Humpback Chub – range expansion in the lower Grand Canyon or better sampling?

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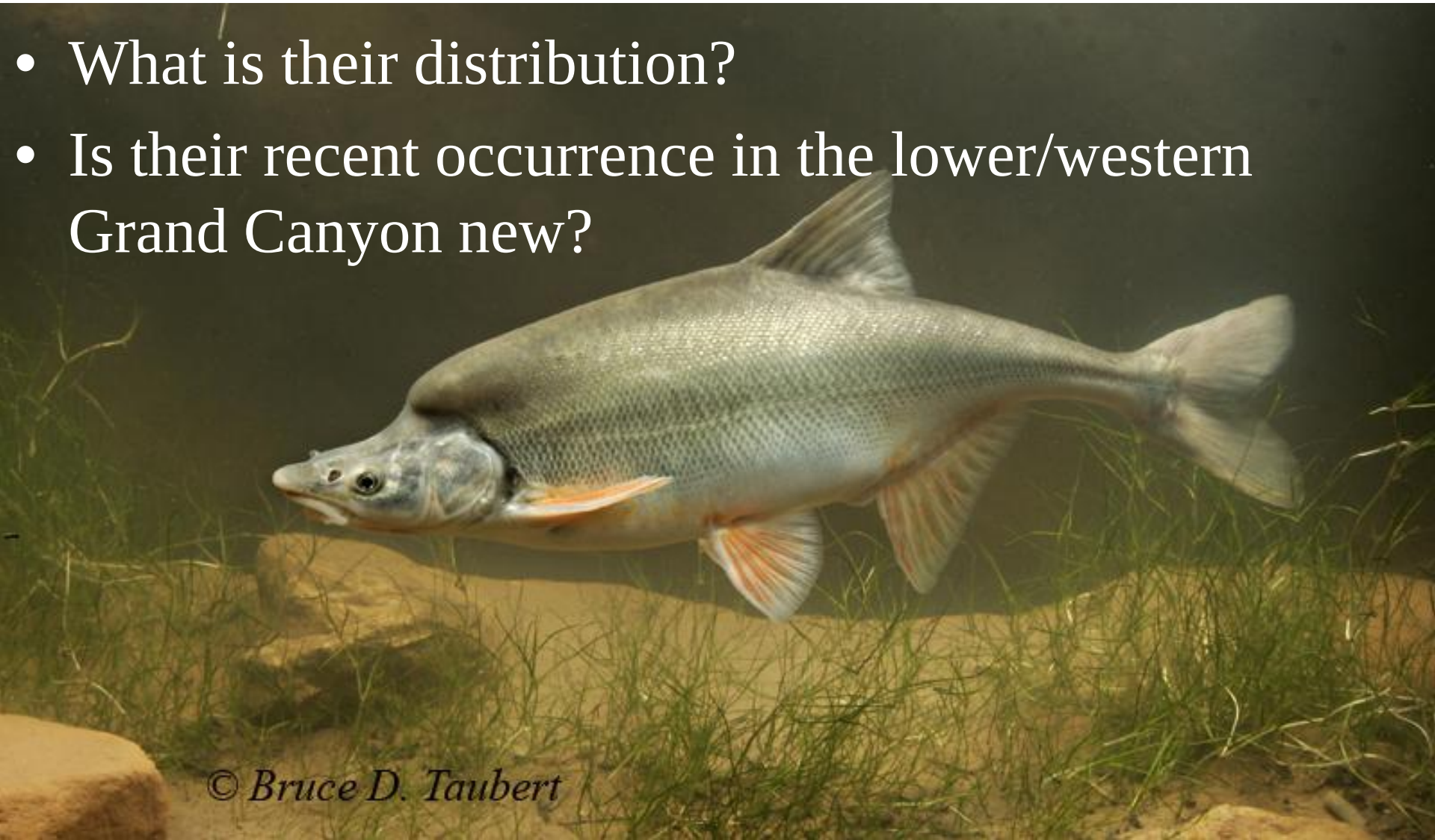
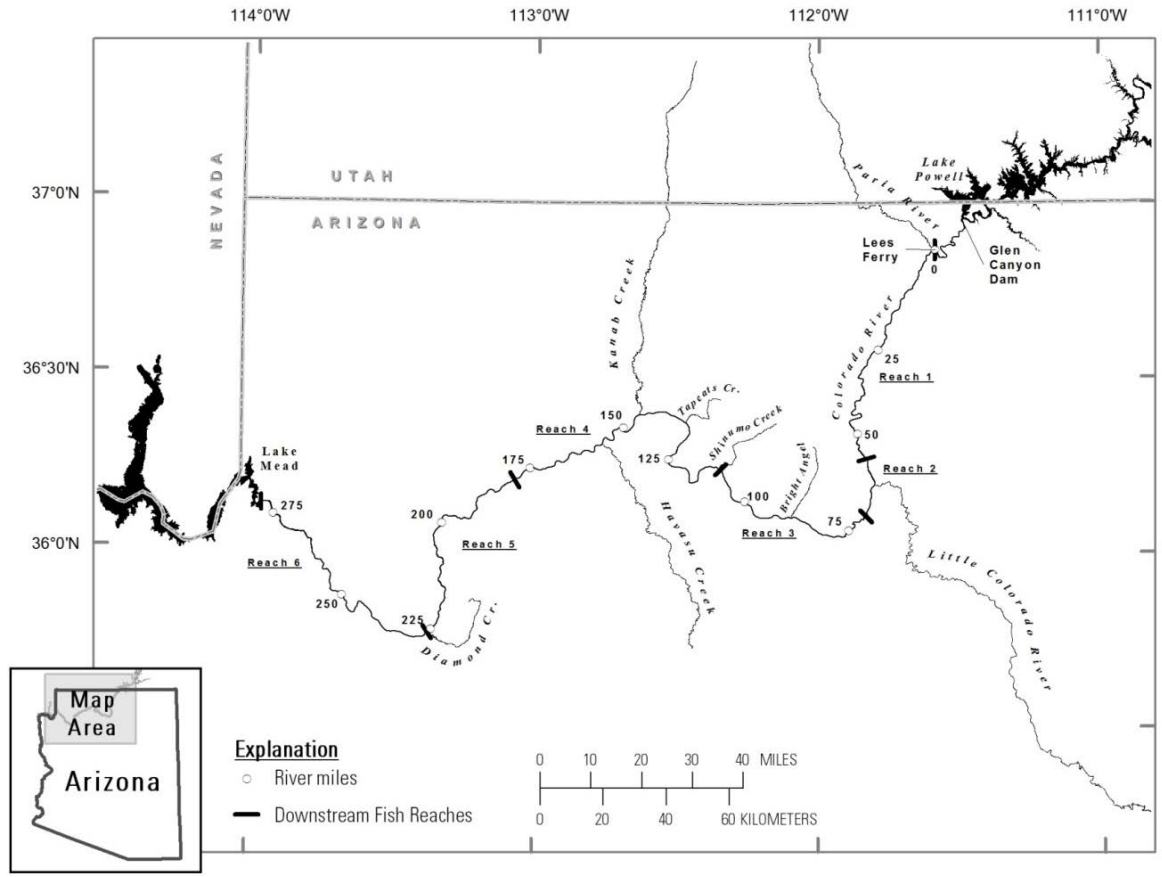
Humpback Chub – range expansion in the lower Grand Canyon or better sampling?

- What is their distribution?
- Is their recent occurrence in the lower/western Grand Canyon new?





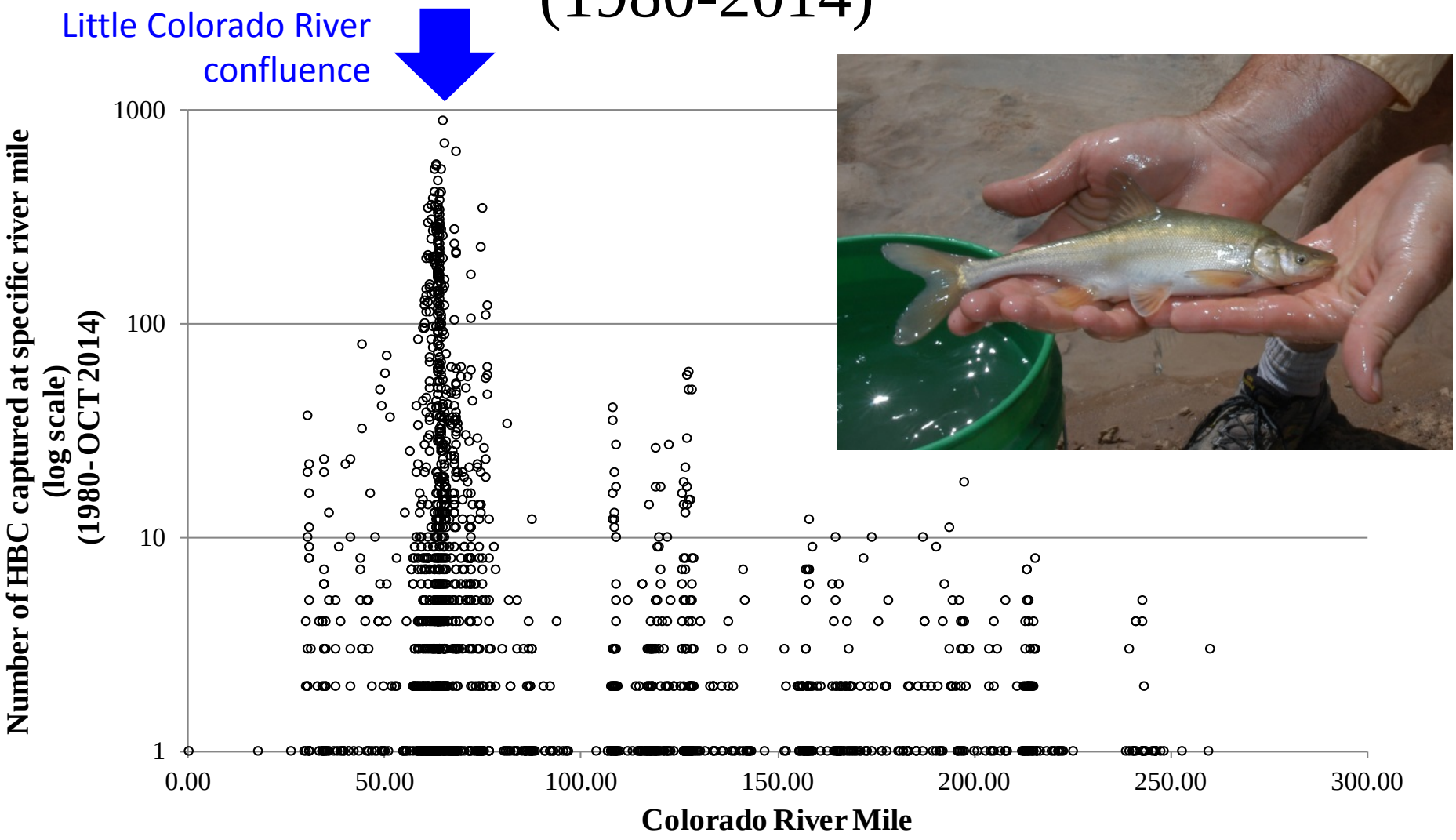
Glen Canyon Dam

http://www.usbr.gov/uc/water/crsp/cs/images/GCDamaerial.jpg

Lake Mead

http://media.npr.org/assets/img/2015/04/17/ap315766408047_custom-107f254056f30e3207a51808a0dd2ed1a0ec70a2-s900-c85.jpg

Number of Humpback Chub captured within Colorado River by river mile (1980-2014)



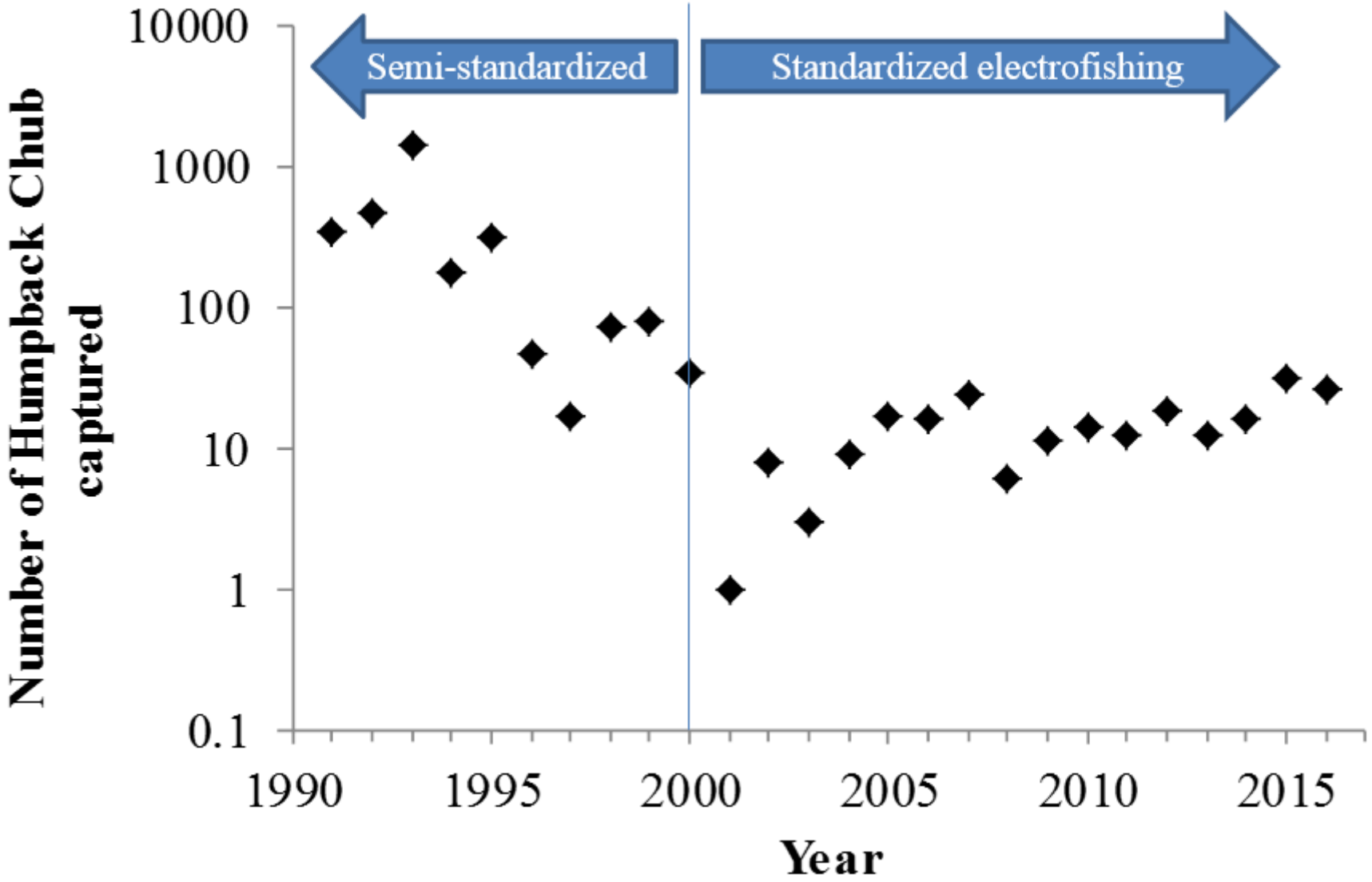
AGFD Methods

- Goal – representative sample of the fish community in the Co. River from Lees Ferry to Lake Mead
- Methods: random stratified sampling
    - 3 trips: 2 spring/summer, 1 in fall
        - Boat Electrofishing – near shore

Photos by George Andrejko, AGFD

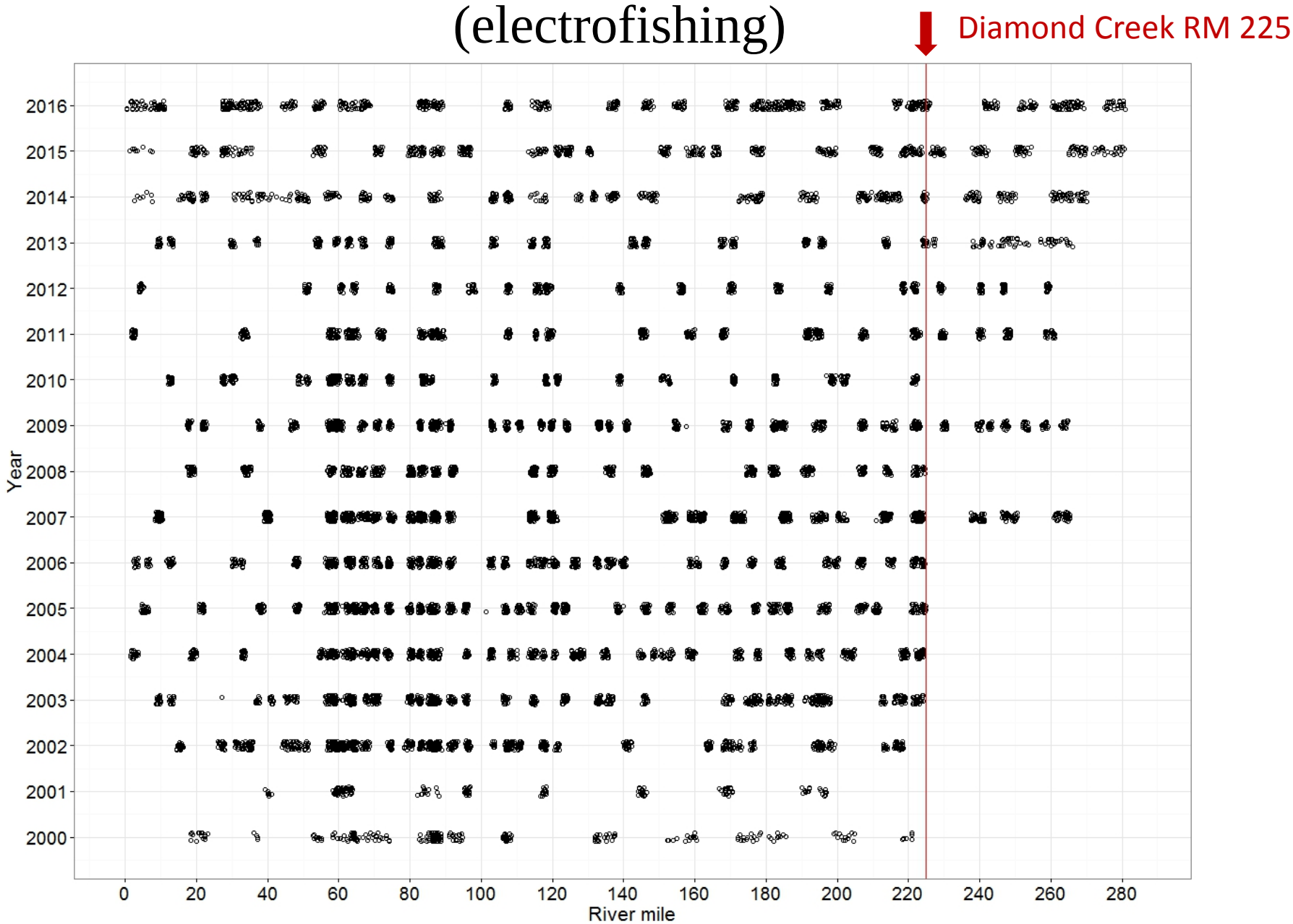
Humpback Chub numbers

(AGFD electrofishing)

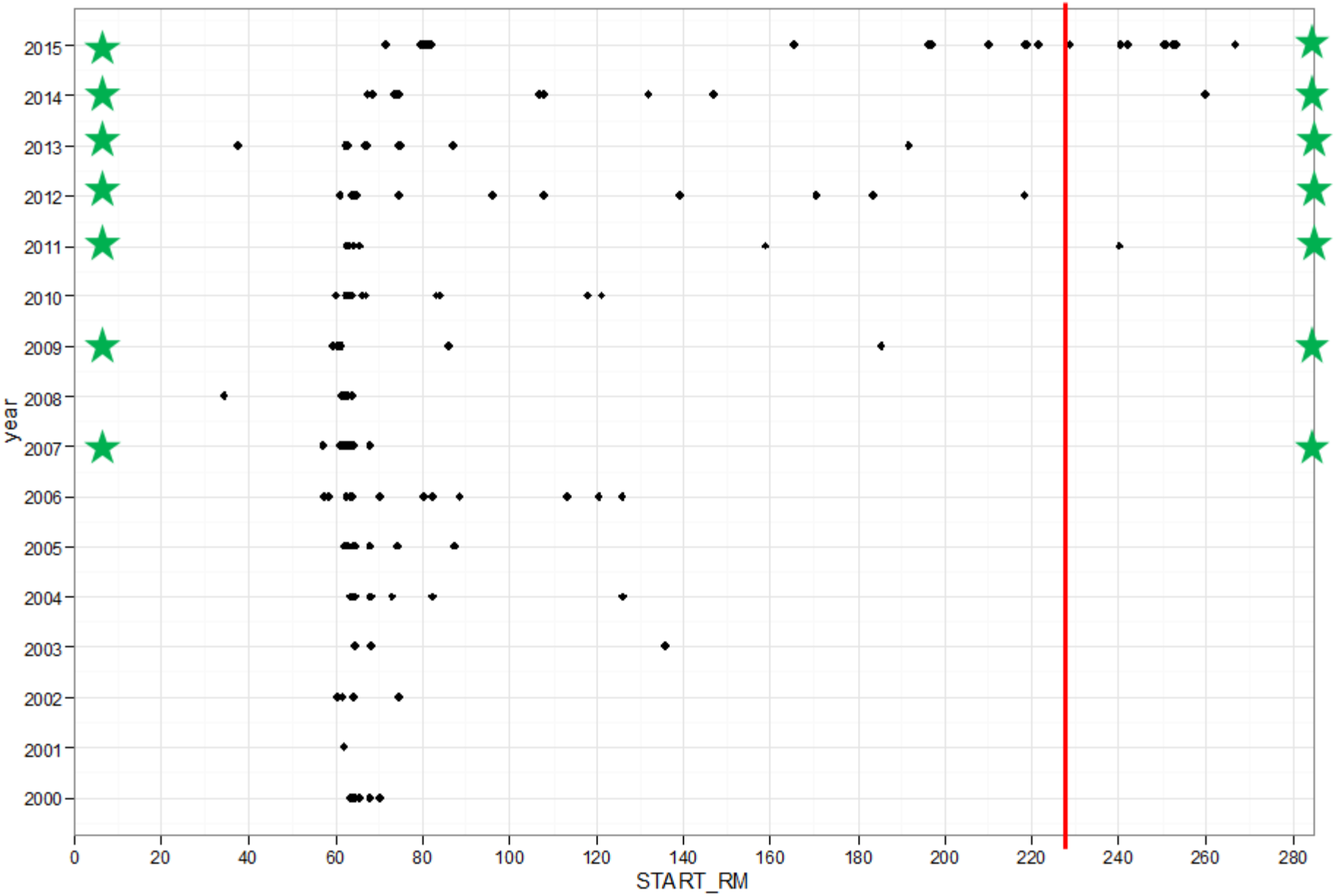


AGFD sample site distribution

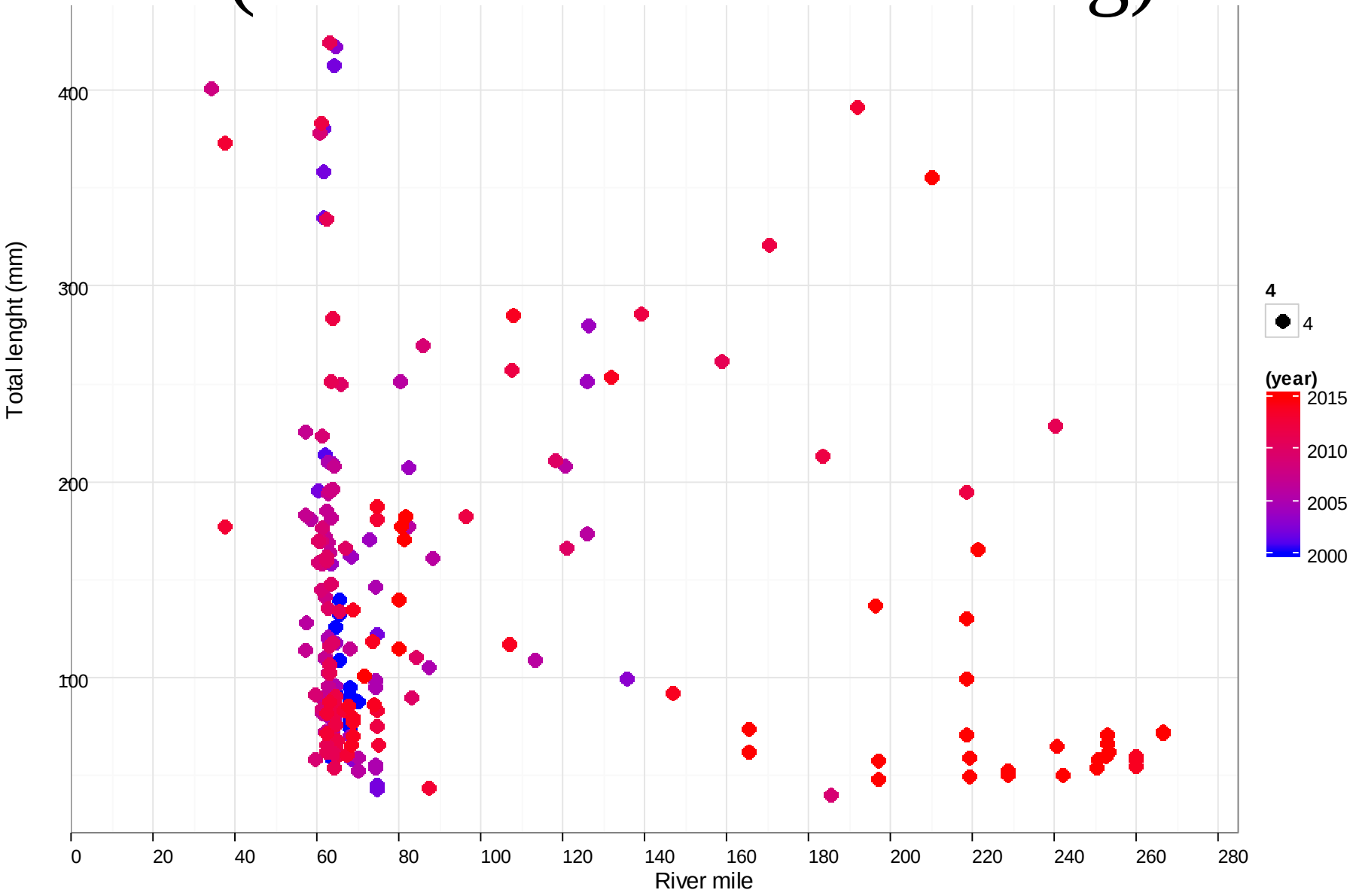
(electrofishing)

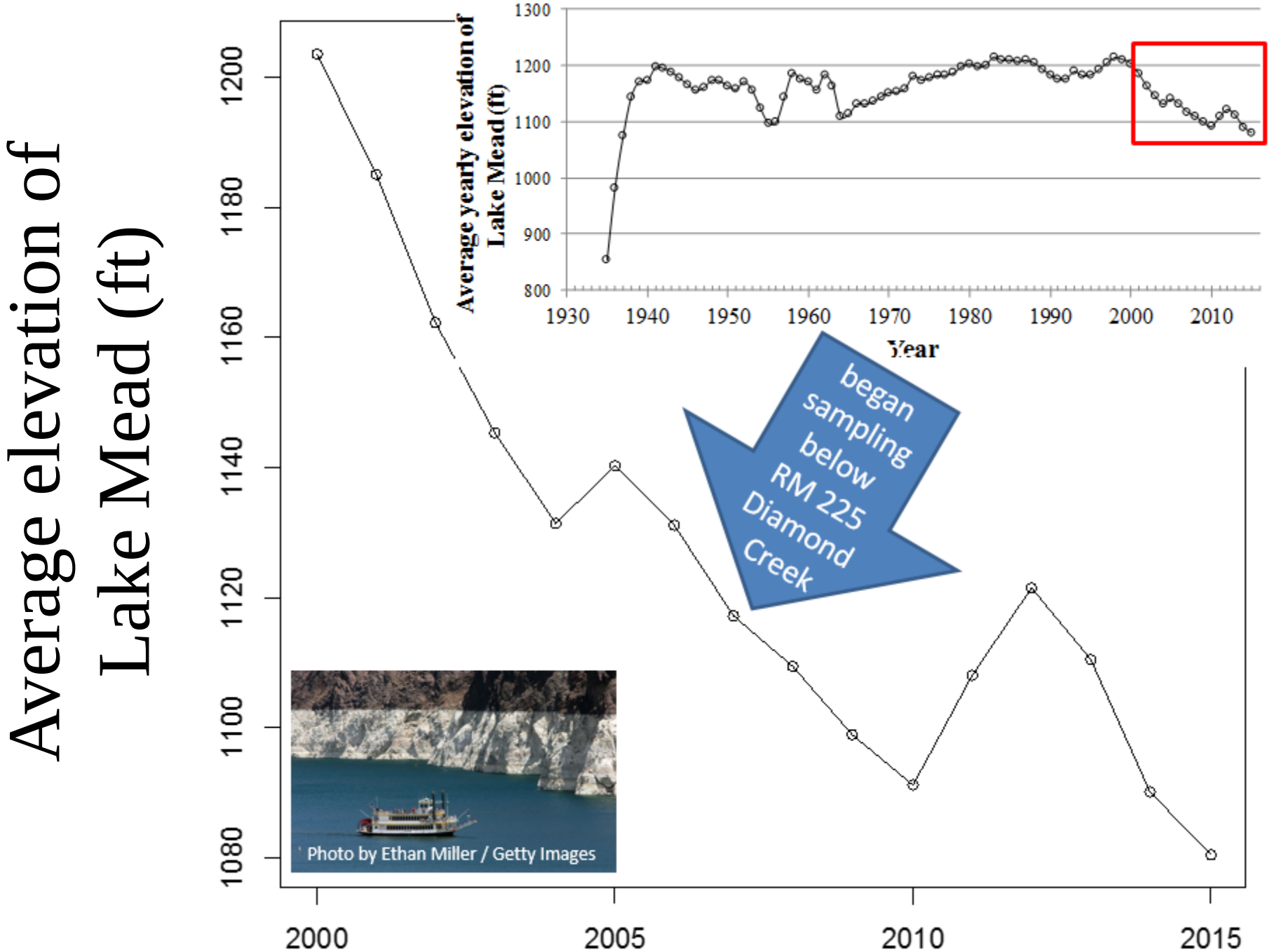


Humpback Chub - distribution (AGFD-EF)



Humpback Chub distribution (via AGFD electrofishing)




Average elevation of Lake Mead (ft)
1200
1180
1160
1140
1120
1100
1080
2000
2005
2010
2015
Average yearly elevation of Lake Mead (ft)
1300
1200
1100
1000
900
800
1930
1940
1950
1960
1970
1980
1990
2000
2010
Year
began sampling below RM 225 Diamond Creek
Photo by Ethan Miller / Getty Images

Grand Canyon long term monitoring

- AGFD – Colorado River (since ~2000):
  - 2 spring/early summer: RM 0-281.4
  - Fall: Diamond Creek Down: RM 225-281.4
- USFWS (since ~2000)
  - Colorado River: “9 Aggregations” (Valdez & Ryell 1995)
  - Little Colorado River (hoop nets)

“Humpback Chub aggregations?”

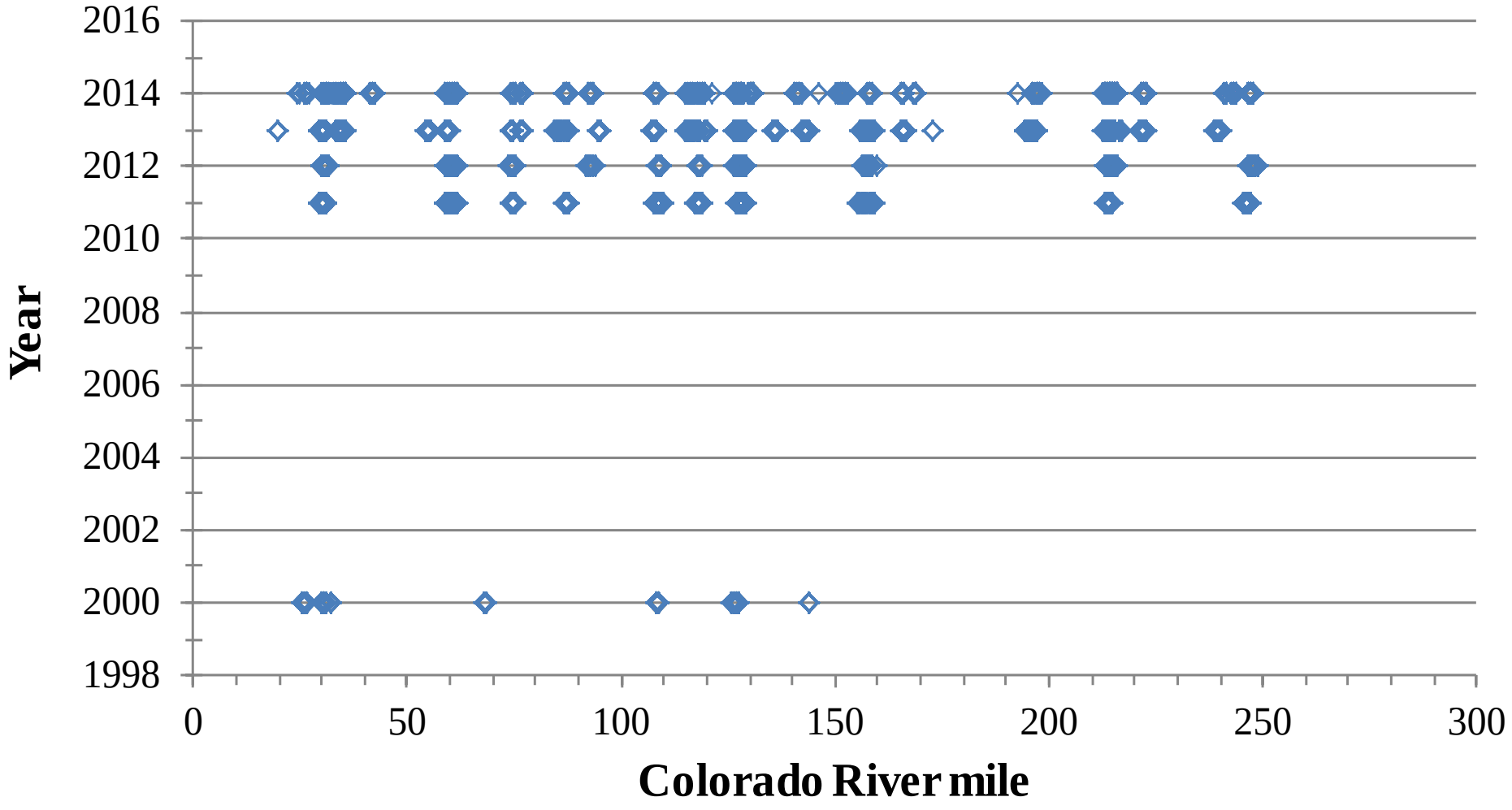
Table 5-11. Location and numbers of humpback chub in nine aggregations in the Colorado River in Grand Canyon, 1990-93.

Aggregations	Location (RM)	Number Captured[a]				% of Total Numbers	Number Recaptured[b]	Estimated Total[c]	Primary Association[d]
		YOY	Juv	Adu	Total				
1. 30-Mile	29.8 - 31.3	14[e]	0	26	26	0.4	6	52	WS
2. LCR Inflow	57.0 - 65.4	1,830	1,293	1,524	4,647	78.2	280	3,482	WT/ED
3. Lava to Hance	65.7 - 76.3	778	226	15	1019	17.2	3	ne	-
4. Bright Angel Creek Inflow	83.8 - 92.2	13	2	9	24	0.4	1	ne	WT
5. Shinumo Creek Inflow	108.1 - 108.6	4	13	27	44	0.7	6	57	WT
6. Stephen Aisle	114.9 - 120.1	0	7	17	24	0.4	2	ne	DF/ED
7. Middle Granite Gorge	126.1 - 129.0	1	4	124	129	2.3	48	98	DF/ED
8. Havasu Creek Inflow	155.8 - 156.7	0	0	7	7	0.2	1	13	WT
9. Pumpkin Spring	212.5 - 213.2	0	0	6	6	0.2	2	5	WS
Total		**2,640**	**1,545**	**1,755**	**5,940**	**100**	**349**		

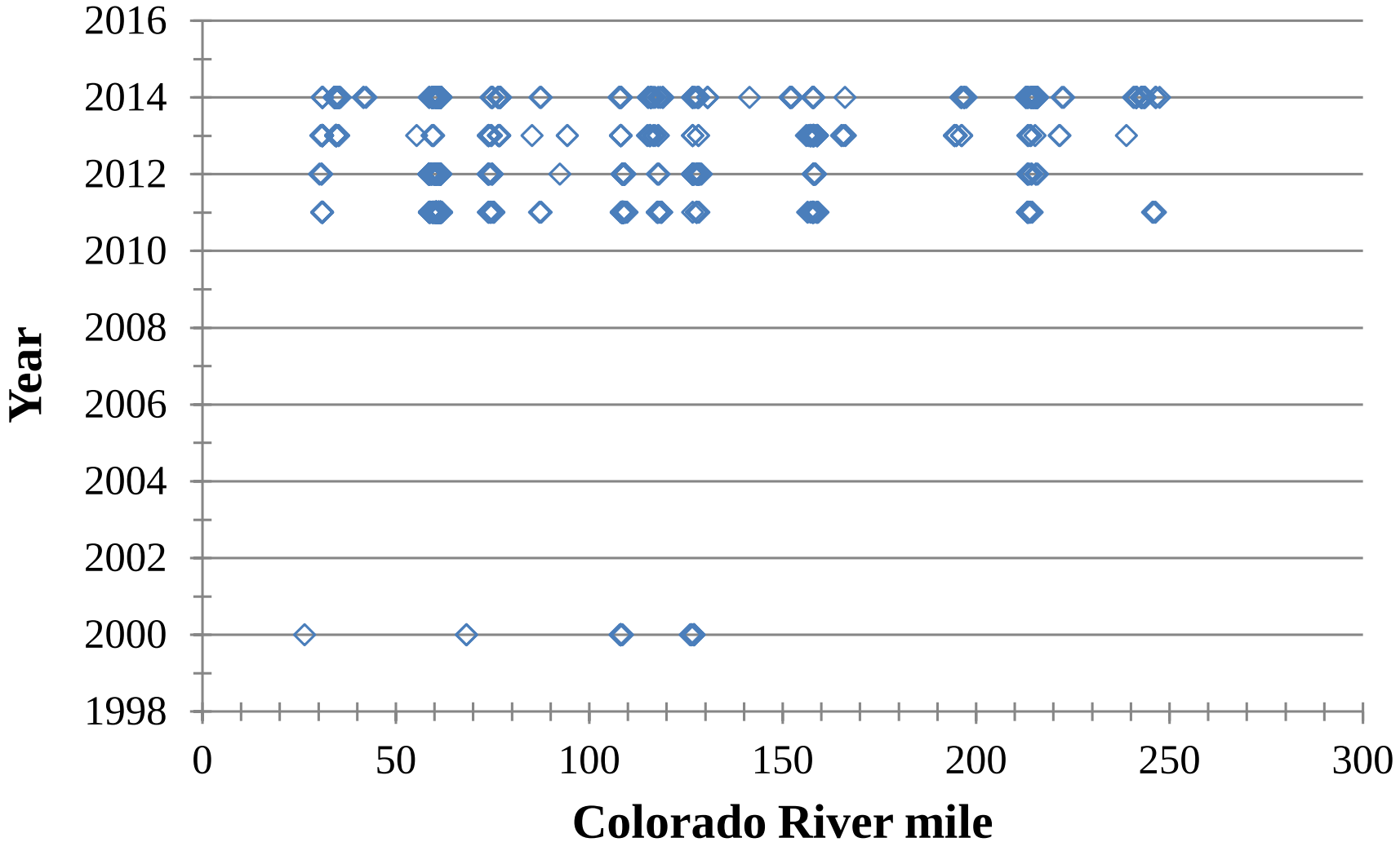
[a] includes recaptures
[b] includes multiple recaptures, i.e., fish recaptured more than once.
[c] Mark-recapture estimate for adults using Chao M_h estimator (See Chapter 6), ne= no estimate.
[d] WS = warm spring, WT = warm tributary, ED = eddy complex, DF = debris fan.
[e] Captured from a school of about 100 YOY in a spring plume, July 14, 1994, not included in totals for October 1990-November 1993.

From: Valdez & Ryel 1995

USFWS “Aggregation” sampling locations



USFWS “Aggregation” sampling: Humpback Chub capture locations



What is the distribution of Humpback Chub in the Grand Canyon?

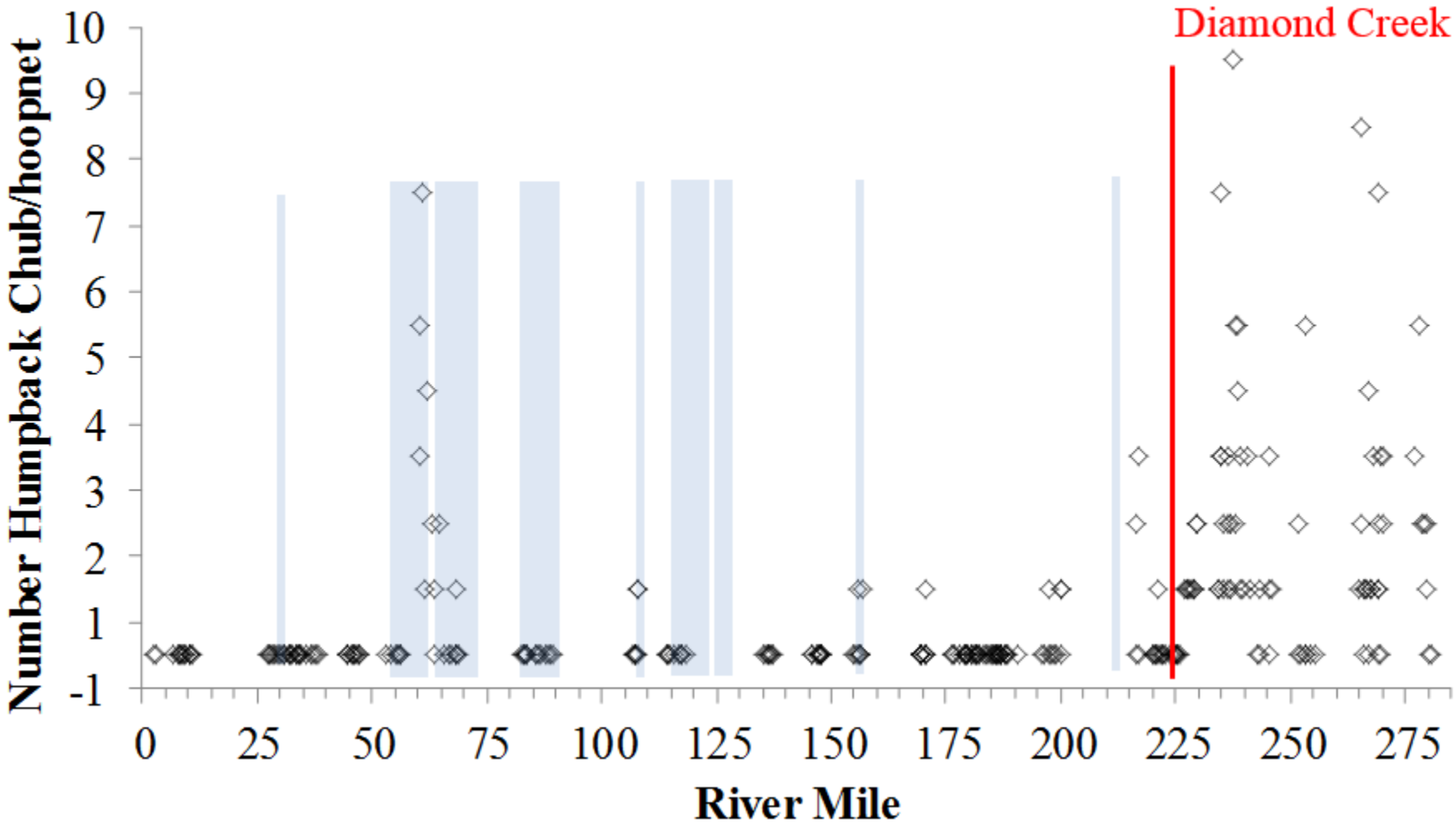
- AGFD – representative sample of the River, but not effective (e.g. electrofishing)
- USFWS – effective sampling (hoop nets, trammels), but not representative

AGFD Methods

- Goal – representative sample of the fish community in the Co. River from Lees Ferry to Lake Mead
- Methods: random stratified sampling
  - 3 trips: 2 spring/summer, 1 in fall
    - Boat Electrofishing – near shore
    - **Baited hoop nets (new in 2016)**

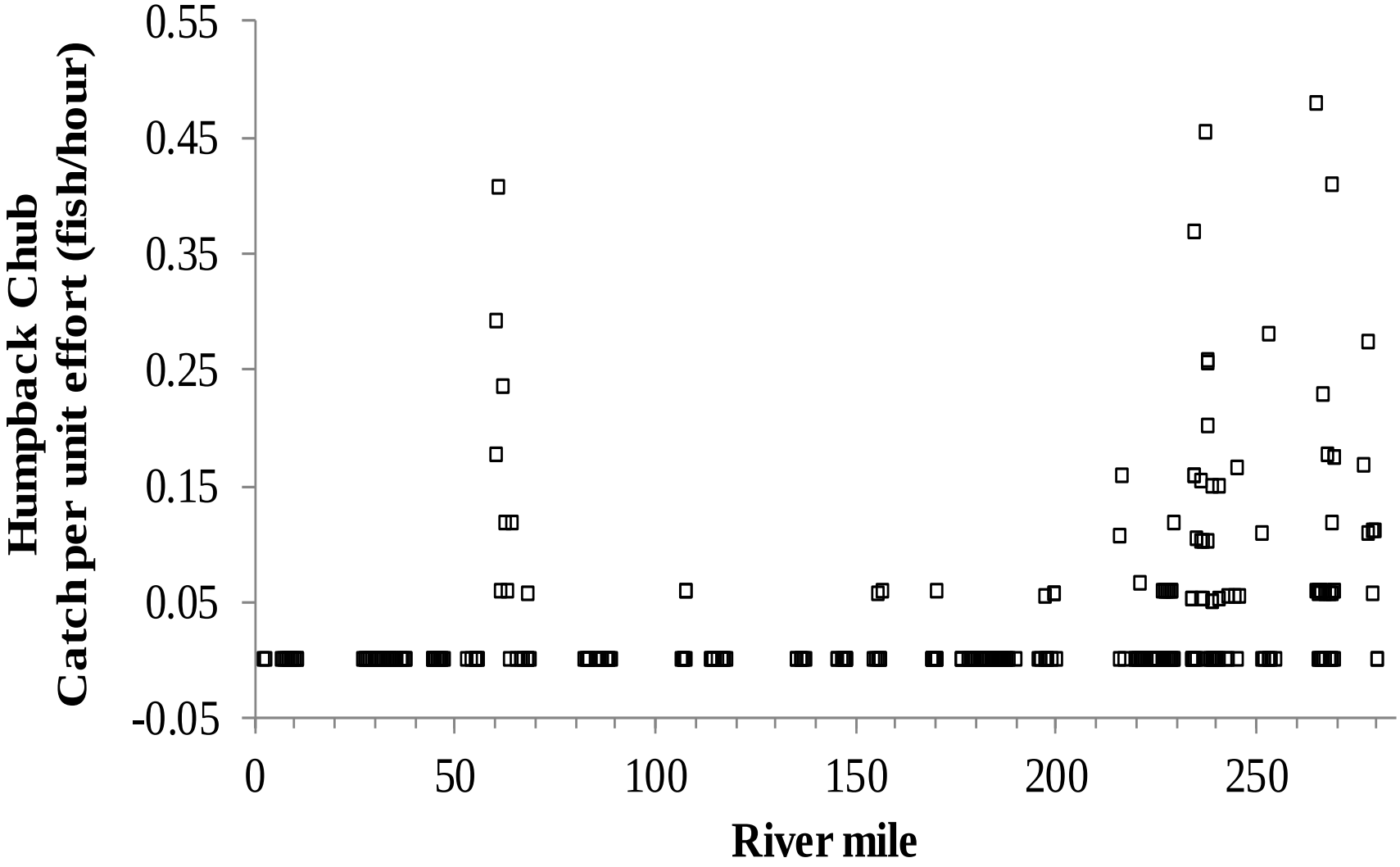
Photos by George Andrejko, AGFD

2016 number of Humpback Chub/hoop net (285 hoop nets)

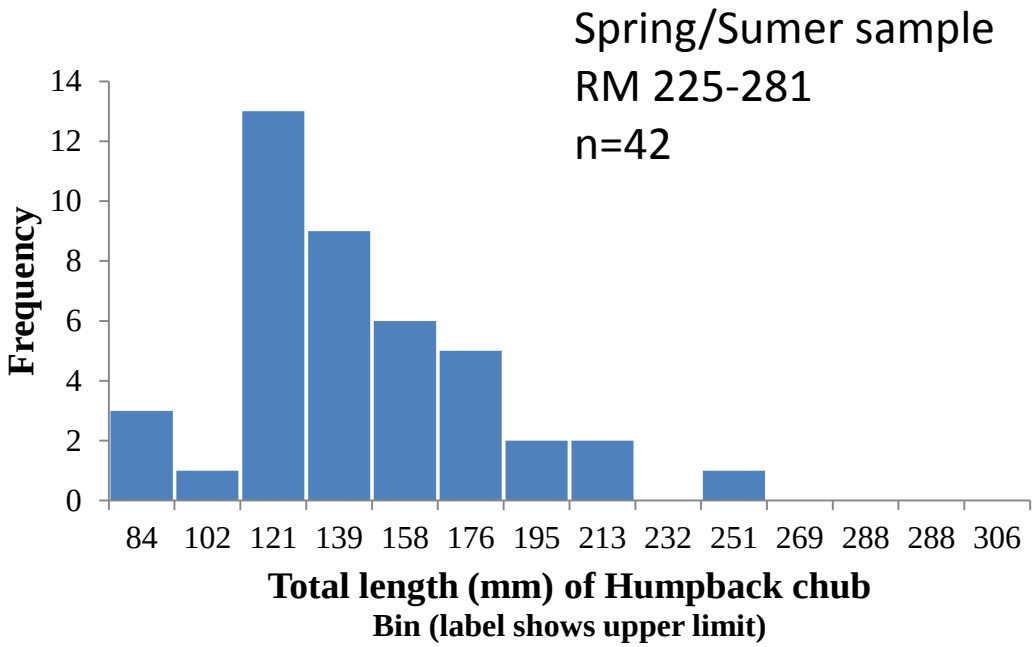


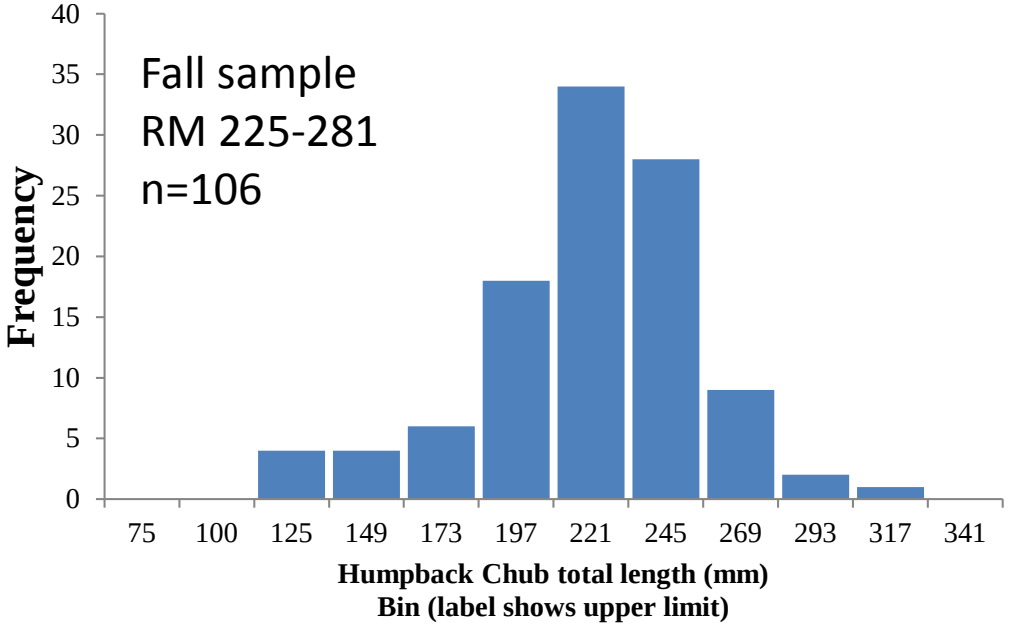
182 Humpback Chub

Humpback Chub CPUE via hoop nets 2016 (n=319)



Humpback Chub length frequency histograms





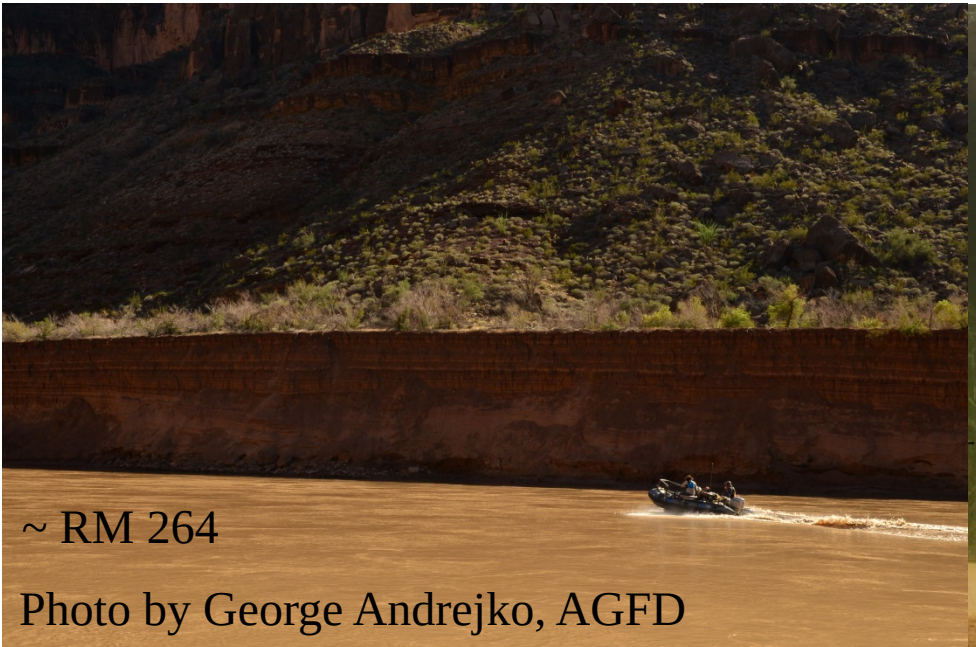
Humpback Chub Recaptures (hoop nets)

- Above RM 220: 21/37 recaptures (57%)
  - At Little Colorado River confluence ~80% recaptures
- Below RM 220: 3/146 recaptures (2%)
  - 3 were tagged recently and at RM 238-239 (2016)

Photo by George Andrejko, AGFD

Humpback Chub

- Occur throughout Colorado River?
  - Occurrence below RM 225 (Diamond Creek)
    - Not sure if this is new or not?
      - No longer a lake
      - More turbid, temperatures are warmer
      - Not adequately sampled



Next year

- Continue hoop nets
- Extend sampling below Pearce Ferry Rapid
  - 3 night hoop net trial

Acknowledgements

- AGFD crew: K. Manuell, R. Osterhoudt, L. Winters, & P. Wolters
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