

Reading Guide
King of Fish: The Thousand-Year Run of Salmon
David R. Montgomery

Chapters 1-3 in *King of Fish* explore the lifecycle and spawning process of different salmon species, as well as the complexities of dynamic river systems and salmon evolution—speciation, colonization, and an anadromous life cycle.

Salmon need just a few basic things, writes Montgomery:

- Cool, unpolluted water
- A clean gravel streambed that doesn't scour out or entomb their eggs in deposits of fine sediment
- A flood regime in tune with their life cycle
- Accessible habitat that provides food and cover from predators, as well as areas where juveniles can grow and develop before heading to the ocean
- A chance for enough juveniles and adults to evade open-ocean and river fisheries so that they can return to their home rivers and spawning beds

Yet, "If salmon are resilient enough to withstand extreme events like massive landslides, volcanic mudflows, and glaciations, then **why are they going extinct across much of their ranges today?**" Montgomery asks. The book seeks to answer this question by considering the last thousand years of human influence on salmon runs around the world.

"Trapped between human population growth, economic development, degradation of environmental quality, and the politics of public policy," salmon have experienced "a **death by a thousand cuts,**" writes Montgomery. "Perhaps the biggest problem lies in the way that individual decisions accumulate into big effects: how land use gradually changed river basins into regions inhospitable to salmon over time spans far longer than social and political processes last."

Montgomery identifies major factors influencing salmon decline as the 5 H's—habitat, hydropower, harvest, hatcheries, and a failure to learn from history.

1. Habitat: polluting rivers in the name of technology

"How we live on the land leads directly (and sometimes indirectly) to the risk of local or regional salmon extinction," writes Montgomery. "Other than the obvious case of impassable dams, individual projects rarely drive salmon from a river. Instead, **lots of small changes** add up to do so over time."

Chapter 5: Old World Salmon shows the **steady loss of salmon** across Europe in the 1800s. In spite of measures to protect an important food source, salmon runs went extinct in river after

river due to forest clearing, dams, commercial fishing pressure, pollution from factories, and governmental inaction.

Chapter 10: Rivers of Change describes the **transformation of Pacific Northwest rivers** in the late 1800s as wetlands were removed for agriculture and Army engineers pulled logs and cut down trees along the banks of Puget Sound rivers for transportation and commerce. Splash dams created to float logs to mills scoured salmon nesting grounds.

We learn that “Pacific salmon have disappeared from a third of the area they inhabited just 150 years ago in California and the Pacific Northwest.”

2. Hydropower: changing the natural environment by damming rivers and clear-cutting forests

Chapter 9: Power for the People traces the **effect of dams** built in the early 1900s on the Columbia River and throughout the Pacific Northwest, revealing outcomes that paralleled the extinction of salmon runs in New England and the United Kingdom.

Chapter 7: Western Salmon Rush shows the destruction of California salmon runs by **hydraulic mining** during the Gold Rush.

Chapter 10: Rivers of Change discusses the damage done when mining, logging, and urban development **alter the movement of water and sediments** through streams, rivers, and flood plains.

3. Harvest: overfishing & ignoring regulations and laws imposed to help salmon populations recover

One challenge of managing salmon harvests, writes Montgomery, is the “conflict between inherent uncertainty of the natural sciences and the certainty demanded by policy makers when balancing natural resource protection against economic opportunities.” Local interest generally seeks to “protect local people’s immediate livelihoods, and avoid sacrifices necessary to sustain the long-term productivity of the resource. Left to their own devices, everyone wants all the fish that they can catch before someone else gets them.”

Chapter 4: Salmon People discusses the **importance of salmon to Native Americans** in the Pacific Northwest, their harvest practices and the cultural restrictions which prevented overexploitation. “Fishing intensity matched the modest needs of local consumption. As long as local human populations depended on local salmon there was a built-in ecological safeguard. People who overfished, or otherwise degraded their fishery, cut off their own life support.”

In *Chapter 6: New World Salmon*, Montgomery compares that cultural restraint with commercial fishing pressure as **salmon became a commodity** on both the East and West coasts of North America. He discusses the politics of open-ocean fishing and restoring regional runs, and the role of CASE (Committee on the Atlantic Salmon Emergency), NASCO (North

Atlantic Salmon Conservation Organization), ICNAF (International Commission for Northwest Atlantic Fisheries), and the Endangered Species Act.

Chapter 7: Western Salmon Rush details the emergence of a seemingly inexhaustible salmon supply in the Pacific Northwest in the 1820s, just as the runs of New England were failing. The canning industry boomed and overfishing, combined with hydraulic mining, soon led to the **commercial extinction of California's salmon**. Next to be overfished and depleted were salmon populations in Oregon and Washington.

The first Alaska salmon canneries were established in the late 1800s, with federal regulations banning obstruction of streams, regulated fishing periods, and protection of spawning grounds beginning in 1889. In spite of these measures, industry practices were pushing Alaska salmon toward extinction before such laws were consistently enforced. "Today, most of the American salmon fishery is located in Alaska, where both habitat and salmon runs remain relatively healthy."

4. Hatcheries

Chapter 8: Better than Natural exposes the **limits of hatcheries**—once seen as "a painless way to treat the symptom of too few fish without curing the diseases of overfishing and environmental degradation." Montgomery writes that hatchery-produced fish may introduce diseases and damage the gene pools of wild stocks, and can lead to overexploitation of wild salmon when both populations are being targeted together.

"The bottom line on hatcheries is that throughout the Pacific Northwest, salmon (both hatchery and natural) have continued to decline even though hatcheries have spent millions of dollars to produce hundreds of millions of fry," he says. "Perhaps the most striking lesson is that hatcheries can only be effective to sustain a fishery if habitat also remains in good shape."

5. History: the fifth H

Salmon runs once provided an abundant food source around the world, until "commercial fishing and industrial interests began to influence legislation as industrialization and urbanization transformed the landscape." Montgomery points out that while details vary by region, the crisis of salmon in the Pacific Northwest "is a strikingly faithful retelling of the fall of Atlantic salmon in Europe, and again later in eastern North America."

"Salmon are amazing," writes Montgomery. "Just a few feet long, they travel thousands of miles to complete their life cycle. They can repopulate streams devastated by volcanic eruptions. Given half a chance they can take care of their own existence quite well and expand to fill the available habitat. But for a century and a half we have sustained a **pace of landscape-scale changes that salmon have never experienced before** except over short time periods and across limited portions of their range. By disturbing everything everywhere all at once, we risk leaving them no sanctuary from which to repopulate depleted rivers and streams.

Suggestions from the Author

In *Chapter 11: The Sixth H* Montgomery provides an excellent summary of the last thousand-year run of salmon, as well as offering ideas for saving this icon of the Pacific Northwest. He believes that along with reduced fishing pressure and removal of barriers to salmon migration, the following actions could aid long-term salmon recovery:

- Protect high-quality habitat and aggressively enforce existing regulations to prevent degradation of critical salmon habitat
- Restore rivers and streams, guided by an understanding of historical conditions and the salmon-producing capacity and potential of individual rivers
- Reform hatcheries so their focus changes from serving as “salmon factories” to rebuilding wild runs

Montgomery offers three ideas to support river restoration and habitat protection projects around Puget Sound:

- Independent riverkeepers with the authority to enforce or trigger enforcement of laws, implement local recovery efforts, and coordinate local, state, and federal actions
- Salmon sanctuaries on valley bottoms and floodplains
- A five-to-ten-year moratorium on fishing for at-risk species and then restricting fishing intensity to no more than half of any run

About the Author

David R. Montgomery is a professor of Geomorphology at the University of Washington. He received his B.S. in geology at Stanford University and his Ph.D. in geomorphology from the University of California Berkeley. His books include *The Rocks Don't Lie: A Geologist Investigates Noah's Flood* and *Dirt: The Erosion of Civilizations*. In 2008, Montgomery was named a MacArthur Fellow and *Dirt* won the Washington State Book Award in General Nonfiction. His work on landscape evolution and the impact of geological processes on ecological systems led him to study the connections, past and present, between humans, salmon, and rivers for *King of Fish: The Thousand-Year Run of Salmon*.