

A photograph of a sunset over a large body of water, likely the Great Salt Lake. The sun is low on the horizon, partially obscured by clouds, creating a bright glow and a reflection on the water. The sky is a deep blue, and the water is a darker blue. In the background, there are dark silhouettes of mountains.

Great Salt Lake Waterbird Survey

monitoring aquatic birds at an
inland sea



Utah Division of Wildlife Resources

Great Salt Lake Ecosystem Projects

- John Luft Project Biologist 2002-present
- Don S. Paul Project 1996-2002
- Ann E. Manning Assistant 1998-2001



>70 aquatic species

GSL Avian Occurrence

factors driving abundance

- landscape setting
- ecosystem extent
- GSL characteristics
- distinct ecological units
- wetland/ GSL interface
- seasonal halophile abundance



GSL Avian Monitoring and Studies

- Breeding
 - colonial
 - species specific

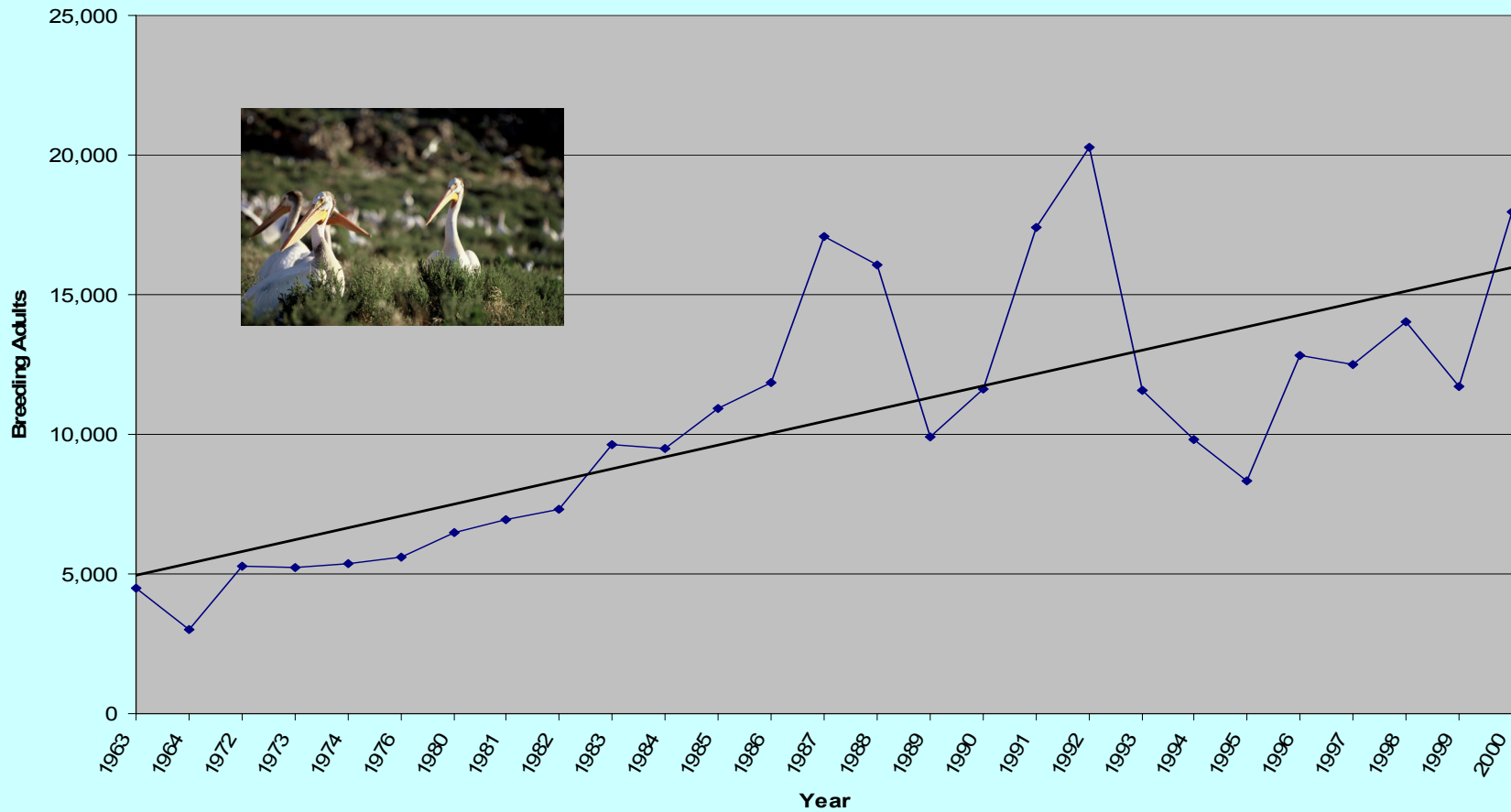


- Migratory
 - shorebirds
 - waterfowl
 - grebes
 - all aquatic birds



GSL Colonial Breeding Species

Figure 1. 1963-2000 Gunnison Island White Pelican Breeding Adult Population Plotted With Trendline



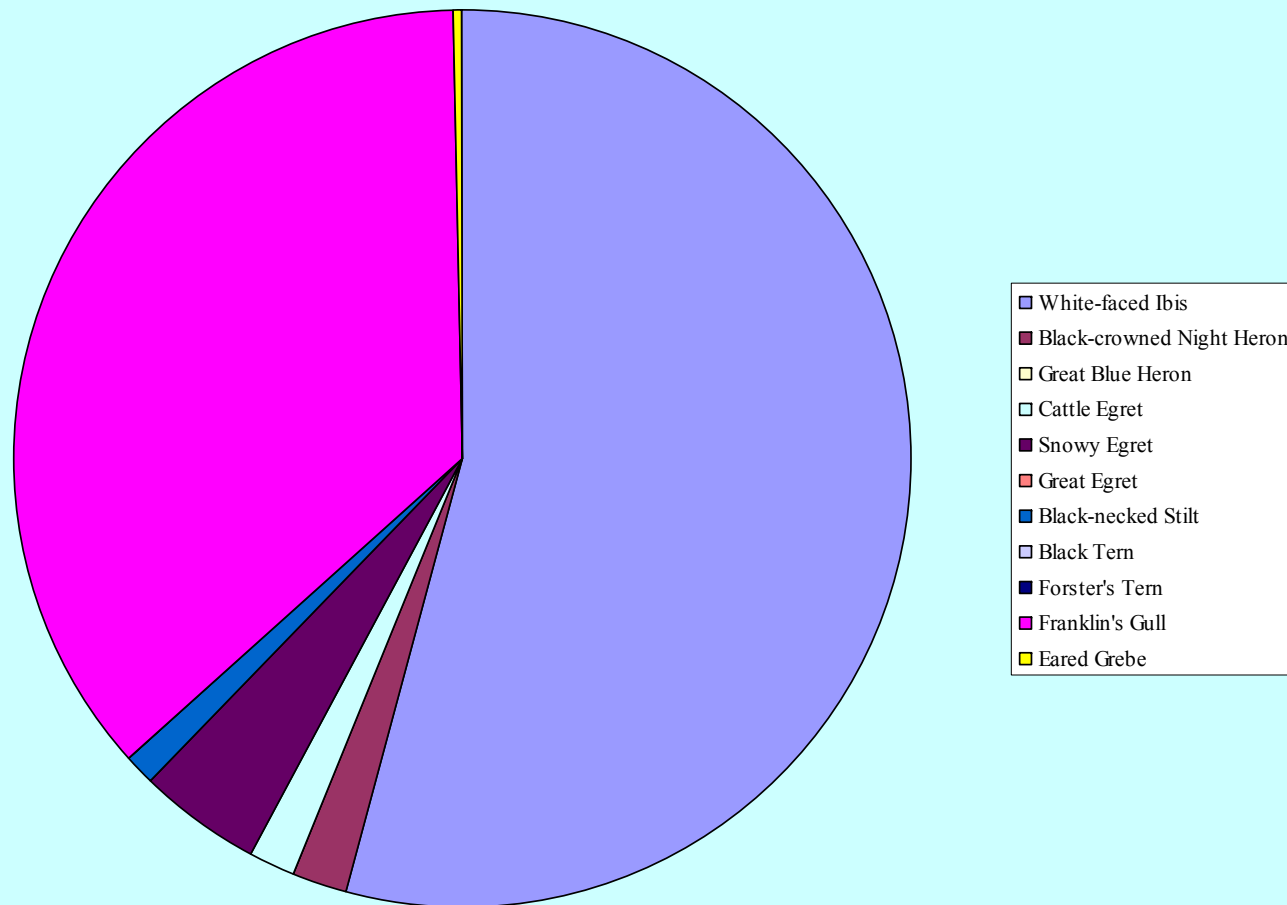
GSL Colonial Breeding Species

- CAGU colony surveys
1981-1994
 - 82,000 -160,000
breeding adults at all
colonies



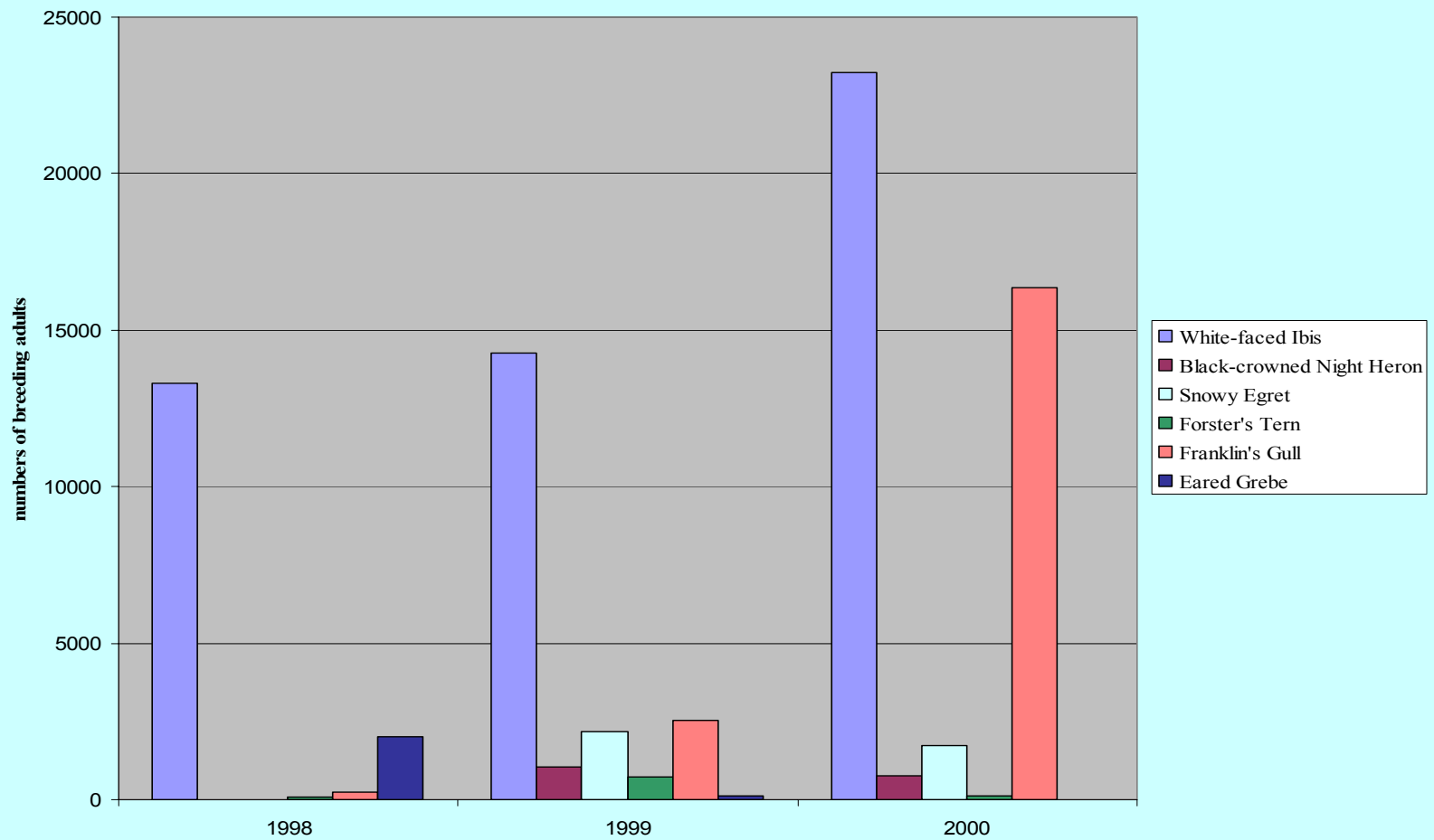
GSL Colonial Breeding Species

Figure 5. Colonial waterbird species nesting in colonies at the Great Salt Lake, 2000.

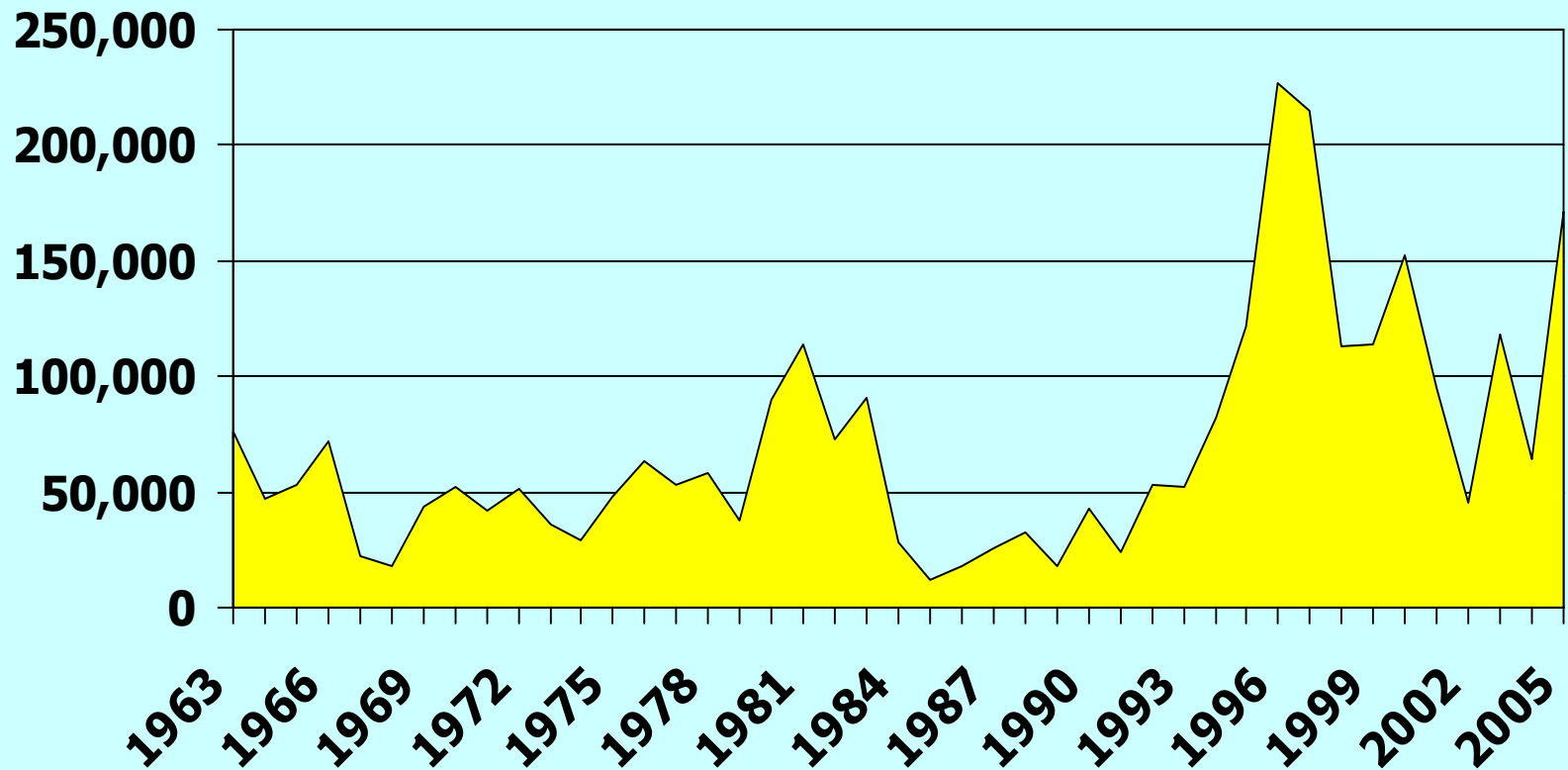


GSL Colonial Breeding Species

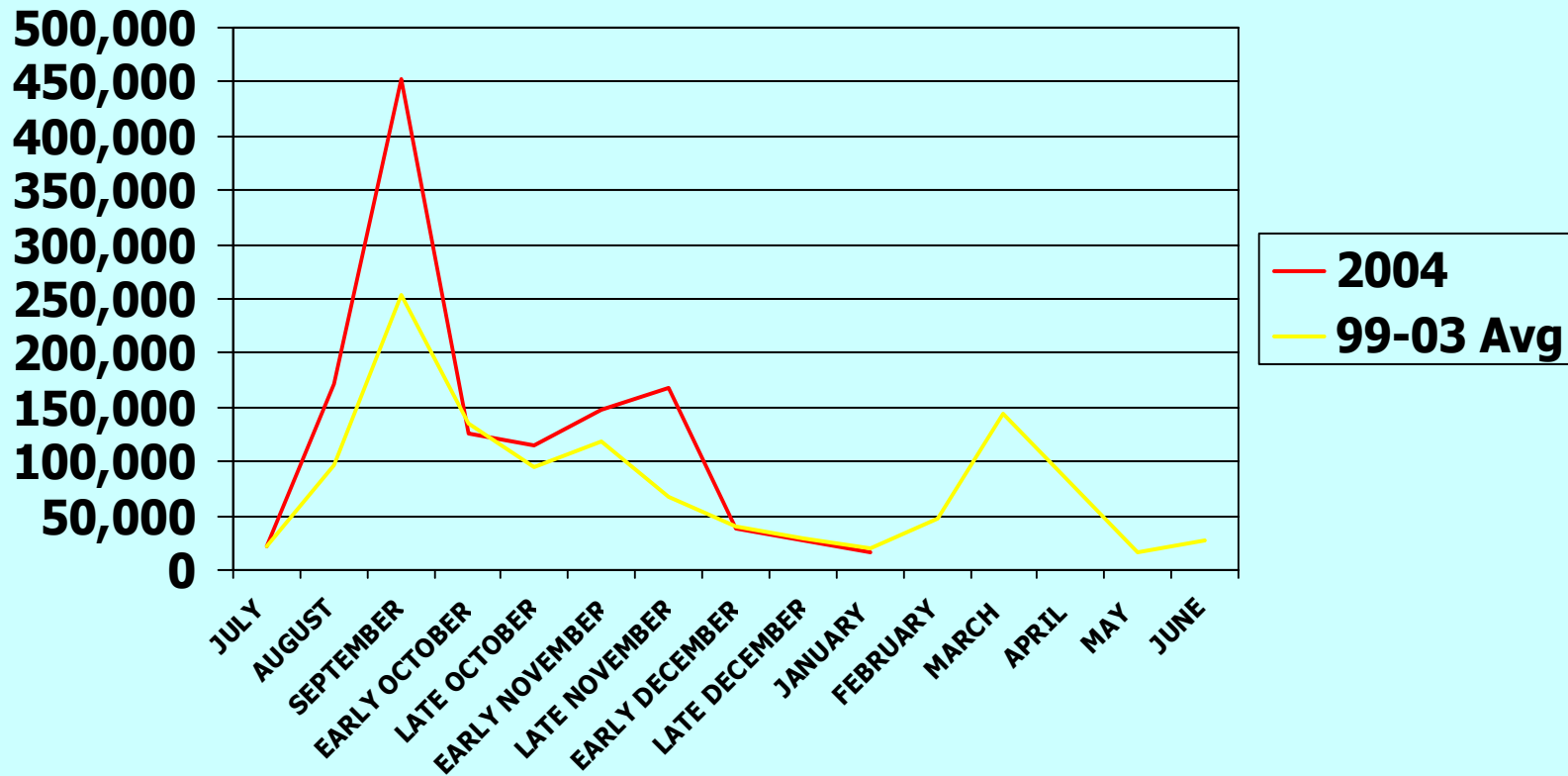
Figure 6. Comparison of colonial waterbird species at Great Salt Lake, 1998-2000.



Statewide Mid-winter Waterfowl Survey



Duck Populations on State WMAs



Wilson's Phalarope Staging Population

Wilson's Phalaropes

	1997	1998	1999	2000	2001
Annual aerial survey ¹	191,733	247,286	74,668	291,671	566,834
Waterbird Survey period 12 count ²	57,328	17,431	81,478	25,021	242,344
Waterbird Survey peak count	57,328	208,461	225,488	378,292	318,974

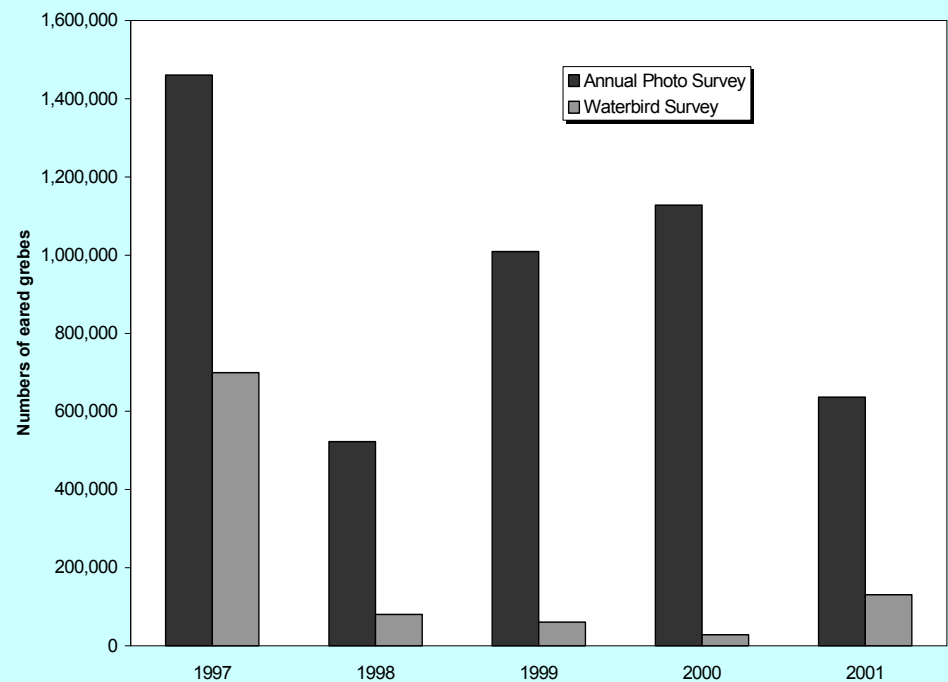
¹ A one-day, all lake survey conducted in late July each year.

² Period 12 includes the date of the annual one-day survey.



Fall Eared Grebe Surveys

- Food preferences
 - 1996, 10 day interval diet sampling
 - October–December:
< 90% adult *Artemia*
- Fall Staging Surveys
 - 1981-2005: 600,000-1.5 million

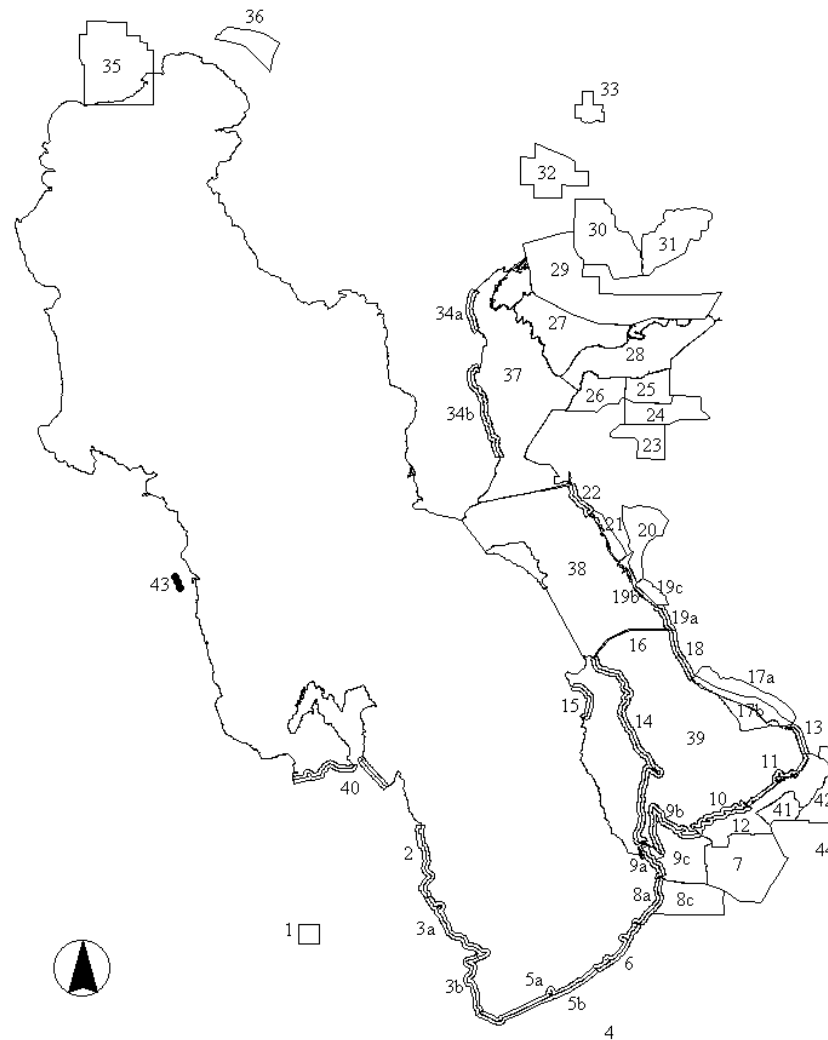


GSL Waterbird Survey Objective:

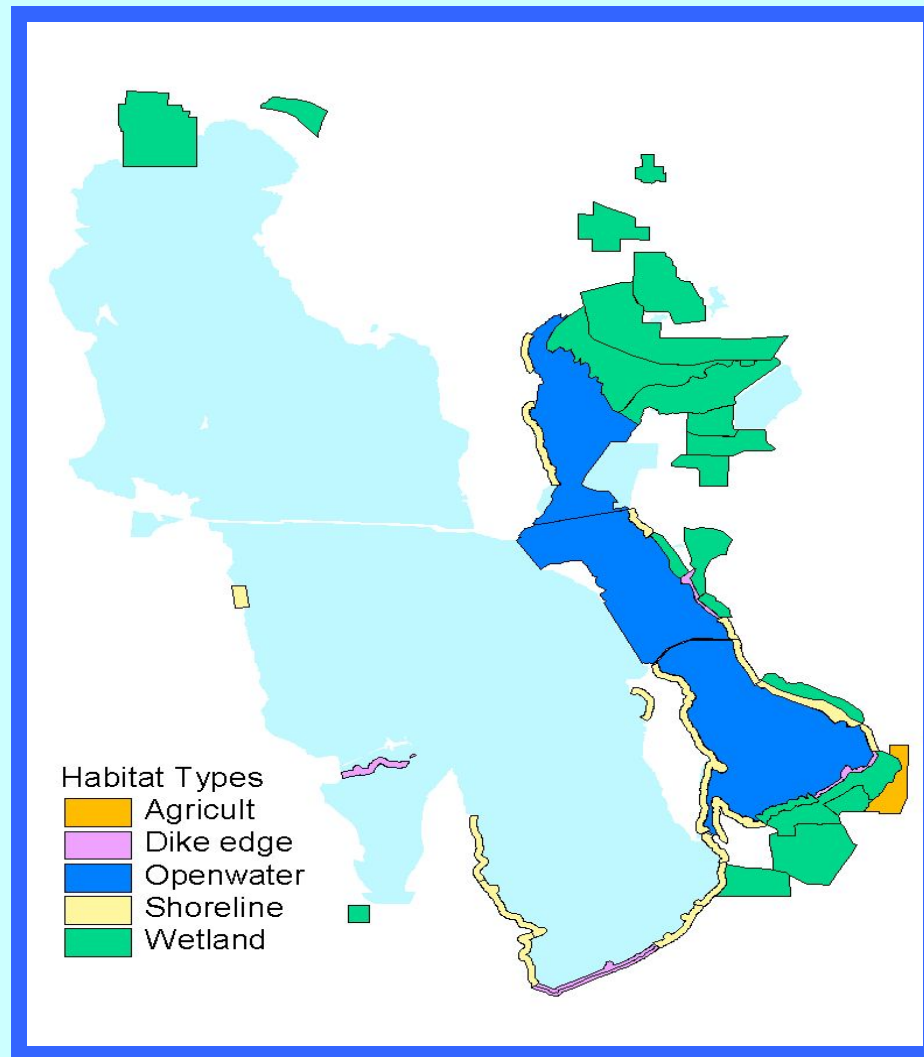
**To examine the temporal and
spacial relationships of waterbirds
in response to varying GSL
elevational changes spring through
early fall.**



GSL Waterbird Survey Study Area



GSL Habitat Types Surveyed



WBS Protocol

- Survey season April – September
- 10-day periods with target dates (N=17)
- Survey types:



Total Count



Aerial Survey



Area Count



Point Sample

Data Management

- Consultation with peers, statisticians, and database managers
- Waterbird Survey database in Paradox[©]



The background of the slide is a close-up photograph of a dark grey, cracked asphalt surface. The cracks are irregular and form a network of small, interconnected polygons across the entire frame. The lighting is somewhat uneven, with slightly darker areas in the shadows of the cracks and lighter areas on the raised surfaces.

Result Highlights

Peak numbers of shorebirds by suite, 1997-2000

Shorebird Suites	1997	1998	1999	2000
Avocets/ Stilts	251,380	127,715	142,763	183,824
Yellowlegs	1,988	620	595	2,432
Dowitchers	25,938	58,880	27,690	28,445
Peeps	128,116	70,314	11,013	199,623
Phalaropes	64,796	208,591	234,566	354,729

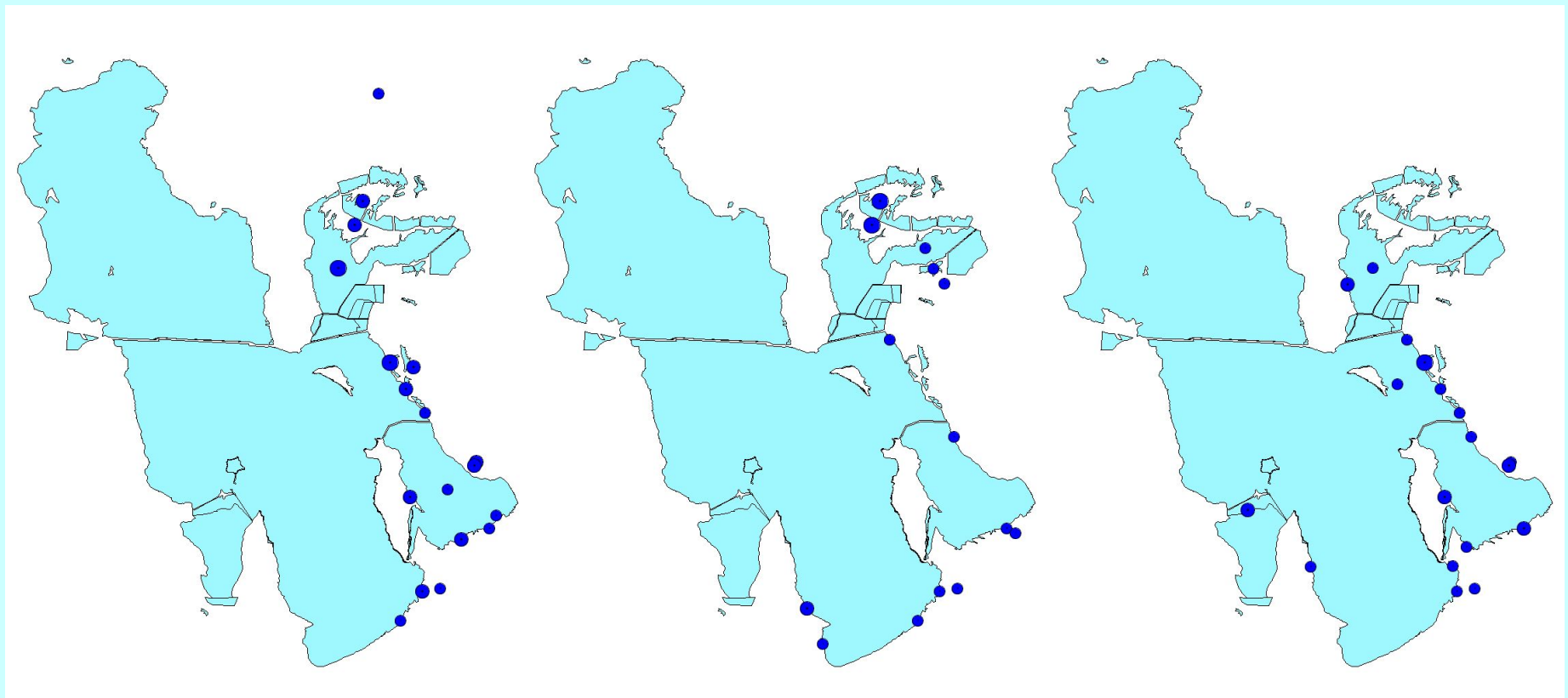
Distribution of peak numbers of

● 1,000 - 4,999 ● 5,000 - 19,999 ● 20,000+
American Avocets

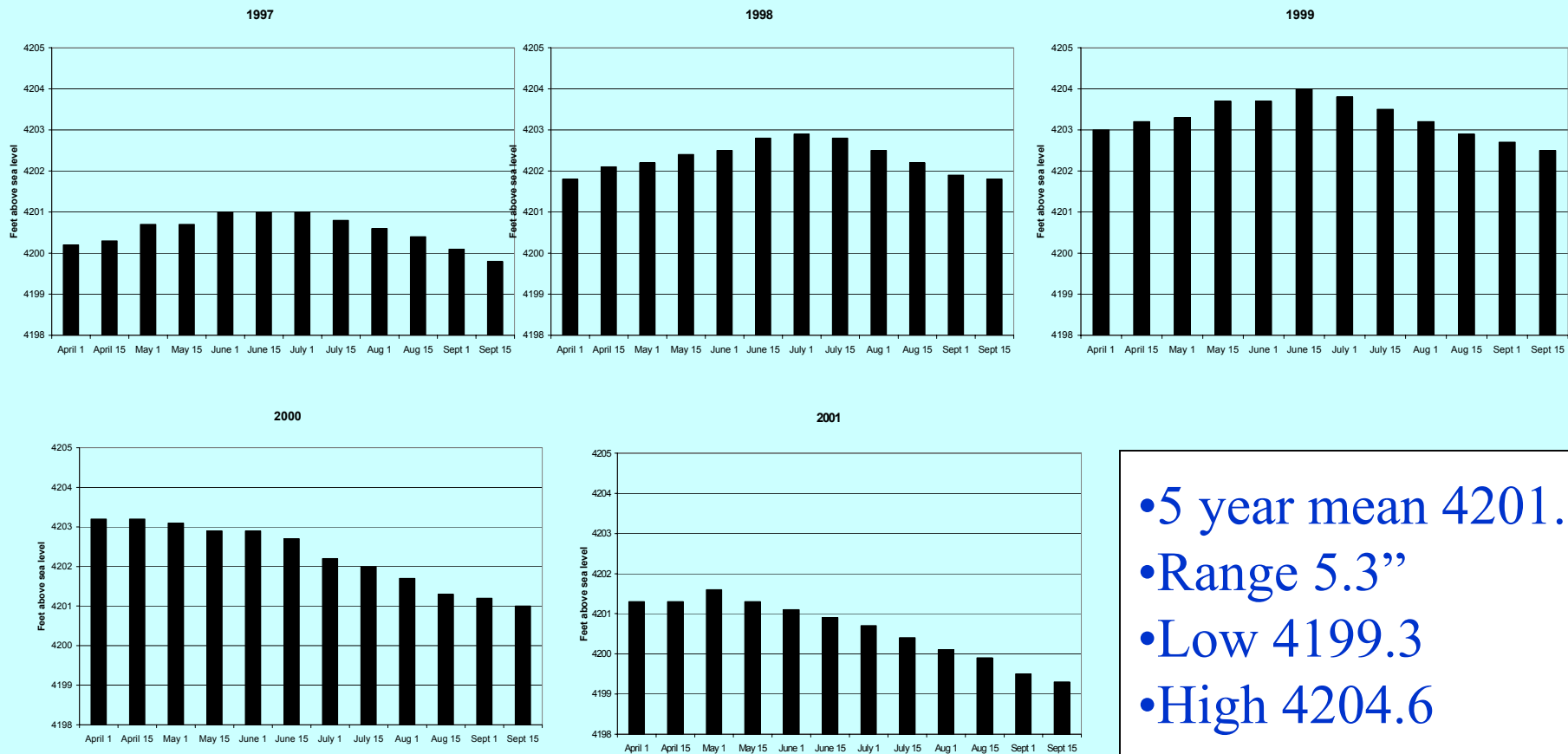
1997

1999

2001



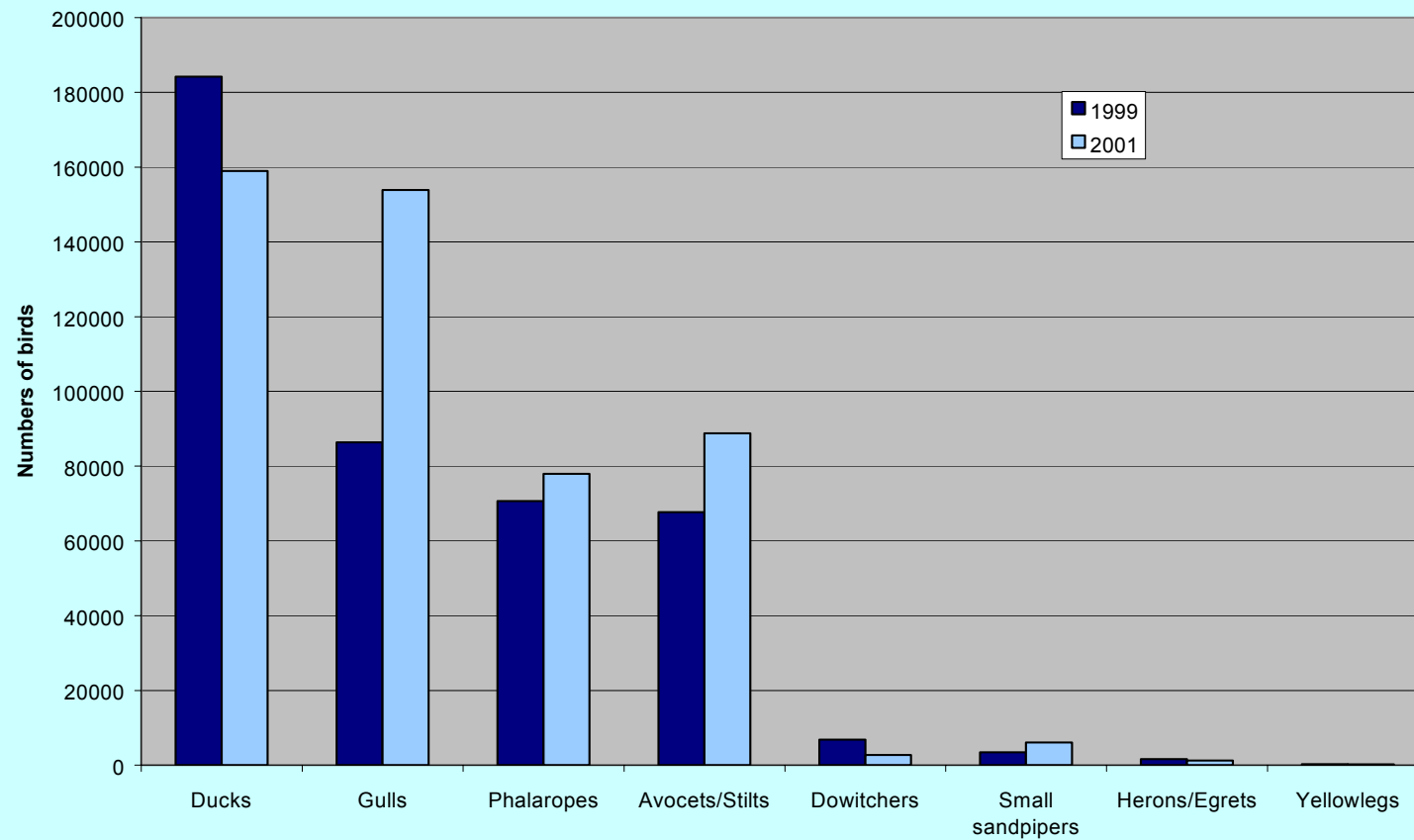
GSL elevations at two-week survey intervals 1997-2001



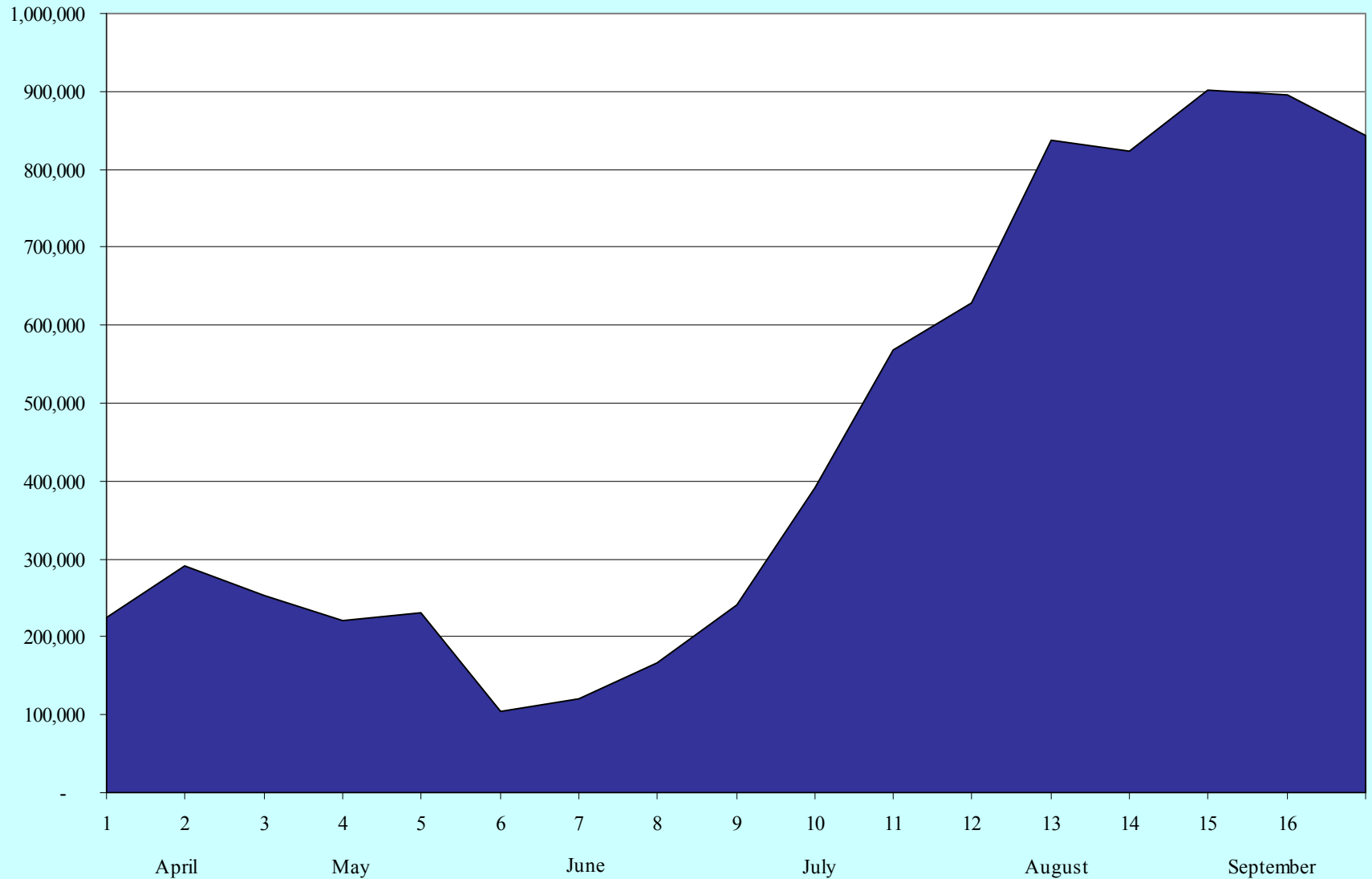
- 5 year mean 4201.9
- Range 5.3"
- Low 4199.3
- High 4204.6

Avian Abundance Comparison Wet and Dry Years

Comparison of numbers of birds at Great Salt Lake by suite in wet and dry years (1999 and 2001 respectively).



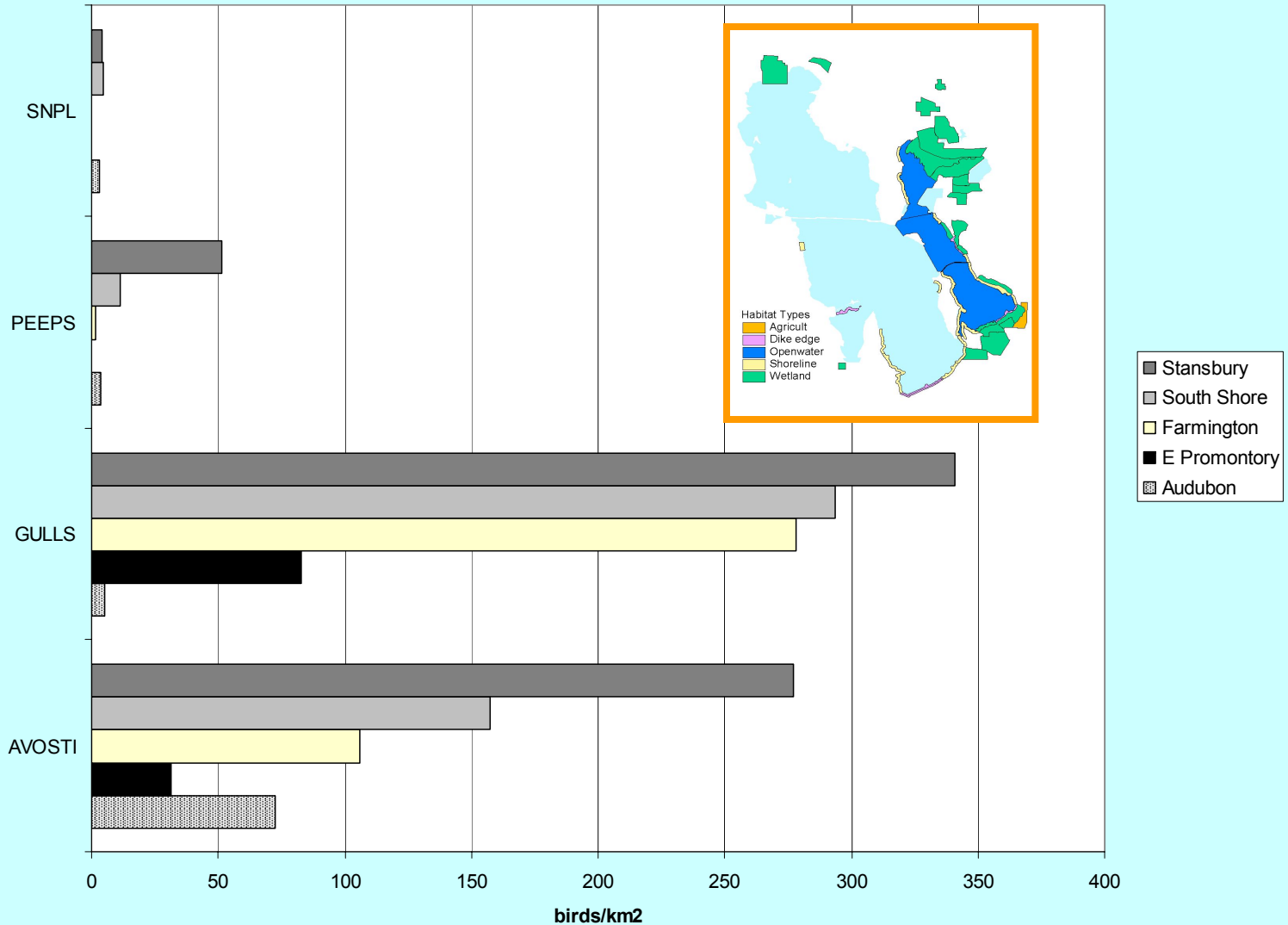
Total birds in all GSL survey areas by period 1997-99



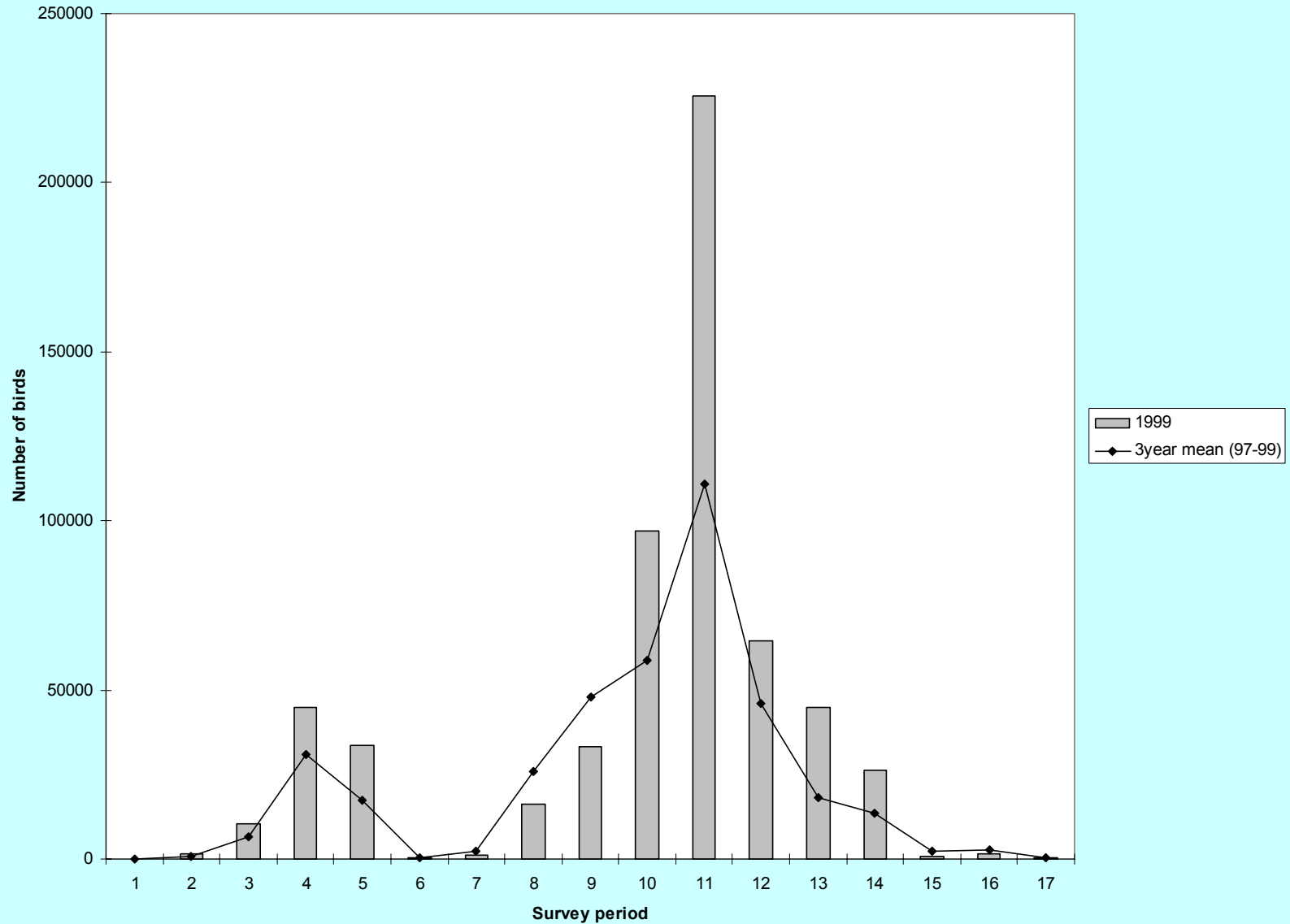
Maximum numbers of birds present at any one period by suite, 1999

Suite	Number of Birds
Ducks	554,614
Phalaropes	225,617
Gulls	217,390
Avocets/Stilts	140,241
Eared Grebes	60,499
American White Pelicans	51,114
White-faced Ibis	30,779
Dowitchers	27,690
Peep Sandpipers	10,848
Western/Clark's Grebes	6,712
Herons/Egrets	2,506
Yellowlegs	595

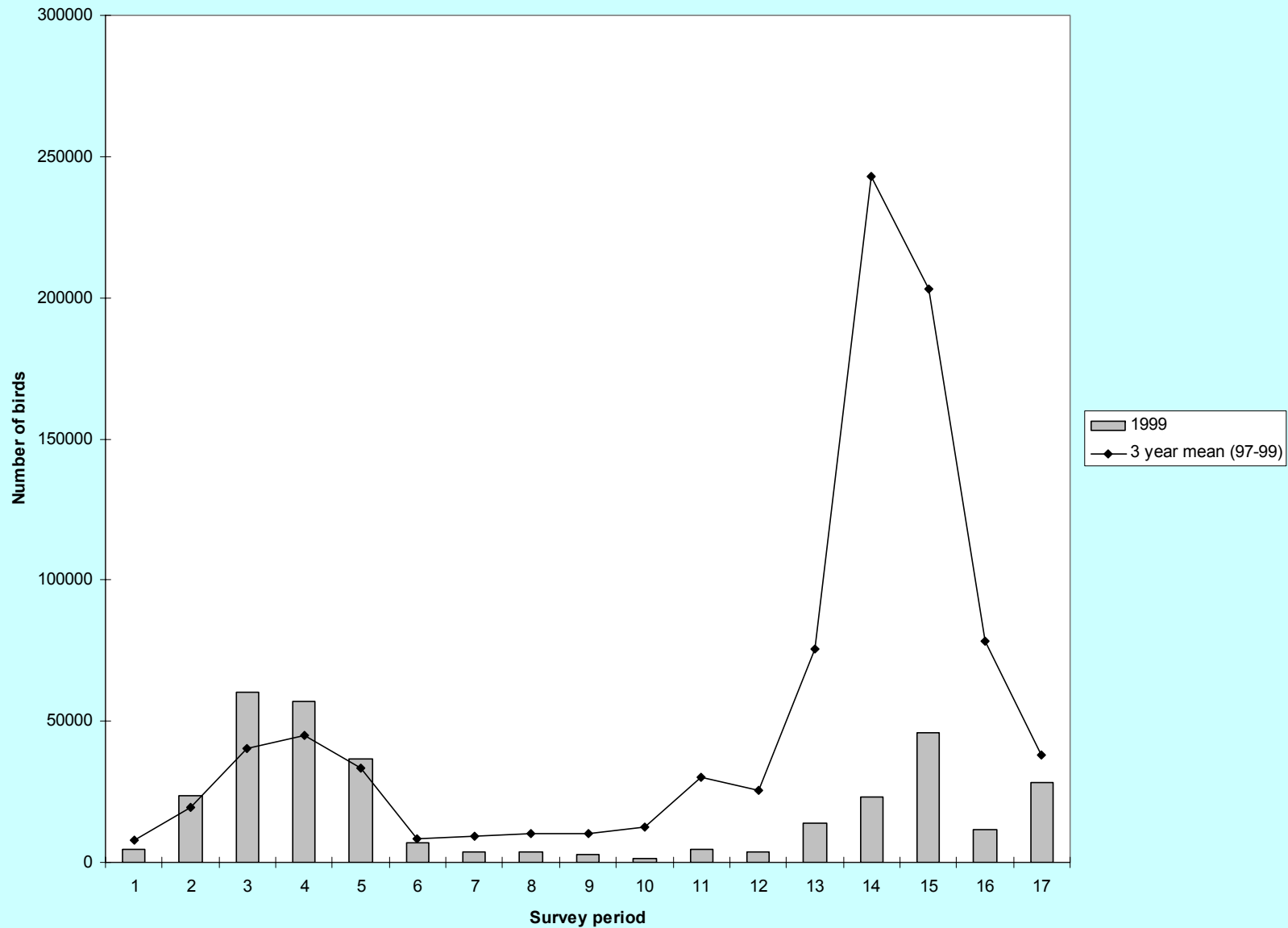
Mean densities of snowy plovers, peep sandpipers, gulls and avocets/stilts at GSL shoreline areas, 1999



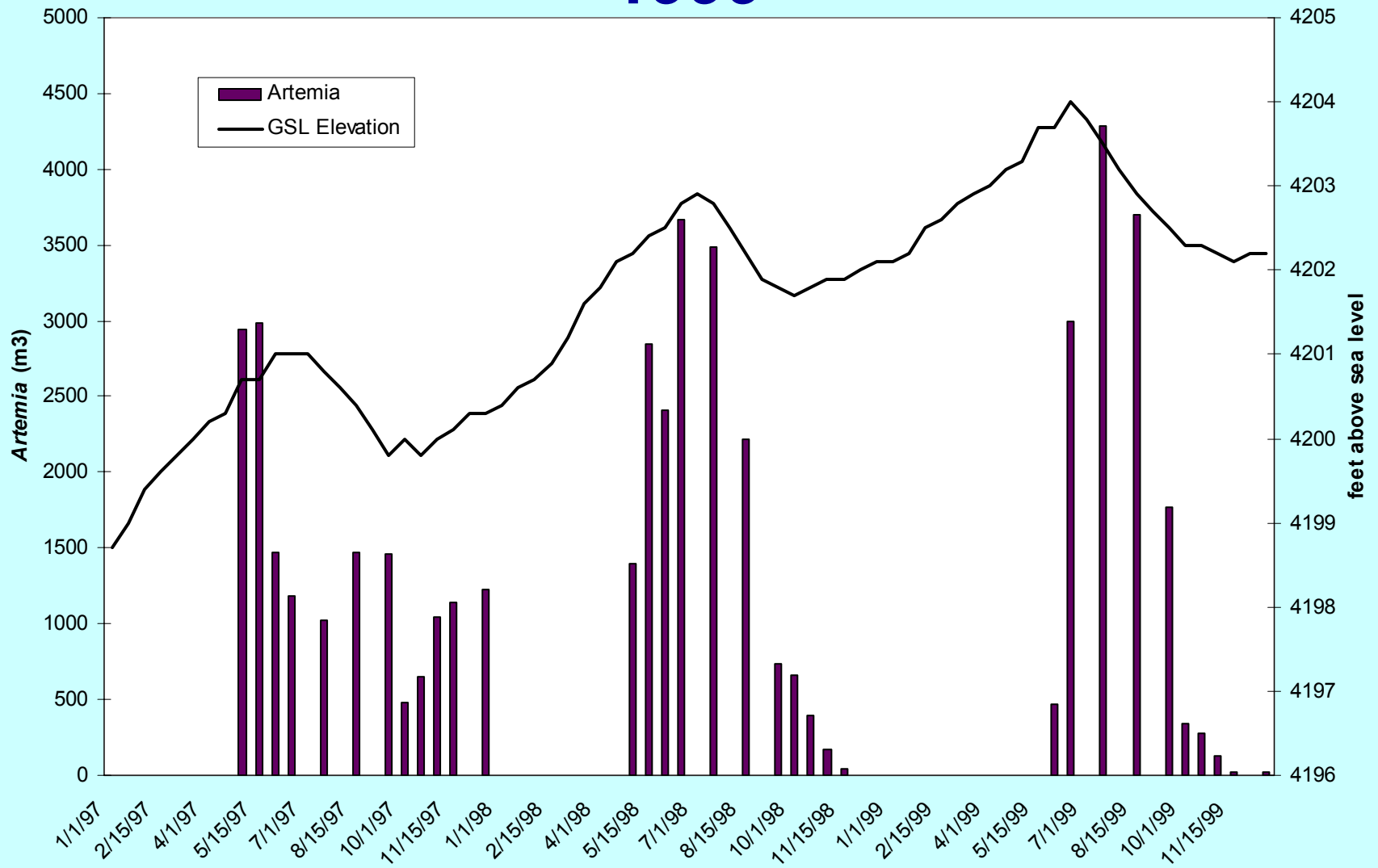
GSL phalarope totals by period in 1999 vs. the three-year mean



GSL eared grebe totals by period in 1999 vs. the three-year mean



GSL adult Artemia by survey period and lake elevation for 1997, 1998 and 1999



Potential Breeding Adults

an estimate based on occurrence
during peak nesting period

Species	Number of potential breeding adults
California gull	95,183
American avocet	63,806
Franklin's gull	30,652
White-faced ibis	28,626
Black-necked stilt	20,502
American white pelican	9,898
Forster's tern	1,586
Snowy egret	1,353
Snowy plover	541
Great blue heron	460
Black-crowned night heron	342
Cattle egret	53

Example of Survey Area Data

Farmington Bay WMA

- *Farmington Bay WMA**
- **Description:** The area is a total count of all Farmington Bay WMA impoundments including Turpin.
- **Area Size (ha):** 4544.5
- **Estimated Area Covered by Survey (ha):** 2953.9
- **Years Surveyed:** 5
- **Detection Rates:** Visibility rates vary as a result of emergent vegetation and large viewing distances in some Units.

Species	Mean	Peak	Birds/ha	Species	Mean	Peak	Birds/ha
AGWT	11279.6	16184.3	3.8	GTBH	51.6	94.6	0.0
AMAV	9354.3	13292.8	3.2	KILL	5.8	18.2	0.0
AMCO	6841.1	14827.0	2.3	LBCU	0.0	0.3	0.0
AMWI	1410.0	2624.3	0.5	LBDO	1666.1	3336.8	0.6
AWPE	554.7	960.0	0.2	LESA	18.5	86.0	0.0
BASA	0.0	0.0	0.0	LESC	1349.0	3706.0	0.5
BBPL	5.8	16.8	0.0	LEYE	15.6	233.0	0.0
BCNH	30.4	89.3	0.0	MAGO	0.7	125.8	0.0
BLTE	94.0	236.8	0.0	MALL	3033.8	3987.8	1.0
BNST	1854.1	2691.0	0.6	NOPI	12162.3	16981.3	4.1
BUFF	39.7	159.0	0.0	NSHO	9359.5	12682.0	3.2
BWTE	0.0	19.0	0.0	PBGR	33.2	56.8	0.0
CAEG	1.9	7.8	0.0	RBGU	110.4	216.8	0.0
CAGO	507.1	733.4	0.2	REDH	1054.7	1779.6	0.4
CAGU	3328.2	5385.0	1.1	RPHA	1213.3	2640.8	0.4
CANV	36.0	148.3	0.0	RUDU	7004.0	14152.3	2.4
CATE	1.1	4.5	0.0	SACR	1.1	2.5	0.0
CITE	2581.4	4624.8	0.9	SAND	0.0	0.0	0.0
CLGR	2.1	20.2	0.0	SNEG	138.3	192.0	0.0
COGO	0.0	0.0	0.0	SNPL	0.0	0.0	0.0
DCCO	73.3	131.8	0.0	SPSA	2.9	8.2	0.0
EAGR	194.5	2732.4	0.1	WEGR	21.4	146.7	0.0
FOTE	72.1	191.3	0.0	WESA	884.8	2611.6	0.3
FRGU	789.0	1195.8	0.3	WFIB	862.4	1193.6	0.3
GADW	4084.4	8275.8	1.4	WILL	6.7	26.5	0.0
GRYE	0.8	7.8	0.0	WIPH	1633.1	5623.0	0.6

Species Accounts

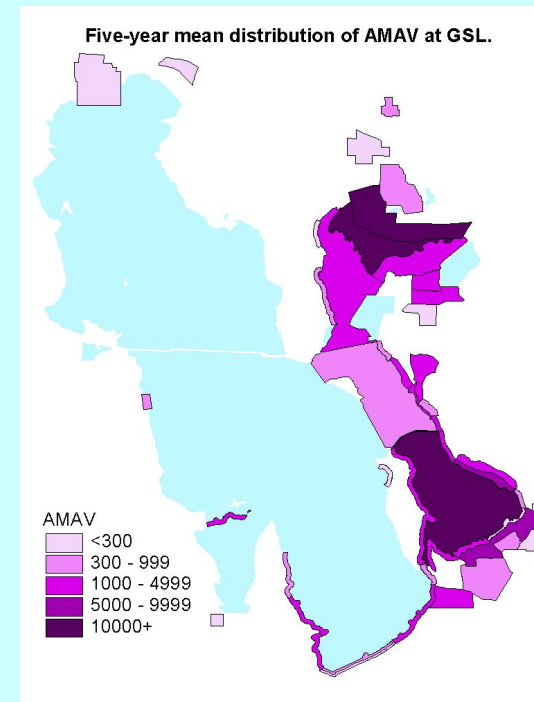
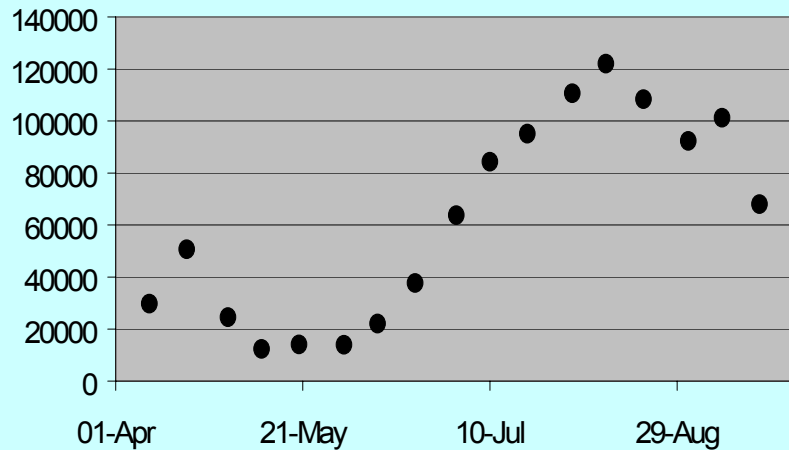
Avocet Example



American Avocet

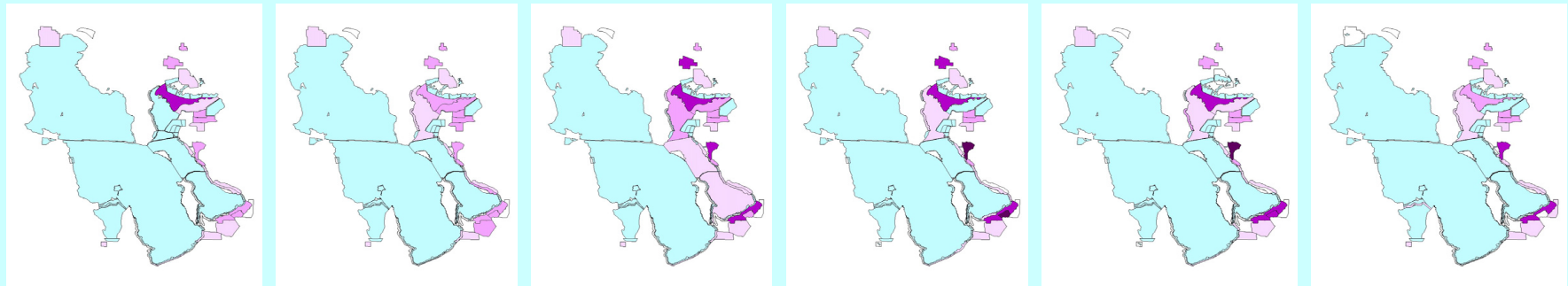
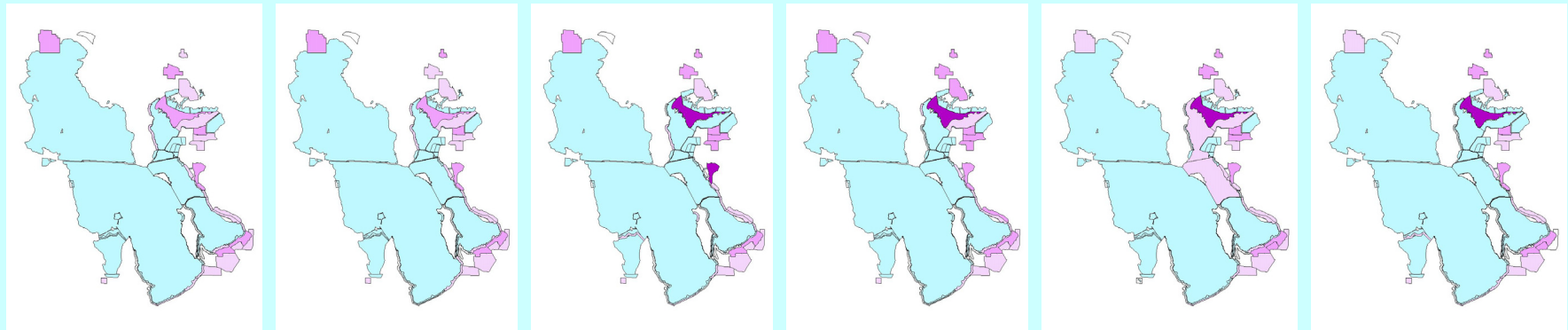
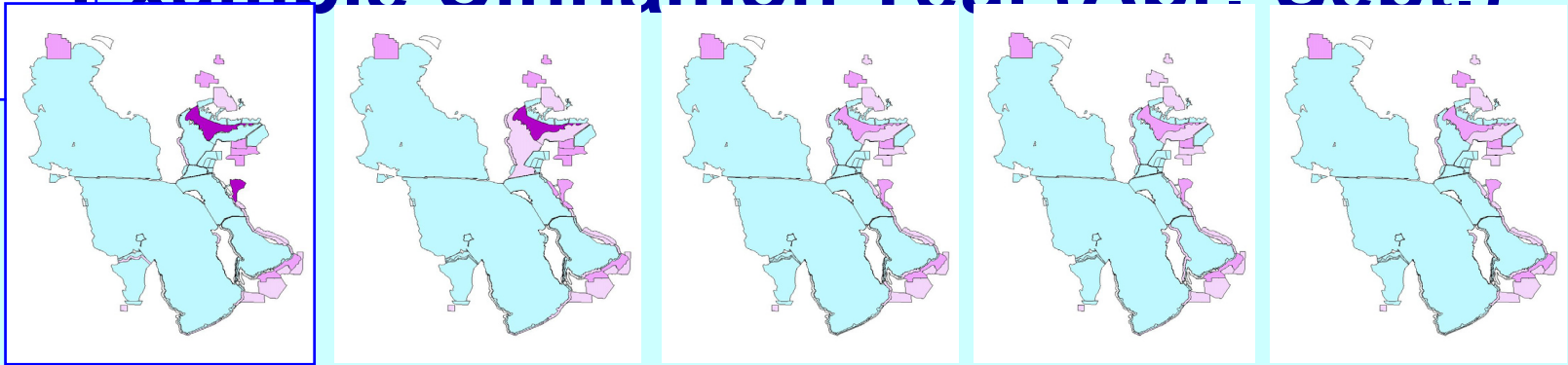
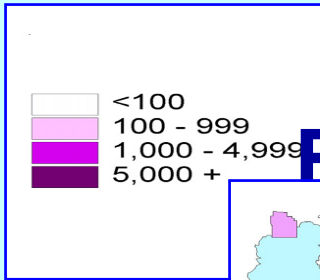
Code	Population estimates		Great Salt Lake			
	Global	North America	Mean Jul-Sep	Peak 10-Aug	High Count 1997	Abundance Status
AMAV	450,000	450,000	94,006	122,083	204,878	C

Mean number of AMAV at GSL by survey period.



Temporal/ Spatial Relationships

Example Cinnamon Teal (Apr.-Sept.)



Bird Use Days

one bird spending 24 hours within the study
area

Year	Mean Bird Days
1998	89,183,180
1999	77,469,285
2000	88,889,577
2001	85,349,660

Suite	Five-Year Mean Bird Days
Avocets and Stilts	14,696,844
Dowitchers	1,133,536
Waterfowl	32,563,640
Gulls	22,062,838
Hérons and Egrets	262,739
Small Sandpipers	2,030,585
Phalaropes	7,044,632
All Waterbirds	86,752,258





State of Utah
Department of Natural Resources



Thank You!



The Public at Large

Great Salt Lake
Ecosystem Project



Magcorp



Strategic Alliance





*The Great Salt Lake
Waterbird Survey*

*adds light to achieve
sustainable waterbird
conservation.*