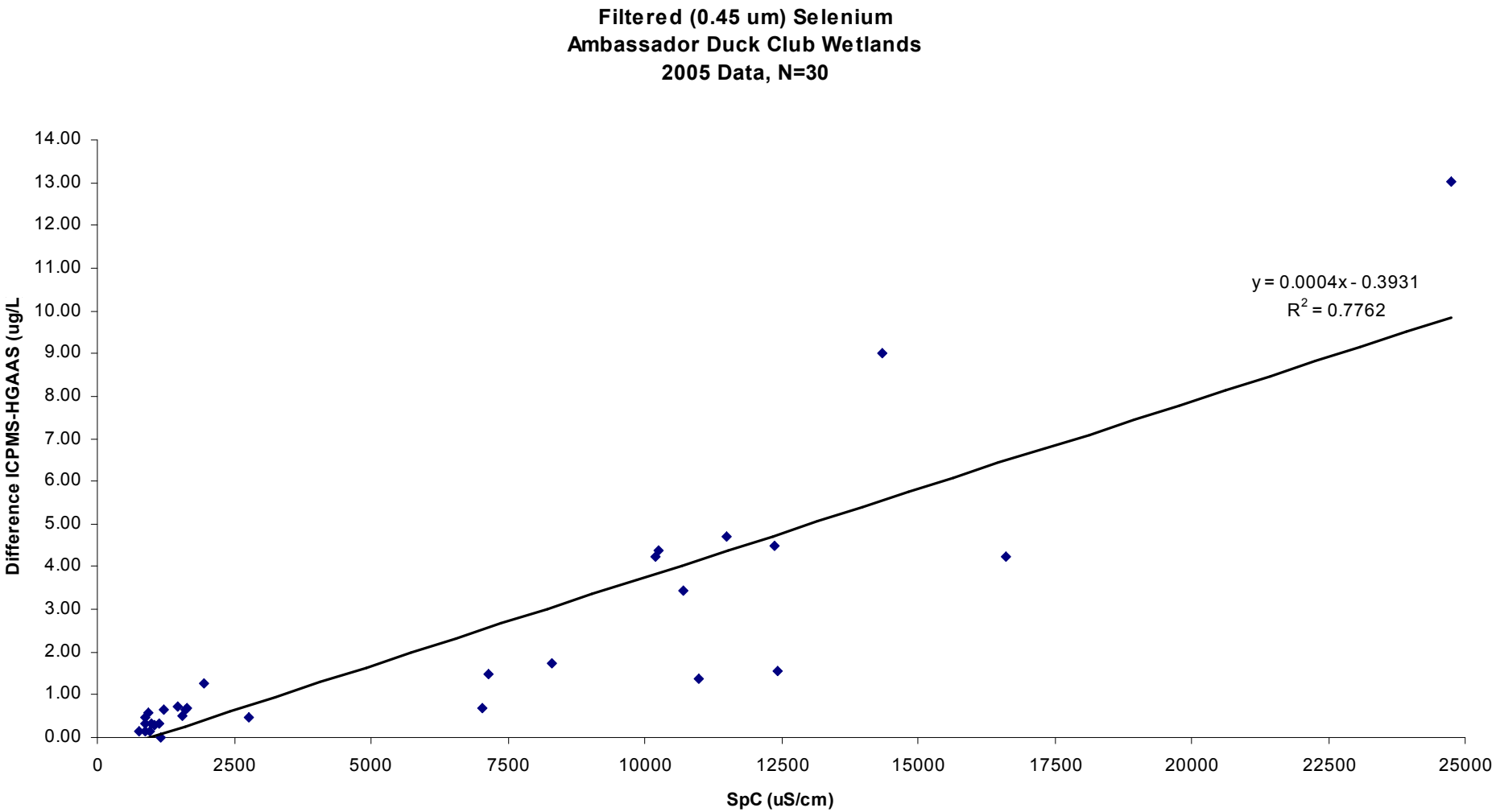
[1]Pre-publication Data. Funding provided by USEPA and Utah DEQ.

[2]TDS > 10,000 ppm

[3]Approximately 200+ samples analyzed over 300+ Collected Up-to-Date.

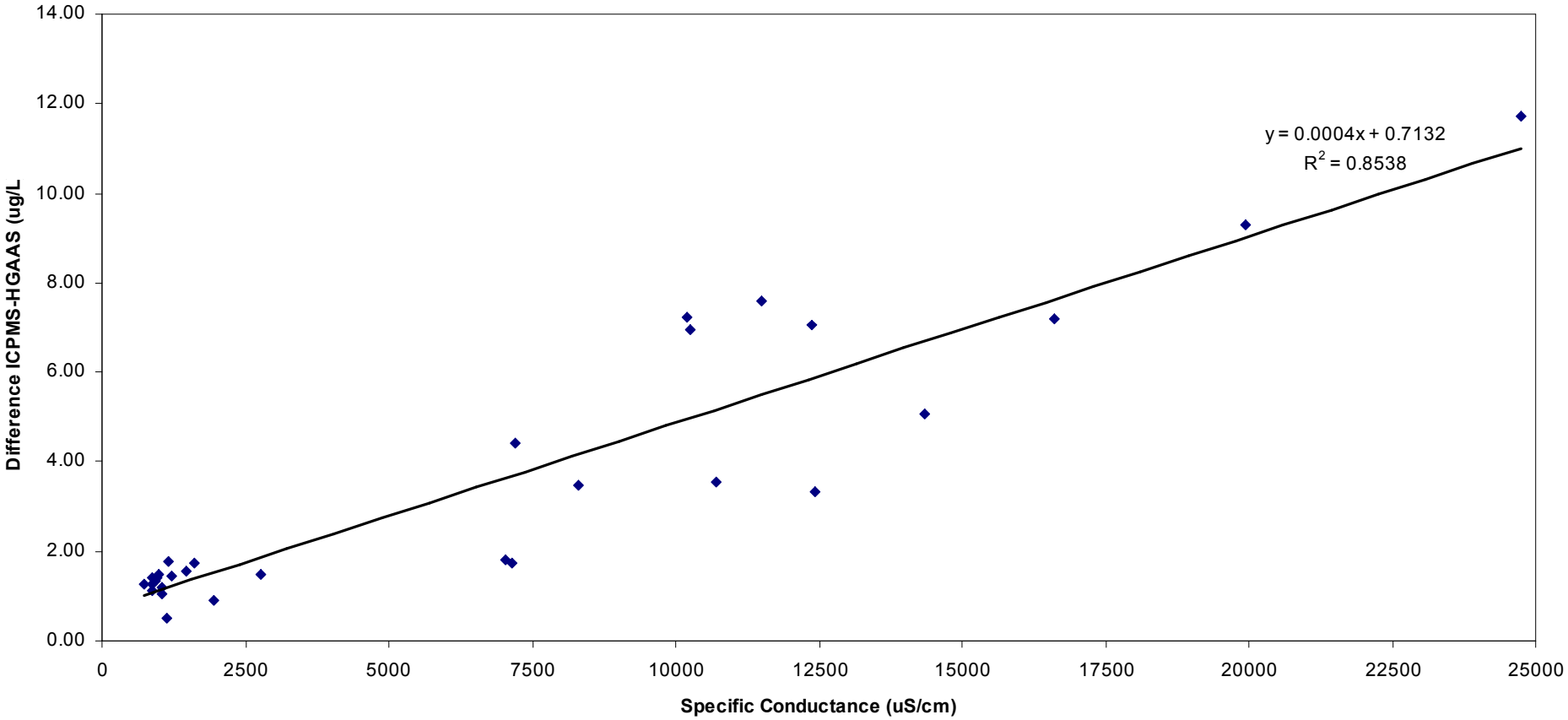
Analytical Question

- We have looked at Specific Conductance (TDS) effects on measurements.
  - ICP-MS vs. HGAAS
- What is the cut off point where Specific Conductance (TDS) interference causes unreliability of ICP-MS measurements?



Pre-publication Data. Funding provided by USEPA and Utah DEQ

Total Selenium
Ambassador Duck Club Wetland
2005 Data, N=30



Pre-publication Data. Funding provided by USEPA and Utah DEQ

Budget

Total $116,793

Year 2005 (6 months)

- $ 43,568 EPA Grant
- ($ 36,000 DWQ (HGAAS))

Year 2006 (12 months)

- $ 73,225
  - $20,000 EPA Grant
  - $53,225 GSL General fund?

Study Duration

- 18-24 months

Relationship of Farmington Bay Se Study to the GSL Selenium Study

- Se toxicology indicates that reproduction (i.e. teratogenesis) in water birds is the most sensitive stage.
- Farmington Bay and Bear River Bay are known to produce 10s of thousands of avocets and black necked stilts.
- Because of the initial proposal by Jordan Valley WCD to discharge brine into the Jordan River, we initially focused on Se processes and toxicity in JR delta wetlands.
- The SAP has recommended we perform a lake-wide Se budget, including the effect (treatment) of wetland processes.
  - (Provides the “How” along with the “What”)
- North Davis POTW contains traces of Se AND discharges to Farmington Bay AND contributes to significant wetland habitat development that is used by avocets and Stilts.