Great Salt Lake
Pressures on the Resource

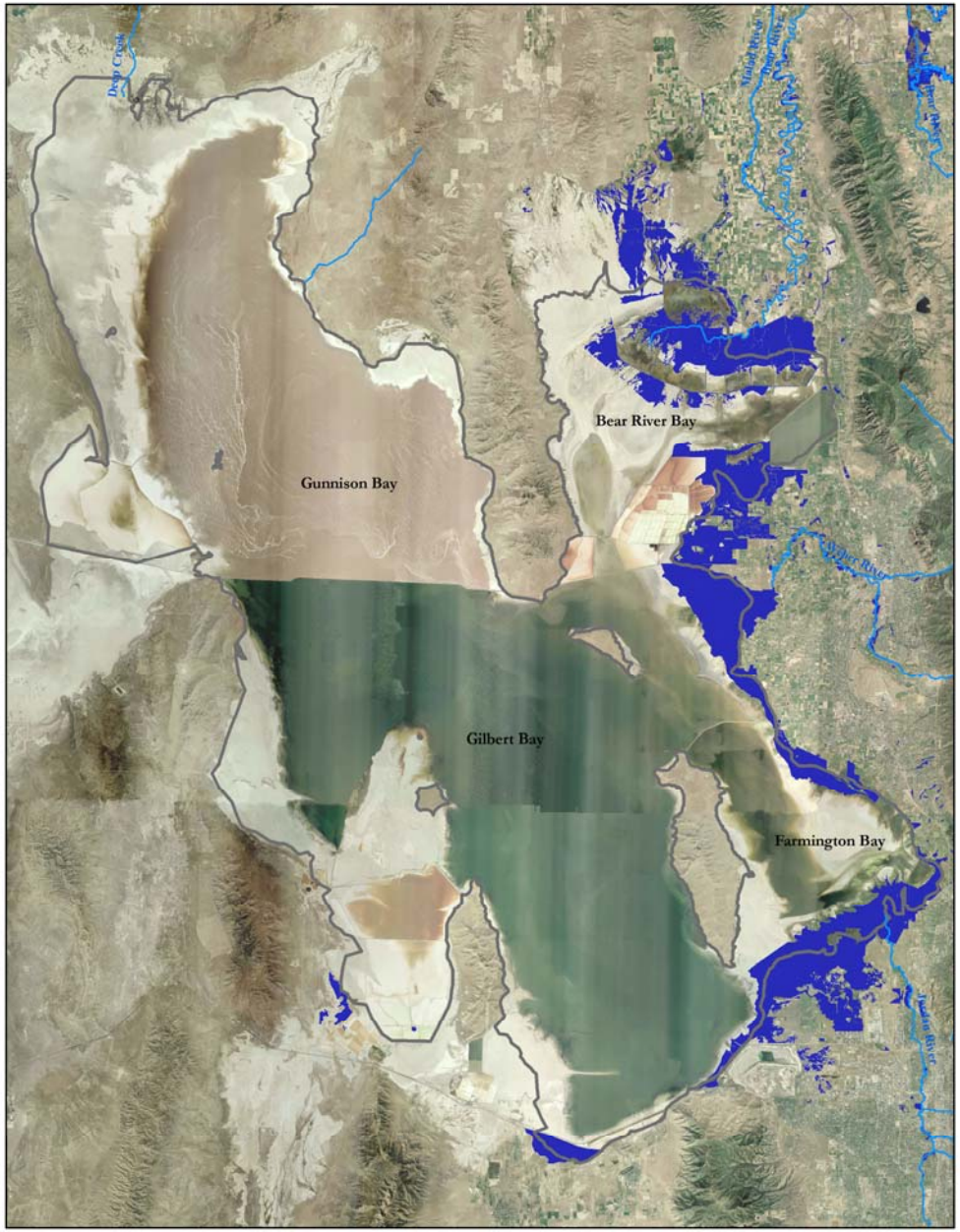
photo - Charles Uibel - greatsaltlakephotos.com

Jodi Gardberg, Great Salt Lake Watershed Coordinator
Utah Department of Environmental Quality/Division of Water Quality

Stressors

- Hydrologic modification and flooding/dewatering
- Pollutants
- Industrial development
- Urban growth and development

Hydrologic Modification



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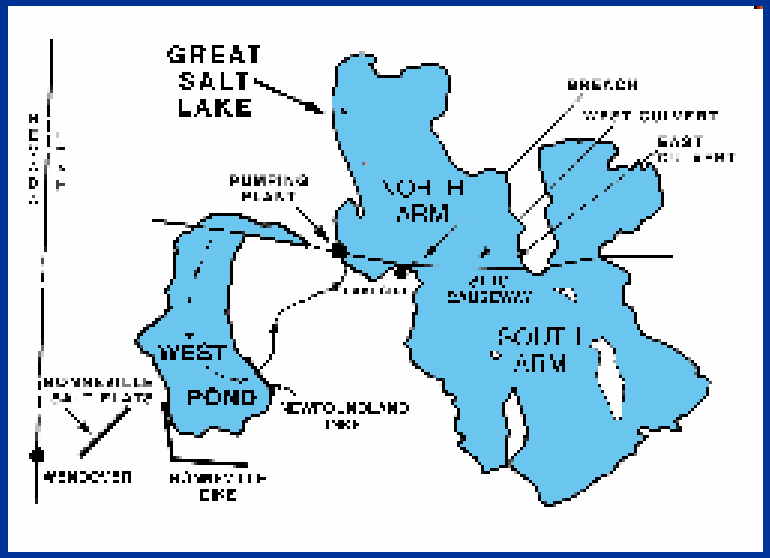
Flooding of Great Salt Lake

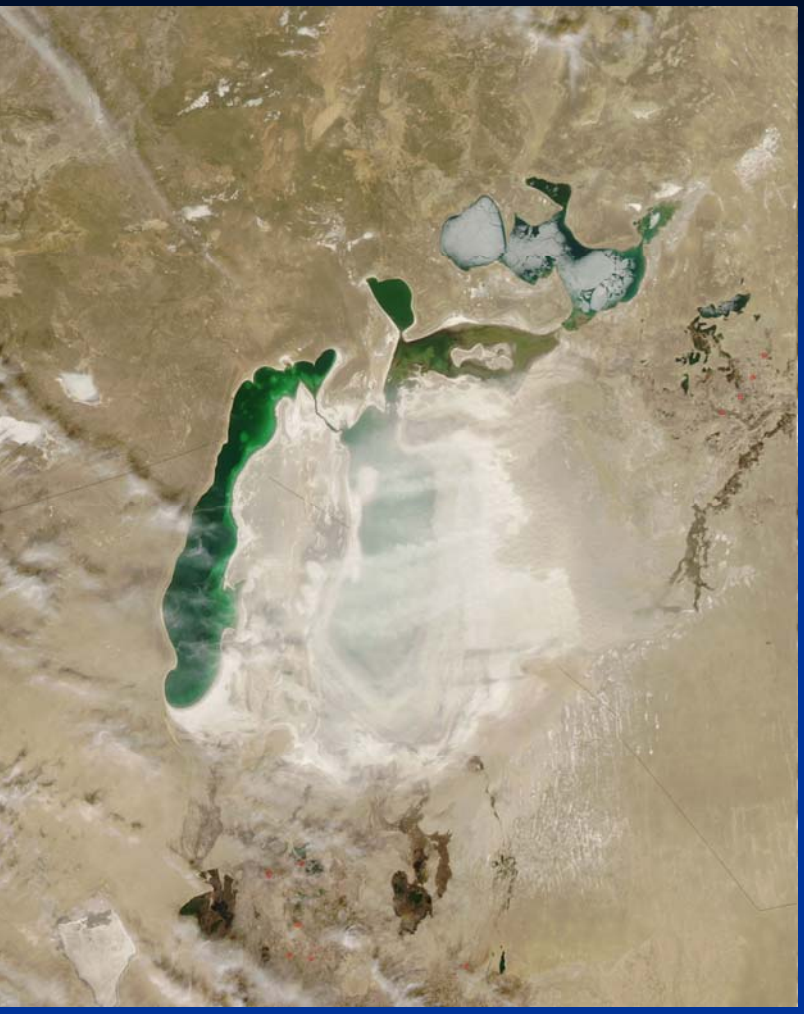


Great Salt Lake Elevation

1999

2009

Aral Sea



July - September, 1989

August 12, 2003

Gilbert Bay Food Web

MAR. – NOV.:

TEMPERATURE

PHOTIC ZONE N (0.74)

BRINE SHRIMP (0.99)

LAKE VOLUME

PHYTO-PLANKTON (0.76)

CORIXIDS (0.30)

GREBES (0.82)

SALINITY (0.86)

BRINE FLIES (0.72)

WATERSHED INFLOWS ?

DEEP BRINE LAYER ?

+0.39
+0.91
+0.19
+0.20
-0.84
+0.22
+0.82
-0.36
-0.93
-0.29
-0.23

DEC. – FEB.:

PHOTIC ZONE N (0.92)

LAKE VOLUME

PHYTO-PLANKTON (0.95)

SALINITY (0.86)

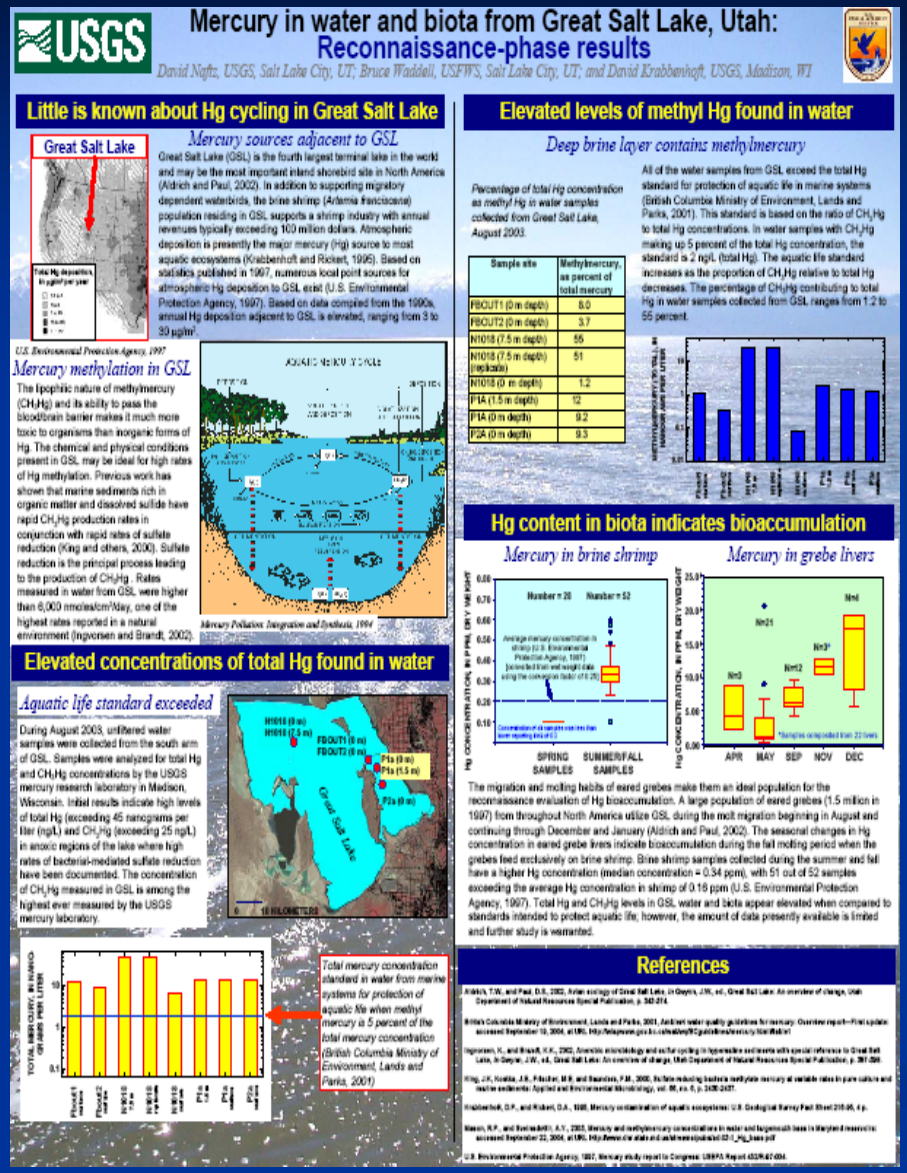
+0.50
-0.96
-0.93
-0.47

GARY E. BELOVSKY
Director, Environmental Research Center
University of Notre Dame

Possible Consequences of a smaller more saline lake

- Lower brine shrimp and brine fly biomass
- Avian populations crash or decrease
- Reduced brine shrimp harvest and associated loss of royalties, jobs and tax revenues
- Dust/Salt storms that can cause health problems, loss of agriculture, increased exposure to toxins and lower quality of life
- Loss of recreation

Pollutants



In 2003, USGS measured some of the highest levels of Hg found in U.S. surface waters

Waterfowl Consumption Advisories

Northern Shoveler

Common Goldeneye

Cinnamon Teal

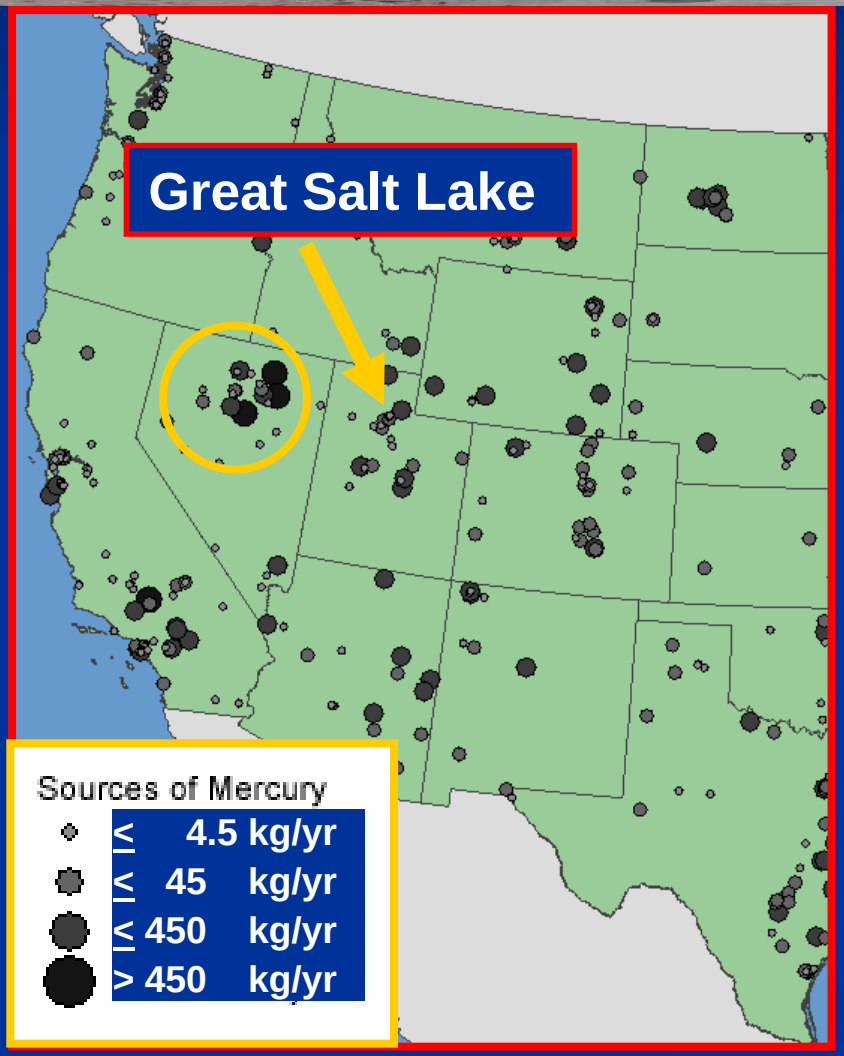
www.waterfowladvisories.utah.gov/advisories.htm

What's the Problem with Mercury in the GSL?

Mercury is toxic & bioaccumulative in both people and wildlife

- Potent neurotoxin- can cause illness and loss of physical abilities (movement, cognition)
- Harmful to developing embryos & young

Where does the Mercury come from?



1) Upwind regional sources

- Regulated- Gold mining, coal-fired power
- Also- wildfires

2) "Global" Sources

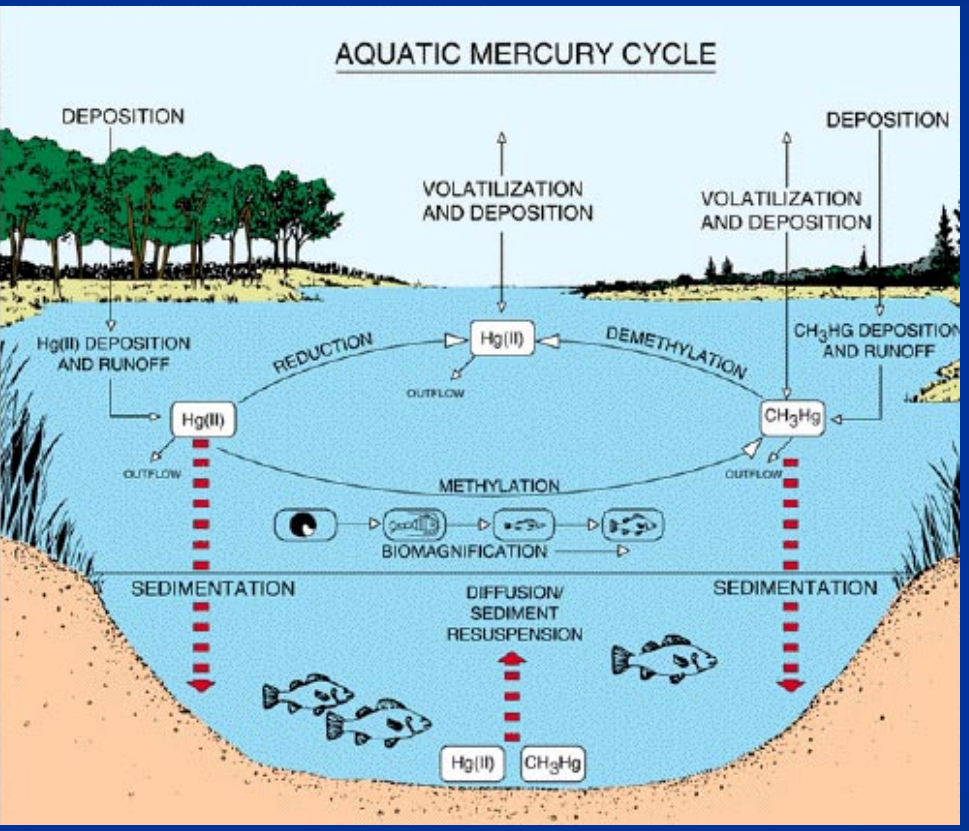
- Asian continent
- "global mercury pool"

3) Local sources

- Stormwater, local air emissions
- Historic contamination into a terminal lake system

Data source: US EPA TRI, 2003; Slide: Dr. D. Naftz, USGS

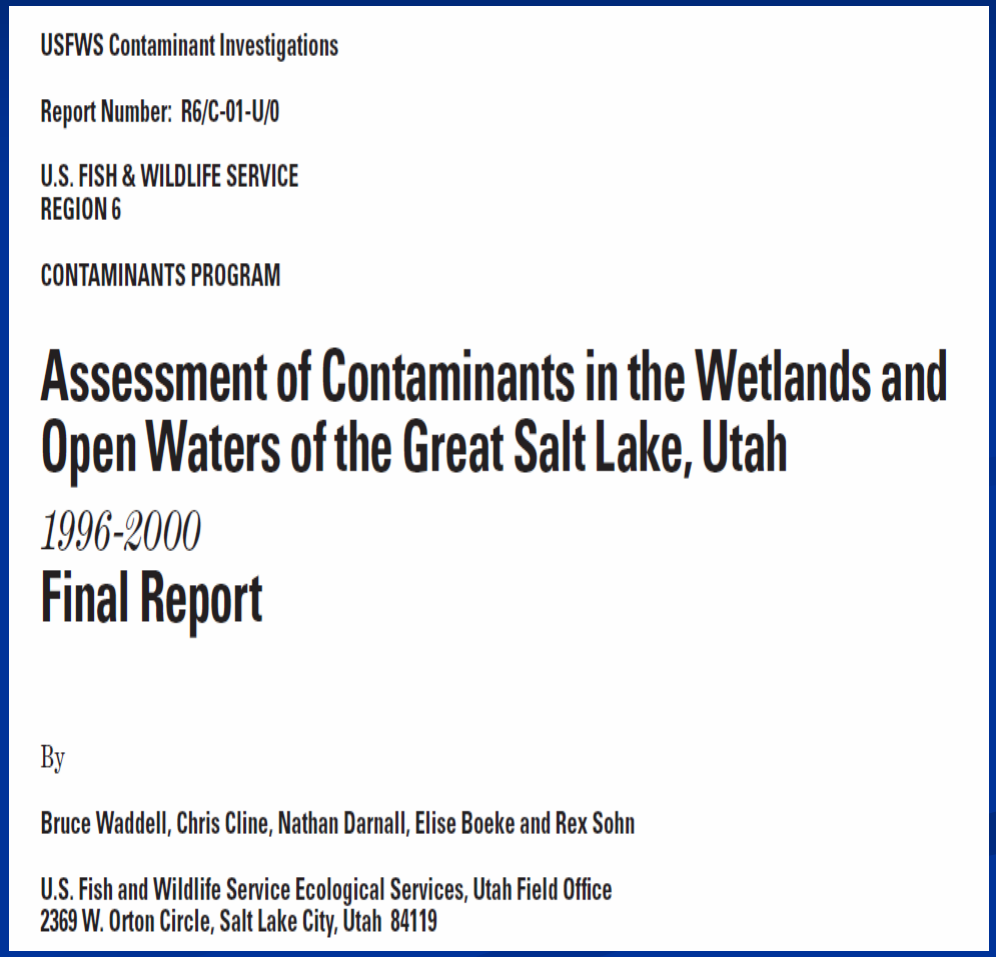
Mercury Cycling: Key Concepts



- **<u>Deposition:</u>** Hg can be deposited, volatilized and re-suspended (air cycle)
- **<u>Methylation:</u>** Microorganisms can transform Hg to an organic form ("**methyl mercury**", MeHg)
- **<u>Biomagnification:</u>** MeHg is accumulated in **increasing concentrations** in the food chain

USFWS Assessment of contaminants in the wetlands and open waters of GSL

- No areas where contaminants were present in acutely toxic concentrations
- Residual concentrations of legacy compounds
- Large number of contaminants at elevated concentrations (Outlet of Northwest Oil Drain into FB, Ogden Bay, South shore of Gilbert Bay)



USFWS Contaminant Investigations

Report Number: R6/C-01-U/0

U.S. FISH & WILDLIFE SERVICE
REGION 6

CONTAMINANTS PROGRAM

Assessment of Contaminants in the Wetlands and Open Waters of the Great Salt Lake, Utah

1996-2000

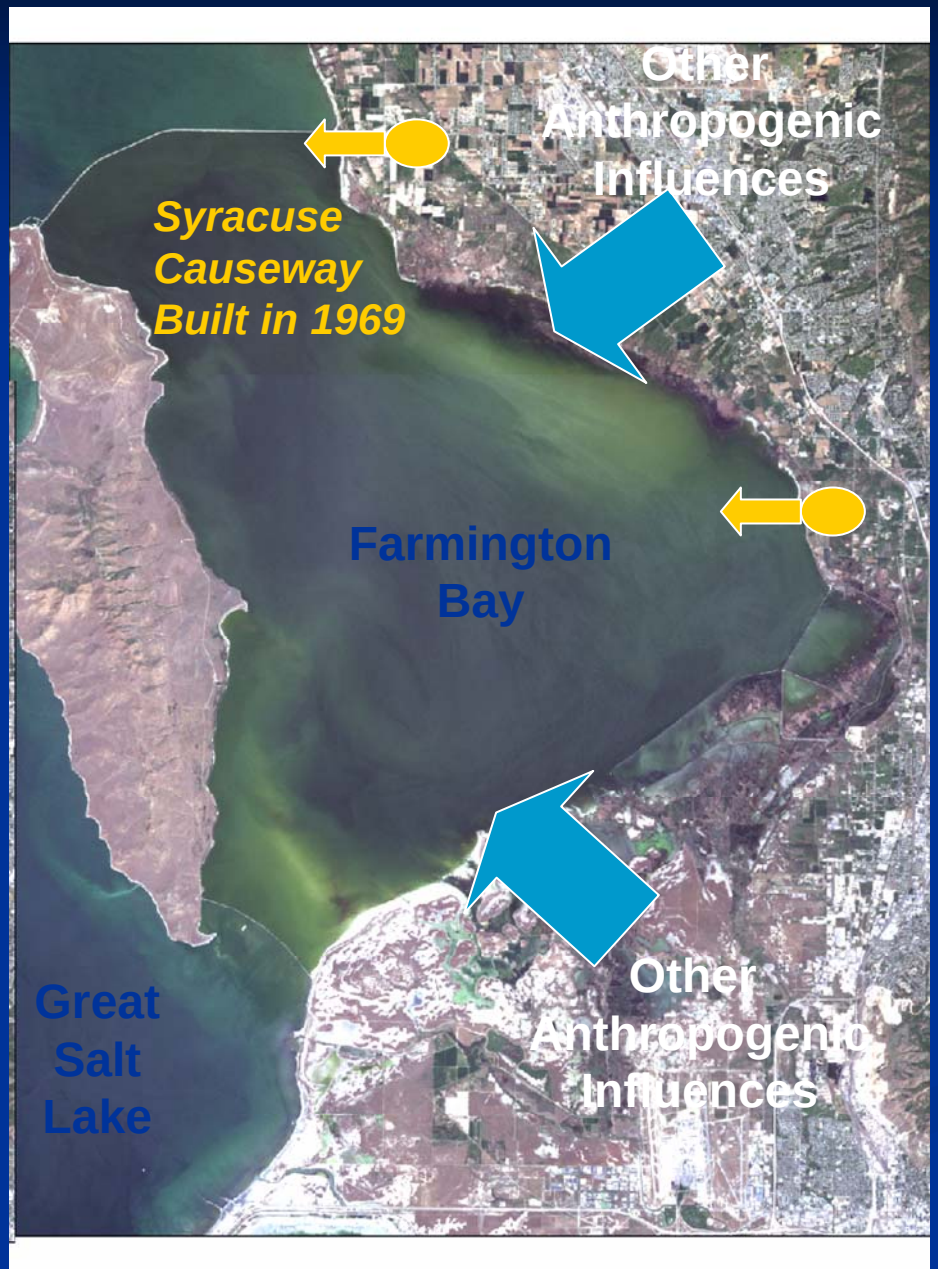
Final Report

By

Bruce Waddell, Chris Cline, Nathan Darnall, Elise Boeke and Rex Sohn

U.S. Fish and Wildlife Service Ecological Services, Utah Field Office
2369 W. Orton Circle, Salt Lake City, Utah 84119

Farmington Bay Stressors



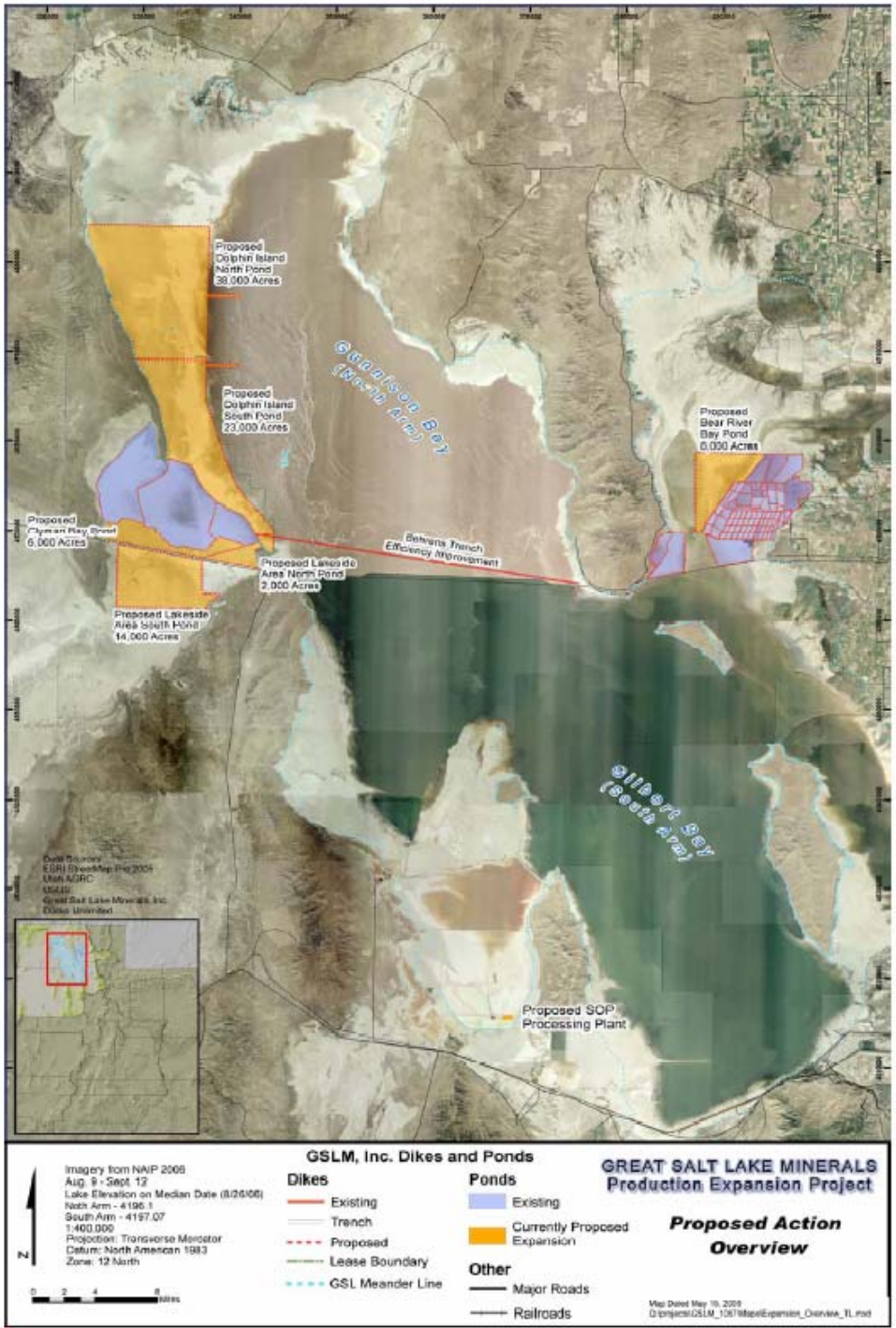
North Davis WWTP Discharge

Central Davis WWTP Discharge

Nutrients concentrate in FB - EUTROPHICATION

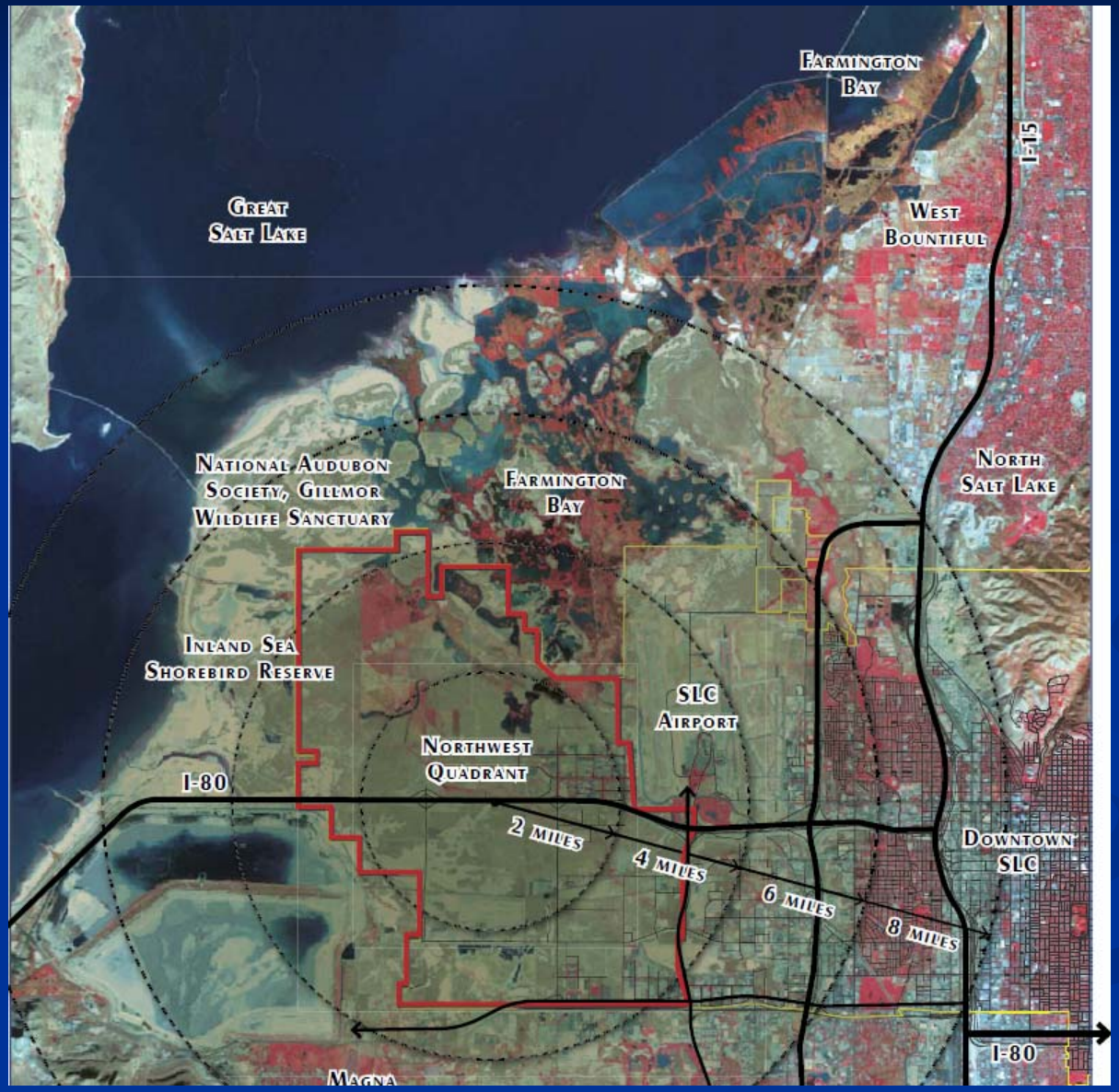
Algal Blooms in Farmington Bay

Algal Blooms in GSL Impounded Wetlands



Great Salt Lake Minerals Expansion

Urban Growth and Development



THREATS: Loss of wetland habitat due to subdivision and infrastructure development, loss of agricultural buffer lands, loss of water quantity, threatened water quality

CAN WE PRESERVE THIS UNIQUE ECOSYSTEM?

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