Brook Trout Interactions with Beaver Ponds & Dams

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Background

Beaver restoration and mimicry is growing in popularity as a means of "low-tech" stream restoration.[a] Beaver restoration is the technique of trapping and translocating nuisance beavers to areas where dam building is expected to be beneficial.[b] Beaver mimicry is the process of building beaver dam analogs (BDAs) to provide some of the same benefits of real beaver dams. Both real and analog beaver dams create ponded habitat that has numerous benefits for riparian vegetation & wildlife and helps prevent channel downcutting. Some species of fish thrive in beaver ponds. Where those species are native, this can be a potential benefit. Where those species are invasive, beaver ponds may increase that species' abundance to a degree that harms native species. Below is a summary of current knowledge regarding the potential for beaver ponds to increase Brook Trout (*Salvelinus fontinalis*) populations.

Summary of Reports

Like other trout, the known relationships of beavers and Brook Trout are highly variable. Large numbers of both positive and negative relationships exist.

Positive Relationships

Brook Trout, like Bull Trout and Cutthroat Trout, often overwinter in beaver ponds to escape anchor ice and conserve energy.[c,d] Beaver ponds also increase the total amount of forage for Brook Trout and other species.[e,f,g,h] Beaver ponds tend to be good foraging & rearing habitat for Brook Trout where dissolved oxygen is not limiting.[i] Beaver impoundments and dam analogs have also been associated with increased groundwater recharge and subsequent downstream recharge of cooler groundwater, which may benefit cold-water fishes in some systems.[j]

Negative Relationships

While the opposite occurs in some locations, beaver ponds can increase stream temperatures in others.[i] This can be a negative for Brook Trout if the stream is already near their upper thermal limit, but it isn't necessarily a problem if the stream is generally cool or fed largely by

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groundwater.[h] Upstream passage for trout is certainly limited by beaver dams to some degree (particularly in streams where drought limits the depth of upstream and downstream pools of dams), but most studies of passage are speculative and/or unable to determine the difference between selection of habitat immediately below dams and blockage of upstream movement.[k] Where quantified, Brook Trout seem to pass beaver dams in relatively high proportions[l] – less than Cutthroat Trout but more than Brown Trout.[m] Depending on the type of habitat that is flooded and age of the beaver dam, dissolved oxygen can become limiting at certain times of year within the pond.[e,h,i]

Conclusion

- We find little evidence for the assertion that Brook Trout are uniquely benefited by beaver ponds in comparison to other salmonids
- Both positive and negative effects of beaver ponds exist and are highly site-dependent
- The degree to which BDAs may benefit Brook Trout more than other species is hypothetical and the topic of current investigation, but it is more likely in streams where Brook Trout are already the dominant species

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[a] See Goldfarb, B. 2018. Eager. Chelsea Green Publishing, Hartford.

[b] See beaver.restoration.usu.edu

[c] Lindstrom, J. & W.A. Hubert. 2004. N AM J FISH MANAG. DOI: 10.1577/M03-223.1

[d] Jakober, M.J. et al. 1998. TRANS AM FISH SOC. DOI: 10.1577/1548-8659(1998)127<0223:ROSIOF>2.0.CO;2

[e] Cook, D.B. 1940. J MAMMAL. DOI: 10.2307/1374874

[f] Rupp, R.S. 1955. TRANS AM FISH SOC. DOI: 10.1577/1548-8659(1954)84[75:BRITHO]2.0.CO;2

[g] Huey, W.S. & W.H. Wolfrum. 1956. PROG FISH CULTUR. DOI: 10.1577/1548-8659(1956)18[70:BRINM]2.0.CO;2

[h] Johnson-Bice, S. et al. 2018. N AM J FISH MANAG. DOI: 10.1002/nafm.10223

[i] Renik, K.M. & A.W. Hafs. 2020. N AM J FISH MANAG. DOI: 10.1002/nafm.10422

[j] Weber N., et al. 2017. PLOS One. DOI: 10.1371/journal.pone.0176313

[k] Wolf, J.M. et al. 2022. bioRXiv. DOI: 10.1101/2022.09.10.507435v1

[l] Benson, R.L. 2002. Univ. of Montana, thesis. scholarworks.umt.edu/etd/6982

[m] Lokteff, R.L. et al. 2013. TRANS AM FISH SOC. DOI: 10.1080/00028487.2013.797497

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