Farmington Bay Wetlands: Nutrient Criteria, Biological Studies and Beneficial Uses

Great Salt Lake Advisory Council

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Theron Miller, Ph.D.
Utah Division of Water Quality
Heidi Hoven, Ph.D
Institute for Watershed Sciences
Dr. John Cavitt, WSU; Dr. Sharook Madon, CH2MHill

Impetus

In the Review of Utah's 2002 303(d) List:

- Environmental groups, academics and EPA challenged that we (Utah DEQ) do not assess beneficial uses of Great Salt Lake or its associated wetlands

- Raised concerns about nutrient impacts to Farmington Bay and its wetlands

Where did We Start?

- Needed a Source of Funding
- Needed Technical Assistance
- Needed Stakeholder “Buy-in”

OBJECTIVES

DEVELOP APPROPRIATE METHODOLOGY FOR SITE-SPECIFIC NUTRIENT CRITERIA AND ASSOCIATED METHODOLOGY FOR BENEFICIAL USE ASSESSMENT

APPROACH

- **UNDERSTAND "HOW THE ECOSYSTEM WORKS"**
- **IDENTIFY SENSITIVE HABITAT, SEASON AND FOODCHAIN LINKS**
- **IDENTIFY (TOLERANCE) THRESHOLDS AMONG IMPORTANT ECOSYSTEM COMPONENTS**

FARMINGTON BAY TECHNICAL ADVISORY COMMITTEE

- Theron Miller, Chair, Limnologist, UDEQ
- Ann Neville, Wetland Scientist, Manager, ISSR, Kennecott
- Nancy Keate, Wetland Scientist, UDWR
- Dennis Wenger, Wetlands Scientist, Frontier Corporation
- Heidi Hoven, Wetlands Scientist, Institute for Watershed Sciences
- Wayne Wurtsbaugh, Limnologist, USU
- Amy Defreeze, Wetlands Scientist, Utah Rivers Council
- John Cavitt, Ornithologist, Weber State U
- Don Paul, Ornithologist
- Sam Rushforth, Phycologist, UVSU
- Larry Gray, Entomologist, UVSC
- Sharook Madon, Wetlands Scientist, CH2MHill
- Leland Myers, P.E., Manager, CDSD
- Florence Reynolds, SLC Public Utility
- Ella Sorensen, ornithologist, National Audubon

Beneficial Uses of GSL

Waterfowl and shorebirds

Important feeding and nesting habitat for migratory birds

Aquatic life in their food chain

Corixidae

Chironomidae

Variety of recreational activities

Farmington Bay Wetlands Study 2004-2006

- **Environmental Variables**
  - Water Quality: (Nutrients, pH, TDS, D.O., TSS, temperature).
  - Soils: (pH, conductivity, nutrients, organic matter).
- **Biotic Variables**
  - Plants: (percent cover, height, species composition, diversity, functional groups).
  - Macroinvertebrates: (species composition, relative abundance, diversity, functional groups).
  - Shorebirds: (nesting success, egg hatchability, foraging habitats)

Wetland Sampling Sites

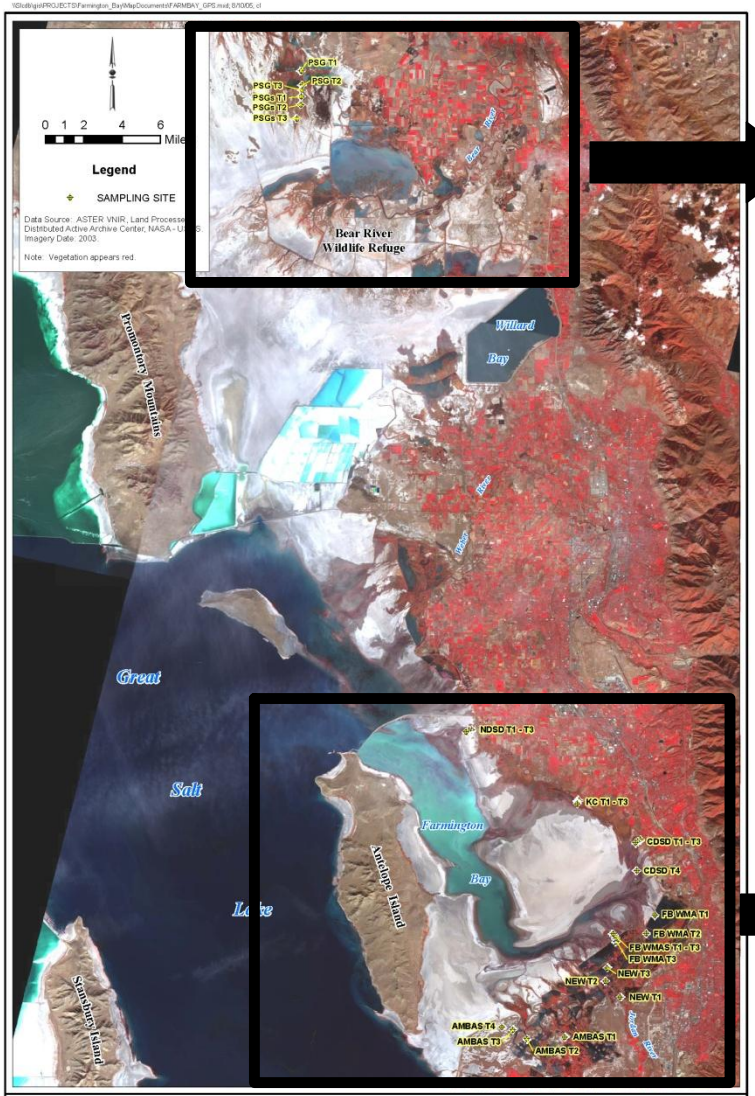
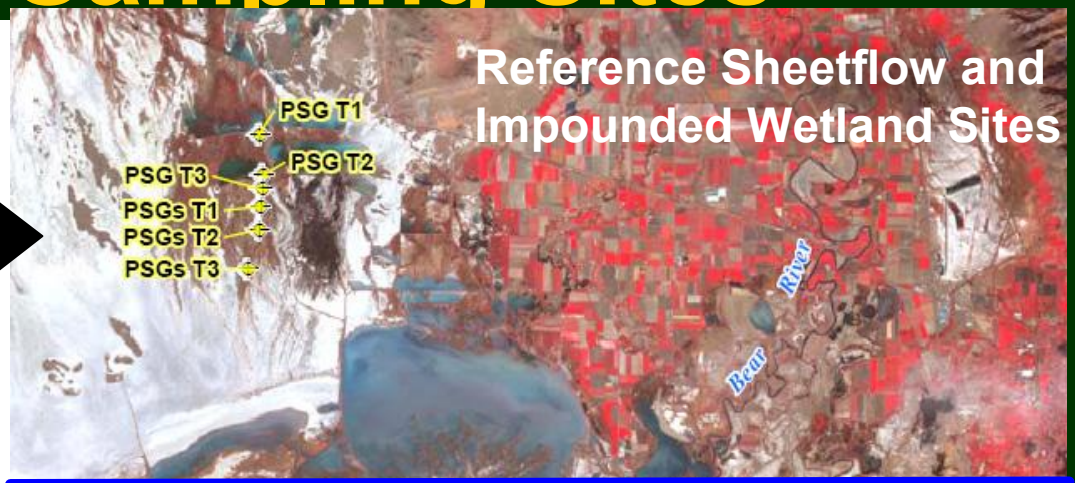
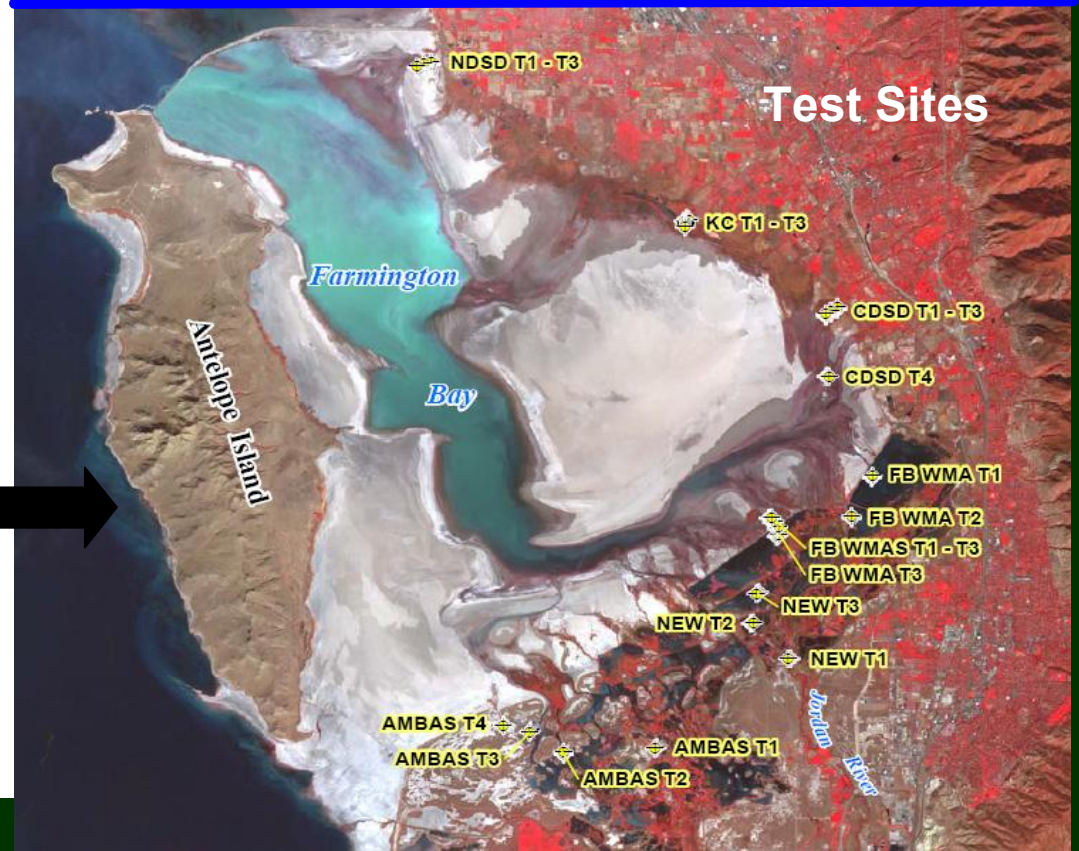


EXHIBIT 1
WETLANDS SAMPLING SITES
STATISTICAL ANALYSES OF 2004 DATA ON WETLAND PLANTS AND INVERTEBRATES IN FARMINTON BAY, GREAT SALT LAKE, UTAH
CH2MHILL





Shorebird Study Objectives

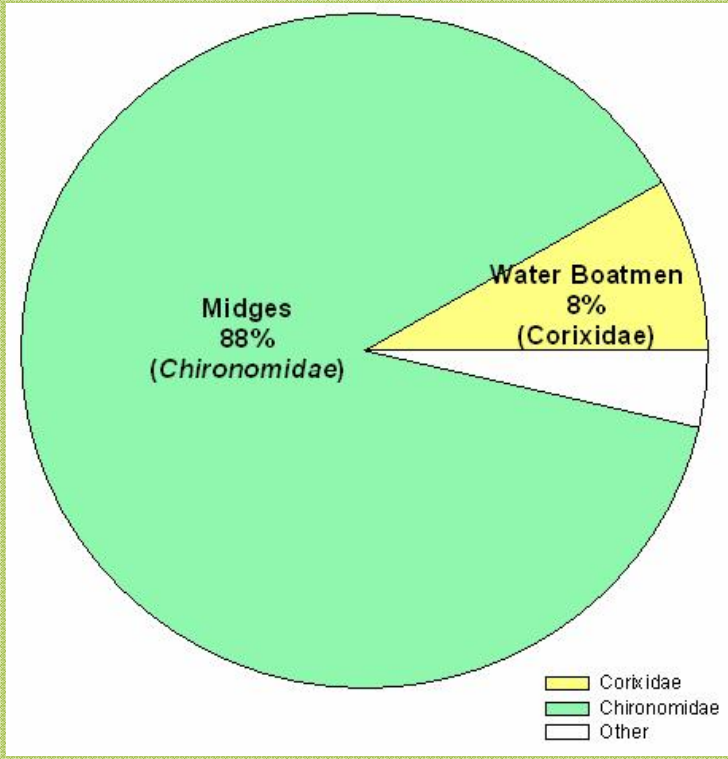
-Nesting habitat

-Nesting Success

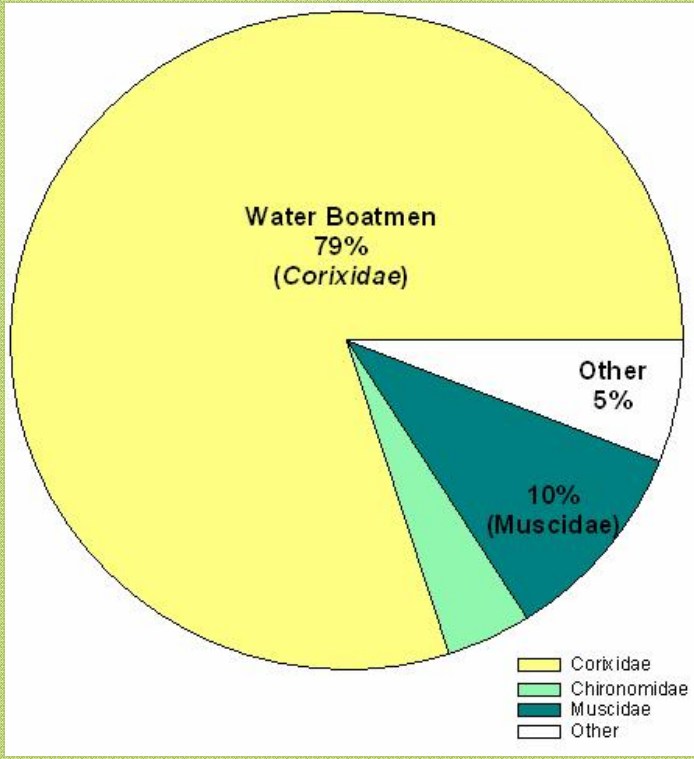
-Hatching success

-Aquatic life in their food chain

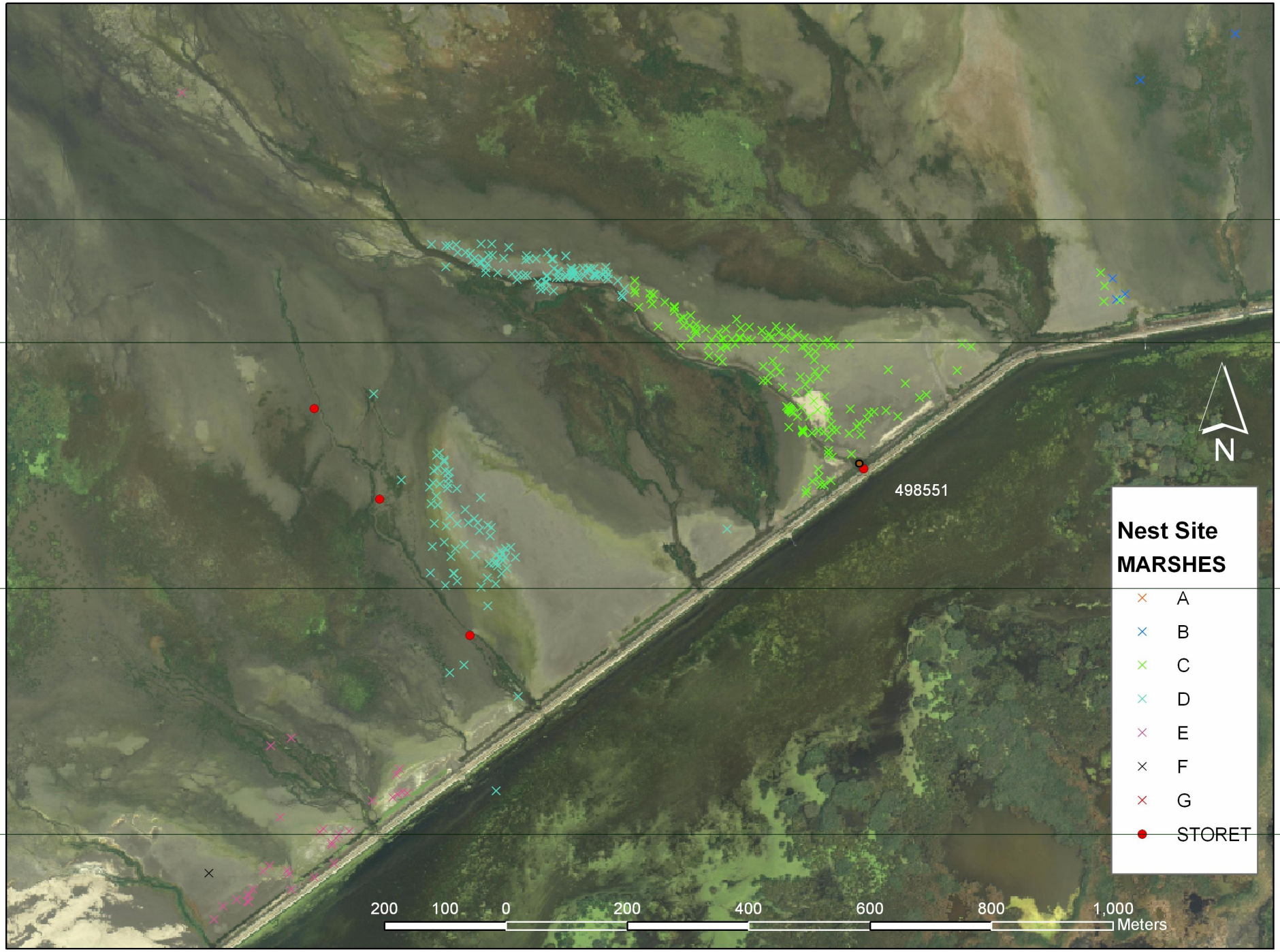
Bear River Bird Refuge
Stomach contents by volume



American avocet



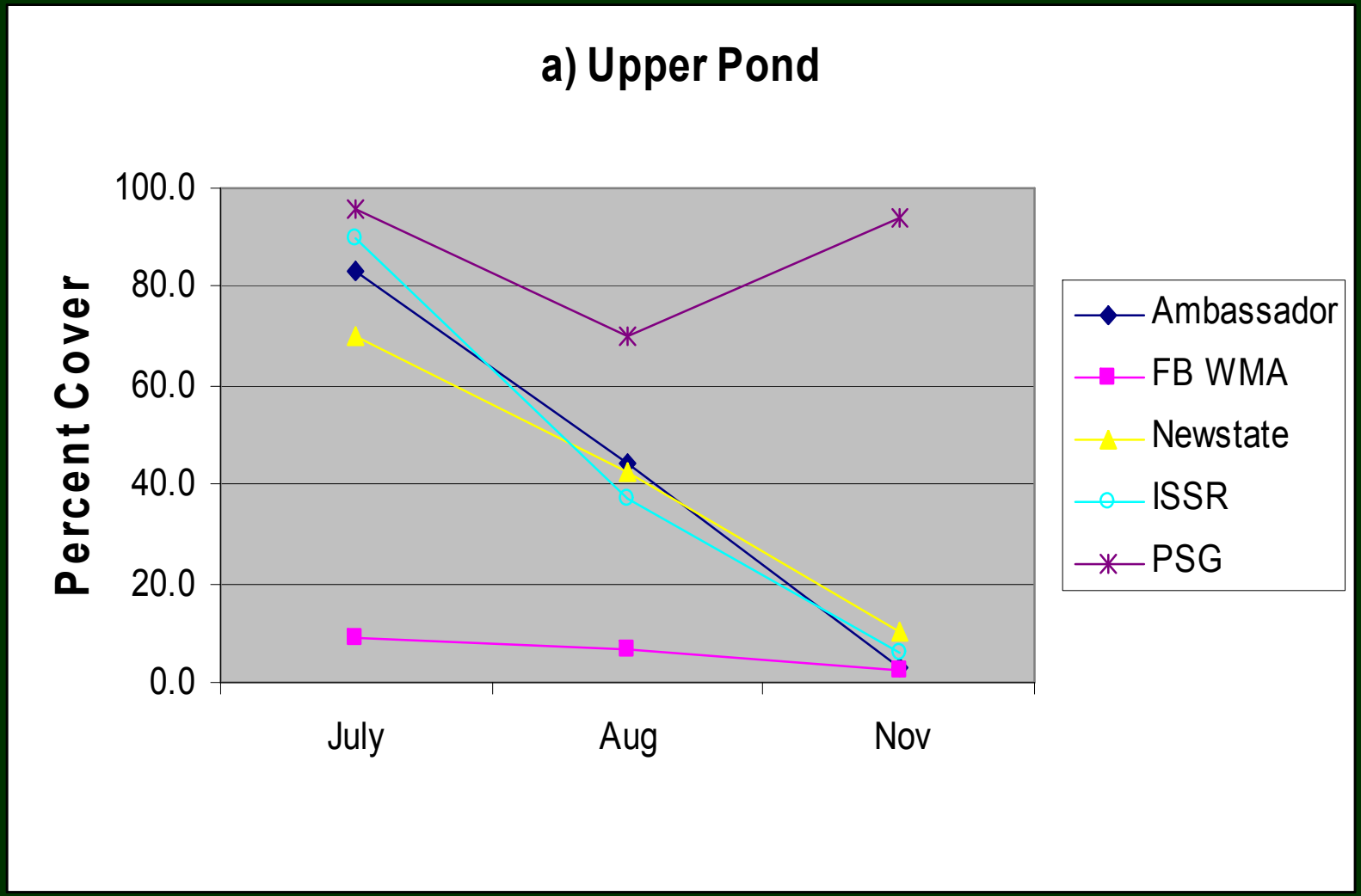
black neck stilt


498551
N
Nest Site
MARSHES
A
B
C
D
E
F
G
STORET
200
100
0
200
400
600
800
1,000
Meters

Nesting and Hatching Success

Site	Year	Species	Total Eggs Laid (total nests)	Clutch Size (n)	Hatch-ability (n)	Total Young Produced (average # eggs hatched / nest)	# Young Leaving/Nest (n)
FARMINGTON BAY	2005						
		AMAV	1681 (481)	3.86 ± 0.51 (247)	**0.96 ± 0.13 (247)**	**914 (1.9)**	3.75 ± 0.57 (247)
		BNST	769 (411)	3.87 ± 0.48 (201)	**0.97 ± 0.11 (201)**	**737 (1.79)**	3.76 ± 0.62 (201)
	2006						
		AMAV	2146 (641)	3.93 ± 0.30 (413)	**0.93 ± 0.15 (369)**	**1538 (2.4)**	3.55 ± (435)
		BNST	1123 (313)	3.97 ± 0.21 (232)	**0.96 ± 0.12 (221)**	**916 (2.9)**	3.77 ± (243)

Impounded Wetlands



Conclusions Thus Far

- **Current sheetflow (sloped) vegetation indicators are not very sensitive to nutrient gradients**
  - However, nesting/fledging habitat is comprised of highly specific plant characteristics; and
  - Plant succession may be related to nutrient gradient.
- **Sheetflow and impounded wetland macroinvertebrates are sensitive to nutrient gradients**
- **However, waterfowl and shorebirds readily forage on tolerant species and successfully nest in FB wetlands**
- **Early Senescence of SAV may constitute impairment of beneficial use (waterfowl)**

QUESTIONS?