BAKER RIVER PROJECT RELICENSE

Economics/Operations Working Group

October 9, 2002

9:00 AM through 12:30 PM

PSE Office
1700 E. College Way, Mt. Vernon, WA

FINAL MEETING NOTES

The Economics/Operations Working Group Mission Statement:

"To ensure that alternative project proposals, operations and emergency plans for the Baker River Project and its components provide for:

1. *Public health and safety; and*
2. *Thorough analysis and evaluation of the economic costs and benefits (including non-market and economic impacts.)"*

Team Leader: Lloyd Pernela (PSE), 425-462-3507; lloyd.pernela@pse.com

Note: Please let the team leader know if you are unable to attend a meeting. If something comes up at the last minute, please call Lyn the day of the meeting. Lyn's cell phone is 425-890-3613.

PRESENT

Lloyd Pernela, Joel Molander (by phone), Bob Barnes, Kris Olin (PSE); Margaret Beilharz, Jon Vanderheyden, Rod Mace (USFS); Stan Walsh (Skagit Systems Cooperative); Ken Brettmann (U.S. Corps of Army Engineers); Donald S. Dixon, PE (Skagit County Public Works Department); Mark Killgore (Louis Berger Group); Jerry Louthain (Economic Engineering Services representing Skagit PUD, City of Anacortes and Town of Concrete); Joyce Liu (Powel Group, Inc.); Bruce Freet (Environmental Agreement); Mary Jean Bullock, note-taker and Lyn Wiltse, facilitator (PDSA Consulting Inc.)

INTRODUCTIONS

We welcomed first-time attendees: Don Dixon, Joyce Liu, Bruce Freet, and Ken Brettmann. We were also pleased to have Margaret Beilharz join us in person!

DATES OF FUTURE MEETING DATES/LOCATION
November 13th, December 11th at PSE Office, 1700 East College Way, Mount Vernon from 9:00 a.m. to noon.

NEW ACTION ITEMS

- ALL: For hydrologic baselines: review hydrologic years in the low, medium and high clusters with resource folks (working groups) to determine which particular year(s) within a cluster helps them resolve the differing interests associated with high/medium/low years.
- Bob: For baseline, distribute copies of hydrologic graphs for candidate years in clusters to share with members of all Working Groups. Also post graphs on PSE's website.
- Ken: Find out what the actual flood control authorization says.
- Don: Get Lloyd a copy of draft economic baseline report.
- Ken: Check with the Corps folks in Portland to see if they are re-evaluating the flood control rule curve.
- Lloyd: Send out revised list of Issues to be solved by Economics Working Group
- Lloyd: Post Ken's presentation on Web.

AGENDA
October 9, 2002 at PSE Office, 1700 E. College Way, Mount Vernon
9:00 to 12:00

1. Introductions
2. Review/revise minutes and agenda
3. Action Items
4. Presentation by ACOE on Baker/Skagit flood program- Ken Brettmann
5. Discussion of approach to analyzing flood control and development of options
6. PMEs: Review issue list and begin to brainstorm possible PMEs
7. Make final decisions re: hydrology baselines to be utilized in analyzing project proposals
8. Demonstration of HYDROPS output screen formats – Joyce Liu.
9. Prepare agenda for November 13th meeting (i.e., discussion of approach to flood analysis)
10. Evaluate meeting

REPORT ON OLD ACTION ITEMS, April 10 Meeting:

- ALL: Review the draft list of issues developed by the teamlet (see below). Reviewed issue lists from other Working Groups to identify missing issues (i.e., the miscellaneous "other" that the Economics/Operations Working Group may address).
- Lloyd et al.: Drafted list of issues for this group, (framed as problems to be solved), and sent out to members for review prior to our October meeting.
- Bob Barnes convened a teamlet to propose hydrology baselines (Margaret and Bob Barnes) before October 9th meeting.

ARMY CORP OF ENGINEER PRESENTATION ON BAKER/SKAGIT FLOOD PROGRAM
Ken Brettmann, hydrologist for the Army Corps of Engineers, opened by explaining the integral relationship the Corps has with PSE for providing flood control. House and Senate resolutions authorized current flood control on the Baker River in May 1977. It would take an act of Congress to remove, or in all likelihood, modify the requirement for flood control.

The current license Article 32 specifies that Puget provide upto 100,000 acre-feet of flood storage with the condition that Puget be fully compensated for storage provided above 16,000 acre-feet. The current flood control contract between the Corps, PSE, and BPA specifies 58,000 acre-feet of flood control storage with compensation for lost generation (this is in addition to the 16,000 acre-feet of flood control storage specified in the license). Puget is compensated 7,000 MWh annually, which equates to a $275,000 average cost over the past 13 years. In 1976 this arrangement had a benefit cost ratio of 2.2.

Since 1980, a total of 74,000 acre-feet of annual flood storage was provided via the FERC license and under a 20-year contract which expired in 2000. A new annual renewable contract was negotiated and will be used until the new license is issued. Since that time, PSE has been required to have the reservoir at or below 720.7 elevation (16,000 acre-feet) by November 1st and at or below 707.9 (74,000 acre feet) by November 15th each year through March 1st.

The main focus of the flood control operation is to limit property damage at communities, e.g. Sedro-Woolley, Burlington and Mt. Vernon and lands downstream. The Corps estimates that flood control at Upper Baker resulted in prevention of flood damages of $20M in November of 1990 and $50M in November of 1995. Since 1977 the Baker Project has saved over $90-million in flood damage. The probability of exceeding the levee capacity is 5% with flood control and about 10% without flood control. The Corps takes control of Upper Baker reservoir elevation and outflow when the natural (unregulated) flow in the Skagit River is forecast to exceed 90,000 cfs at the Concrete gage. At flood stage the unregulated flows of the Sauk River alone can cause the flows on the Skagit to exceed flood stage.

His presentation addressed these four areas:

- Why flood control?
- How dams are managed for flood control
- Effects of flood control – EIS dated September 15, 1976
- Future intent

His presentation is on the Baker Relicensing Website.

DISCUSSION OF APPROACH TO ANALYZING FLOOD CONTROL AND DEVELOPMENT OF PROJECT OPTIONS

The Corps will propose that flood control remain at current levels. Their interest is to continue to provide at least the same level of flood protection as they are currently providing. They also want to minimize costs to the Federal government for flood control at the Upper Baker Project.

Skagit County wants to see the same or more storage provided for flood control.

We, as members of the Economics/operations Working Group, want to verify that the reservoir levels set by the Corps in 1976-77 are still appropriate. The stage damage-curve is changing. We also want to take into account the effects of changes in flood frequency analyses.

Downstream property owners are interested in maintaining at least the same level of flood protection.

Next steps: Model reservoir levels that would maximize other resources (recreational and ecological, etc.) and then see how those levels might affect flood control. Might there be benefits associated with degrees

of flood control? It may be helpful to set some reservoir baselines as they relate to flood control. We might consider an earlier/ later drawdown, a deeper drawdown, and an earlier/ later return to normal operations.

MAKE FINAL DECISIONS RE: HYDROLOGY BASELINES TO BE UTILIZED IN ANALYZING PROJECT PROPOSALS

Bob shared what the teamlet came up with in order to determine what constitutes a high/medium/low flow year. The teamlet proposes we run all years and choose three cluster of years based on a combination of economics and hydrology, where the economics are basically the same (such economics ceases to be an issue). They created an economics exceedance table where:

High: 76 – 95% exceeding
Med.: 40 – 60% exceeding
Low: 5 – 25% exceeding

Bob distributed a handout of Energy Inflow Analysis done by Powel along with an economics exceedance table he created.

They suggest we choose from among the years listed in each of the clusters below:

Low – 1952, 57, 70, 92
Med. – 1946, 55, 62, 66, 86
High – 1954, 68, 72

The co-variance among the years in each cluster is less than 1% (not statistically significant).

PSE will post the hydrology graphs associated with each of the candidate years on their website. Bob will also make hard copies to distribute to members in each of the resource Working Groups. During their meetings this month we will ask them to select which years help them resolve the differing interests they have for high/medium/low years. We will review their selections at our November meeting.

DEMONSTRATION OF HYDROPS OUTPUT SCREEN FORMATS

Bob Barnes and Joyce Liu walked us through some of the new-output screens for the HYDROPS model. They showed how the model treats hard and soft constraints. Rod Mace reported that Stetson Engineering is just now beginning their review of the model. Due to technical difficulties (firewall), they have just recently been able to establish a connection with the Powel Group up in Victoria. We hope to hear their report at our next meeting in November.

REVIEW ISSUE LIST AND BEGIN TO BRAINSTORM POSSIBLE PMEs

This discussion was deferred to the next meeting. Lloyd will distribute an updated list of issues and interests for our review. This list was updated to include operations-related issues that were raised two years ago by member of the Hydrology Working Group. The hydrology group was subsequently incorporated into the Economics/Operations and Aquatics Working Group.

HANDOUTS

- Powel Job Number 2116.3 Summary of output of economic value for all years (Post on web)
- Statistical analysis of High/Medium /Low Flows based on economics (Post on web)

NOT HANDED OUT AND TO BE POSTED ON THE WEB

- USACE presentation on flood control
- Hydrologic graphs for clusters of high/medium/low years provided by Bob Barnes

PARKING LOT

- Forest Service Watershed Analysis
- New Baker EAP Inundation maps are available at end October 2002.
- Consider who will be the number cruncher for this team: PSE? Other?
- GANNT chart with due dates, etc.
- Presentations:
  - Wild and scenic river 101
  - ~~Flood Plain Values 101~~
  - Fisheries/Hydraulics 102
  - ~~Economic Model~~

EVALUATION OF THE MEETING

We elected to skip the evaluation in the interest of time.

What's Hot?

- Flood control

TENTATIVE AGENDA FOR NEXT MEETING

November 13, at PSE Office, 1700 E. College Way, Mount Vernon
9:00 to 12:00

1. Introductions
2. Review/revise minutes and agenda
3. Action Items
   - Baseline teamlet report.
   - Discussion of baseline hydrology years (feedback from Working Groups)
4. Discussion of approach to analyzing flood control and development of options
5. HYDROPS update
6. PMEs: Review issues list and begin to brainstorm possible PMEs
7. Prepare agenda for December 11th meeting
8. Evaluate meeting

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Upper Baker Flood Control

Ken Brettmann

Hydrology and Hydraulics Section

October 21, 2002

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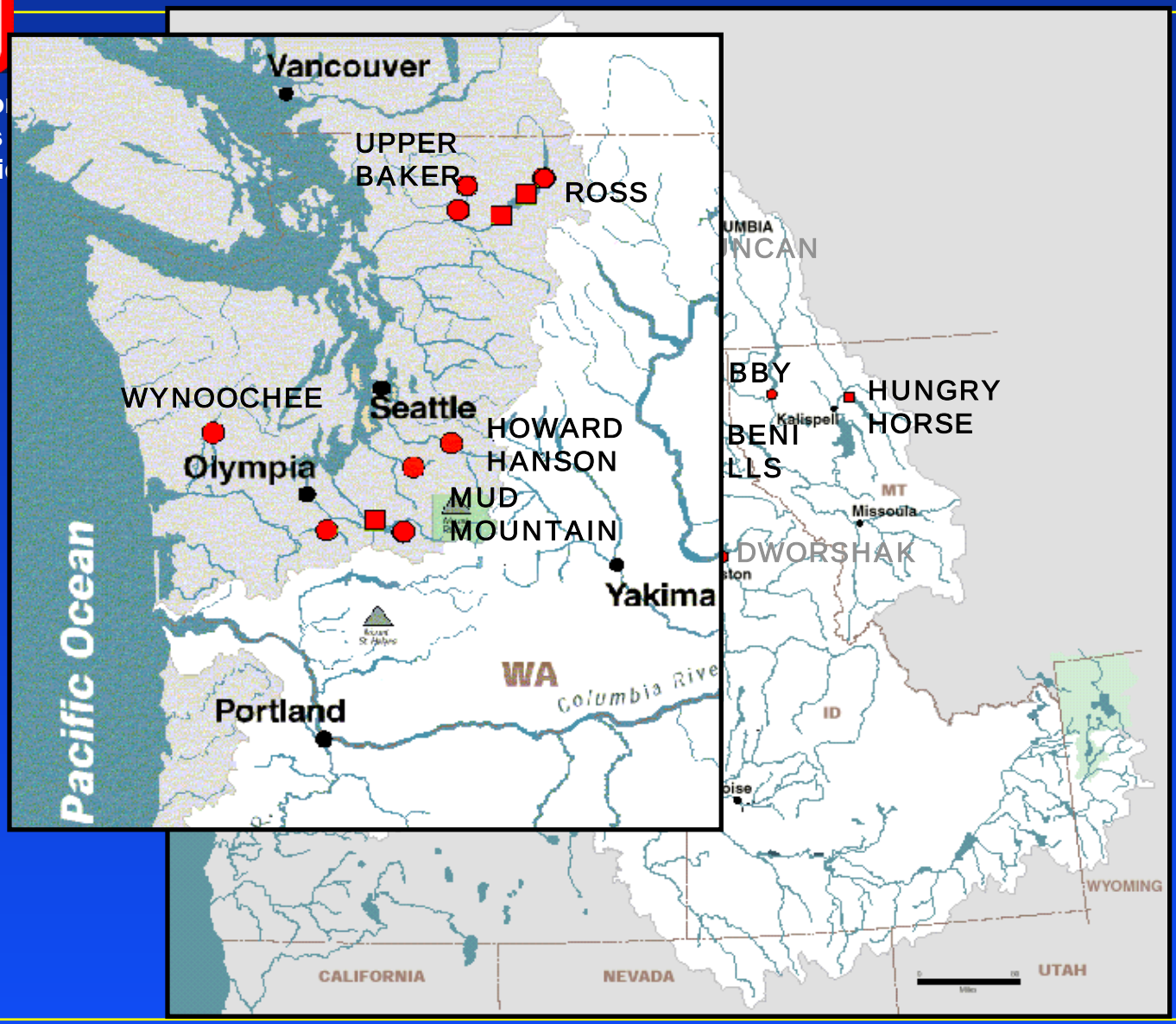

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Upper Baker Flood Control

- Why flood control?
- How dams are managed for flood control
- Effects of Flood Control
- Where are we going?

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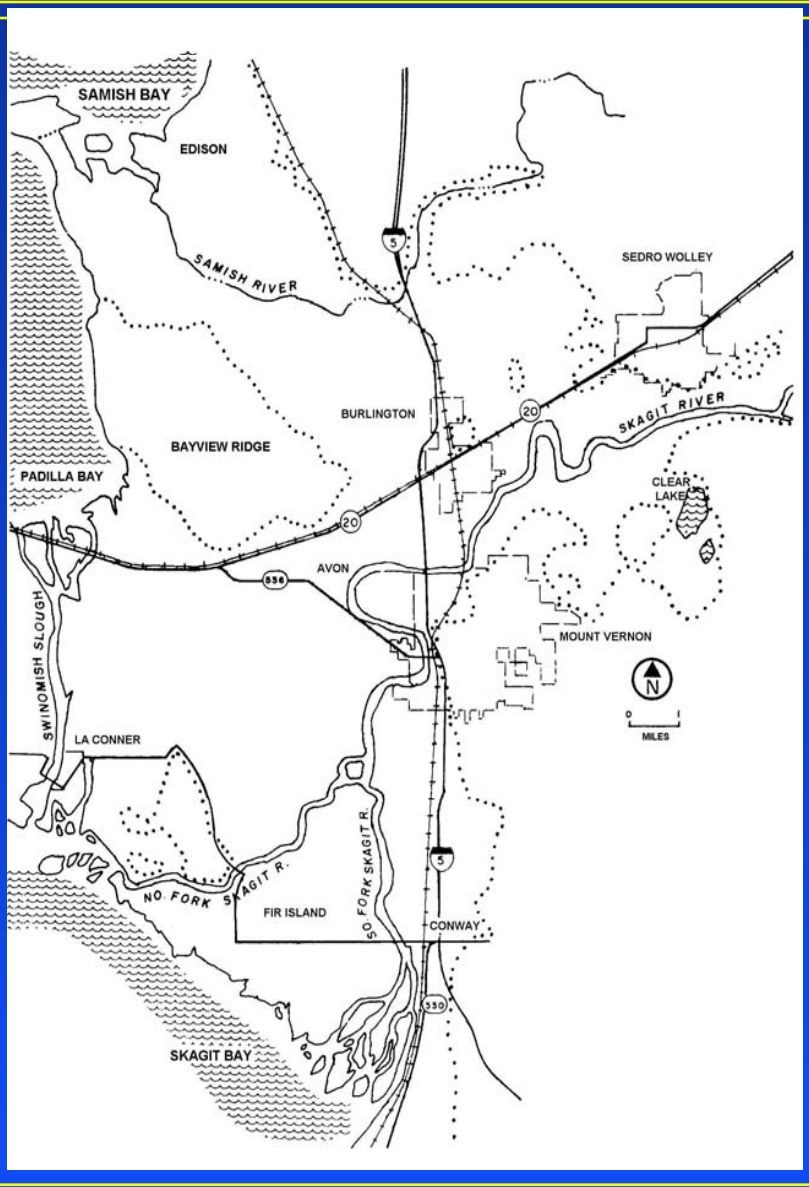

Skagit River Floodplain

- Channel Capacity about 150,000 cfs
- About 90,000 acres farmland
- Towns of Burlington, Mt. Vernon, Sedro Woolley, Conway, and LaConner

Flood of 1951 - Skagit River Valley

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Article 32 of the 1956 FERC License for Upper Baker

"The Licensee shall so operate the Upper Baker reservoir as to provide each year 16,000 AF of space for flood regulation between 1 November and 1 March as replacement valley storage eliminated by the development. Utilization of this this storage space shall be as directed by the District Engineer, Corps of Engineers, Seattle, Washington."

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Article 32 of the 1956 FERC License for Upper Baker

(cont.)

"In addition to the above-specified 16,000 AF, the Licensee shall provide in the Upper Baker reservoir space for flood control during the storage drawdown season (about 1 September to 1 April 15) up to a maximum of 84,000 AF as may be requested by the District Engineers, provided that suitable arrangements shall have been made to compensate the Licensee for reservation of flood control space other than the 16,000 AF specified herein."

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Upper Baker Flood Control Project Authorization

Seattle District report to Congress dated 10 September 1976

- Recommended 58,000 AF additional flood control storage space in Upper Baker Reservoir
- Puget Sound Energy (PSE) be compensated w/ power, in kind, for resulting power losses
- B/C ratio of 2.2 based on 1976 price levels

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Upper Baker Flood Control Project Authorization

- House Resolution adopted May 10, 1977
- Senate Resolution adopted May 23, 1977
- No annual appropriation

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Upper Baker Flood Control Agreements

Three party agreement w/ CORPS, BPA & PSE

- PSE provides flood storage space (74 KAF)
- BPA reimburses PSE for power losses
- Corps regulates flood storage from Nov-Mar

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Upper Baker Flood Control Agreements

20 year contract executed on 10 Oct. 1980

- Flat rate reimbursement @ 7,000 MWh/yr ($275,600 avg. annual cost over 13 yrs)
- Expired Sept. 30, 2000

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Upper Baker Flood Control Agreements

Current Flood Control Agreement

- Separate agreements with PSE and BPA
- Executed Oct 31, 2000
- Renewed annually
- No change in PSE compensation

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Upper Baker Flood Control

- Why flood control?
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How dams are managed for flood control

Flood Control Objective

Reduce flood damages in the Skagit River below Sedro Woolley to the greatest extent possible

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How dams are managed for flood control

Operating Principals

- Flood control requires dams to preserve storage during flood period (i.e., Rule Curve)
- Dams hold back water during floods and release water when waters recede
- Flood control begins when natural flow in the Skagit River is forecasted to exceed 90,000 cfs

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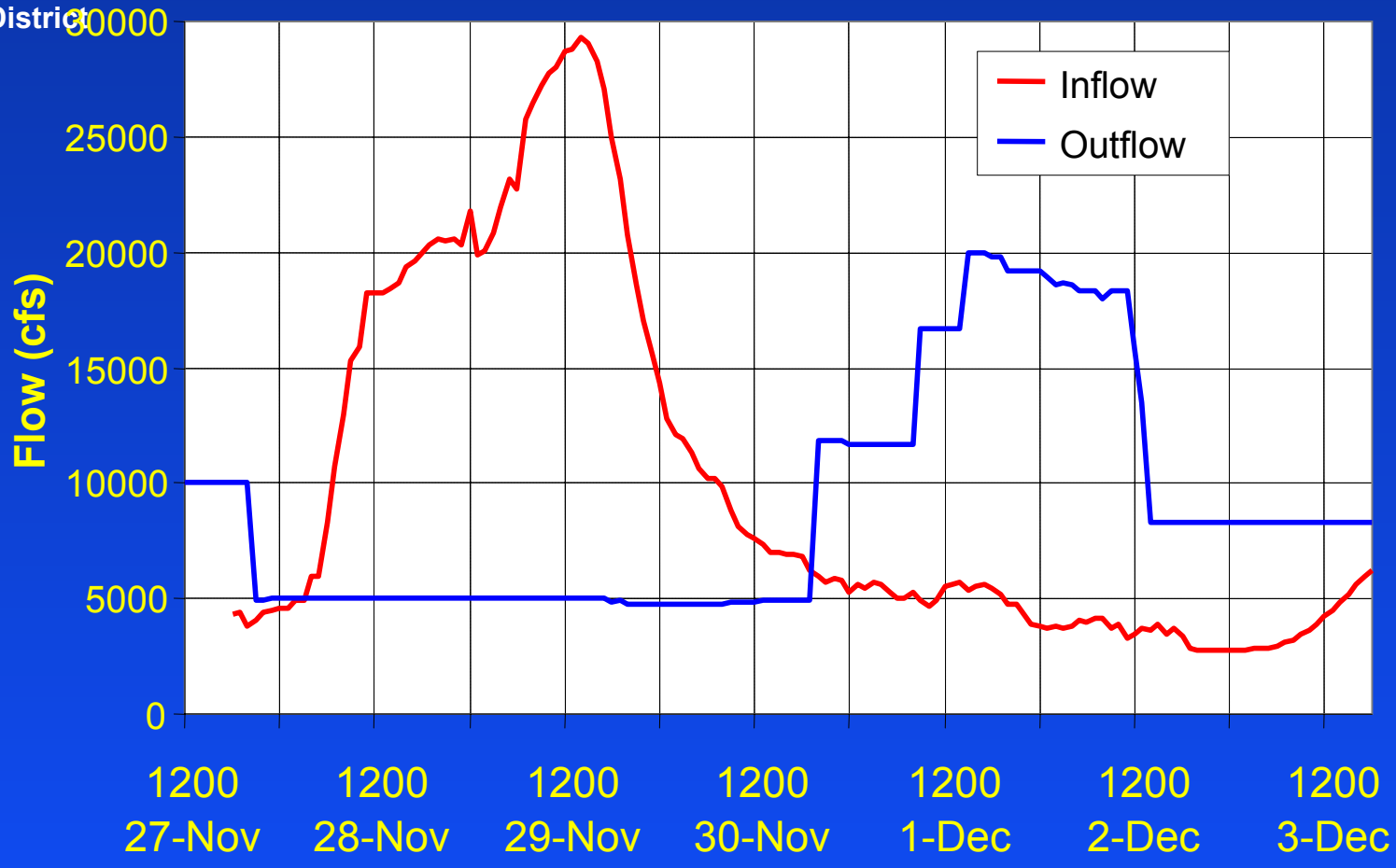
UPPER BAKER DAM
NOV-DEC 1995 FLOOD



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Upper Baker Flood Control

- Why flood control?
- How dams are managed for flood control
- **Effects of Flood Control**
- Where are we going?

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Effects of Flood Control

- Flood control reduces the magnitude and frequency of flood events, but doesn't prevent floods

- Flood control is limited by the portion of the basin above the dam and the storage space available

Upper Baker Location Map

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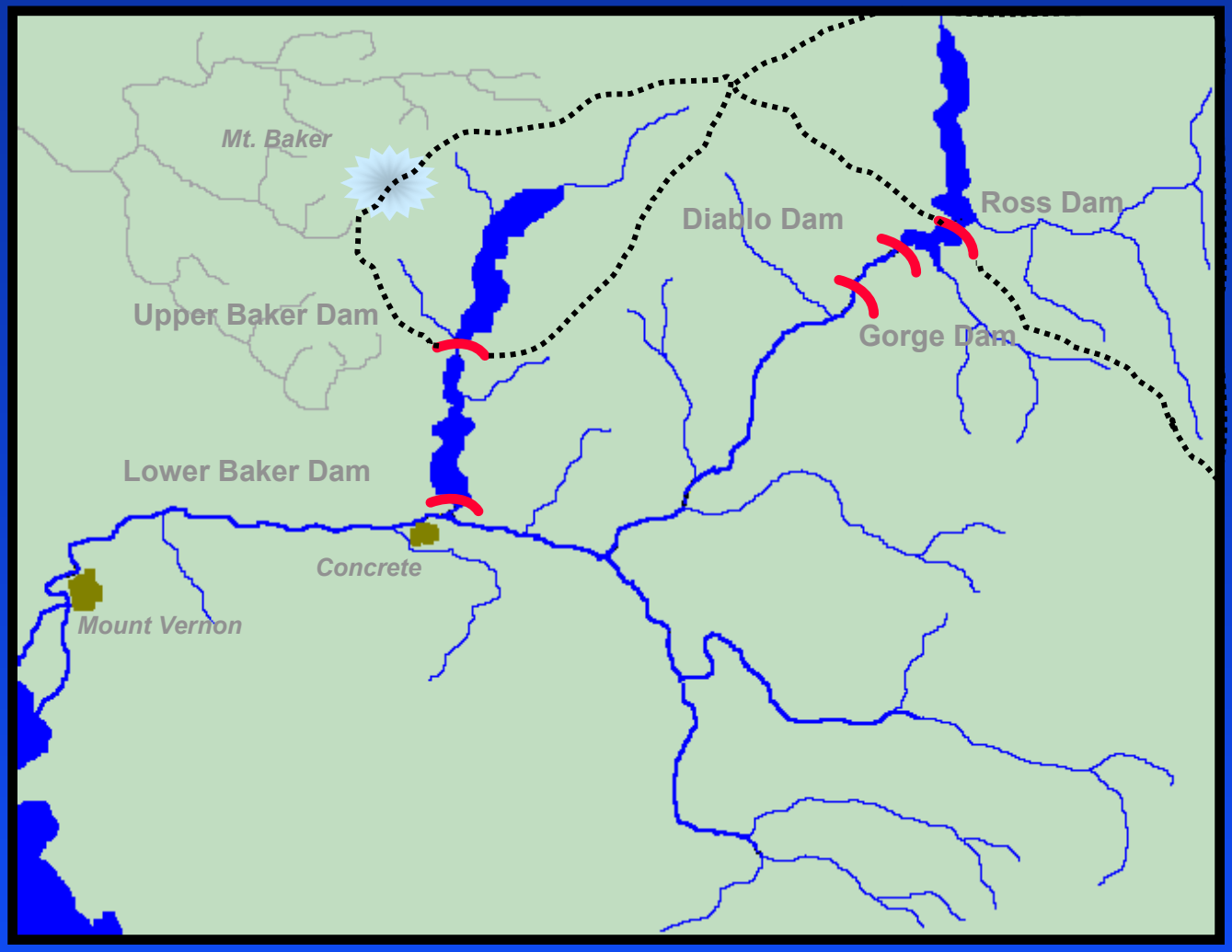

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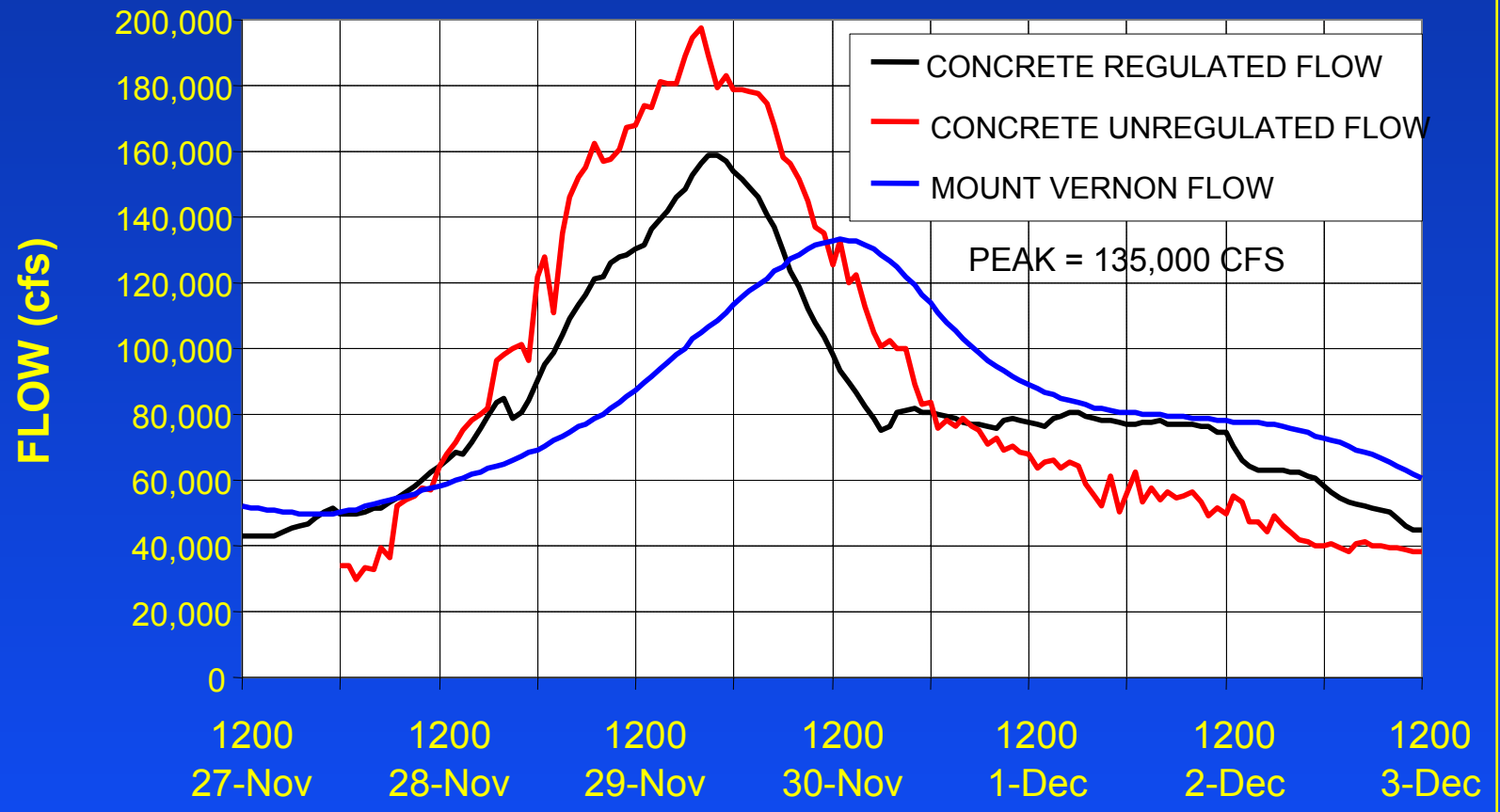
SKAGIT RIVER BASIN
NOV-DEC 1995 FLOOD



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Effects of Flood Control

Skagit River at Concrete

Flood Event	Natural	Regulated
Nov-90	208,000	149,000
Nov-95	200,000	156,000
100 Year	300,000	225,000

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Effects of Flood Control

Flood Control Benefits

- Flood Damages prevented
  - $90M since 1977
  - $20M in November 1990
  - $50M in November 1995
- Reduces flood peak
  - Probability of exceeding levee capacity is about 5% with Flood Control
  - Probability increases to about 10% without

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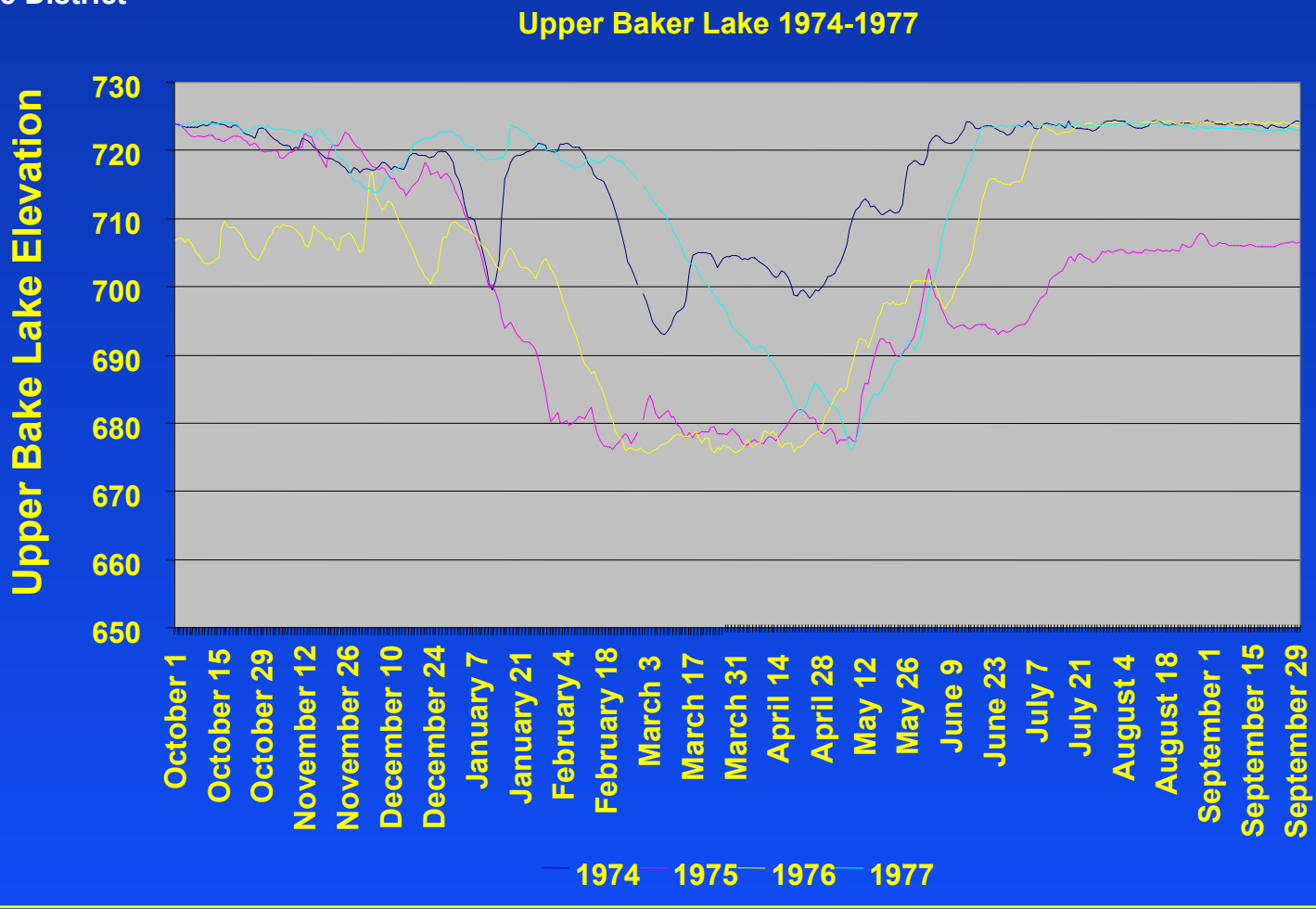
Effects of Flood Control



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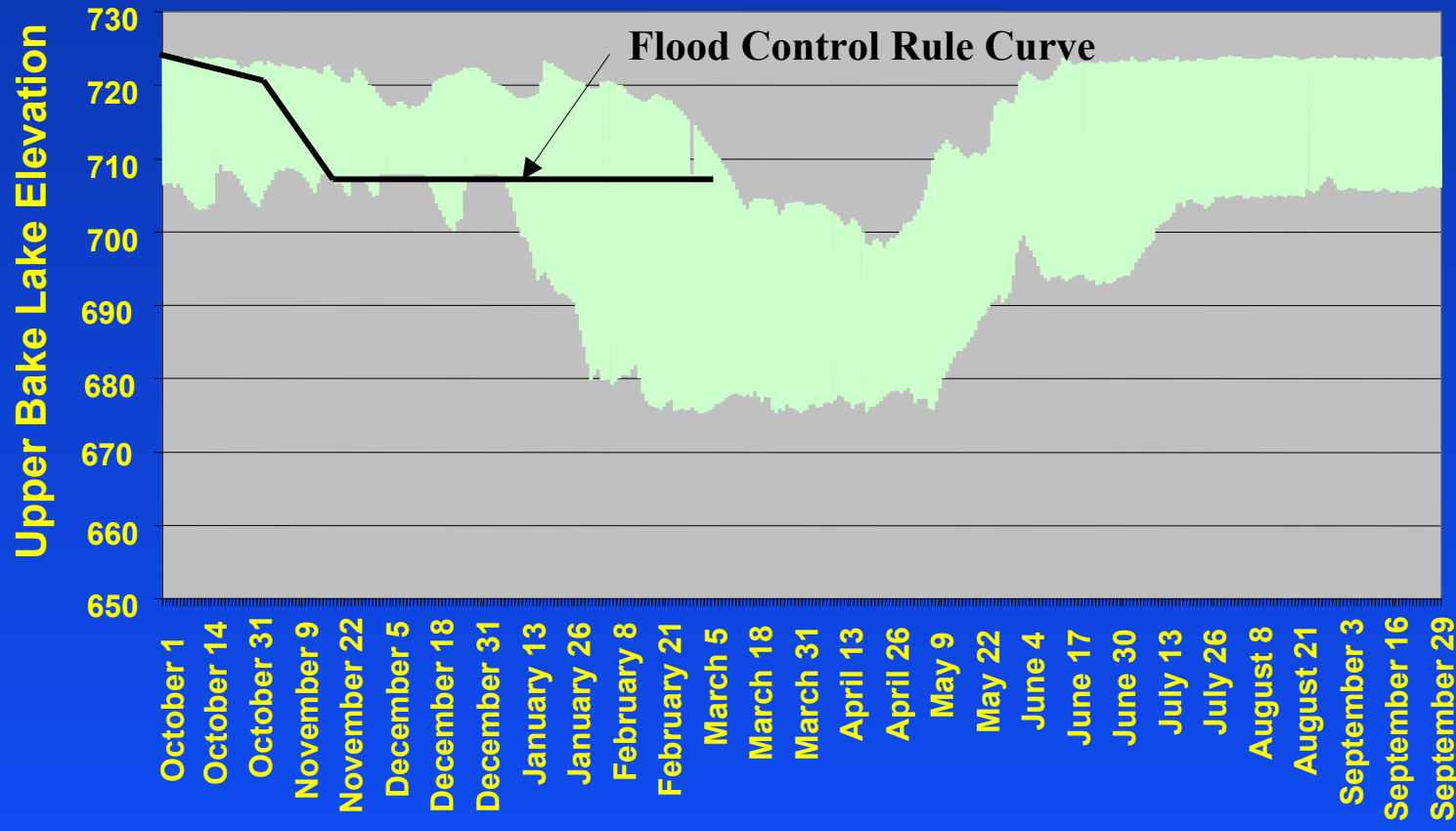
Effects of Flood Control

Upper Baker Lake 1974-1977



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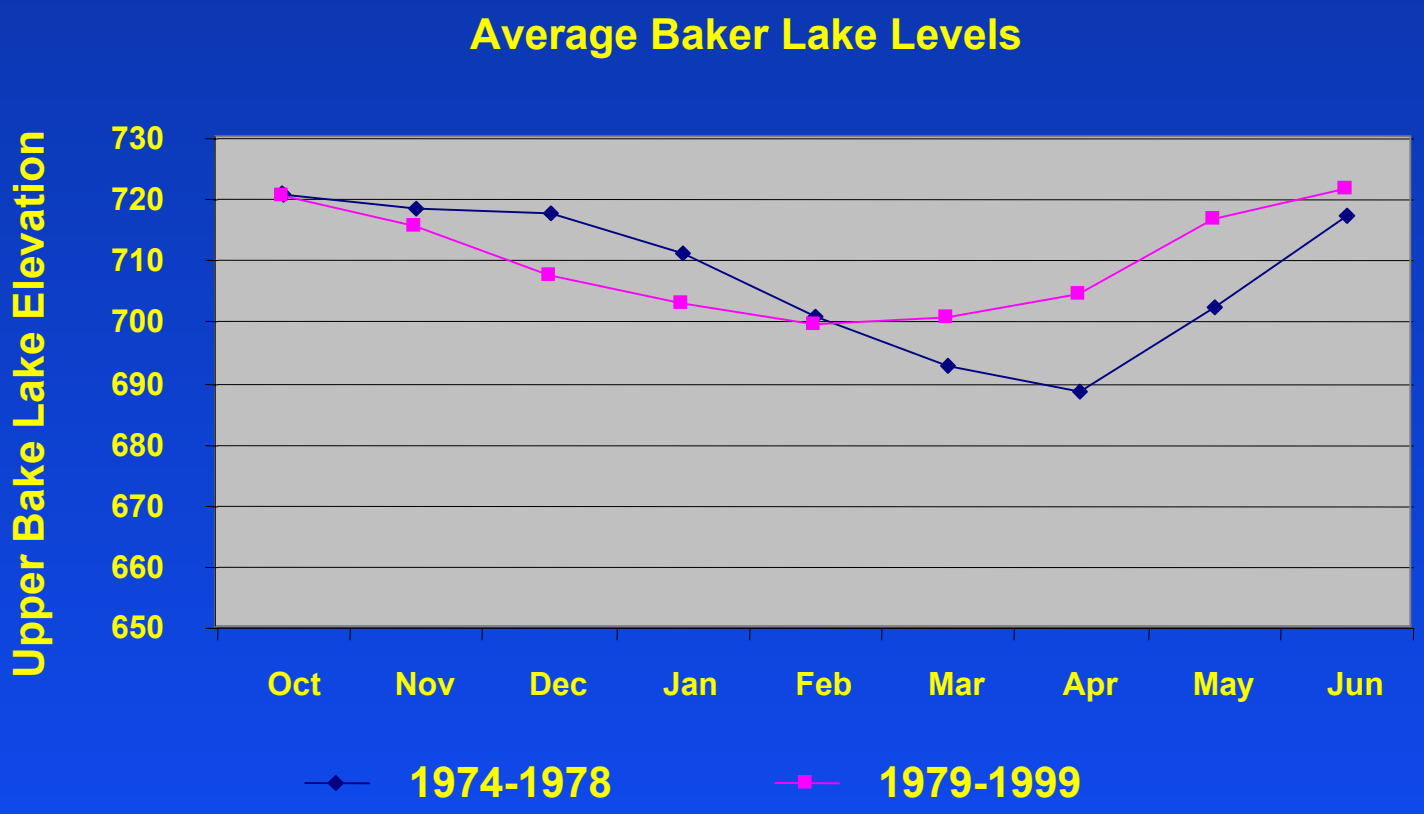
Effects of Flood Control



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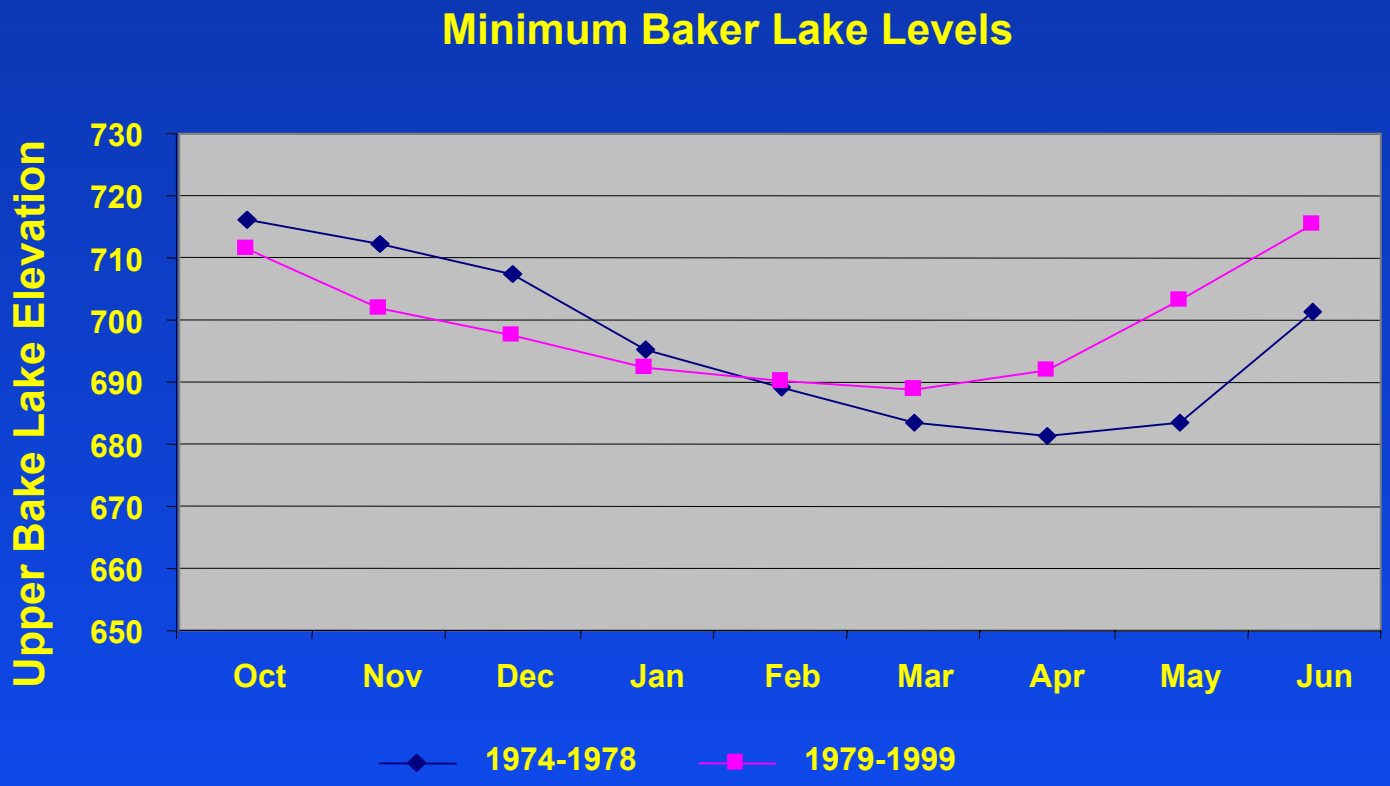
Effects of Flood Control



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Effects of Flood Control

Final Environmental Impact Statement For Additional Flood Control At Upper Baker Project, 15 September 1976 (page 38)

"Although there would be some spawning losses regardless of drawdown schedule, the proposed plan is not expected to result in greater losses, and may reduce the amount of redd losses now experienced."

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Upper Baker Flood Control

- Why flood control?
- How dams are managed for flood control
- Effects of Flood Control
- **Where are we going?**

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Where are we going?

Short term

- Annual renewal of flood control agreements
- Seek alternative funding arrangements

Long term

- Include flood control in new FERC license
- Minimize Federal cost for flood control

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Thank You

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Economics/Operations Working Group
ISSUES AND INTERESTS

ISSUES:

Water Quality
1. Potential contaminant sources in basis for snow chemistry, air pollution, recreation impacts to water quality
2. Parameter effects- pH, etc. (impacts on water quality and reservoir ops)
3. Watershed discharge rate (from land use and impacts on water quality)
4. Impacts of glacial flux on flow and water quality relationships to project ops

Project Viability
1. Economic efficiency: Can revenues generated off set costs? (Market and non-market?)
2. Financial Model of project
3. Economics of operations of the project & how we compare those to the non-commodity
4. Minimum instream flow verification and economics
5. Ramping rates verification and economics
6. Downstream passage economics
7. Provide a standard cost/benefit assessment methodology for all working group requests.
8. What does increased license term mean in terms of consideration? (30-50 years)
9. Establishing a baseline economics scenario to use/description of variables.

Operations
1. How resources management interacts with PSE operations
2. Technology to achieve flow and ramping goals at Lower Baker

Flood Control
1. Controlling downstream flooding
2. Relationships between flood control and water level manipulations for reservoir impoundment (ecological considerations)

Safety
1. Catastrophic events
2. Improve emergency notification plan/ documentation
3. Notifying people in event of emergency
4. PME Follow FERC regulations and more?
5. Stability/safety of West Pass dike
6. Volcanic eruption of Mt. Baker (overtopping)
7. Gate Failure
8. Resource protection

Need to discuss
1. Lake productivity, Limnology
2. Marine derived nutrients
3. Erosion
4. Water releases for restoration projects
5. tradeoffs (e.g., aesthetics, preservation of historic buildings)
6. Satisfy existing water rights

INTERESTS:

A. Flood control

B. Consequences of operating the reservoir to provide flood protection

C. Economic viability

D. Fear: income might be less than cost of operations and mitigation

E. Fear: We won't be able to afford all mitigation

F. 4(e) conditions and ability to fund

G. Section 18, ability to fund

H. Commercial fear:

I. Stay in Business

J. Fulfilling legal mandates (CWA, CZMA, FPA)

K. Maintaining public safety

L. Protection of life and property

M. Project Impacts on terrestrial, water quality, aquatic resources, recreational resources

N. Having to modify management practices to meet aesthetic regulations

O. Protection of existing water rights

P. Town of Concrete and Skagit Valley municipalities meeting financial and legal responsibilities

Q. To protect, preserve and perpetuate fish and wildlife and their habitats (legislative mandate)

R. Loss of natural stream processes

S. To have 95-100% successful passage of fish with mitigation for anything less than 100%

T. Loss of access to tributaries

U. Road access for removal /management of resources