

MYTHBUSTERS #4

Public Power Council Fish and Wildlife Committee

Revealing Fish and Wildlife Myths

MYTH: *The federal hydrosystem is the greatest source of mortality for salmon populations in the Columbia River Basin.*

THE FACTS:

- Freshwater habitat and ocean conditions are the primary factors affecting the survival of salmon and steelhead in the Columbia River Basin.
 - ⇒ Fewer than 10% of the eggs spawned in the Snake River successfully hatch and survive as juvenile fish to begin their migration to the ocean.
 - ⇒ Fewer than 5% of the juvenile fish that successfully migrate to the ocean ever return back to the Columbia River as adults.
- The federal hydrosystem is a relevant, but not the greatest source of mortality for salmon and steelhead in the Columbia River Basin.
 - ⇒ The survival of juvenile salmon and steelhead passing through the Columbia River is similar to or better than that observed in some undammed river systems on the Pacific Coast of North America.
 - ⇒ About 55% of juvenile spring chinook and 35% of the steelhead arriving at the Lower Granite Dam survive the migration to Bonneville dam (NOAA-F 2007).

What arguments are used to support this myth?

- **The federal dams are the largest *human* caused source of mortality.** Parties state that freshwater and ocean survival are natural forms of mortality and that the federal dams are the primary human cause of decline of salmon and steelhead in the Columbia River Basin.
 - ⇒ *Counter:* *Urban development and land use in juvenile rearing habitat are the largest human caused sources of mortality.*
- **Federal dams are the cause of low estuary and ocean survival.** Parties argue that the federal dams affect the ability of juvenile salmon and steelhead to survive beyond the hydrosystem.
 - ⇒ *Counter:* *This mortality is caused by a number of factors that include loss of habitat, predation by birds and fish, and disease.*
- **Salmon and steelhead populations will not recover until the dams are removed.** Parties state that since fish populations have not returned to historic levels that not enough has been done to improve fish survival at the federal dams.
 - ⇒ *Counter:* *Ocean conditions are primarily responsible for the number of adult salmon and steelhead returning to the Columbia River.*
 - ⇒ *Counter:* *Salmon and steelhead populations originating above Bonneville Dam are demonstrating significant improvements over the past several years.*

What this means:

- The federal hydrosystem is not the largest source of mortality for Columbia River Basin salmon and steelhead.
- Improvements in juvenile rearing habitat above the federal hydrosystem would address the most significant man-made impacts to salmon and steelhead populations in the Columbia River Basin.

What are the supporting arguments for these facts?

- 1. The quality of freshwater habitat is a primary factor affecting the survival of salmon and steelhead in the Columbia River Basin** (Kareiva, *et al.*, 2000), (Scheuerell and Williams 2005). Researchers at the NOAA-Fisheries (NOAA-F) Northwest Fisheries Science Center estimated the location and magnitude of mortality through the lifecycle of salmon and steelhead from the Columbia and Snake Rivers. As an example, **Figure 1** illustrates the location and magnitude of mortality for Snake River spring chinook (Kareiva, *et al.*, 2000). This stock has to travel through all eight federal dams during their juvenile and adult migrations.
 - Fewer than 10% the eggs spawned in the Snake River successfully hatch and survive as juvenile fish to begin their migration to the ocean (Kareiva, *et al.*, 2000).
 - ⇒ Sources of mortality during the juvenile rearing portion of the salmon lifecycle include both man-made impacts to rearing habitat such as logging and road construction, and natural factors such as disease and predation.
- 2. Ocean conditions are a significant factor affecting the return of adult salmon and steelhead.** Ocean researchers have been measuring the conditions in the Pacific Ocean where juvenile salmon from the Columbia River live and grow. They found that water temperature, food availability, and the number of predators that eat juvenile salmon have a much greater effect on salmon and steelhead stocks than the federal dams on the Columbia River.
 - Ocean conditions are the largest single factor in the variability of adult returns (Scheuerell and Williams 2005).
 - Fewer than 5% of the juvenile fish that successfully migrate to the ocean ever return back to the Columbia River as adult fish (Kareiva *et al.*, 2000).
 - ⇒ Numerous species of predators feed on young salmon in their first few years at sea.
 - ⇒ In the ocean, some fish die of natural causes such as disease.
 - ⇒ The amount of food available in the ocean also plays an important role in the survival of juvenile salmon. There are periods when there is less food available to young fish. Therefore, fewer juvenile fish survive to return as adults.
 - Improvements in ocean conditions since 1998 have resulted in significantly improved salmon and steelhead returns (Scheuerell and Williams 2005).
- 3. The survival of juvenile salmon and steelhead passing through the Columbia River is similar to, or better than survival observed in other river systems on the Pacific Coast of North America.** Researchers at the NOAA-F Northwest Fisheries Science Center reviewed studies conducted in 2006 on the survival of juvenile salmon and steelhead in some undammed rivers on the Pacific Coast of North America. Results of this survey are summarized in **Table 1** (NOAA-F 2007).
 - Mean estimated survival for yearling chinook salmon traveling through the entire Columbia River hydropower system in 2006 was 55%; for steelhead it was about 35% (NOAA-F 2007).
 - Mean estimated survival for yearling chinook salmon traveling through the undammed Fraser-Thompson River system in British Columbia in 2006 ranged from 14% - 34%; steelhead survival ranged from 21% - 39% (NOAA-F 2007).

Table 1. Survival of Juvenile Salmon from the Columbia River as Compared to the Undammed Thompson-Fraser River.		
2006 Estimates	Columbia River	Undammed Fraser-Thomson River
Yearling Chinook	55%	14% - 34%
Steelhead	35%	21% - 39%

LITERATURE CITED

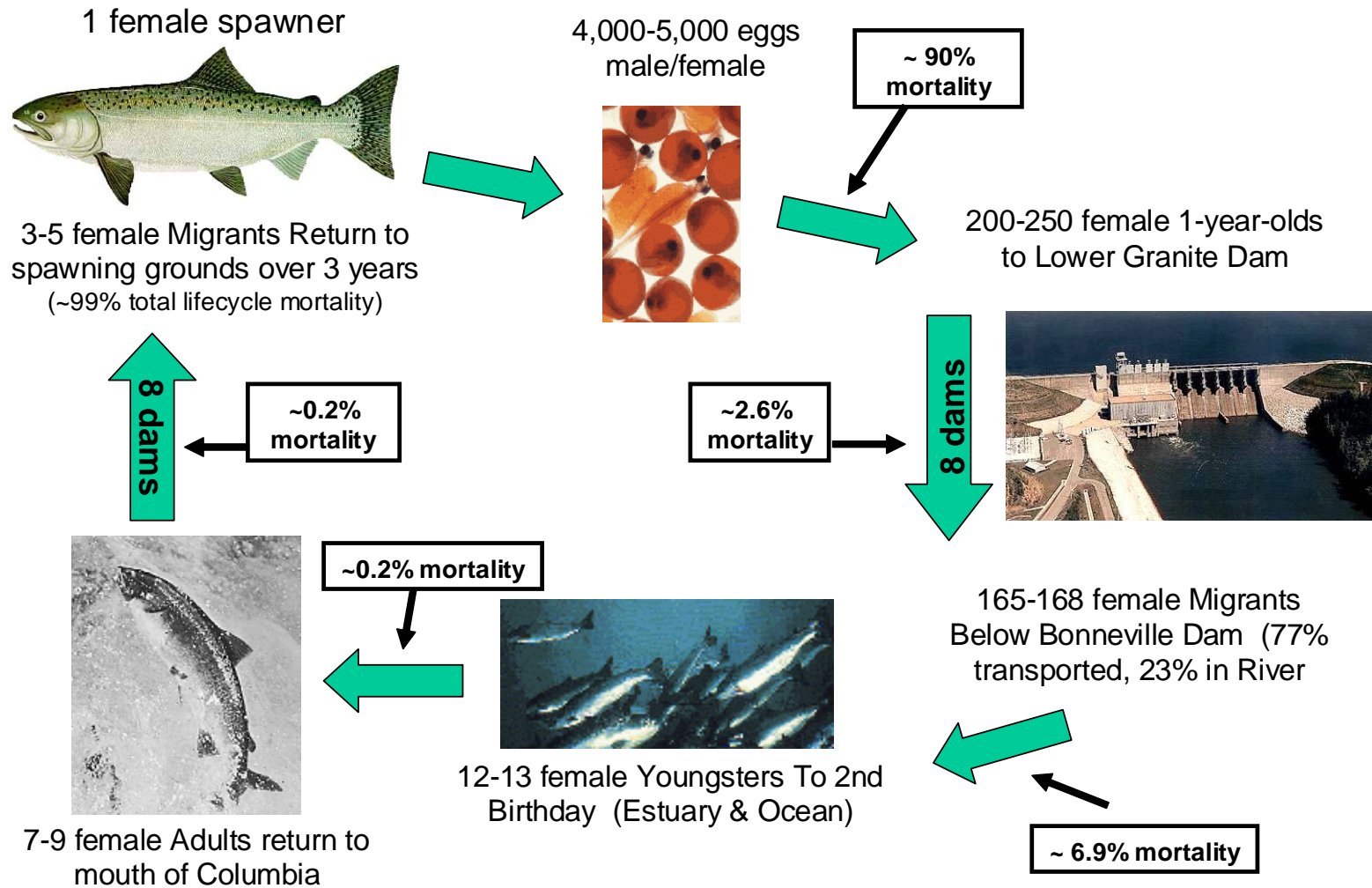
Kareiva, P., Marvier, M. and McClure, M. (2000) Recovery and management options for spring/summer chinook salmon in the Columbia River basin. *Science* 290:977– 979.

NOAA-Fisheries (NOAA-F) 2000. Endangered Species Act Section 7(a)(2) Consultation Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation. NOAA's National Marine Fisheries Service. Northwest Region. Portland, Oregon. December, 2000

NOAA-F 2007. MEMORANDUM FOR: - Bruce Suzumoto. FROM: - John W. Ferguson. SUBJECT: Preliminary survival estimates among large west coast rivers. Dated October 2, 2007

Scheuerell, M. D. and J. G. Williams 2005. Forecasting climate-induced changes in the survival of Snake River spring/summer Chinook salmon (*Oncorhynchus tshawytscha*). *Fisheries Oceanography* 14:6, 448–457, 2005

Figure 1. Allocation of Mortality: Snake River Spring/Summer Chinook Life Cycle



Karieva *et al.*, 2000