Razorback Sucker *Xyrauchen texanus* Research and Monitoring in the Colorado River Inflow Area of Lake Mead and the Lower Grand Canyon, Arizona and Nevada

Brandon Albrecht [1], Ron Kegerries [1], W. Howard Brandenberg [2], Adam L. Barkalow [2], Steven Platania [2], Mark McKinstry [3], Brian Healy [4], Emily Omana [4], and James Stolberg [5]

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

The results of the larval community sampling documented reproduction by Razorback Sucker and Humpback Chub during the 2014 survey of the lower Grand Canyon. Larval Razorback Sucker (n=462) were captured in four of the six months of the survey (April – July). The April survey had the highest density of capture and catch increased in the lower portion of the study area. Larval Razorback Sucker were distributed throughout the study area during the May and June survey including capture of a larval Razorback Sucker at the top of the study area, upstream of Lava Falls Rapid. Three Razorback Sucker larvae were captured in July. Larval Razorback Sucker captured represented all larval ontogenetic stages (protolarvae, mesolarvae, and metalarvae). Mesolarvae (flexion and postflexion) constituted 97.2% of the total Razorback Sucker catch. No recently transformed juvenile was captured in the 2014 captures.

Larval Humpback Chub were first documented during the May survey. Age-0 captures of this species were documented through the end of the 2014 study period (n=209). Larval Humpback Chub were captured during the May – August Survey and were distributed throughout the study area. Recently transformed juveniles were captured between June and September. September captures of age-0 Humpback Chub were composed entirely of age-0 juveniles.

Native fishes composed 97.6% of the total age-0 catch during the 2014 survey. The three most abundant native species captured during the 2014 larval survey were Bluehead Sucker, Flannelmouth Sucker, and Speckled Dace. These three species comprised over 99% of the total native fish catch among the six trips.

RECLAMATION

Managing Water in the West

Razorback Sucker *Xyrauchen texanus* Research and Monitoring in the Colorado River Inflow Area of Lake Mead and the Lower Grand Canyon, Arizona and Nevada

2014 ANNUAL REPORT

Prepared by:
Brandon Albrecht [1], Ron Kegerries [1], W. Howard Brandenburg [2], Adam L. Barkalow [2], Steven P. Platania [2], Mark McKinstry [3], Brian Healy [5], Emily Omana [5], James Stolberg [5], and Zachary Shattuck [1]

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

April 2015

American Southwest Ichthyological Researchers

Larval fishes of the Lower Grand Canyon 2014

Objectives

- Continue monitoring the CRI
  - Same methods since 2010
- Determine RBS presence and habitat use in LGC
  - Larval and small-bodied fish community sampling within the LGC
    - Assess reproduction, spawning, and distribution
  - LGC sonic telemetry
- Explore linkages between Lake Mead and LGC



Why larval fish surveys?

- Good methodology for documenting rare fishes.
  - Breeding females have high fecundity.
- Track temporal and spatial changes in larval abundance.
  - Density and ontogenetic life stage
  - Identify potential bottlenecks.
- Provides information on spawning adults
  - Back-calculated spawning dates
  - Duration of spawning
  - Indication of spawning areas



Larval Fish Sampling

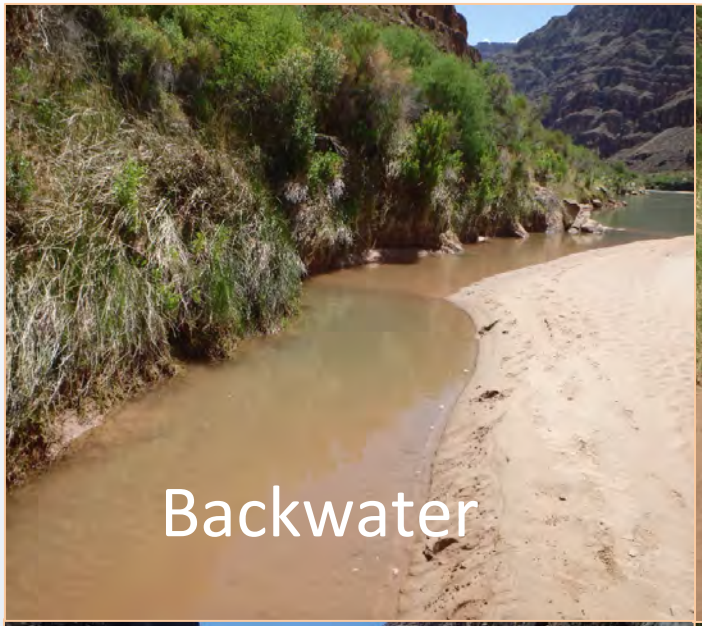
- Small seine (1 m x 1 m x 0.8 mm mesh)
- Generally shallow habitats
- Low-velocity habitats

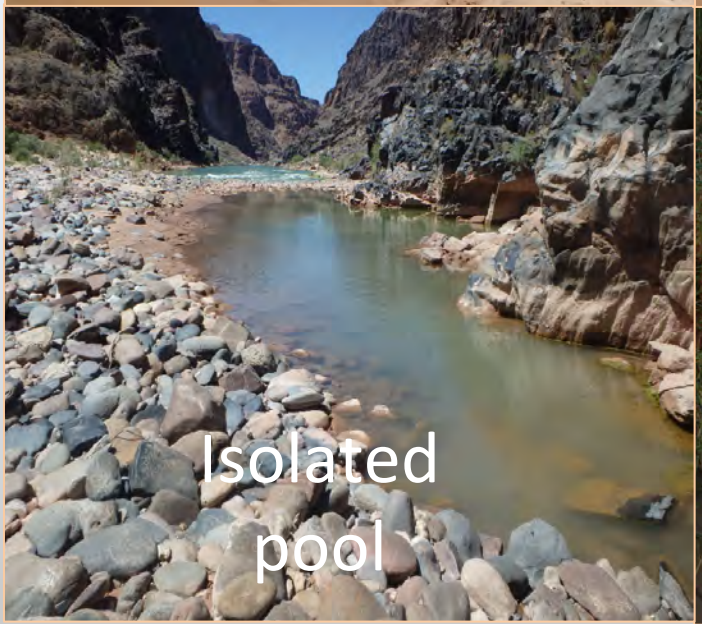
At each site:

- Four hauls @ 10.0 m per haul.
- Document physical characteristics of each habitat
- Maintain released fish in live wells



Habitats Sampled

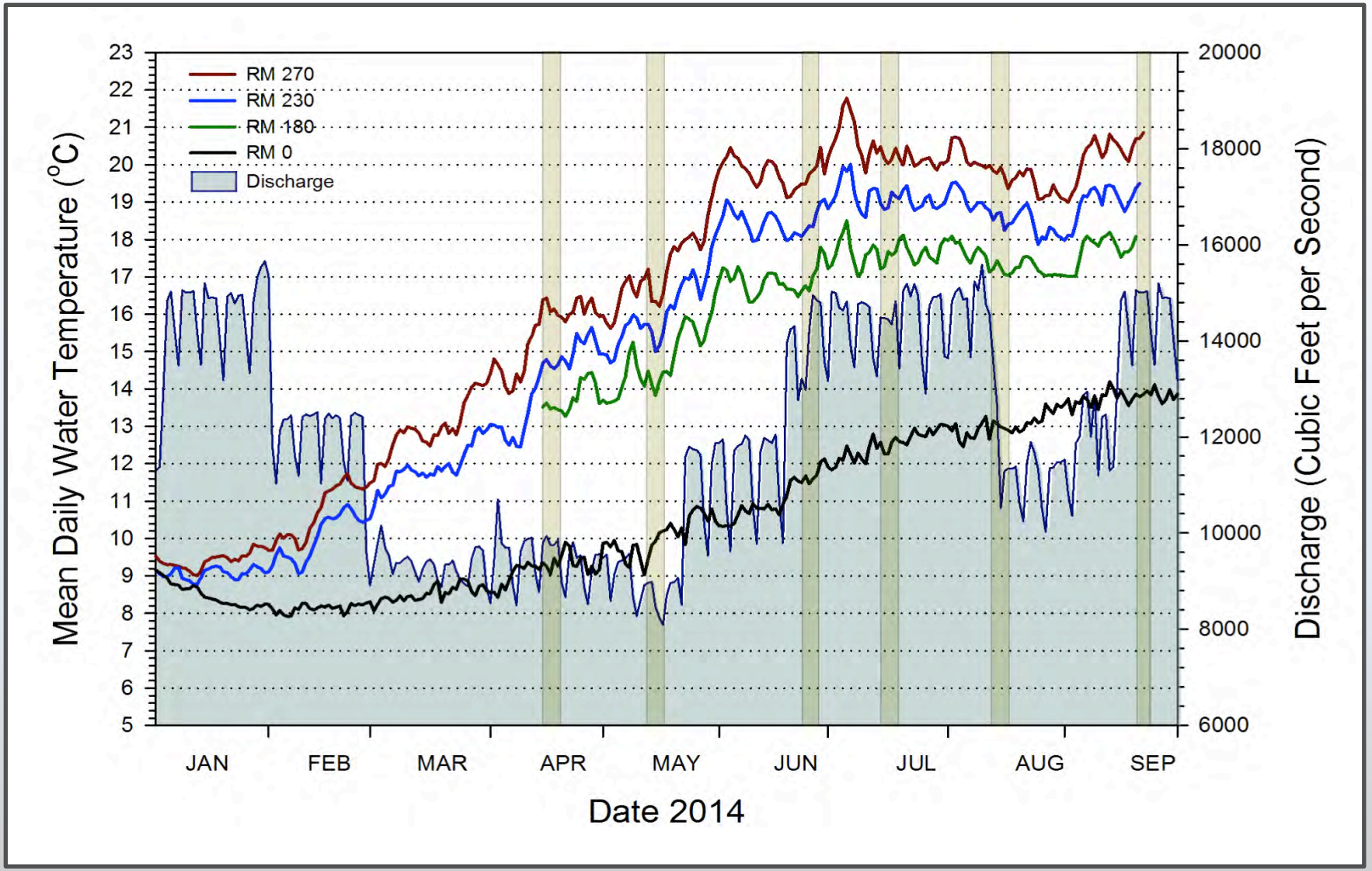


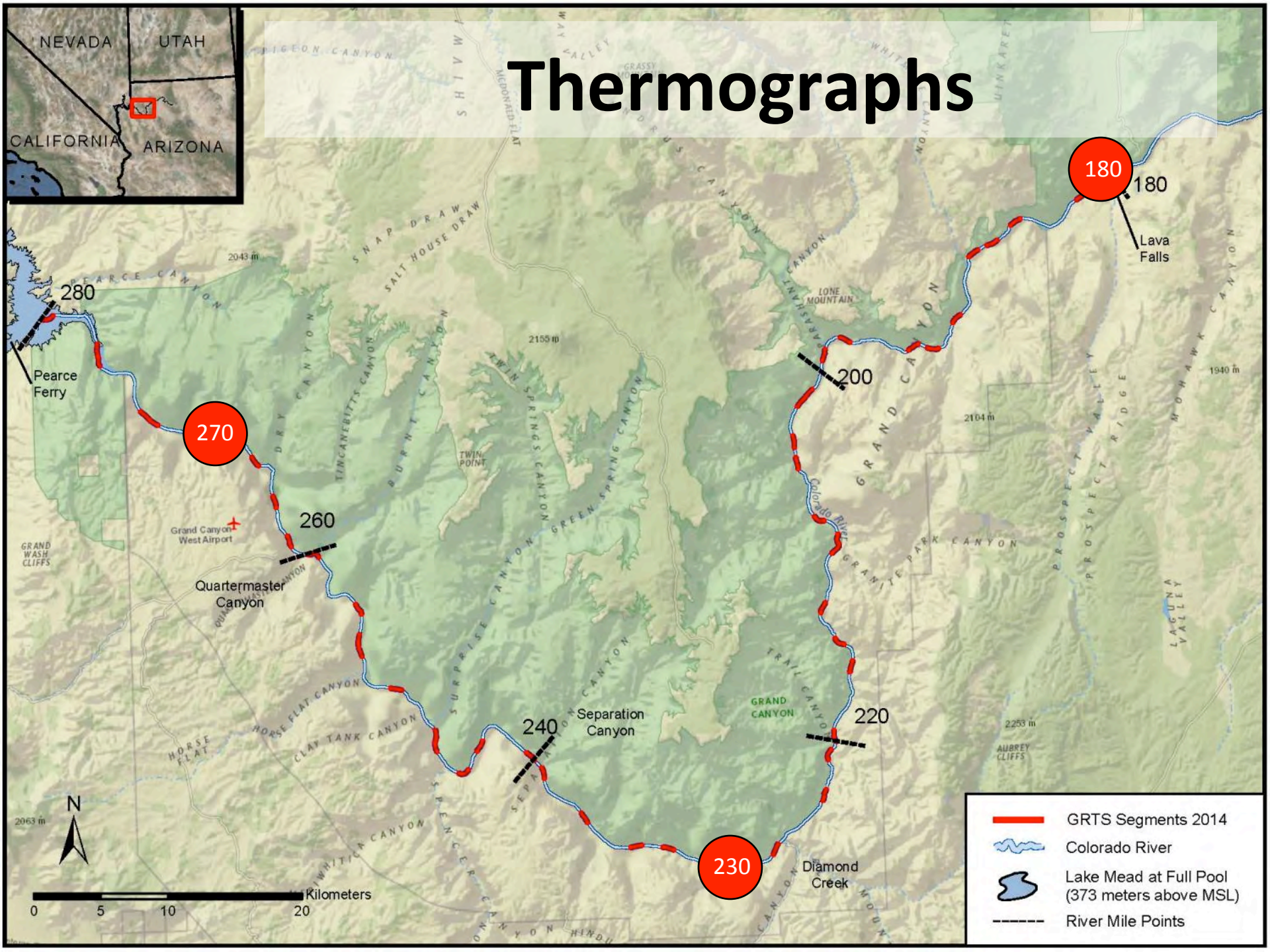


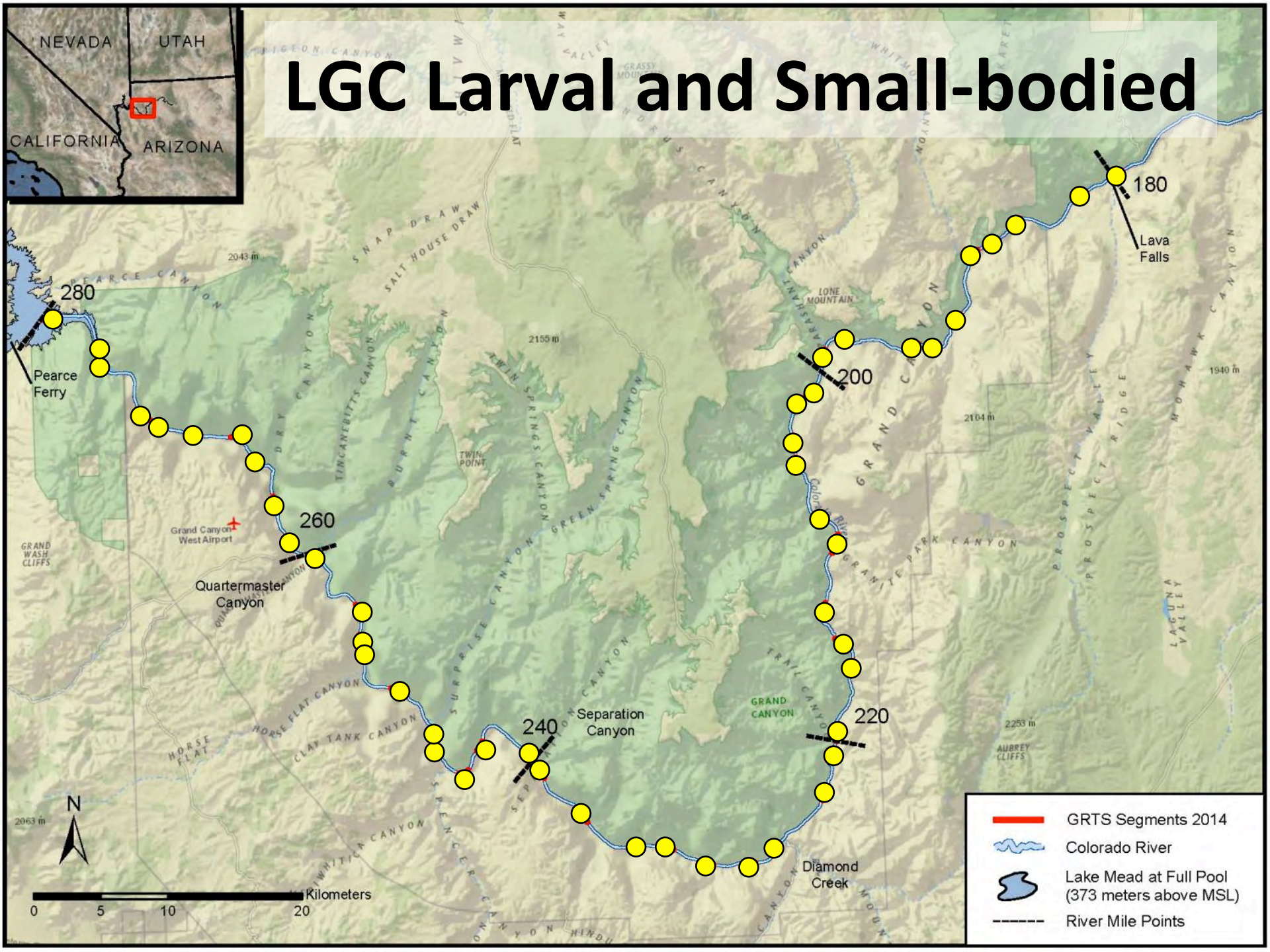
Generalized Pattern of spawning

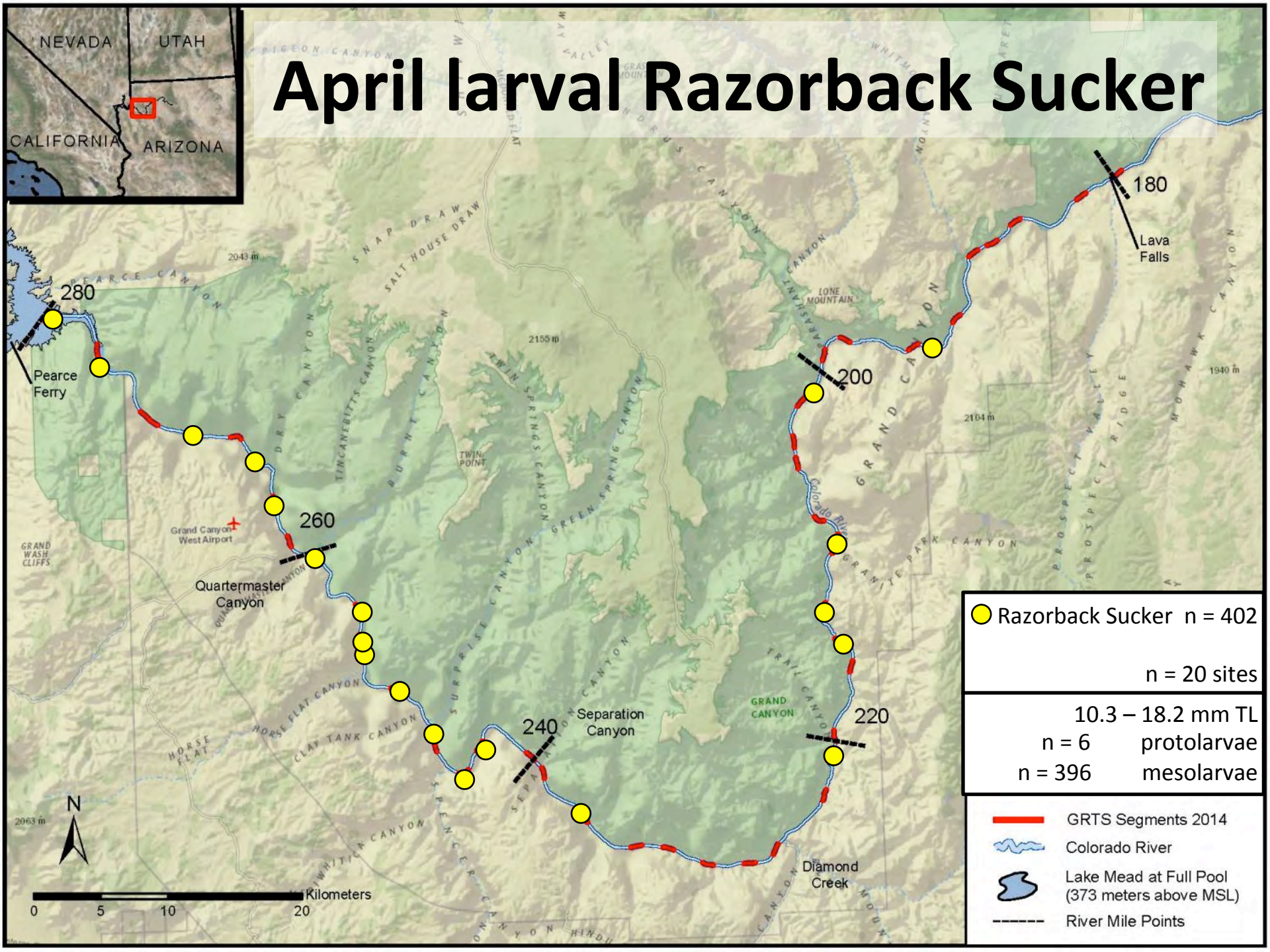
Catostomids – (March), April, May, June
Cyprinids – May, June, July, August

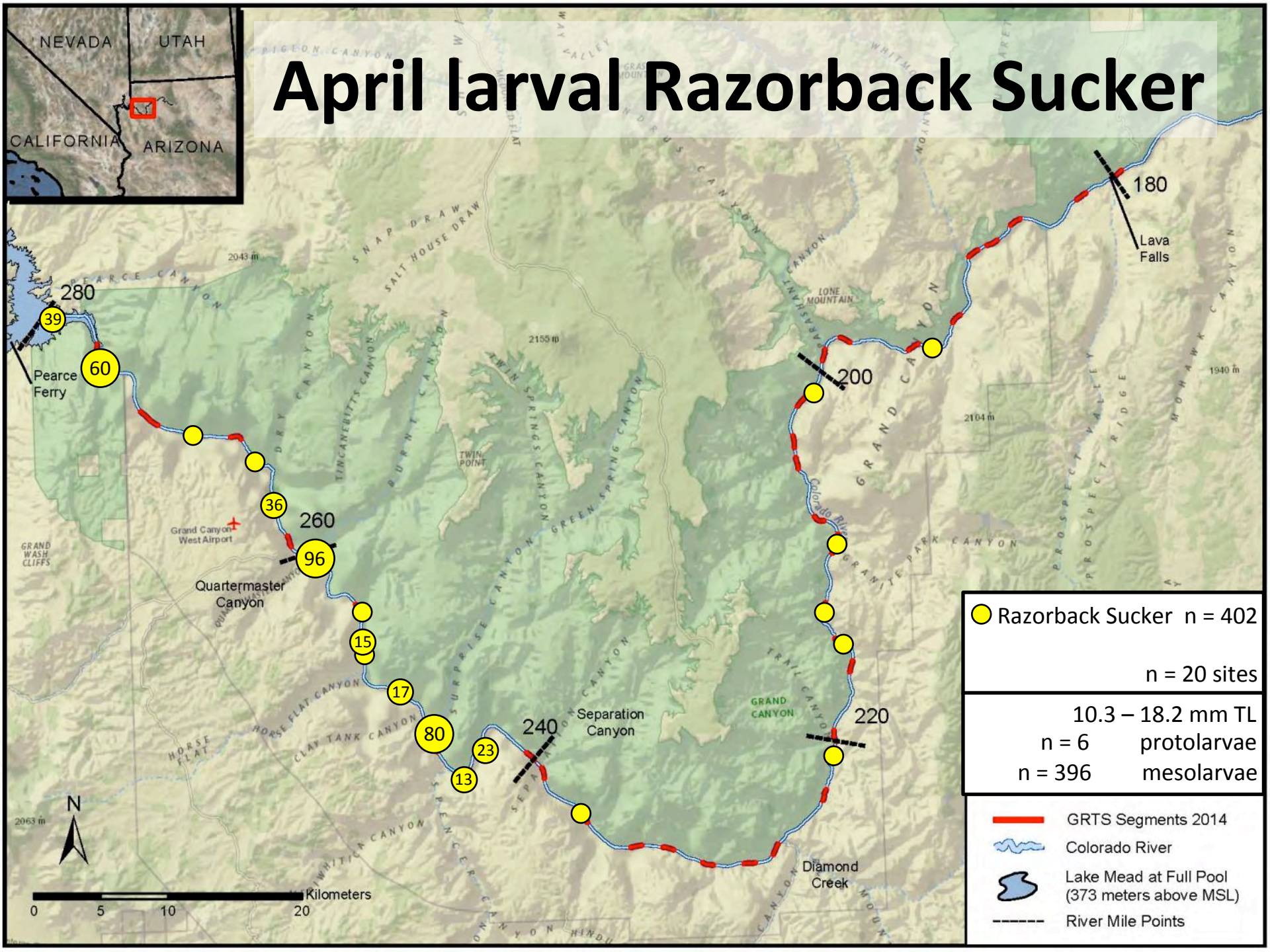
Discharge & Water Temperature

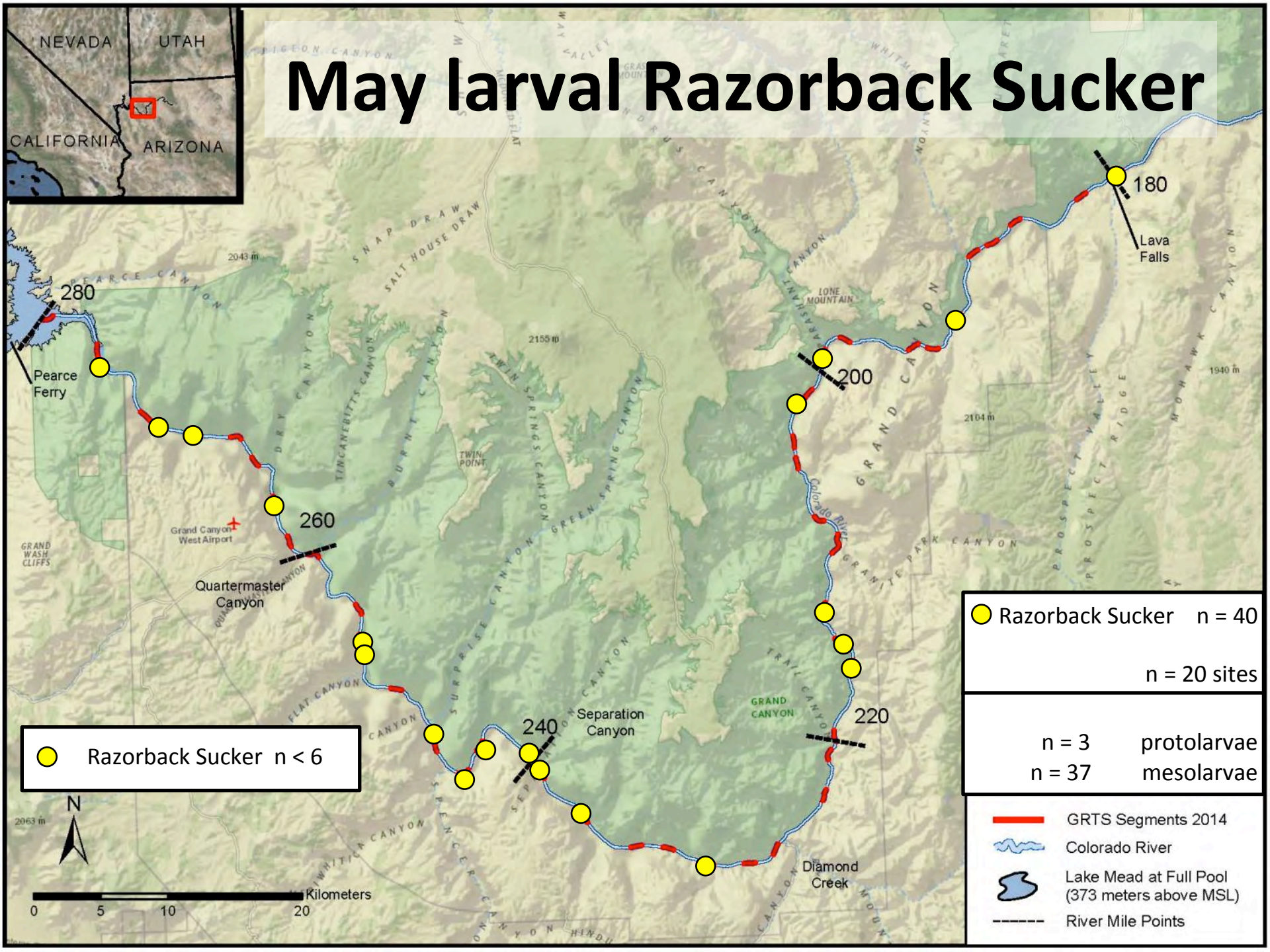


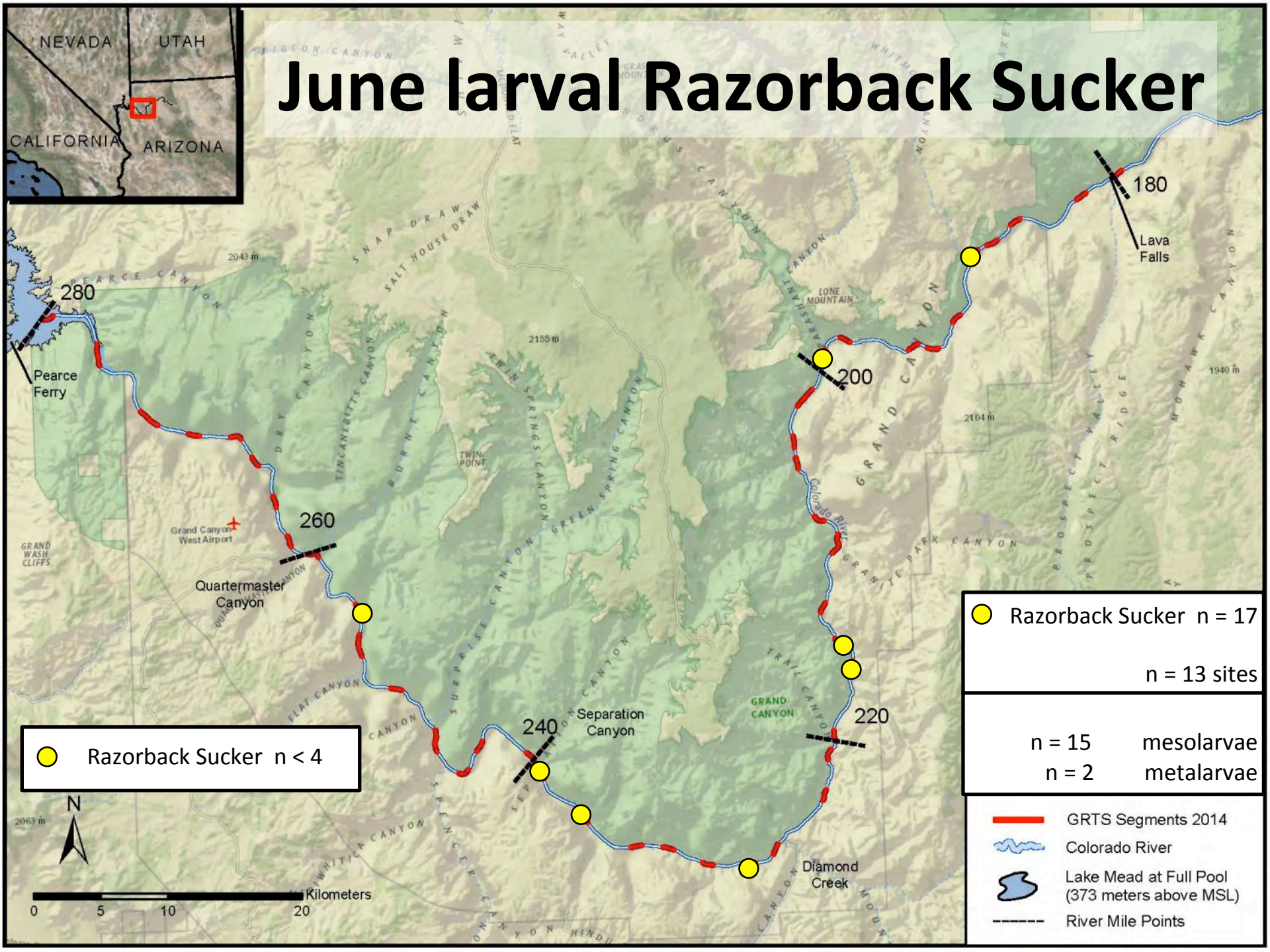

Thermographs
NEVADA
UTAH
CALIFORNIA
ARIZONA
280
Pearce Ferry
270
260
Quartermaster Canyon
240
Separation Canyon
230
Diamond Creek
220
200
180
180
Lava Falls
Grand Canyon West Airport
GRAND CANYON
N
0
5
10
20
Kilometers
GRTS Segments 2014
Colorado River
Lake Mead at Full Pool (373 meters above MSL)
River Mile Points

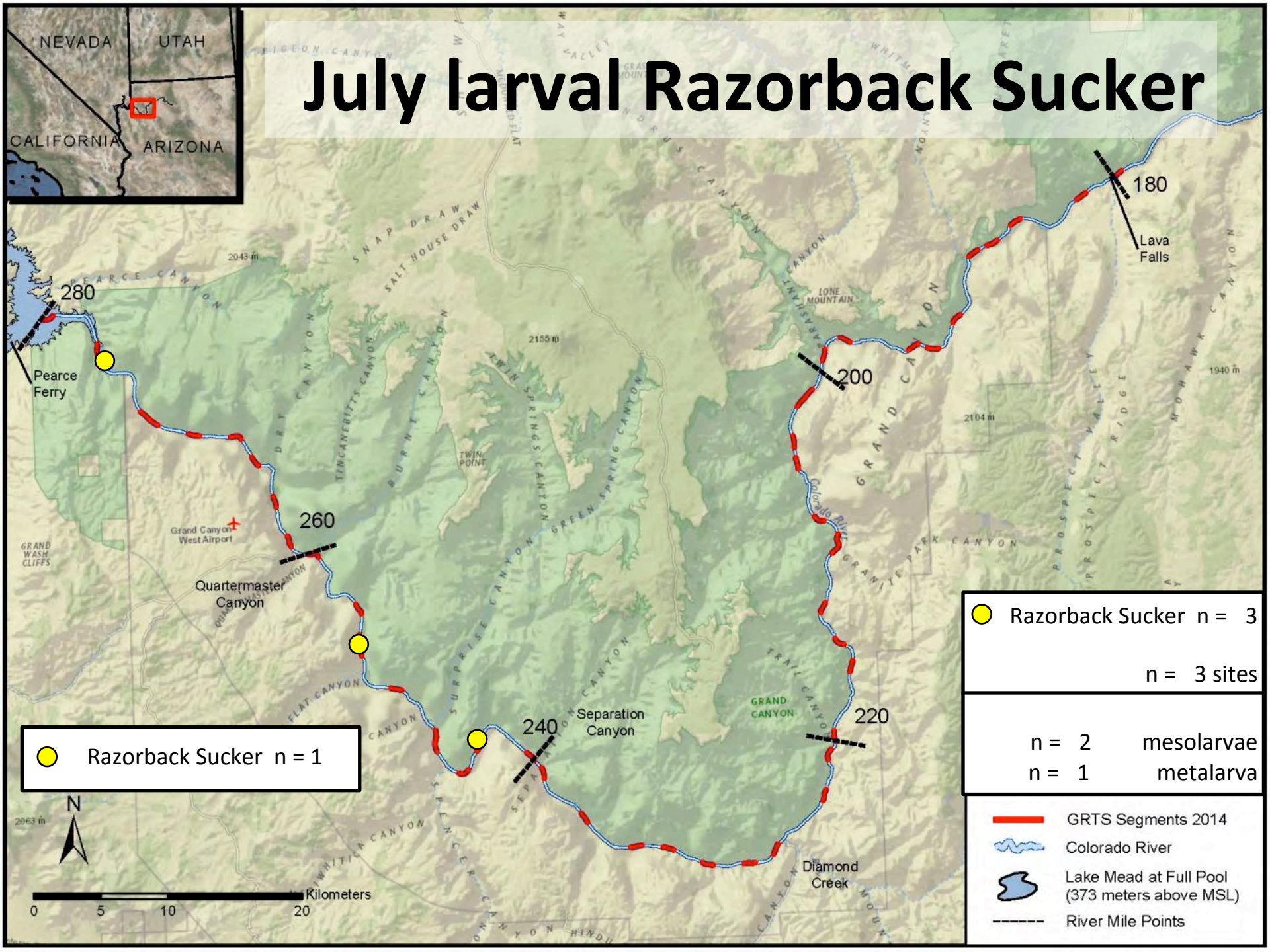

LGC Larval and Small-bodied
NEVADA
UTAH
CALIFORNIA
ARIZONA
280
Pearce Ferry
260
Quartermaster Canyon
240
Separation Canyon
220
200
180
Lava Falls
Diamond Creek
Grand Canyon West Airport
N
0
5
10
20
Kilometers
GRTS Segments 2014
Colorado River
Lake Mead at Full Pool (373 meters above MSL)
River Mile Points

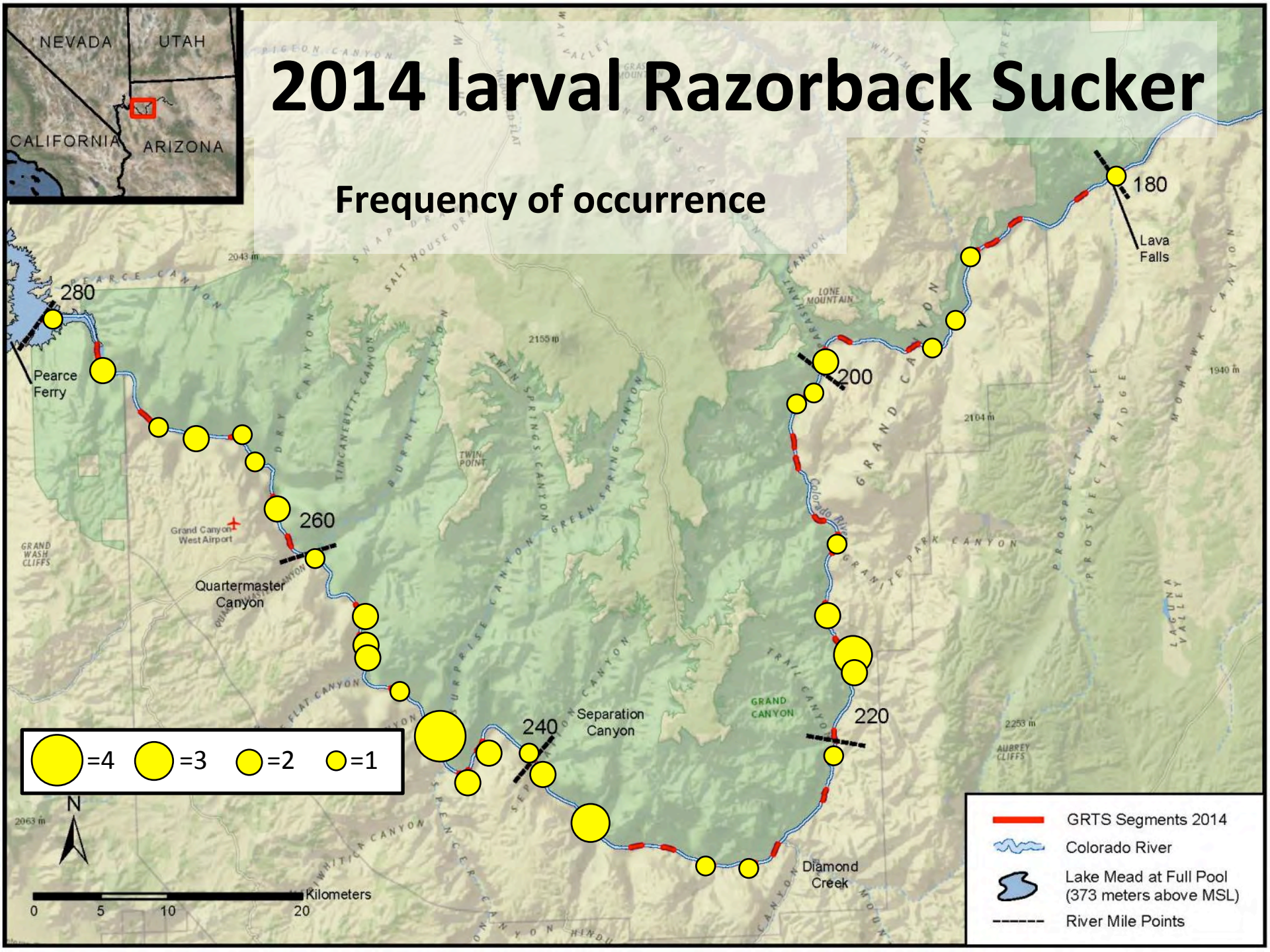

April larval Razorback Sucker
NEVADA
UTAH
CALIFORNIA
ARIZONA
280
Pearce Ferry
260
Quartermaster Canyon
240
Separation Canyon
220
200
180
Lava Falls
Diamond Creek
Grand Canyon West Airport
Razorback Sucker n = 402
n = 20 sites
10.3 – 18.2 mm TL
n = 6 protolarvae
n = 396 mesolarvae
GRTS Segments 2014
Colorado River
Lake Mead at Full Pool (373 meters above MSL)
River Mile Points
N
Kilometers
0
5
10
20


April larval Razorback Sucker
NEVADA
UTAH
CALIFORNIA
ARIZONA
280
39
60
Pearce Ferry
36
260
96
Quartermaster Canyon
15
17
80
23
13
240
Separation Canyon
220
200
180
Lava Falls
Grand Canyon West Airport
Razorback Sucker n = 402
n = 20 sites
10.3 – 18.2 mm TL
n = 6 protolarvae
n = 396 mesolarvae
GRTS Segments 2014
Colorado River
Lake Mead at Full Pool (373 meters above MSL)
River Mile Points
N
Kilometers
0
5
10
20

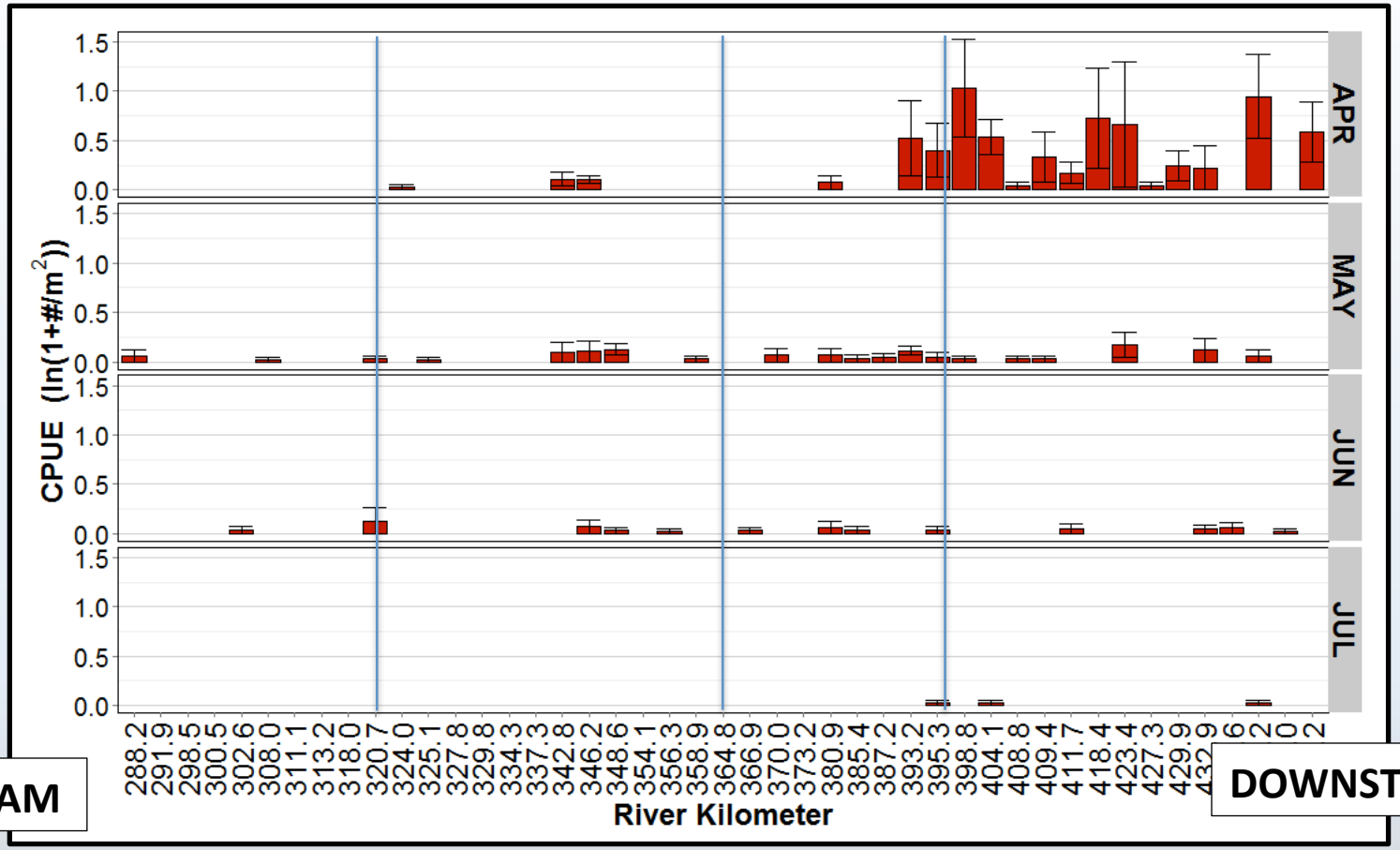

May larval Razorback Sucker
NEVADA
UTAH
CALIFORNIA
ARIZONA
280
Pearce Ferry
260
Quartermaster Canyon
240
Separation Canyon
220
200
180
Lava Falls
Diamond Creek
Grand Canyon West Airport
Razorback Sucker n < 6
Razorback Sucker n = 40
n = 20 sites
n = 3 protolarvae
n = 37 mesolarvae
GRTS Segments 2014
Colorado River
Lake Mead at Full Pool (373 meters above MSL)
River Mile Points
N
0 5 10 20 Kilometers


June larval Razorback Sucker
NEVADA
UTAH
CALIFORNIA
ARIZONA
280
Pearce Ferry
260
Quartermaster Canyon
240
Separation Canyon
220
200
180
Lava Falls
Diamond Creek
Grand Canyon West Airport
Razorback Sucker n < 4
Razorback Sucker n = 17
n = 13 sites
n = 15 mesolarvae
n = 2 metalarvae
GRTS Segments 2014
Colorado River
Lake Mead at Full Pool (373 meters above MSL)
River Mile Points
N
0 5 10 20 Kilometers


July larval Razorback Sucker
NEVADA
UTAH
CALIFORNIA
ARIZONA
280
Pearce Ferry
260
Quartermaster Canyon
240
Separation Canyon
220
200
180
Lava Falls
Razorback Sucker n = 1
Razorback Sucker n = 3
n = 3 sites
n = 2 mesolarvae
n = 1 metalarva
GRTS Segments 2014
Colorado River
Lake Mead at Full Pool (373 meters above MSL)
River Mile Points
N
0 5 10 20 Kilometers


NEVADA
UTAH
CALIFORNIA
ARIZONA
2014 larval Razorback Sucker
Frequency of occurrence
280
Pearce Ferry
260
Quartermaster Canyon
240
Separation Canyon
220
200
180
Lava Falls
Diamond Creek
Grand Canyon West Airport
=4
=3
=2
=1
N
0
5
10
20
Kilometers
GRTS Segments 2014
Colorado River
Lake Mead at Full Pool (373 meters above MSL)
River Mile Points

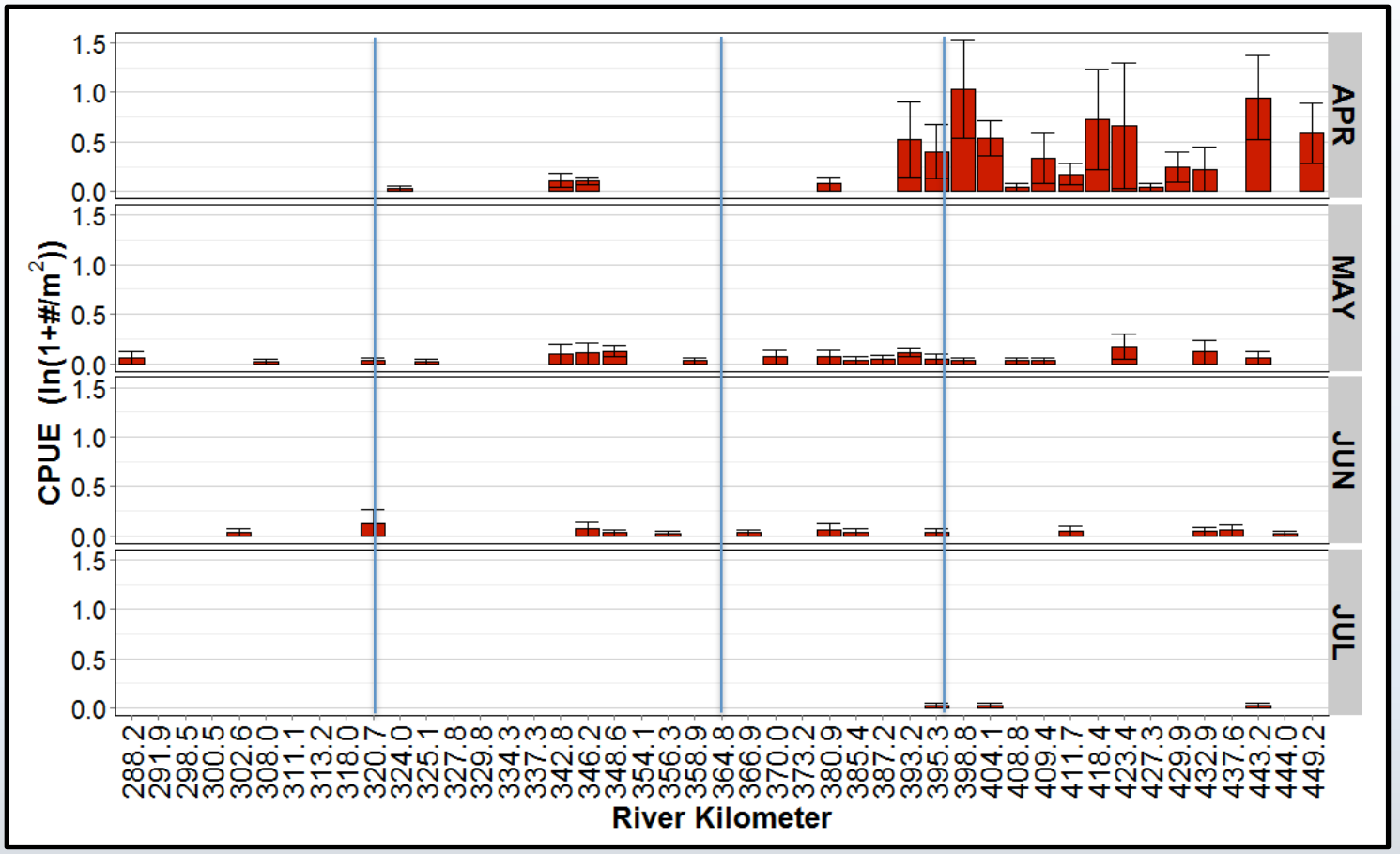
Razorback Sucker CPUE



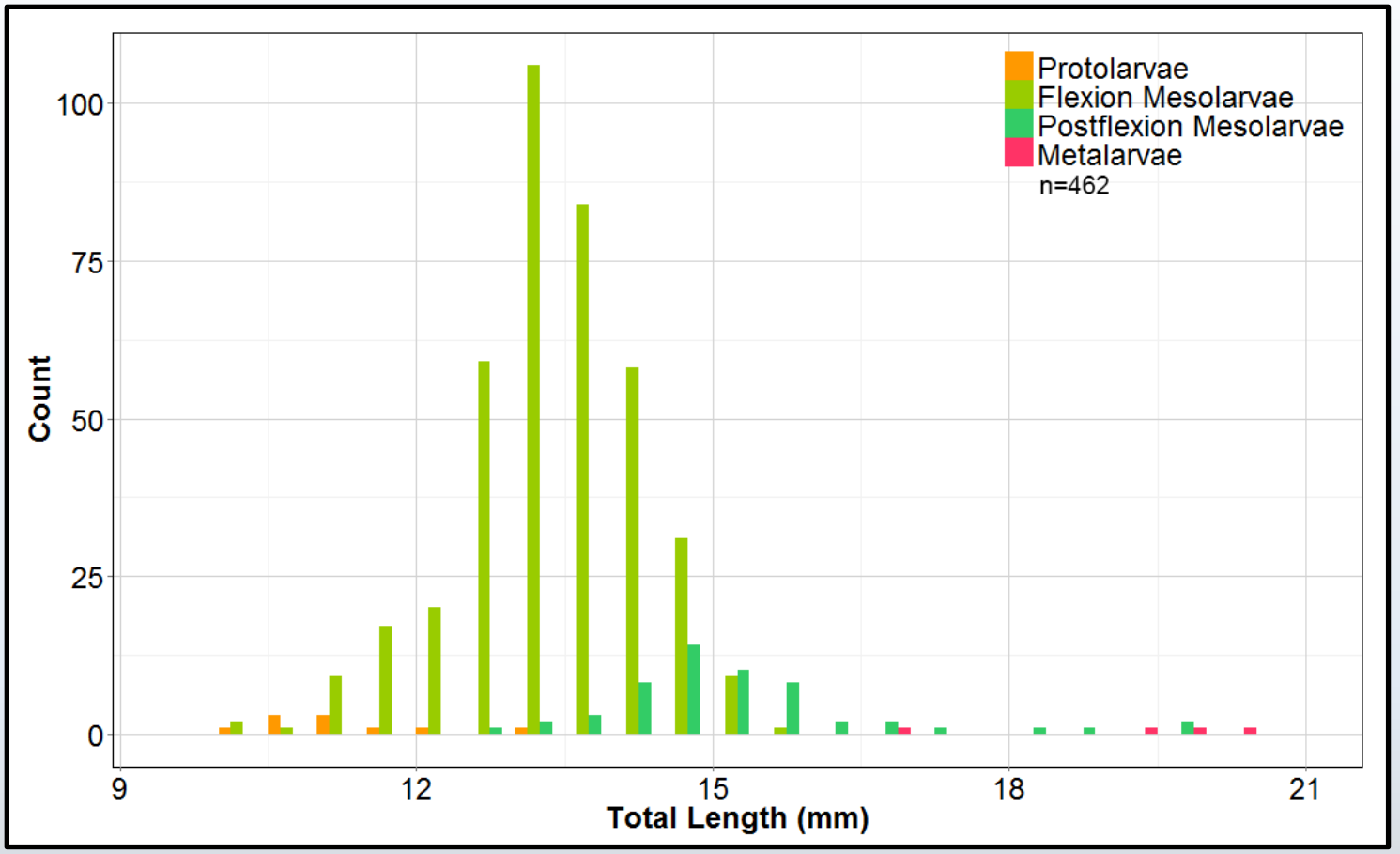
UPSTREAM

DOWNSTREAM

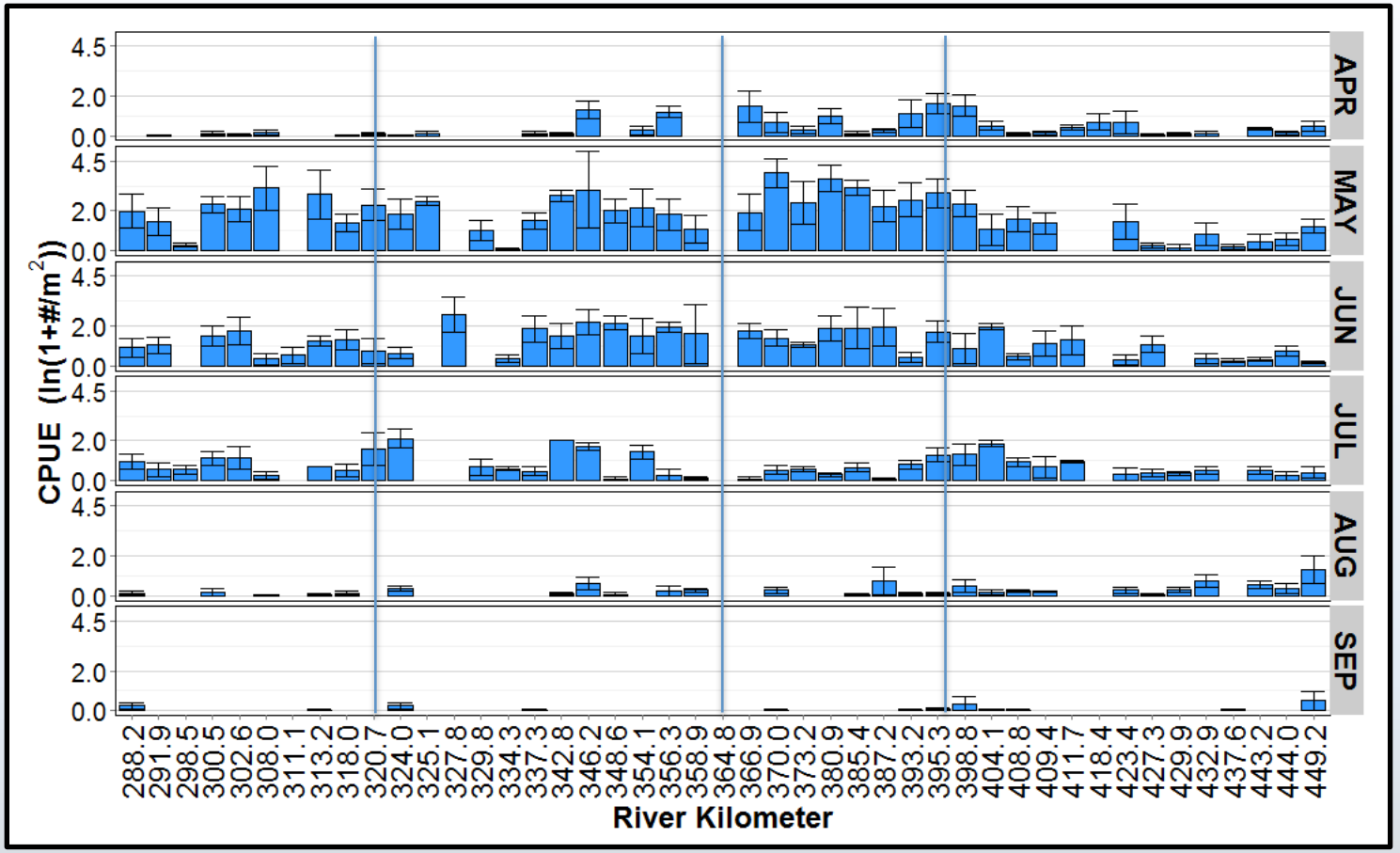
Razorback Sucker CPUE



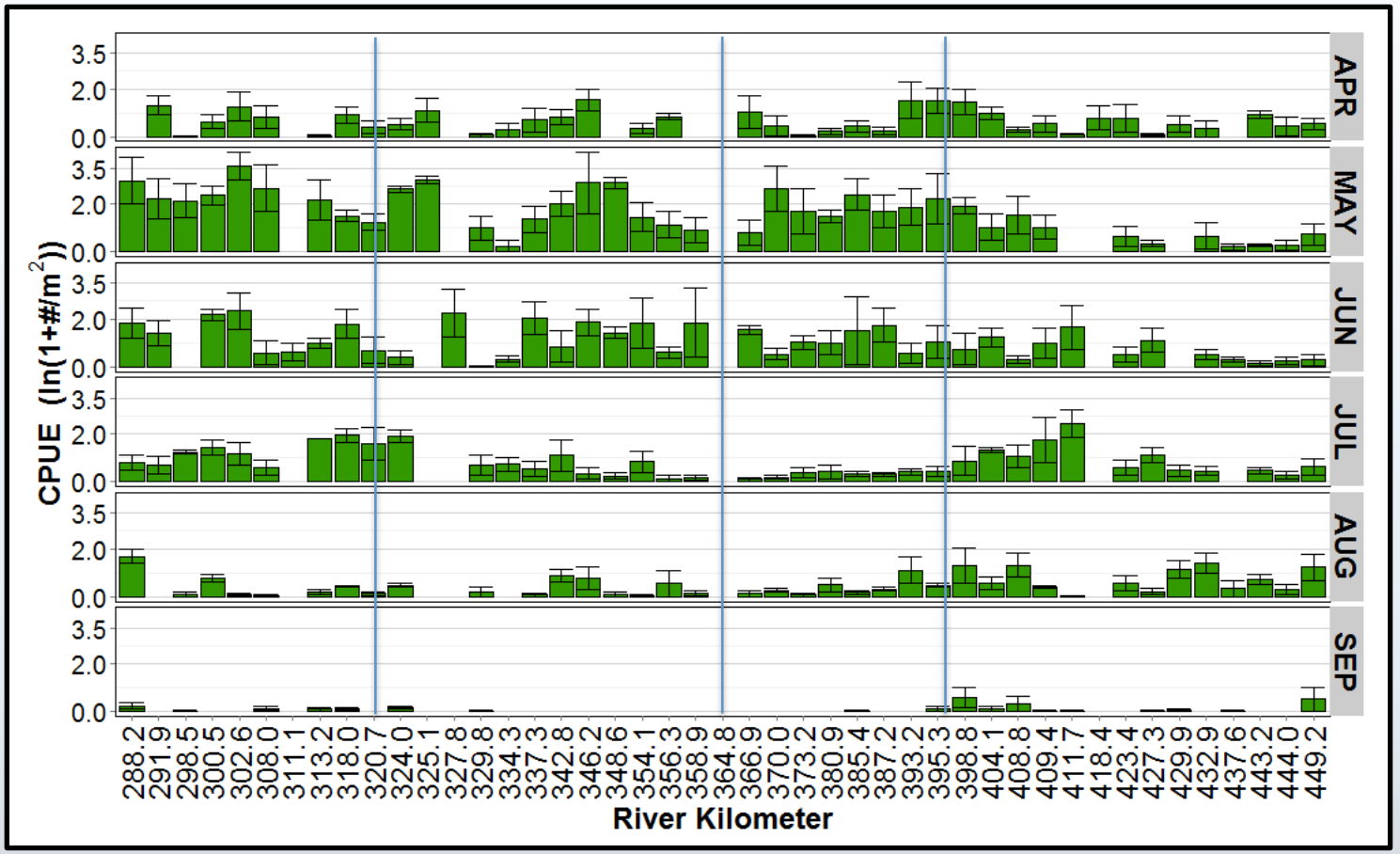
Razorback Sucker Lengths

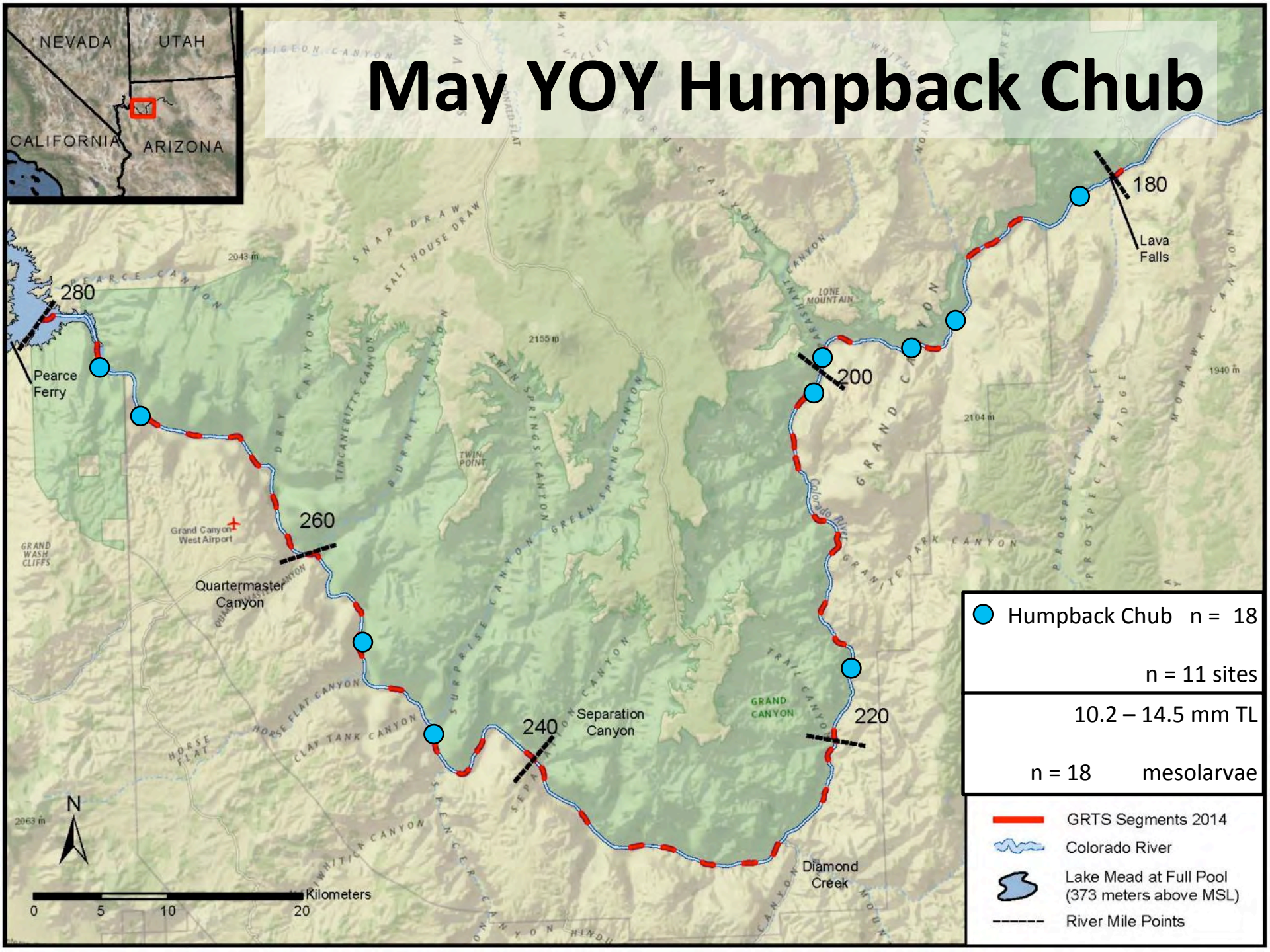


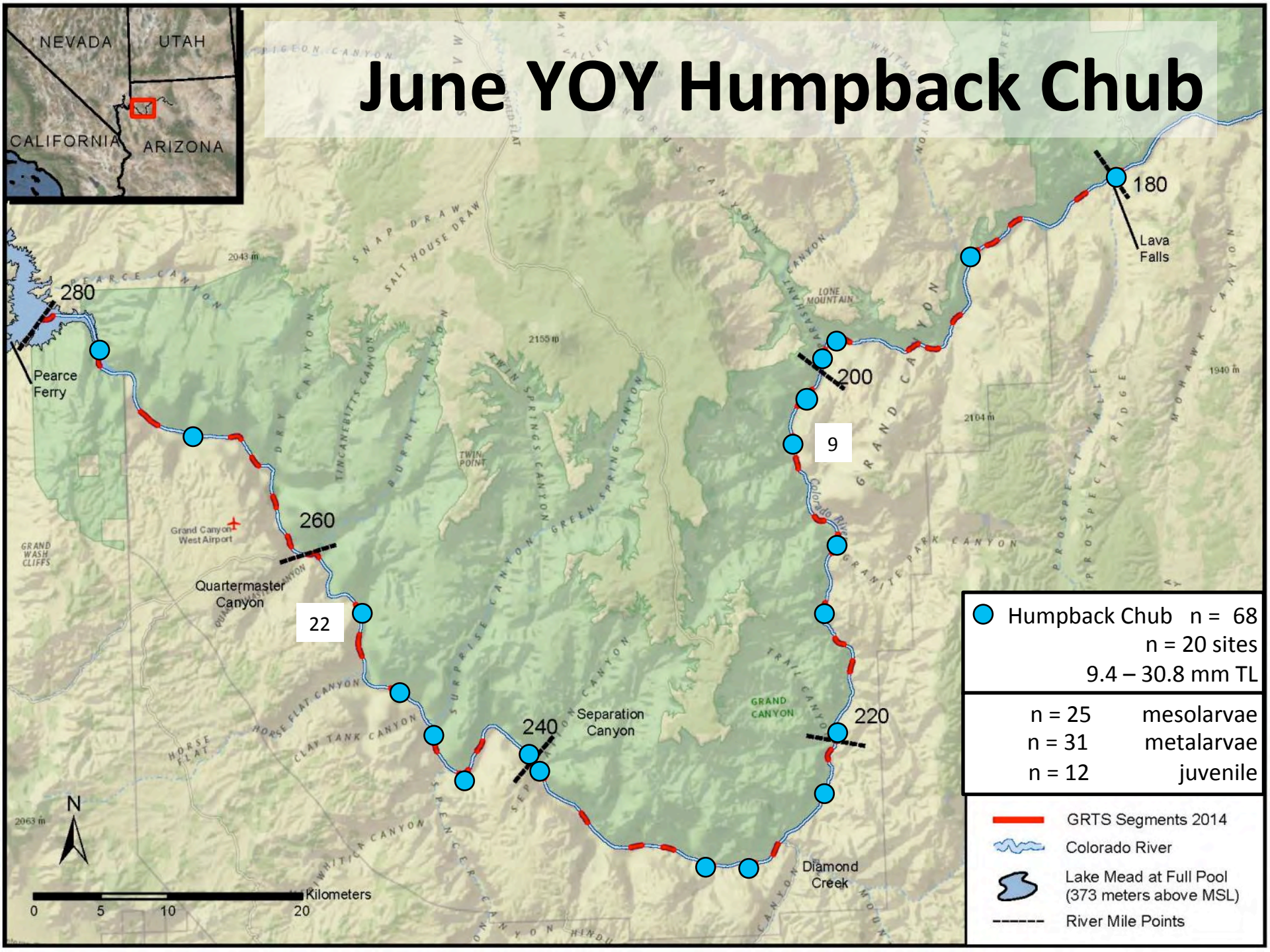
Bluehead Sucker CPUE

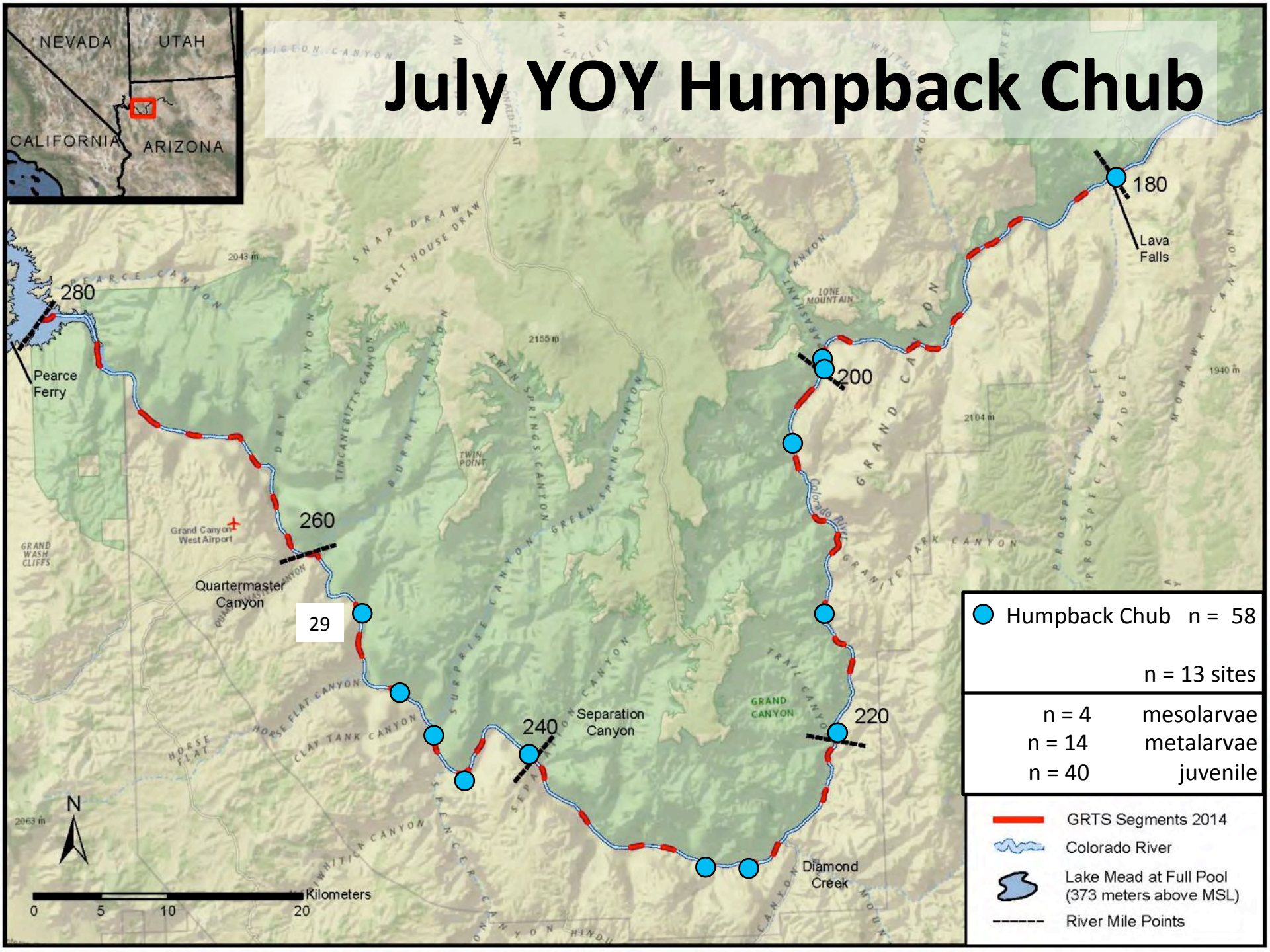


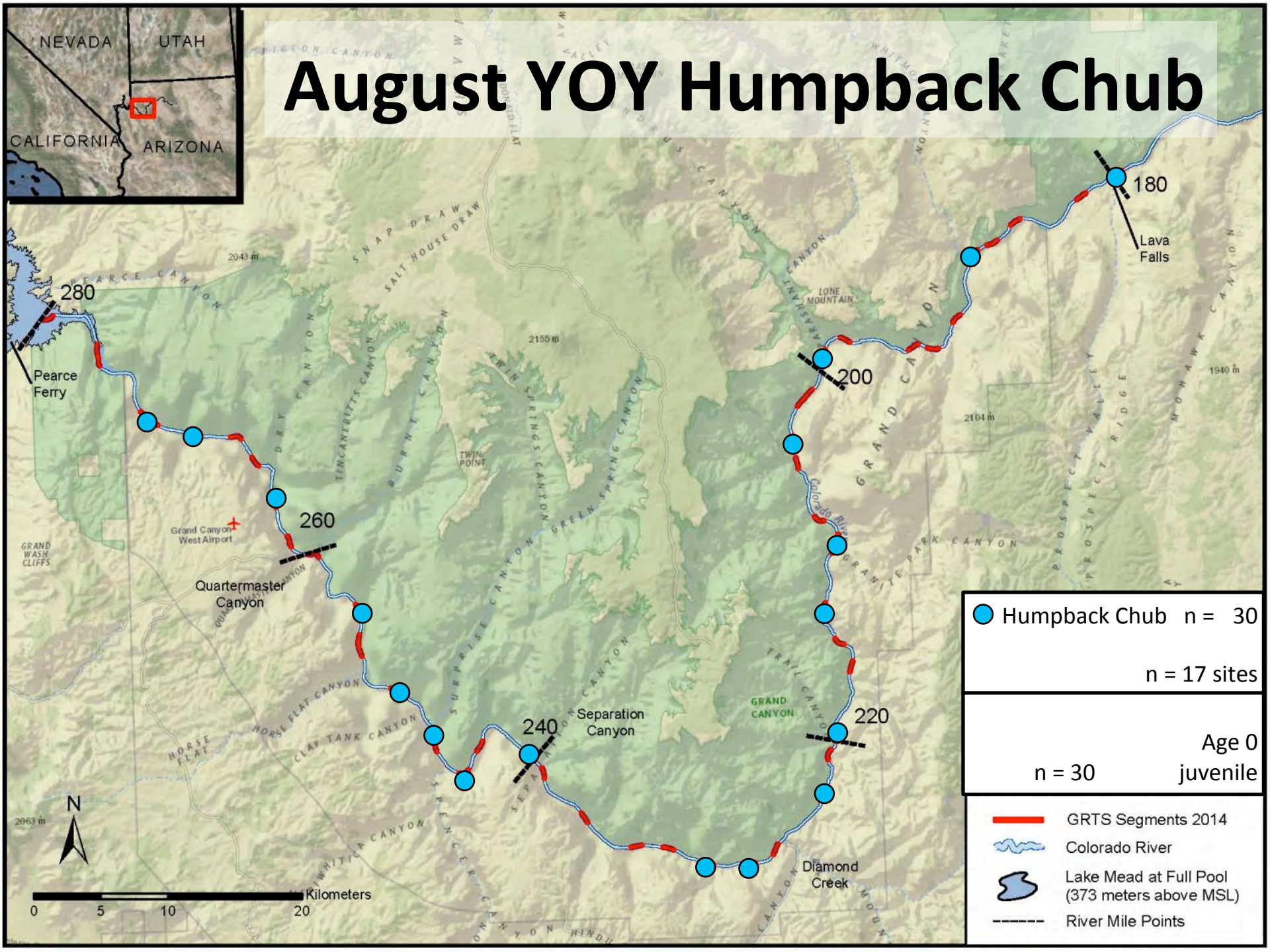
Flannelmouth Sucker CPUE

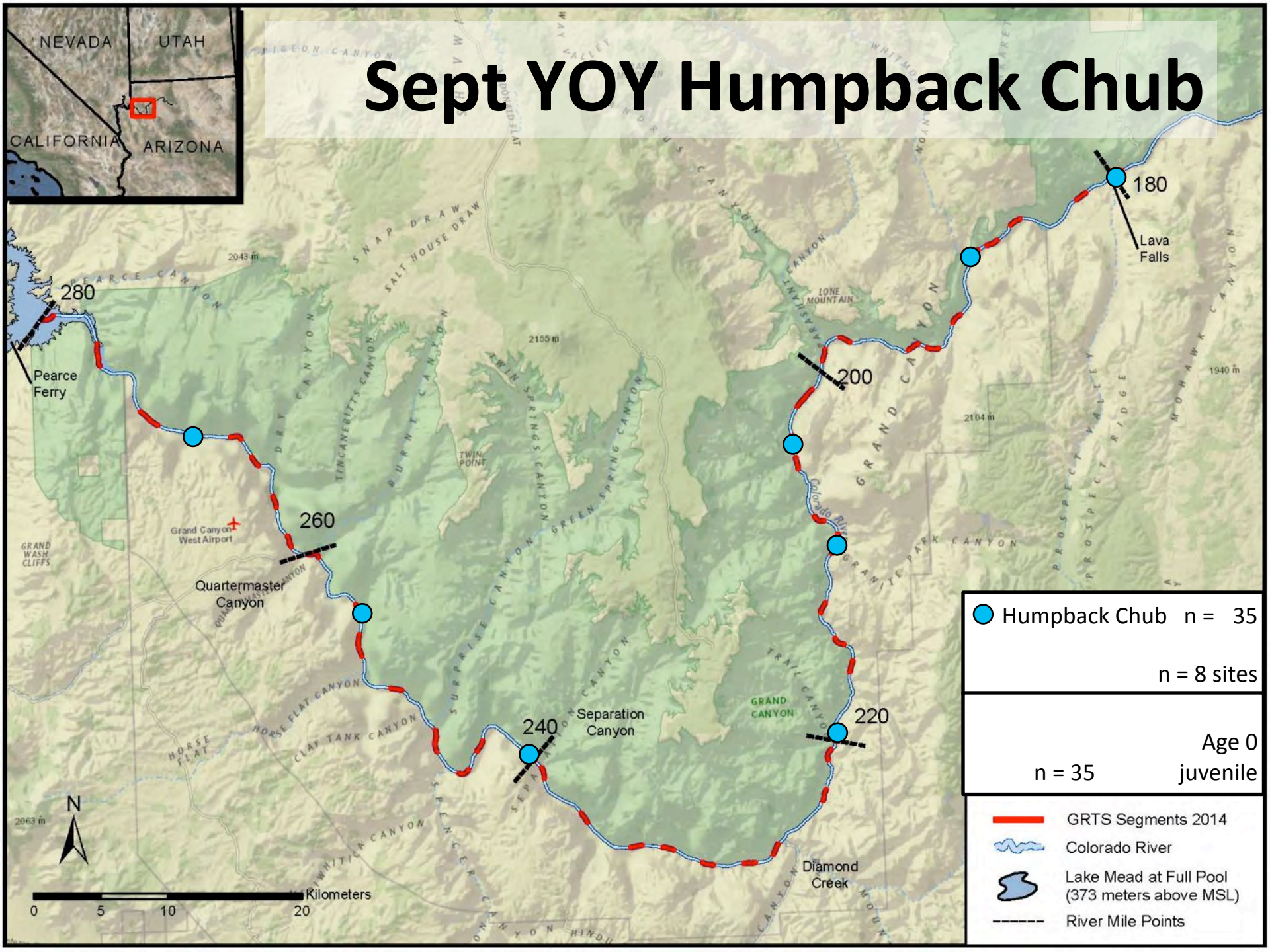


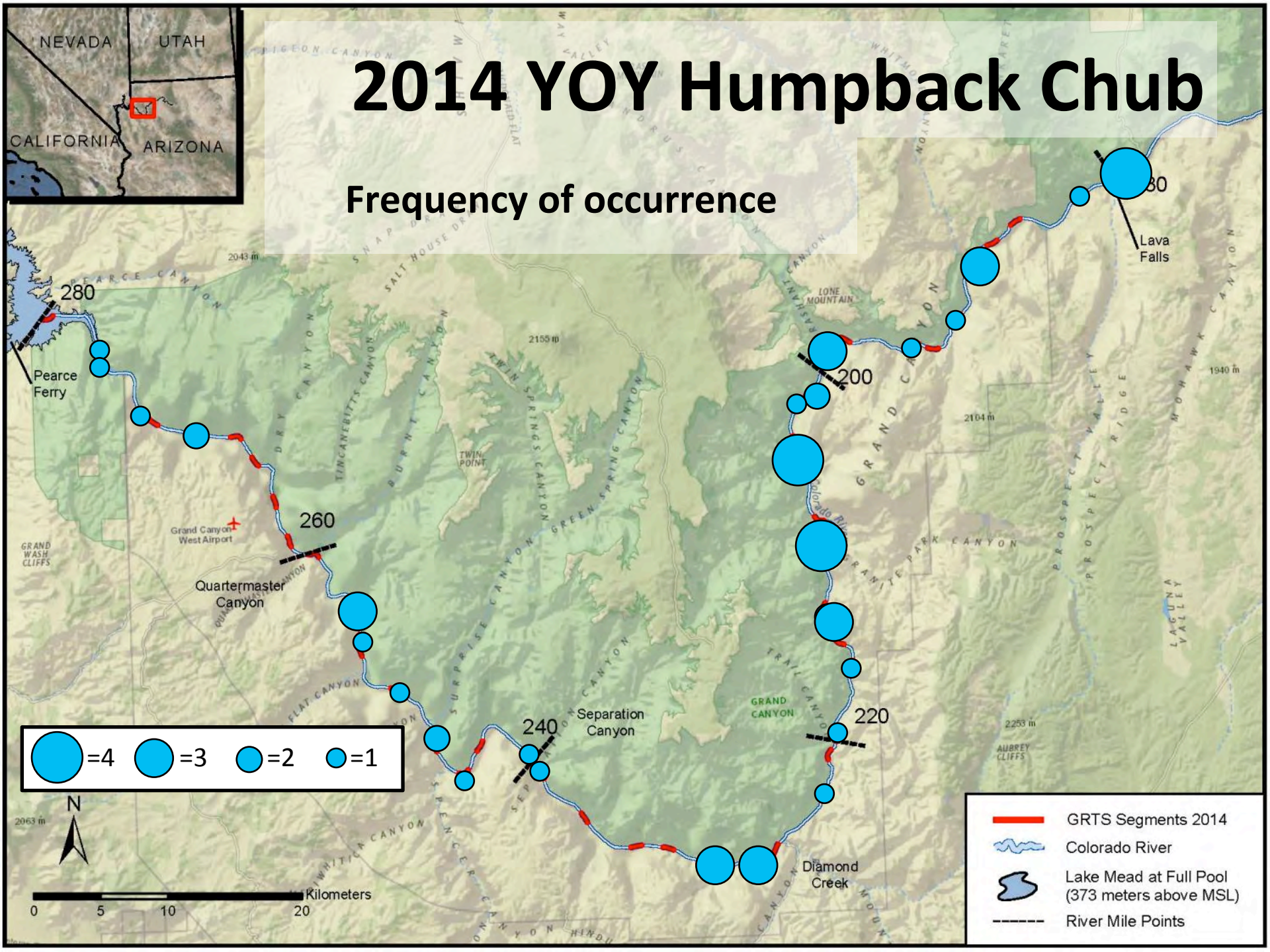

May YOY Humpback Chub
NEVADA
UTAH
CALIFORNIA
ARIZONA
280
Pearce Ferry
260
Quartermaster Canyon
240
Separation Canyon
220
200
180
Lava Falls
Diamond Creek
Grand Canyon West Airport
Humpback Chub n = 18
n = 11 sites
10.2 – 14.5 mm TL
n = 18 mesolarvae
GRTS Segments 2014
Colorado River
Lake Mead at Full Pool (373 meters above MSL)
River Mile Points
N
0 5 10 20 Kilometers


June YOY Humpback Chub
NEVADA
UTAH
CALIFORNIA
ARIZONA
280
Pearce Ferry
260
Quartermaster Canyon
22
240
Separation Canyon
220
200
9
180
Lava Falls
Diamond Creek
Grand Canyon West Airport
N
0
5
10
20
Kilometers
Humpback Chub n = 68
n = 20 sites
9.4 – 30.8 mm TL
n = 25 mesolarvae
n = 31 metalarvae
n = 12 juvenile
GRTS Segments 2014
Colorado River
Lake Mead at Full Pool
(373 meters above MSL)
River Mile Points

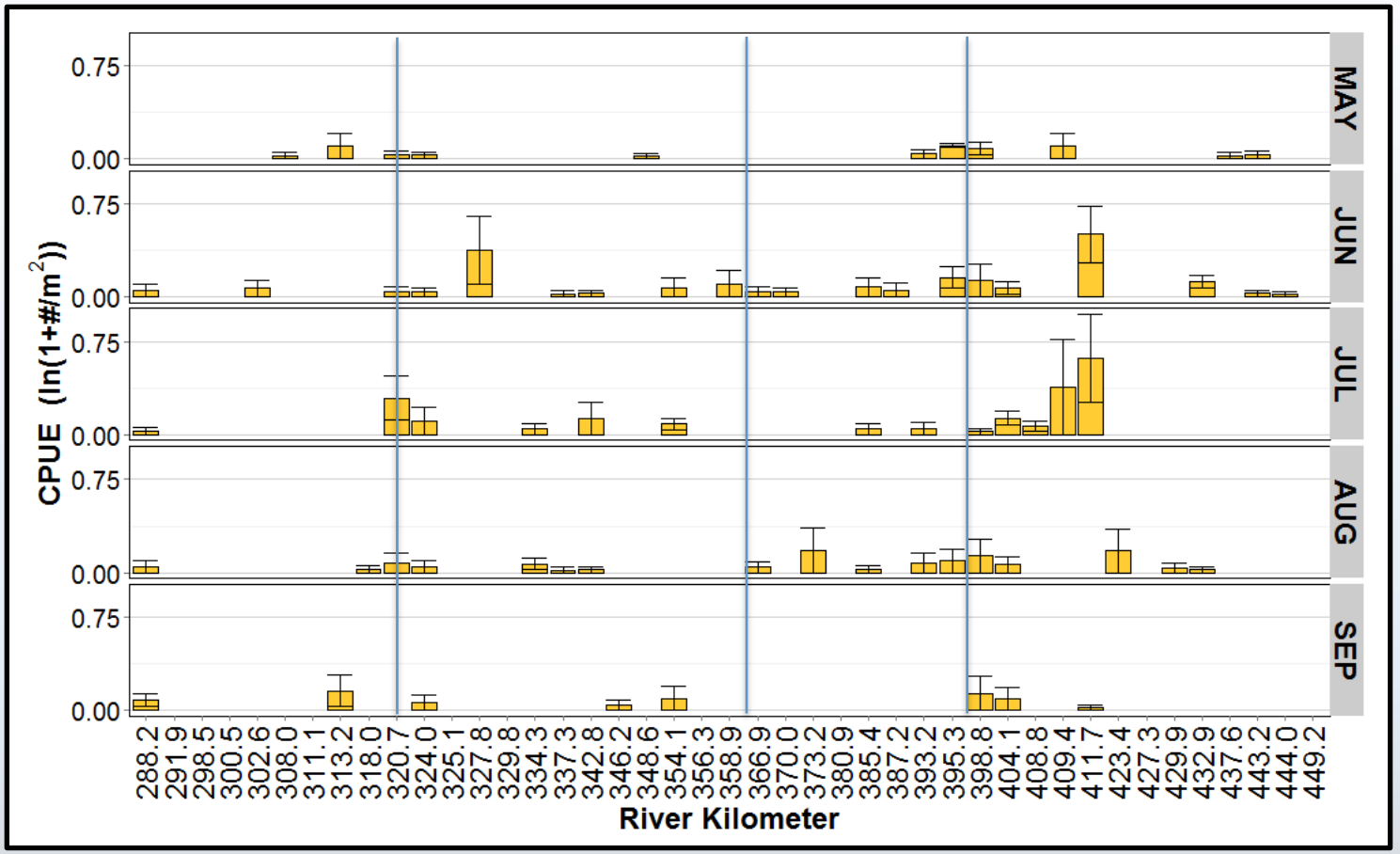

July YOY Humpback Chub
NEVADA
UTAH
CALIFORNIA
ARIZONA
280
Pearce Ferry
260
Quartermaster Canyon
29
240
Separation Canyon
220
200
180
Lava Falls
Diamond Creek
Grand Canyon West Airport
Humpback Chub n = 58
n = 13 sites
n = 4 mesolarvae
n = 14 metalarvae
n = 40 juvenile
GRTS Segments 2014
Colorado River
Lake Mead at Full Pool (373 meters above MSL)
River Mile Points
N
Kilometers
0 5 10 20


August YOY Humpback Chub
NEVADA
UTAH
CALIFORNIA
ARIZONA
280
Pearce Ferry
260
Quartermaster Canyon
240
Separation Canyon
220
200
180
Lava Falls
Diamond Creek
Grand Canyon West Airport
Humpback Chub n = 30
n = 17 sites
Age 0 juvenile
n = 30
GRTS Segments 2014
Colorado River
Lake Mead at Full Pool (373 meters above MSL)
River Mile Points
N
Kilometers
0
5
10
20

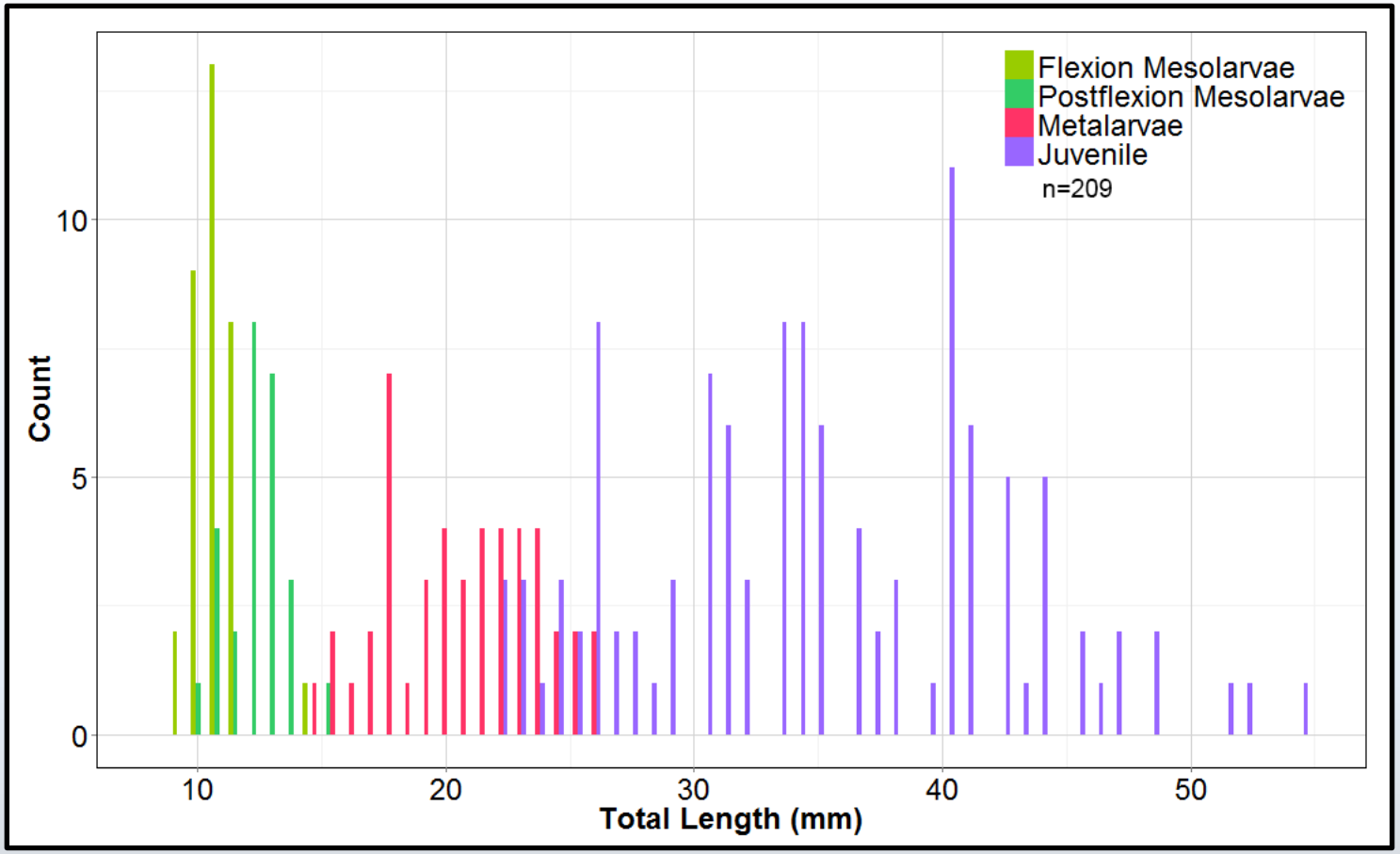

Sept YOY Humpback Chub
NEVADA
UTAH
CALIFORNIA
ARIZONA
280
Pearce Ferry
260
Quartermaster Canyon
240
Separation Canyon
220
200
180
Lava Falls
Diamond Creek
Grand Canyon West Airport
Humpback Chub n = 35
n = 8 sites
Age 0
n = 35
juvenile
GRTS Segments 2014
Colorado River
Lake Mead at Full Pool
(373 meters above MSL)
River Mile Points
N
Kilometers
0
5
10
20


2014 YOY Humpback Chub
Frequency of occurrence
NEVADA
UTAH
CALIFORNIA
ARIZONA
280
260
240
220
200
80
Pearce Ferry
Quartermaster Canyon
Separation Canyon
Lava Falls
Diamond Creek
Grand Canyon West Airport
=4
=3
=2
=1
N
0
5
10
20
Kilometers
GRTS Segments 2014
Colorado River
Lake Mead at Full Pool (373 meters above MSL)
River Mile Points

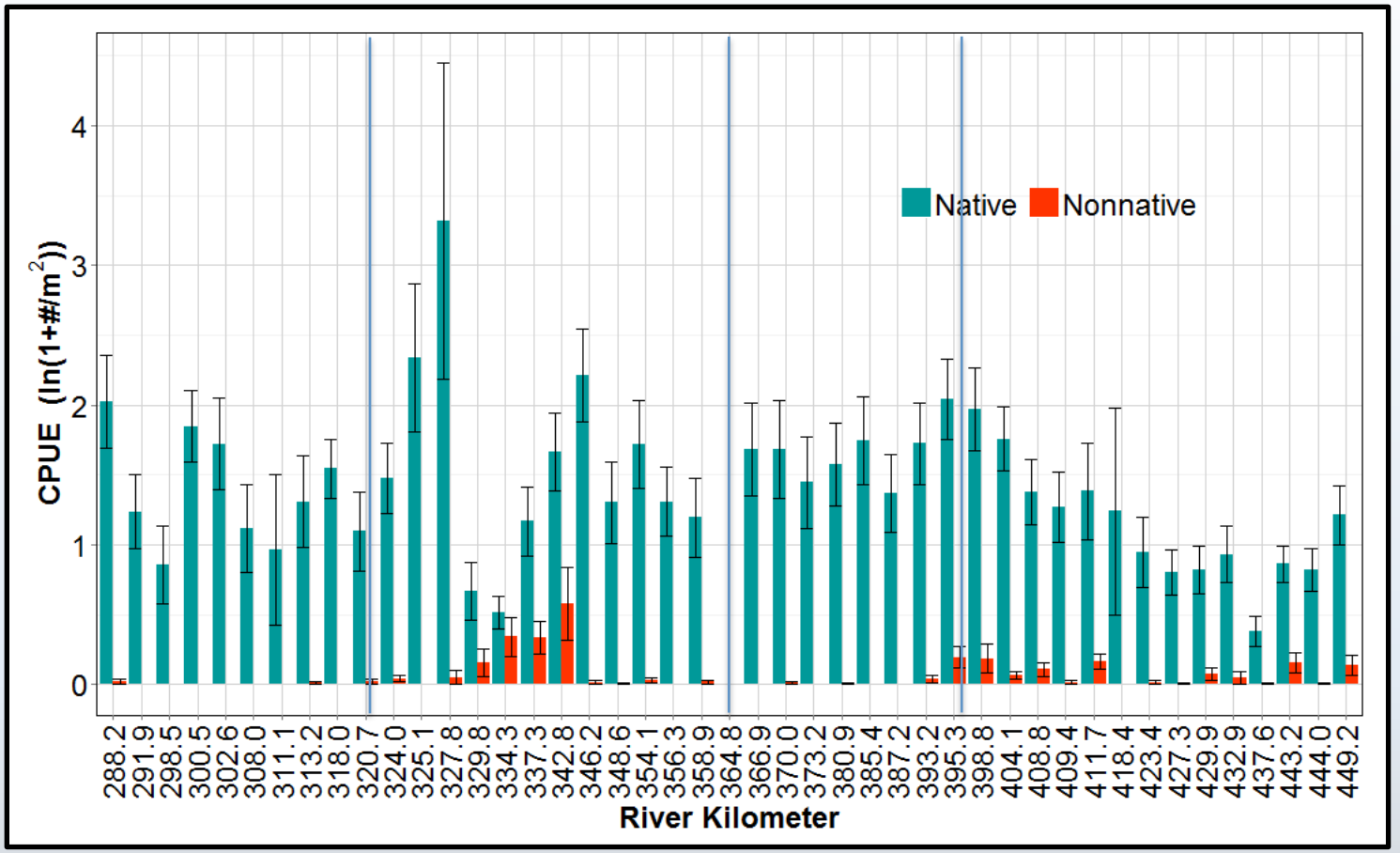
Humpback Chub CPUE



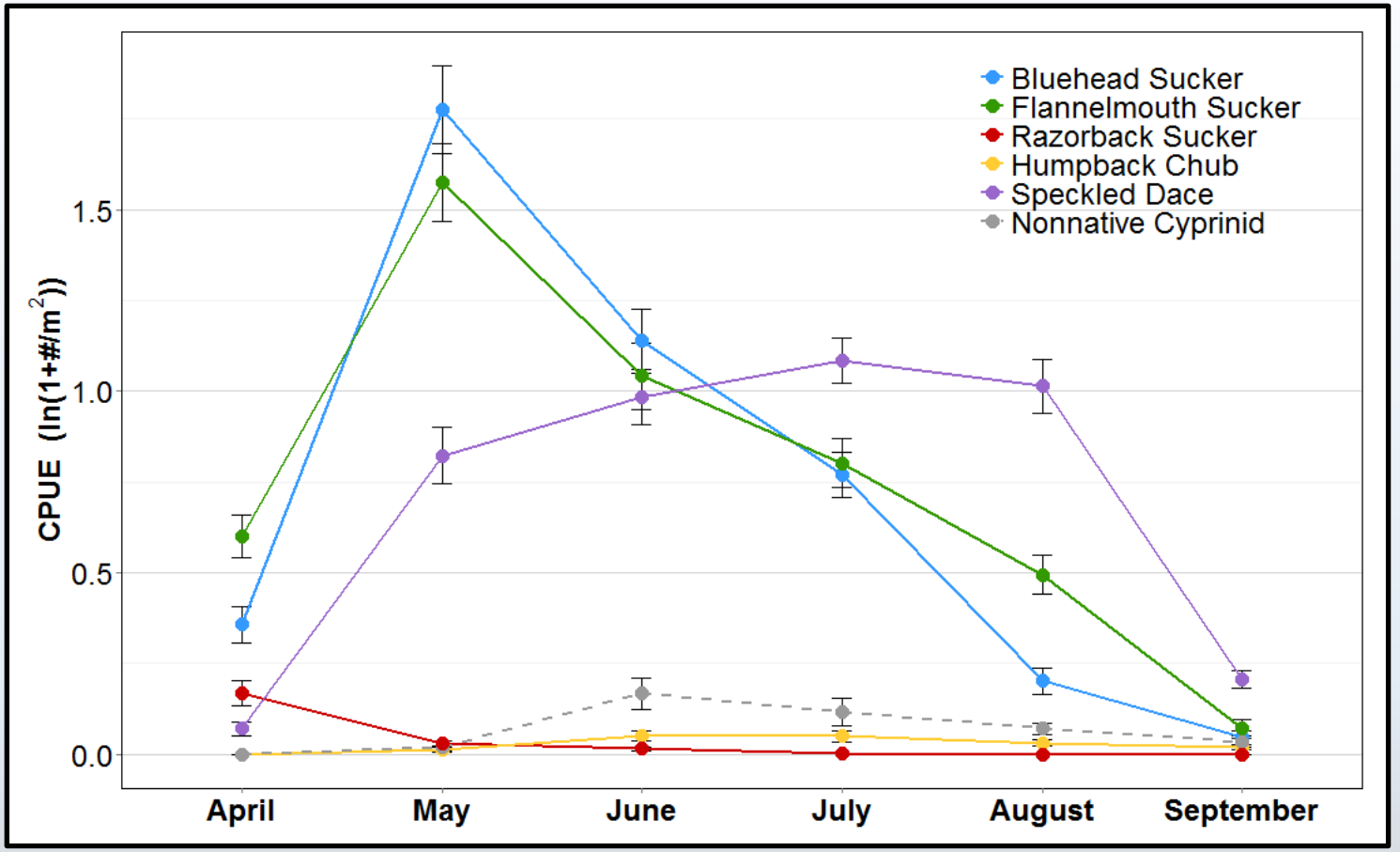
Humpback Chub Lengths



Native vs Non Native CPUE

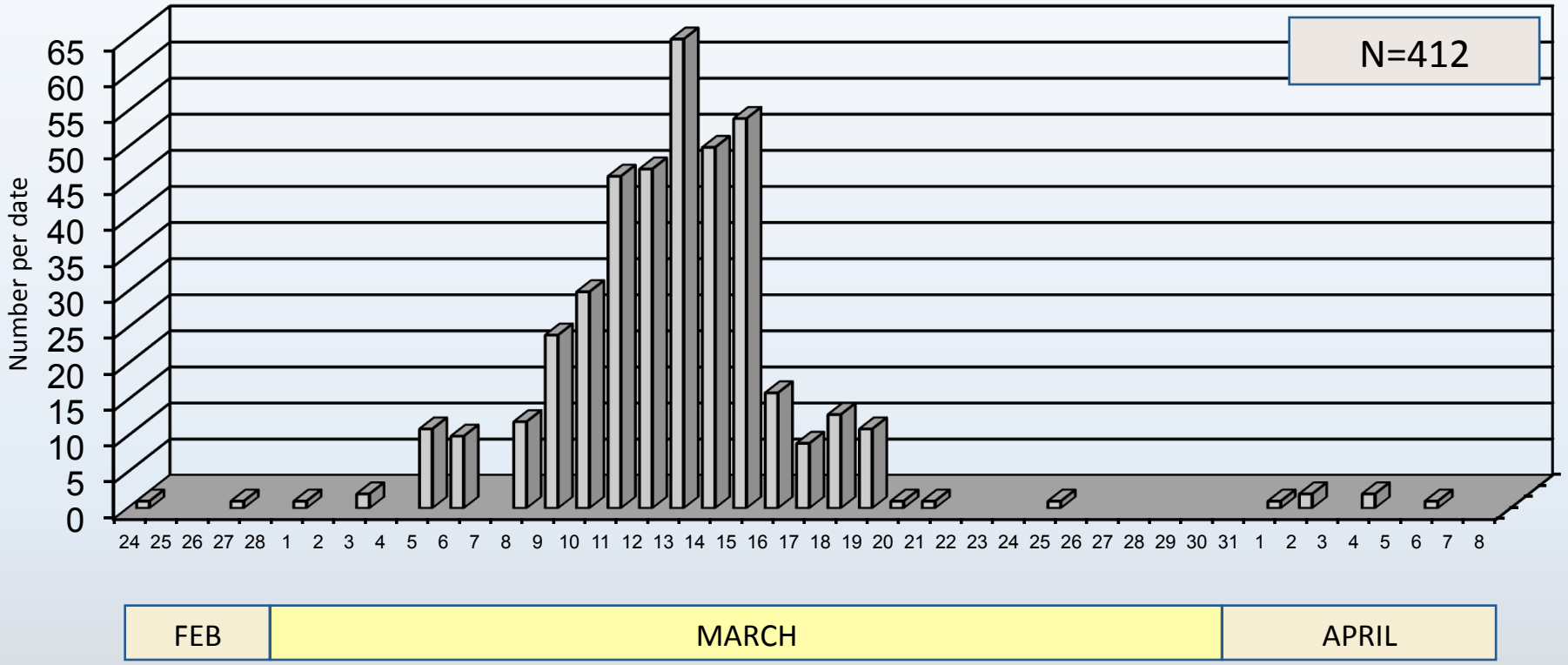


Monthly CPUE



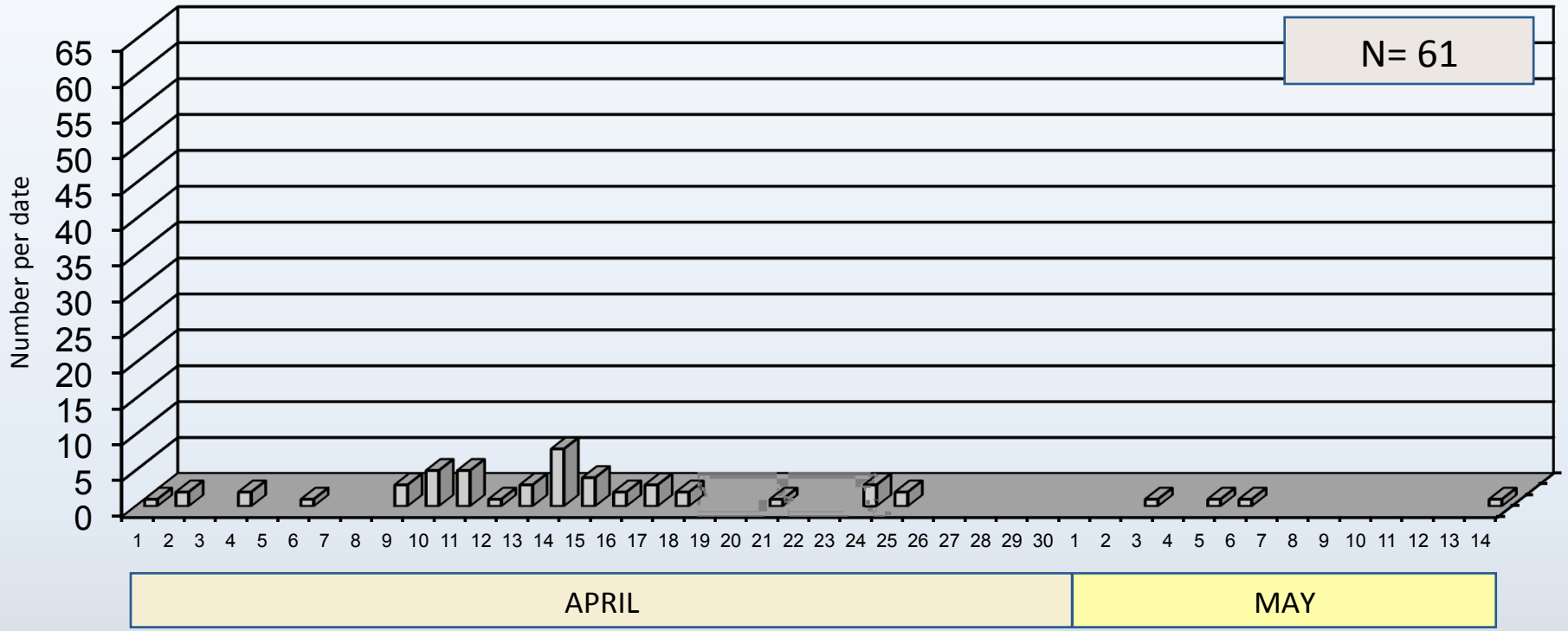
Spawning dates of Razorback Sucker

24 February - 6 April 2014

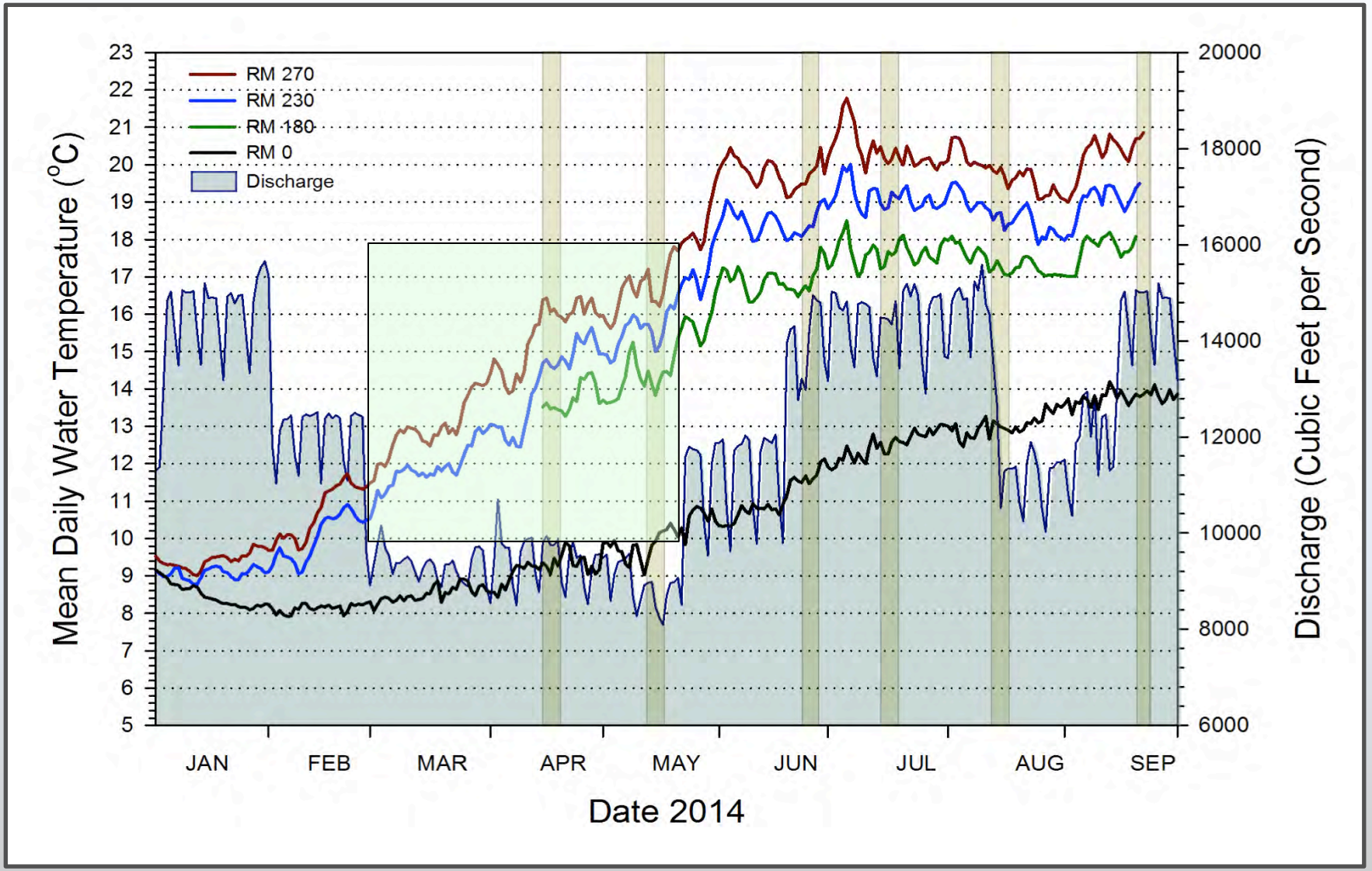


Spawning dates of Razorback Sucker

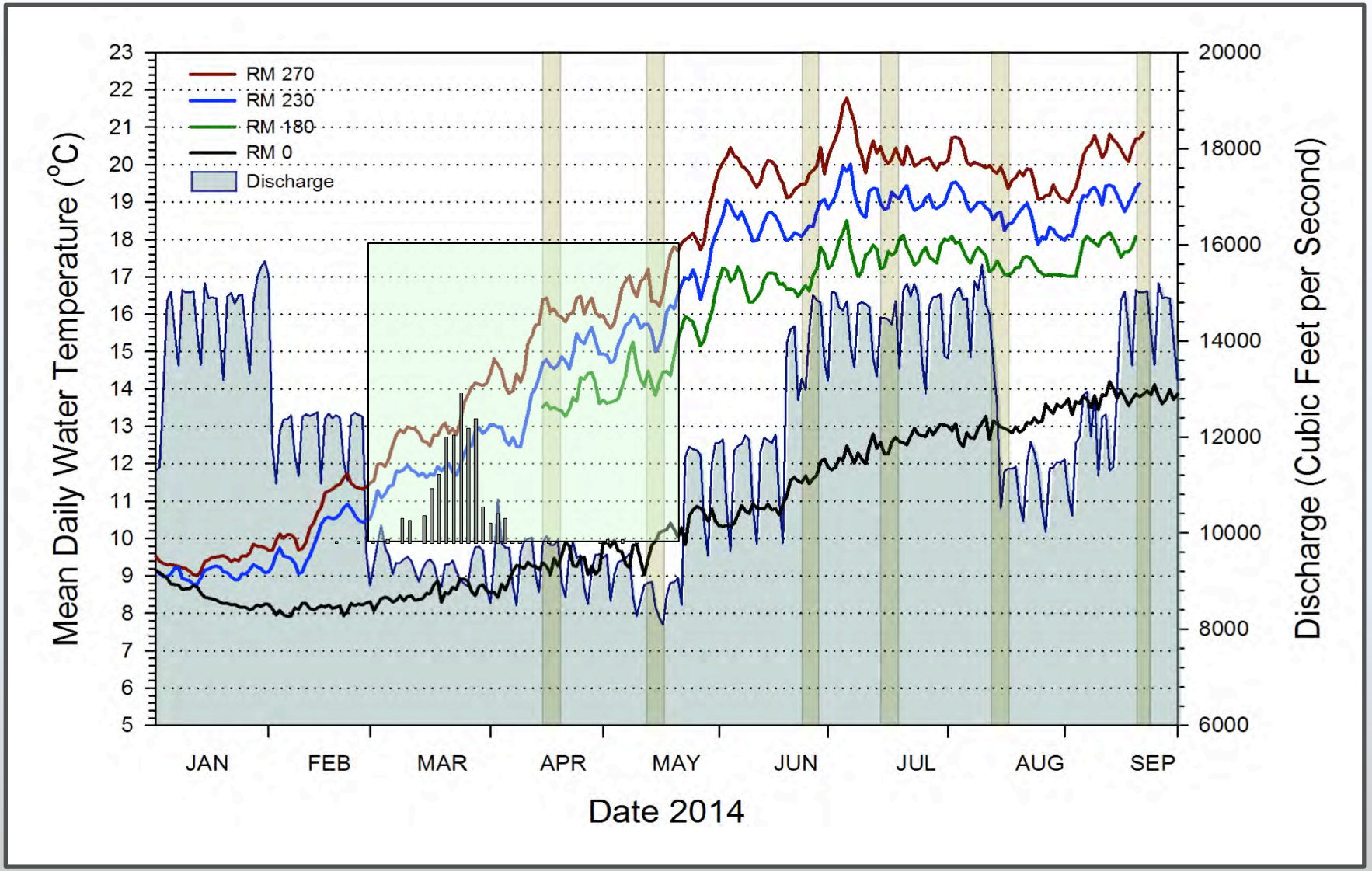
1 April - 14 May 2014



Discharge & Water Temperature



Discharge & Water Temperature



Conclusions

Razorback Sucker

- Larval Razorback Sucker present through study area from Lava Falls to Pearce Ferry
- Spawning occurring above Lava Falls
- Razorback Sucker present at 32 of 50 sites
- April distribution skewed downstream
- Spawning had begun prior to first (April) sampling effort

Conclusions

Humpback Chub

- Humpback Chub present through study area from Lava Falls to upstream of Pearce Ferry
- Humpback Chub present at 27 of 50 sites
- Distribution increased monthly
- Present in samples throughout study period

Recommendations

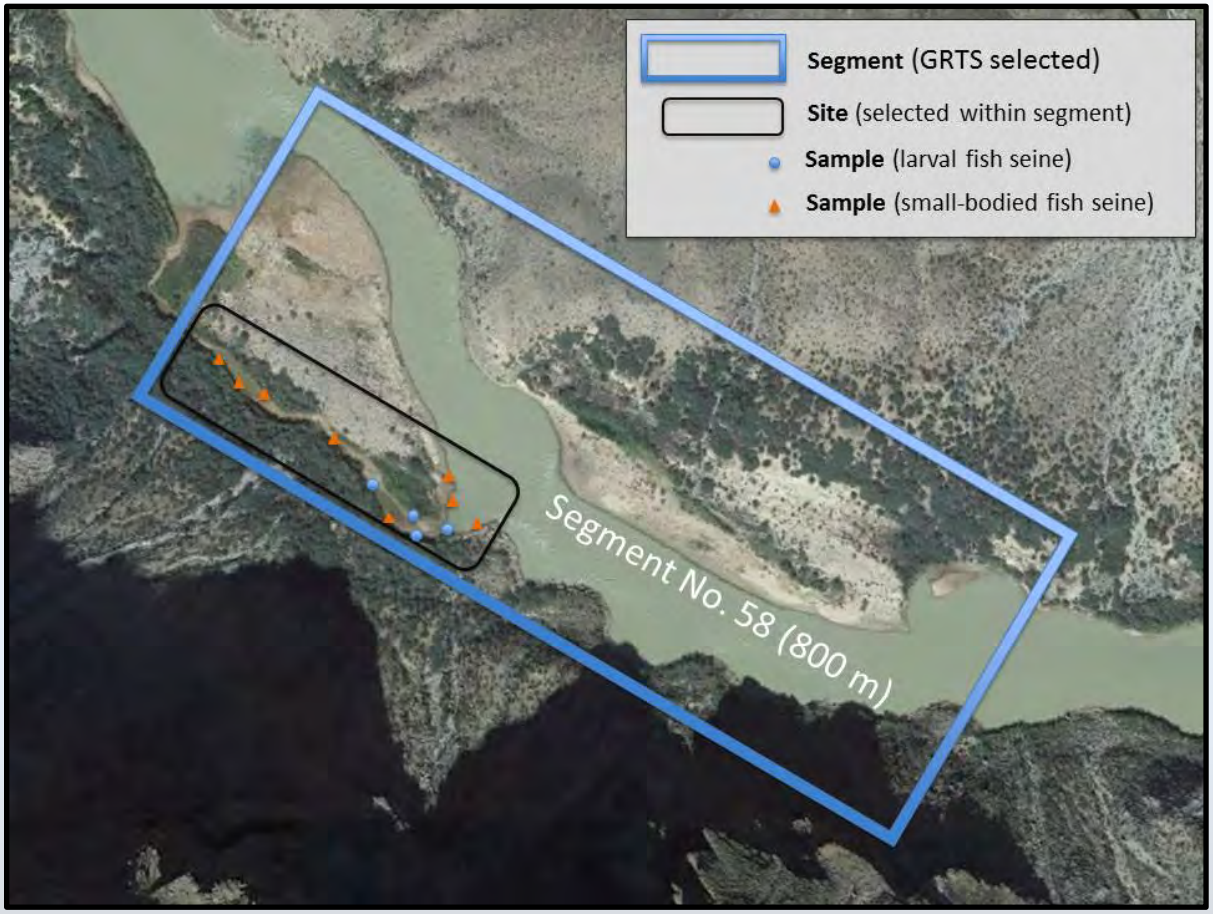
1) Continue monitoring the CRI under current methods including sonic-tagging wild Razorbacks, as needed
2) More frequent sampling from Separation to the CRI during lake sampling events, particularly for adults
3) Continue small-bodied and larval fish sampling within the LGC
4) Maintain telemetry efforts with SURs and release sonic fish as needed, within the LGC
5) Explore the use of dual functioning (acoustic/RF) tags for implantation
6) Discuss options for determining extent of spawning
7) Need for a comprehensive report detailing and analyzing Razorback Sucker data from Lake Mead and the LGC to date.

Recommendations

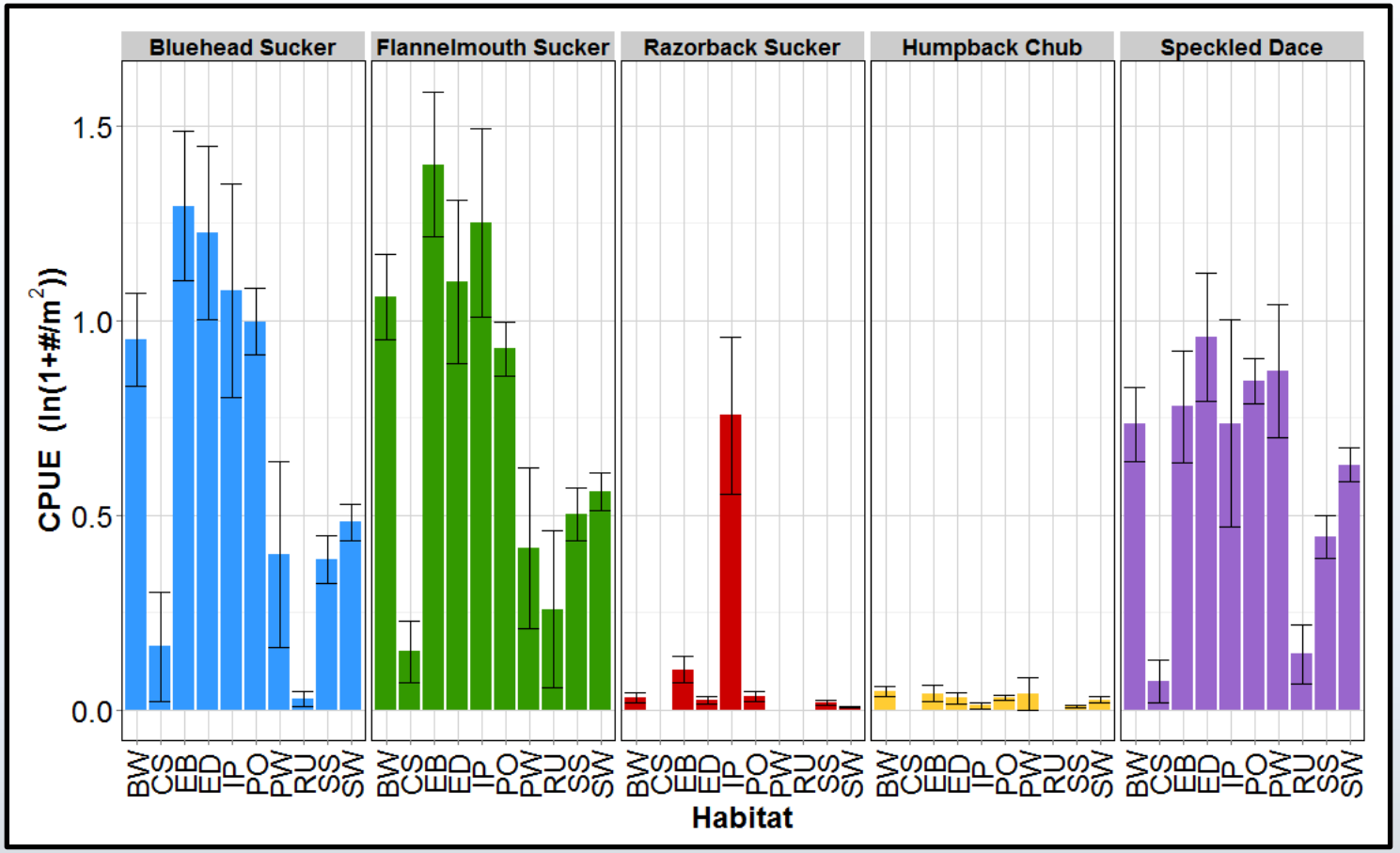
3) Continue small-bodied and larval fish sampling within the LGC
   A. *Consider spatial (upstream) and temporal (earlier) expansion of larval study*

5) Discuss options for determining extent of spawning
   A. *Age larval fish using otoliths*
   B. *Determine spawning dates*
   C. *Correlate with flow and water temperature*

GRTS


Segment (GRTS selected)
Site (selected within segment)
Sample (larval fish seine)
Sample (small-bodied fish seine)
Segment No. 58 (800 m)

Habitat Use


Bluehead Sucker
Flannelmouth Sucker
Razorback Sucker
Humpback Chub
Speckled Dace
CPUE (ln(1+#/m2))
1.5
1.0
0.5
0.0
BW
CS
EB
ED
IP
PO
PW
RU
SS
SW
Habitat