

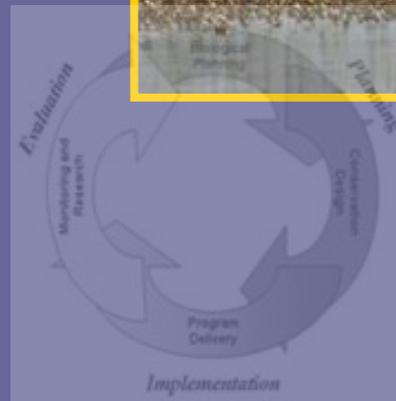
Great Salt Lake Shorebird Conservation Strategy

Accounting for Migratory shorebird
Habitat Needs at One of North
America's Great Ecosystems



Shorebird Conservation Approach

- Regional Shorebird Science Team
 - Use key site accounting for IWJV passage shorebirds
 - Habitat objectives based on energetic models
 - Identify explicit habitats to support population objectives
 - Develop key site conservation strategies



Great Salt Lake Ecosystem

- **GSL Key Site approach**

1. Regional Science Team
Key site outline

2. GSL Strategy

- assemble GSL Team
- workbook chapters
- chapter committees
- conservation strategy



A background image showing a crowd of people, many with their arms raised in a celebratory gesture, suggesting a sports event or a public gathering. The image is somewhat dark and has a grainy texture.

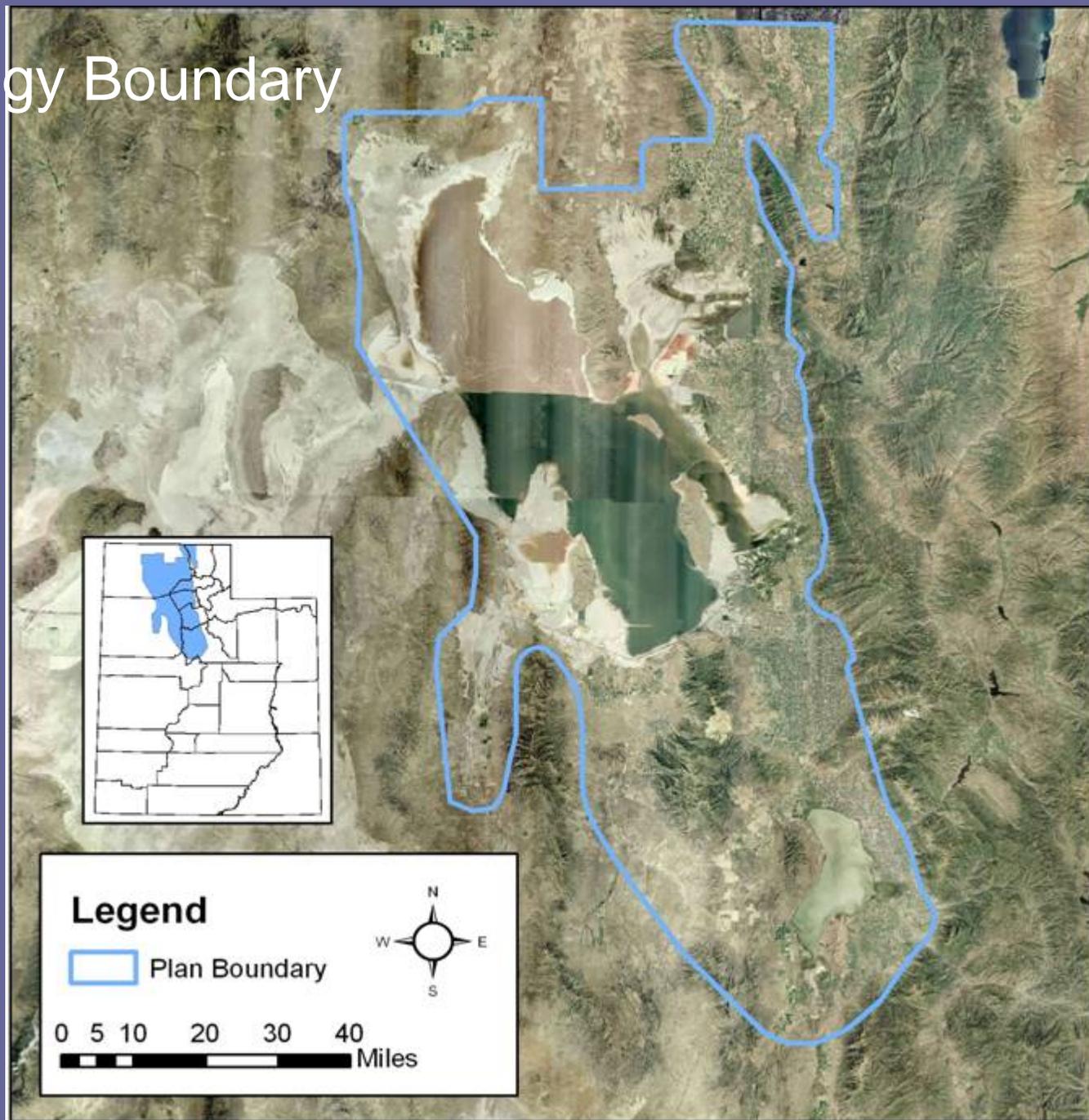
Team Leaders and Committee Chairs

- **Project Coordinator: Don S Paul,**
- **Habitat Availability : Karl Fleming**
- **Trends in Use and Threats : Pam Kramer and Nathan Darnall**
- **Management Focus : Don S Paul**
- **Species, Focal Species and Guilds : Sue Thomas and Don S Paul**
- **Species Occurrence, Population Size and Habitat Need : John Cavitt**
- **Daily Energetic Demand and Modeling : John Neill and Josh Vest**
- **Conservation Strategy and Partners : Karl Fleming and Karen Fullen**
- **Monitoring and Research : John Cavitt**
- **Strategy editors: Eric McCulley and Sue Thomas**

34 Team Members

Al Trout	USFWS retired	John Luft	Utah DWR
Ann Manning	USGS, Boise ID	John Neill	Utah DWR
Ann Neville	Kennecott	Josh Vest	Utah State University
Brad Andres	USFWS	Karen Fullen	Utah NRCS
Bridget Olson	USFWS	Karl Fleming	USFWS
Bruce Dugger	Oregon State University	Mark Petrie	Ducks Unlimited
Bryan Dixon	Bridger Land Audubon	Nathan Darnall	USFWS
Chris Brown	Utah TNC	Neka Roundy	Davis County
Dave Lee	Utah DWR	Pam Kramer	Utah DWR
Dave Smith	IWJV	Randy Berger	Utah DWR
Don Paul	IWJV Science Team	Rich Hansen	Utah DWR
Ella Sorensen	Audubon	Rob Baskin	USGS, Utah
Eric McCulley	Legacy Parkway/SWCA	Sue Thomas	USFWS
Heidi Hoven	IWSciences	Suzanne Fellows	USFWS
Jeff McCreary	Ducks Unlimited	Val Bachman	Utah DWR
Jim Parrish	Utah DWR	Virginia Getz	Ducks Unlimited
John Cavitt	Weber State Univ.	Wayne Martinson	National Audubon

Strategy Boundary



GSL Ecosystem Shorebird Habitats

Four general habitat types important to foraging migratory shorebirds

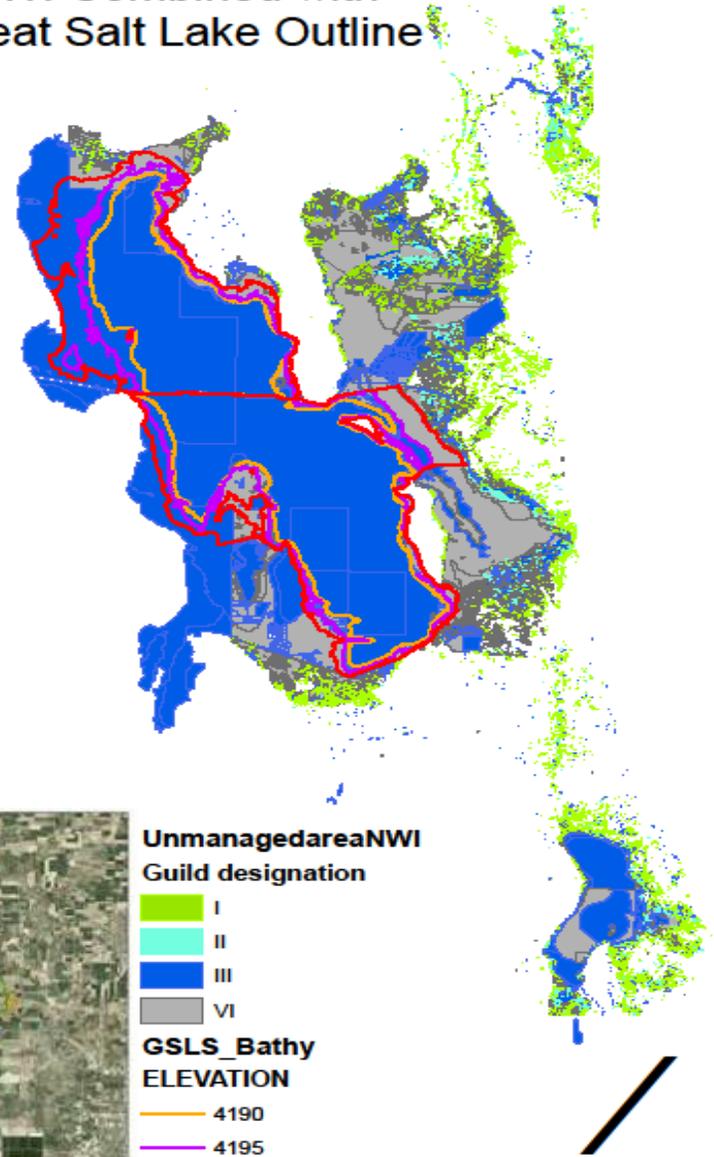
1. **Habitat I:** Vast emergent and seasonal wetlands, wet meadows
2. **Habitat II:** Semi-permanent and hemi-marsh wetlands
3. **Habitat III:** Extensive open water, freshwater and salt lakes, deepwater wetlands
4. **Habitat VI:** Dry and wet playas, alkali lakes, impoundments, riparian



Habitat Analysis

- Each habitat type is a composite of:
 - NWI
 - GSL wetland classifications
 - 2007 DU wetland survey
- Assessment at three GSL elevation

NWI Combined with
Great Salt Lake Outline



Legend

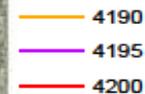


Unmanaged area NWI

Guild designation

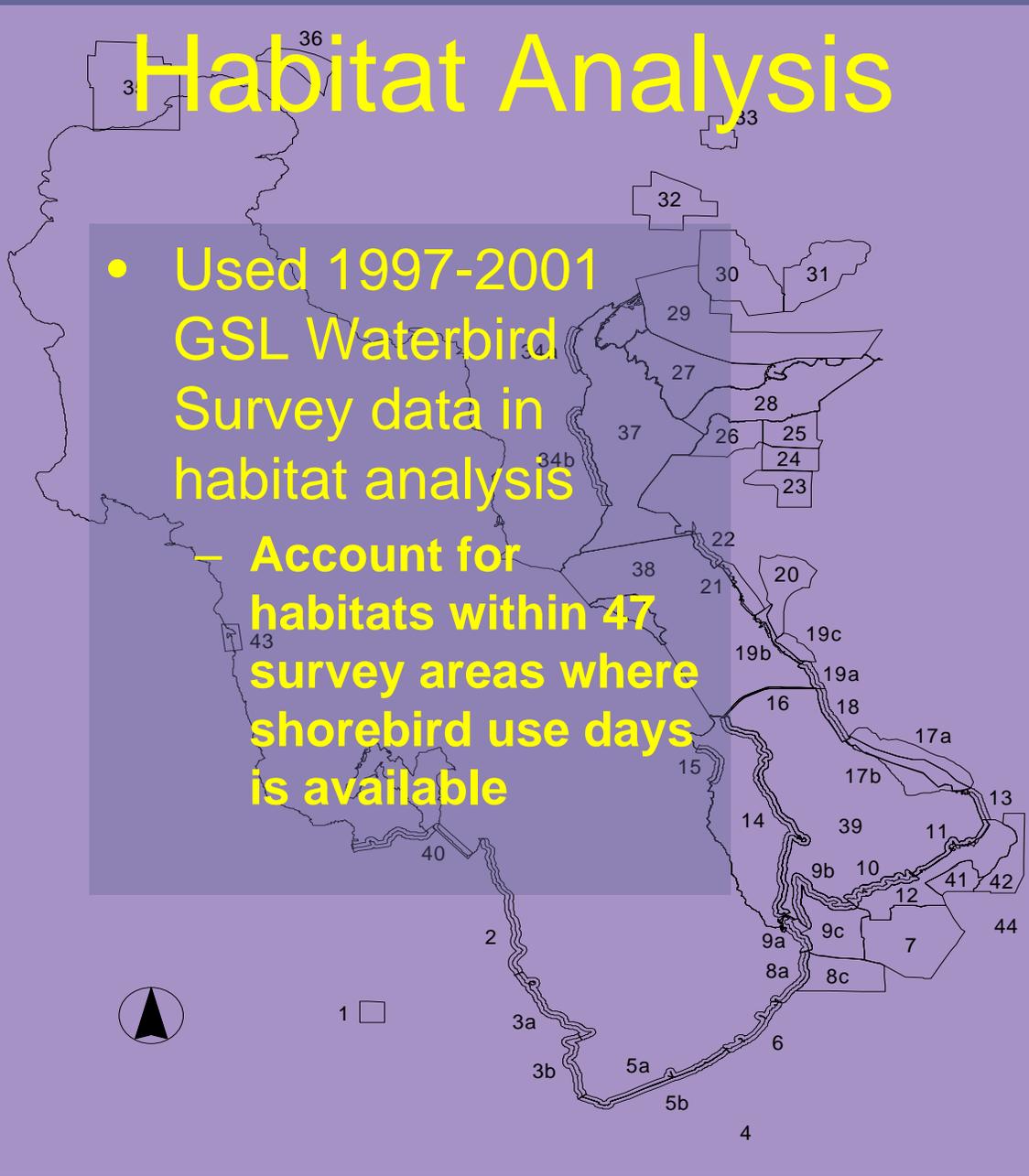


GSLs_Bathy
ELEVATION



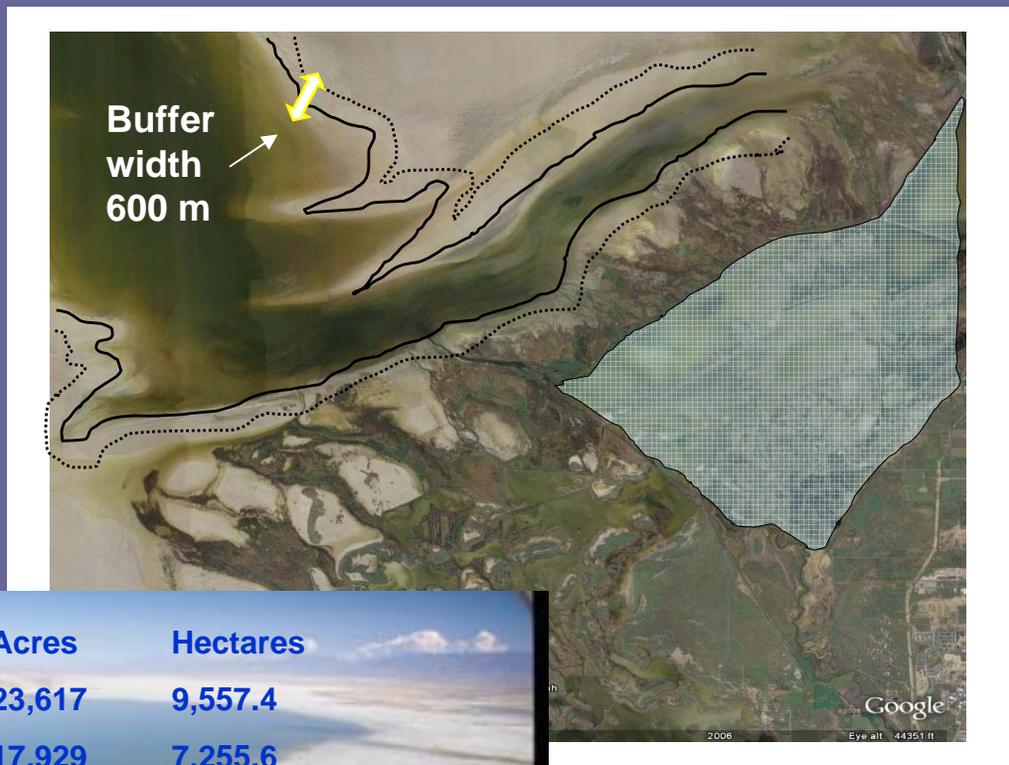
Habitat Analysis

- Used 1997-2001
GSL Waterbird
Survey data in
habitat analysis
 - Account for
habitats within 47
survey areas where
shorebird use days
is available



Habitat Analysis

- **Accounting for a dynamic GSL shoreline**
 - **GSL elevation analysis**
 - **Buffering shorelines**



Buffer width 600m

600m X shoreline length = functional habitat

Buffer: 100 m landward and 100 m into water	Buffer: 300 m landward	Buffer: 100 m landward and 300 m into water or to a depth of 12"	Buffer: shore and all open water
Black-bellied Plover Killdeer Long-billed Curlew Sanderling Western Sandpiper Least Sandpiper Dowitcher Spotted Sandpiper Whimbrel Red Knot Semipalmated Sandpiper Baird's Sandpiper			
	Snowy Plover		
		Black-necked Stilt American Avocet Willet Marbled Godwit	
			Wilson's Phalarope Red-necked Phalarope

Total Available Habitat



Habitat I acres	Habitat II acres	Habitat III acres	Habitat VI acres	Total acres from Habitat class
19,388.4	23,528.7	98,511.5	166,954.6	308,383.2

Acres of shorebird forage habitat identified in the Ducks Unlimited classification of GSL wetlands and their quality values

Shorebird Habitat Types	Quality	DU Acres
I	High	4924
I	Medium	2239
I	Low	6502
II	High	7577
II	Medium	6718
II	Low	6311
III	Medium	51789
VI	High	36058
VI	Medium	50797

Key to Ducks Unlimited GSL wetland classification

CLASS NUMBER	CLASS NAME	PREDOMINANT VEGETATION	% COVER PER ACRE	DESCRIPTION
1	Open Water	None	<15% emergent vegetation	Sago Pondweed Habitat / Widgeon Grass
2	Phragmites 1	<i>Phragmites australis</i>	>75%	75% Phragmites, Other veg does not matter
3	Alkali Bulrush 1	<i>Scirpus maritimus</i>	>75%	75% Alkali, Other veg does not matter
4	Cattail/Bulrush (hardstem)	Typha and/or Scirpus	>75%	75% Cattail/Bulrush(hardstem), Other veg does not matter
5	Phragmites 2	<i>Phragmites australis</i>	>50% and <75%	Between 51-75% Phragmites
6	Alkali Bulrush 2	<i>Scirpus maritimus</i>	>50% and <75%	Between 51-75% Alkali Bulrush
7	Playa/Mudflat	non-vegetated	na	No Vegetation
8	Playa/Mudflat	salt grass / pickleweed	>25%	More than 25% cover of pickleweed or salt grass or other vegetation
9	Mixed Emergent 1	any, other than above	na	Any vegetation other than what is already classified
10	Upland	any upland plants	na	All uplands
11	Salt Cedar	Tamarisk	>50%	
12	Wet meadow	Sedges and Rushes	>50%	
13	River/Channel	None	0	Deep Water

Habitat Condition

- DU vegetation assessment:
 - provides a measure of habitat quality
 - considers amount of invasive vegetation
 - measures degree of vegetation cover



CLASS NUMBER	CLASS NAME	PREDOMINANT VEGETATION	% COVER PER ACRE	DESCRIPTION
5	Phragmites 2	<i>Phragmites australis</i>	>50% and <75%	Between 51-75% Phragmites

Status of Shorebirds at GSL

Common Name	USFWS BMC ^b	Utah Strategy Species ^c	NAWCA Species ^d
American Avocet	x	x	x
Baird's Sandpiper			
Black-bellied Plover			x
Black-necked Stilt	x	x	
Greater Yellowlegs			
Killdeer			
Lesser Yellowlegs			
Least Sandpiper			
Long-billed Curlew	x	x	x
Long-billed Dowitcher			
Marbled Godwit	x		x
Red-necked Phalarope			
Sanderling	x		x
Snowy Plover	x	x	x
Western Sandpiper			
Willet			
Wilson's Phalarope	x		x

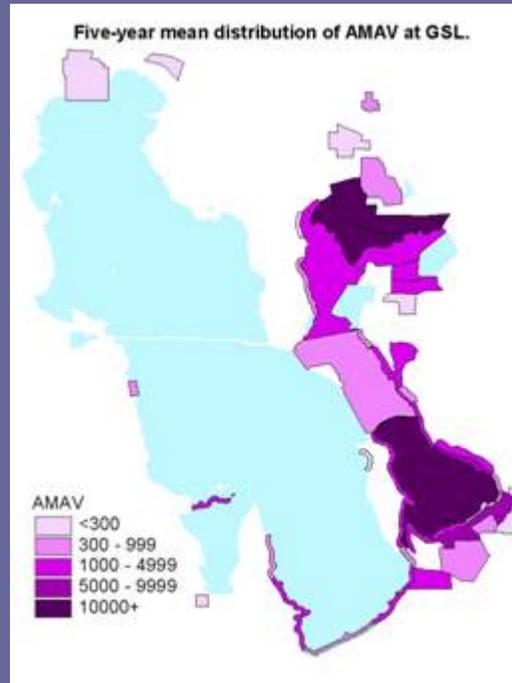
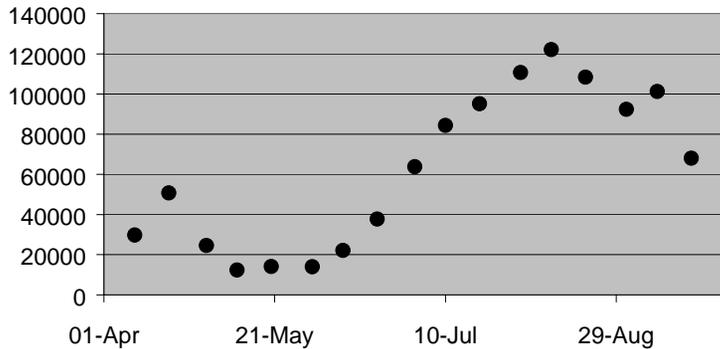


Occurrence

American Avocet

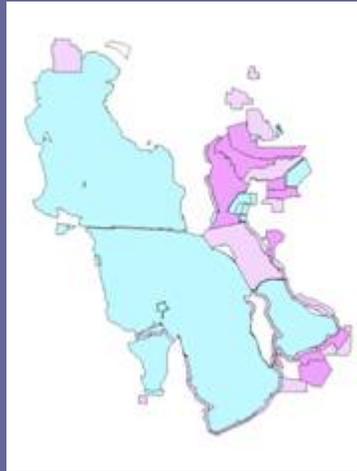
Code	Population estimates		Great Salt Lake			
	Global	North America	Mean Jul-Sep	Peak 10-Aug	High Count 1997	Abundance Status
AMAV	450,000	450,000	94,006	122,083	204,878	C

Mean number of AMAV at GSL by survey period.

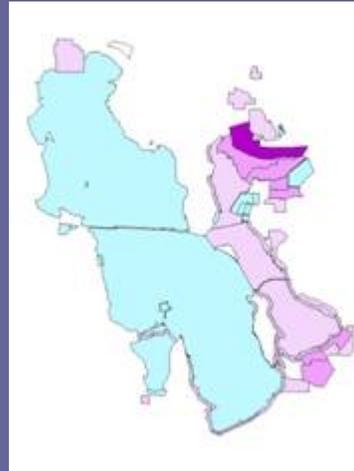


American avocet distribution by survey period

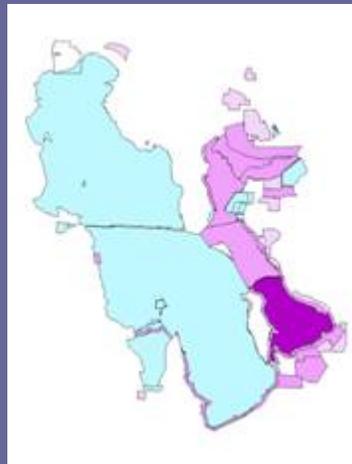
Period 1:
April 6-15



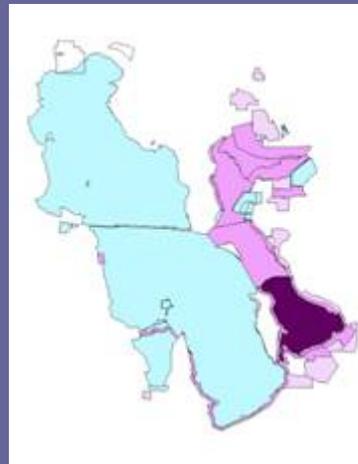
Period 2:
April 16-25



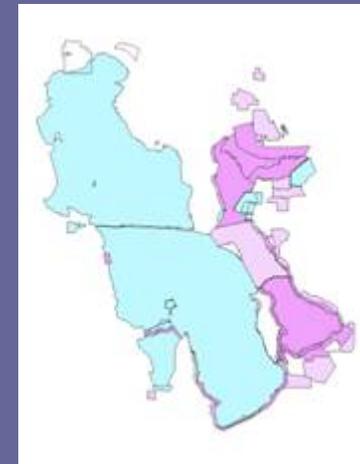
Period 3: April
26-May 5



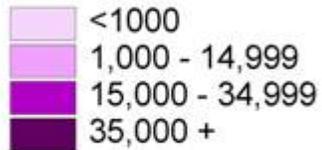
Period 15:
Aug 24-Sep 2



Period 16:
Sep 3-12



Period 17:
Sep 13-22



May 6-
Aug 23
Not shown



Bird Use Days

**Migratory shorebird
population size
expressed in use days**

- Spring: 2,741,420
- Fall: 18,222,445
- Grand total: 20,963,865



**Udderly ridiculous
numbers!!**

Population Objectives

- GSL objectives derived from Shorebird Science Team (SST) national objectives
- GSL Waterbird Survey used to assess SST national objectives
- Most GSL objectives are to maintain population



Energetic model components

- Population objective

Species	IMWJV	GSL	Proportion	IMWJV objective	Proportion GSL of IMWJV Objective	Objective
Black-necked Stilt	86,902	66,216	0.762	120,000	91,435	maintain at current level

- Population energy requirement

Species	GSL	Body mass range (g)	Mass mean (g)	EMR*	Source
Black-necked Stilt	66216	136-202	170	262	BNA

* Existence metabolic rate

- Habitat availability to Shorebirds

Habitat I acres*	Habitat II acres	Habitat III acres	Habitat VI acres	Total acres from Habitat class
19388.4	23528.7	98511.5	166954.6	308383.2

* BNST habitats not subtracted from these four habitat classes data

Energetic model components

- **Food density**

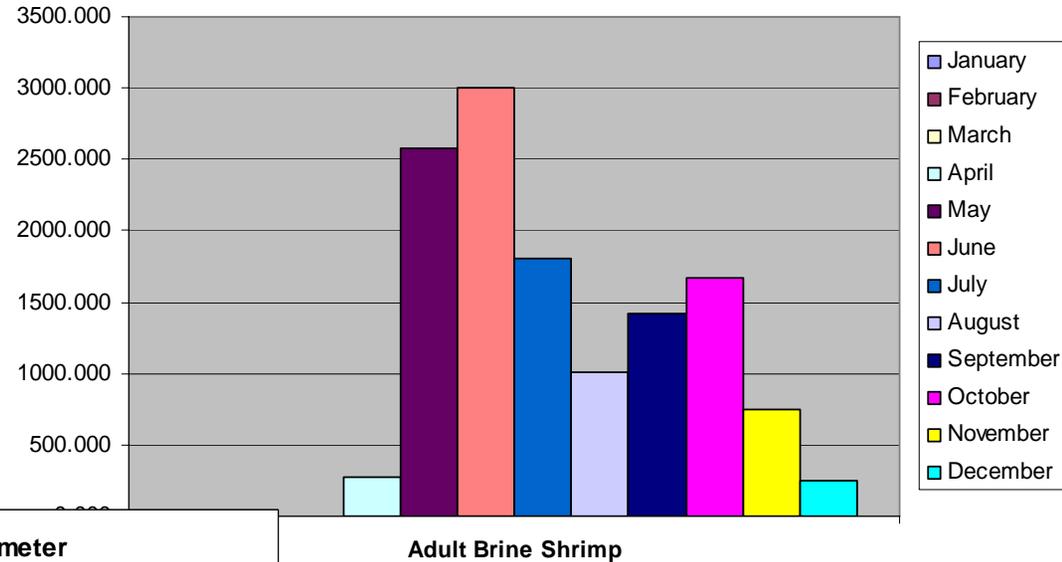
- Invertebrate biomass densities (g/m²) from managed wetland habitat types I and II

Habitat Types I & II						
Spring			Fall			
Water	Benthic	Σ	Water	Benthic	Σ	Source
	1.5	1.5		0.8	0.6	Huener (1984)
			0.4	3.6	4.0	Johnson (2007)
					1.1	Cox & Kadlec (1995)
		1.5			2.0	

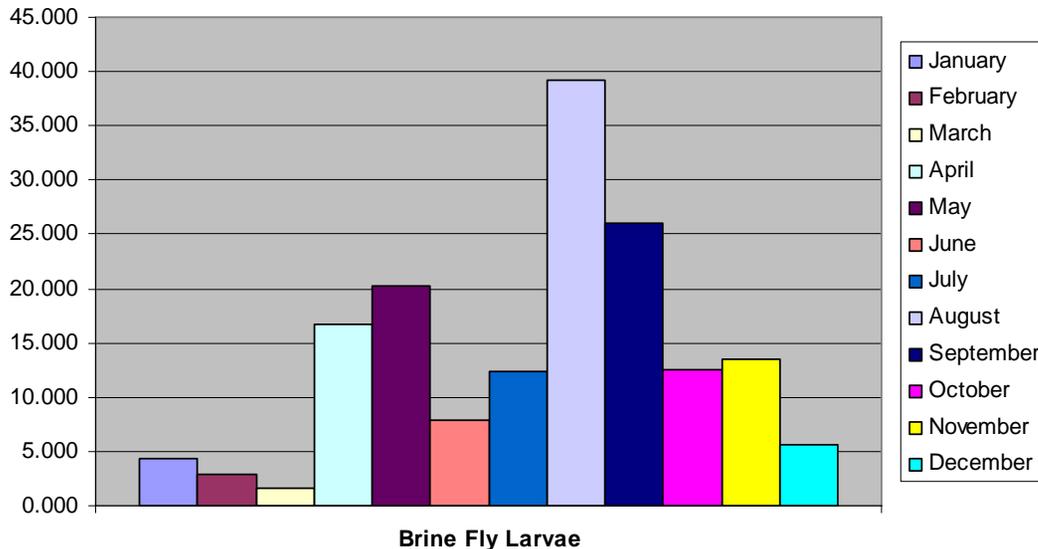
Food density

- Habitat III
 - adult brine shrimp and brine fly larval densities (cubic meter) for the GSL

Brine Shrimp water column density - cubic meter

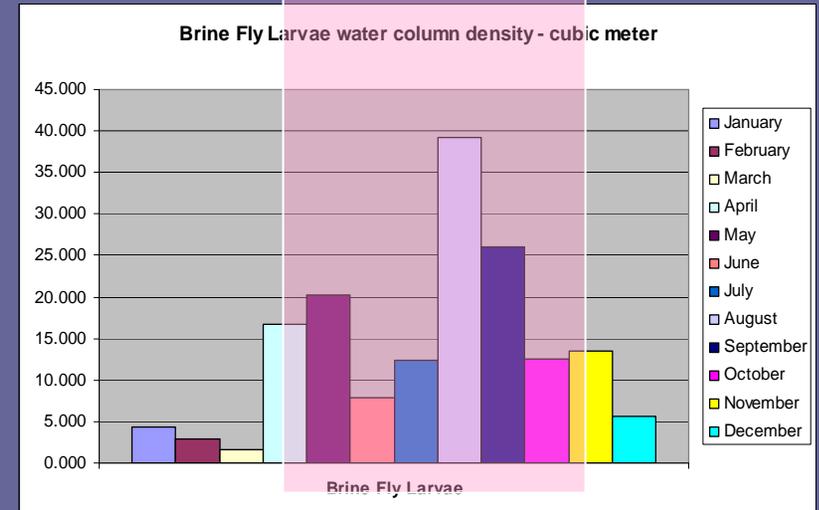
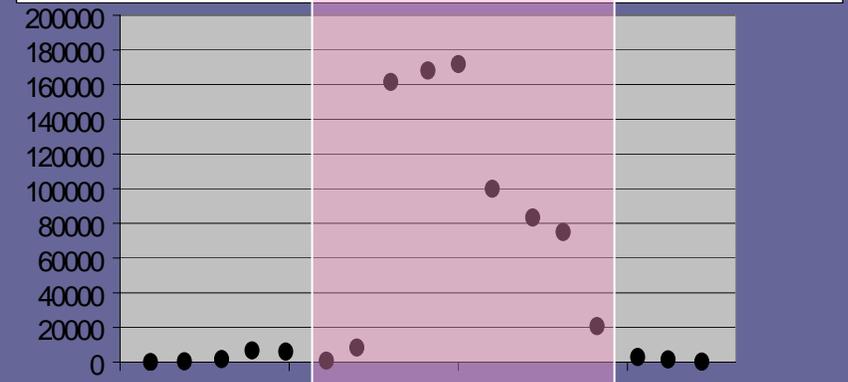
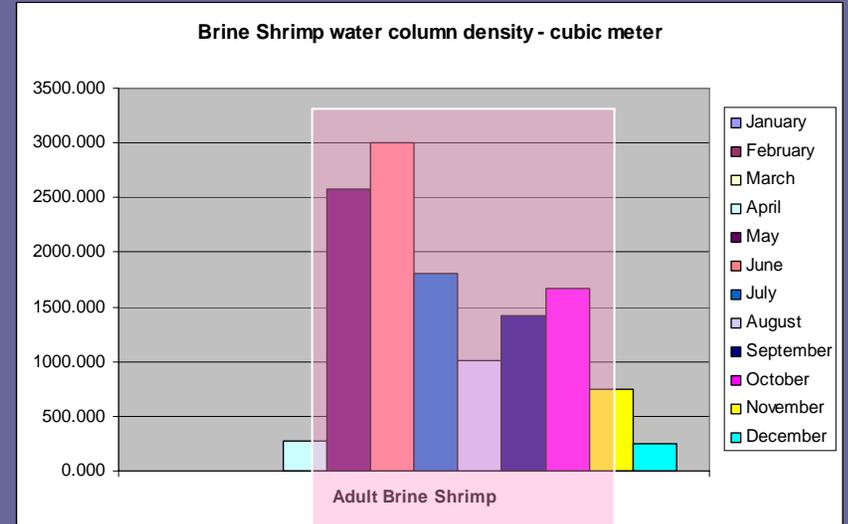


Brine Fly Larvae water column density - cubic meter



• Food density

- Mean adult brine shrimp (July 1999 - March 2009) and brine fly larval (March 2003-March 2009) water column densities (cubic meter) for the south arm of the GSL



Threats and Trends

Threats

- Water Quantity
 - water rights, diversion, re-use and timing of water delivery
- *Water Quality*
- *Water Distribution*
- *Exotic/Invasive Species*
- *Diseases/Pathogens*
- *Habitat Conversion, Fragmentation and Loss*

Trends

Year	Population of seven counties surrounding GSL
1950	546,600
2008	2,295,000
2050*	4,593,000

* projected

Additional Strategy Chapters

- Management Survey
- Conservation Partners/Programs
- Conservation Strategy
- Monitoring/ Research
- Adaptive Management



