



# Lake Chelan Lake Level Management

***Presentation to:  
Board of Commissioners***

***Presented by:  
Power Management & Hydro Services***

***March 20, 2006***

# Agenda

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- Lake level management and 2006 operations

*Janet Jaspers, Scott Buehn*

- Changes to lake level management pending new license

*Gregg Carrington*

- Questions and answers

# Current Lake Level Operations

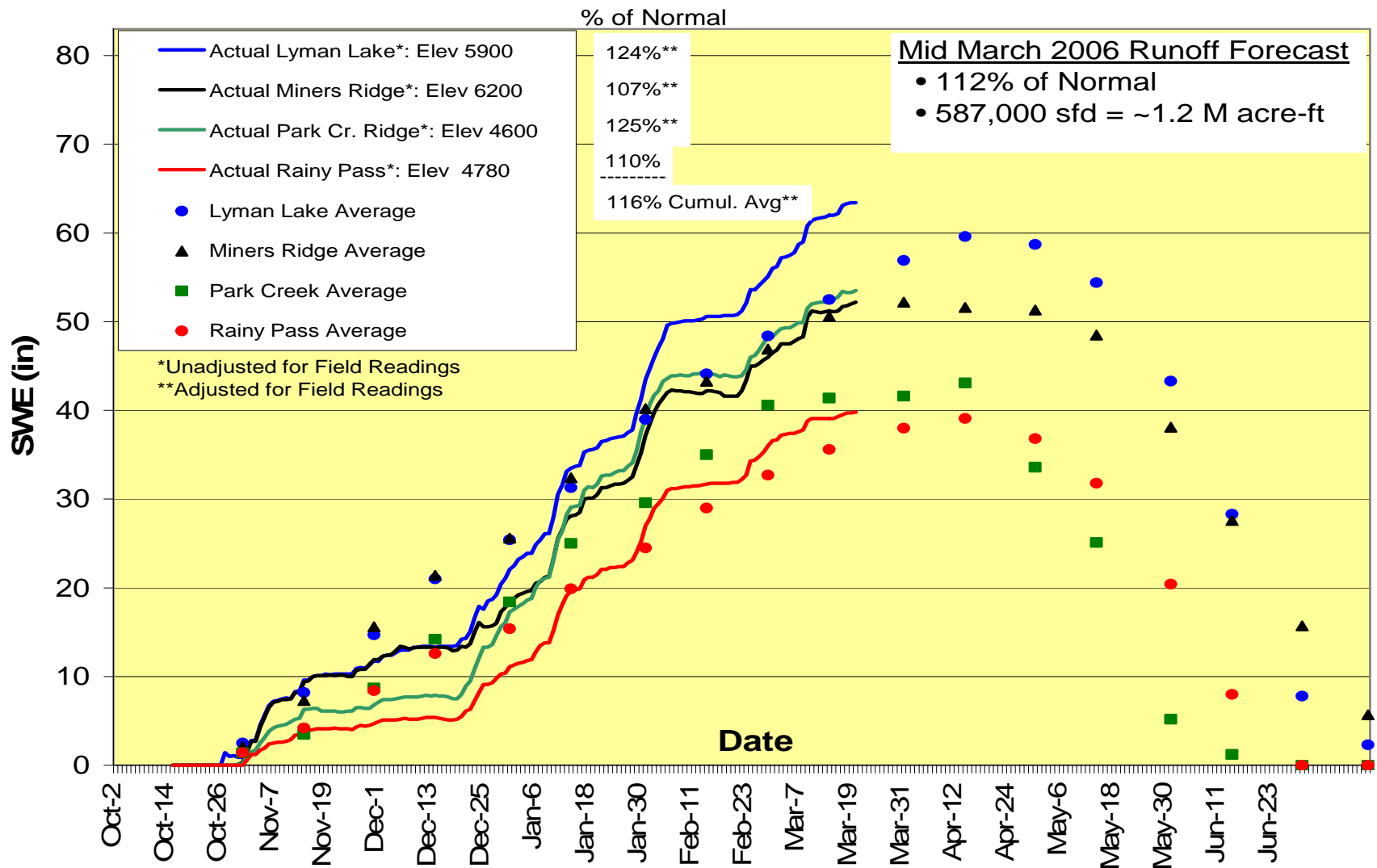
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- Current License Elevation Requirements
  - Maximum elevation 1,100 ft
  - Minimum elevation 1,079 ft
  - Full pool 1,098 ft
  - Make best efforts to operate between 1,098 ft and 1,100 ft (July 1 – Sept 30)
- Current Operating Strategy
  - Operate within the License requirements
  - Balance benefits from available water
  - Minimize erosion due to high flows (spill above 6,000 cfs) in the Chelan River
  - Provide flow for fall Chinook salmon incubation in the tailrace

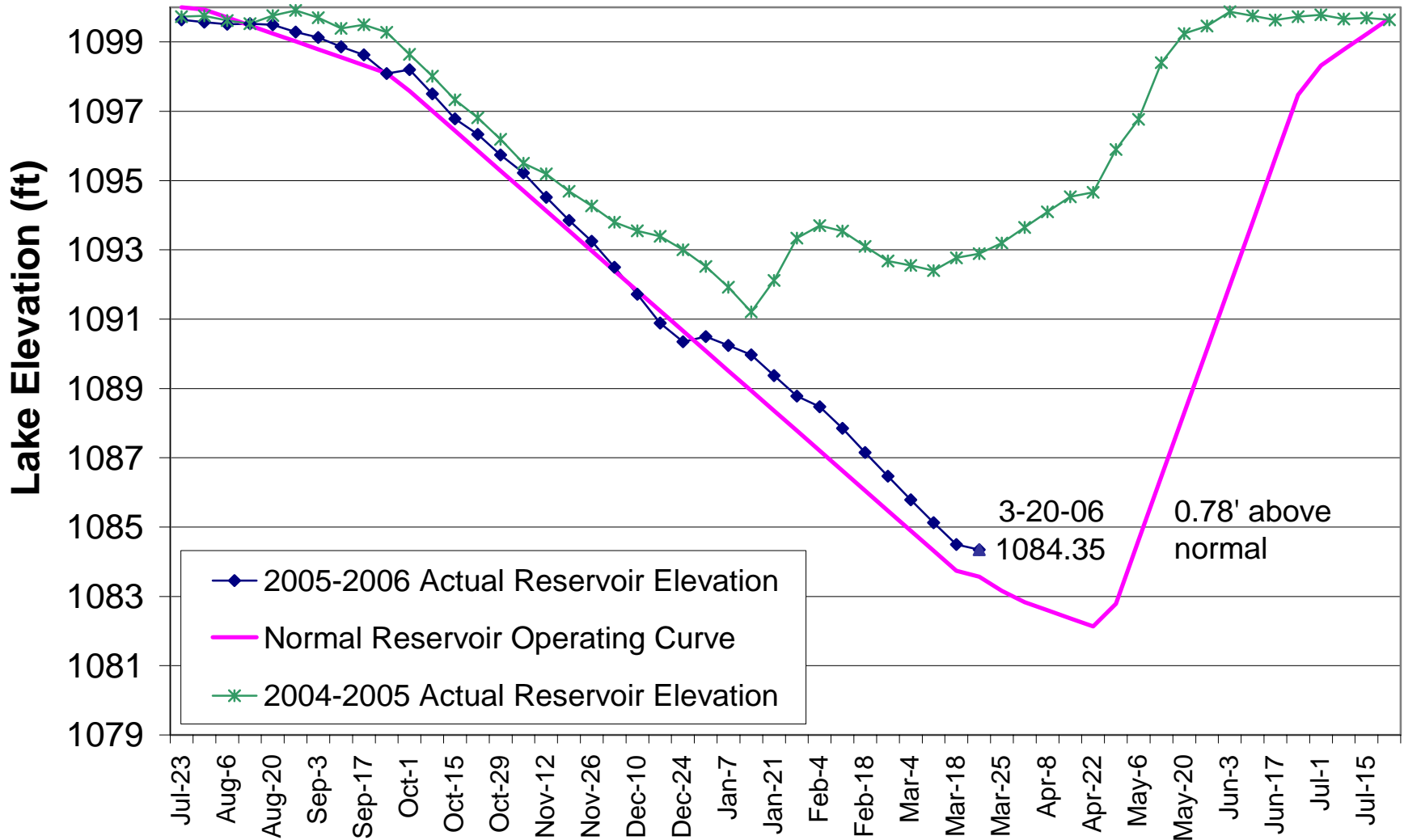


# Lake Chelan Basin Snow Pack

## Water Year 2006

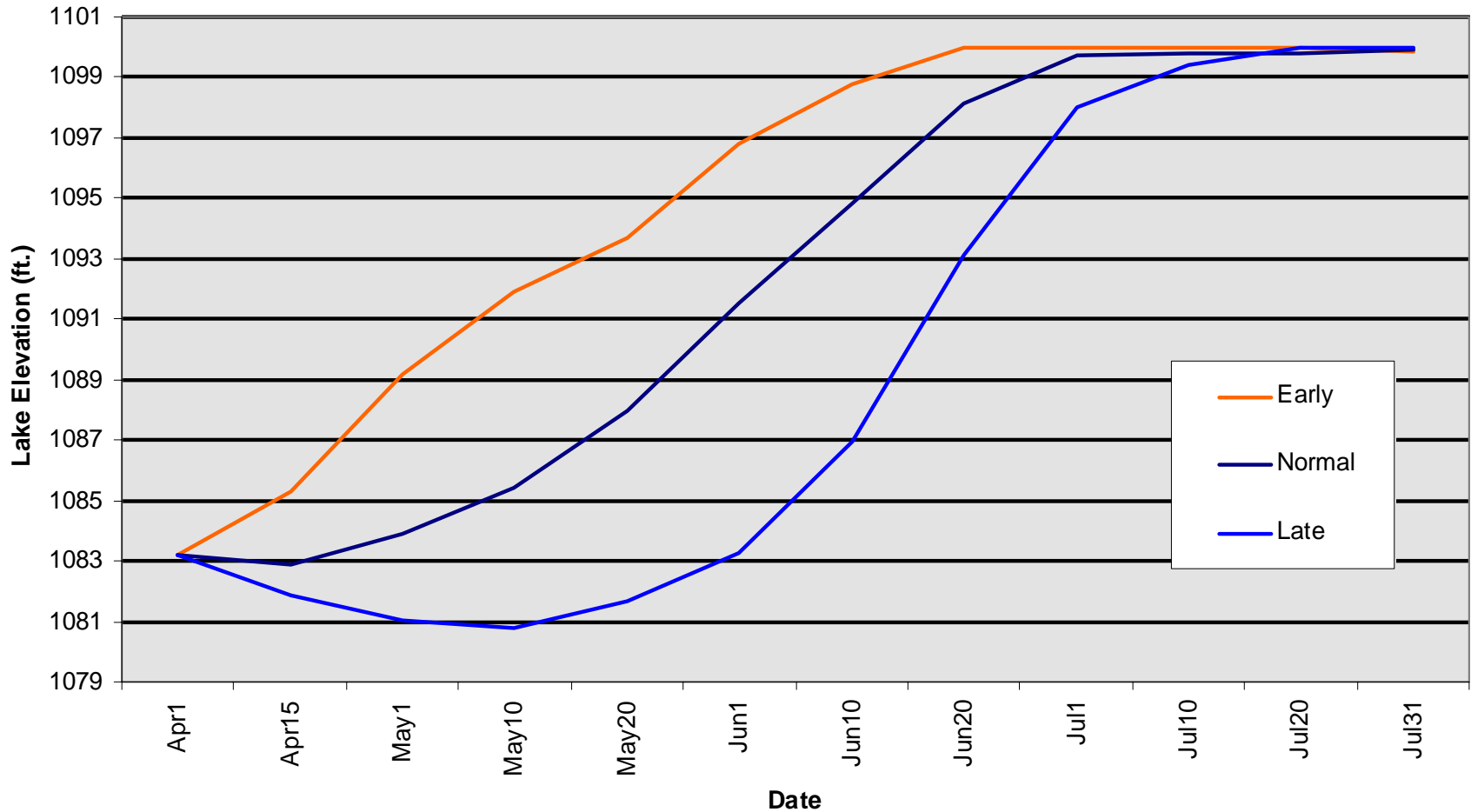


# Lake Chelan Reservoir



# 2006 Lake Chelan Refill Curves

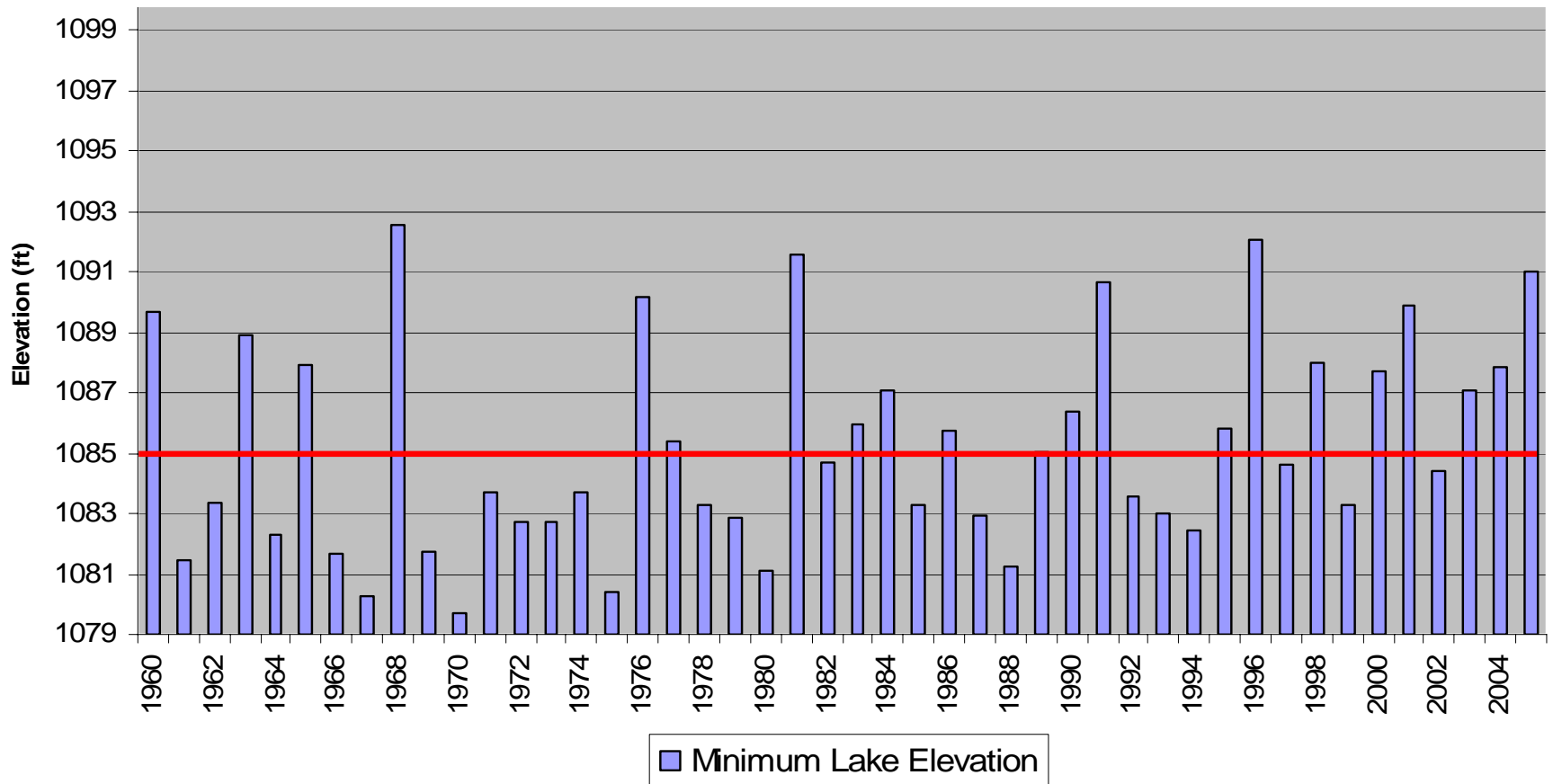
Mar 16th, 2006 Forecast: 587,000 SFD,112%



# Lake Chelan Minimum Elevations

(Water Year August to July)

Since 1960, lake elevations have dropped below elevation 1085' 55% of the years (25 of 47)  
Since 1990, lake elevations have dropped below elevation 1085' 35% of the years (6 of 17)



# Lake Level Management Apr - Jul

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*Typical Year*

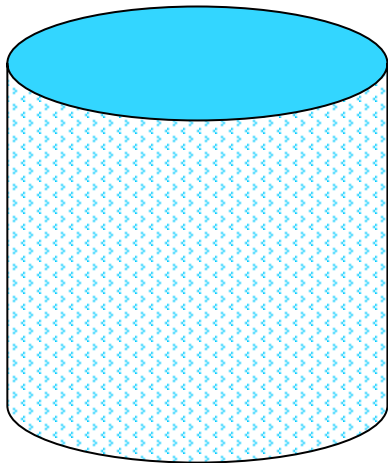
**Volume in  
Snow Pack**

=

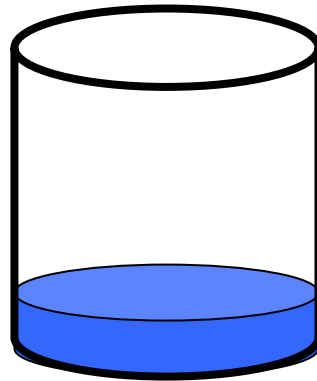
**Lake Fill**

**+ Generation\***

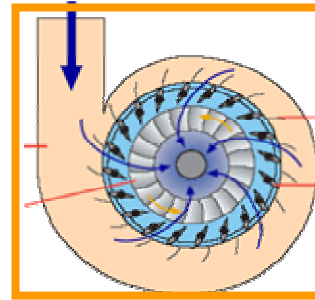
**+ Spill**



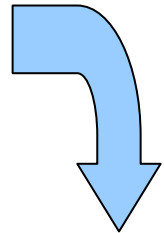
=



+



+

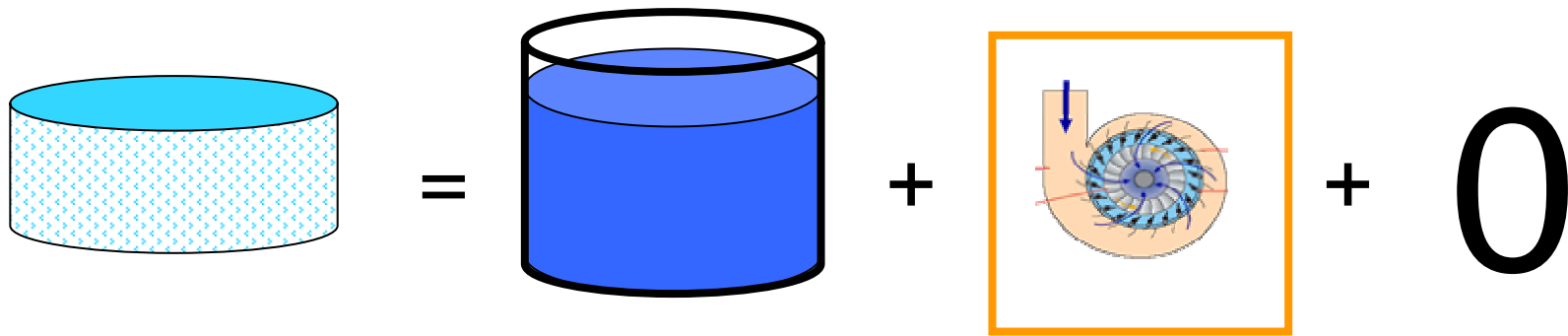


*Generation\* between April 1 and July 30*

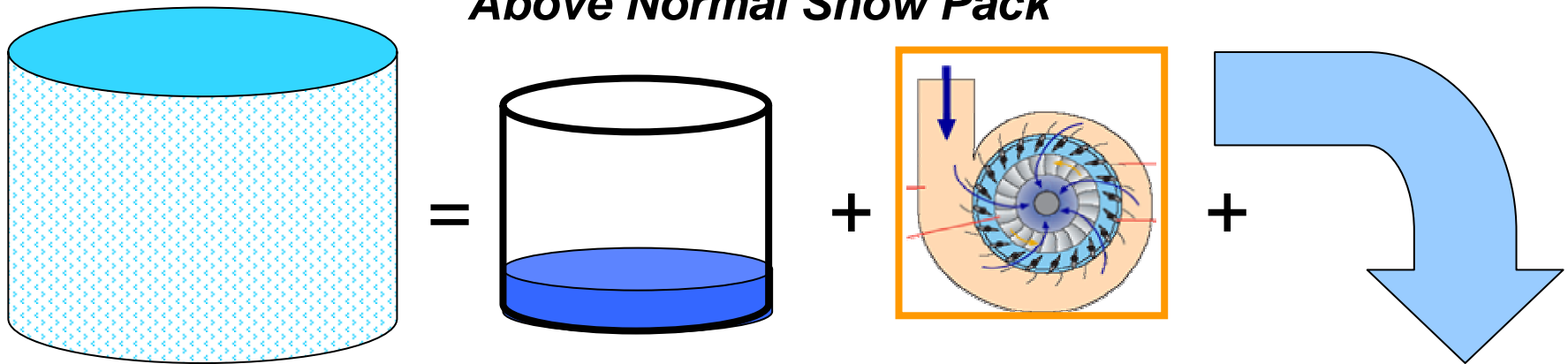
$$\text{Volume in Snow Pack} = \text{Lake Fill} + \text{Generation} + \text{Spill}$$

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*Drought Year*



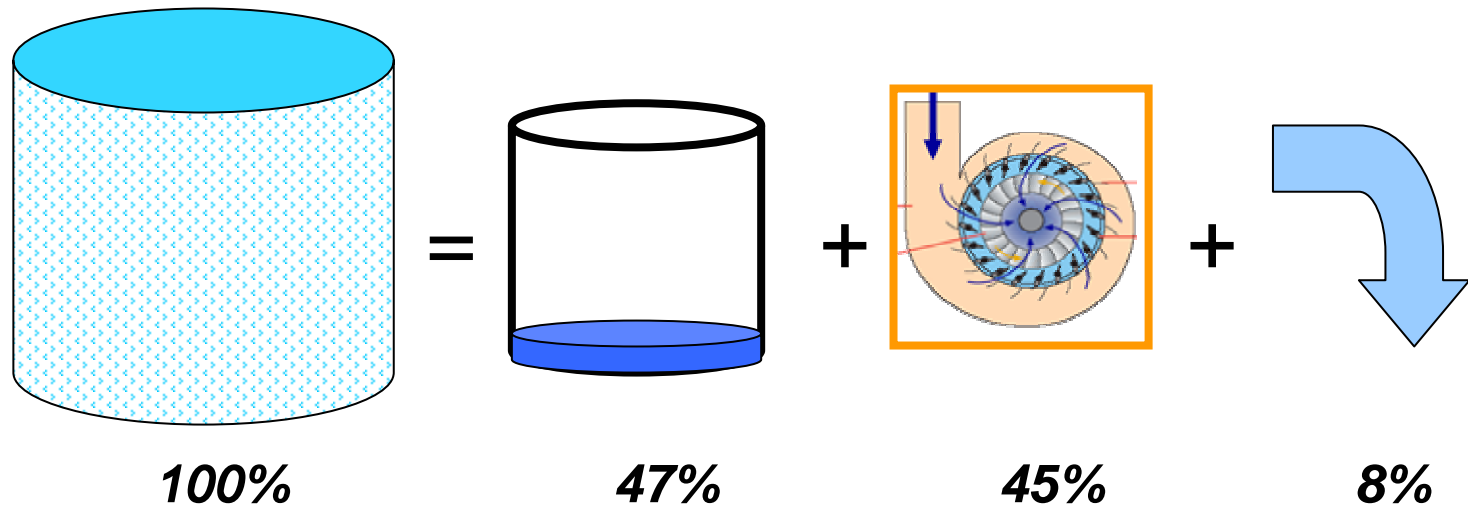
*Above Normal Snow Pack*



$$\text{Volume in Snow Pack} = \text{Lake Fill} + \text{Generation} + \text{Spill}$$

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*2006 Expected Operations*



# Agenda

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***Gregg Carrington***

- Questions and answers

# Relicensing Process

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- 154 meetings between 1998 and 2002 to identify issues and discuss alternatives
- More than 40 meetings to discuss lake level
  - Lake Level Committee
  - People for Lake Chelan
  - Natural Sciences Working Group
  - Social Sciences Working Group
  - Full Relicensing Stakeholder Group

# Proposed for New License

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- Target elevation between 1,079 ft and 1,100 ft
- Full pool 1,098 ft
- Chelan PUD will manage lake levels from October 1 through May 1 based on monitoring of snow pack water content, lake levels, projected precipitation and runoff timing, and anticipated generation.

# Lake Level Management Objectives: A Balancing Act

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Chelan PUD will make every reasonable effort to operate the project to meet the following objectives.....

- 1. Maintain minimum flows in the Chelan River**  
(this objective has priority over lake levels)
- 2. Reduce high flows in the Chelan River** (this objective has priority over lake levels)
- 3. Regulatory requirements for flood control**  
(adjusting lake level) *continued...*

# Lake Level Management Objectives: A Balancing Act

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4. **Useable lake level for recreation** (dock usage varies between 1090 ft and 1098 ft depending on slope of shoreline and boat dock configuration)
5. **Reduce shoreline erosion**
6. **Prevent fish passage blockages** (due to tributary barriers)
7. **Minimize the effect of refill on attainment of flow objectives for salmon in the mainstem Columbia River**

# Lake Level Minimums

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Chelan PUD shall make every reasonable effort to operate the project to meet the objectives and to obtain minimum elevations by the dates specified in the project license (within reasonable predictive probability):

<b><i>Day</i></b>	<b><i>Minimum Elevation (ft)</i></b>
May 1	1087.6
June 1	1094.0
July 1	1098.0
August 1	1099.0
September 7	1098.7
October 1	1097.2

# Lake Level Averages

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<b>Day</b>	<b>Original License (1927-1981)</b>	<b>Existing License (1981-2000)</b>	<b>Proposed For New License</b>
<b>January 1</b>	<b>1,090.7</b>	<b>1,091.7</b>	<b>1,089.2</b>
<b>February 1</b>	<b>1,088.4</b>	<b>1,089.2</b>	<b>1,087.1</b>
<b>March 1</b>	<b>1,086.6</b>	<b>1,087.1</b>	<b>1,085.7</b>
<b>April 1</b>	<b>1,085.6</b>	<b>1,086.3</b>	<b>1,085.4</b>
<b>May 1</b>	<b>1,087.6</b>	<b>1,088.0</b>	<b>1,087.8</b>
<b>June 1</b>	<b>1,094.8</b>	<b>1,094.4</b>	<b>1,095.2</b>
<b>July 1</b>	<b>1,099.3</b>	<b>1,099.2</b>	<b>1,099.3</b>
<b>August 1</b>	<b>1,099.7</b>	<b>1,099.7</b>	<b>1,099.7</b>
<b>September 1</b>	<b>1,098.8</b>	<b>1,099.5</b>	<b>1,098.9<sup>2</sup></b>
<b>October 1</b>	<b>1,096.9</b>	<b>1,098.3</b>	<b>1,097.4</b>
<b>November 1</b>	<b>1,094.7</b>	<b>1,095.8</b>	<b>1,094.3</b>
<b>December 1</b>	<b>1,092.9</b>	<b>1,094.2</b>	<b>1,091.8</b>

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<sup>1</sup> Average elevation derived from 1952-1995 period of record

<sup>2</sup> September 7

# Lake Level Management

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## **Existing License:**

- ❑ Currently, until spring runoff begins, the lake is managed assuming average-to-late runoff conditions (100% probability of refill by July 1)

## **Proposed Operating Regime:**

- ❑ Lake managed to assume early-to-average runoff conditions (80% probability of refill by July 1)
- ❑ Flexibility provides for:
  - Reduced impacts on aquatic life in the bypass reach from high spill
  - Benefits aquatic life because closely mimics natural hydrograph
  - Less frequent powerhouse shut-down (June)
  - More flow in tailrace in late spring (June) for steelhead egg incubation and fry emergence
  - Reduced impacts on power generation

# Summary

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- Lake level operating sideboards will remain the same (1,079 ft – 1,100 ft);
- Objective to protect Chelan River from high flows and erosion;
- Lake level will be higher in the spring during normal runoff;
- Lake level will be lower in the spring during late runoff;
- Lake Level will be lower in the fall.

# Questions and Answers

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