Beaver Management & Beaver Dam Analogs

A DOI Nature-Based Solutions Roadmap Fact Sheet

Beavers are large, semiaquatic rodents that alter stream and small river hydrology by building dams, creating an array of benefits.[1] Intensive trapping has drastically reduced beaver populations in North America.[2] Beaver management aims to increase beaver populations and restore the benefits they provide.[3] Beaver dam analogs, which are human-built structures that mimic the design and function of beaver dams, are an alternative way to obtain some of the benefits without a local beaver population.[4]

TECHNICAL APPROACH

Several strategies can be used in combination to promote beaver populations:

- Reintroducing beavers in areas without present-day colonies. Beavers are usually trapped, quarantined, and tagged before release.[5]
- Enhancing beaver habitat by reducing competition from other herbivores (including domestic livestock) and planting trees as food sources.[6]
- Promoting human-beaver coexistence, for example by protecting valuable trees with wire mesh or installing pond levelers to prevent flooding from beaver dams.[6]

Alternatively, beaver dam analogs can be constructed from layers of logs, stones, mud, and turf, with posts made of trees from the local area extending above the fill and branches interwoven. Multiple small structures are more effective than one large structure.[7] Beaver dam analogs can also help attract beavers to an area.

BENEFITS

Climate Threat Reduction

- Reduced flooding
- Carbon storage and sequestration
- Drought mitigation
- Reduced wildfire risk
- Heat mitigation

Social and Economic

- Aquifer recharge
- Resilient fisheries
- Jobs
- Mental health and well-being
- Tourism
- Cultural values
- Reduced erosion

Ecological

- Supports wildlife
- Enhanced biodiversity
- Improved water quality
- Increased primary productivity

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SITE SUITABILITY FACTORS

- ✓ Low gradient, narrow channels
- ✓ High channel complexity
- ✓ High canopy cover of woody riparian vegetation
- ✓ Low-lying areas directly adjacent to the stream
- ✗ Heavily incised channels
- ✗ Large rivers
- ✗ Frequent, intense flooding
- ✗ Noise and light pollution
- ✗ Little to no water

EXAMPLE PROJECT

The Methow Beaver Project, a partnership between Bureau of Reclamation, US Fish and Wildlife Service, US Forest Service, and the state of Washington, relocates nuisance beavers to streams on public lands, including Okanogan-Wenatchee National Forest.[8] The relocated beavers increase habitat quality and complexity as well as enhance drought resilience, benefiting endanagered species including salmon.

Relocating two beavers in Okanogan-Wenatchee National Forest. Photo credit: OkaWen NF. CC BY 2.0 DEED.

KEY RESOURCES

Title and Link	Site Suitability	Design and Construction	Monitoring Guidance	Example Projects
The Beaver Restoration Guidebook (USFWS, USFS, NOAA, University of Saskatchewan)	✓	✓	✓	✓
Managing for Large Wood and Beaver Dams in Stream Corridors (USFS)	✓	✓	✓	✓

LEARN MORE

Visit the DOI Nature-Based Solutions Roadmap for more information on beaver management, other nature-based solutions, and principles and considerations broadly relevant for nature-based solutions projects. The beaver management summary includes additional details on each section included in this fact sheet, plus information on operations and maintenance, common barriers, and more resources and example projects.

Explore the Roadmap

Full Roadmap Document

Beaver Management & Beaver Dam Analogs Section

www.nicholasinstitute.duke.edu/roadmap

REFERENCES

1 Goldfarb, Ben. 2018, July 3. "Beavers are the Ultimate Ecosystem Engineers." *Sierra: The Magazine of the Sierra Club.* https://www.sierraclub.org/sierra/2018-4-july-august/feature/beavers-are-ultimate-ecosystem-engineers

2 Ortiz, Sarah and Michael Dello Russo. 2021. "Beavers Bring Benefits to Partnerships." *U.S. Fish and Wildlife Service.* https://www.fws.gov/story/beavers-work-improve-habitat#:~:text=By%20the%20early%201900s%2C%20beaver,trapping%20of%20beaver%20is%20sustainable.

3 Jordan, Chris E., and Emily Fairfax. 2022. "Beaver: The North American Freshwater Climate Action Plan." *Wires Water* 9 (4): e1592. https://doi.org/10.1002/wat2.1592.

4 Anabranch Solutions. n.d. "Beaver Dam Analogs." *Anabranch Solutions*. https://www.anabranchsolutions.com/beaver-dam-analogs.html#:~:text=A%20Beaver%20Dam%20Analog%20(BDA,reduces%20the%20risk%20of%20predation.

5 Doden, Emma, Phaedra Budy, Tal Avgar, and Julie K. Young. 2022. "Movement Patterns of Resident and Translocated Beavers at Multiple Spatiotemporal Scales in Desert Rivers." *Frontiers in Conservation Science* 3. https://www.frontiersin.org/articles/10.3389/fcosc.2022.777797.

6 Pollock, Michael M., G.M. Lewallen, K. Woodruff, C.E. Jordan and J.M. Castro. 2023. "The Beaver Restoration Guidebook: Working with Beaver to Restore Streams, Wetlands, and Floodplains". Version 2.02. *United States Fish and Wildlife Service*, Portland, Oregon. 189 pp. https://www.fws.gov/media/beaver-restoration-guidebook

7 Shahverdian, Scott, Joseph Wheaton, Stephen Bennett, Nick Bouwes, Reid Camp, Chris Jordan, Elijah Portugal, and Nick Weber. 2019. *Chapter 4 – Mimicking and Promoting Wood Accumulation and Beaver Dam Activity with Post-Assisted Log Structures and Beaver Dam Analogues.* https://doi.org/10.13140/RG.2.2.22526.64324.

8 "Watershed Restoration – Methow Beaver Project." n.d. https://methowbeaverproject.org/beaver-solutions/watershed-restoration/.

CITATION

Warnell, K., Mason, S., Siegle, A., Merritt, M., & Olander, L. 2023. "Fact Sheet: Beaver Management and Beaver Dam Analogs." *NBS Roadmap Project*. Durham, NC: Nicholas Institute for Energy, Environment & Sustainability, Duke University. www.nicholasinstitute.duke.edu/roadmap.