



Goal 3 Humpback Chub – Metrics*

Meet humpback chub recovery goals, including maintaining a self-sustaining population, spawning habitat, and aggregations in the Colorado River and its tributaries below the Glen Canyon Dam.

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Metric 3.1: Status of adult Humpback Chub (HBC) in the Little Colorado River (LCR) Aggregation (as described in the 2016 LTEMP Biological Opinion; US DOI 2016)

- The LCR Aggregation of HBC was able to persist in higher abundance after construction of Glen Canyon Dam compared to other sites in Grand Canyon.
- Calculation based off abundance estimates derived from a multistate mark-recapture model (Yackulic et al. 2014, Dzul et al. 2022).
- There are three values (0,1, 2) to act as a proxy for the likelihood the adult population is below 7000 individuals:
 - **0** (unlikely to drop to 7000)
 - **1** (may drop to 7000)
 - **2** (below 7000)

Results

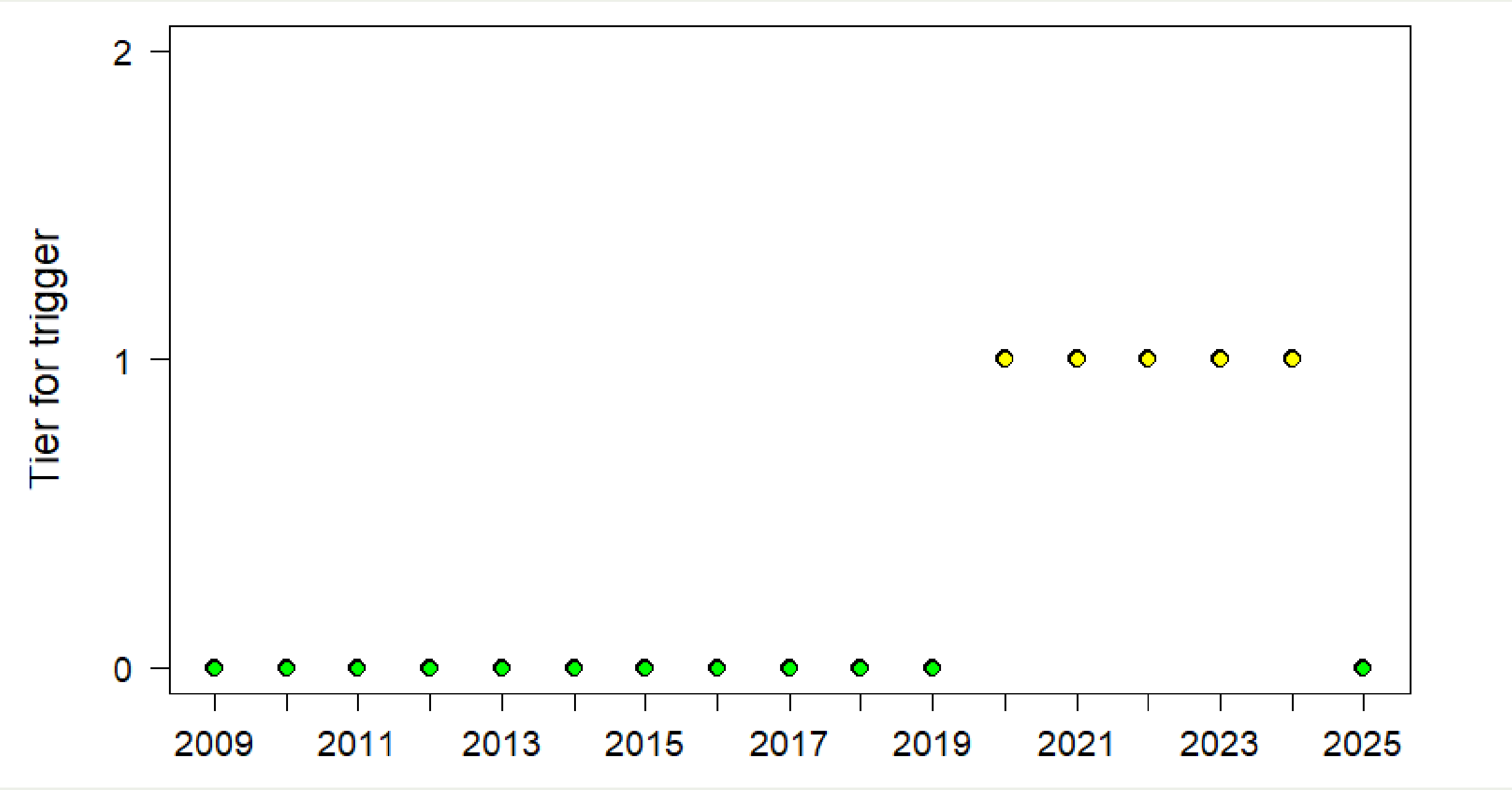


Figure 1. Tier of the LCR humpback chub aggregation, as described in the 2016 LTEMP Biological Opinion from 2009-2025.

Interpretation

The tier for 2025 is tier-0, indicating that currently the LCR Aggregation of HBC is above 7000 and is unlikely to fall below 7000 in the near future.

Metric 3.2: Grand Canyon-wide Abundance of Adult Humpback Chub (HBC)



Photo of mainstem Colorado River.



Photo of humpback chub. Credit:Annelise Bibleheimer

- Since ~2010, HBC have increased in abundance and expanded their spatial range in Grand Canyon.
- Sum abundance estimates from separate mark-recapture models from the regions below. Assume independence when calculating error.
 - LCR Aggregation (Dzul et al. 2022)
 - Western Grand Canyon (mainstem, Havasu Creek confluence to Pearce Ferry Rapid; Dzul et al., Accepted)
 - Other tributaries (i.e., Havasu Creek; Healy et al. 2020)**

**Currently, Havasu Creek estimate is not included in total abundance estimate but instead included in Figure 2 caption for 2025.

Results

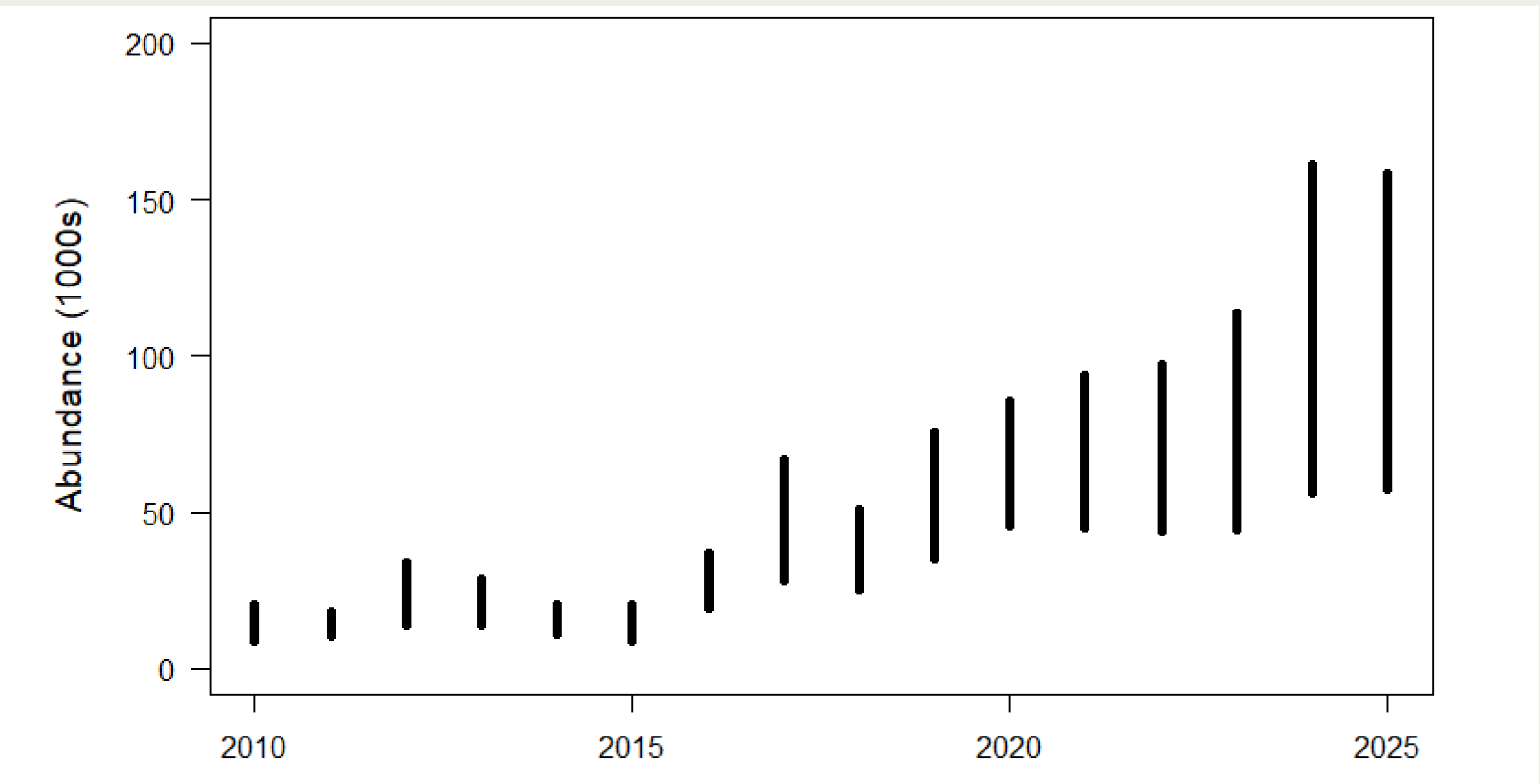


Figure 2.Abundance of humpback chub in Grand Canyon from 2010-2025. Error bars represent 95% credible intervals from models estimating abundances in and near the Little Colorado River and in western Grand Canyon (Havasu Creek confluence to Pearce Ferry Rapid).The Havasu Creek estimate for adult HBC was 15 (95% CI: 11-28).

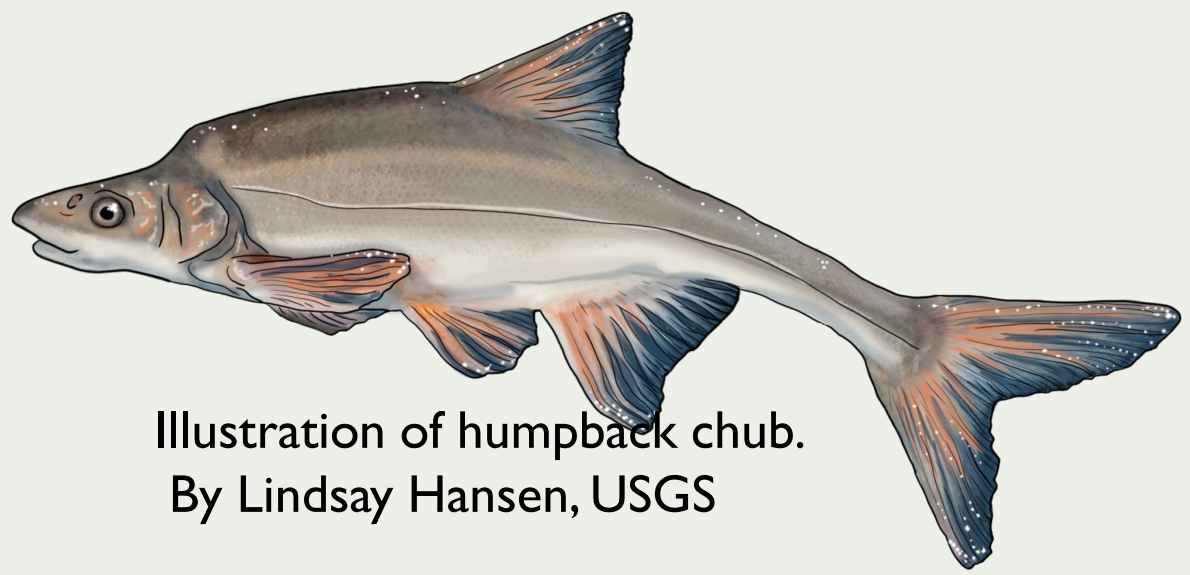
Interpretation

Humpback chub abundance in Grand Canyon has been increasing over the last 15 years.This increase is driven mainly by increases in western Grand Canyon.

Metric 3.3: Proportion of the Grand Canyon Ecosystem with Evidence of all 3 Life Stages of Humpback Chub (HBC)

- Life stages of HBC were defined by total length (TL) as follows:

- Juvenile (<100mm TL)
- Subadult (100-199mm TL)
- Adult (≥ 200mm TL)



- The mainstem was divided into 11-13km reaches. Tributaries were divided into reaches based on habitat. Reaches were sampled and scored as follows:
 - **0** (0-2 life stages detected)
 - **1** (all 3 life stages detected)

Results

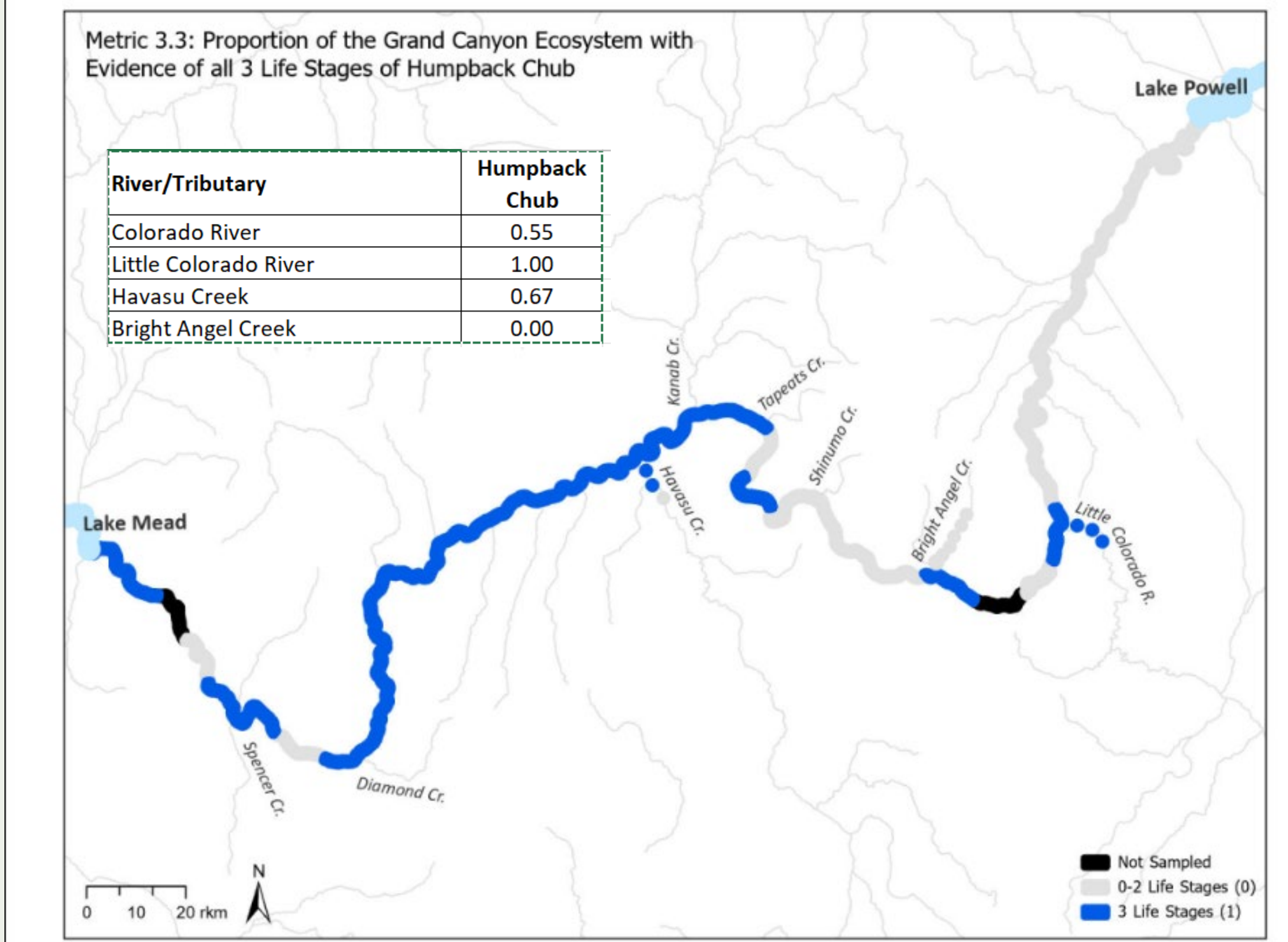


Figure 3. Map of the Colorado River and its major tributaries in Grand Canyon. Colors refer to whether or not all 3 HBC life stages were sampled in a 11-13-km river section during 2025 sampling efforts. Kim Dibble, USGS.

Interpretation

In 2025, all 3 humpback chub life stages were detected in 55% of sampled segments in the Colorado River, mostly downstream of the LCR confluence. In tributaries, 0%, 67%,100% of sampled segments in Bright Angel Creek, Havasu Creek, and the Little Colorado River had all 3 life stages, respectively. Data from 2024 are not comparable due to differences in sampling locations and data sets.

References

Dzul, M.C.,Yackulic, C.B., Kendall,W.L., Winkelman, D.L., Conner, M.M., and Yard, M.D. 2022. Incorporating antenna detections into abundance estimates of fish. Canadian Journal of Fisheries and Aquatic Sciences 79(3): 436-447. <https://doi.org/10.1139/cjfas-2021-0003>
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Yackulic, C.B.,Yard, M. D., Korman, J., and Van Haverbeke, D. R. 2014. A quantitative life history of endangered humpback chub that spawn in the Little Colorado River: variation in movement, growth, and survival. Ecology and Evolution, 4(7): 1006-1018.

*This information is preliminary and is subject to revision. It is being provided to meet the need for timely best science. The information is provided on the condition that neither the U.S. Geological Survey nor the U.S. Government shall be held liable for any damages resulting from the authorized or unauthorized use of the information.