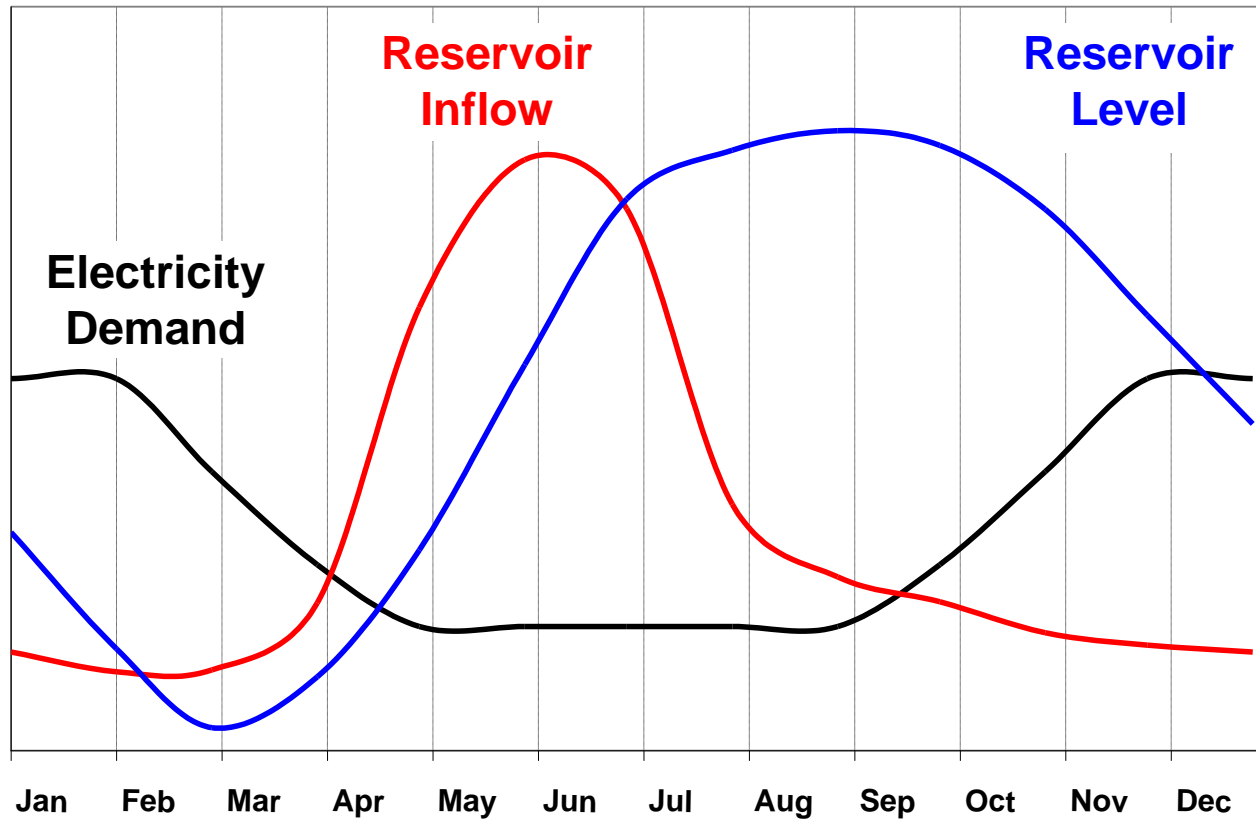


US Columbia Operations Overview

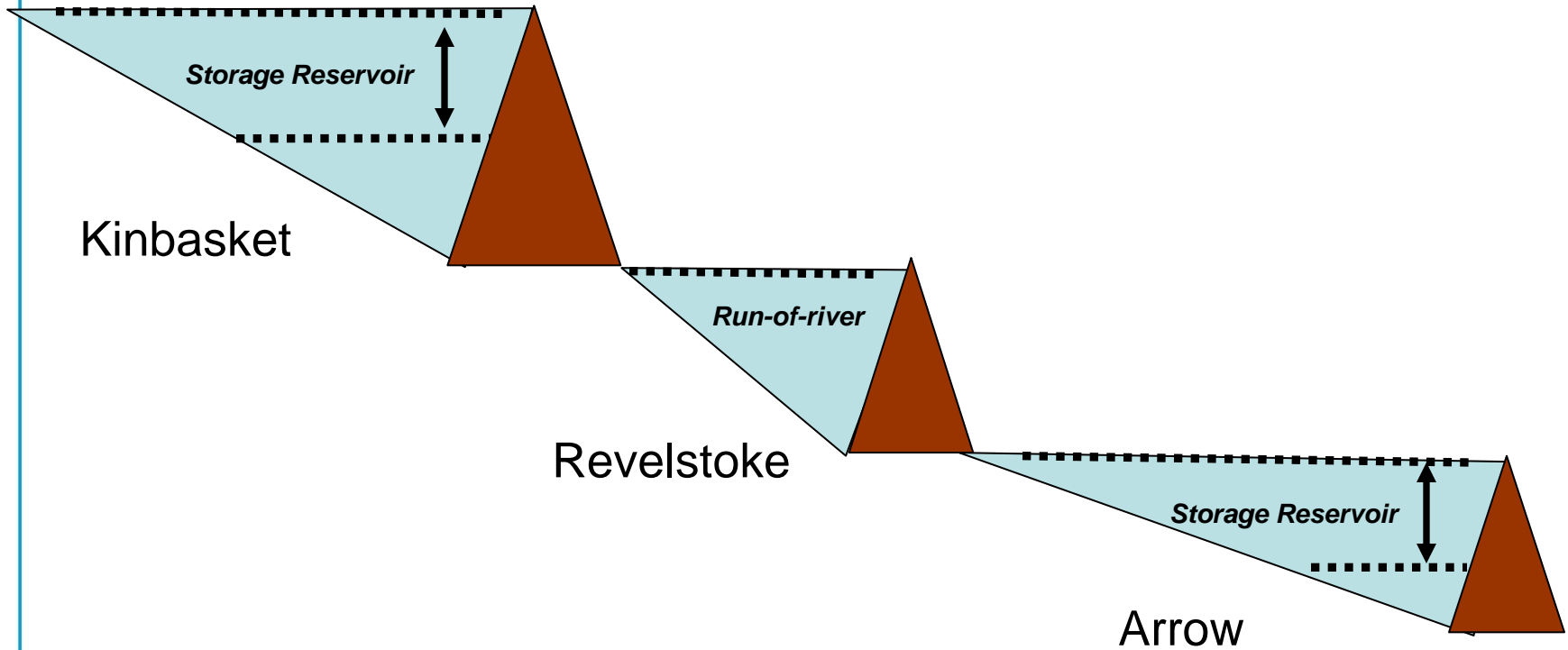
Columbia Basin Advisory Committee

The Role of Reservoir Storage

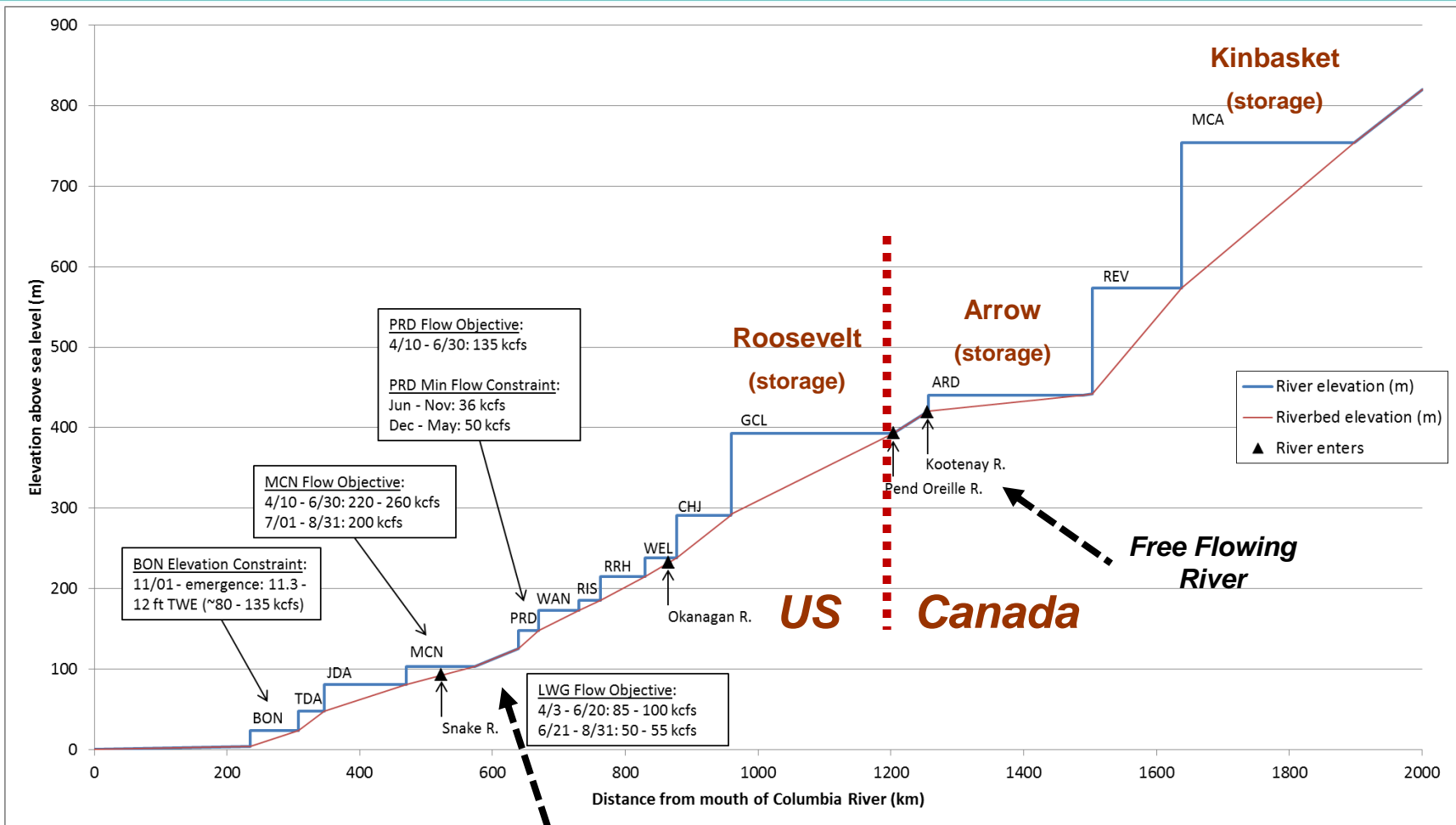
The Role of Reservoir Storage



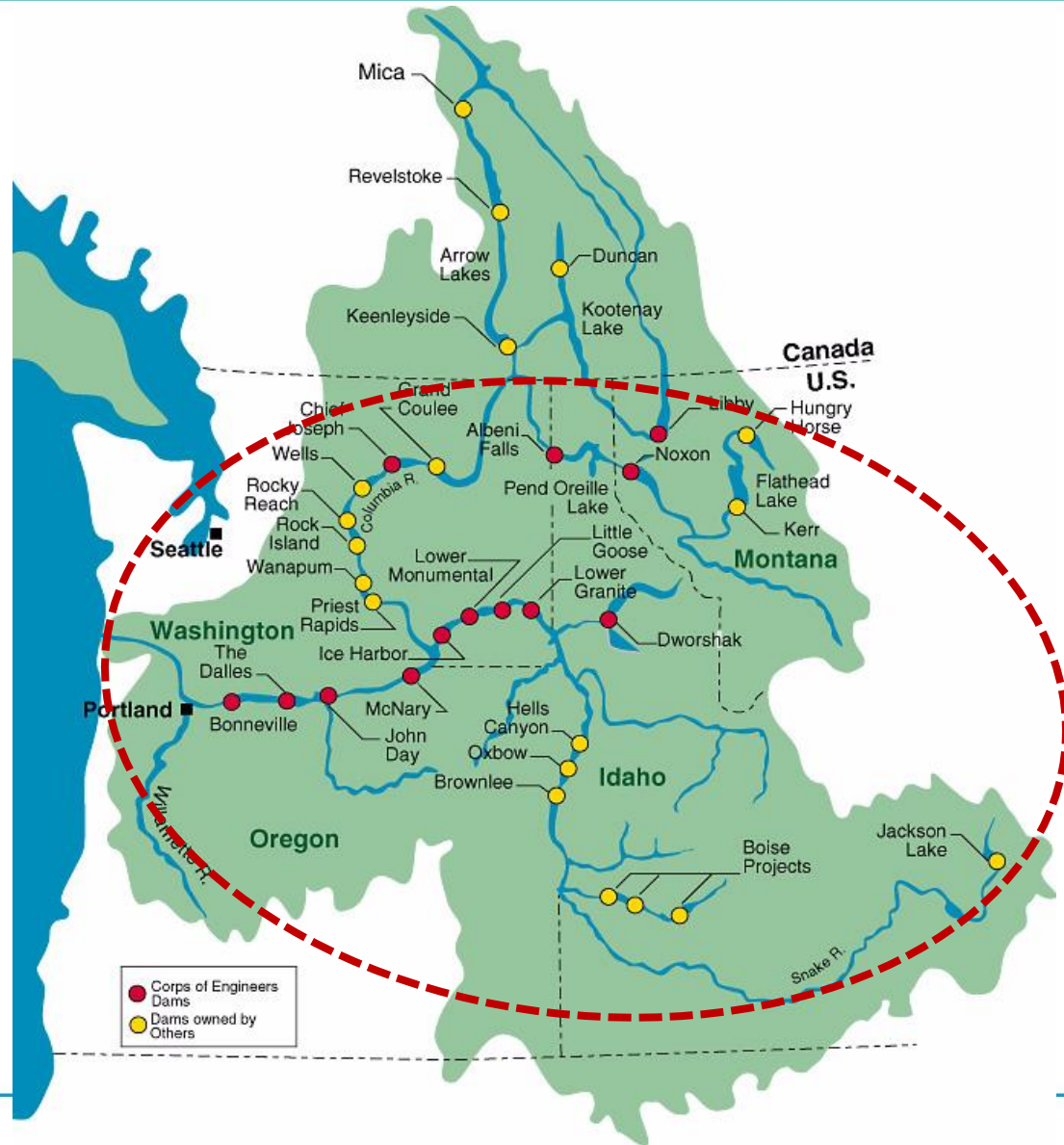
Storage vs Run-of-River Plants

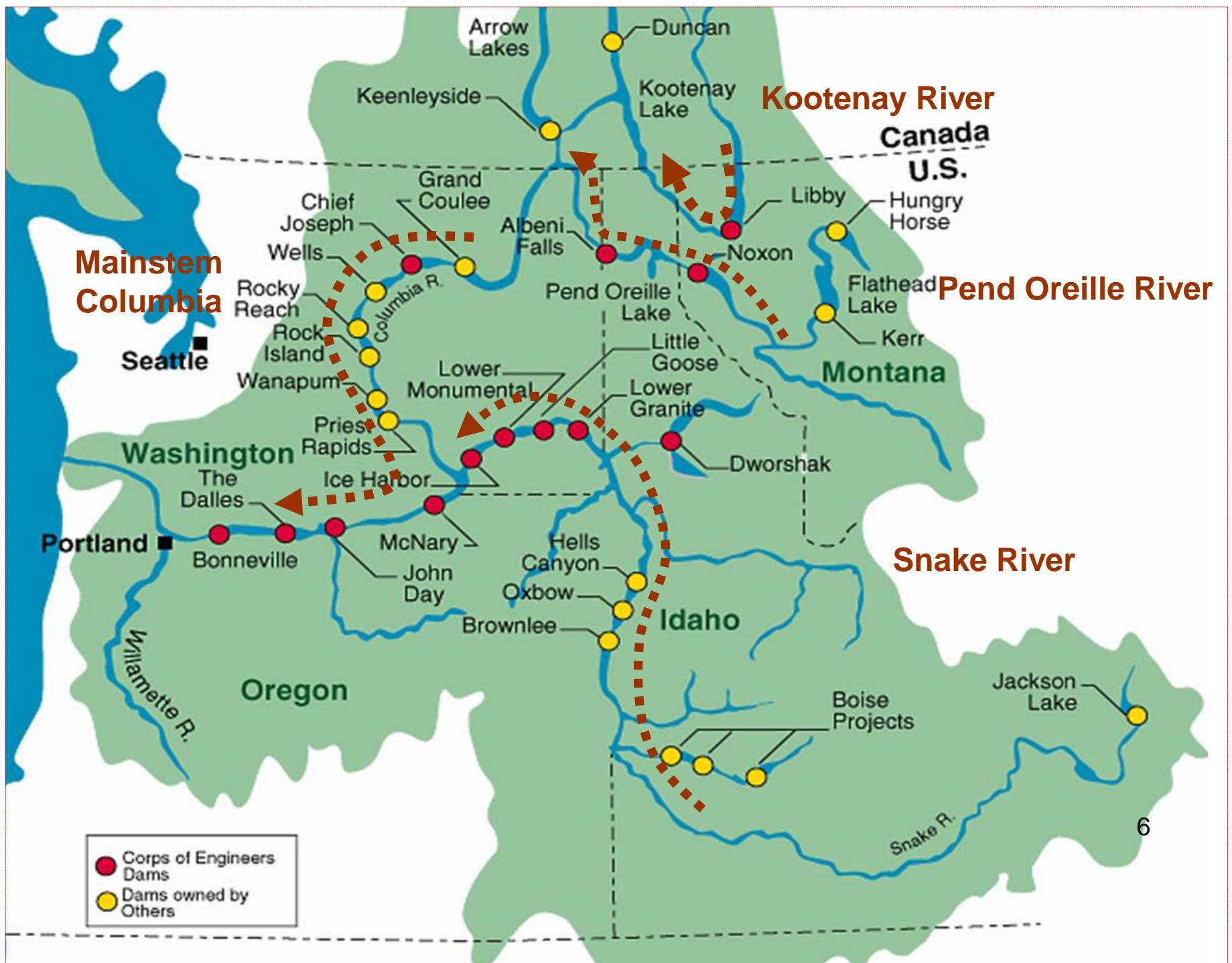


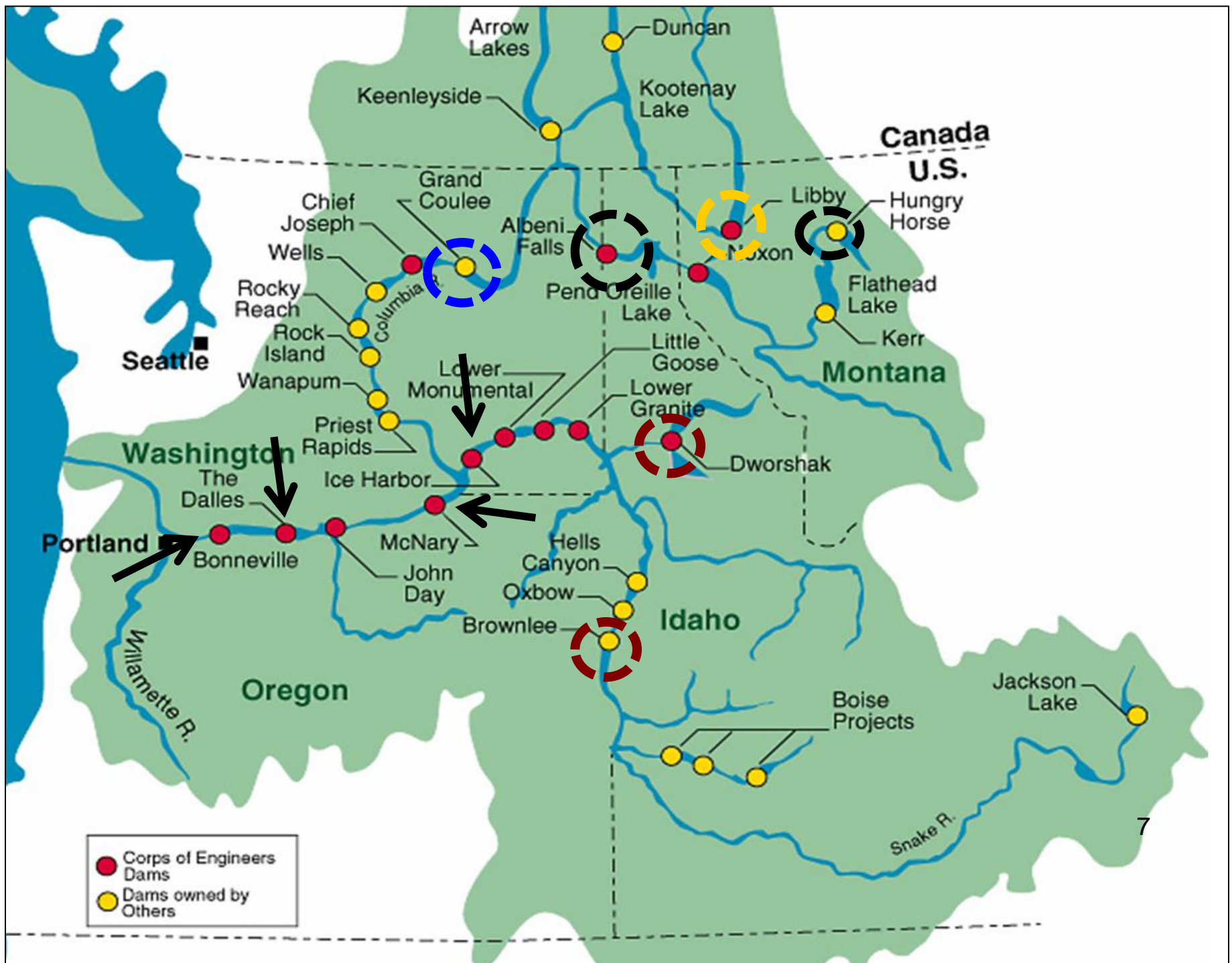
Mainstem Columbia Dams



Columbia Basin







Key Players in US Operations

- Action Agencies:
 - US Army Corp of Engineers (COE) ← Owner Operator
 - Bonneville Power Administration (BPA) ← Operator
 - Bureau of Reclamation (Reclamation) ← Owner
- Regulators & Sovereigns:
 - National Marine Fisheries Service (NMFS)
 - US Fish and Wildlife Service (USFWS)
 - State Regulators
 - Tribal Fisheries (CRITFC very active)
- Decision Making:
 - Technical Management Team (TMT)
 - Action Agencies, Regulators, Sovereigns

US Legislation

- Endangered Species Act:
 - Some fish species are listed as threatened or endangered.
 - Chum Salmon near mouth of river
 - Chinook Salmon and Steelhead in Snake and Columbia
 - Sockeye Salmon in the Snake River
 - White Sturgeon on Kootenai River
 - Bull Trout on the Kootenai and Pend Oreille
 - Must be actions to avoid jeopardizing the survival and recover of the listed species.

US Legislation

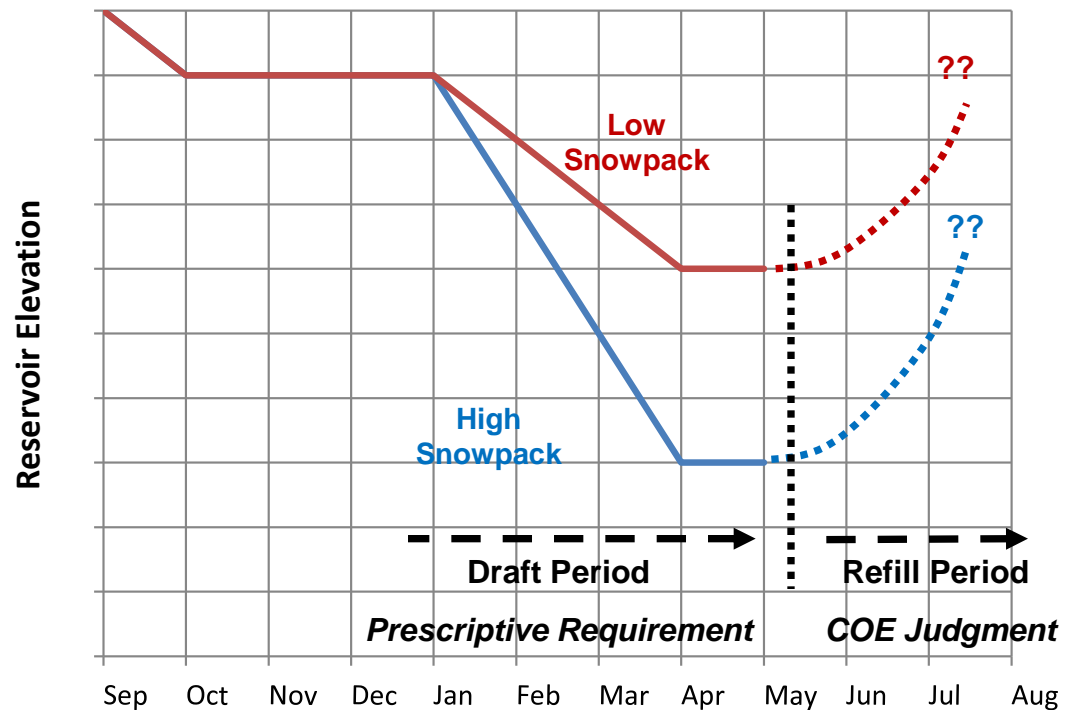
- **Biological Opinion:**
 - Authored by USFWS
 - Recommending reservoir operations required to meet the terms of the Endangered Species Act.
- **Water Management Plan**
 - Developed by Action Agencies, in consultation with regulators and sovereigns (at TMT)
 - The implementation plan for fisheries operations identified in the Biological Opinion

Key US Operations Objectives

Key US Operational Objectives

- Flood Control
 - COE have responsibility for both Canadian and US Flood Management
 - Each Storage Reservoir will have Flood Control obligation.

Typical Reservoir Flood Control Requirement



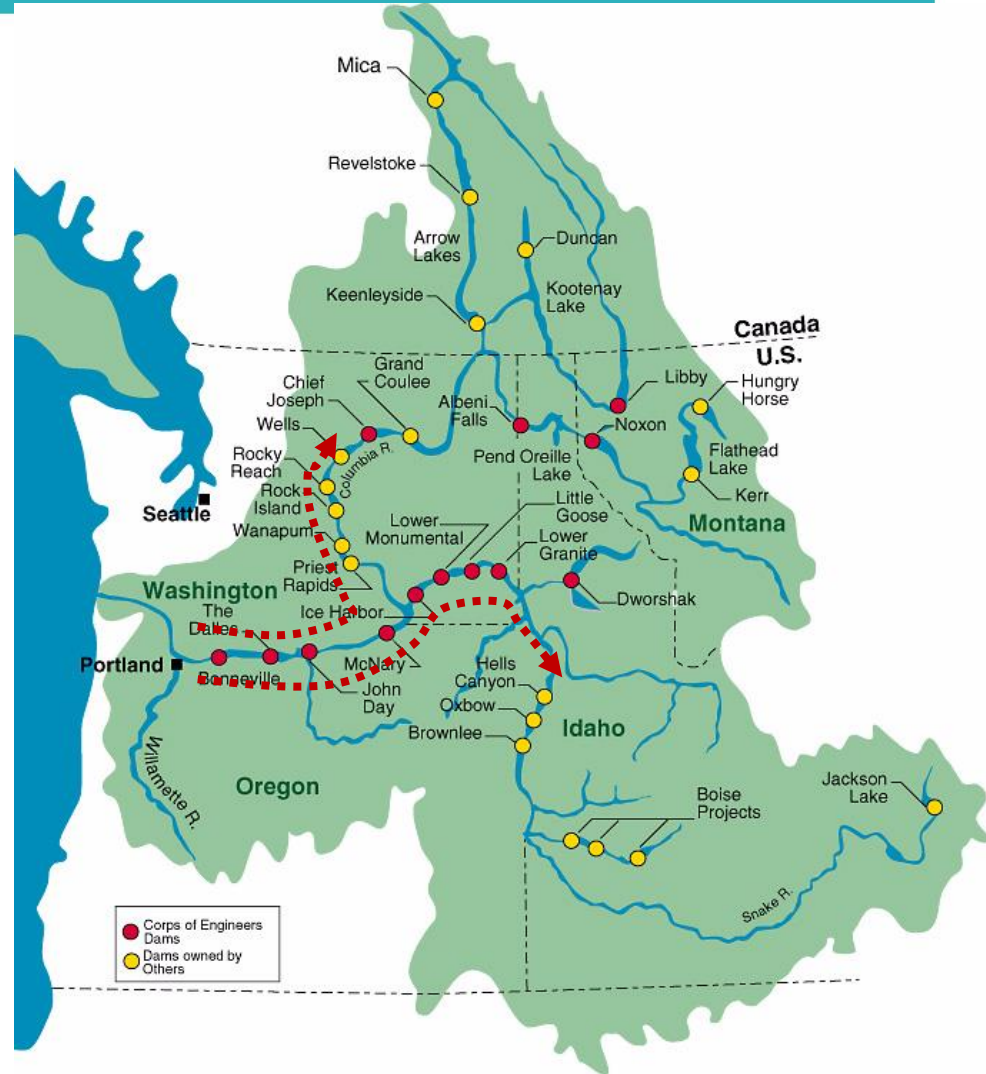
Key US Operational Objectives (Apr 10 - Aug 31)

- Support out-migration of Salmon Smolt
 - Peak: April – June
 - Objective to flush smolt to ocean as quick as possible.
 - McNary Flow Objective:
 - 220 to 260 kcfs at McNary
 - Hold below ~300 kcfs, else Total Dissolved Gas will be too high.



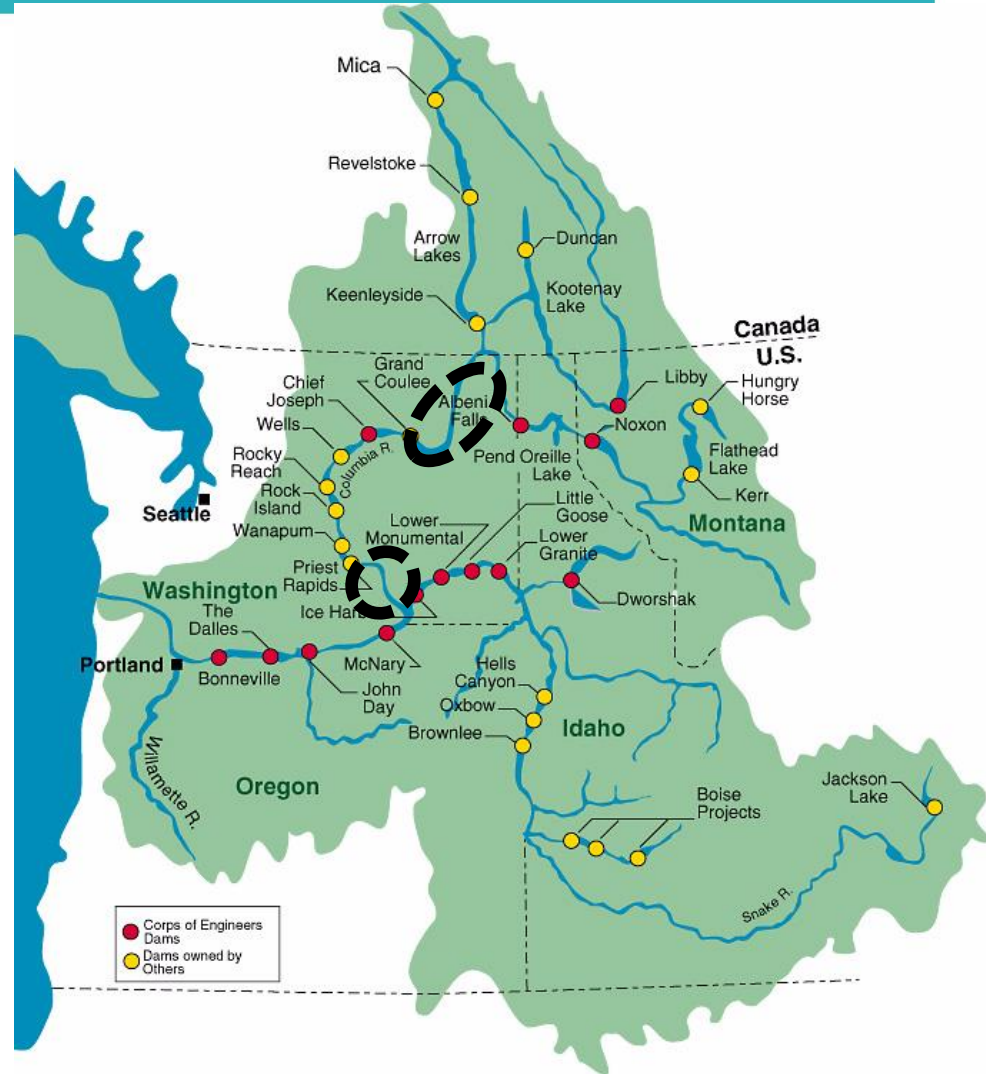
Key US Operational Objectives (Apr 10 - Aug 31)

- Support Spawning Adults Salmon
 - Peak: July – Aug
 - Temperature issue in River
 - >21oC can drastically slow spawning.
 - 200 kcfs objective at McNary to help cool river water.



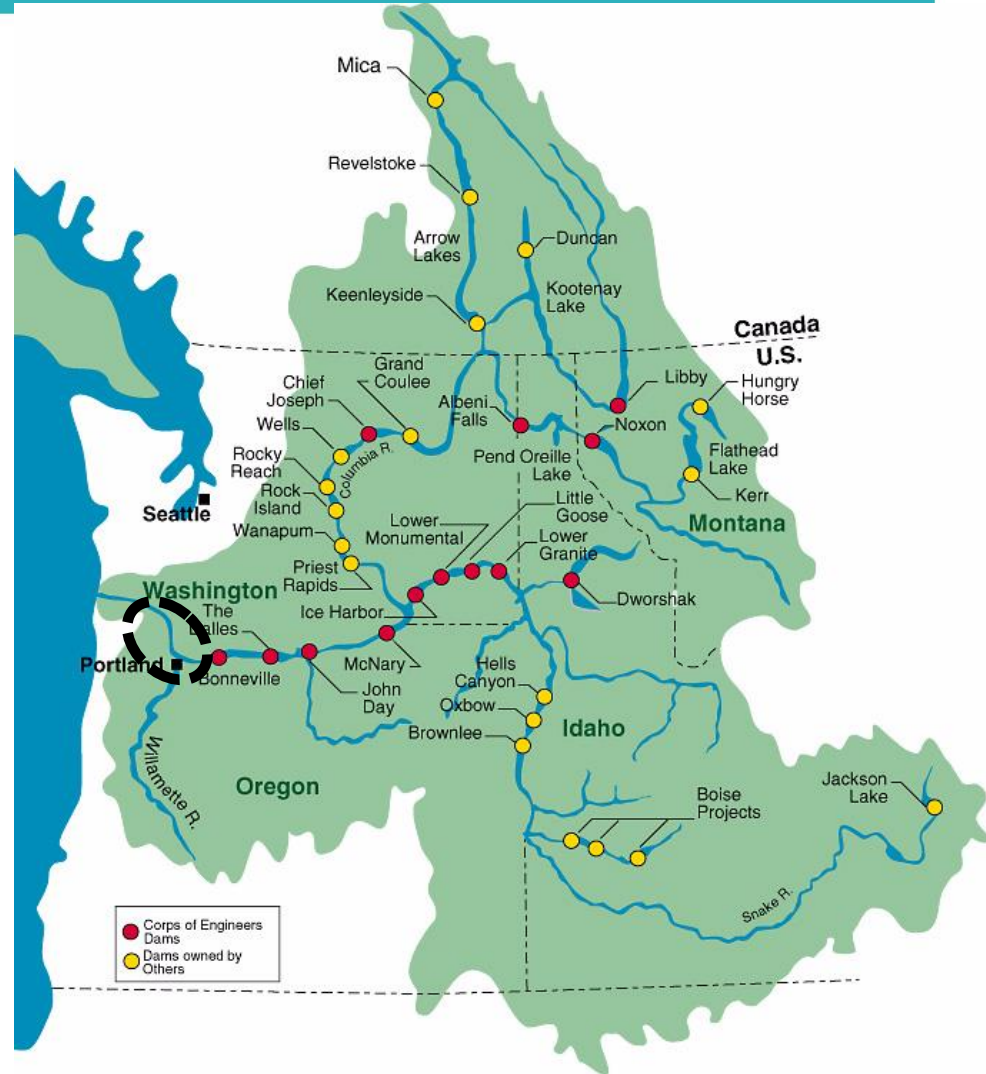
Key US Operational Objectives (Sep 1 - early-Nov)

- Grand Coulee
Kokanee
Spawning
 - Hold Roosevelt high in fall.
- Vernita Bar
Salmon
Spawning
 - October
 - Hold water level low for spawning.



Key US Operational Objectives (Early-Nov – Apr 10)

- Support Chum Salmon Spawning
 - Higher flow desirable to increase spawning habitat
 - Not too high, else there may not be enough winter water to prevent dewatering
 - Hold the protection level across the winter.
 - Plant Tailwater of about Elev 11.4 feet (~120 kcfs)



Other US Operational Objectives

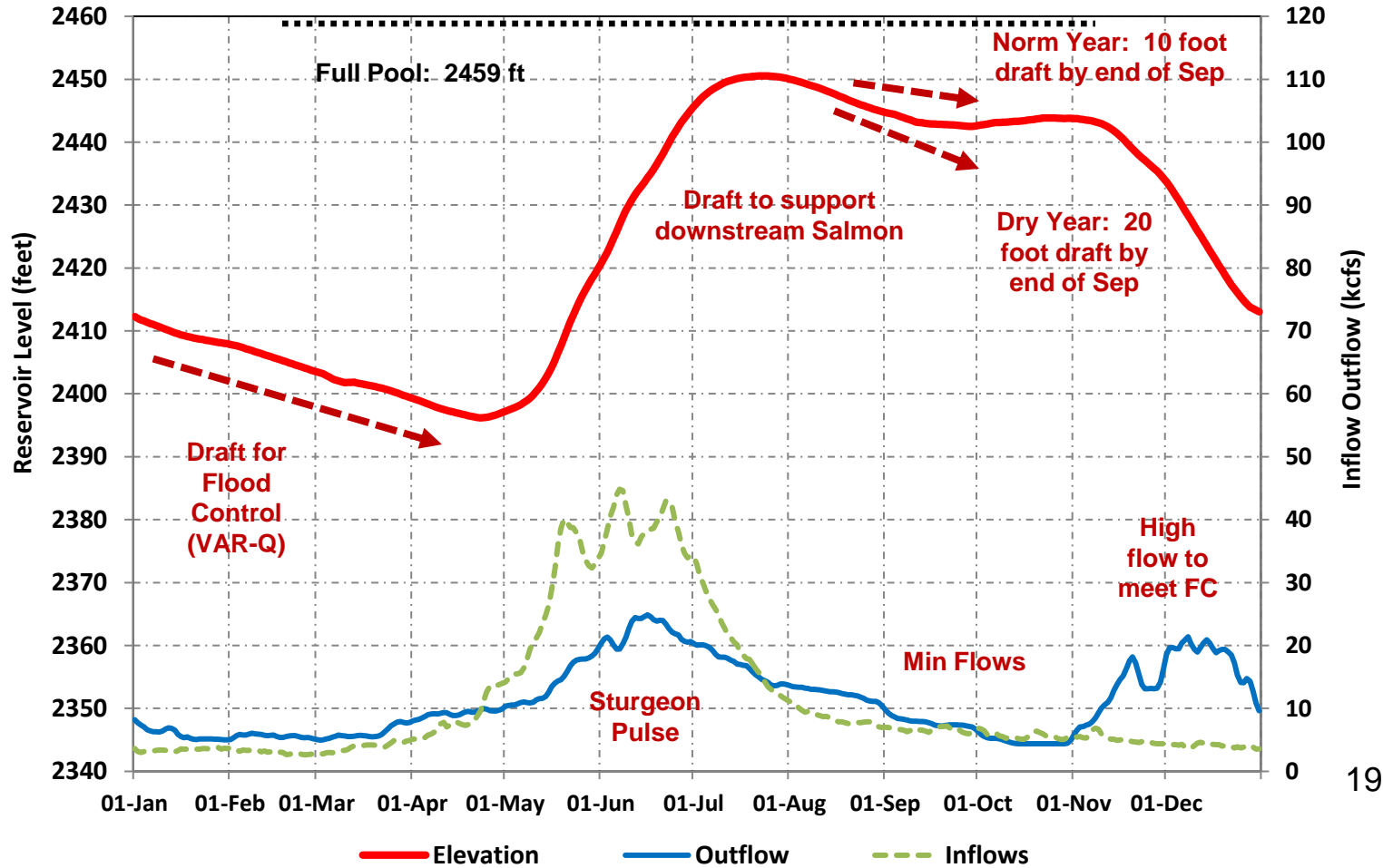
- Libby
 - Flow pulse at LIB to trigger spawning of Sturgeon.
 - Bull Trout flows
- Hungry Horse
 - Bull trout flows.



US Storage Reservoir Operations

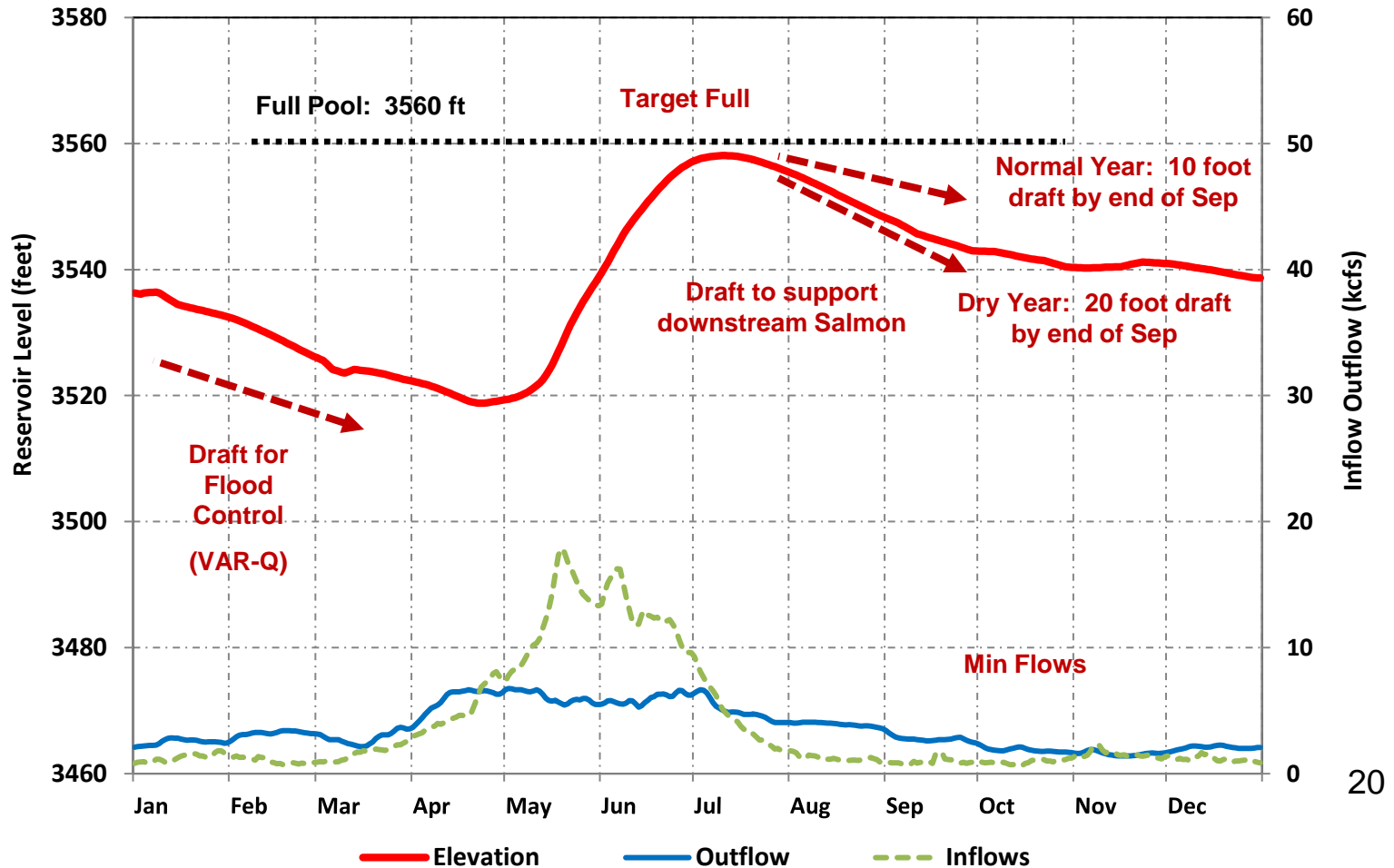
Libby Dam (Koccanusa Reservoir)

Libby Reservoir Summary of inflows, Outflows and Levels (Average: 2004 - 2014)



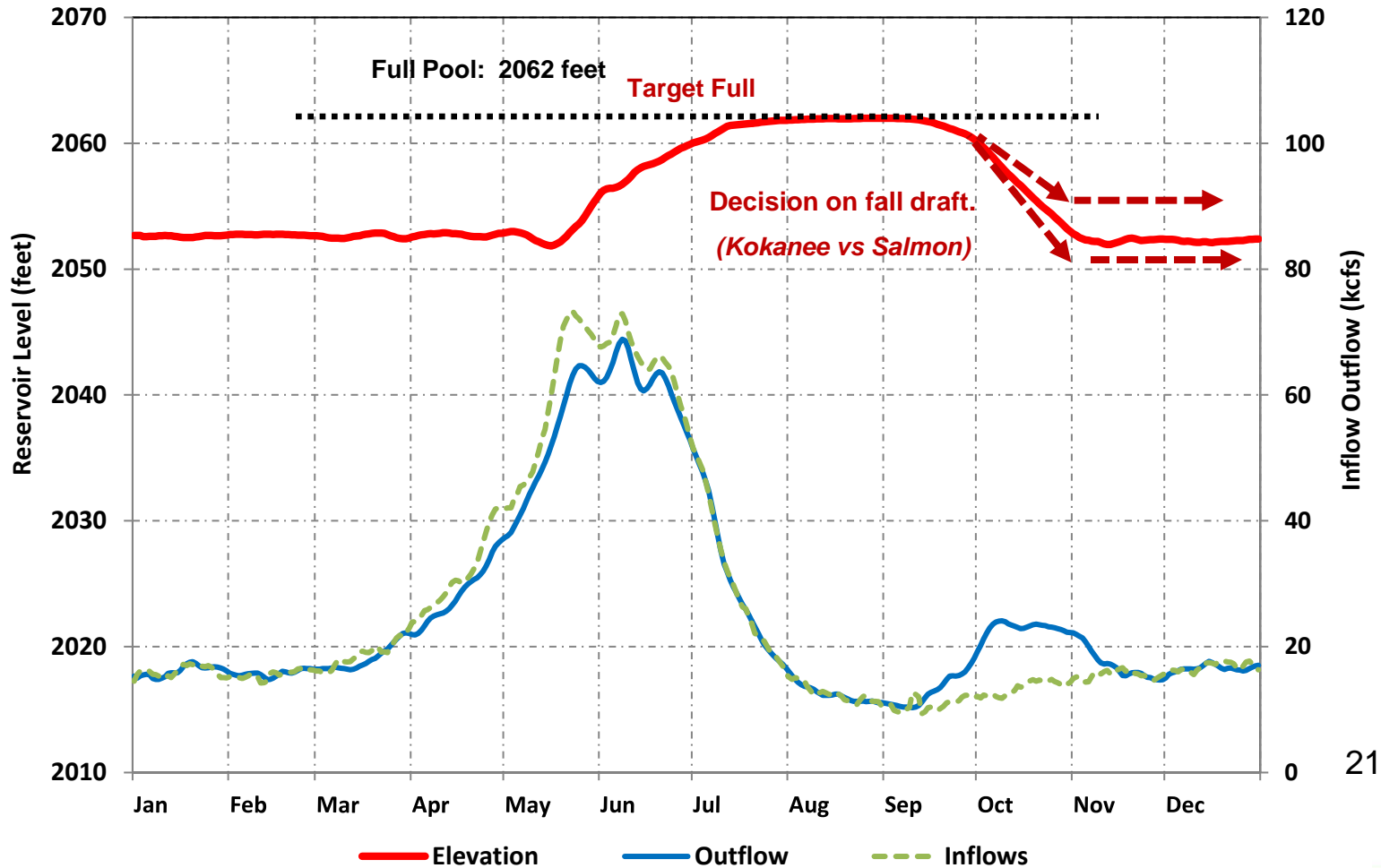
Hungry Horse Dam and Reservoir

Hungry Horse Reservoir
Summary of Inflows, Outflows and Levels
(Average: 2004 - 2014)



Albeni Falls (Lake Pend Orielle)

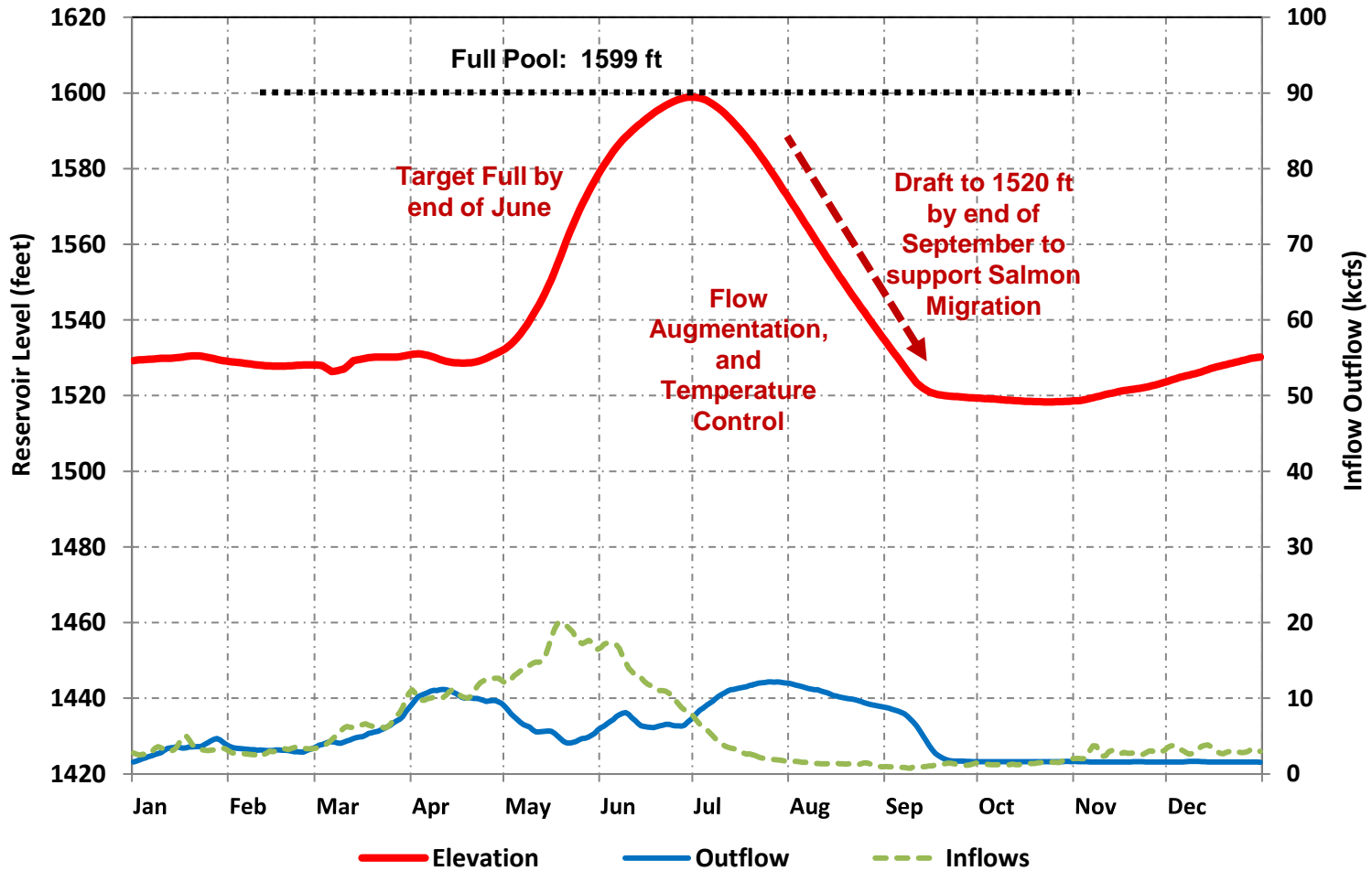
Albeni Falls Reservoir Summary of Inflows, Outflows and Levels (Average: 2004 - 2014)



B
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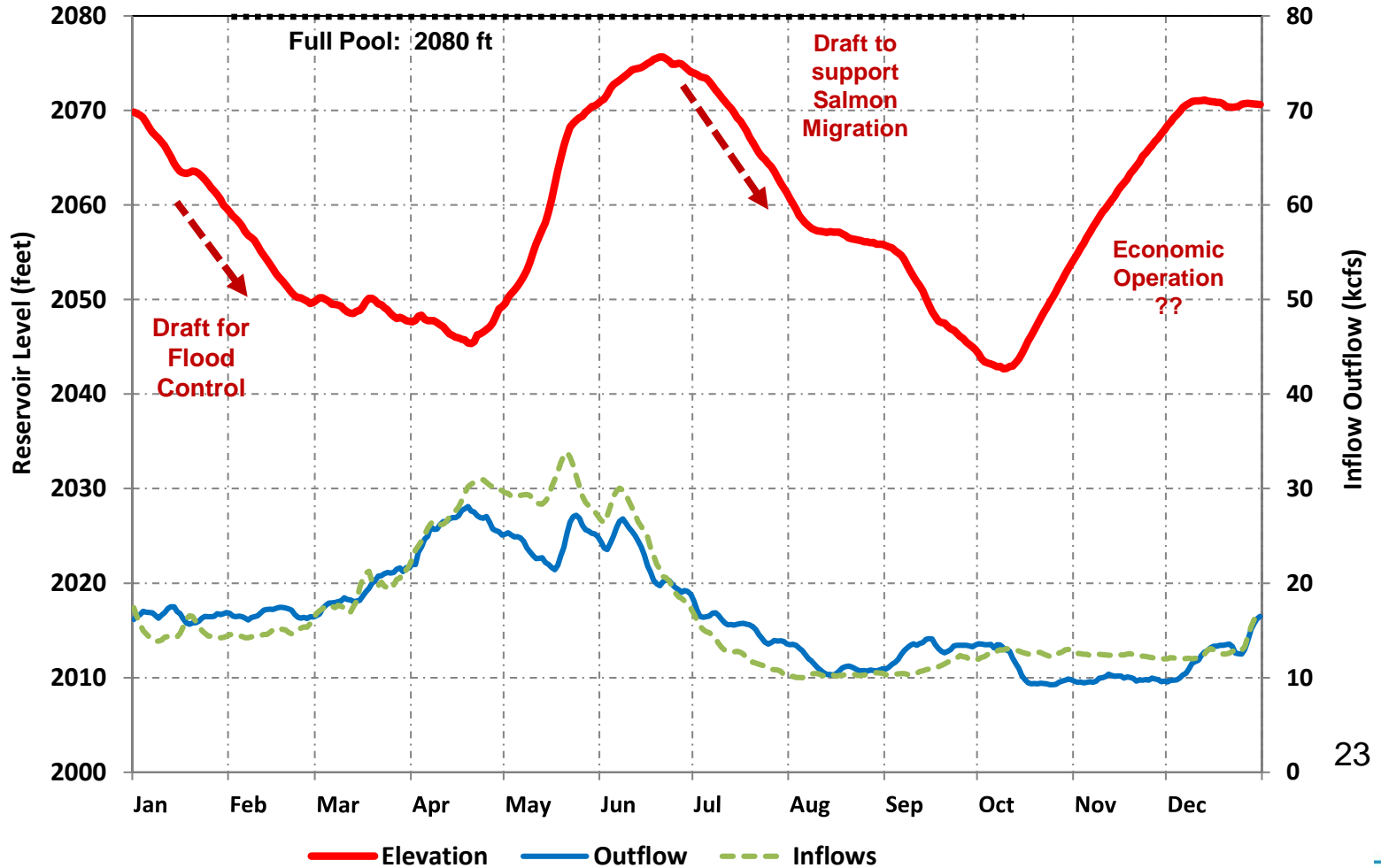
Dworshak Reservoir

Dworshak Reservoir
Summary of Inflows, Outflows and Levels
(Average: 2004 - 2014)



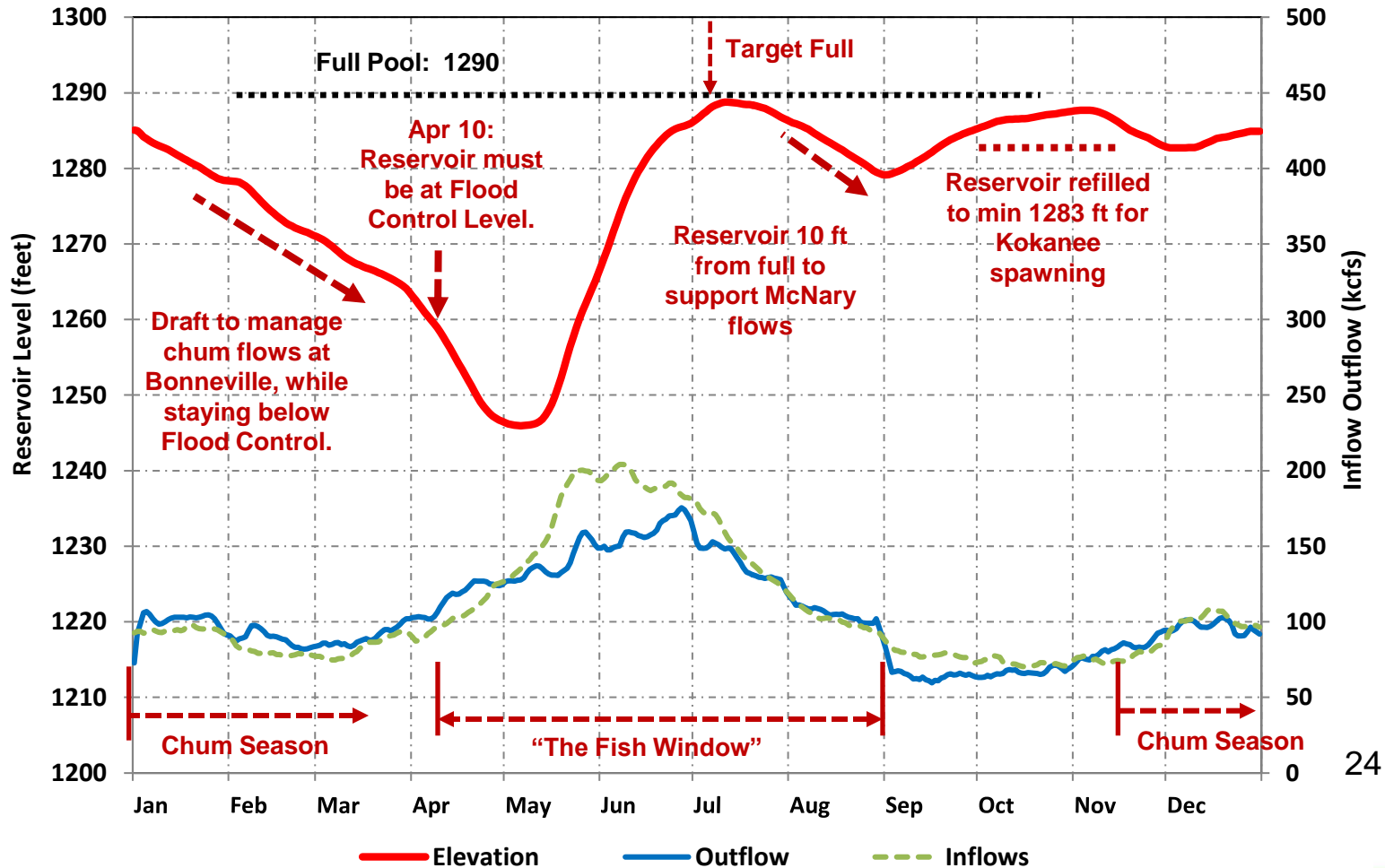
Brownlee Reservoir

Brownlee Reservoir
Summary of Inflows, Outflows and Levels
(Average: 2004 - 2012)



Grand Coulee (Lake Roosevelt) Reservoir

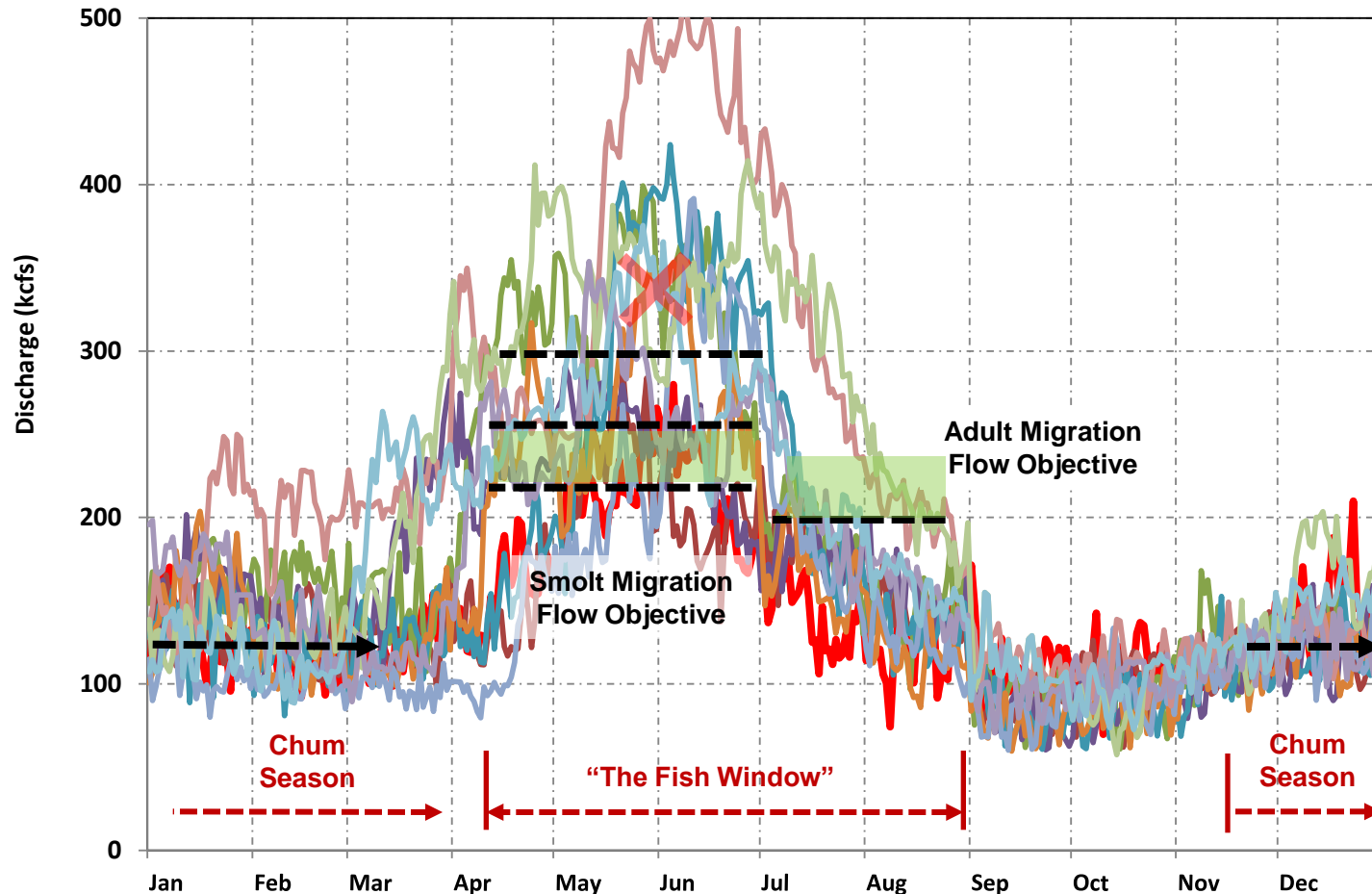
Grand Coulee Reservoir
 Summary of Inflows, Outflows and Levels
 (Average: 2004 - 2014)



Downstream Flow Outcomes

McNary Plant Discharge

McNary Dam Discharges
(Average: 2004 - 2014)



— 2004 — 2005 — 2006 — 2007 — 2008 — 2009 — 2010 — 2011 — 2012 — 2013 — 2014

Questions ?