

ARAL SEA ARTEMIA POPULATION DYNAMICS

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NATO SCIENCE FOR PEACE
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**Economic and Ecological Benefits from Sustainable
Use of the Aral Sea Artemia Resource**

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Specific Objectives of Research

- Document current status of emerging Artemia population
 - Record Artemia population dynamics
 - Identify cyst quality characteristics



Commercial Potential of the Aral Sea Artemia Resource



Artemia Research Program

- Both East and West Aral Sea
- Sampling locations along transect
- Five transects on West Aral
- Two transects on East Aral
- 19 sample locations on West Aral
- 10 sample locations on East Aral
- Vertical plankton net haul (2x/location)
- Sampling frequency: 1-2 times/month (April-November)

Sampling Logistics and Equipment

Difficult access causes
some modifications in
sampling program

East Aral only by ATV.

West Aral by truck and ATV

Lake access by 4-meter
rigid-inflatable vessel

Former sea bed sediments
are highly variable

Each ATV expedition = 300
to 500 km.



Expedition conditions

- Poor weather
- Equipment failure
- Prolonged delays





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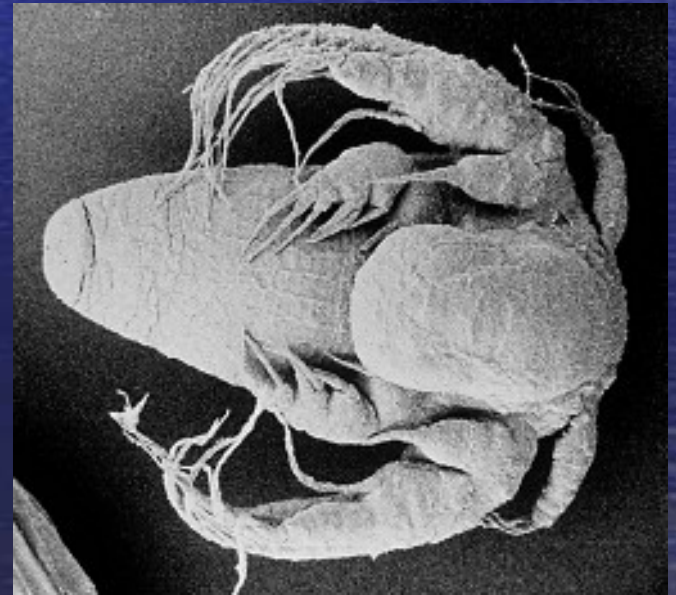
Artemia Biological Assessments:

Population structure---Age classes

Reproduction

Cyst production

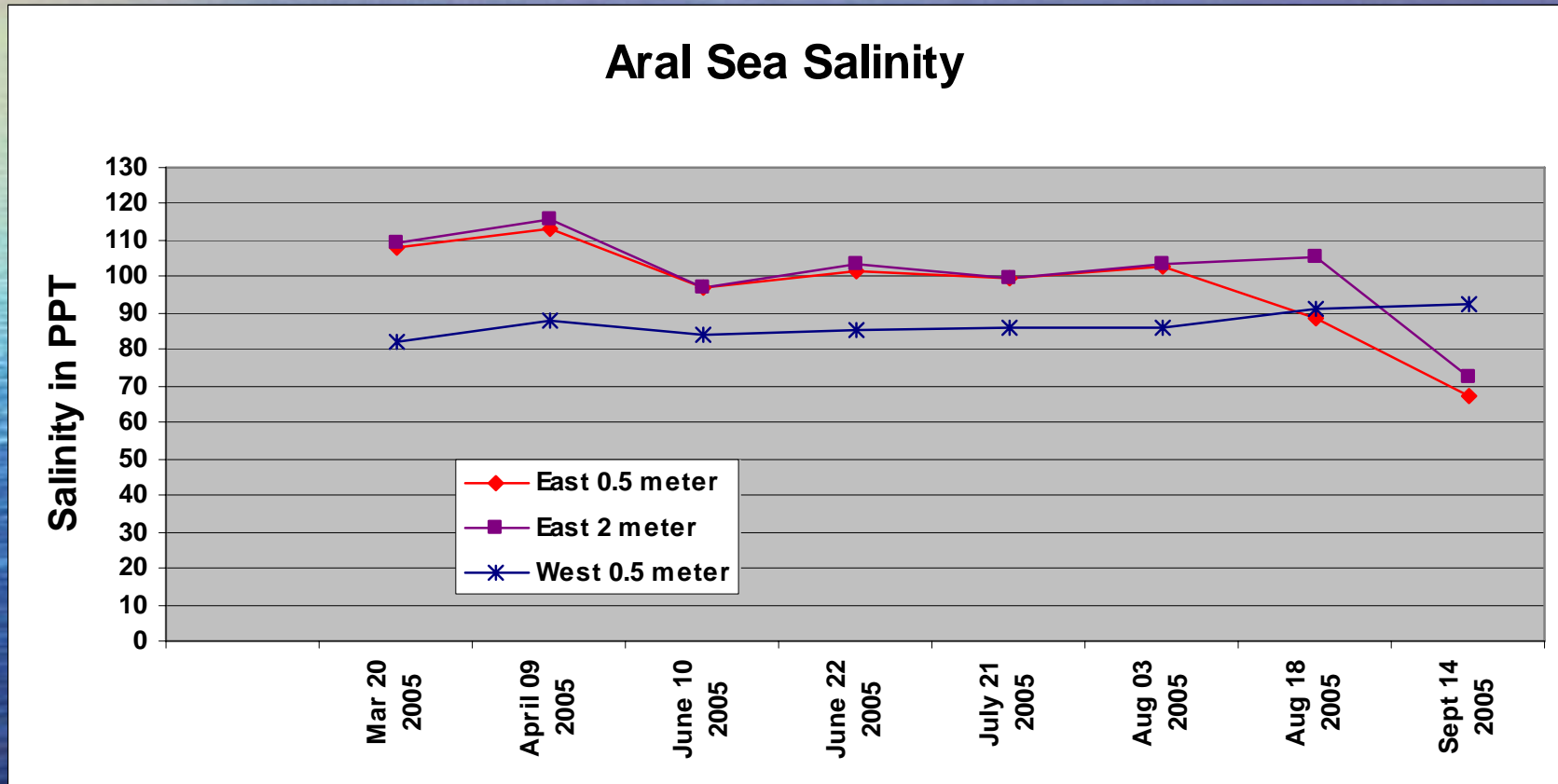
Cyst quality and hatching characteristics



Aral sea sampling schedule 2005

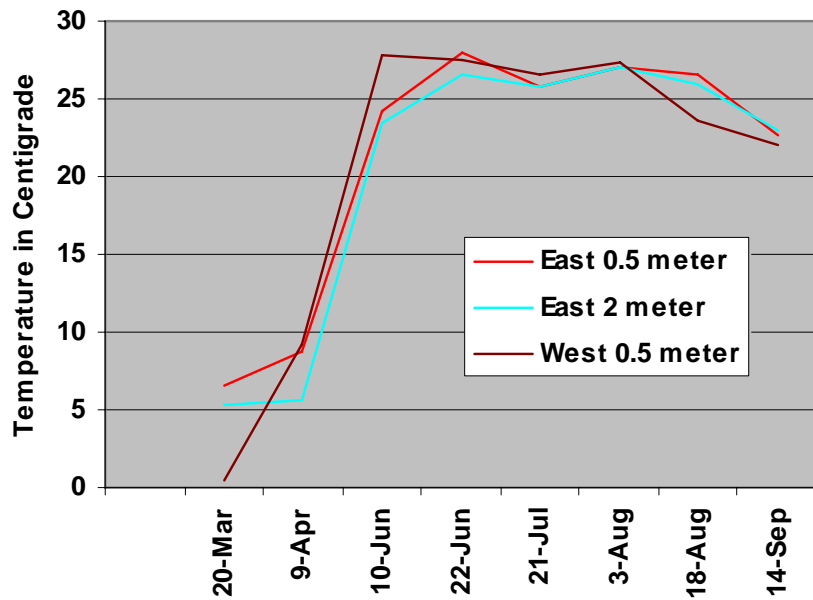
Expedition date	Sampling location	Sample sites
Mar 20 2005	East Aral sea	10
Mar 21 2005	West Aral sea	9
April 09 2005	East Aral sea	10
April 11 2005	West Aral sea	9
June 10 2005	East Aral sea	10
June 11 2005	West Aral sea	10
June 20 2005	East Aral sea	10
June 22 2005	West Aral sea	10
July 21 2005	East Aral sea	10
July 27 2005	West Aral sea	20
Aug 03 2005	East Aral sea	10
Aug 04 2005	West Aral sea	10
Aug 16 2005	West Aral sea	10
Aug 18 2005	East Aral sea	10
Sept 14 2005	East Aral sea	10
Sept 15 2005	West Aral sea	9

East Aral salinity changes

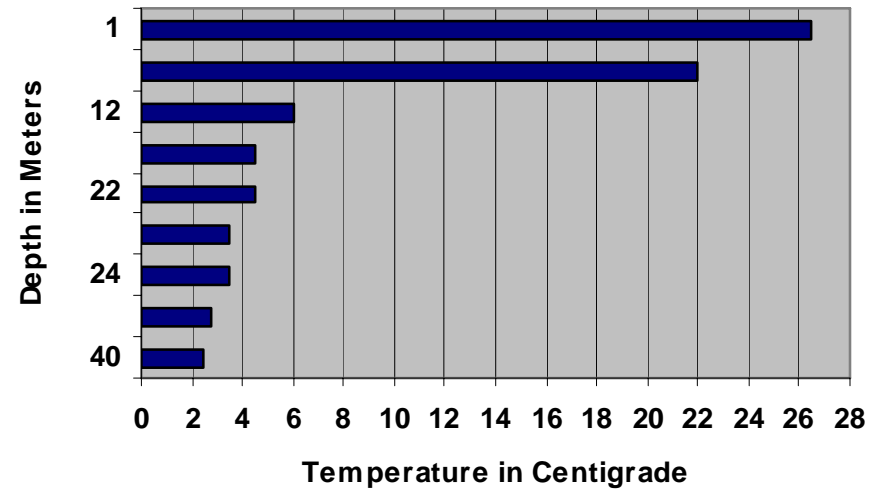


Aral Sea Temperature

Aral Sea Surface Temperature

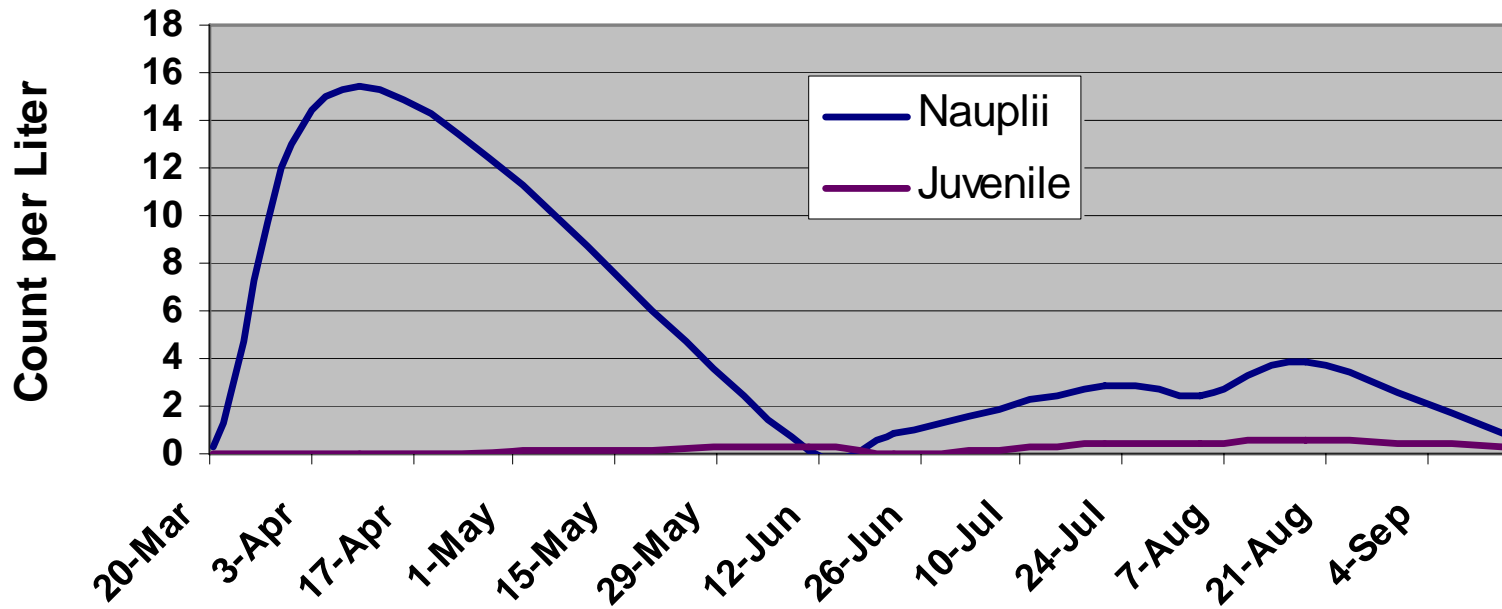


West Aral Sea Water Temperature



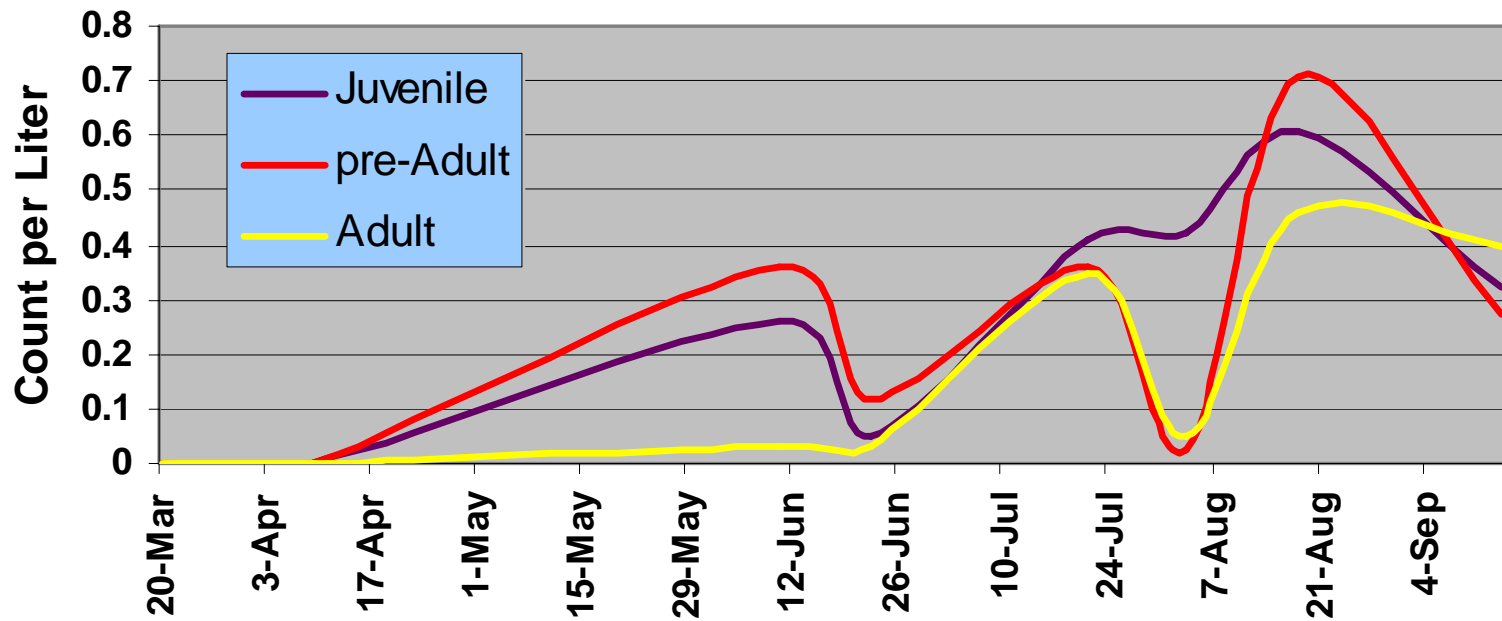
East Aral Sea Artemia Population

Artemia Population Dynamics



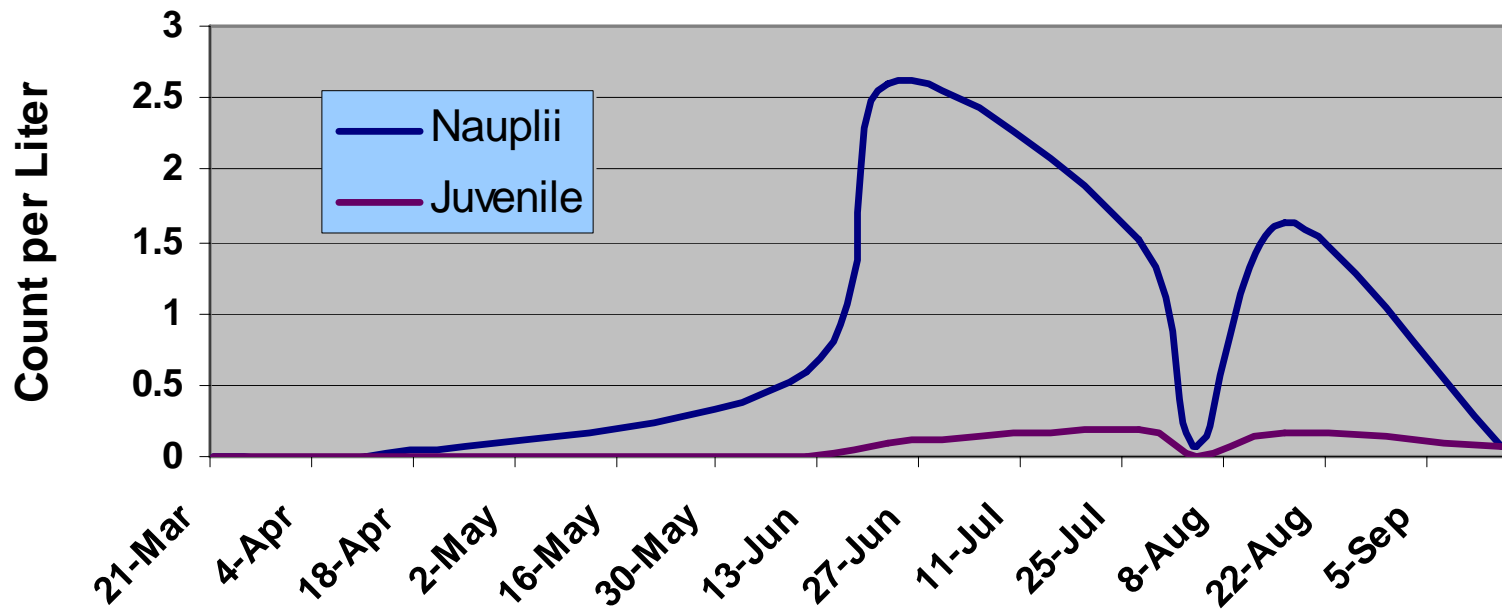
East Aral Sea Artemia Population

Artemia Population Dynamics



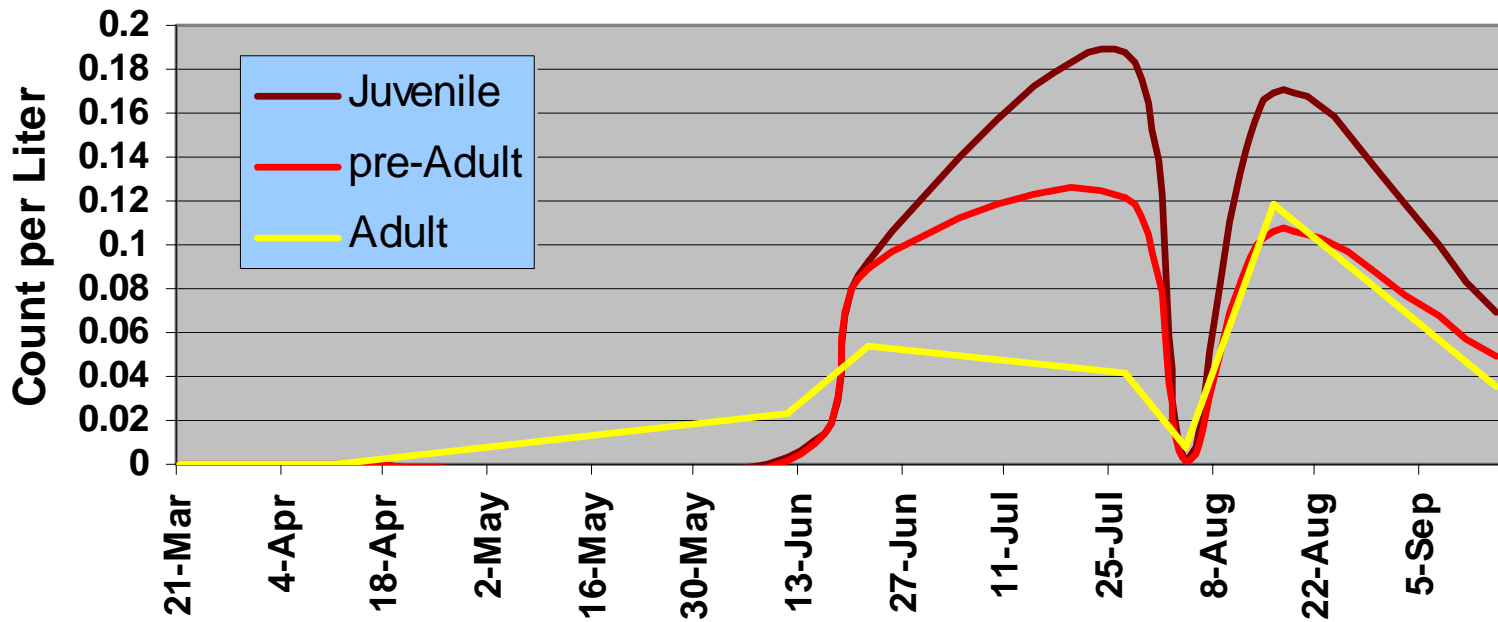
West Aral Sea Artemia Population

Artemia Population Dynamics

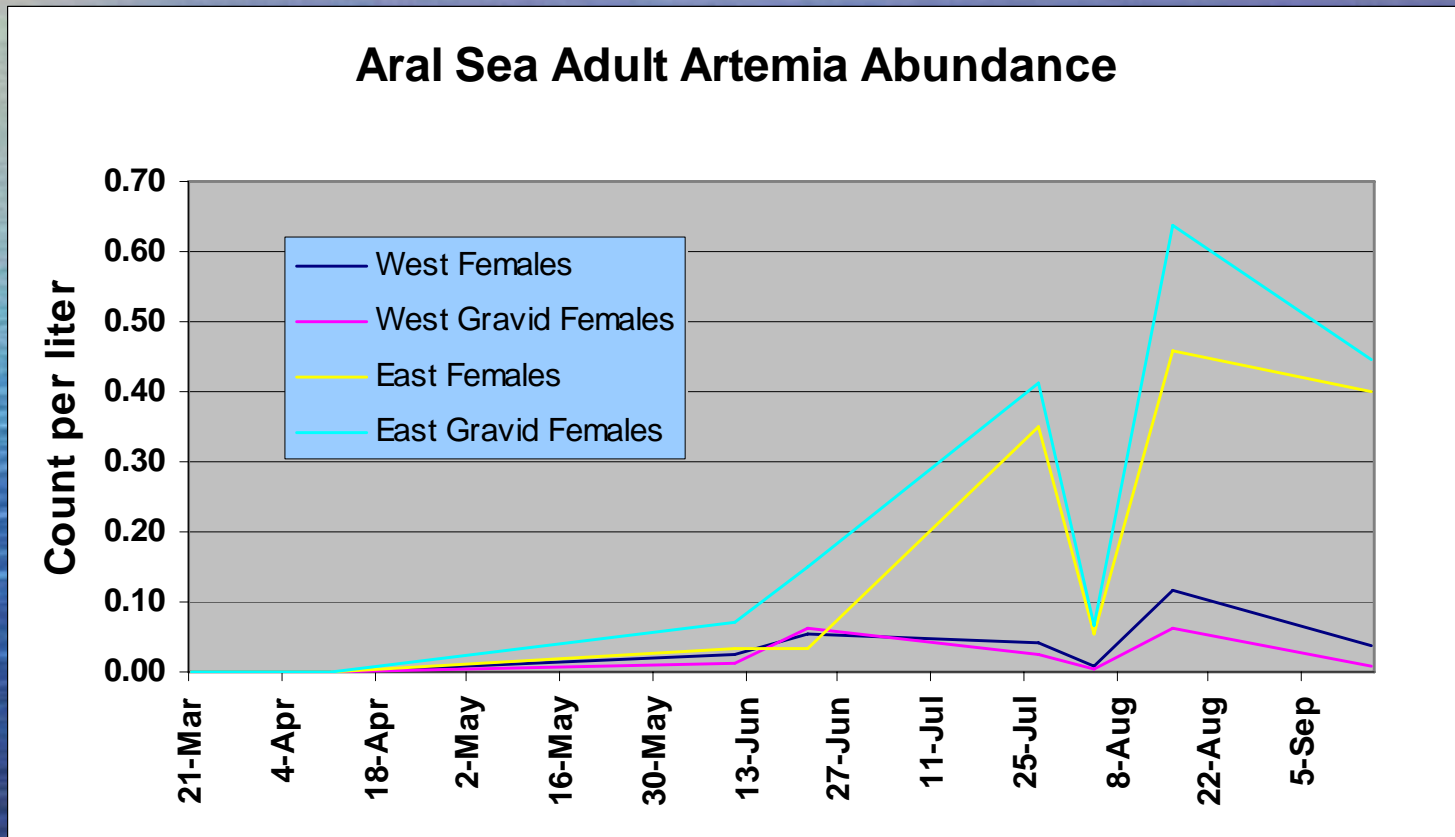


West Aral Sea Artemia Population

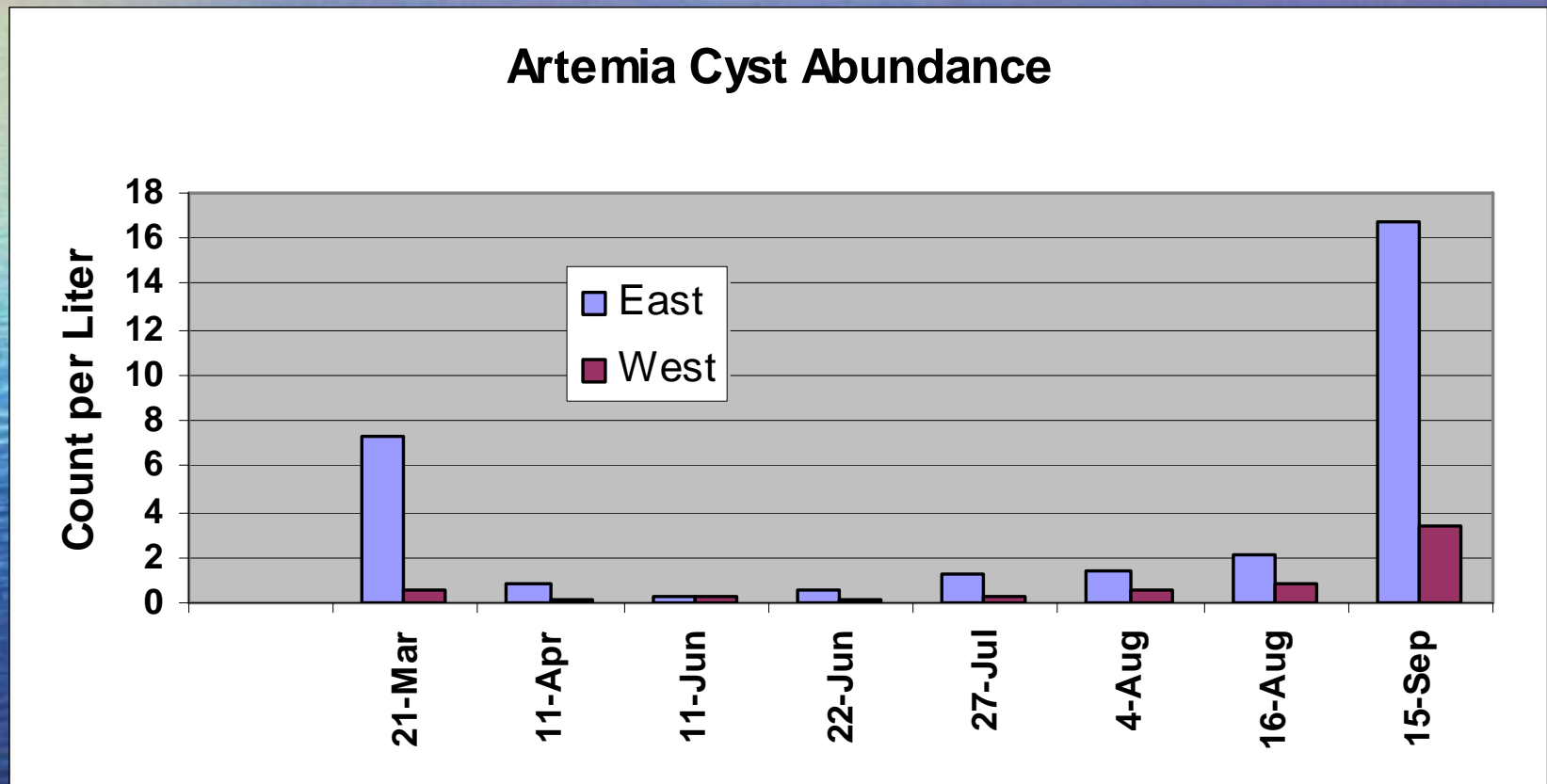
Artemia Population Dynamics



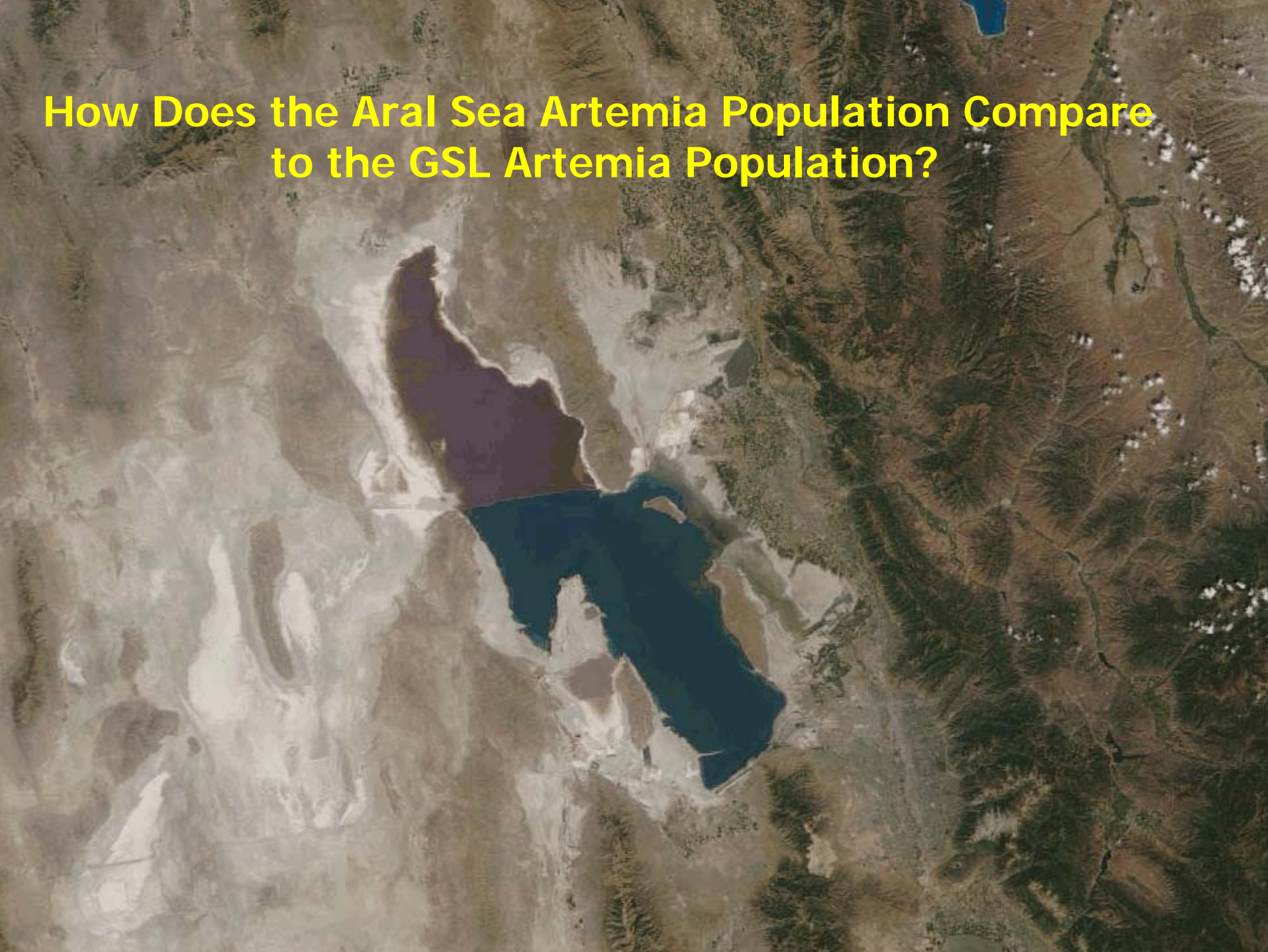
East Aral female reproduction



Aral Sea Artemia Cyst Abundance

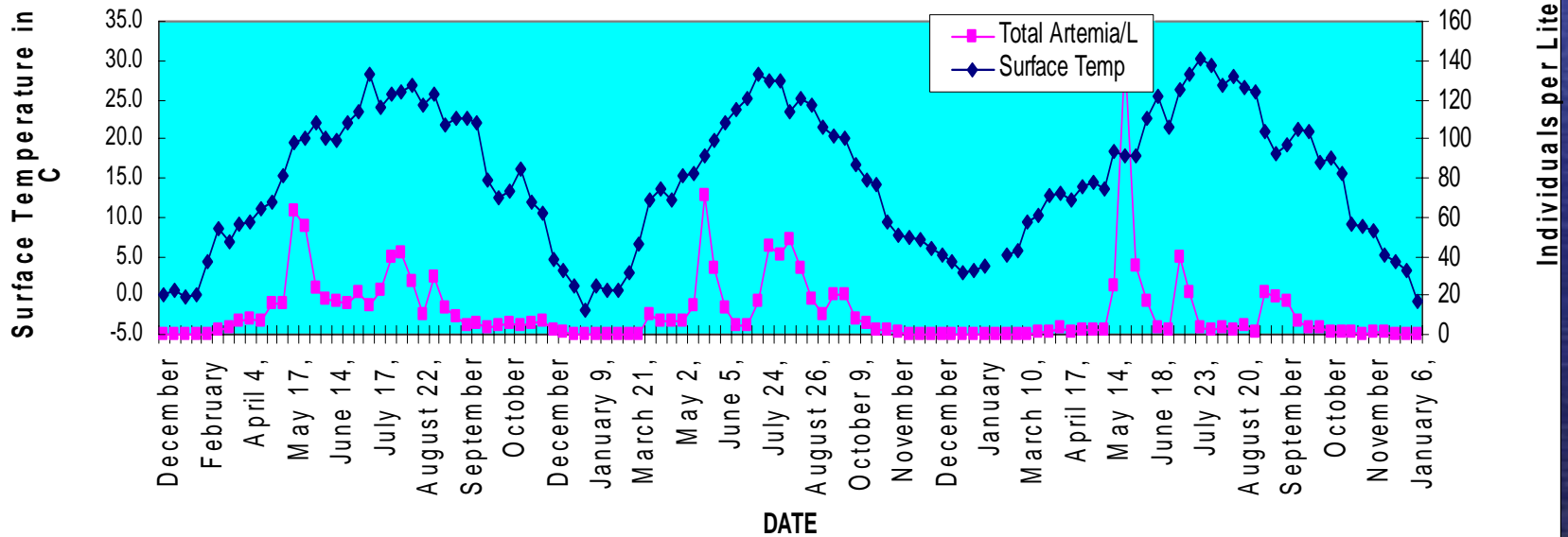


How Does the Aral Sea Artemia Population Compare to the GSL Artemia Population?



WATER TEMPERATURE AND POPULATION GROWTH

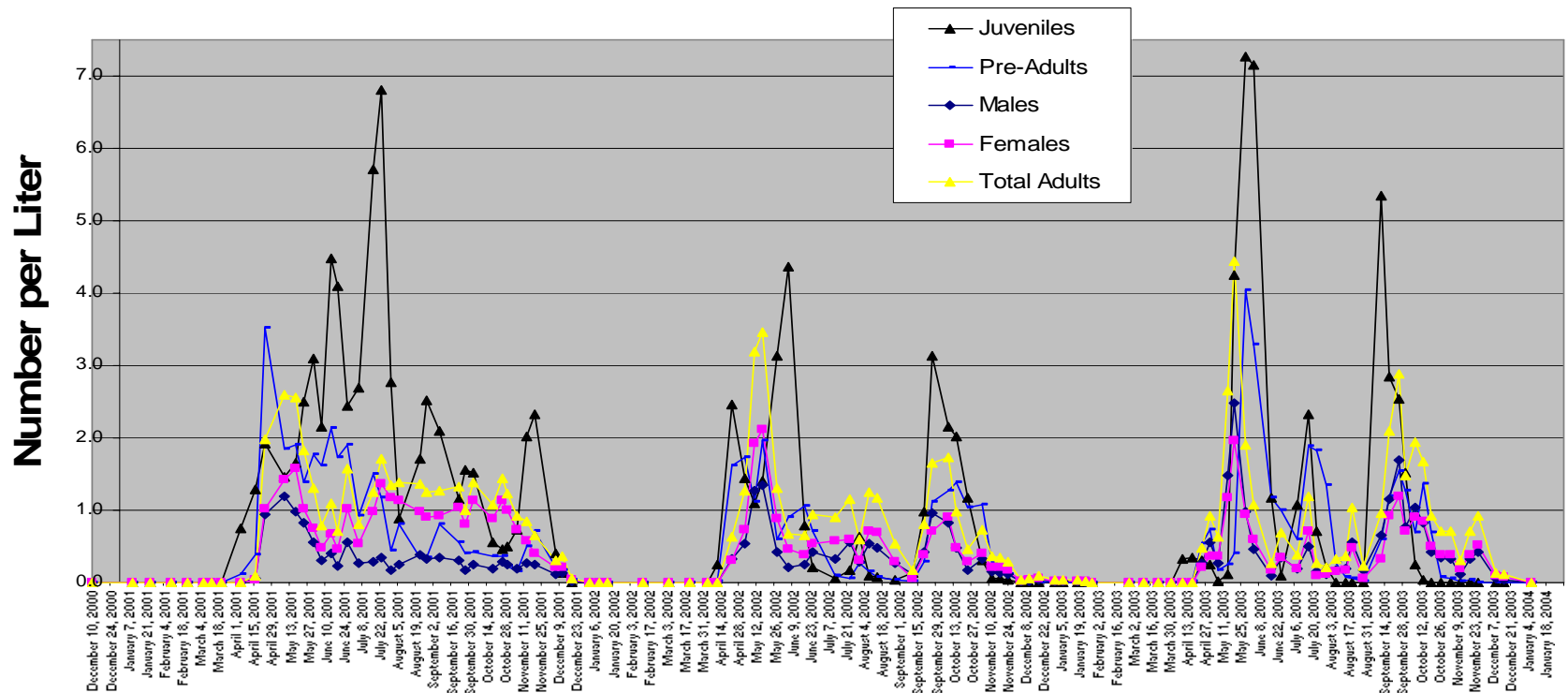
Total Artemia and GSL Water Temperature
2001-2003



ATF DATA

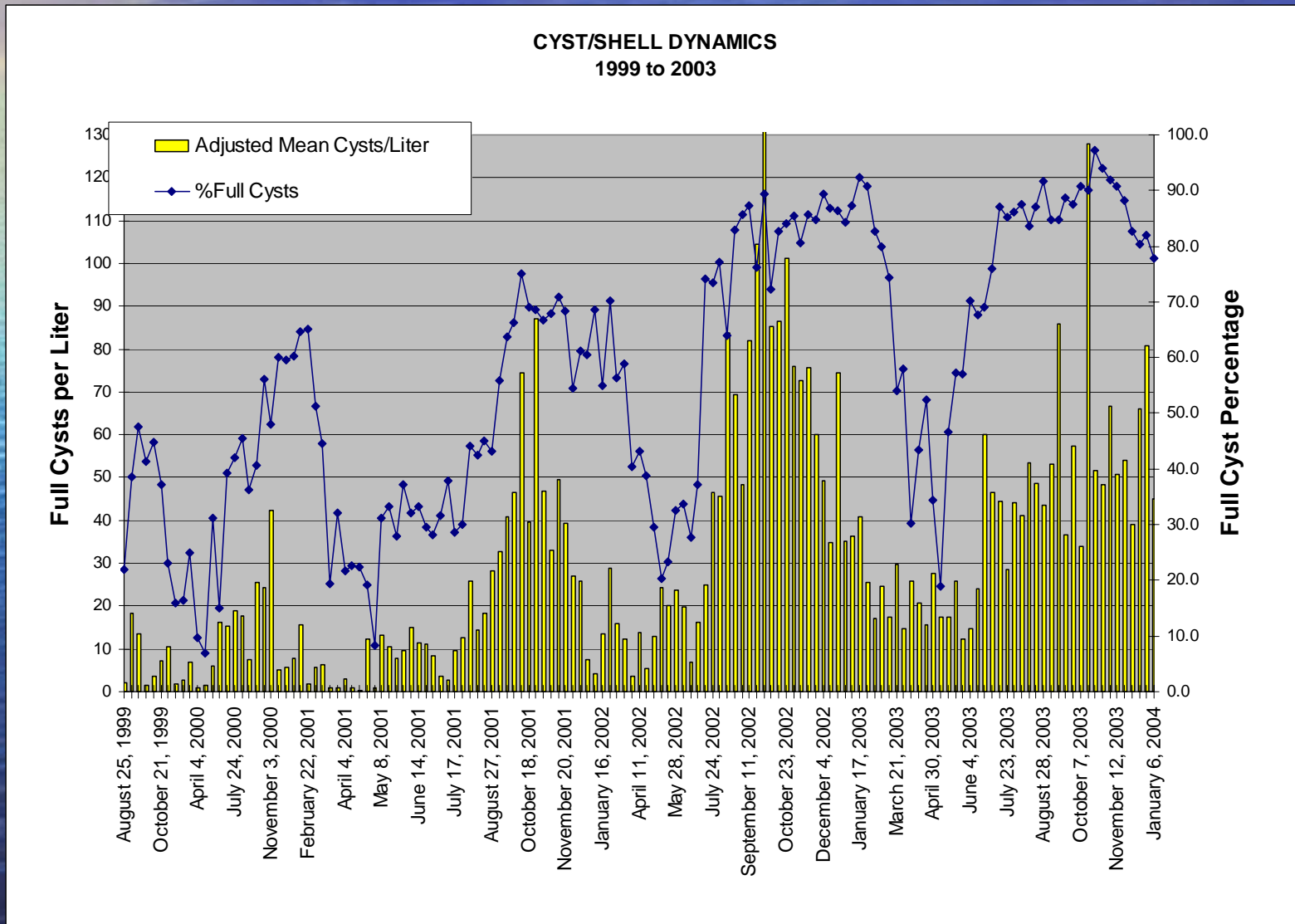
GSL Population Dynamics

Juvenile, Pre-adult, and Adult Population Trends 2001-2003



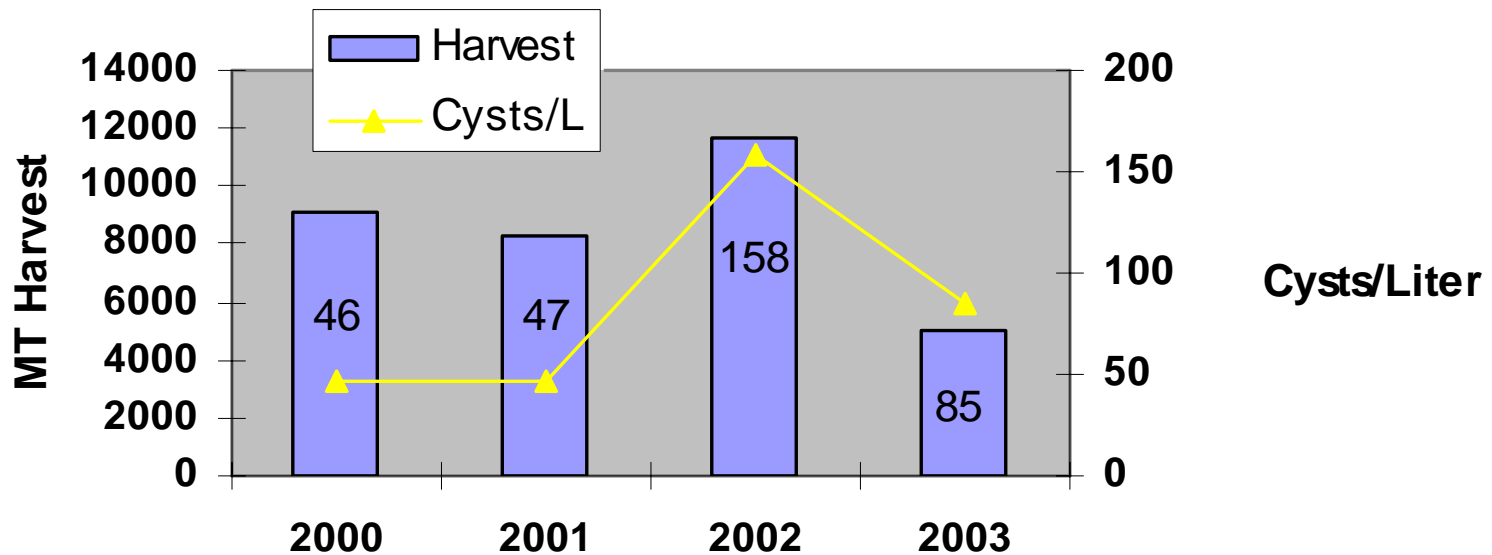
ATF RESEARCH ON THE GSL

Cyst Abundance



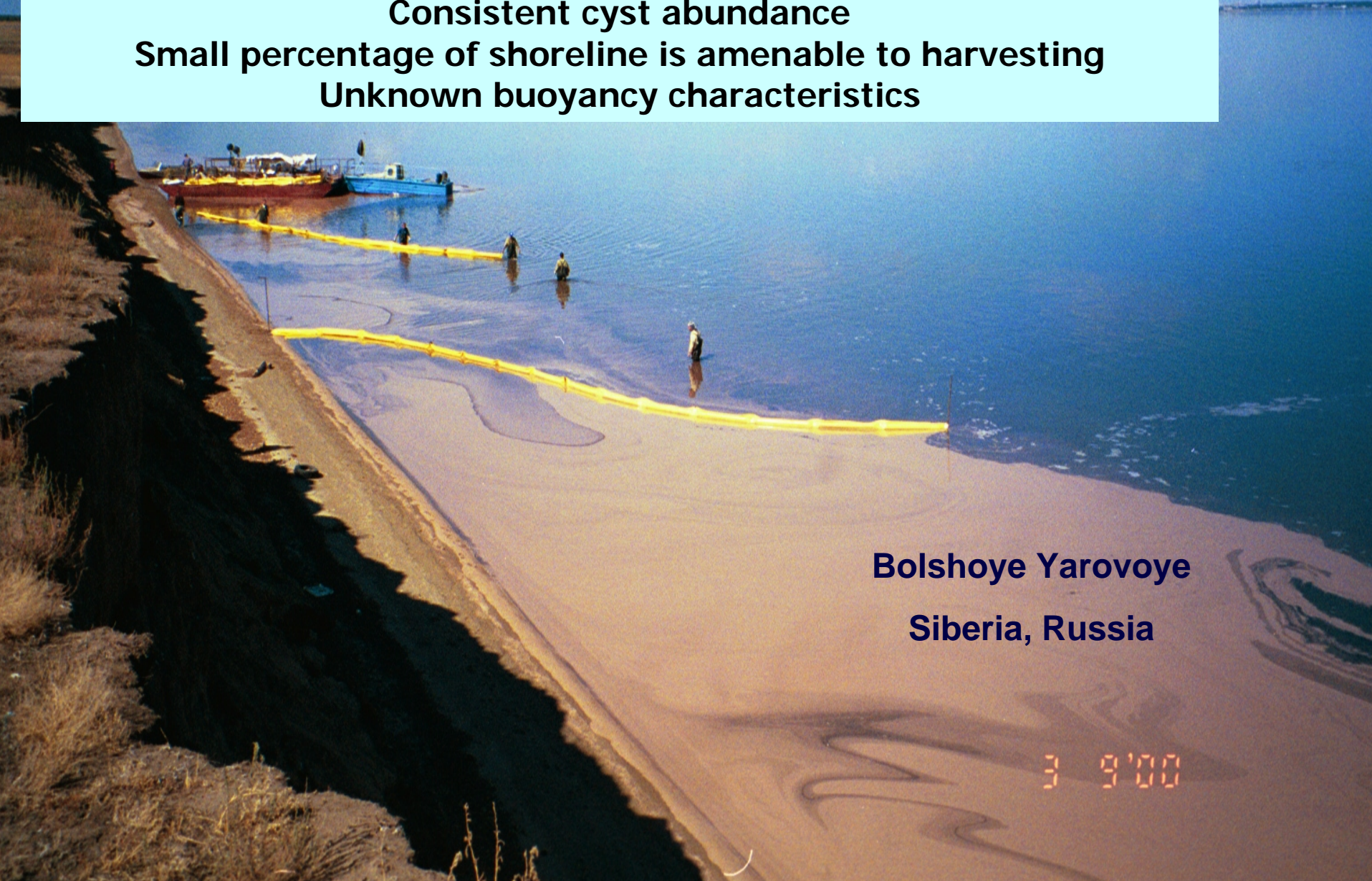
GSL Artemia Industry Harvest Totals and Cyst Abundance in September

GSL Harvest and September Cyst Abundance



Will the Aral Sea Support a Commercial Shoreline Operation?

Consistent cyst abundance
Small percentage of shoreline is amenable to harvesting
Unknown buoyancy characteristics



Bolshoye Yarovoye
Siberia, Russia

3 9'00

**Commercial Harvest on Aral Sea 2004-2005:
Approximately 32 MT Total Material
Estimated 13 MT Brined Weight
Successfully Processed & Marketed = 0 MT
2 months**

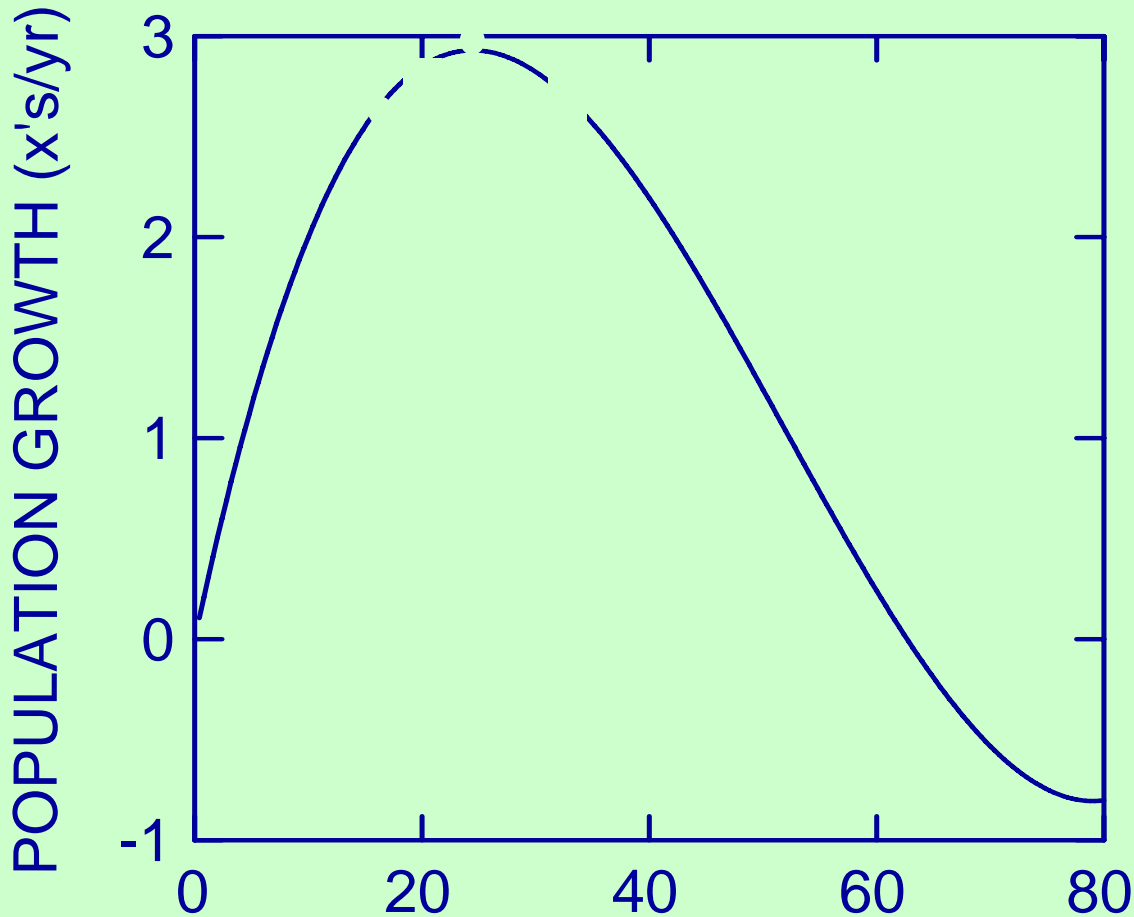


GSL 2002

**30 MT Harvested
in < 6 hrs.**

ARTEMIA POPULATION GROWTH MODEL

Basis for Continued Research and Restrictions
on Commercial Scale Harvesting



An aerial photograph showing a large, irregularly shaped green lake or reservoir in a dry, brown landscape. The lake is surrounded by a light-colored, sandy or silty shoreline. The surrounding terrain is arid and cracked, with some smaller, dark green patches of water or vegetation scattered throughout. The overall scene suggests a water source in a semi-arid or desert environment.

Economic Concerns: Cost of Production

**Substantial transportation costs
Unknown Cyst Quality
Dependability of Harvest is Highly Uncertain
Experimental Harvest is Recommended
Commercial Scale Harvest at this time
is Counter-productive.**

ARTEMIA SAMPLING PROGRAM CHANGES FOR 2006

- Increased sampling frequency
- Additional sampling locations on East Aral
- Measures of cyst quality characteristics
- Chlorophyll measurements
- Samples to USGS for nutrient isotope profile
- Buoyancy tests
- Less emphasis on West Aral Sea

QUESTIONS?



Diapause Status of Cysts

GSL Water Column Cyst Quality Characteristics: Hatching Percentage

