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Water Management Actions called for in NOAA Fisheries 2014 BiOp on the FCRPS

Paul Wagner

Date: August 21, 2015

NOAA FISHERIES SERVICE

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Endangered Species Act Findings of Congress

- "Various species of fish, wildlife, and plants have been rendered extinct as a consequence of growth untempered by adequate conservation."

- "These species are of esthetic, ecological, educational, historical, recreational, and scientific value to the nation and its people."
  ESA Sec. 2

- The Endangered Species Act is the last resort for species at risk of extinction.

- Under the ESA, the National Marine Fisheries Service (NOAA Fisheries) is accountable to ensure that salmon and marine species are preserved for future generations.

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Federal Columbia River Power System (FCRPS)

- Dams and reservoirs on the mainstem Columbia and Snake rivers and their tributaries comprise the FCRPS.
- Operation of this dam and reservoir system is a federal action and subject to ESA consultation.

Present Conditions

Mainstem highly altered with 8 mainstem dams

>500 km reservoirs

- 70 hydroelectric dams
- 128 non hydro dams
- 68.2 km^3 storage

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Effects of Dams on Salmonids

- Restrict access to habitat
- Alter habitat
- Alter hydrology
- Alter gradient
- Passage hazard
- Creates recreational opportunities and expectations.
- Creates opportunities for further water development within the basin.

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Water Project Development has had a significant effect on Natural Hydrograph

- Although reservoir storage accounts for roughly 25% of the annual average runoff in the basin, it is sufficient to change the shape of the natural hydrograph

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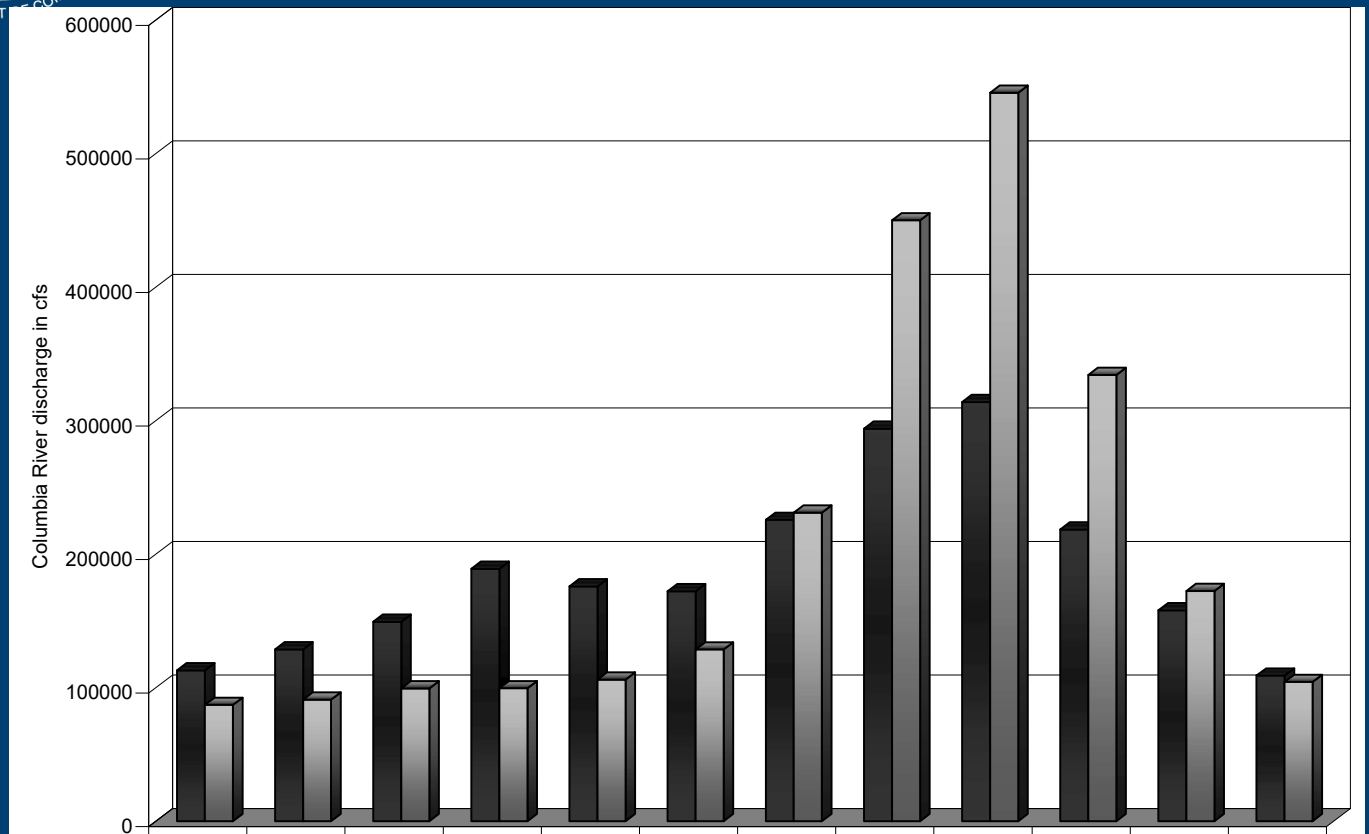

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Current	113017	128641	149403	189076	175921	172150	225689	293948	313930	218523	157935	109020
Natural	87115	91029	99387	99496	106033	128580	231047	450040	545561	334238	172430	104310

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Basis for Managing Flow

- Evolutionary Considerations
- Recognition there was a flow/travel time relationship for juvenile salmon.
- Data suggesting survival benefits over the life cycle of salmon (SARs).
- Beneficial effects of a freshwater plume to estuary and near ocean environmental processes.

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Importance of flow to Juvenile Migration

- Salmonids evolved to migrate under flow conditions with a natural hydrograph.
- Due to the small size of smolts, the limited ability to store energy reserves, and the long distance they must travel, fish rely tremendously on flow (water velocity) to move them to the ocean.

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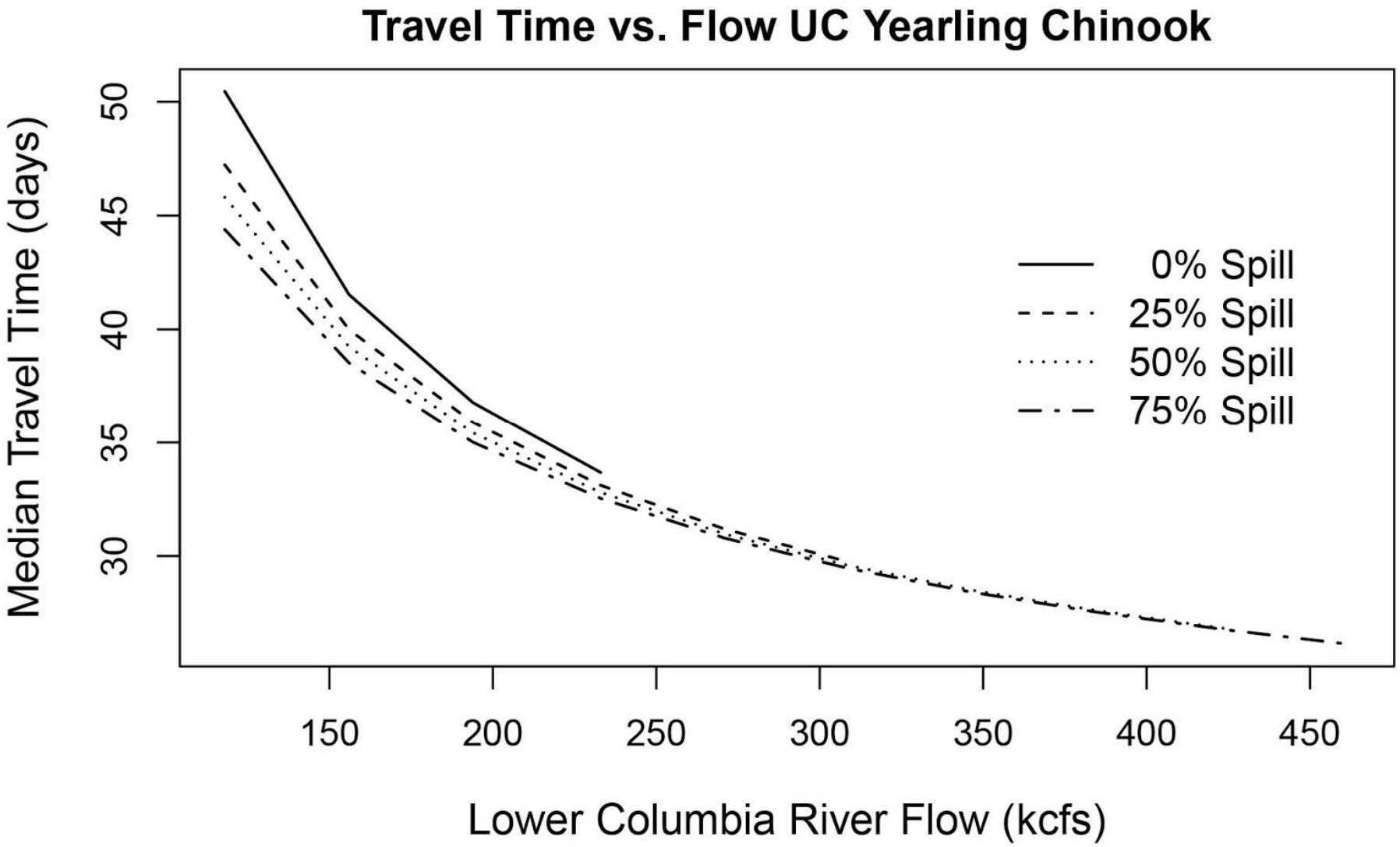
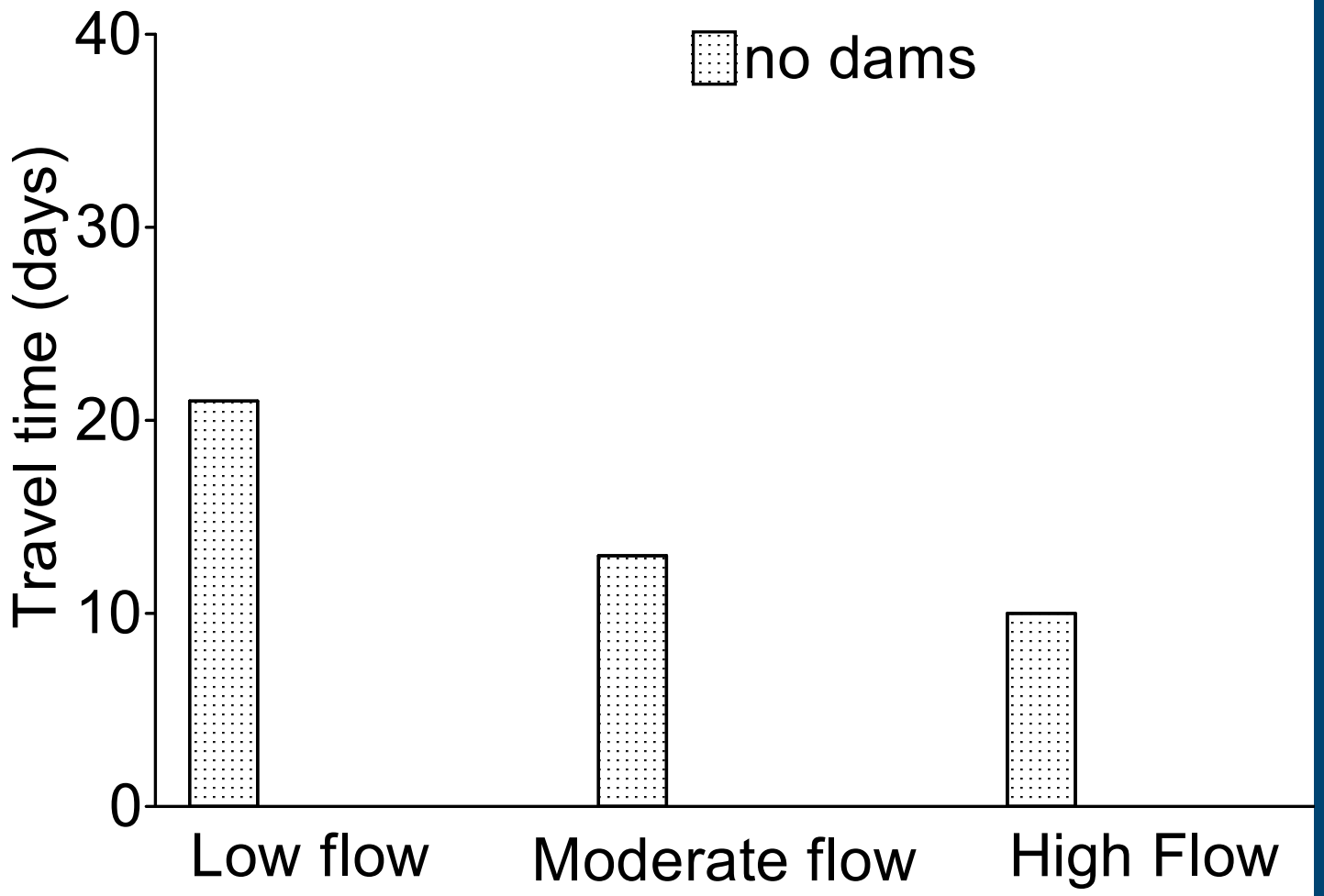
Travel time impacts arrival to and through the hydropower system and thus, timing to the estuary and ocean.


Travel Time vs. Flow UC Yearling Chinook
Median Travel Time (days)
30
35
40
45
50
150
200
250
300
350
400
450
Lower Columbia River Flow (kcfs)
0% Spill
25% Spill
50% Spill
75% Spill

Historic estimated juvenile chinook travel time from Lewiston to Bonneville Dam

(after Raymond 1979)



Snake R.	(35-53 kcfs)	(71-106 kcfs)	(106-177 kcfs)
Columbia R.	(141-177 kcfs)	(212-318 kcfs)	(353-494 kcfs)

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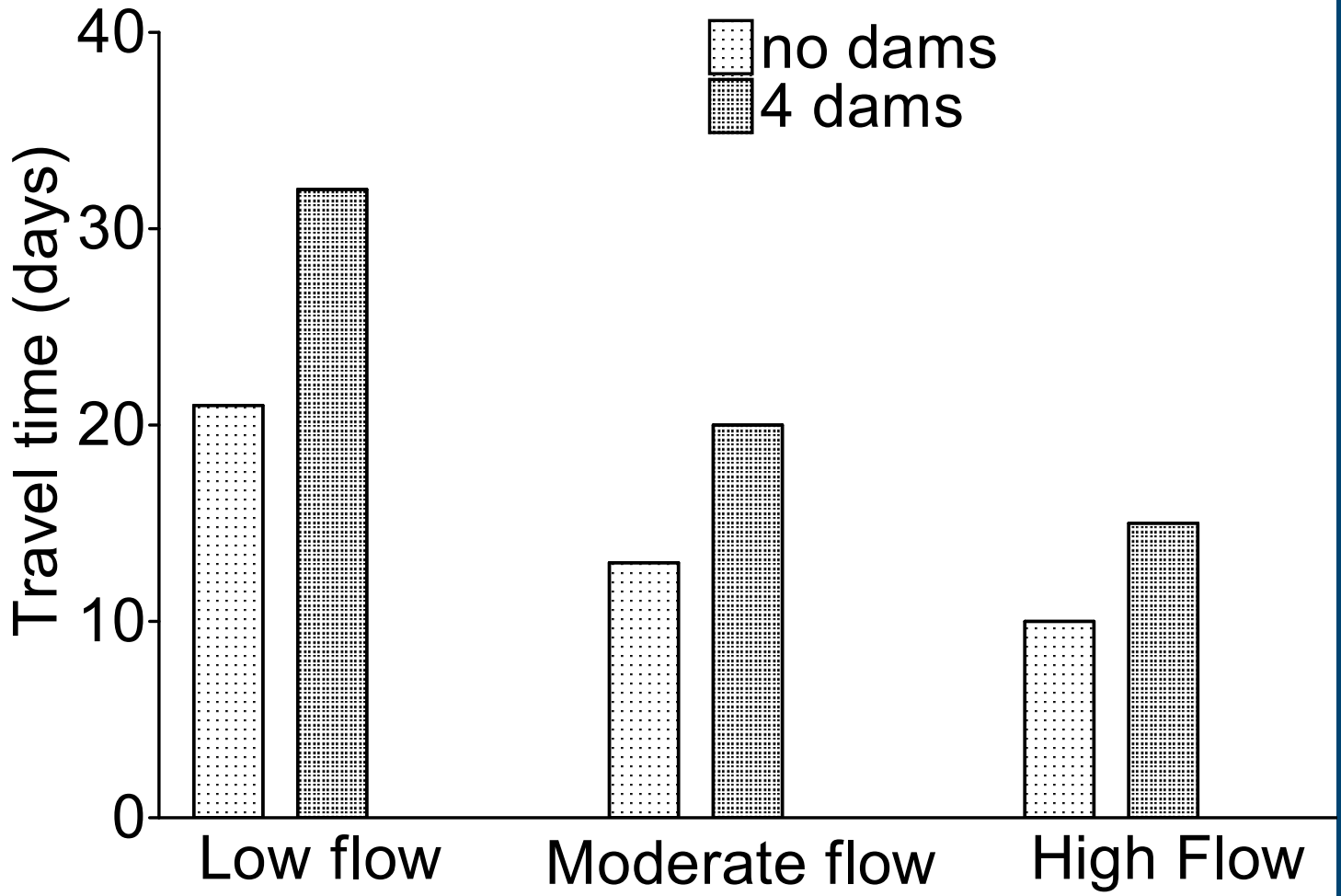
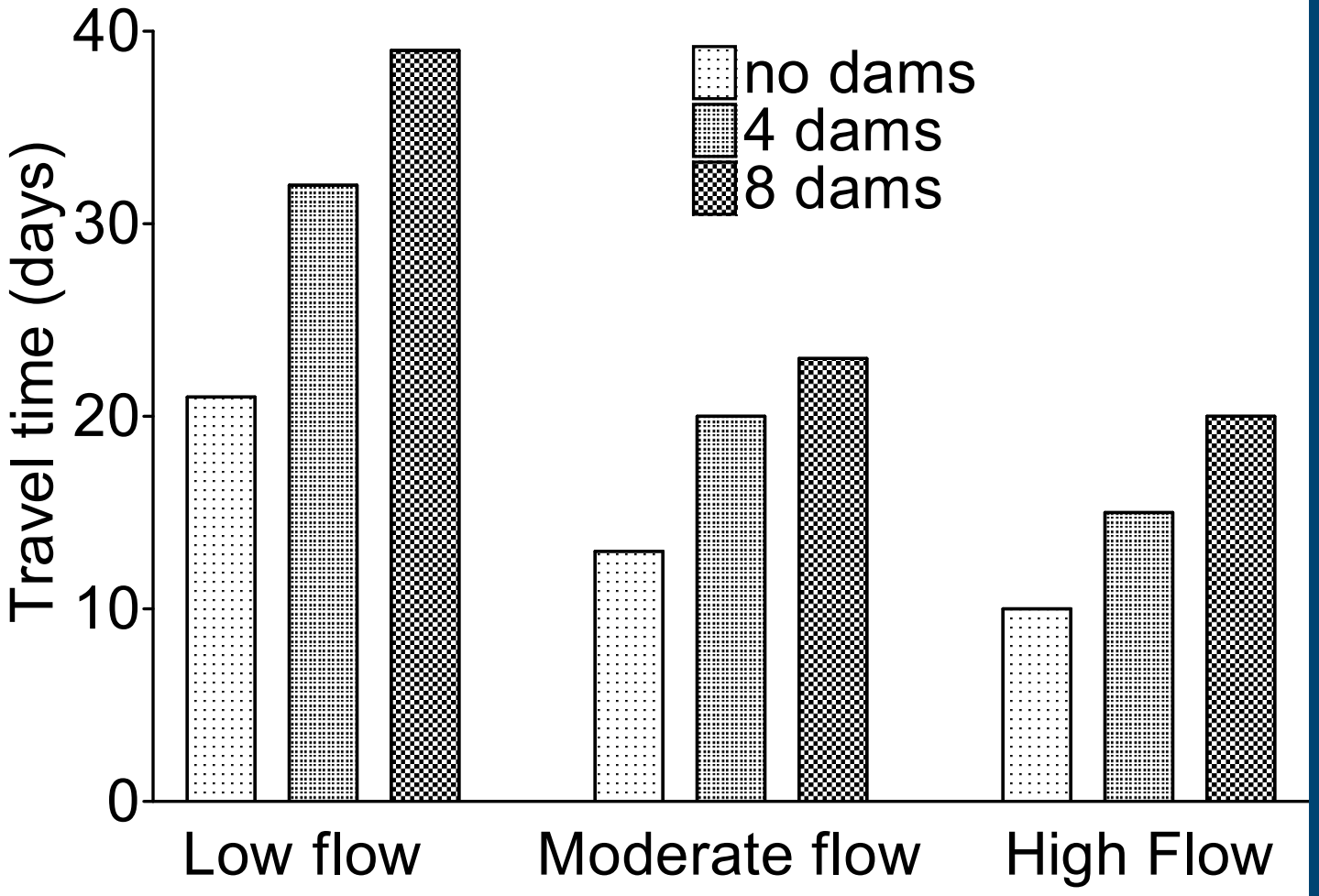


Estimated yearling chinook travel time - Lewiston to Bonneville Dam



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Spring & Summer Flow Objectives

Flow levels sought during the juvenile migration.

Columbia River

Spring: 220 – 260 kcfs depending on runoff volume

Summer 200 kcfs

Snake River

Spring: 85 – 100 kcfs depending on runoff

Summer: 50 – 55 kcfs depending on runoff

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Spring Flow Management

- Largely achieved by having reservoirs operate no lower than their flood control rule curves by April 10.
- Rationale is it passes the freshet into the river as opposed to refilling reservoir space.

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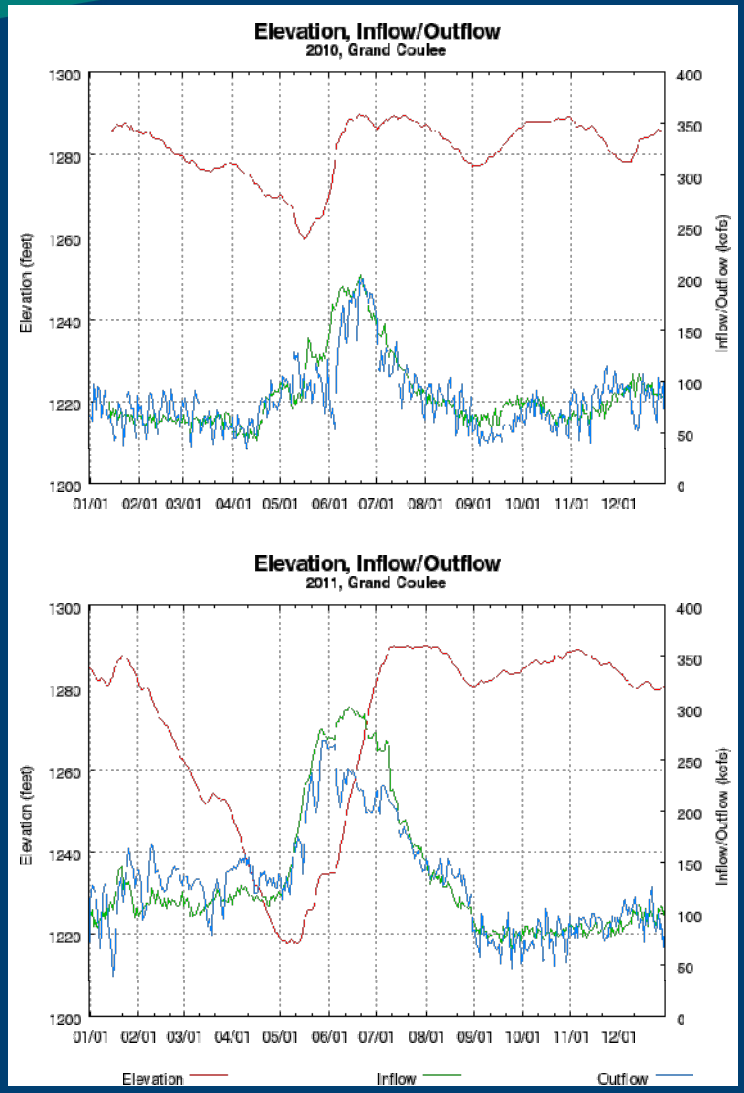
System Operations and Effects

Example:
Grand Coulee Dam



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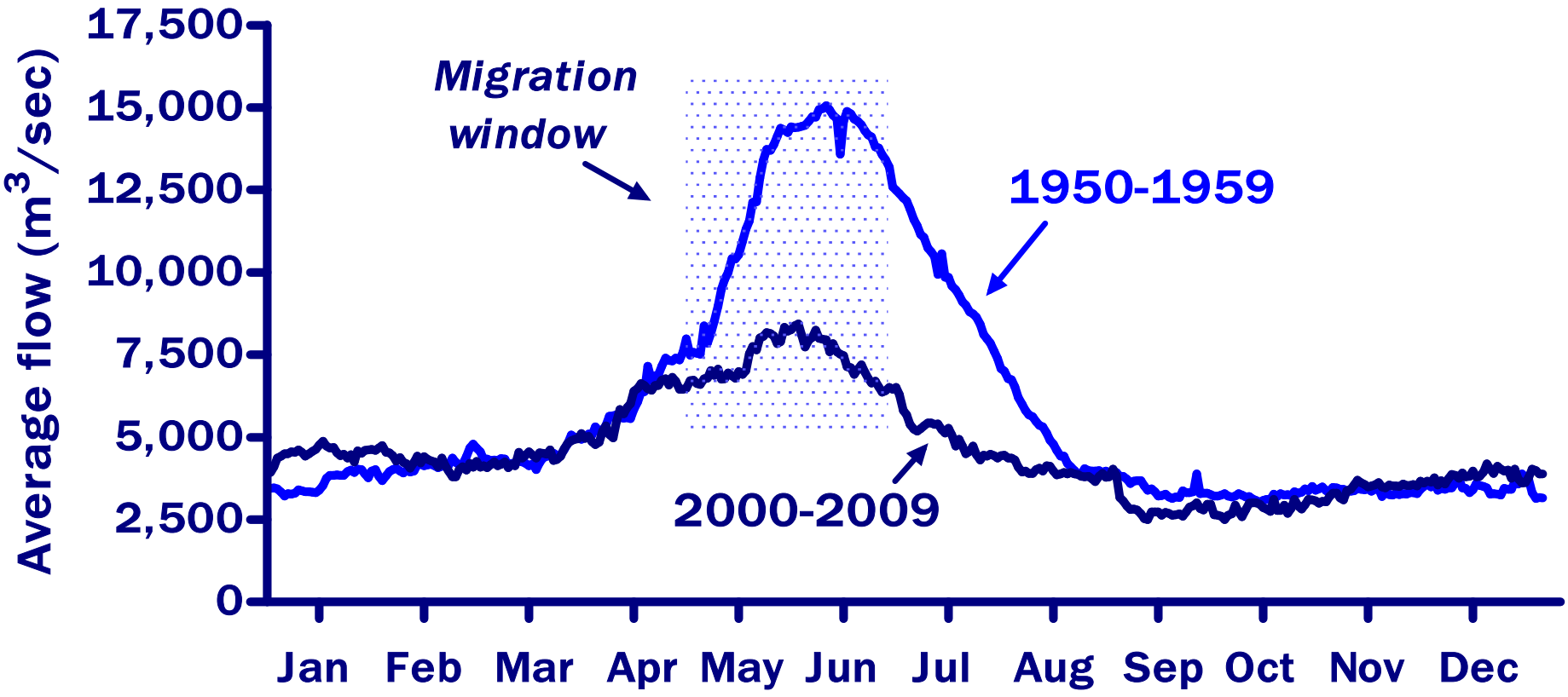
Summer Flow Management

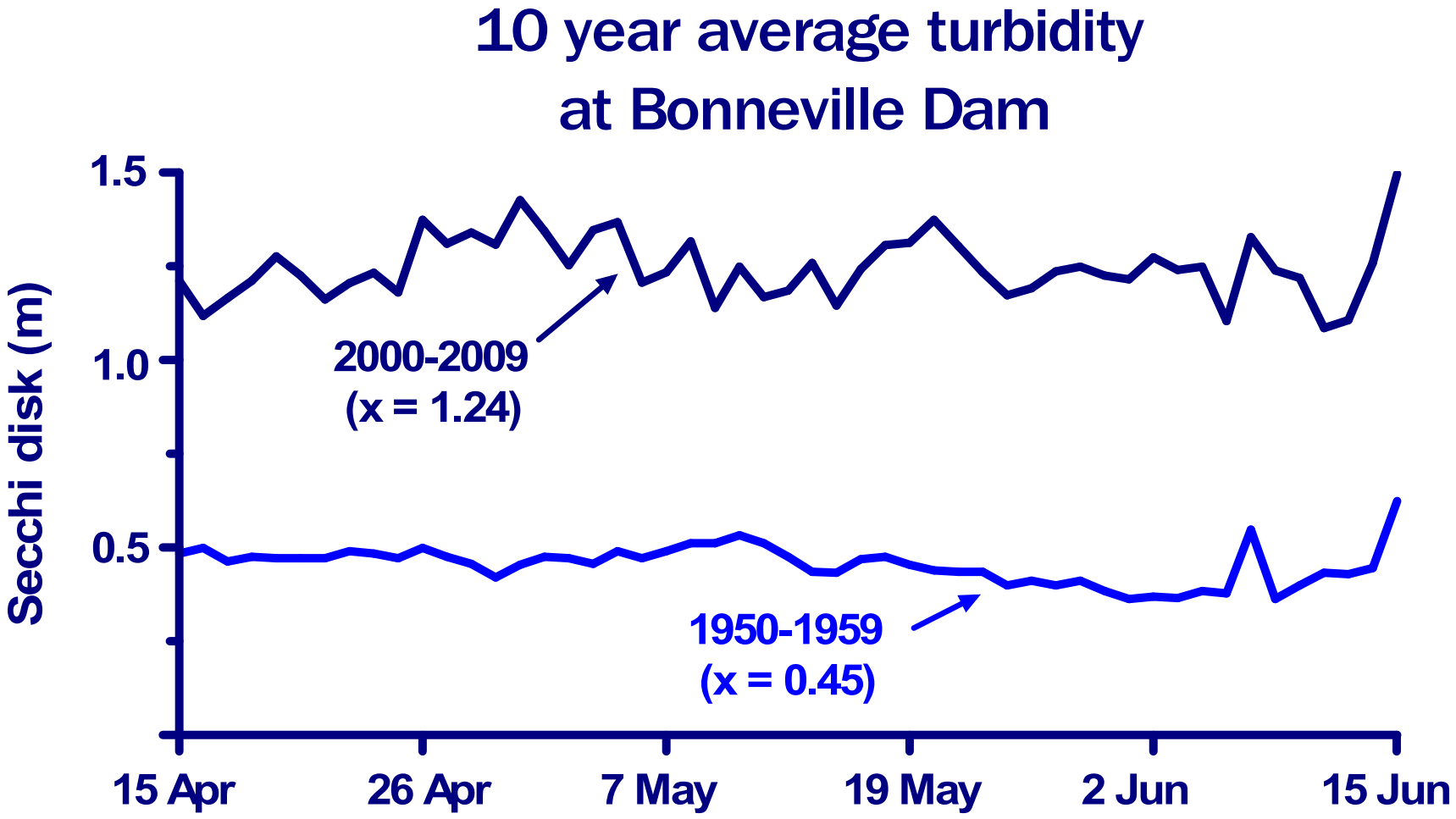
- Goal is to refill all storage project to full pool by June 30.
- Draft reservoirs within draft limits to increase river flow during the summer months.

Summer Flow Management Volumes

Storage Reservoir	Draft Limit from Full (feet)	Draft Volume (kaf)
Libby	10 – 20	455 – 891
Hungry Horse	10 – 20	246 – 467
Grand Coulee	10 – 12	789 – 942
Banks Lake	5	130
Dworshak	80	1,200
Upper Snake		487
Canadian water		1,000 – 2,000
Total		4,307 – 6,117

10 year average flow at Bonneville Dam




10 year average turbidity
at Bonneville Dam
Secchi disk (m)
1.5
1.0
0.5
2000-2009
(x = 1.24)
1950-1959
(x = 0.45)
15 Apr
26 Apr
7 May
19 May
2 Jun
15 Jun

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Plume effects

- Acts as a buffer between the freshwater and marine environments
- Higher turbidity provides smolts protection from predators
- Increases nearshore productivity by providing nutrients- increased smolt growth
- Especially important during weak upwelling or late spring transition