# USFWS Activity Update
# June 2018

Kirk Young, David Van Haverbeke, Dennis Stone, Mike Pillow, Chad Baumler – USFWS; Mike Dodrill -USGS

- LCR
  - HBC Annual Abundances
  - Translocations
  - LCR AIS Surveillance
- Mainstem
  - HBC Aggregations
  - WGC

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## Mark-Recapture and Fish Monitoring Activities in the Little Colorado River in Grand Canyon from 2000 to 2017

David R. Van Haverbeke, Kirk L. Young, Dennis M. Stone, Michael J. Pillow, and Chad E. Baumler

U.S. Fish and Wildlife Document: USFWS-AZFWCO-FL-18-04

USGS Interagency Acquisition: G17PG00059

Submitted to USGS Grand Canyon Monitoring and Research Center 31 January 2018.



## Spring 2017 Monitoring of Humpback Chub (*Gila cypha*) and other Fishes in the Lower 13.57 km of the Little Colorado River, Arizona

Trip Report for:

April 18-28
and
June 9-16, 2017

Prepared for:
U.S. Geological Survey
Grand Canyon Monitoring and Research Center
Flagstaff, Arizona

by

Michael J. Pillow

U.S. Fish and Wildlife Service
Arizona Fish and Wildlife Conservation Office
Flagstaff, Arizona

July 2017

Interagency Acquisition No. G17PG00059

Document No. USFWS-AZFWCO-17-07

## Aquatic Invasive Species Surveillance in the Little Colorado River Basin during 2017

**Final Report for 2017 Surveys**

Prepared for:
U.S. Geological Survey
Grand Canyon Monitoring and Research Center
Flagstaff, Arizona

by

Dennis M. Stone, Kirk L. Young, Chad E. Baumler,
Michael J. Pillow, and David Van Haverbeke

U.S. Fish and Wildlife Service
Arizona Fish and Wildlife Conservation Office
Flagstaff, Arizona

January 2018

Interagency Acquisition No. G17PG00059
Document No. USFWS-AZFWCO-18-03

## Monitoring Humpback Chub in the Colorado River, Grand Canyon

August 19 – September 4, 2017

Submitted to:
USGS Grand Canyon Monitoring and Research Center
Flagstaff, Arizona

By:
Michael J. Pillow, David R. Van Haverbeke, and Kirk L. Young
U.S. Fish and Wildlife Service
Arizona Fish and Wildlife Conservation Office
Flagstaff, Arizona

March 2018

USFWS Document No. USFWS-AZFWCO-18-05

## Spring 2017 Monitoring of Humpback Chub (*Gila cypl*
## and other Fishes above Lower Atomizer Falls in the Little Colorado River, Arizona

Trip Report for June 9-15, 2017

Prepared for:
U.S. Geological Survey
Grand Canyon Monitoring and Research Center
Flagstaff, Arizona

by

Dennis M. Stone

U.S. Fish and Wildlife Service
Arizona Fish and Wildlife Conservation Office
Flagstaff, Arizona

July 2017

## Fall 2017 Monitoring of Humpback Chub (*Gila cypha*) and other Fishes in the Lower 13.57 km of the Little Colorado River, Arizona

TRIP REPORT
for
Sep. 19-28 and Oct. 17-26, 2017

Prepared for:
U.S. Geological Survey
Grand Canyon Monitoring and Research Center
Flagstaff, Arizona

by

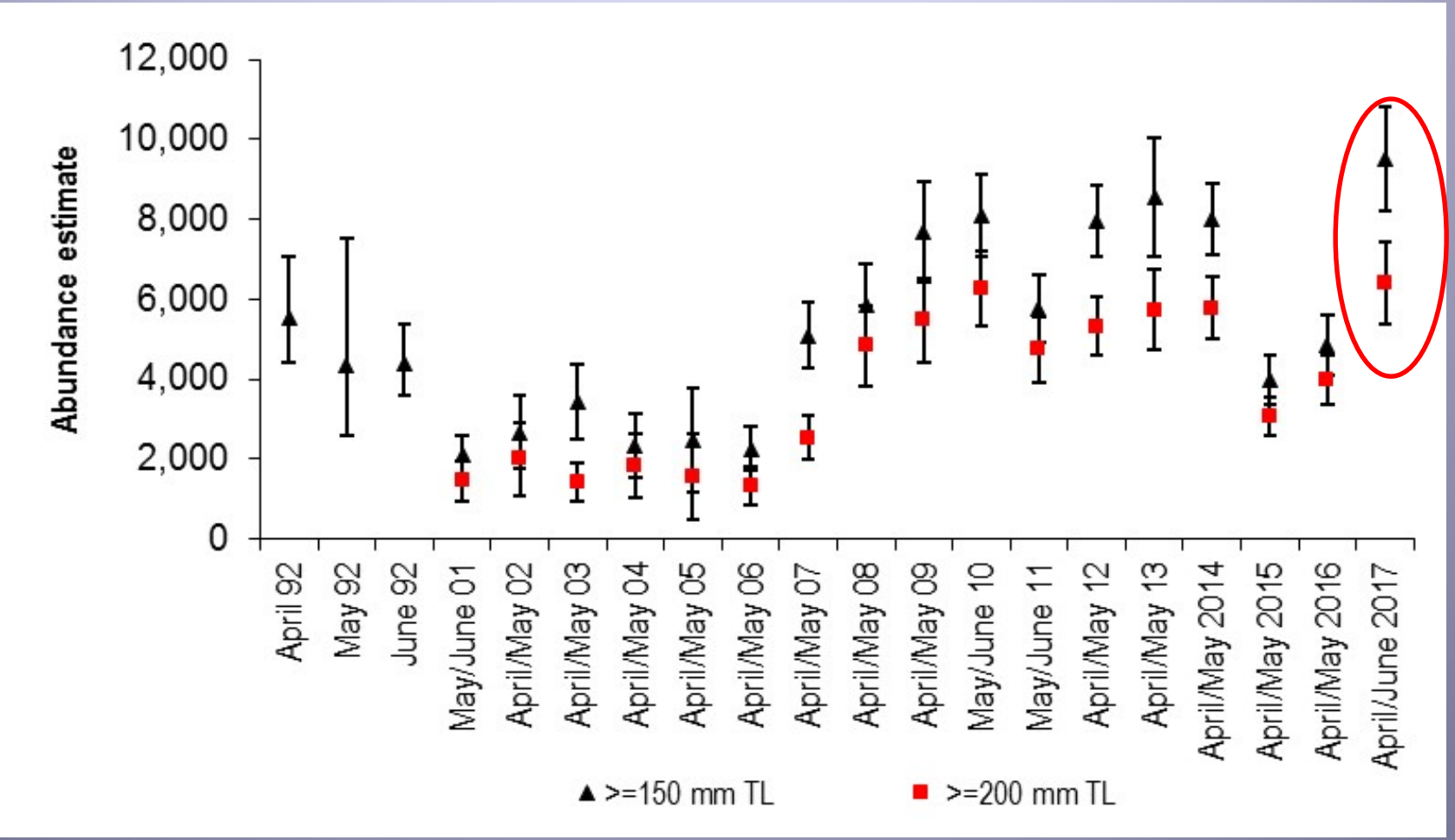
Dennis M. Stone

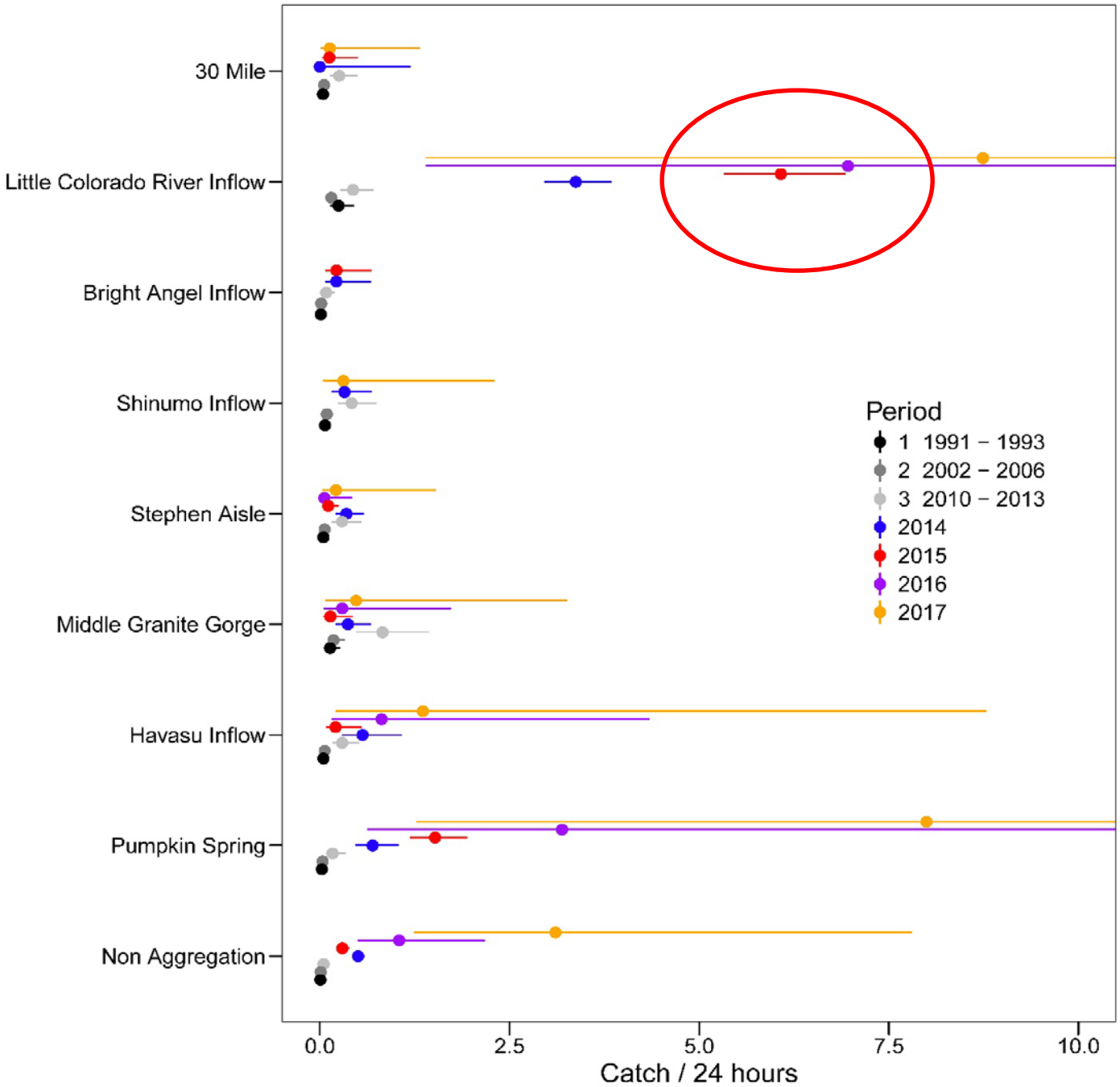
U.S. Fish and Wildlife Service
Arizona Fish and Wildlife Conservation Office
Flagstaff, Arizona

November 2017

# LCR - HBC

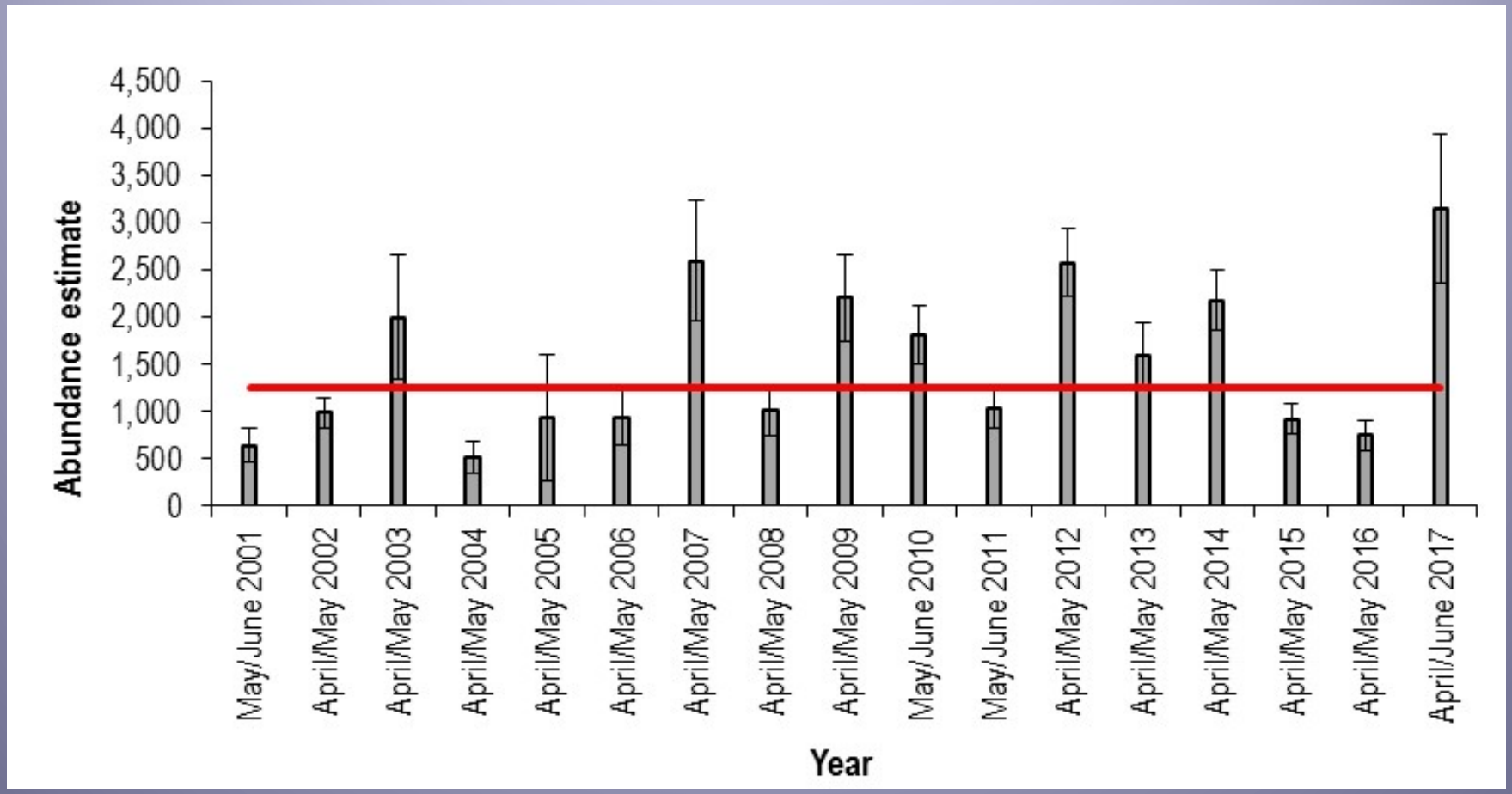
# Annual spring abundances of Humpback Chub ≥150 mm and ≥200 mm in lower 13.6 km of LCR



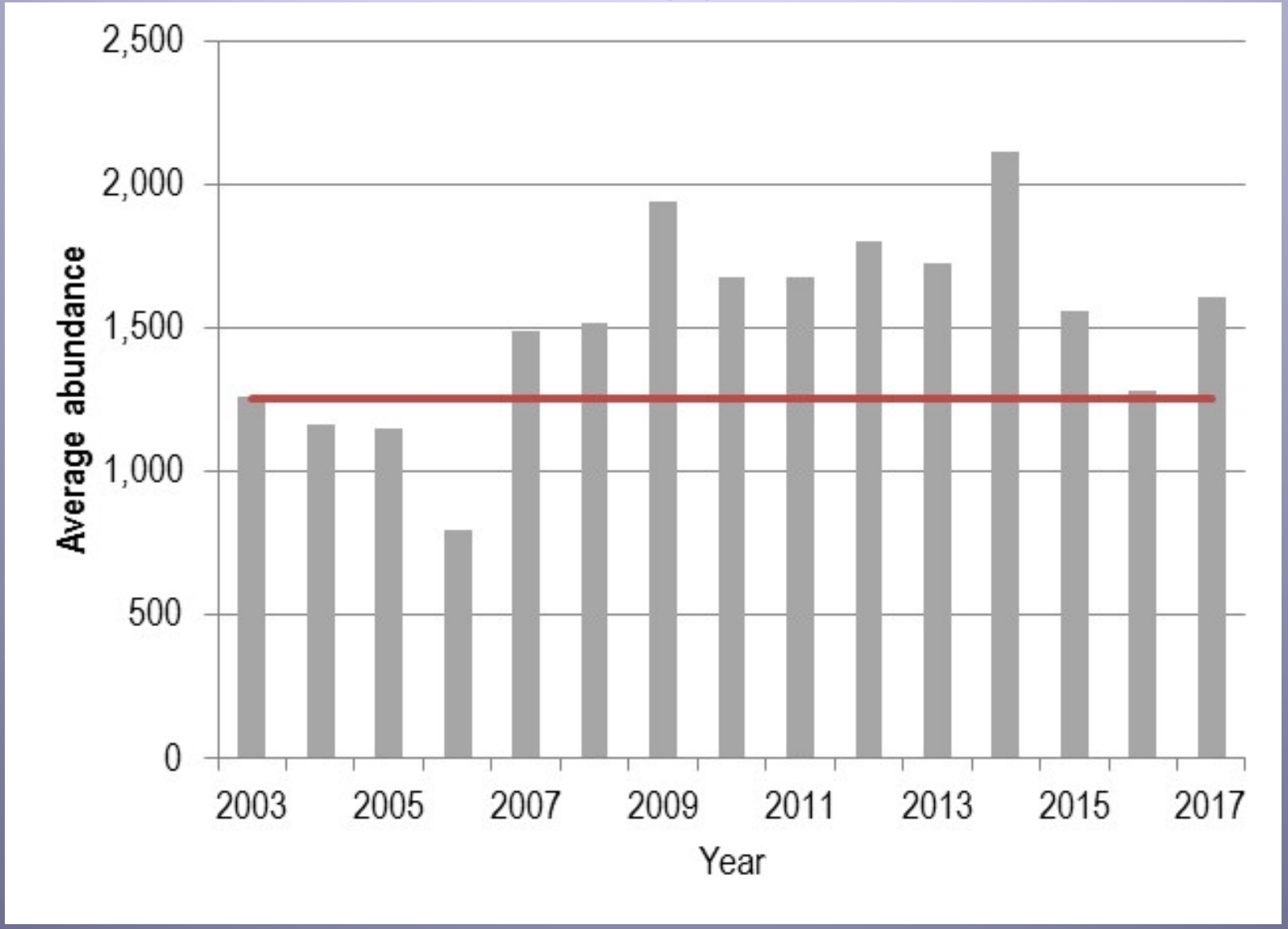



*Preliminary data; do not cite*

# Annual spring abundances of Humpback Chub 150-199 mm (Sub adults) in lower 13.6 km of LCR



# Are we above the new 3 year rolling average HBC Action trigger this year?



# LCR Summary

- Spring 2015 and 2016 saw a significant apparent decline in the number of sub-adult and adult Humpback Chub in the Little Colorado River, but then recovered in 2017.
- There is evidence that a higher proportion of sub-adult and adult chub remained in the mainstem (and outside of the LCR) during 2015 and 2016, which may have led to an apparent “decline” in the LCR spring spawning abundance during those years.
- No HBC action trigger this year, unlikely next year.

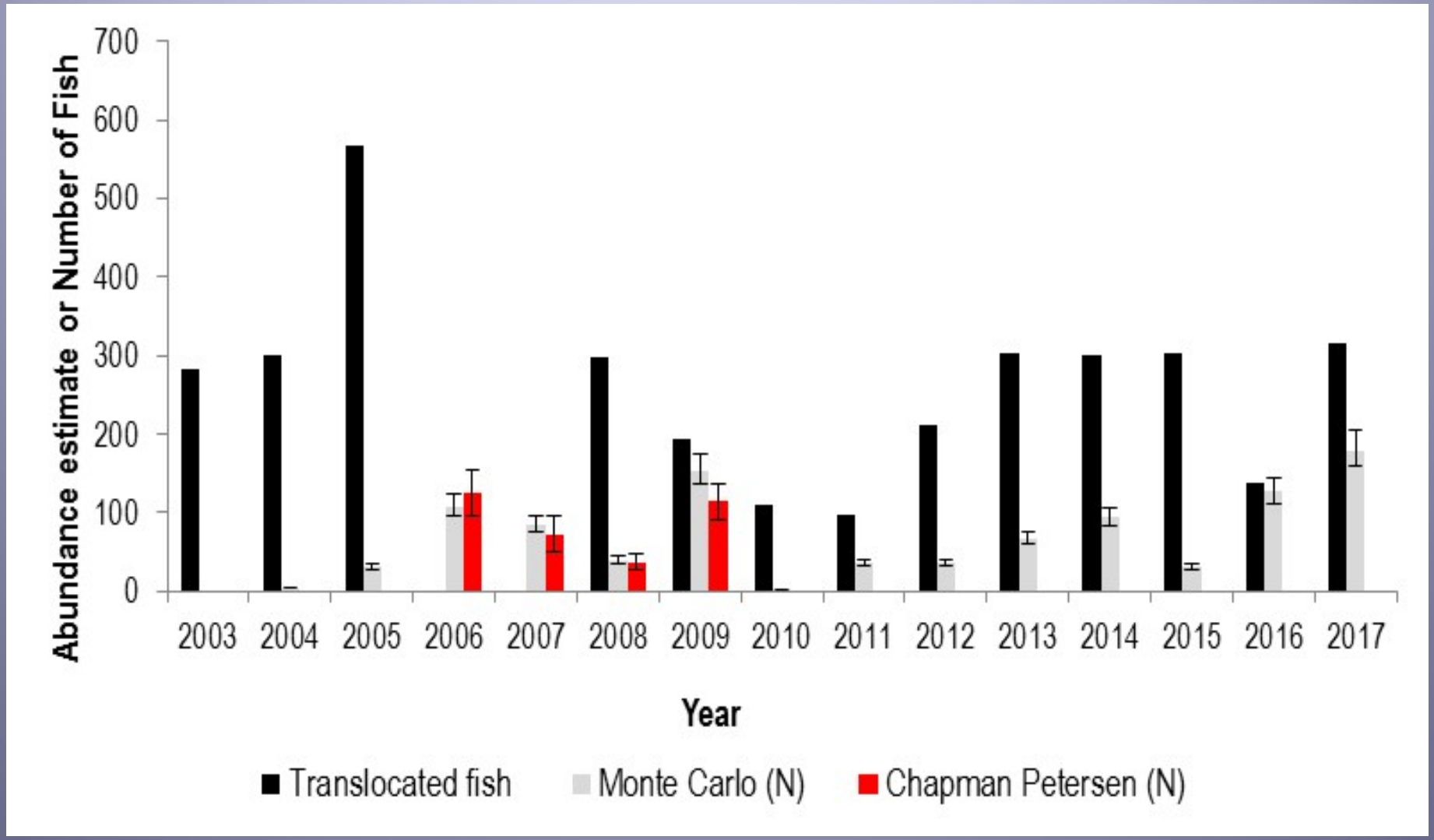
# Translocations

# Numbers and sizes of Humpback Chub collected from the Little Colorado River for translocations (2003-2017)

| Date | Chute Falls * | Size (mm) | SNARRC | Shinumo | Havasu | Size (mm) | Total | Capture Location | Capture Location (km) | Tag |
|---|---|---|---|---|---|---|---|---|---|---|
| 8/1/03 | 283 | 50-100 | | | | | 283 | Boulders | ~1.15-3.15 | VIE |
| 7/30/04 | 299 | 50-100 | | | | | 299 | Boulders | ~1.15-3.16 | VIE |
| 7/29/05 | 567 | 50-100 | | | | | 567 | Boulders | ~1.15-3.17 | VIE |
| 7/22/08 | 299 | ~80-130 | | 207 | | <80 | 506 | Boulders | ~1.15-3.18 | PIT |
| 10/13/08 | | | 300 | 100 | | <130 | 400 | Boulders | ~1.15-3.18 | |
| 7/24/09 | 194 | ~80-130 | 205 | 83 | | <80 | 482 | Boulders | ~1.15-3.18 | PIT |
| 10/10/09 | | | | 238 | | <130 | 238 | Coyote | ~7.56--9.85 | |
| 7/16/10 | 108 | ~80-130 | 175 | | | <80 | 283 | Boulders | ~1.15-3.18 | PIT |
| 11/5/10 | | | | 300 | 300 | <80 | 600 | Coyote | ~7.56--9.85 | |
| 11/9/11 | 96 | ~80-130 | 200 | | 300 | <80 | 596 | Coyote | ~7.56--9.85 | PIT |
| 7/12/12 | 212 | ~80-130 | 202 | 200 | 300 | <80 | 914 | Coyote | ~7.56--9.85 | PIT |
| 5/24/13 | | | | 73 | | <30 | 73 | Boulders | ~1.15-3.18 | |
| 7/11/13 | | | | 99 | | <80 | 99 | Coyote | ~7.56-9.85 | |
| 11/7/13 | 303 | ~80-130 | | 11 | 300 | <130 | 614 | Coyote | ~7.56-9.85 | PIT |
| 5/1/14 | | | | | 660 | <30 | 660 | Riverwide | 0-13.57? | |
| 10/31/14 | 305 | 65-137 | | | | <130 | 305 | Coyote | ~7.56-9.85 | PIT |
| 5/28/15 | | | | | 315 | <30 | 315 | Riverwide | | |
| 11/1/15 | 303 | | | | | | 303 | Coyote | ~7.56-9.85 | PIT |
| 10/27/16 | 137 | 58-146 | | | | | 137 | Coyote | ~7.56-9.85 | PIT |
| 6/16/17 | | | 139 | | | <40 | | Riverwide | | |
| 10/26/17 | 315 | 66-120 | | | | | 315 | Coyote | | PIT |
| Totals | 3,421 | | 1,082 | 1,311 | 2,175 | | 7,989 | | | |

*Preliminary data; do not cite*

# Above Chute Falls - Number of juveniles Humpback Chub translocated (black) and adult abundances (red & grey)



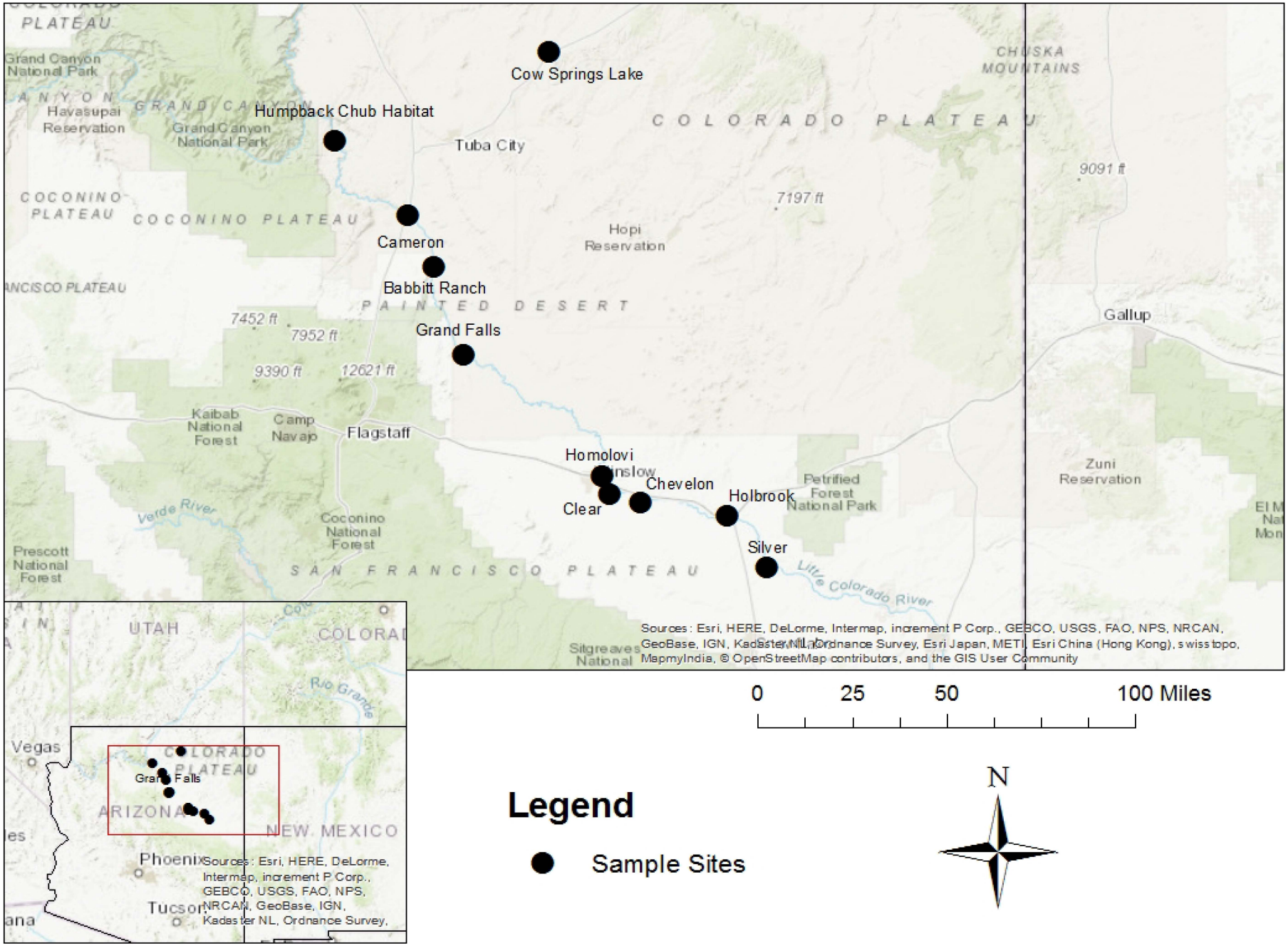

*Preliminary data; do not cite*

# Summary

- Higher growth rates and increased survival appear to be a result of translocating fish to above Chute Falls.
- Environmental stochasticity (floods/loss of habitat) may be one factor ultimately precluding permanent colonization of Humpback Chub above Chute Falls.
- Detailed analysis of Chute Falls effort is underway USGS/USFWS.

# LCR AIS Surveilance

| Basin | Upper LCR | Silver | Puerco | Chevelon | Clear | Jack's | Total |
|---|---|---|---|---|---|---|---|
| Drainage Area ($mi^2$) | 8100 | 924 | 3015 | 800 | 600 | 325 | 13764 |
| Number of Stockponds | 2000 | 762 | 205 | 417 | 147 | 192 | 3723 |
| Number of Reservoirs | 51 | 33 | 0 | 4 | 4 | 3 | 95 |


Cow Springs Lake
Humpback Chub Habitat
Tuba City
Cameron
Babbitt Ranch
Grand Falls
Hopi Reservation
Gallup
Homolovi
Winslow
Chevelon
Clear
Holbrook
Silver
Petrified Forest National Park
Zuni Reservation
Flagstaff
Camp Navajo
Kaibab National Forest
Coconino National Forest
Prescott National Forest
Havasupai Reservation
Grand Canyon National Park
COLORADO PLATEAU
COCONINO PLATEAU
PAINTED DESERT
SAN FRANCISCO PLATEAU
CHUSKA MOUNTAINS
Verde River
Little Colorado River
Rio Grande
9091 ft
7197 ft
7452 ft
7952 ft
9390 ft
12621 ft
UTAH
COLORADO
ARIZONA
NEW MEXICO
Vegas
Phoenix
Tucson
Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
0 25 50 100 Miles
Legend
Sample Sites
N

# Professionals seining - LCR outside of Holbrook

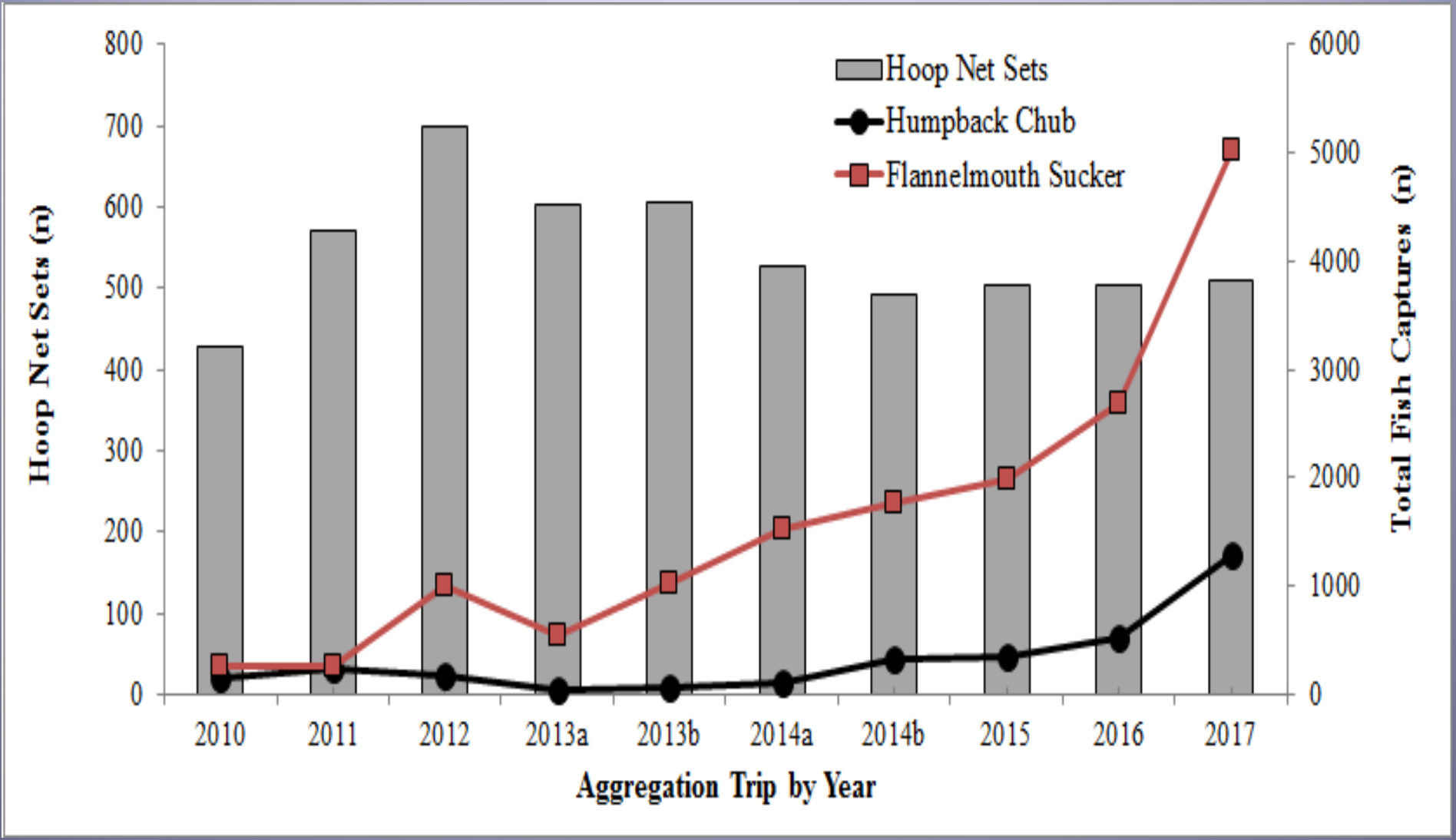
# LCR AIS Summary

- Back door wide open…
- 7,607 non-native fish captured (13 species), 74 crayfish and 410 tadpoles
- Black bullhead, bluegill, channel catfish, carp, fathead, killifish, green sunfish, white crappie, red shiner, largemouth bass, gizzard shad, smallmouth buffalo, and bigscale logperch
- 1 native - FMS

Bigscale Logperch

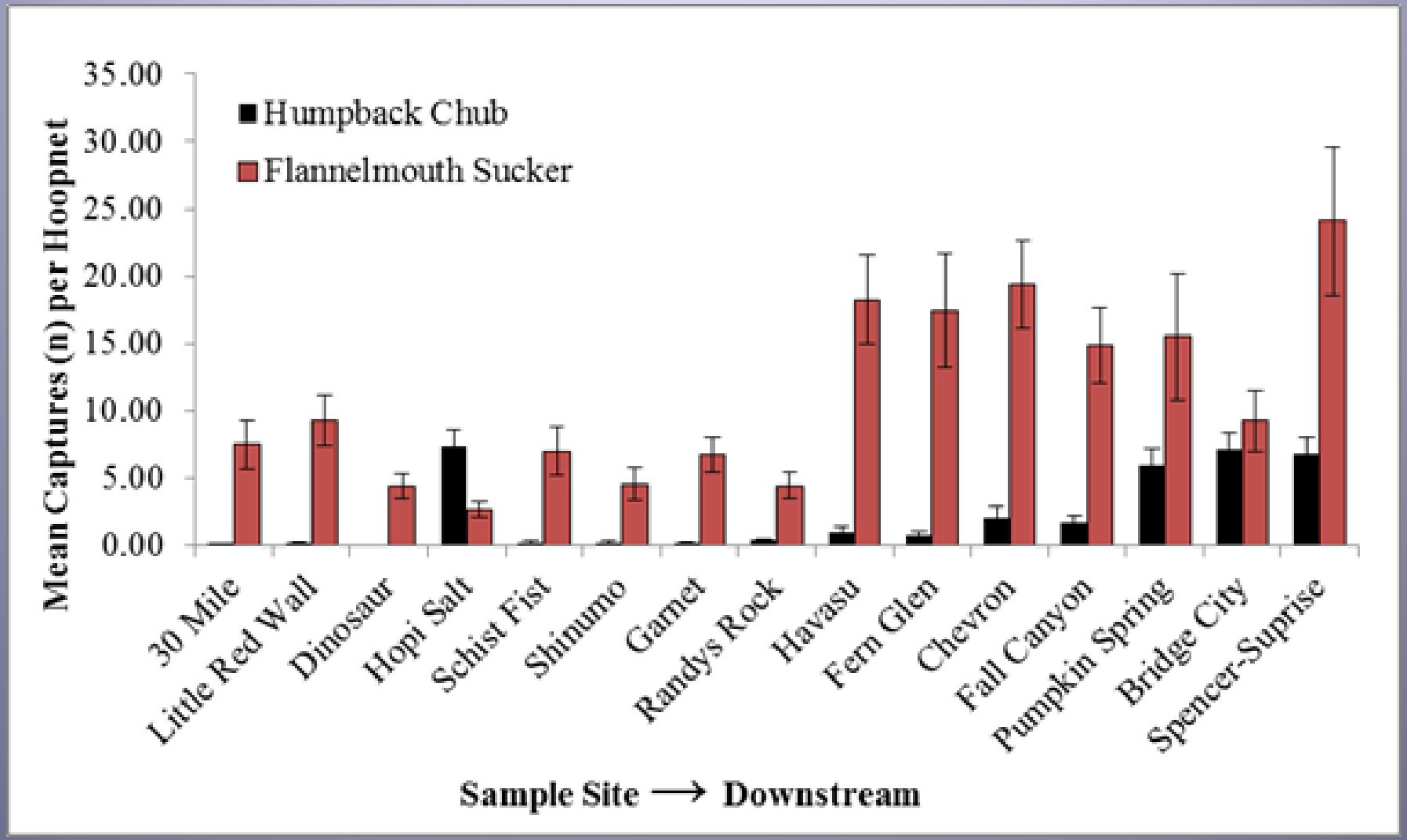
# Mainstem HBC

# Annual HBC and FMS Catch



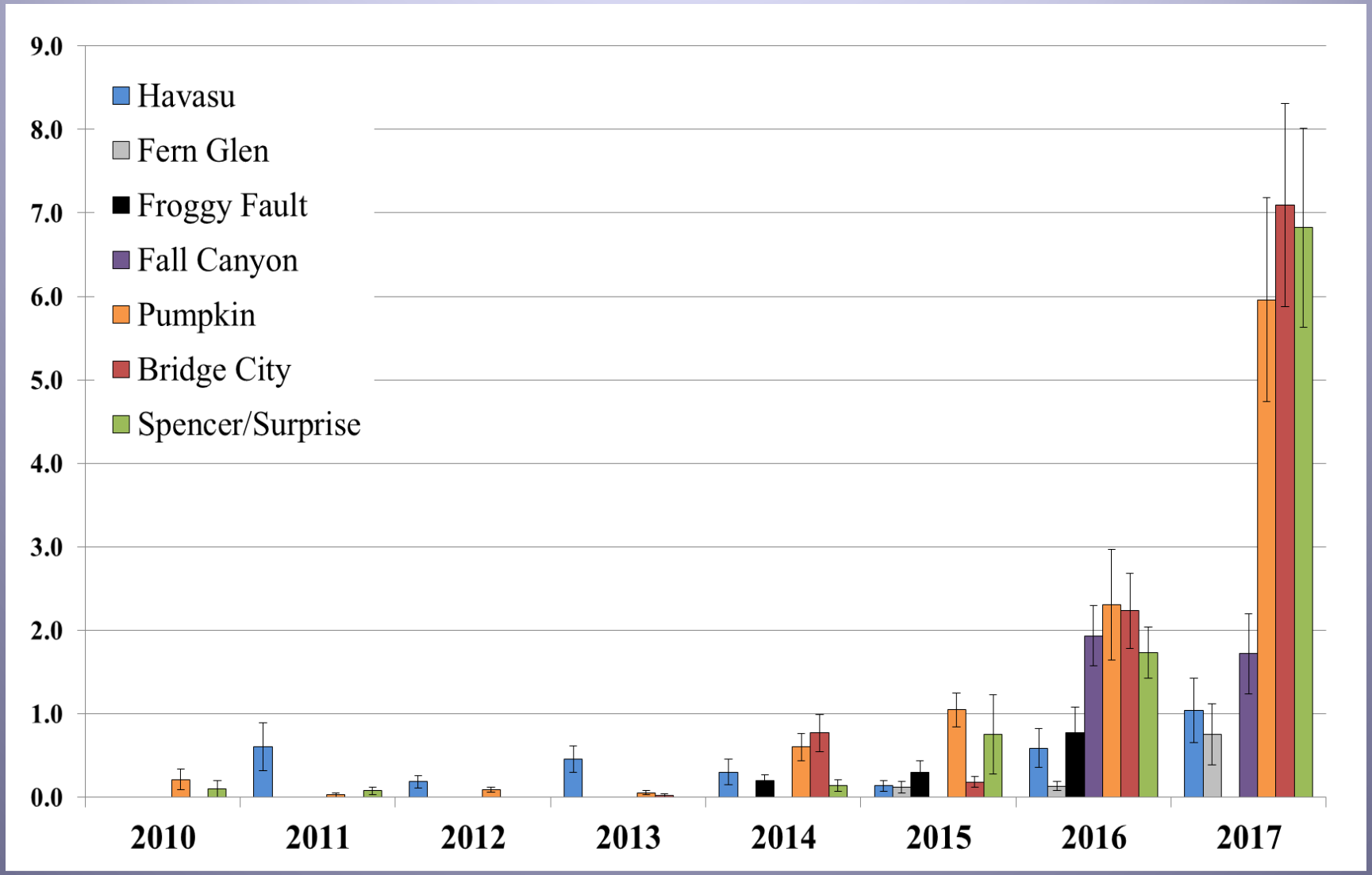

*Preliminary data; do not cite*

# 2017 Humpback Chub and Flannelmouth Sucker CPUE (Mean Captures per Hoop Net ± SE)



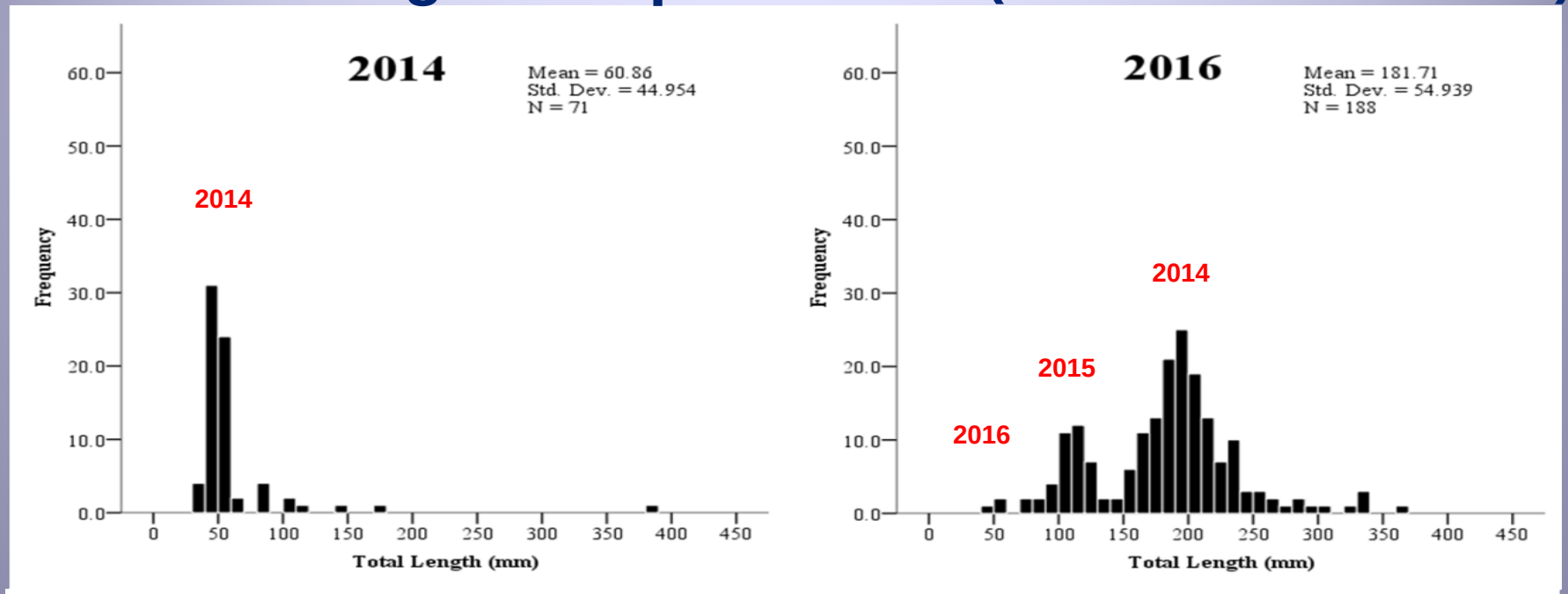

*Preliminary data; do not cite*

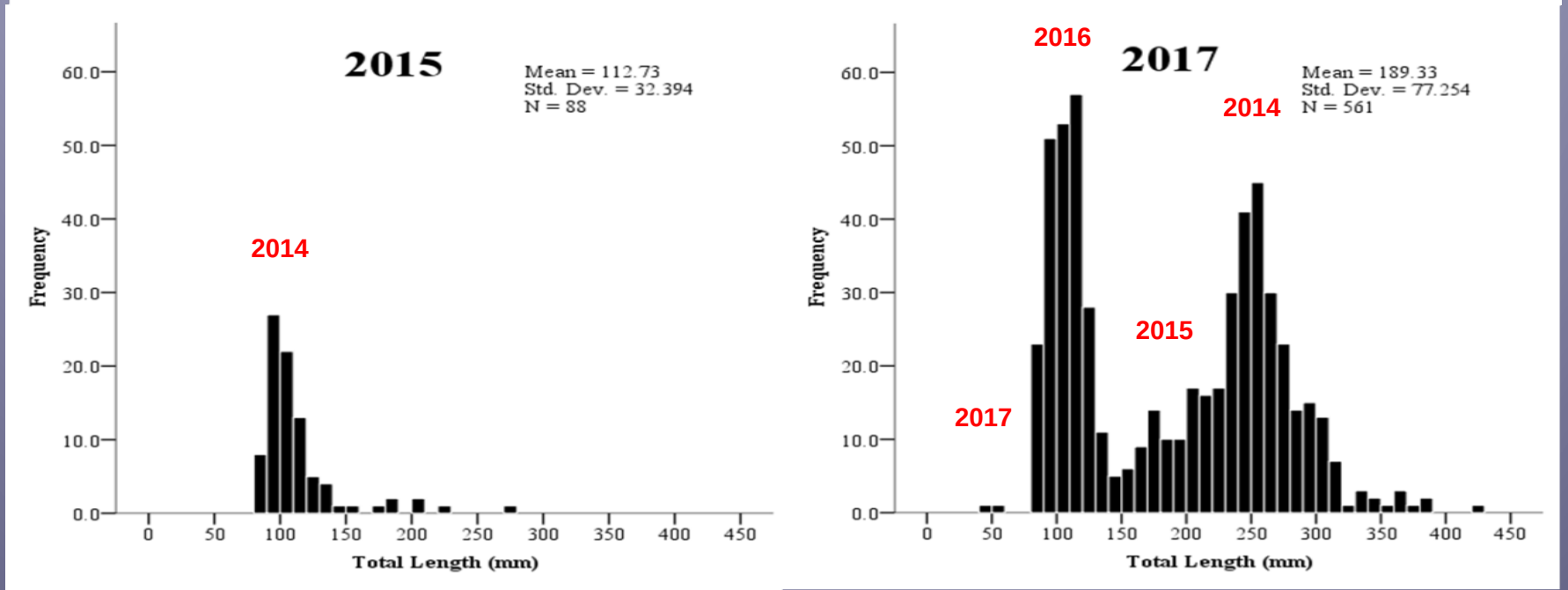
# *Western Grand Canyon* - Humpback Chub CPUE by Year (Mean Capture/Hoop Net ± SE)




*Preliminary data; do not cite*

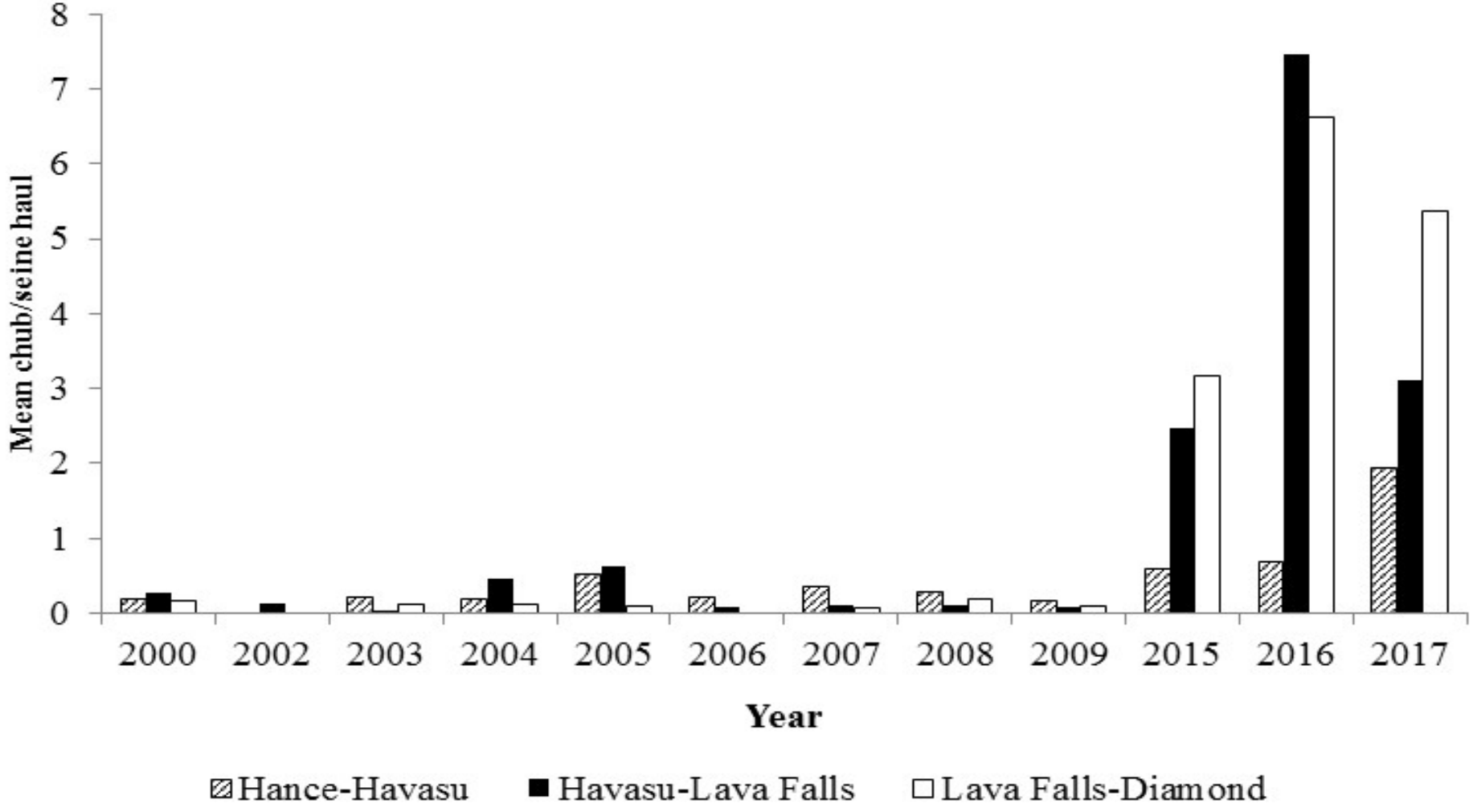
# WGC HBC Length Frequencies – (RM 212.5 – RM 249.5)




*Preliminary data; do not cite*

# Seining trends - 3 reaches 2000-2009 and 2015-2017




*Preliminary data; do not cite*

# Preliminary WGC HBC Pop. Estimates

- WGC Pumpkin (RM 210.19-213.76) 3.57 miles

  2800 ≥80 mm; 785/mile

  1,500 Adult HBC; 418/mile

* Much additional work needed to increase confidence…

*Preliminary data; do not cite*

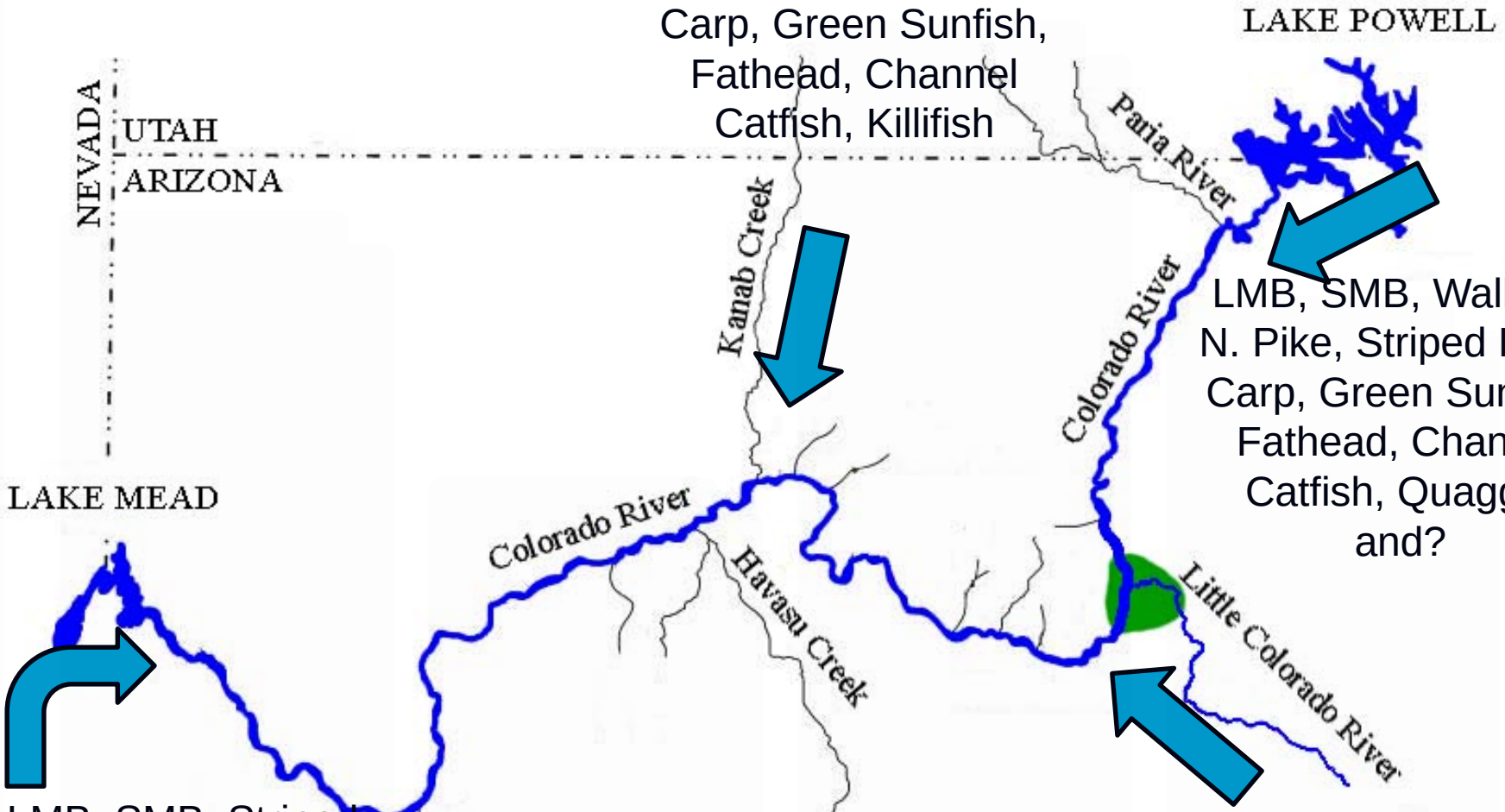
# Other Noteworthy

- **Ripe - egg expressive HBC @ Spencer Creek.**
- **Additional strong evidence for in-situ spawning and recruitment in WGC.**

*Preliminary data; do not cite*

# Mainstem Summary

- Overall - HBC and FMS CPUE is increasing, largely driven by increases in WGC
- Compelling evidence for in-situ WGC spawning & Recruitment




Carp, Green Sunfish, Fathead, Channel Catfish, Killifish

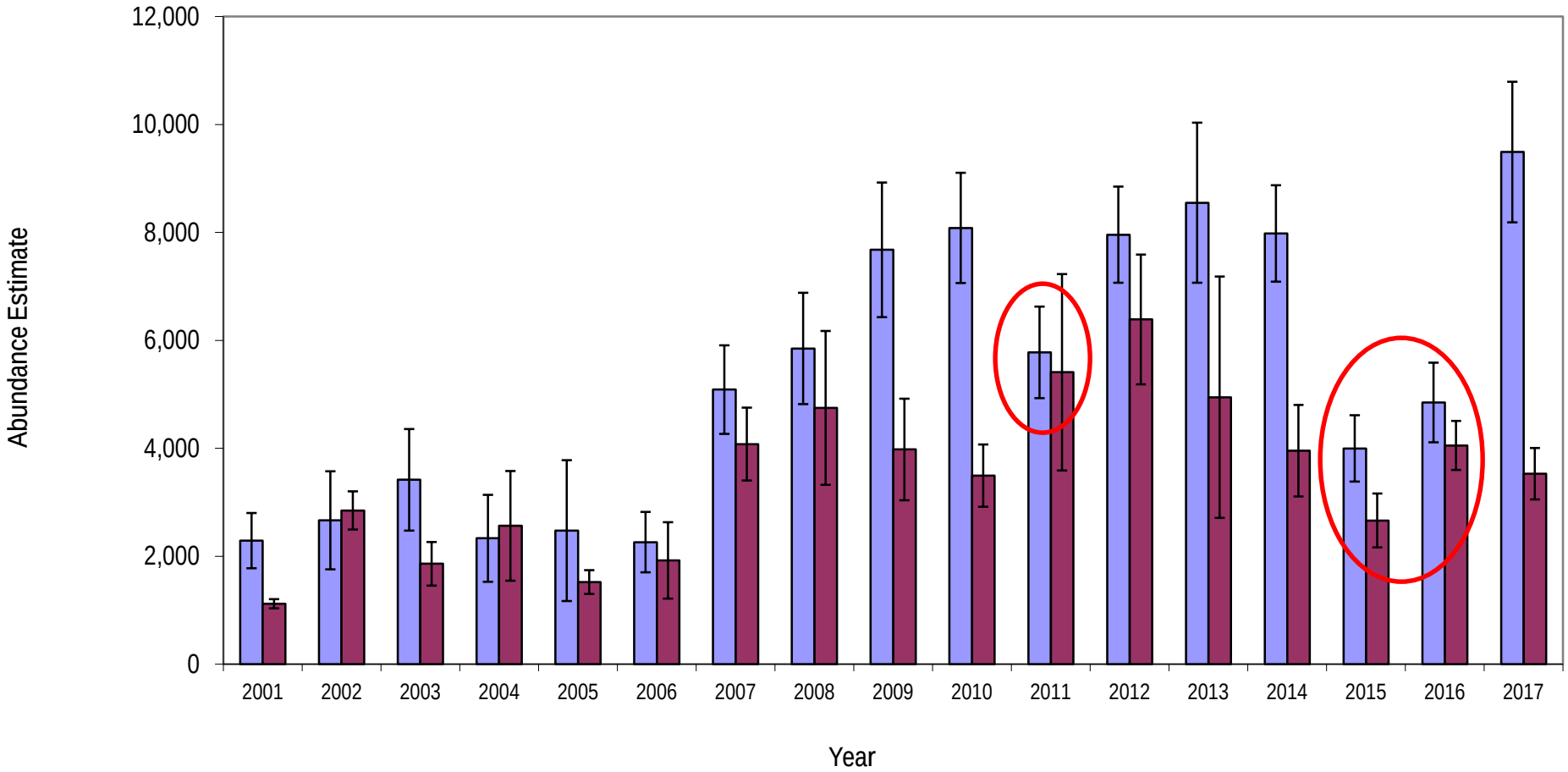
LMB, SMB, Walleye, N. Pike, Striped Bass, Carp, Green Sunfish, Fathead, Channel Catfish, Quagga, and?

LMB, SMB, Striped Bass, Carp, Tilapia Green Sunfish, Fathead, Channel Catfish, and?

Carp, Green Sunfish, Fathead, Channel Catfish, Killifish, Red Shiner, and?

# Thank You

# Comparison of HBC ≥ 150 mm abundances from spring and fall seasons

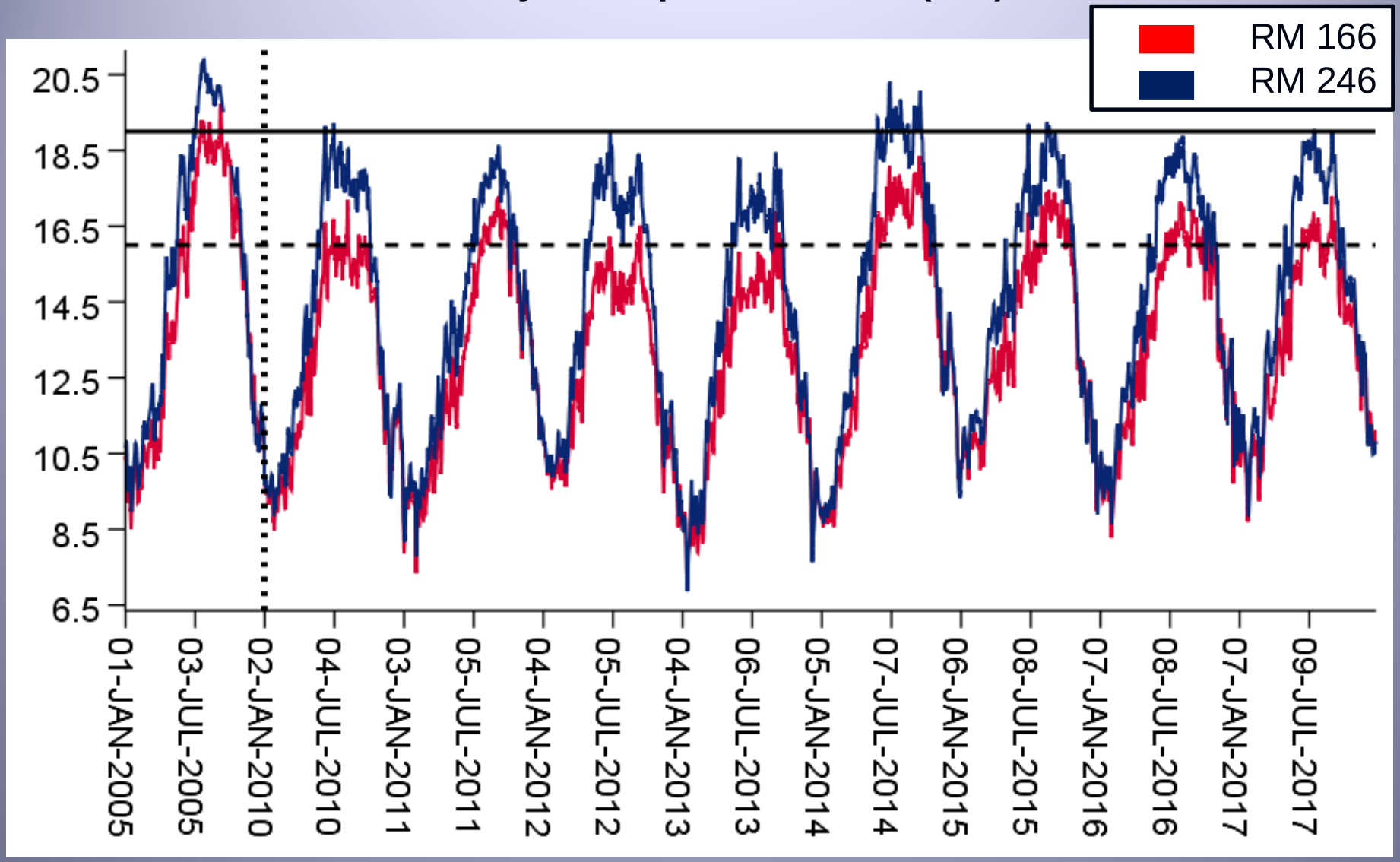



*Preliminary data; do not cite*

Spring HBC >= 150 mm

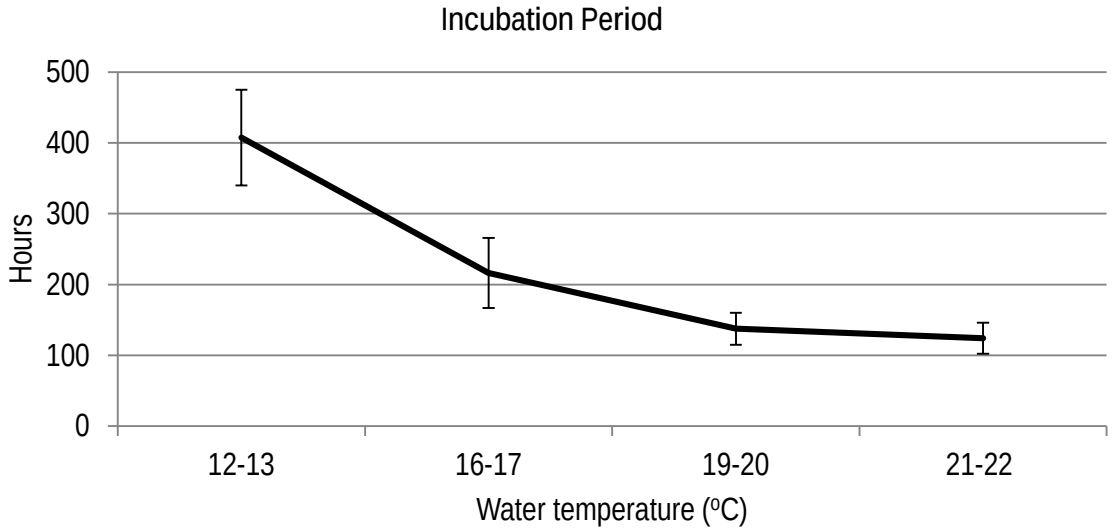
Fall HBC >= 150 mm

# Mean daily temperatures (ºC)

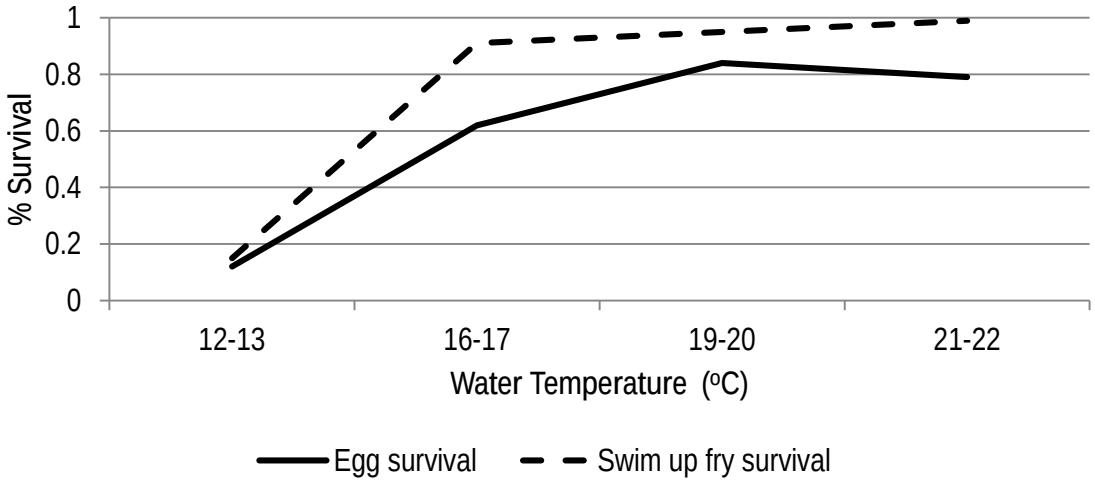



*Preliminary data; do not cite*

# Temperature (review)

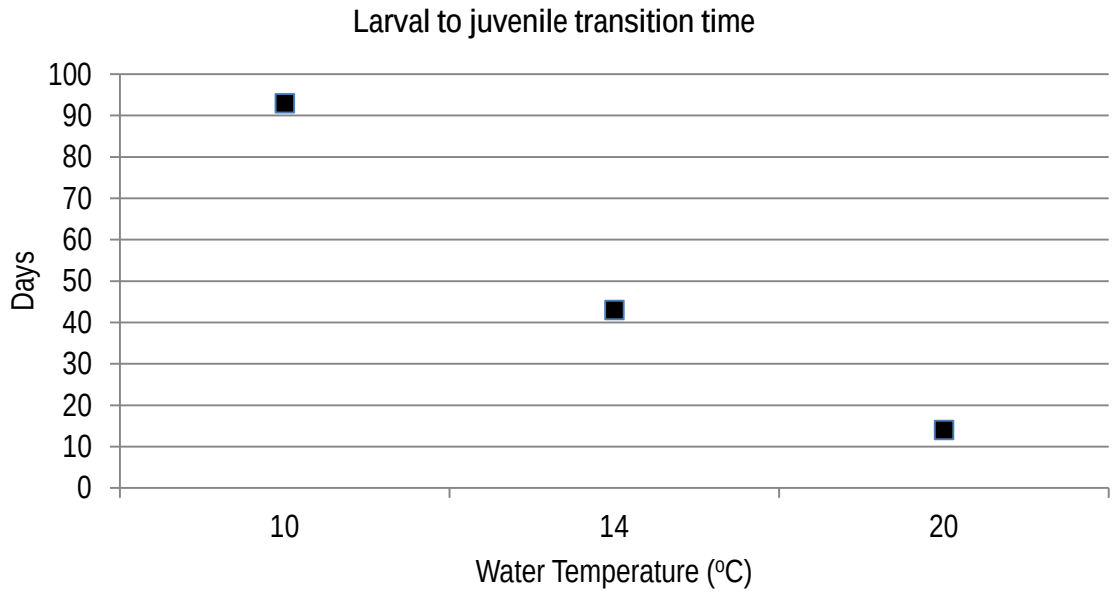



Incubation period of HBC in relation to water temperature (Hamman 1982). 16-8-5 days

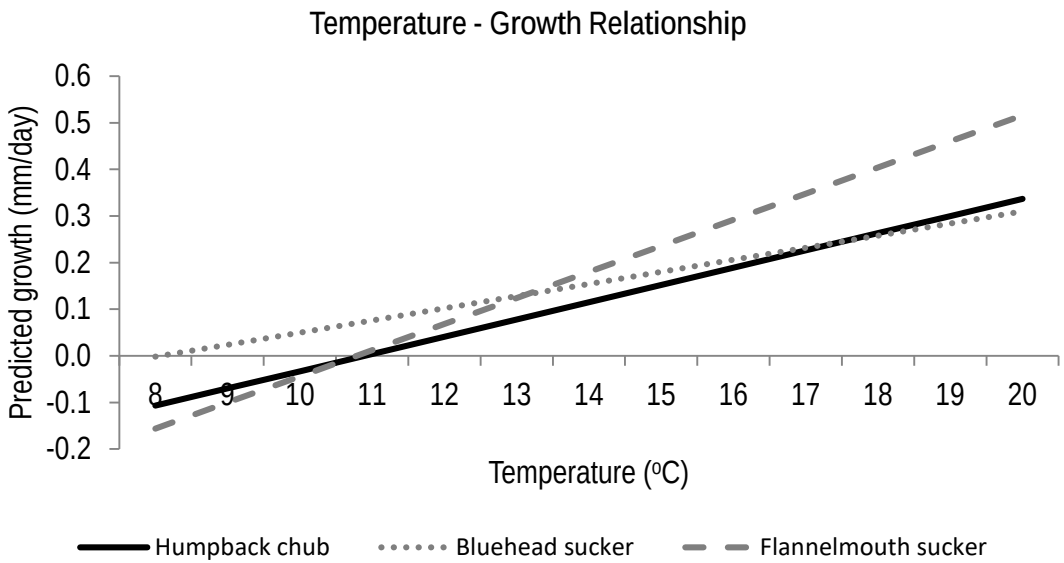



Egg survival and swim-up fry survival of HBC in relation to temperature (Hamman 1982). Fry 15%-91% 12-16

# Temperature (review)

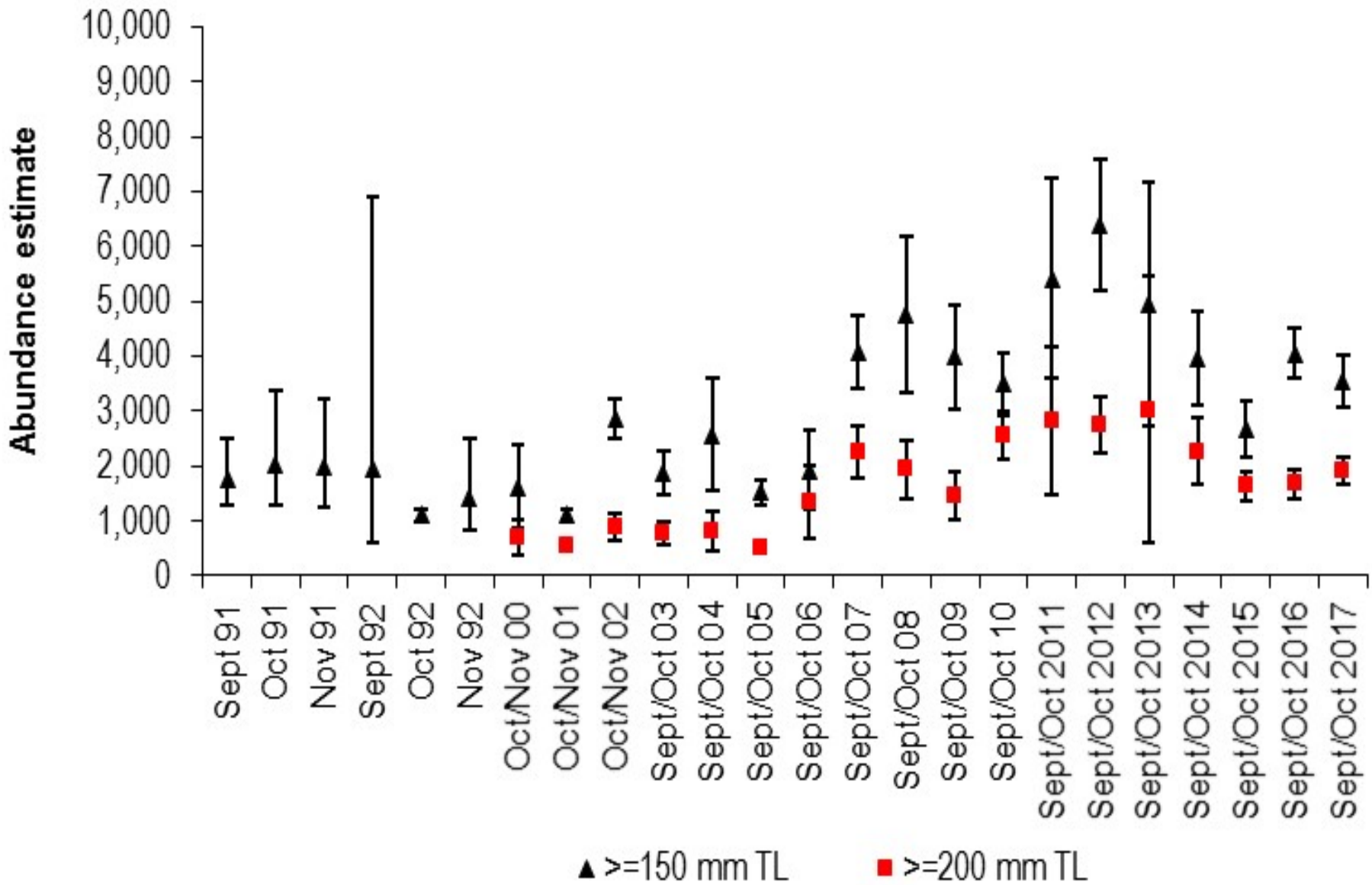



Number of days that larval HBC took to grow to juvenile stage at different water temperatures (Clarkson & Childs 2000).

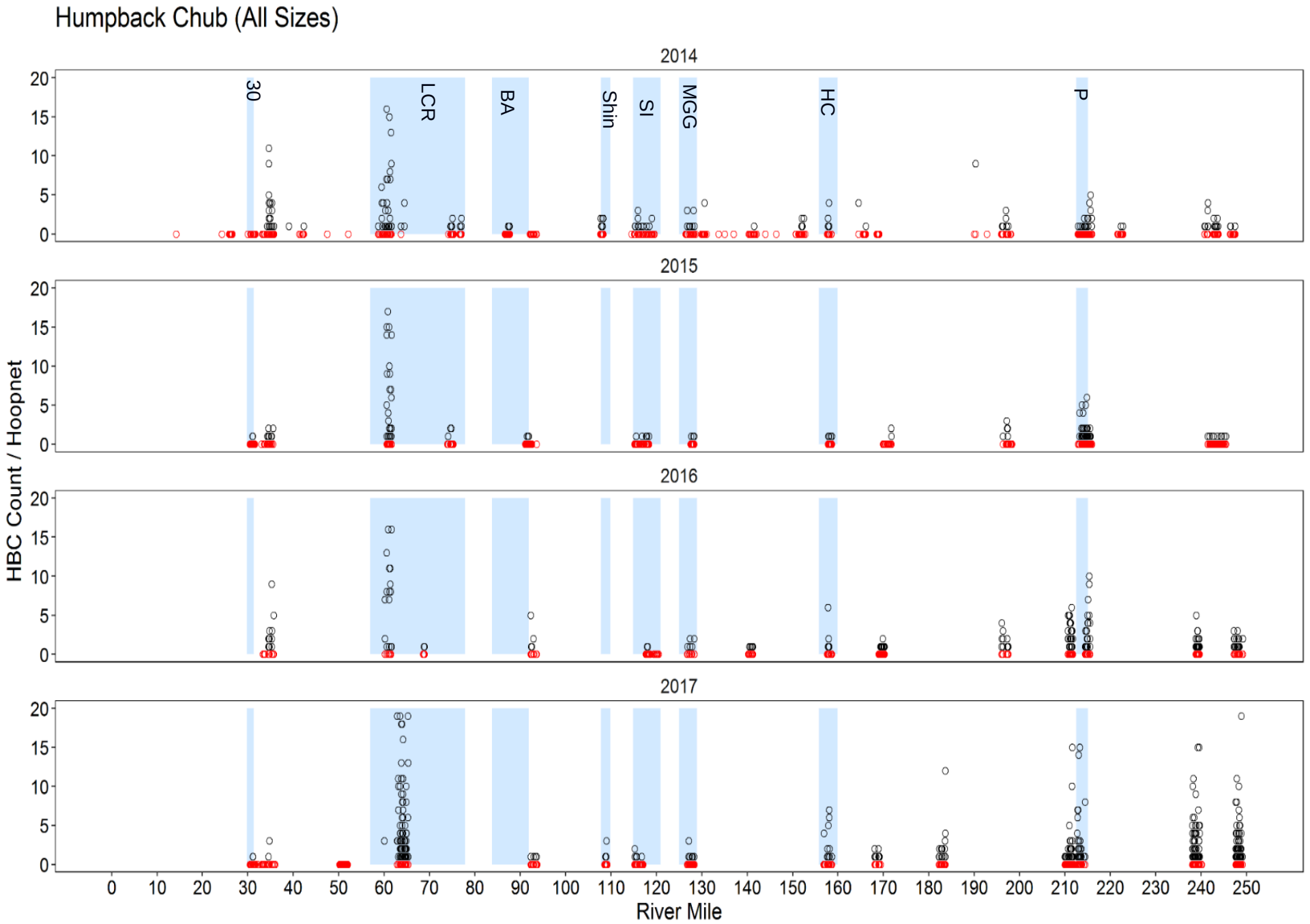


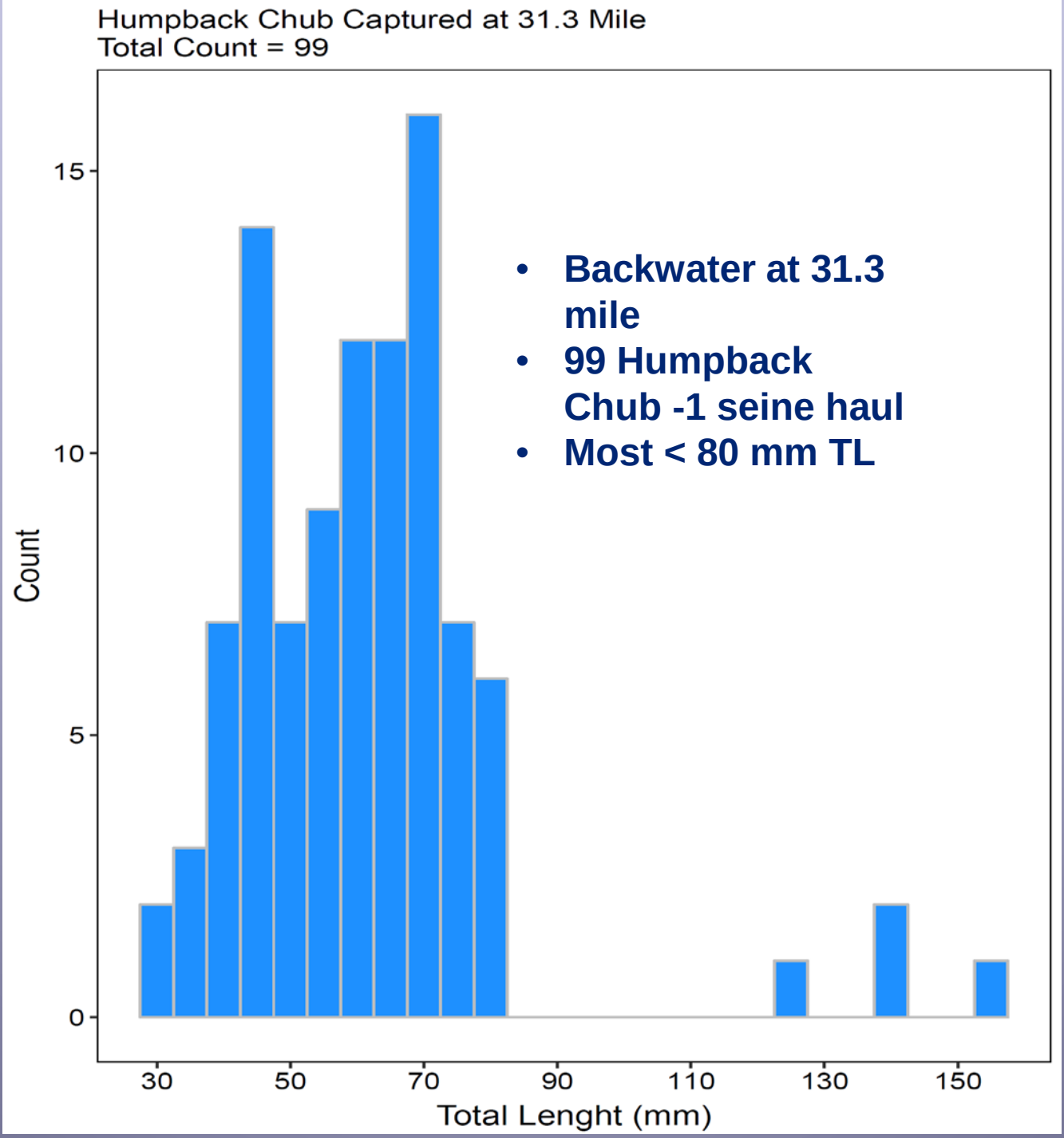

Association between temperature and growth (mm/day) for hatching to Age I of HBC (r = 0.98, *P* <0.001), bluehead sucker (r = 0.78, *P* = 0.005) and flannelmouth sucker (r = 0.98, *P* < 0.001) (constructed from Robinson and Childs 2001).

# Fall Abundance Estimates



# HBC counts/hoopnet by river mile






- **Backwater at 31.3 mile**
- **99 Humpback Chub -1 seine haul**
- **Most < 80 mm TL**