Northwest Power and Conservation Council

Incorporating Fish and Wildlife Operations…

…into the Power Planning Process

Resource Adequacy Forum
Technical Committee Meeting
March 16, 2007

Purpose

- To develop a power planning methodology that will ensure the region an "adequate, efficient, economical and reliable" power supply…
- … while at the same time assuring an acceptable likelihood of providing mainstem operations intended to "protect, mitigate and enhance" fish and wildlife populations.

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Proposal

- Create a metric (Loss Of Fish-operation Probability or LOFP) that measures how often fish and wildlife operations are curtailed due to power system emergencies.

- Establish a planning standard for the LFOP (similar to the 5% used for the LOLP).

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Fish and Wildlife Operations

- Flow Augmentation – storing water during winter for later release during the migration season in spring and summer.

- Bypass Spill – diverting flows around turbines to improve passage survival for outmigrating smolts during spring and summer months.

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Emergency Provision

- In the 2000 biological opinion, a provision allows for the curtailment of fish and wildlife operations in the event of a power system emergency.

- A power system emergency could be declared in the event of a severe cold snap and/or a generator or transmission line outage.

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Flow Augmentation/Refill Objectives

- Fill to flood control elevations by early April.
- Fill to full elevations by the end of June.
- Draft no lower than the biological opinion elevation limits by the end of August.
- Within these constraints, attempt to meet the flow objectives for spring and summer for both the Snake and Columbia rivers.

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Curtailment of Flow Augmentation

- Will manifest itself as a failure to refill reservoirs by target dates.
- April refill is the most likely to be curtailed because water releases for power emergencies will most likely happen during winter months.
- Under severe conditions (very dry and/or generation resource shortfall) June and August refill could also be affected.

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Curtailment of Bypass Spill

- Bypass spill occurs in spring and summer so it is unlikely that it would be curtailed for power emergencies (unless there is a severe shortage of generating resources).
- Bypass spill can also be curtailed to fill dams to desired elevations by August to avoid potential problems in the following winter.

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Prototype Metric

- Of all the fish and wildlife measures, April refill is the most likely to be curtailed.
- It is unlikely that June or August refill would be curtailed when the April refill is not.
- Bypass spill would most likely be curtailed for refill purposes (i.e. not for power needs).
- Therefore, use the April refill as a prototype measure for the LOFP.

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What is Hydro Flexibility?

- Drafting below the operating rule curves to provide additional energy during power system emergencies (some of this water is earmarked for flow augmentation).

- To be replaced as soon as possible even if it means buying imported energy or running expensive thermal generators.

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Calculating LOFP

- Run a simulation without the use of hydro flexibility (this will assure that no refill violations occur due to operating flexibility).
- Run a second simulation enabling hydro flexibility.
- If hydro flexibility water can be replaced before April, then no violation is recorded.
- Count the number of times that the "flex" simulation does not fill to the "non-flex" elevations by April.

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The LOFP Standard

- Some argue that the LFOP should be zero percent, meaning that we should plan a power system in which fish and wildlife operations are never curtailed. It is supported by the fact that refill and flow objectives are already compromised and are not always achieved.

- An alternative approach is to plan a power system in which fish and wildlife operations are occasionally curtailed. The power system is not designed to provide 100 percent reliability nor should it provide 100 percent compliance with fish and wildlife operations.

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Counting Curtailment Events

- Because of uncertainties in data and imperfect computer models, a threshold must be established to identify significant events.

- The energy standard uses a 1,200 MW-day threshold.

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LOFP Threshold

- The average spring flow augmentation volume provided is about 2 maf.
- The average spring flow augmentation volume provided during the driest years is about 6 maf.
- Proposal – use 10% of the average spring flow augmentation volume or 200 kaf.
- Equates to a flow reduction of about 1,300 cfs during spring months when average flows are about 275,000 cfs (0.5% reduction in flow).

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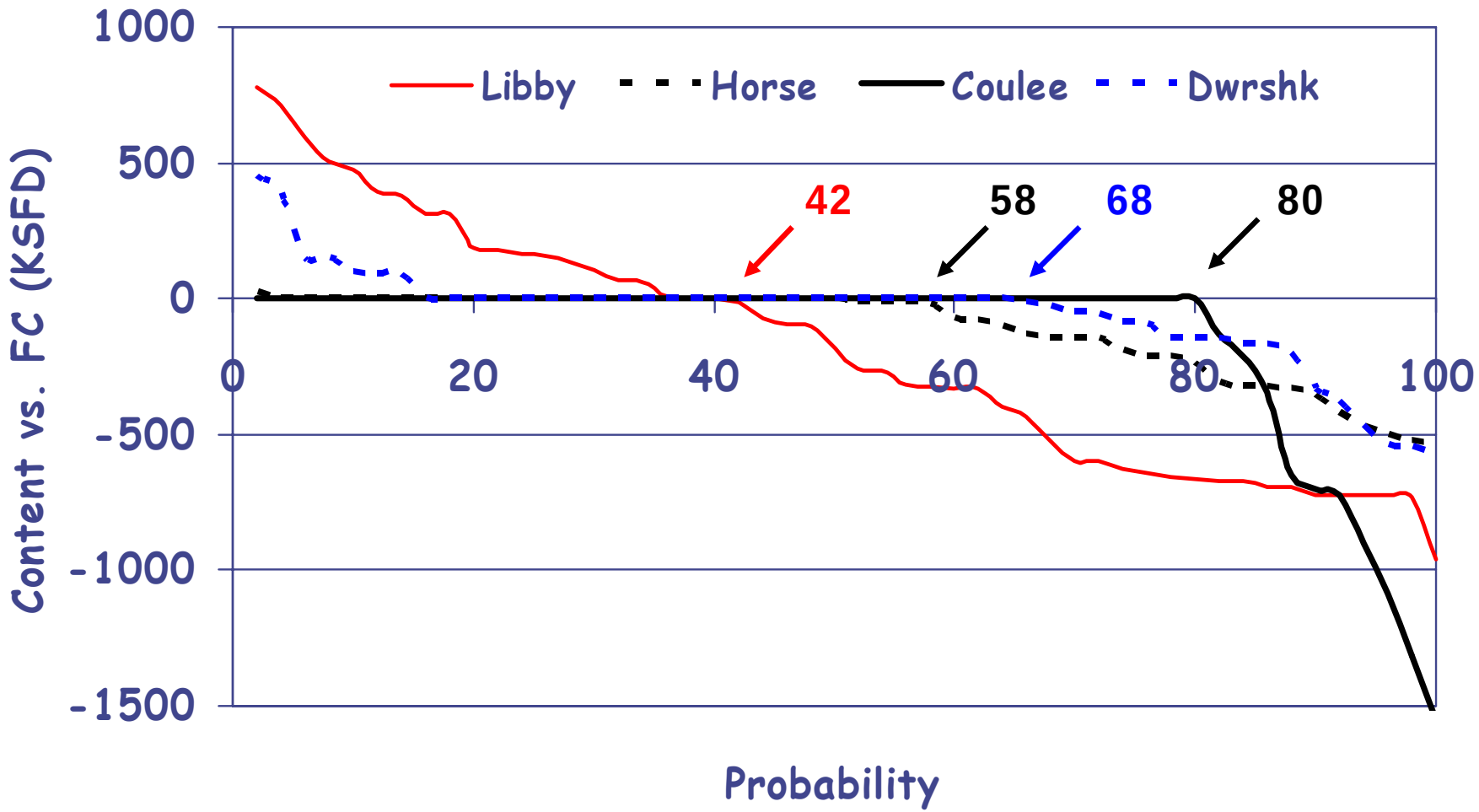
April Refill Probability (w/o Flex)



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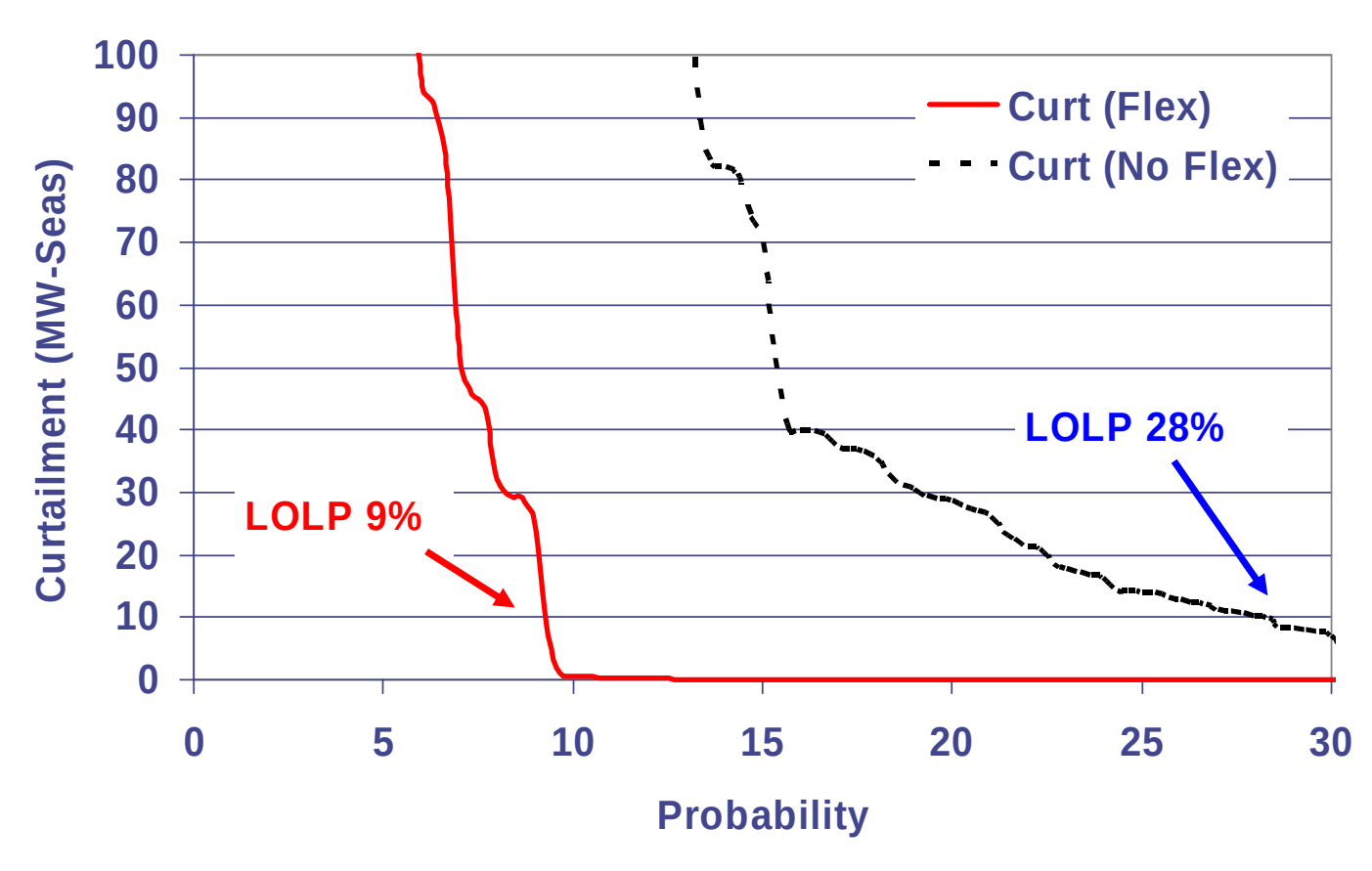
Examples of LOLP
(With and without Hydro Flex)



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LOLP vs. LOFP
(Fixed Resources and Loads)

	LOLP	LOFP
Flex	9%	6%
No Flex	28%	0%

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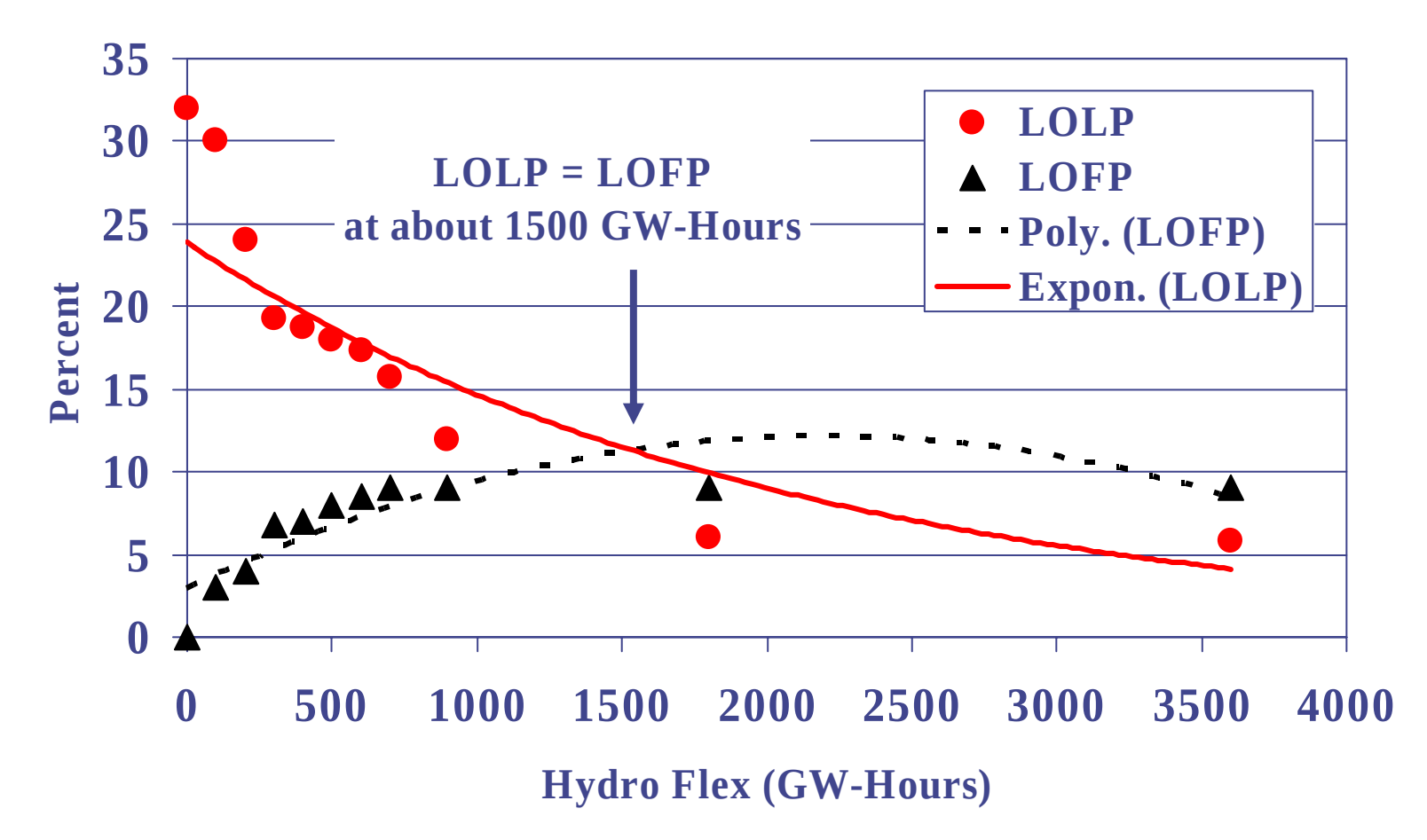
LOLP and LOFP vs. Hydro Flex



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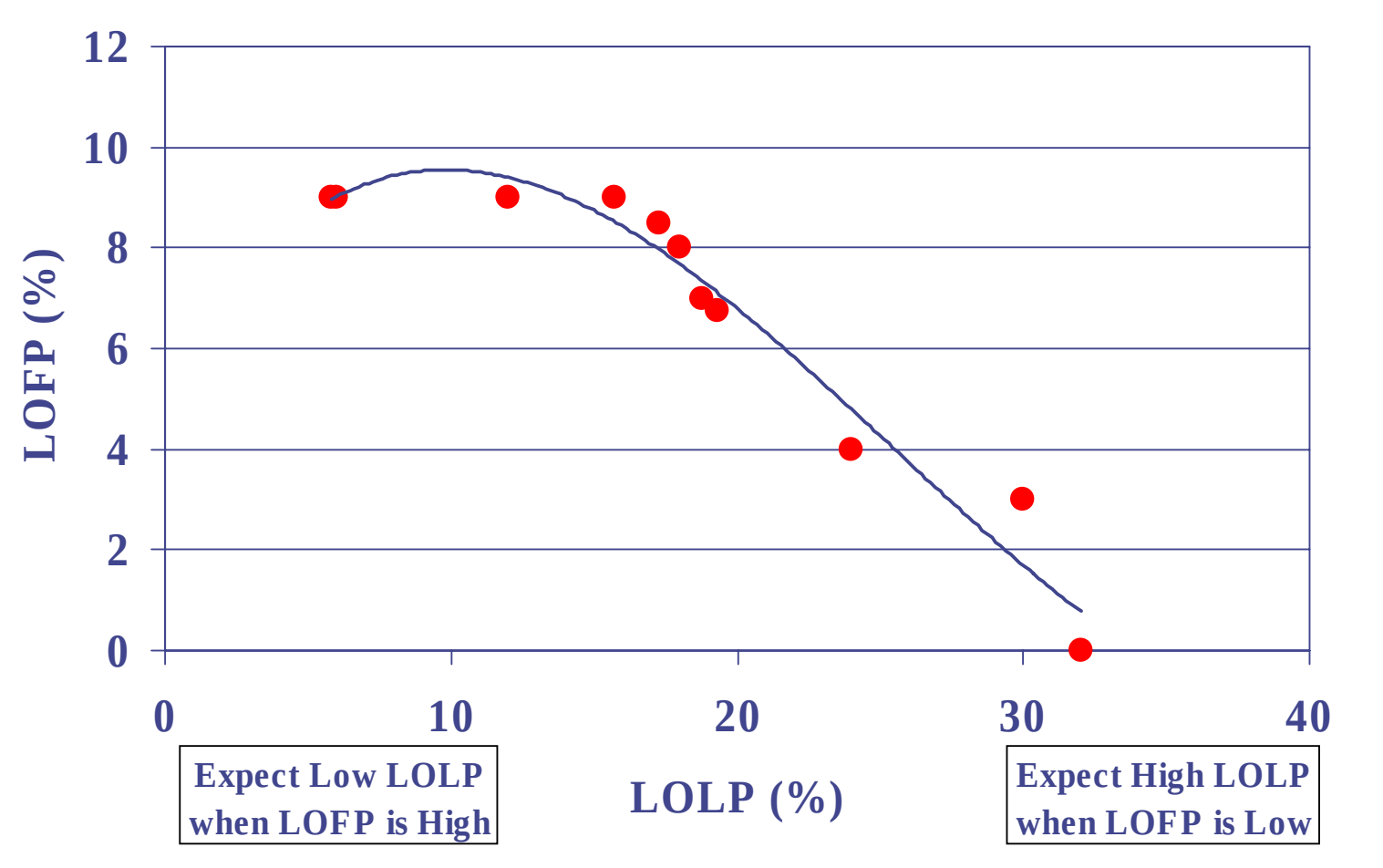
LOLP vs. LOFP
(Variable Flex, Fixed Resources and Loads)



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Initial Observations

- More work required on threshold levels
- Flex is used as a surrogate for "new" resources to show relationship between LOLP and LOFP
- Flex limit should be based on operational considerations
- Once the Flex limit is established, new resources should be added until the LOLP and LOFP are within acceptable levels.

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Current Situation

- West Coast is surplus and depressed demand yields a very low LOLP…
- … and presumably a low LOFP.
- When demand increases to produce a 9% LOLP, the resulting LOFP is about 6%
- Hydro flexibility is used in real life and is modeled in our simulations.

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