

Great Salt Lake Watershed and Nutrient Dynamics



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Great Salt Lake Research Team



TOPICS

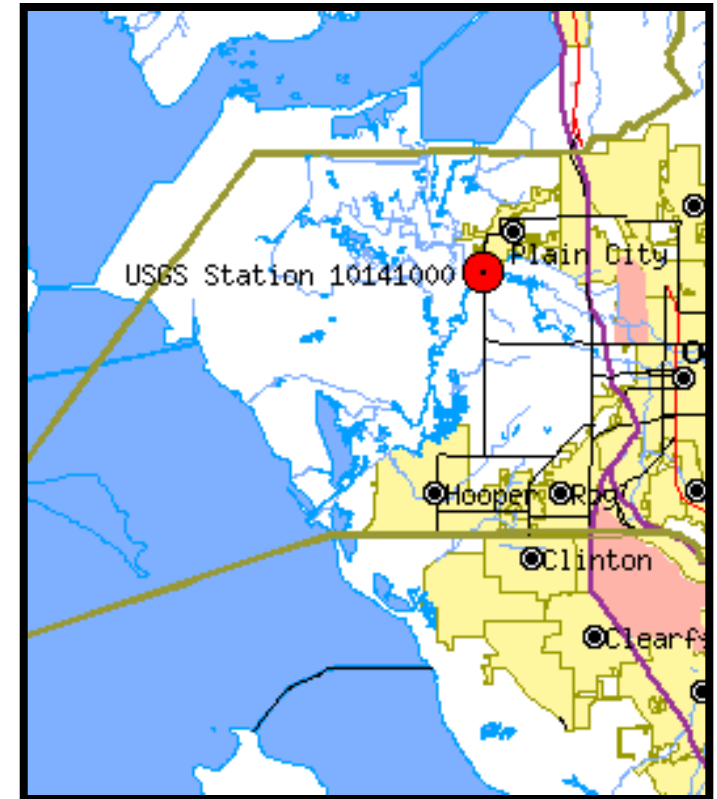
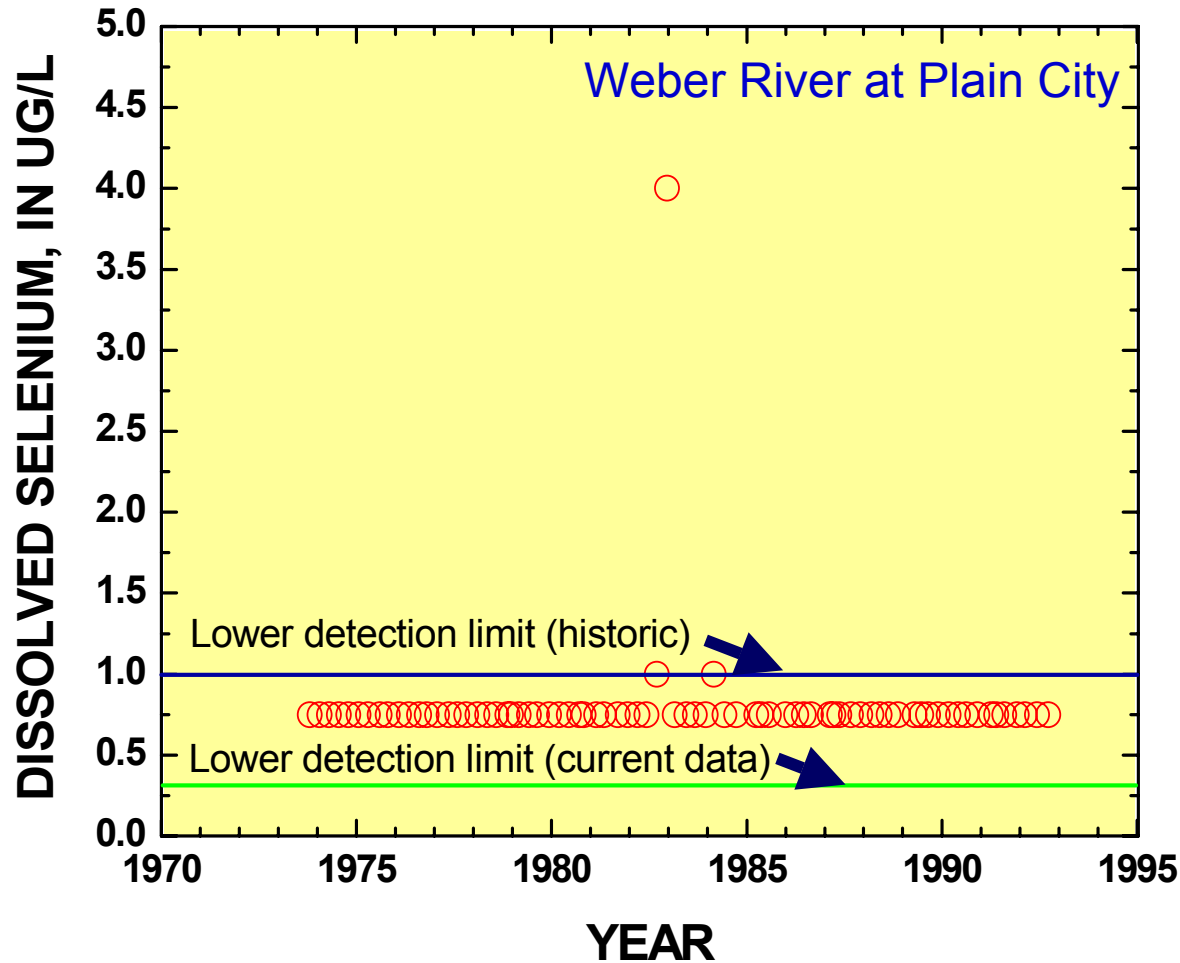
- ◆ **Current and historic selenium loadings**
- ◆ **Infrastructure to measure chemical loadings to main body GSL**
- ◆ ***Artemia* food web dynamics**
- ◆ **Coupling of ongoing and planned work**

SELENIUM LOADINGS

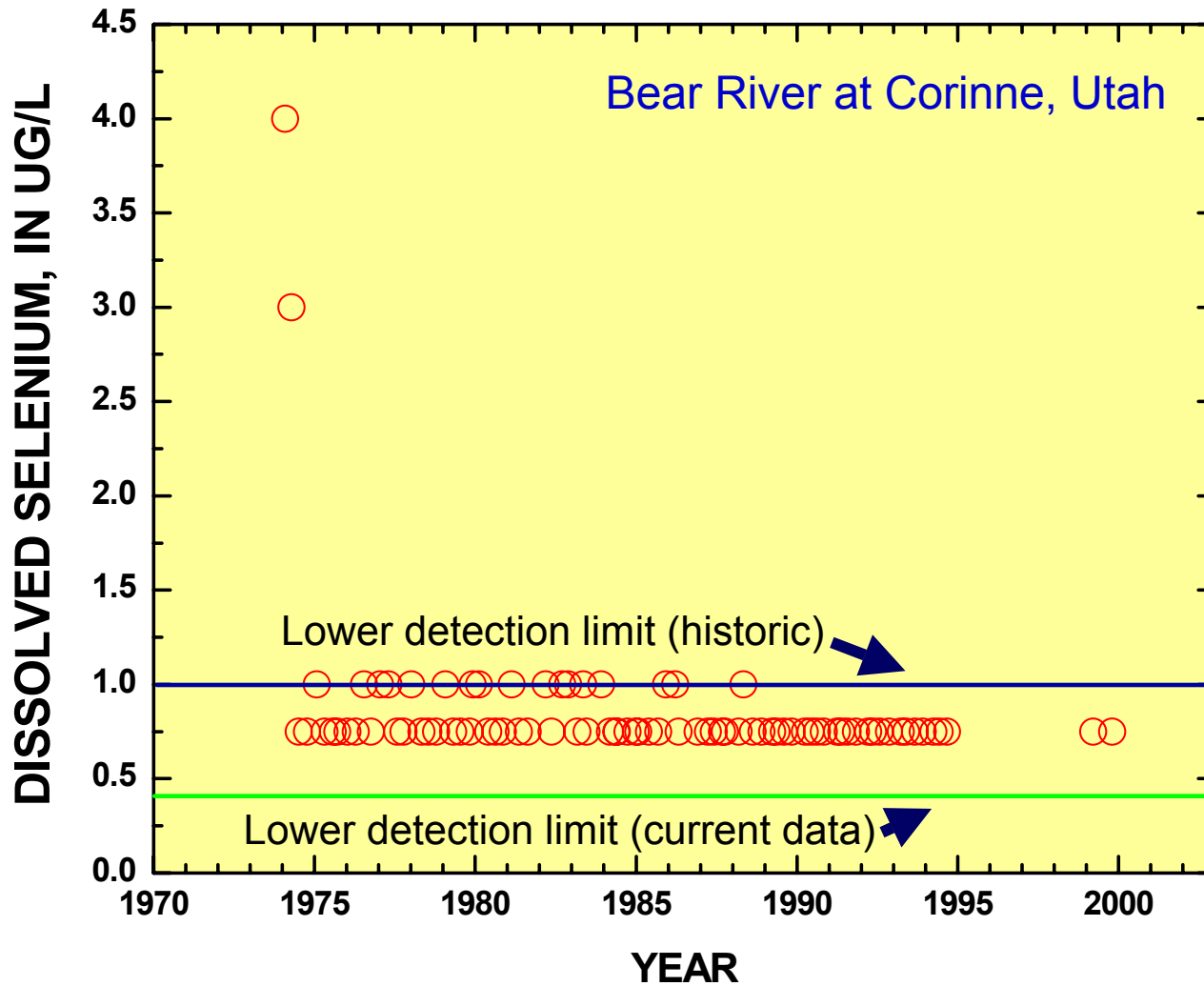
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WEBER R. SE INPUT UNKNOWN



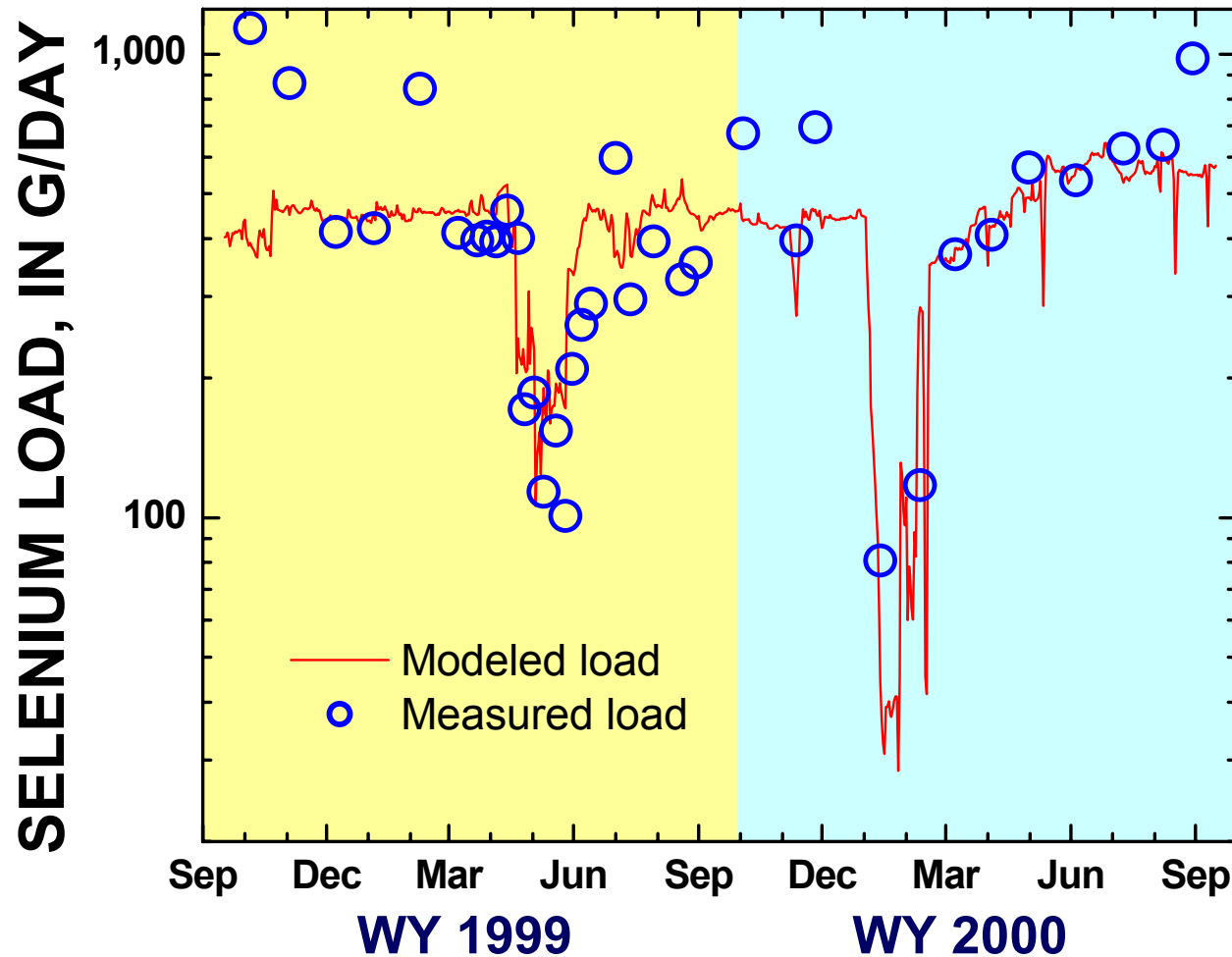
BEAR R. SE INPUT UNKNOWN



JORDAN R. MODELED LOADS

$$\ln(\text{Se load}) = 1.30 + 0.22(\text{Date}) + 0.92(\ln Q)$$

$R^2 = 0.57$ $p < 0.0001$



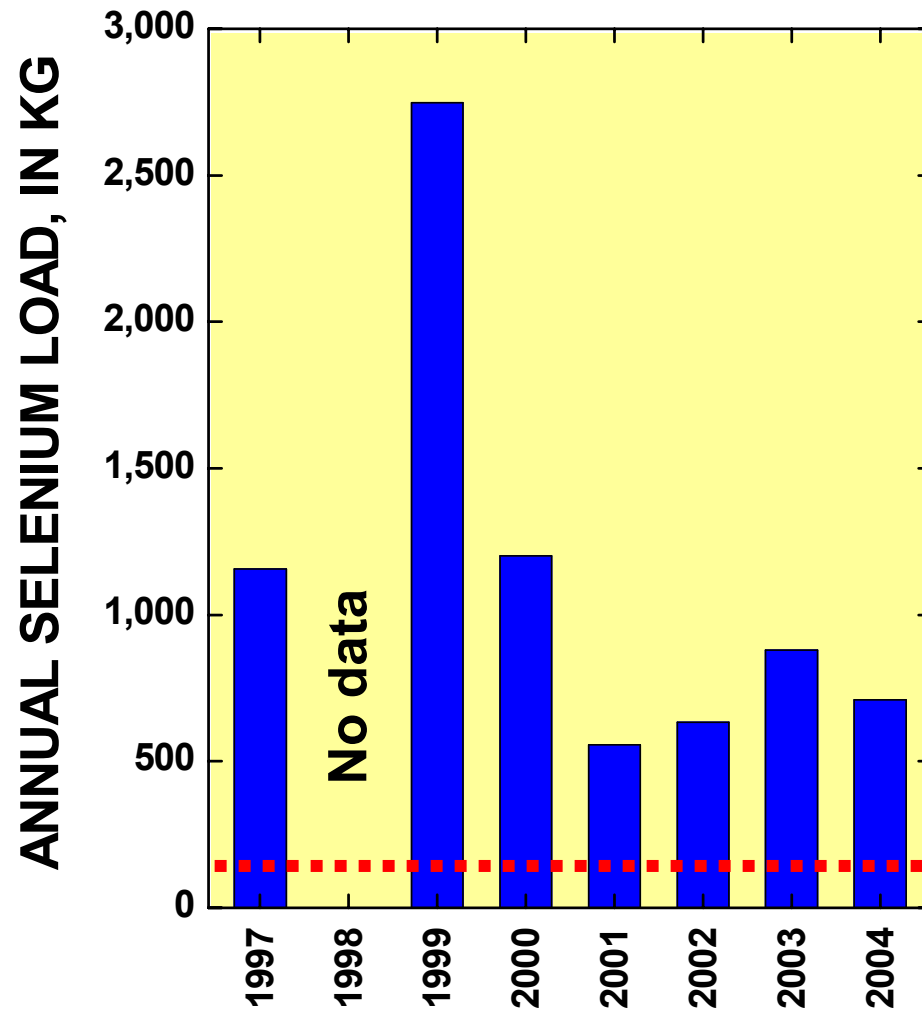
Total load (kg)

1999	2000
150	160

Avg. load (kg/d)

1999	2000
0.42	0.44

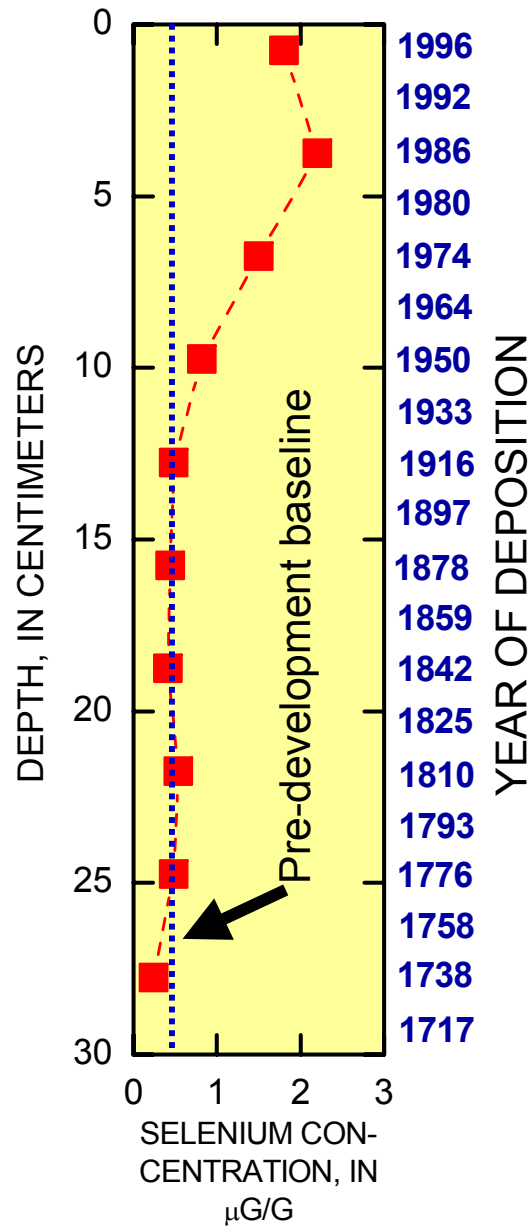
KUCC ANNUAL SE INPUT



Annual Se input from Jordan River prior to wetland entry

HISTORIC SE INPUT TO FARMINGTON BAY

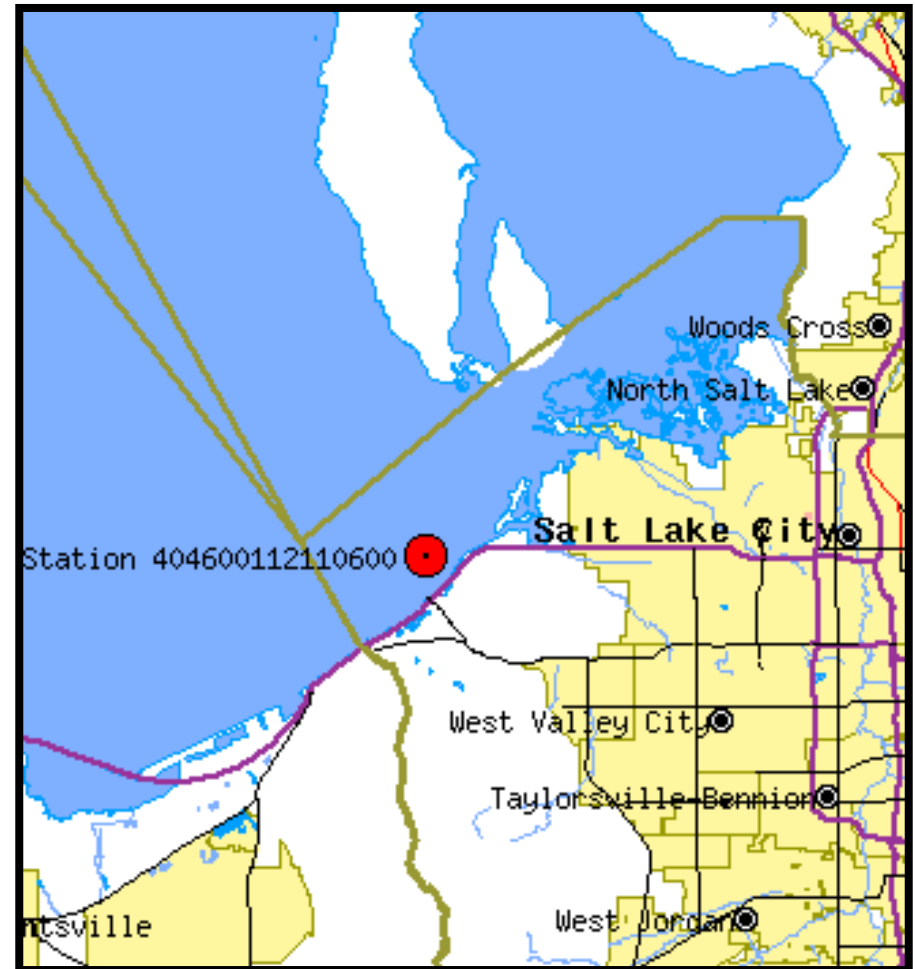
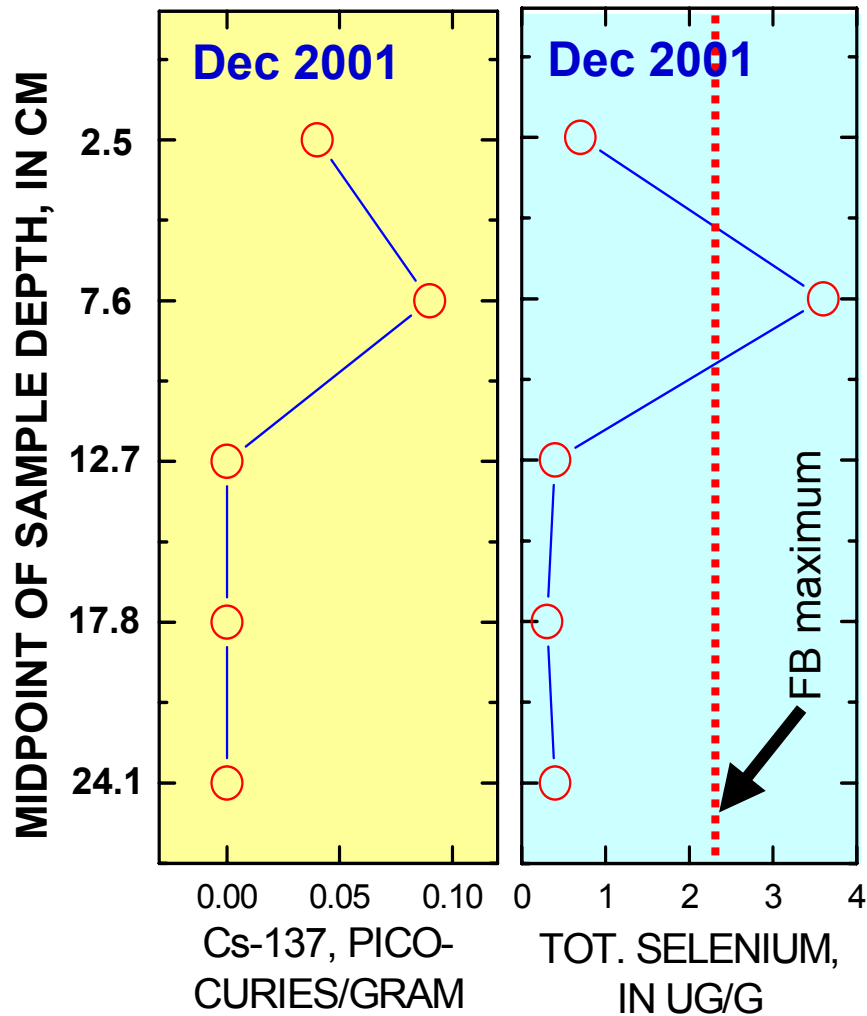
Four- to five-fold increase in recent sediments



1998
sediment core

HISTORIC SE INPUT TO S. GSL

Nine-fold increase in recent sediments



NEW GAGING NETWORK



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LOADINGS TO MAIN BODY GSL



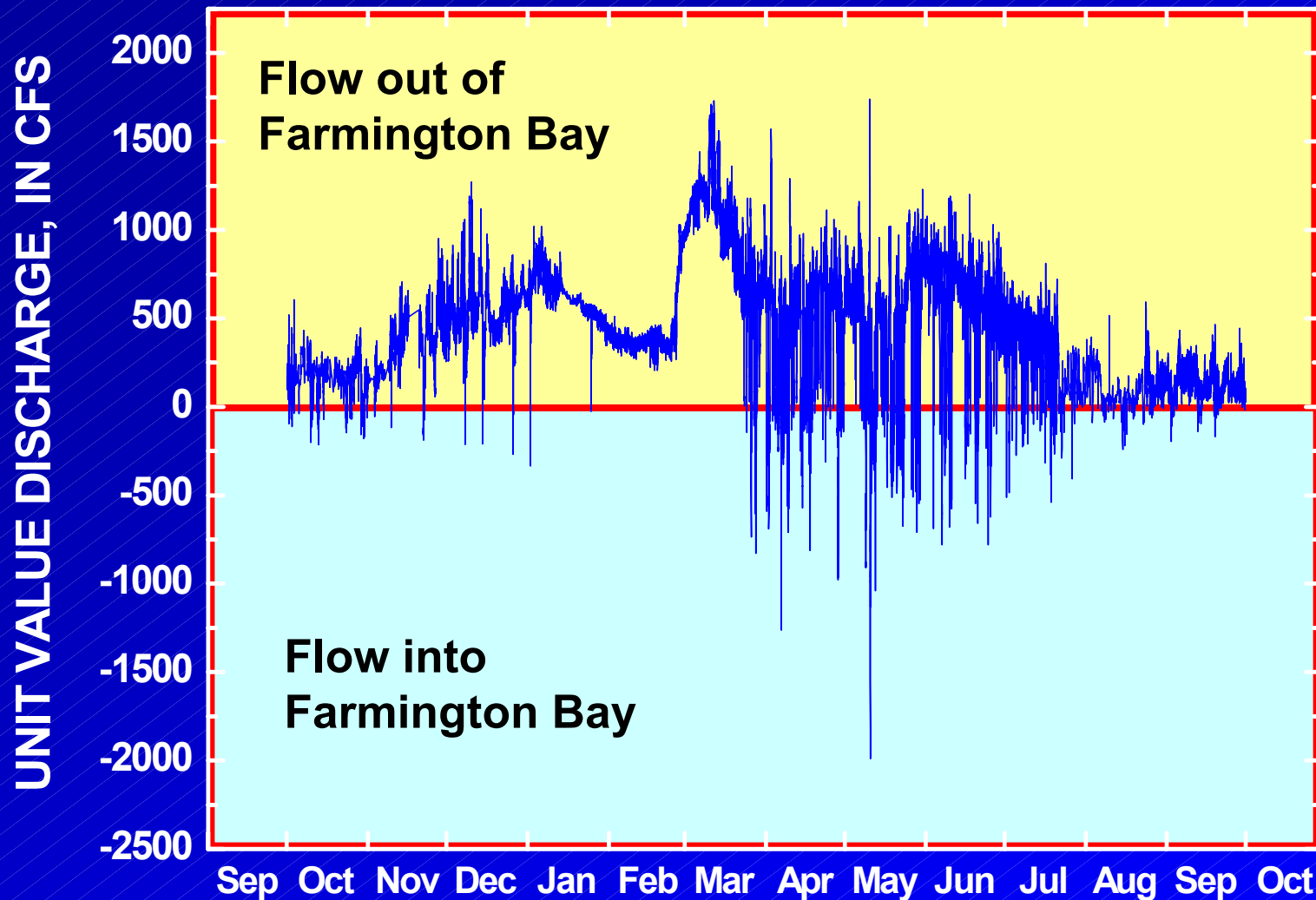
- ▲ Existing acoustic gages
- Needed acoustic gages

Why acoustics?

- ◆ Bi-directional flow
- ◆ Density-driven flow
- ◆ Discharge/loadings controlled by wind speed, wind direction, lake level, salinity gradients, and other variables

WY 04 FARMINGTON BAY RECORD

first acoustic record in Utah (funded by UDWR, Davis Co., and USGS)

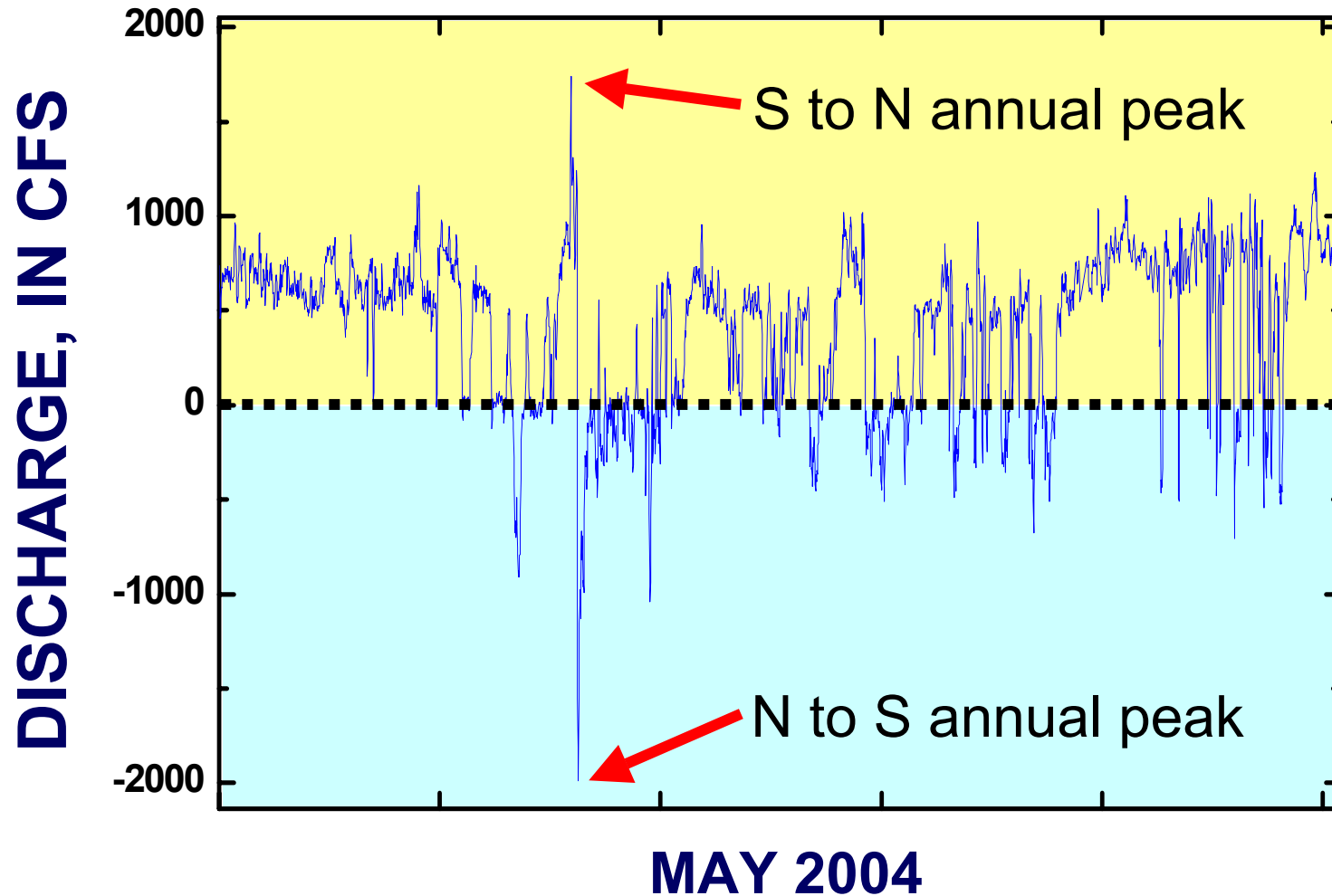


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A DYNAMIC FLOW SYSTEM!

Se load = lake level + wind speed + wind direction + NS disch +



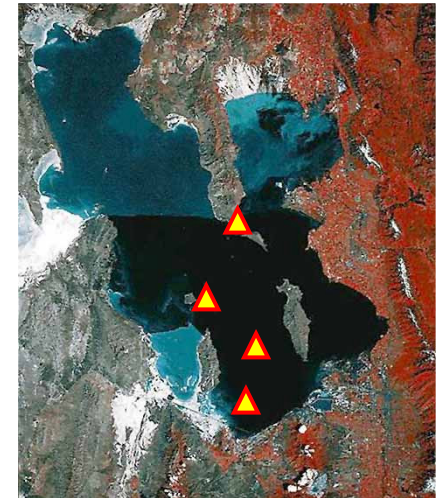
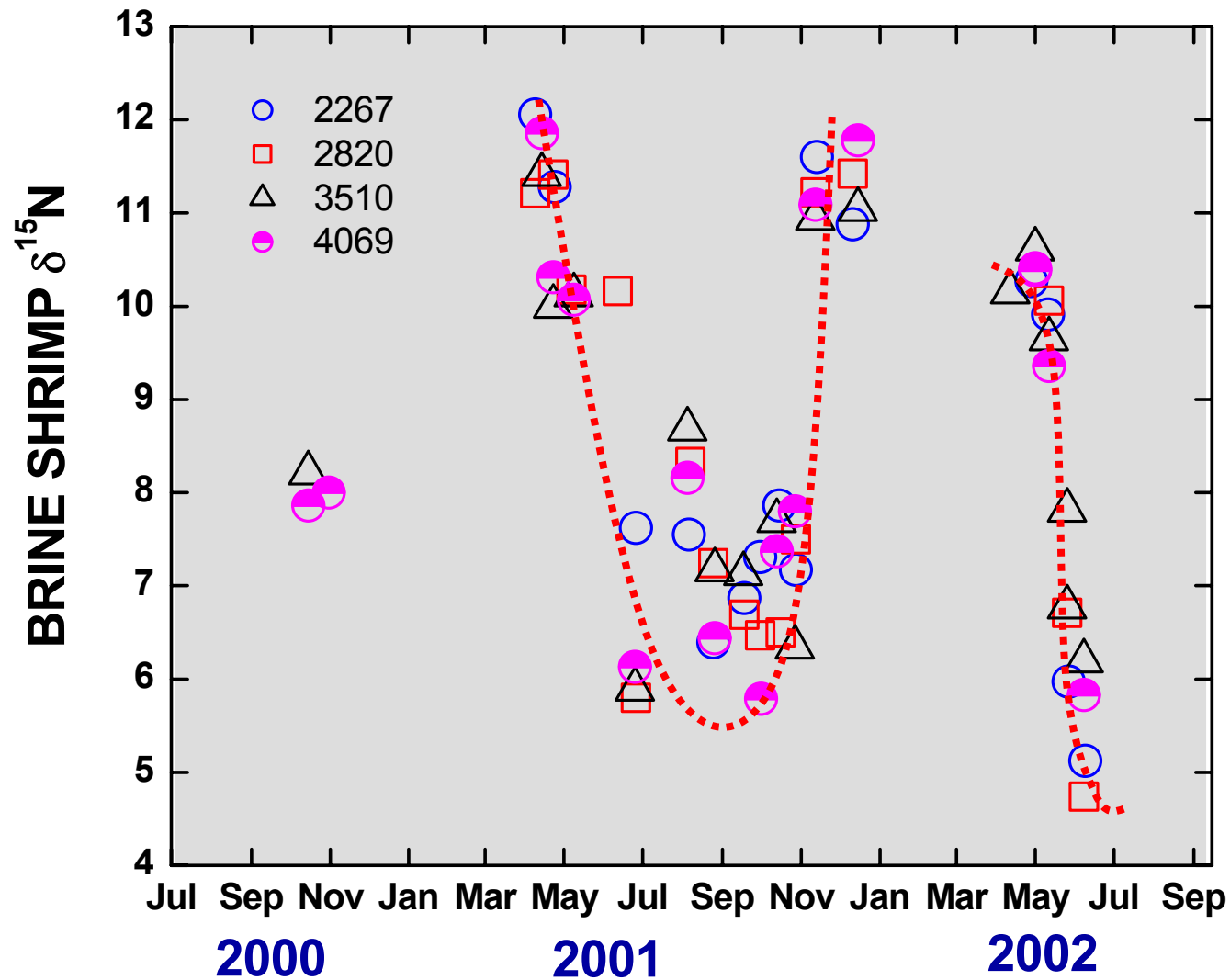
ARTEMIA FOOD WEB RESULTS



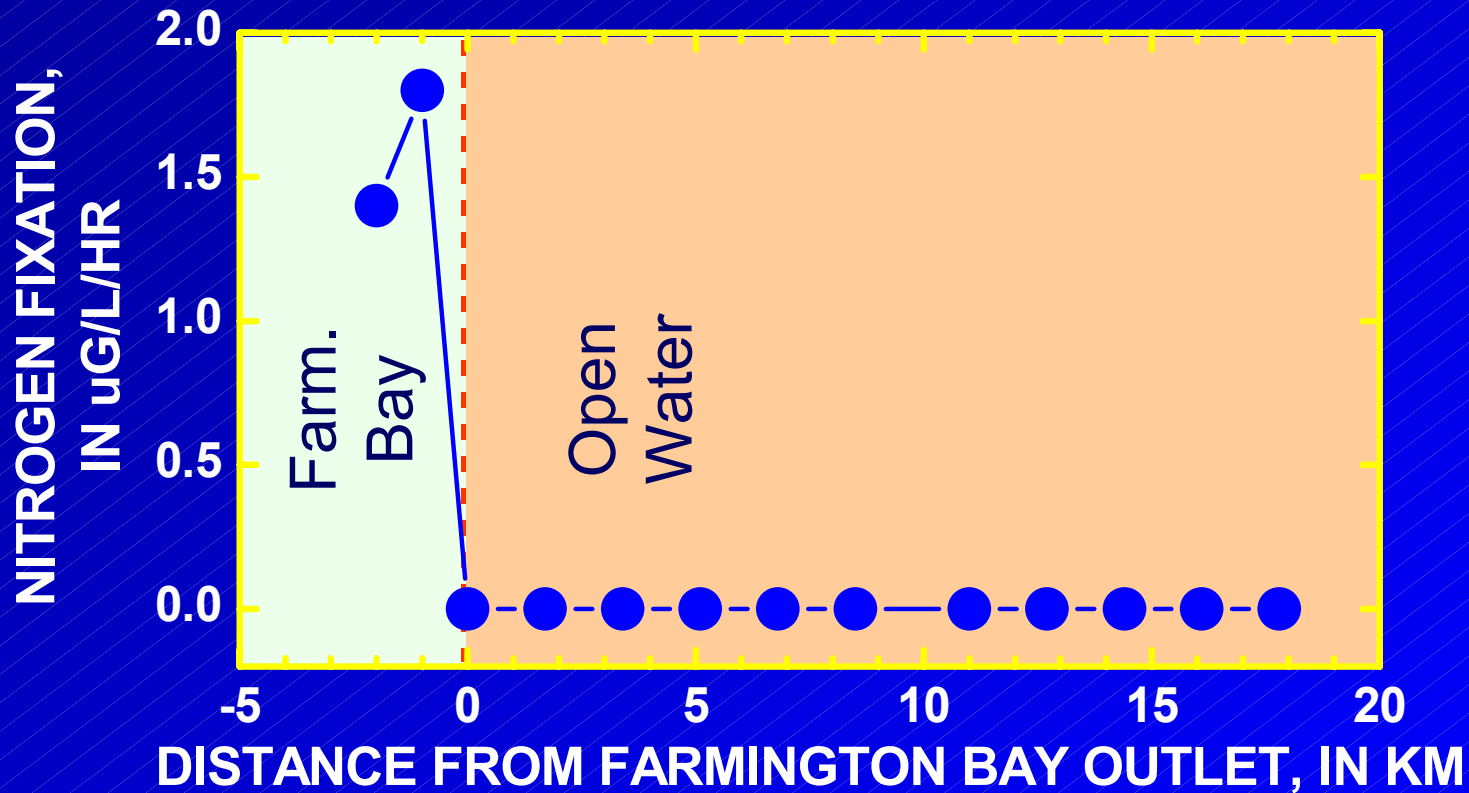
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YOU ARE WHAT YOU EAT +1

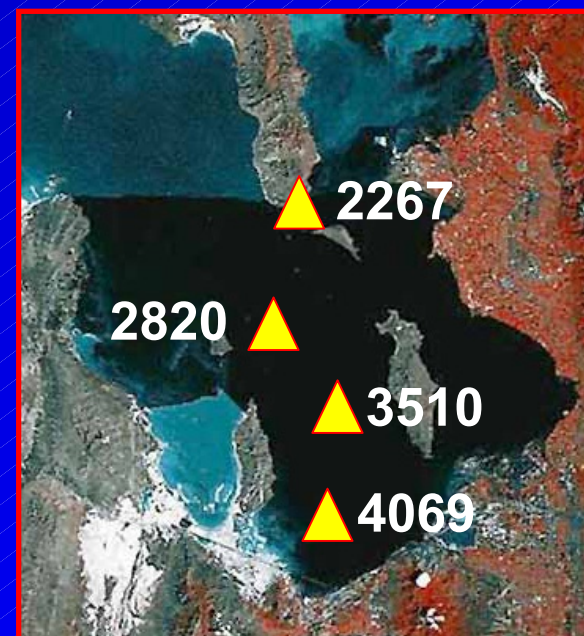
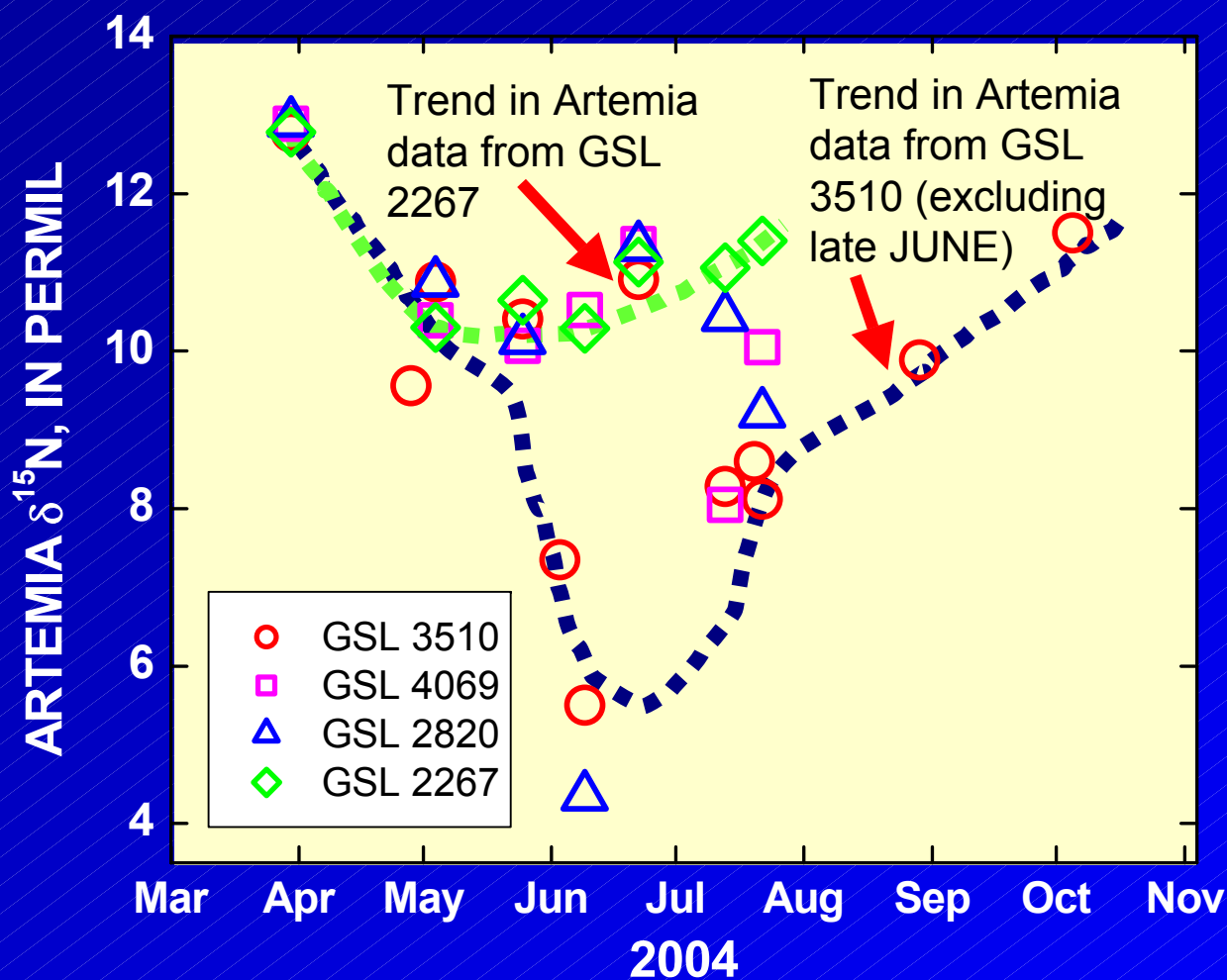


N-FIXATION NEAR ZERO

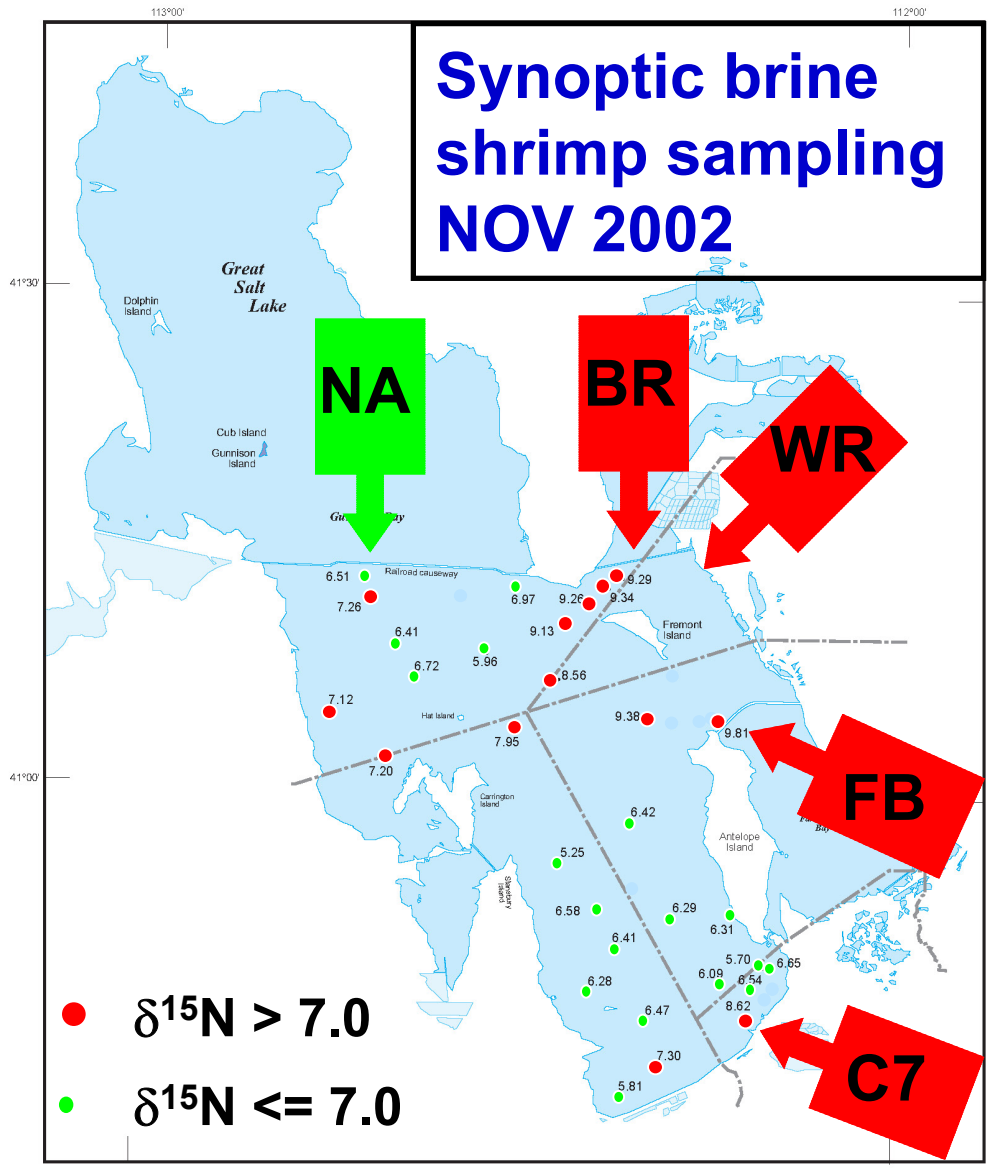


J. Robinson, USU, writ. commun., 2005

2004 BRINE SHRIMP DATA



Synoptic brine shrimp sampling NOV 2002



GSL CURRENTS



COUPLING OF ONGOING AND PLANNED WORK

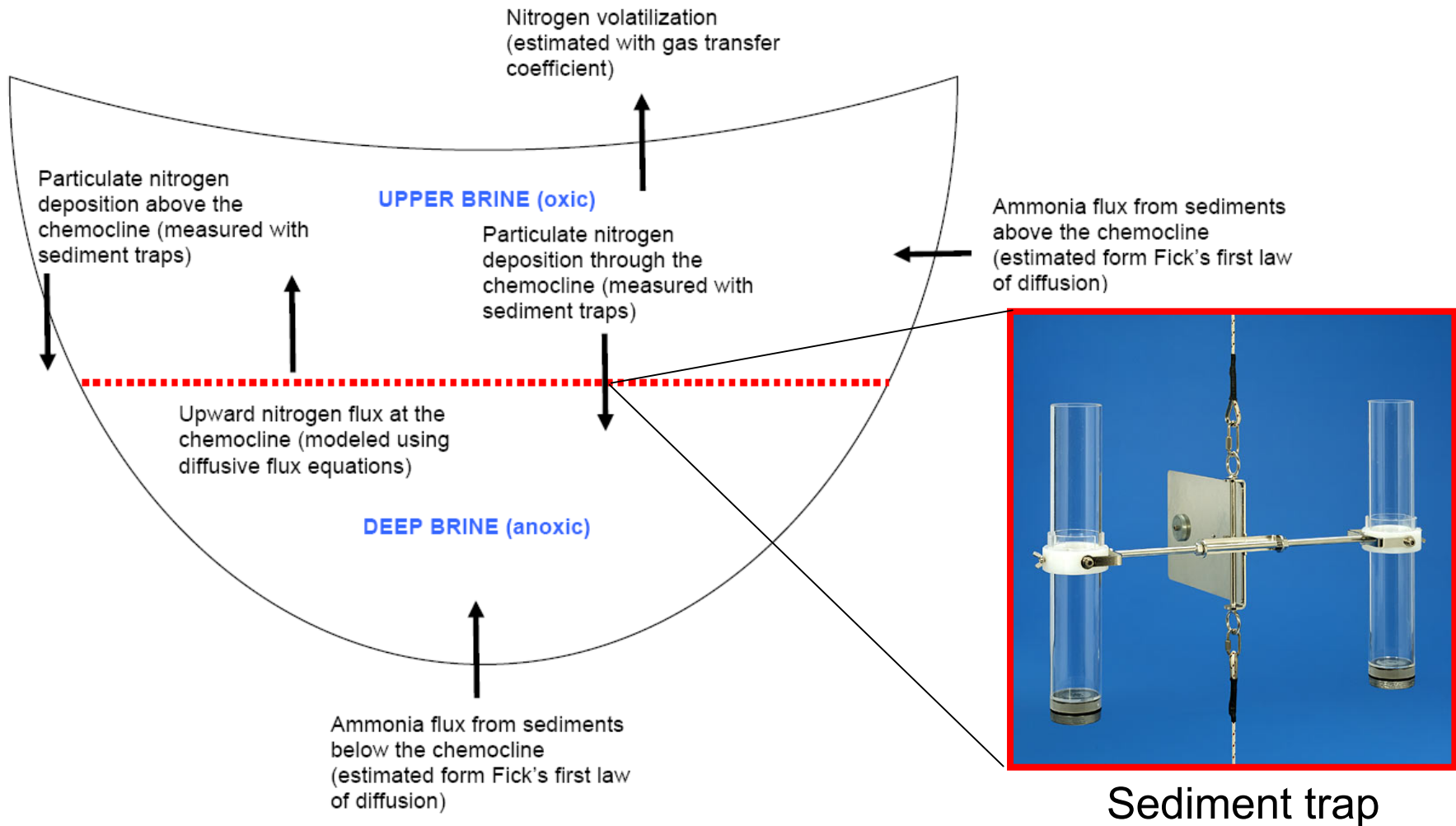


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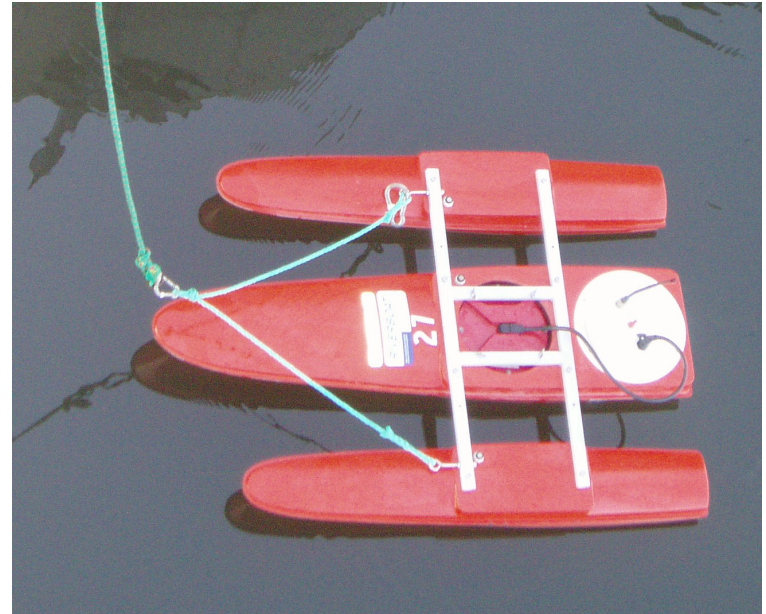
IN-LAKE NUTRIENT CYCLING

Modified from Jellison and others (1993)



IN-LAKE CURRENT PROFILING

- ◆ Utilize acoustic doppler profiling equipment “down-looking mode”
- ◆ Monitored at 10 sites in S. Arm GSL (Mar thru Sep)
- ◆ 30-minute time intervals
- ◆ Vertical bin size of 10 cm
- ◆ Data summarized into vector plots



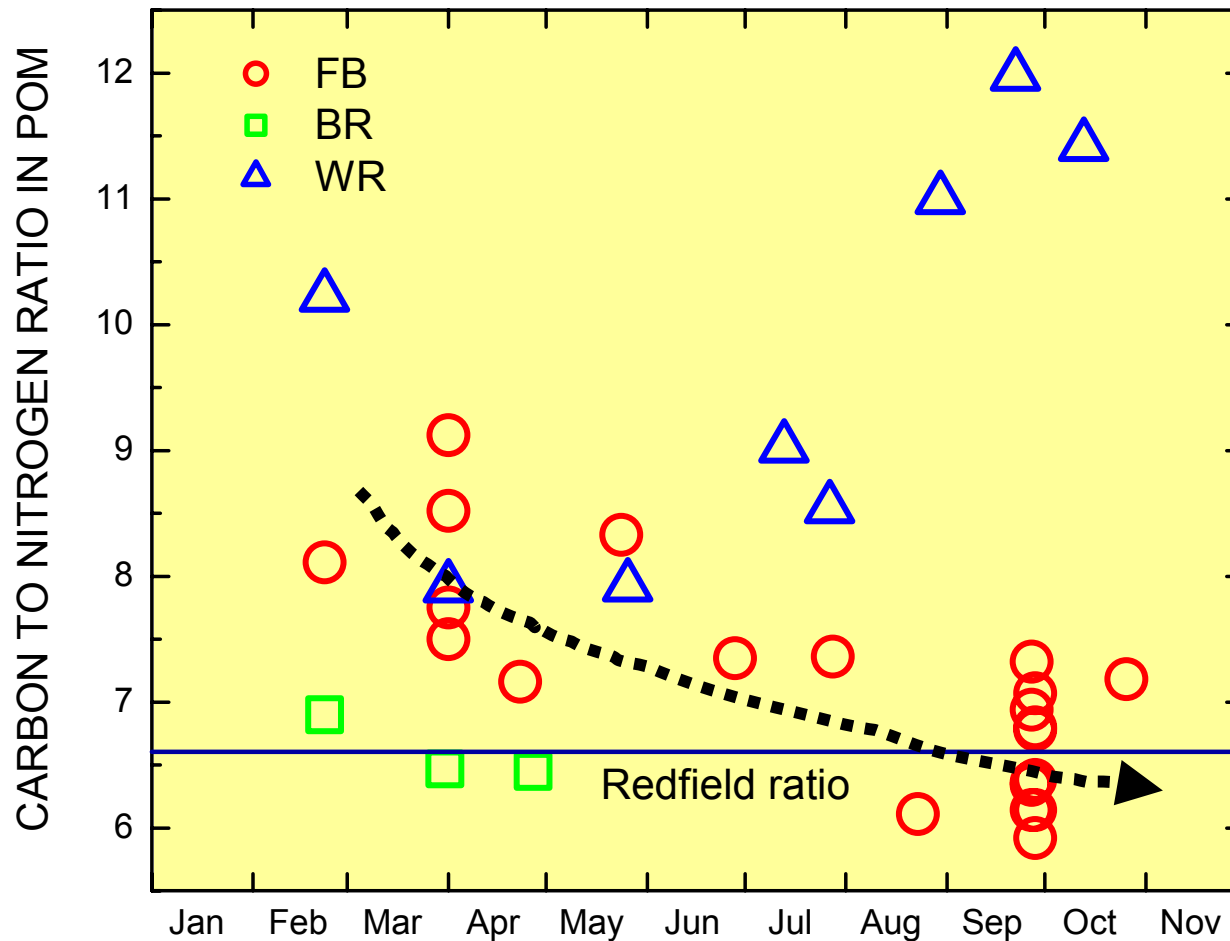
WHAT DO WE HAVE?

- ◆ **Infrastructure for continuous measurement of discharge (acoustic methods) to main body GSL**
- ◆ **Infrastructure for monthly measurement of selected chemical constituents to main body GSL**
- ◆ **Infrastructure for monitoring in-lake chemical cycling and currents**
- ◆ **Ongoing food web studies**

WHAT IS MISSING?

- ◆ **Measurements and models of Se loads entering main body GSL**
- ◆ **Recent and historical information on Se accumulation in GSL sediments**
- ◆ **Measurement and model of in-lake Se cycling and recycling**
- ◆ **Influence of changes in *artemia* food sources on changes in Se bioaccumulation**

REDFIELD RATIO CHANGES



Higher proportion of terrestrial and macrophyte debris



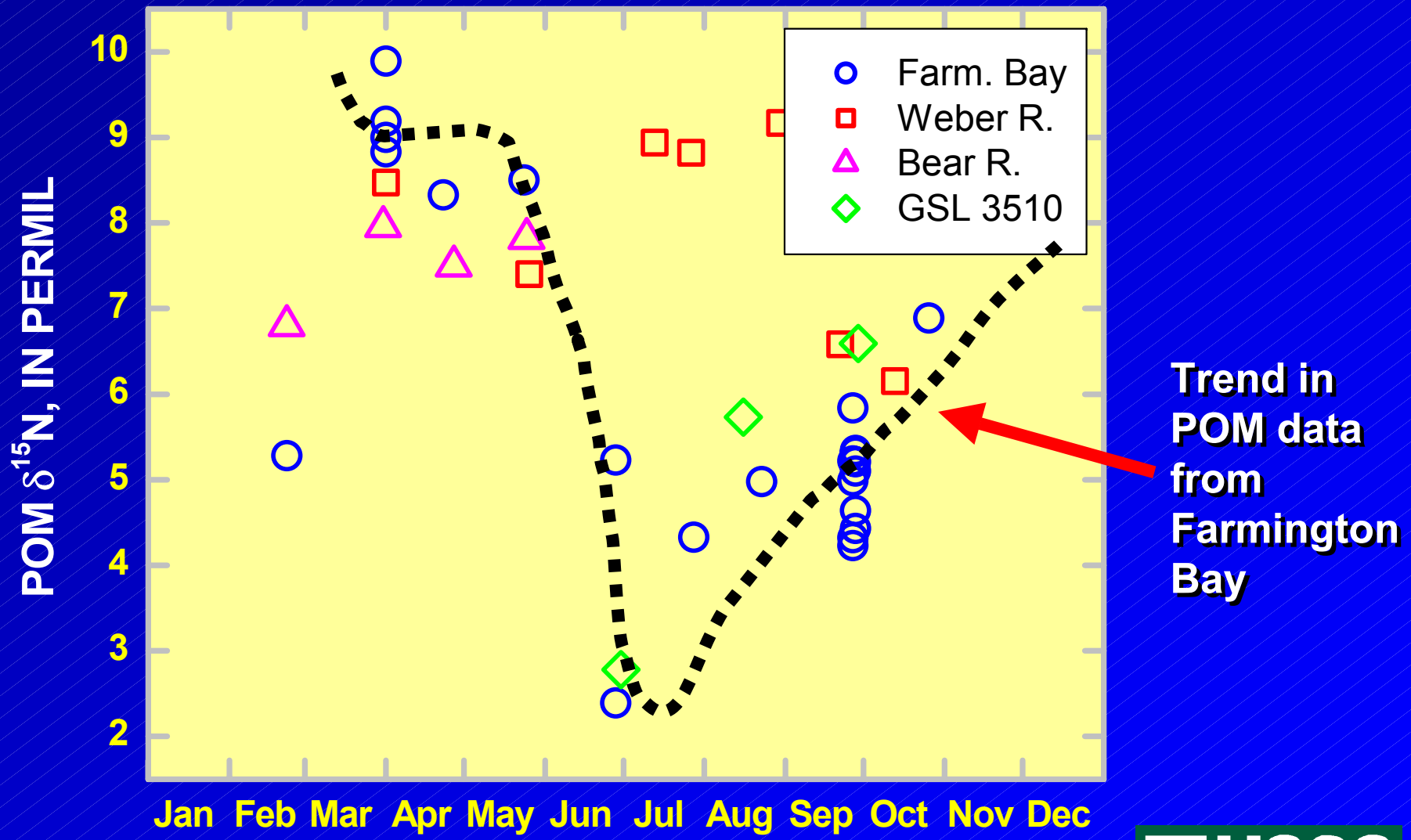
BEAR RIVER ACOUSTIC GAGE



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N-15 IN PART. ORG. MAT.



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UPLOOKING ACOUSTICS

