Razorback Sucker *Xyrauchen texanus* and associated fish community reproduction Colorado River, lower Grand Canyon

Eliza I. Gilbert[1], W. Howard Brandenburg[1], Adam L. Barkalow[1], Ron B. Kegerries[2], Brandon C. Albrecht[2], Mark C. McKinstry[3], Brian D. Healy[4], Emily C. Omana Smith [4], Clay B. Nelson[4], James R. Stolberg[5]

([1] American Southwest Ichthyological Researchers, LLC; [2] BIO-WEST, Inc.; [3] U.S. Bureau of Reclamation, Upper Colorado Region; [4] U.S. National Park Service; [5] Lower Colorado River Multi-Species Conservation Program)

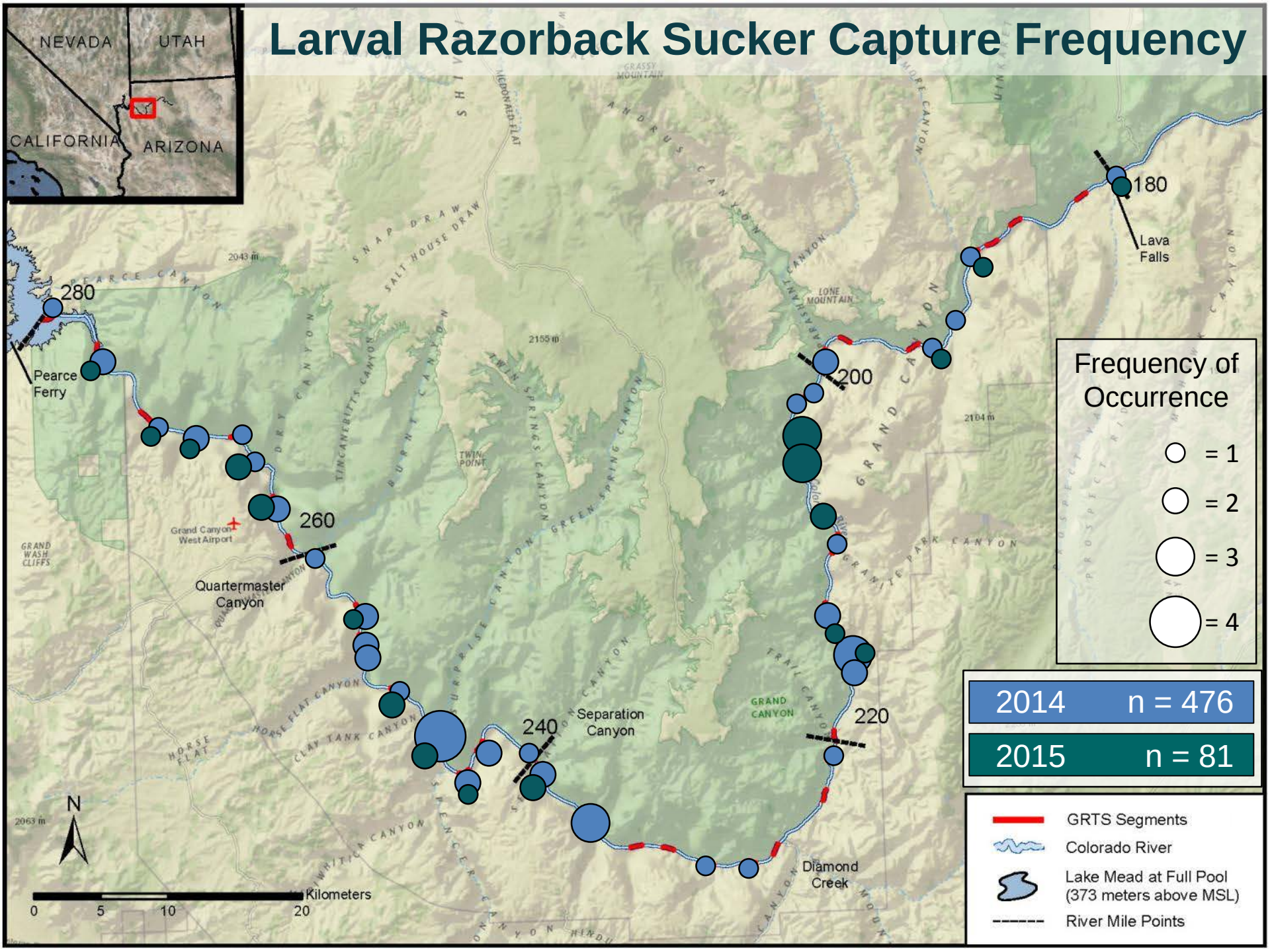
Colorado River Aquatic Biologists Meeting: January 2016

Larval Fish Sampling 2014 and 2015

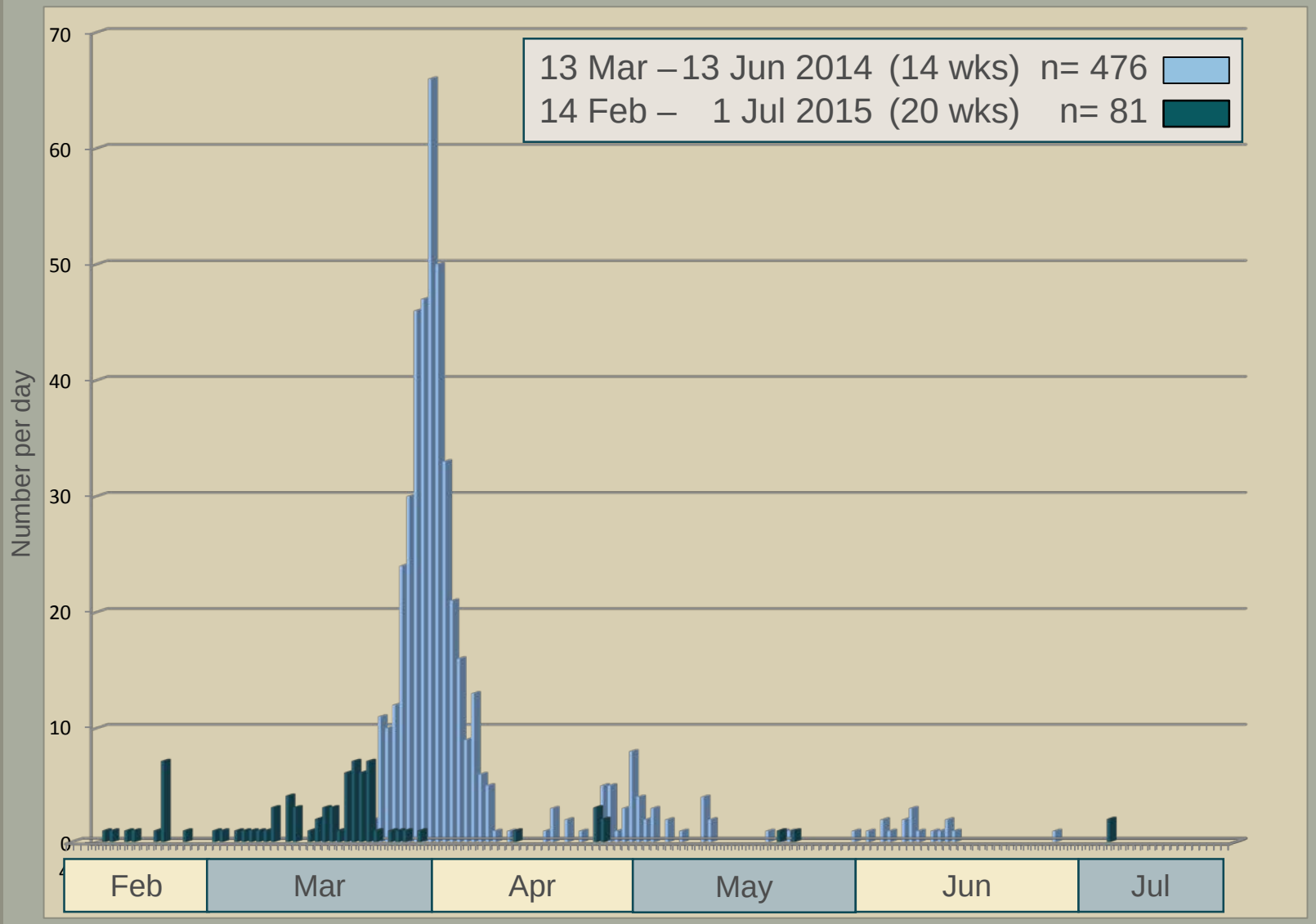
- Small seine (1 m x 1 m x 0.8 mm mesh)
- Low-velocity shallow habitats
- Four hauls/site
- Specimens <20 mm retained

- Monthly samples (Mar*- Sep)
- 100 river mile study area
- 40 random sites

Larval Razorback Sucker Capture Frequency



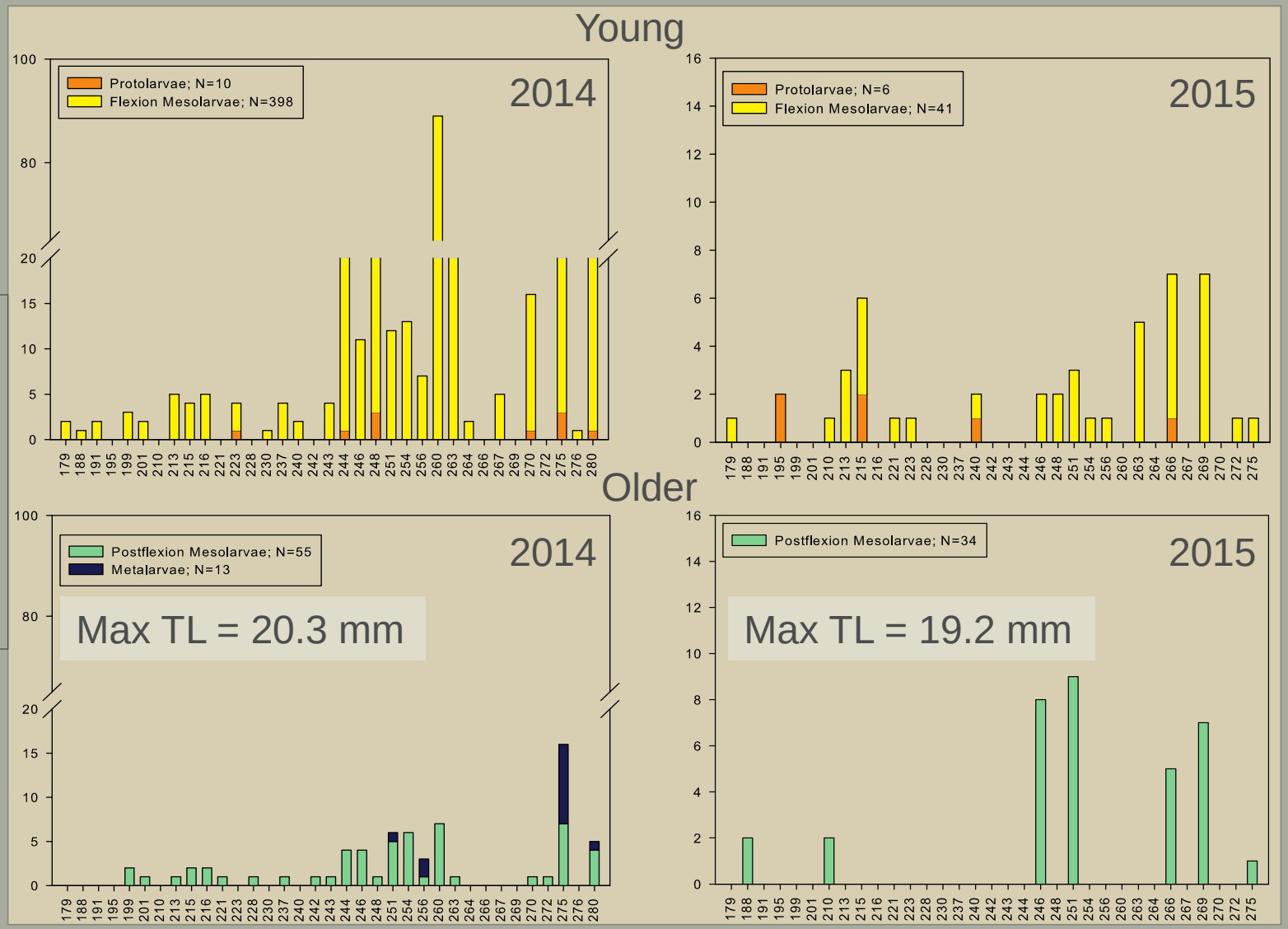
Razorback Sucker Back-calculated Spawning



Formula: Bestgen 2002, 2011 (Green River)

Temperature Dependent

Larval Fish Developmental Stages



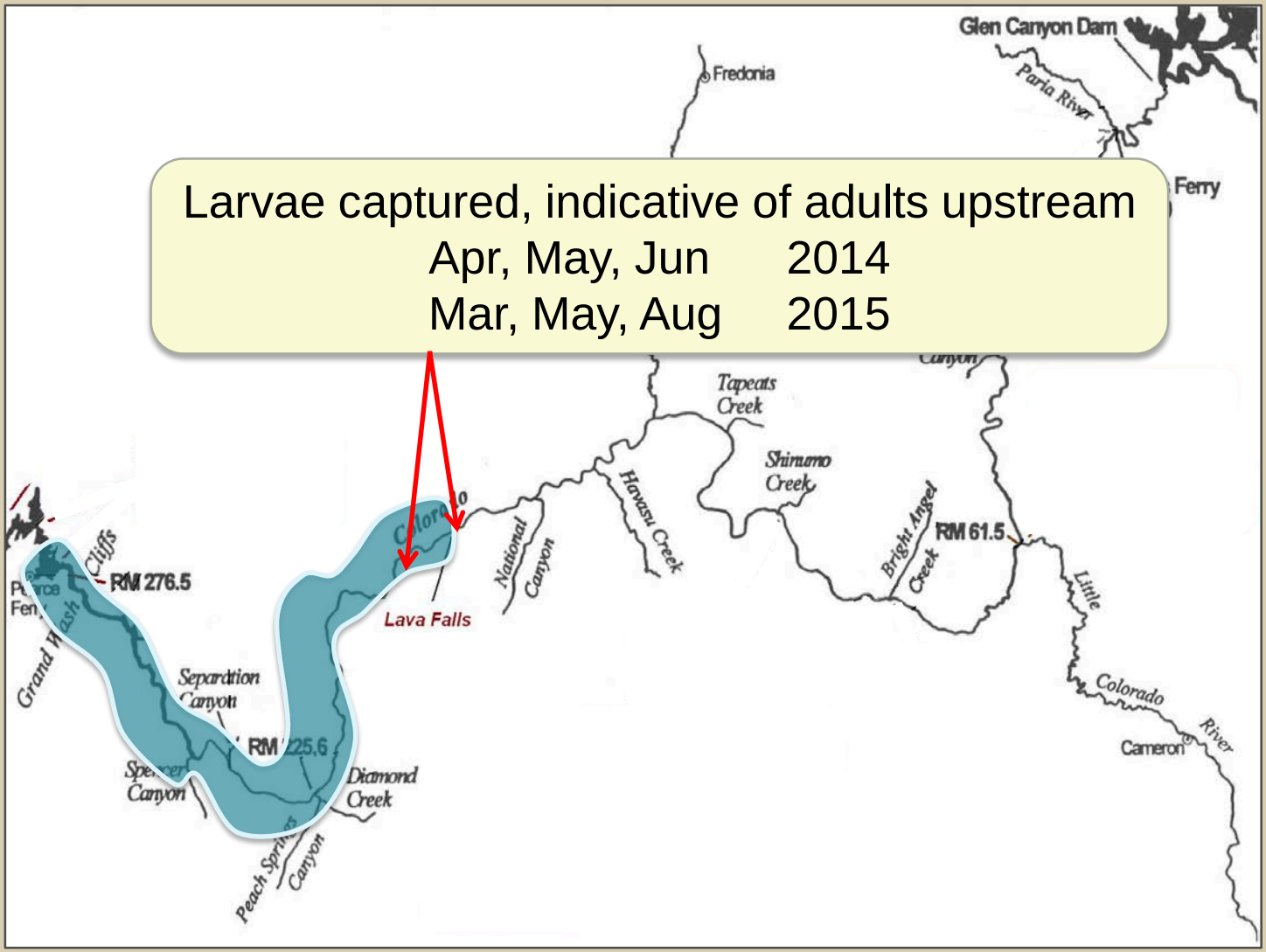
UPSTREAM — DOWNSTREAM →

UPSTREAM — DOWNSTREAM →

Questions Raised

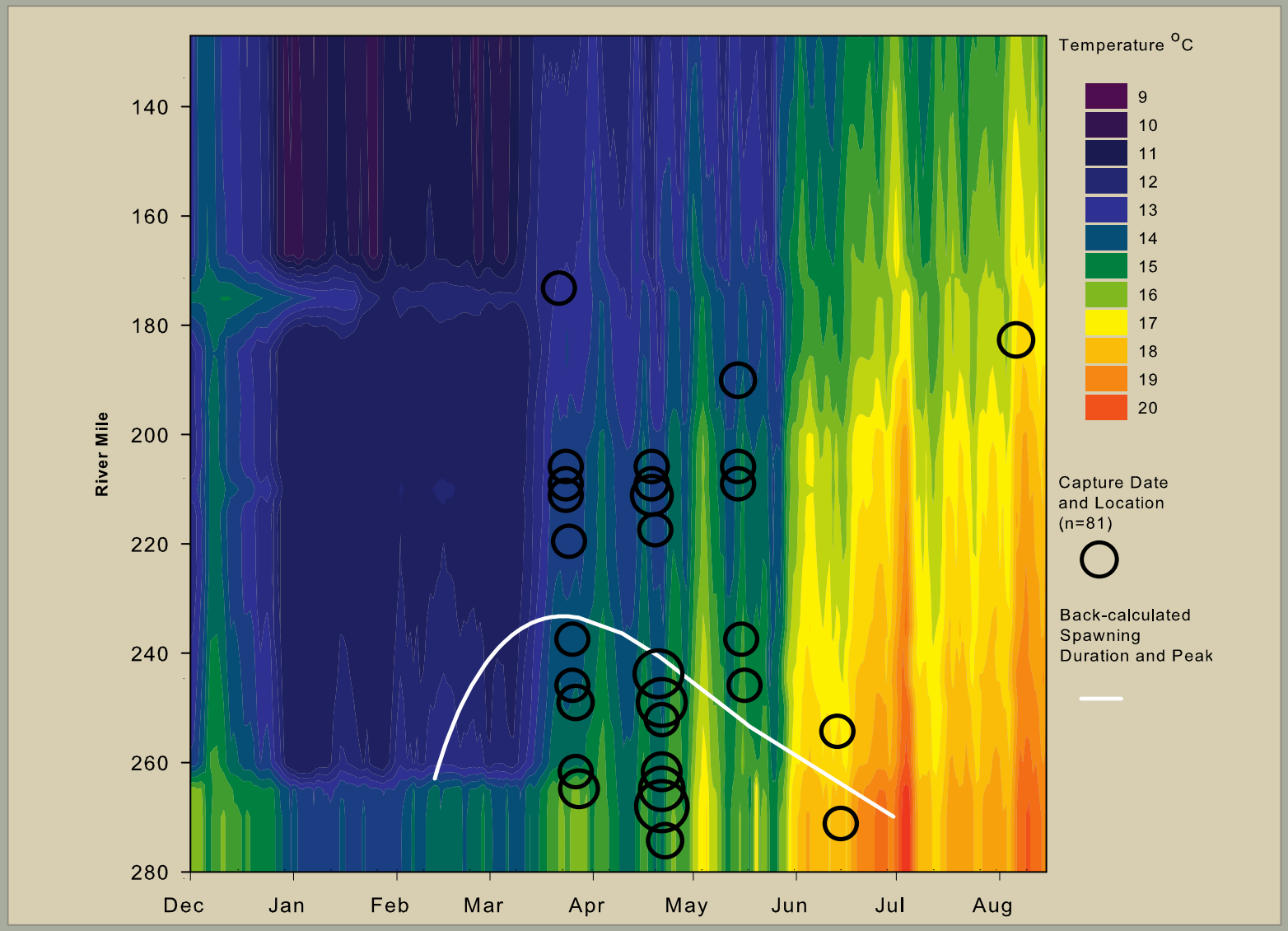
- *Pertaining to spawning Razorback Sucker:* What was going on upstream of the study area?
- What is the role of water temperature in spawning?
- Are there physiological aspects of Razorback Sucker larvae that limit their ability to recruit in environments that support Bluehead Sucker and Flannelmouth Sucker?

Upstream Spawning



Graphic modified from McKinstry and Valdez 2012 presentation

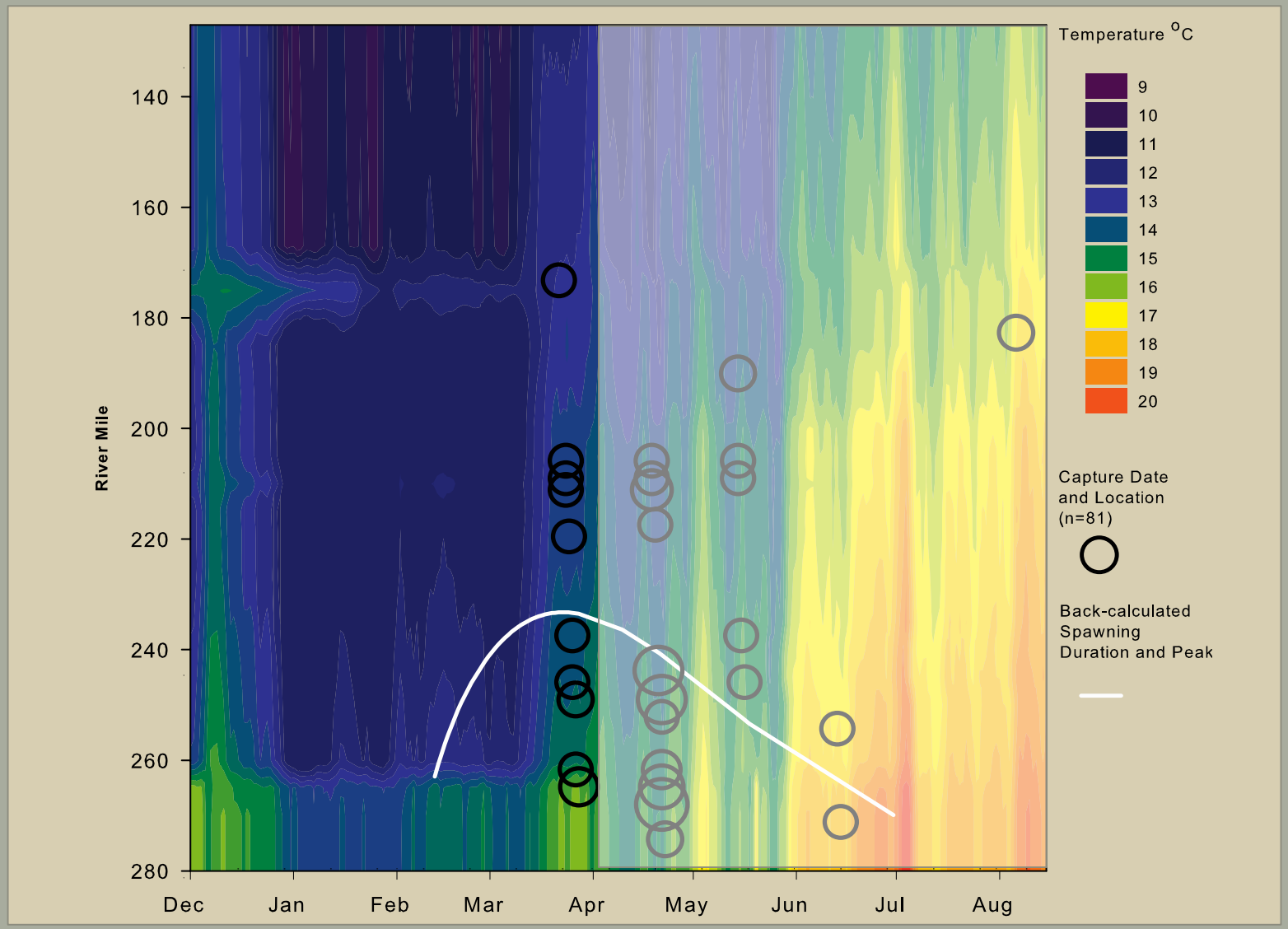
Mainstem Water Temperature - 2015



2014

2015

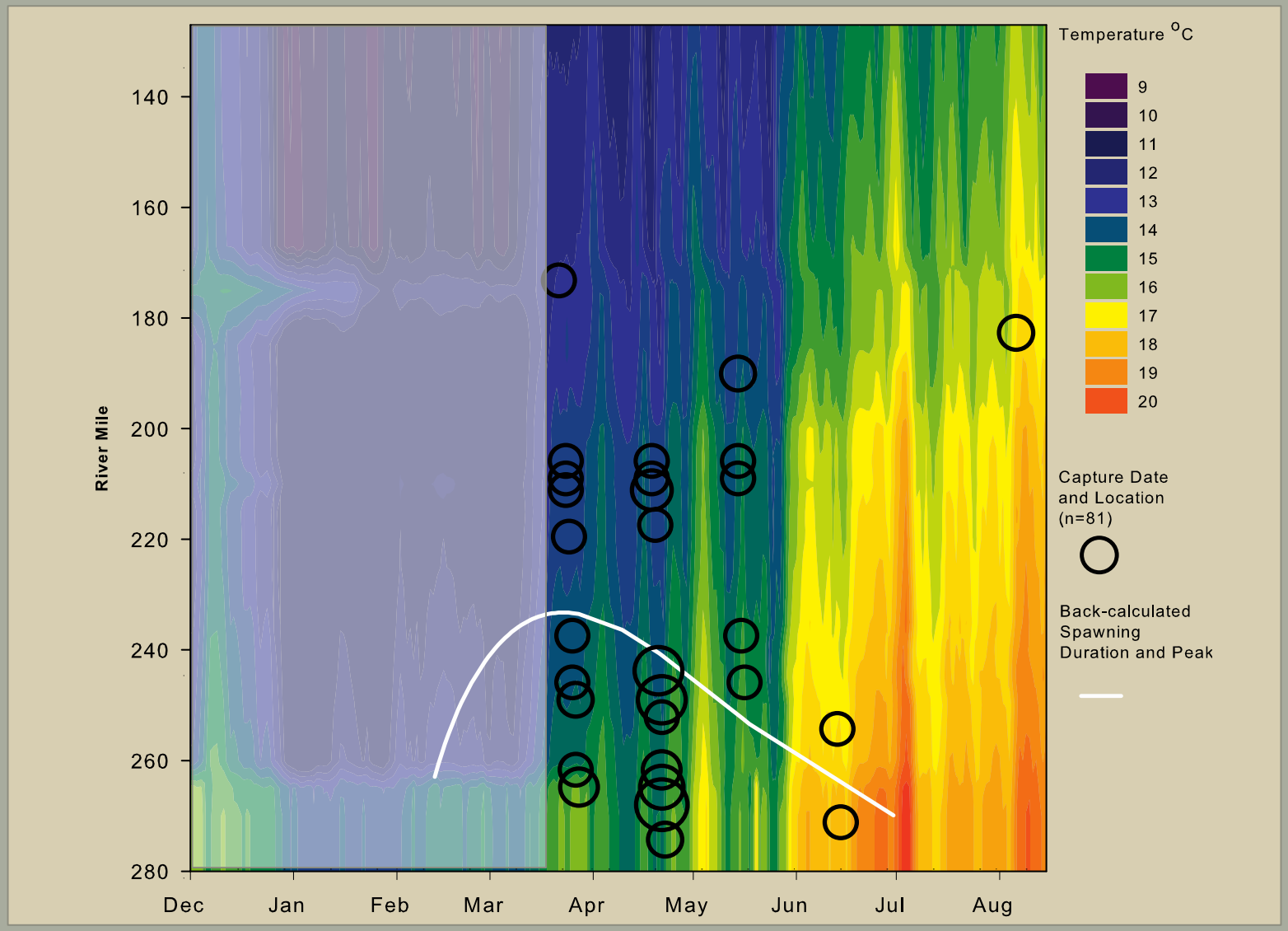
Mainstem Water Temperature - 2015



2014

2015

Mainstem Water Temperature - 2015



2014

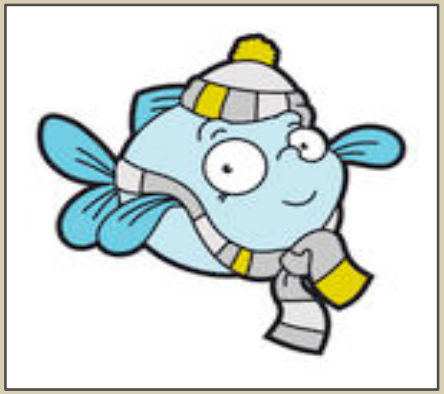
2015

Water Temperature–Hatch Success & Growth

Hatch Success
10° C – 0-57%
15° C – 32-65%

Time to swim up
10° C – 3x longer than 20° C
10° C – 2x longer than 15° C

Growth to juvenile
10° C – none at 3 months
14° C – none at 3 months



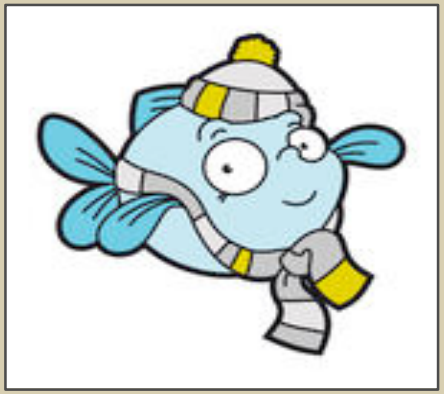
Hatch Success
20° C – greatest hatch success

Growth Rate
20° C – fastest growth rates

Growth to juvenile
20° C – all juveniles at 3 months
some within 1½ months

Marsh 1985, Bozek 1999, Clarkson and Childs 2000, Bestgen 2008

Mean Water Temperatures - 2015



2015 peak spawning
(Mar)

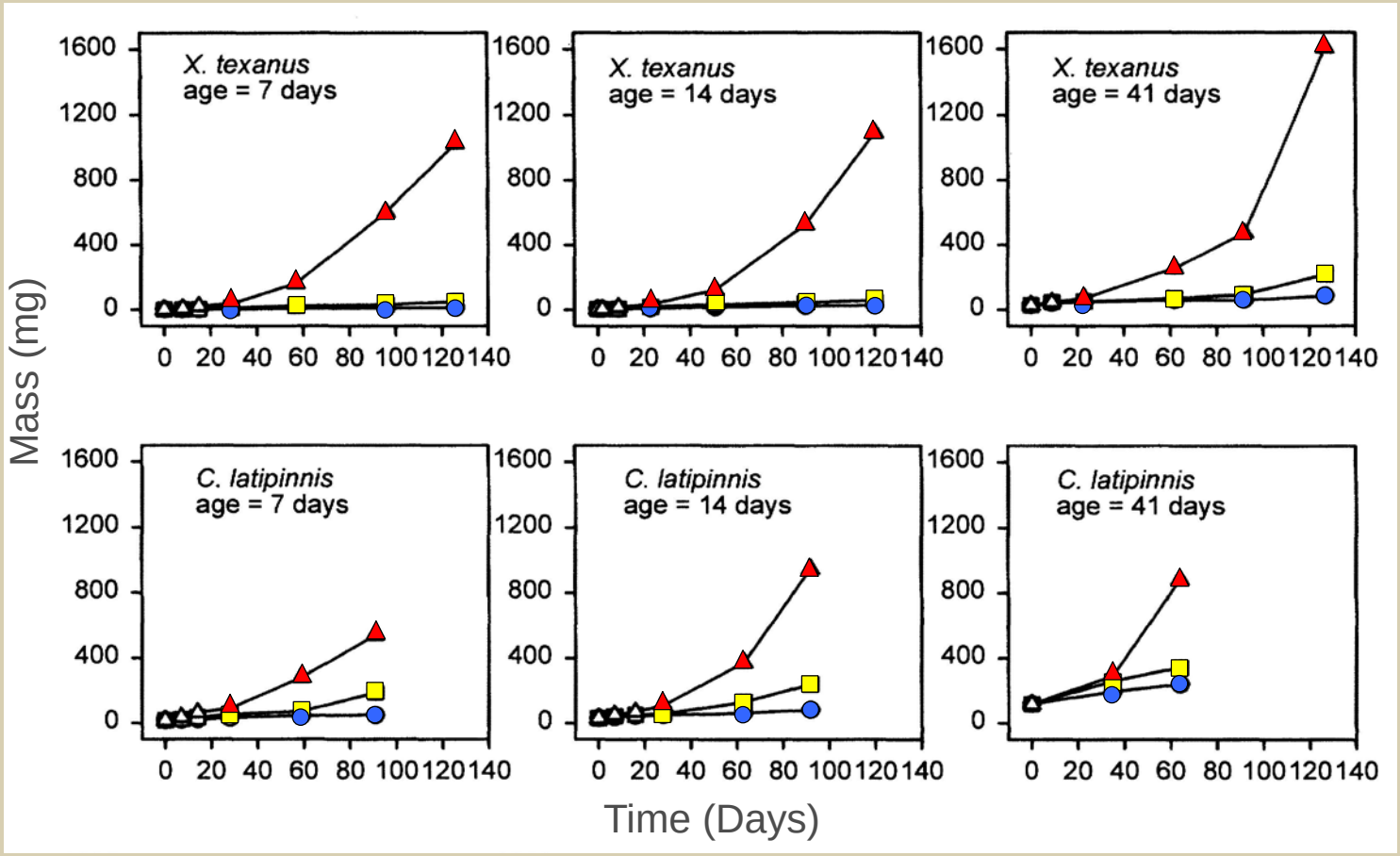
11° C	top
13° C	middle
18° C	bottom

2015 developmental season
(temperatures)

15 – 16° C	late May/Jun
17° C	mid Aug
not >18° C	mid Sep

*Highest point temperatures of 20° C

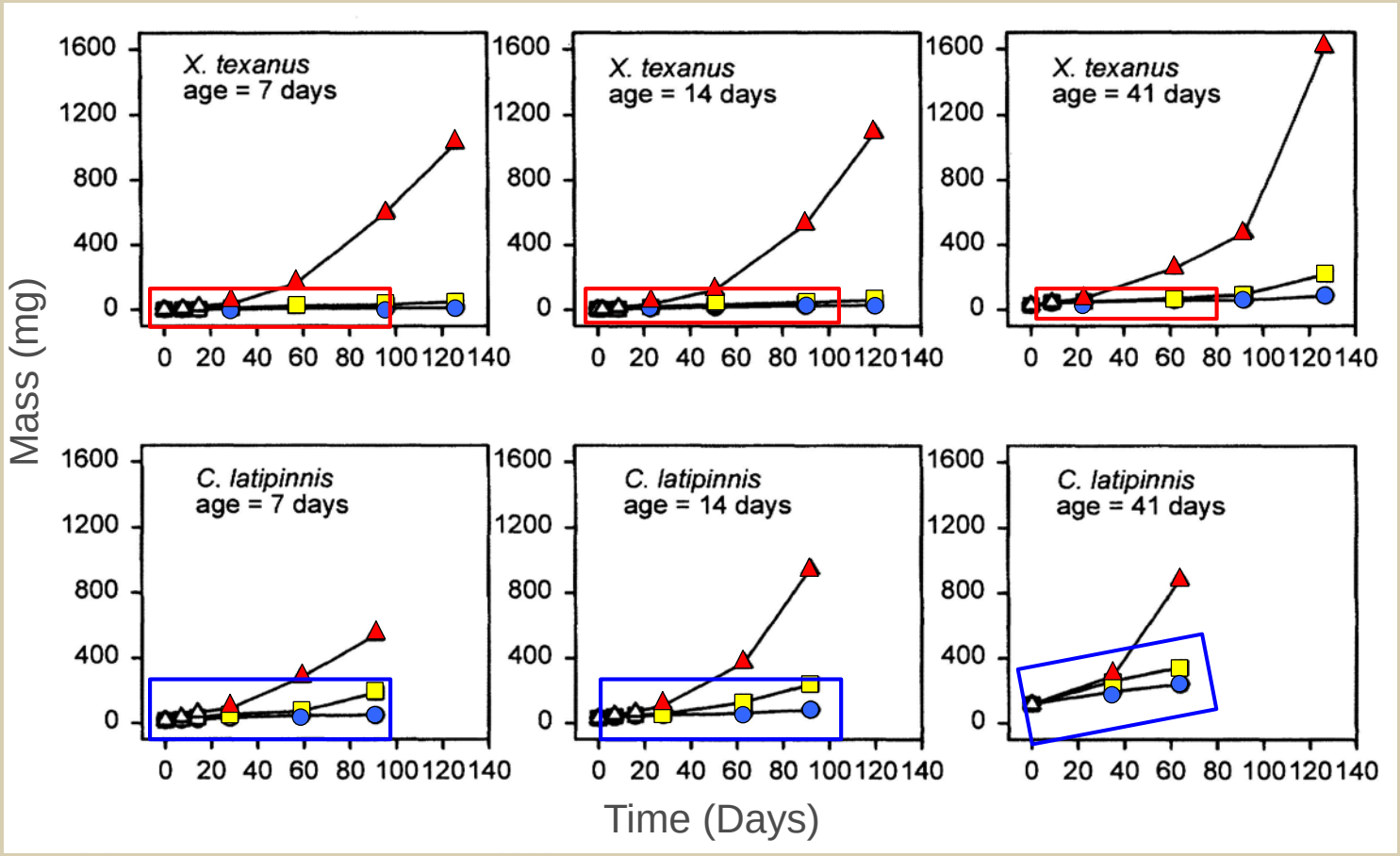
Species Comparisons



10° C ● **14° C** ■ **20° C** ▲

modified from Clarkson and Childs 2000

Species Comparisons



10° C

14° C

20° C

modified from Clarkson and Childs 2000

Questions Raised

- Pertaining to spawning Razorback Sucker, what was going on upstream of the study area? Spawning occurred upstream in at least three months of each year of sampling

- What is the role of water temperature in spawning? Cool

- Are there physiological aspects of Razorback Sucker larvae, which limit their ability to recruit in the same environment that supports Bluehead Sucker and Flannelmouth Sucker? Interactions of water temperature and growth

Acknowledgments

BIO-WEST

NATIONAL PARK SERVICE

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

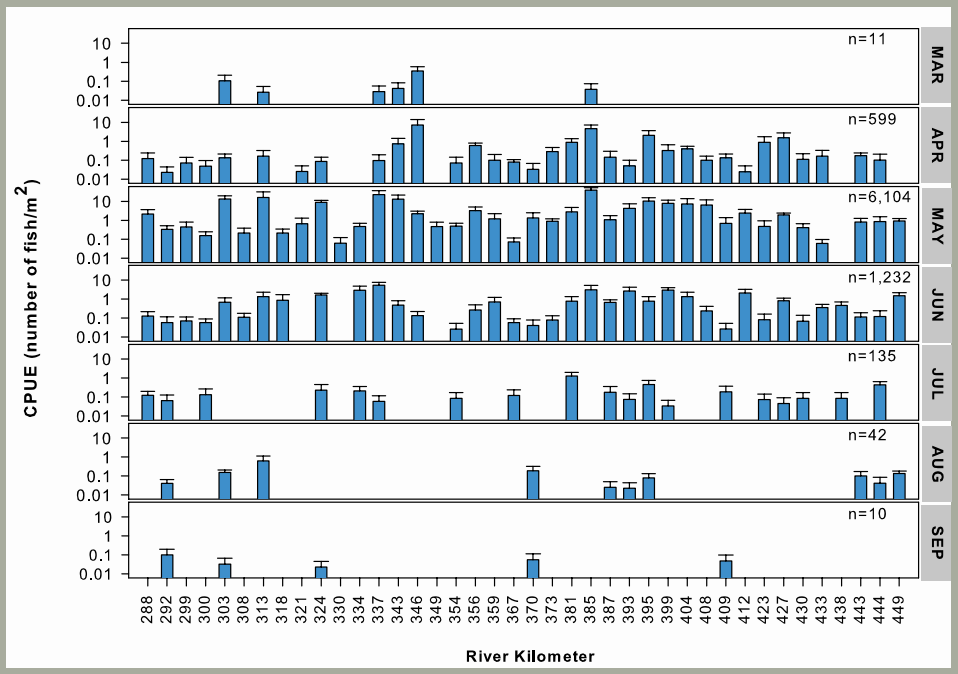
Lower Colorado River
Multi-Species Conservation Program

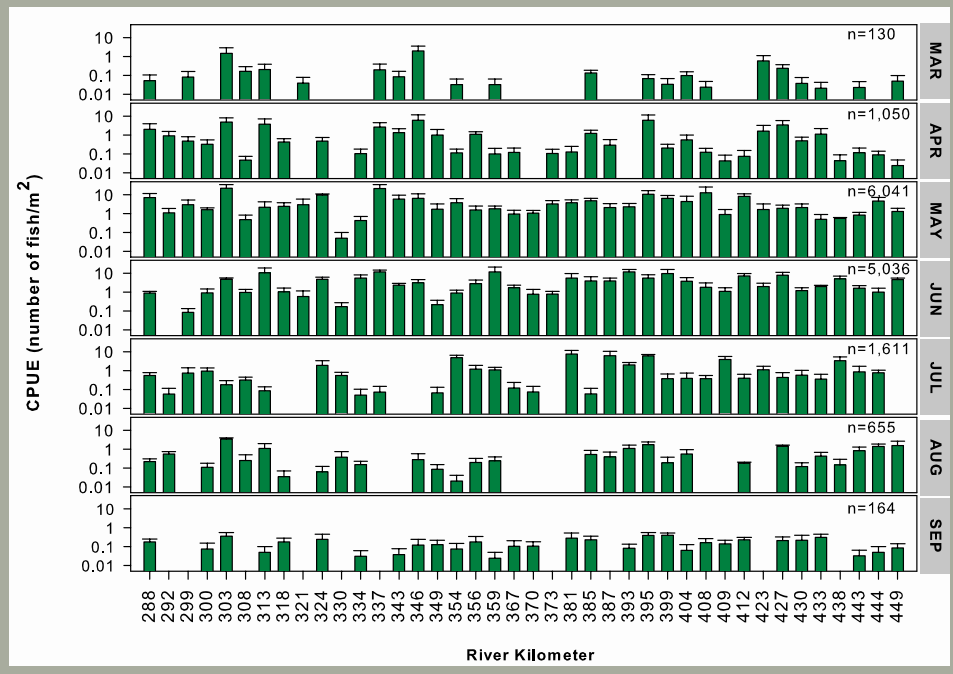
ARIZONA GAME & FISH

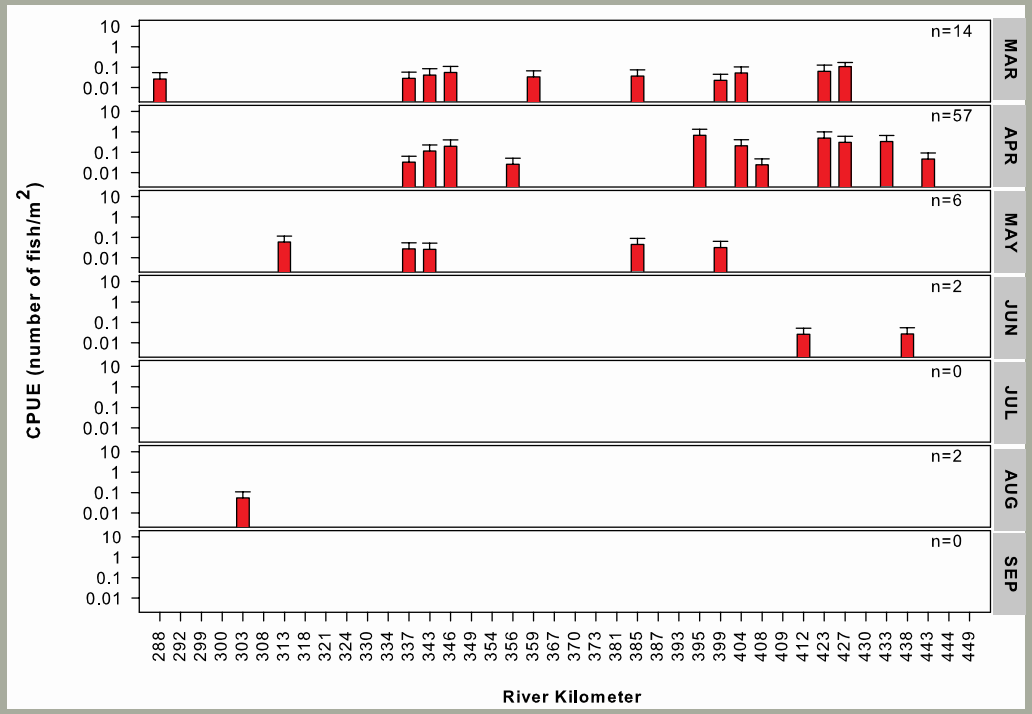
NEVADA DEPARTMENT OF WILDLIFE

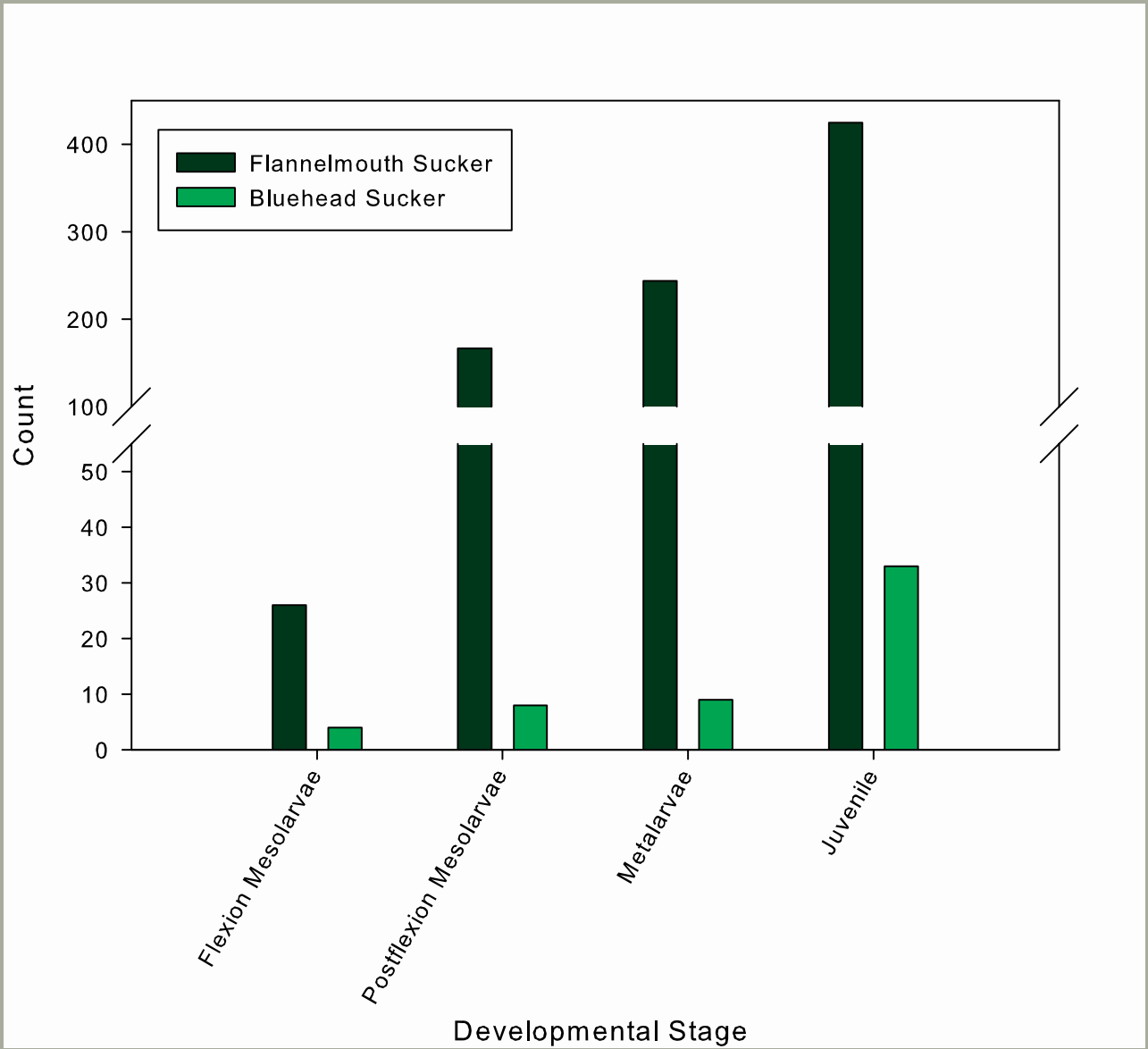
Museum of Southwestern Biology

U.S. FISH & WILDLIFE SERVICE
DEPARTMENT OF THE INTERIOR

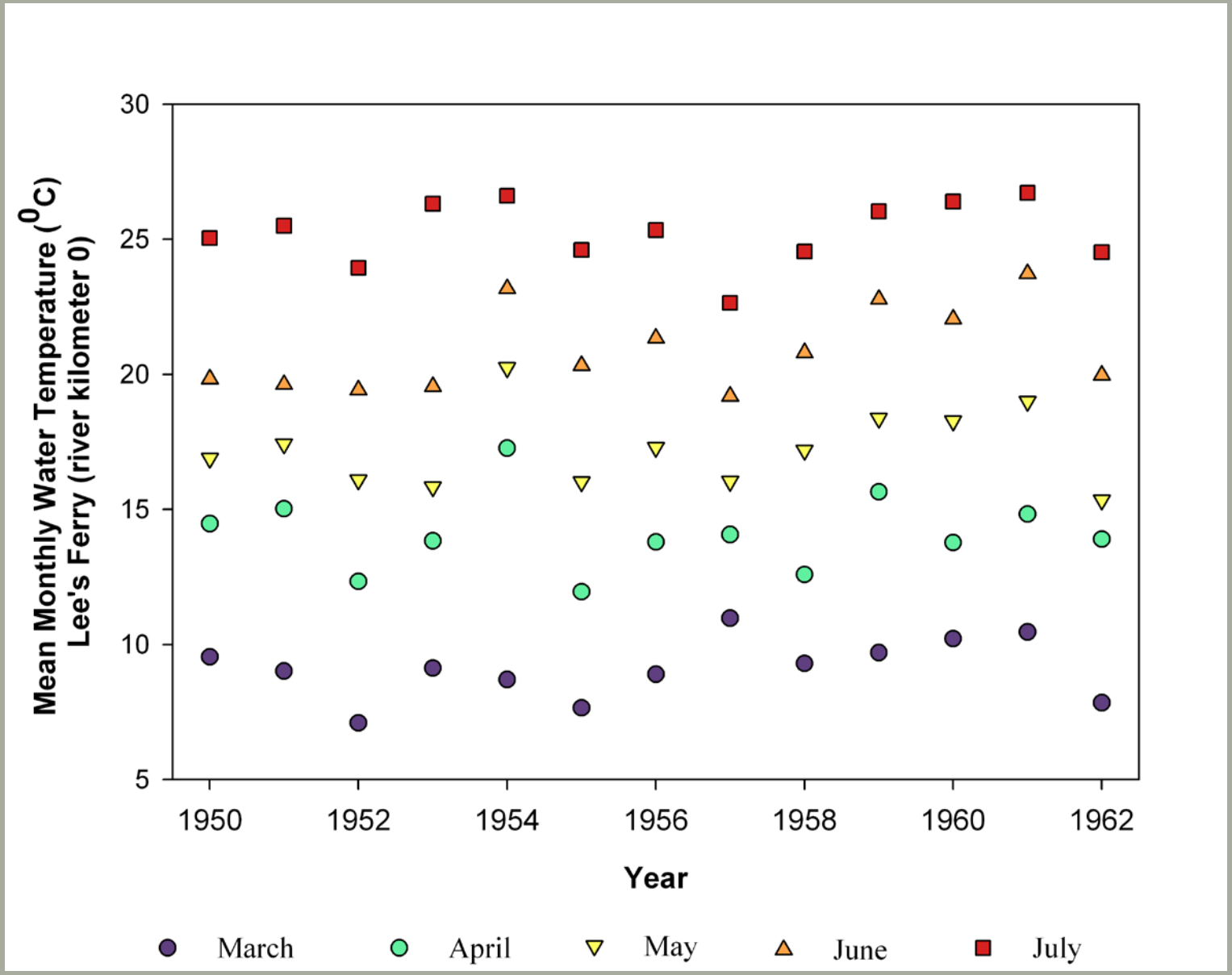

CPUE (number of fish/m2)
River Kilometer
MAR
APR
MAY
JUN
JUL
AUG
SEP
n=11
n=599
n=6,104
n=1,232
n=135
n=42
n=10


CPUE (number of fish/m2)
River Kilometer
MAR
APR
MAY
JUN
JUL
AUG
SEP
n=130
n=1,050
n=6,041
n=5,036
n=1,611
n=655
n=164


CPUE (number of fish/m2)
River Kilometer
MAR
APR
MAY
JUN
JUL
AUG
SEP
n=14
n=57
n=6
n=2
n=0
n=2
n=0



July and August


Mean Monthly Water Temperature (0C)
Lee's Ferry (river kilometer 0)
30
25
20
15
10
5
1950
1952
1954
1956
1958
1960
1962
Year
March
April
May
June
July