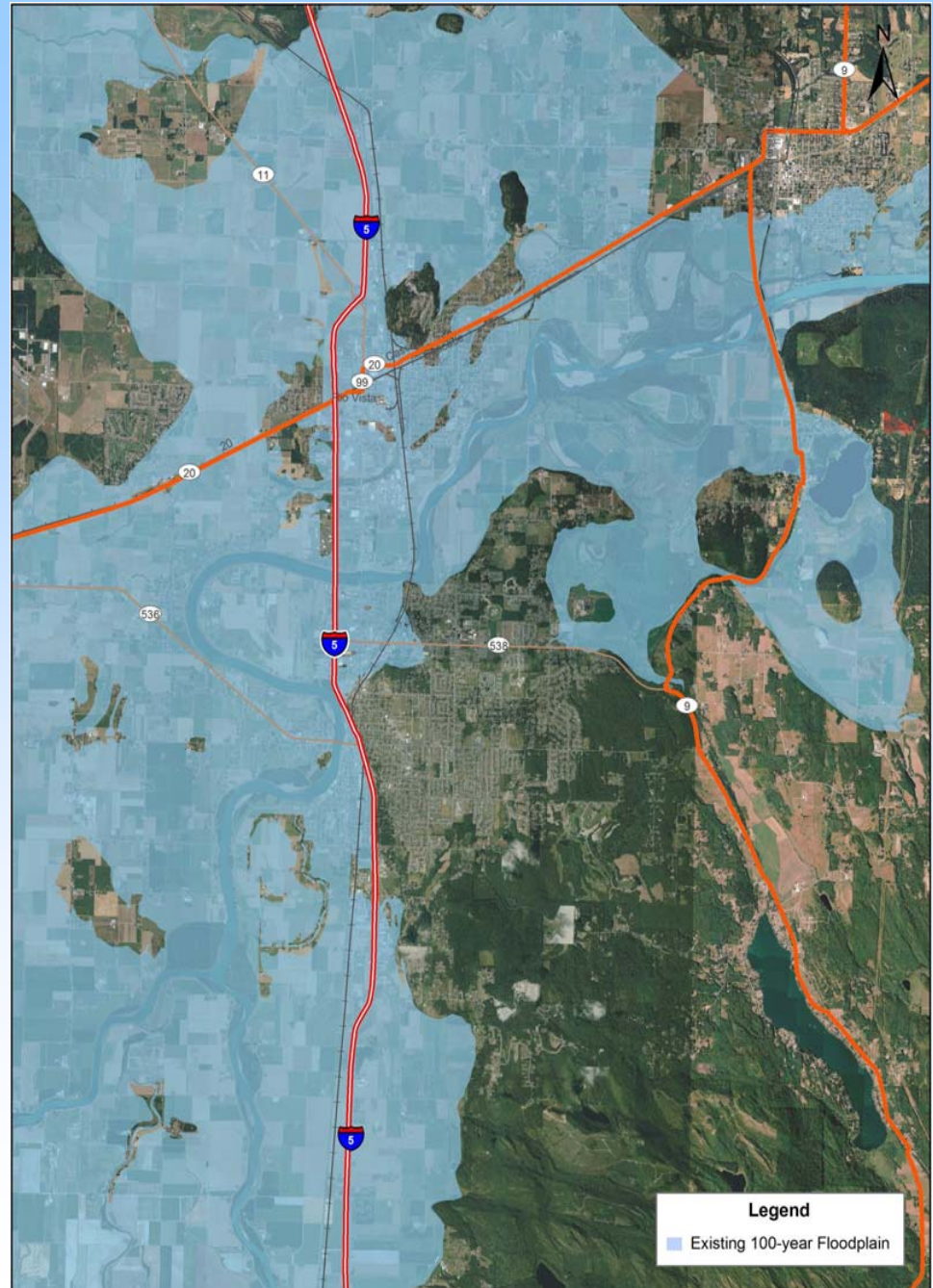


# Impacts of an Incorrect Hydrologic Analysis for the Skagit River

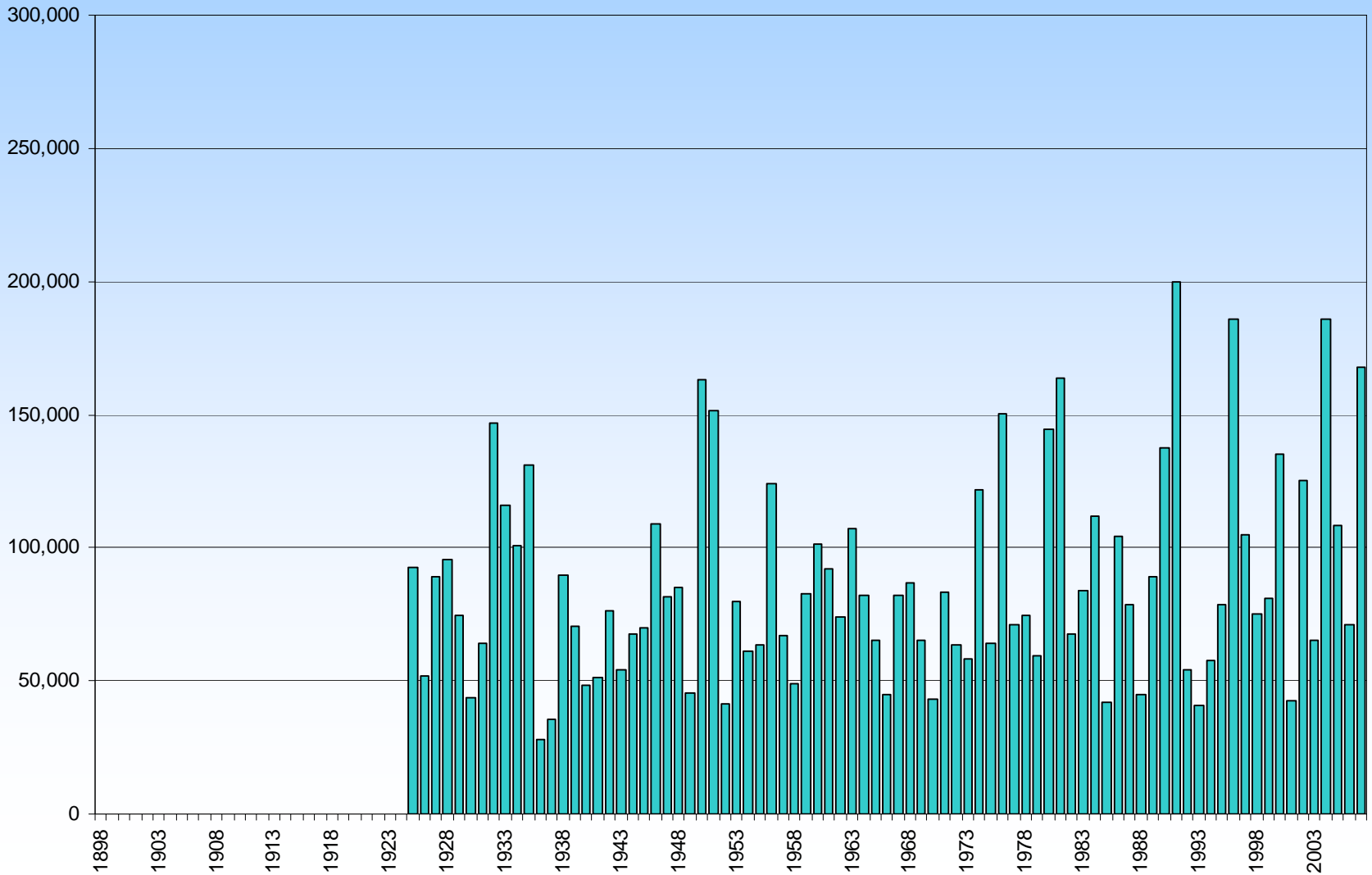
## Why Our Community Needs Your Help

Chal Martin, P.E.  
City of Burlington  
Public Works Director

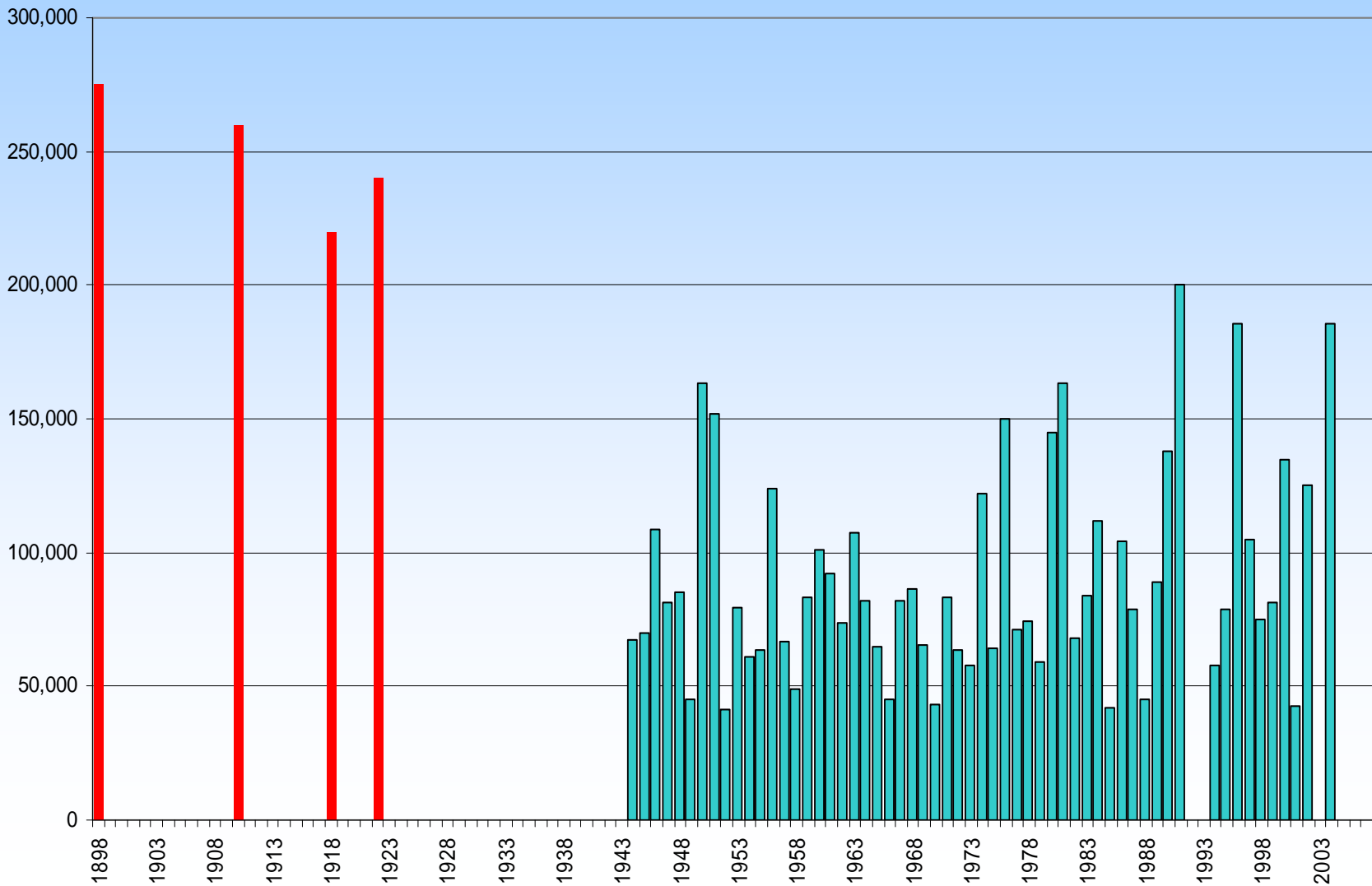
September 5, 2007



# Winter Unregulated Annual Peak Flows Skagit River Near Concrete

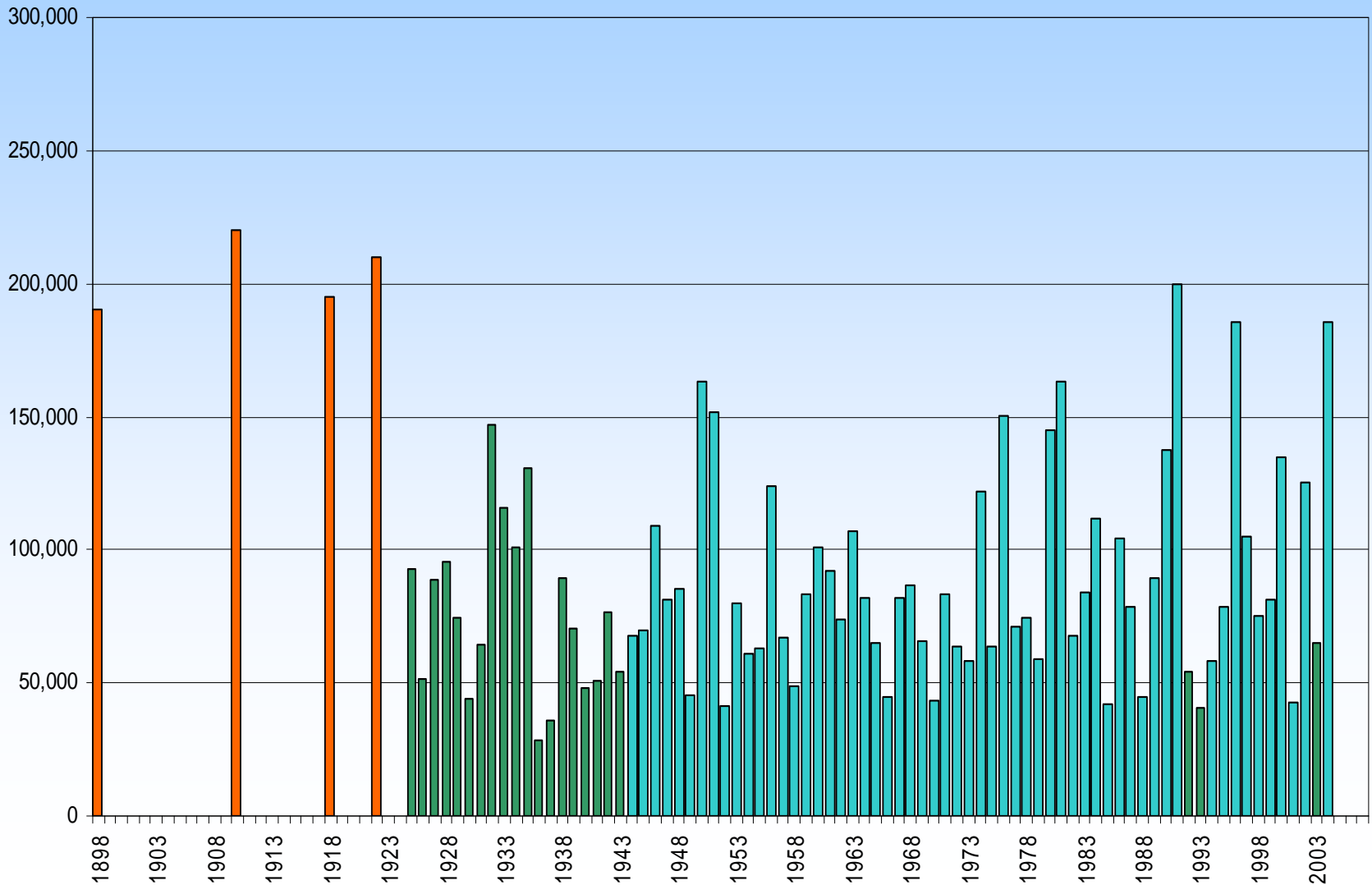


# Winter Unregulated Annual Peak Flows Skagit River Near Concrete: Corps of Engineers Data Set

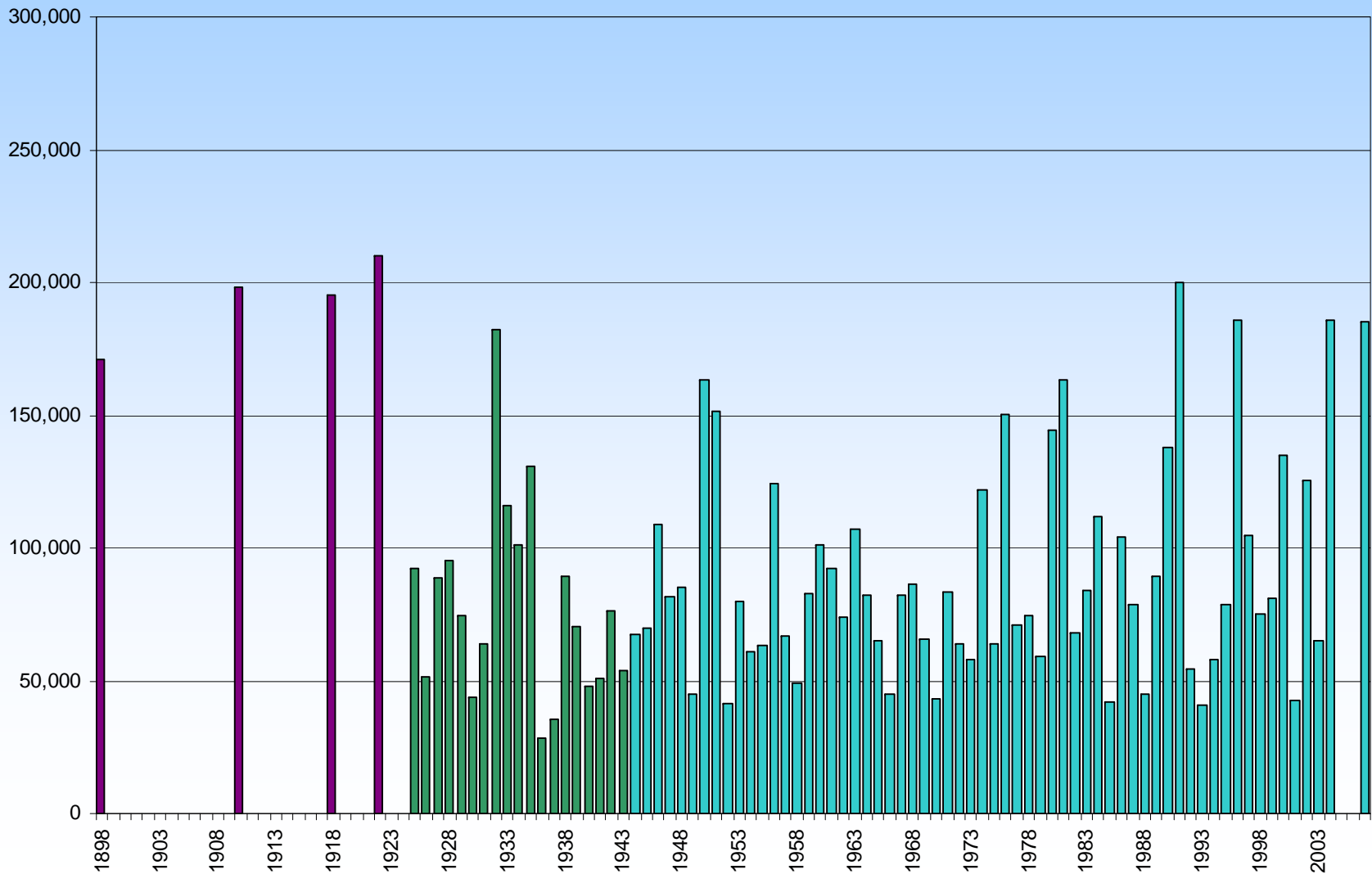




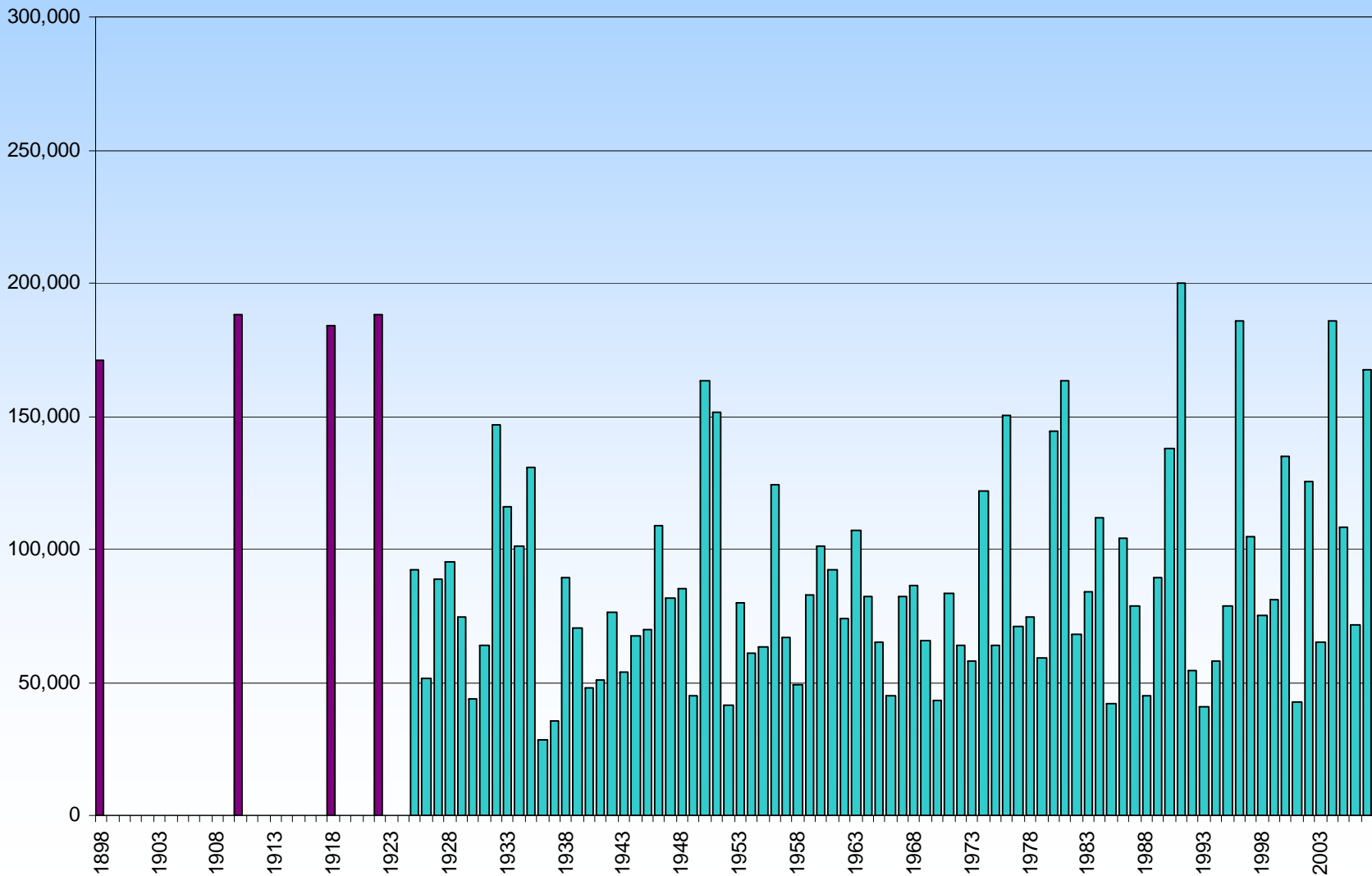
# Winter Unregulated Annual Peak Flows Skagit River Near Concrete: PI Engineering Data Set w/ Sedro Woolley Historic Peaks



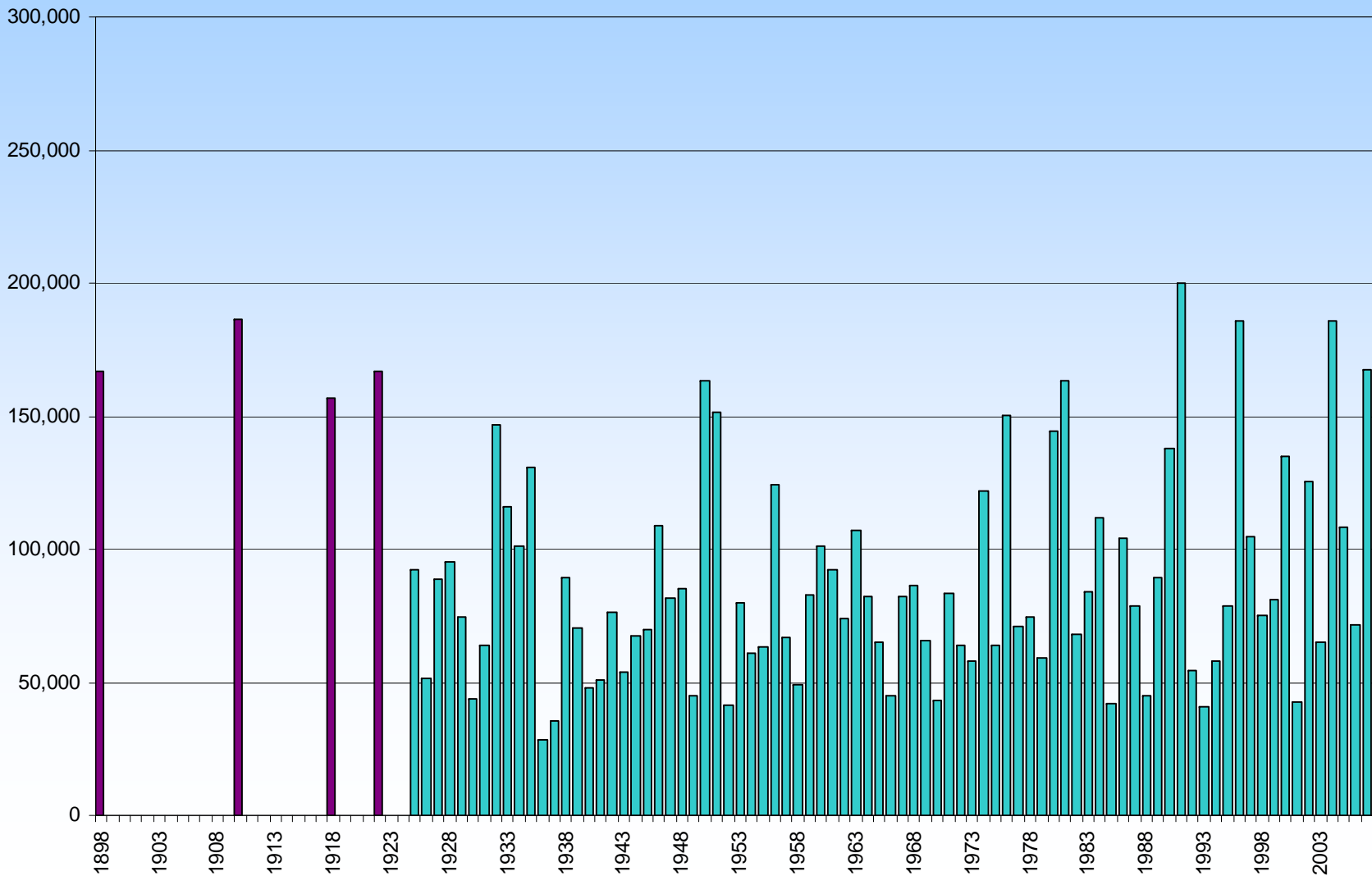
# Winter Unregulated Annual Peak Flows Skagit River Near Concrete w/ Adjusted Sedro-Woolley Historic Estimates



# Winter Unregulated Annual Peak Flows Skagit River Near Concrete: **Minimum Smith House Modification**

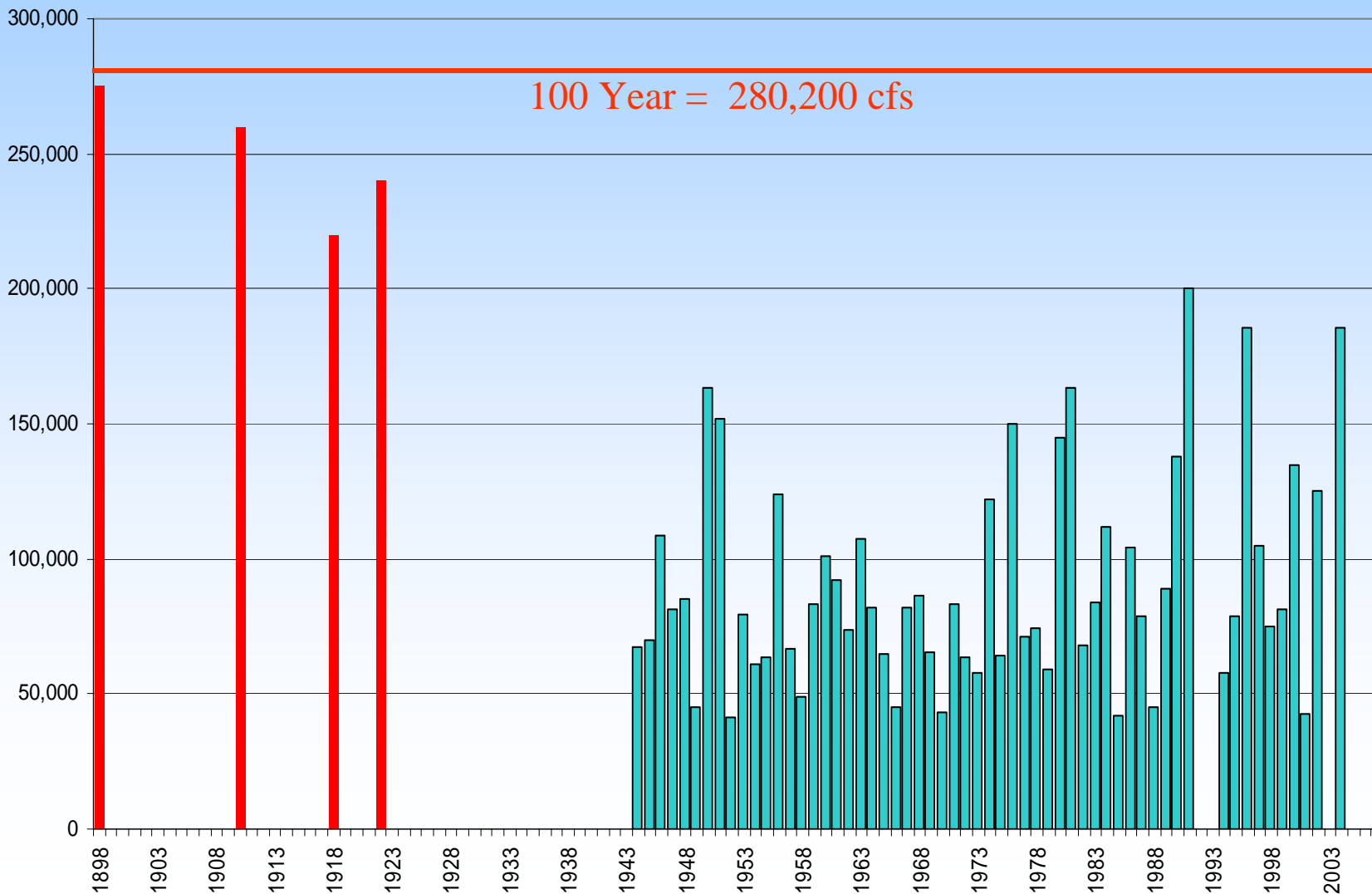


# Winter Unregulated Annual Peak Flows Skagit River Near Concrete: **Draft Revised PI Engineering Input Data**

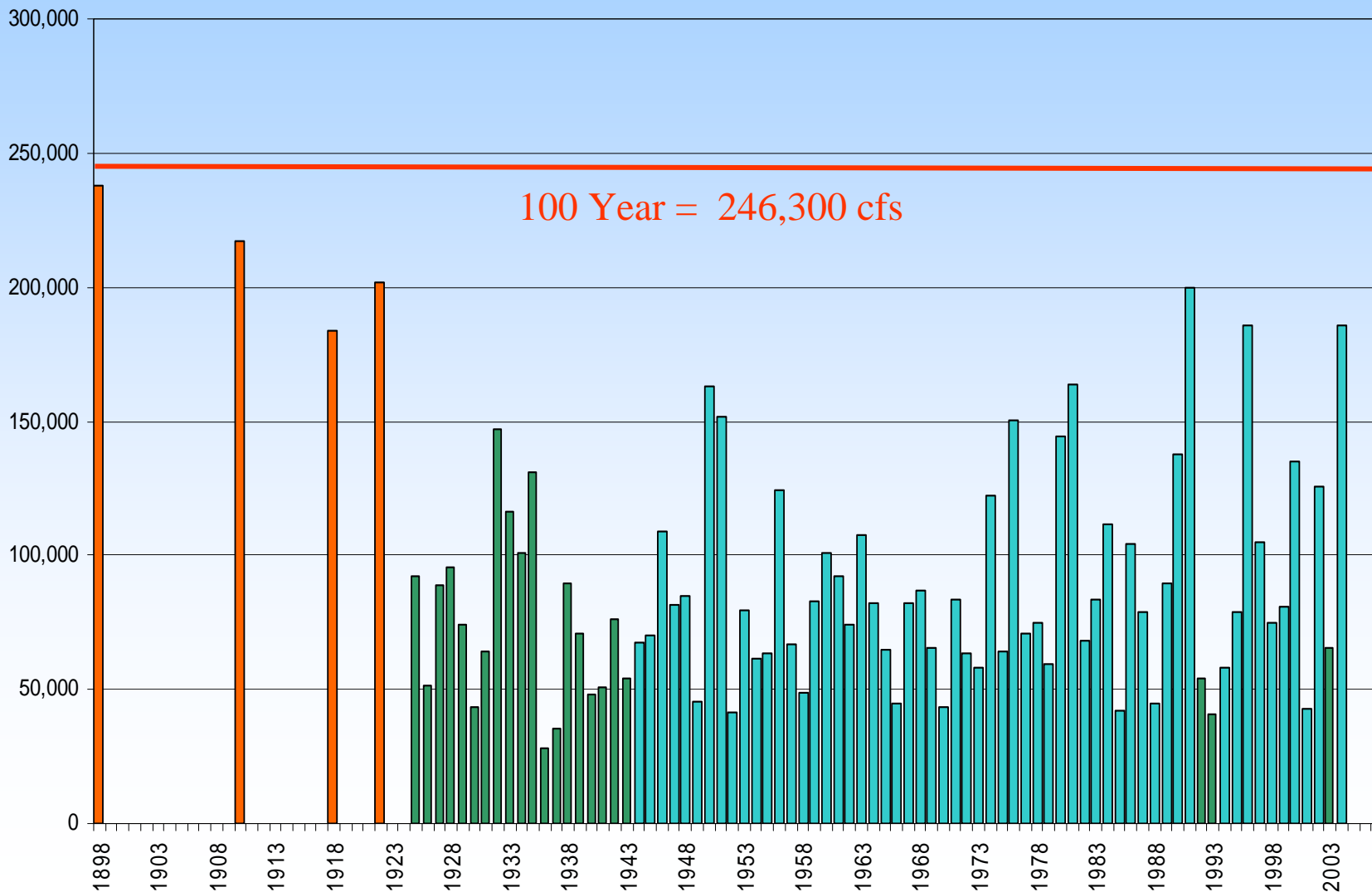




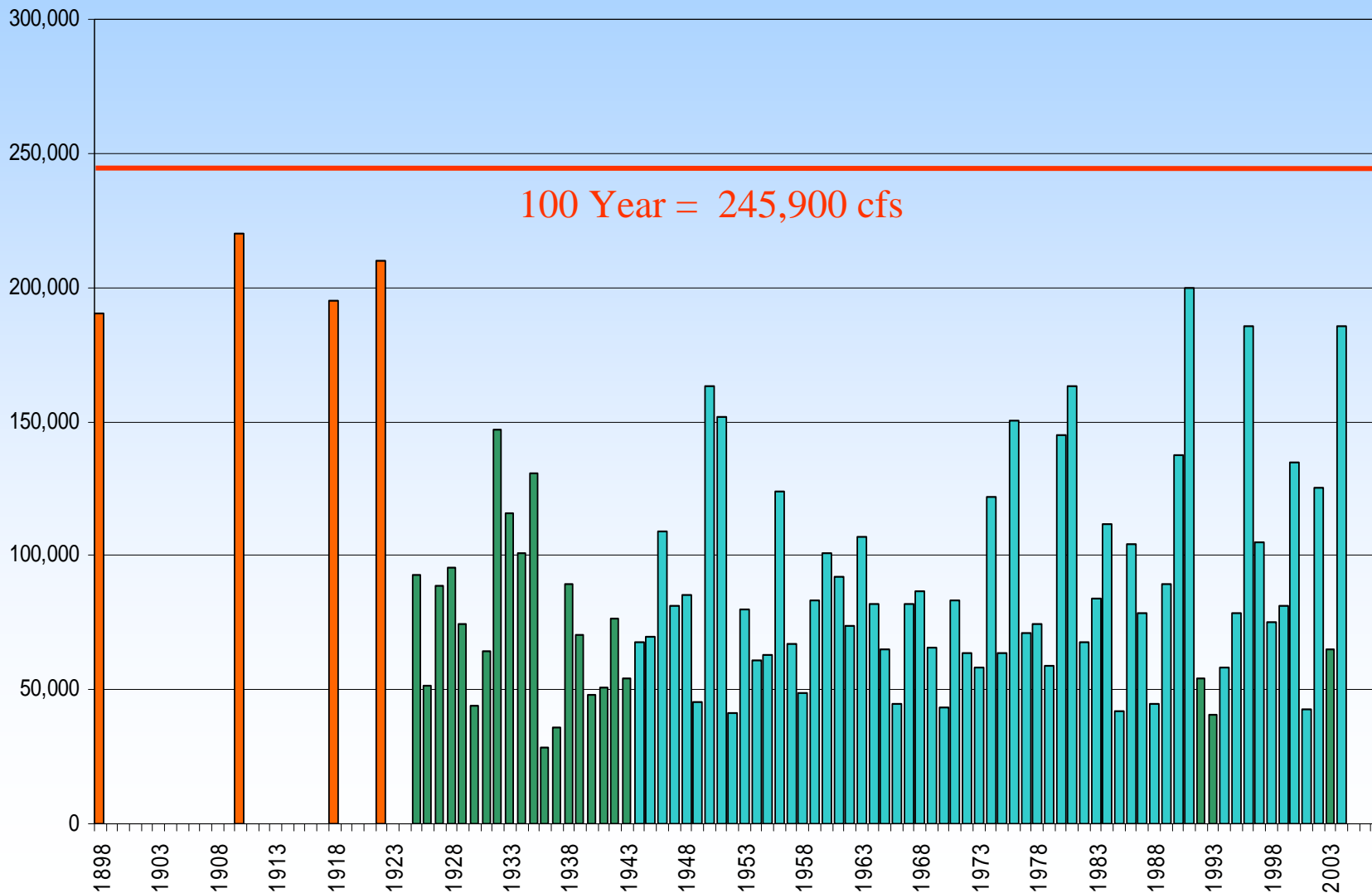
# Winter Unregulated Annual Peak Flows Skagit River Near Concrete: Corps of Engineers Data Set



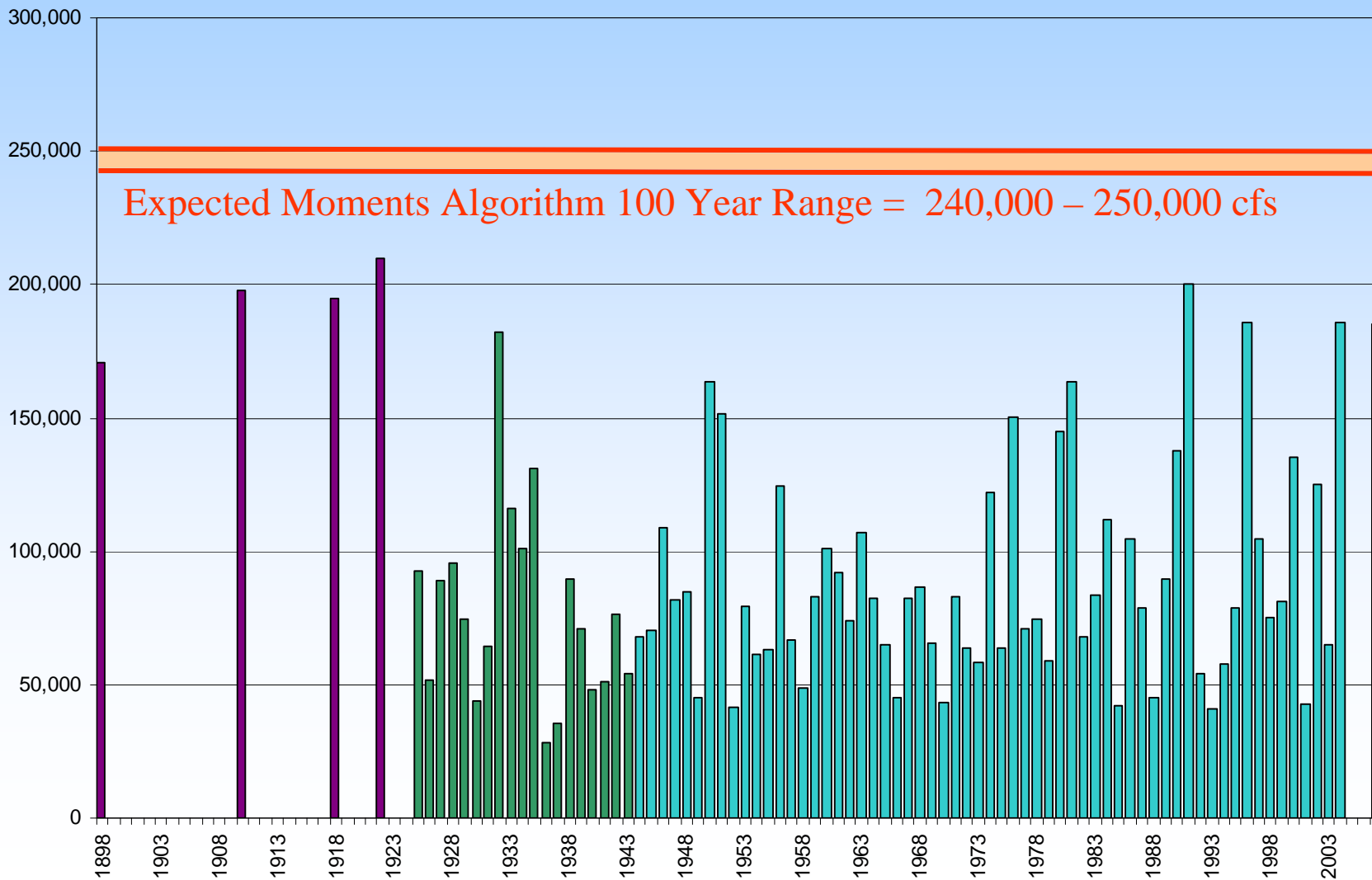
# Winter Unregulated Annual Peak Flows Skagit River Near Concrete: PI Engineering Data Set



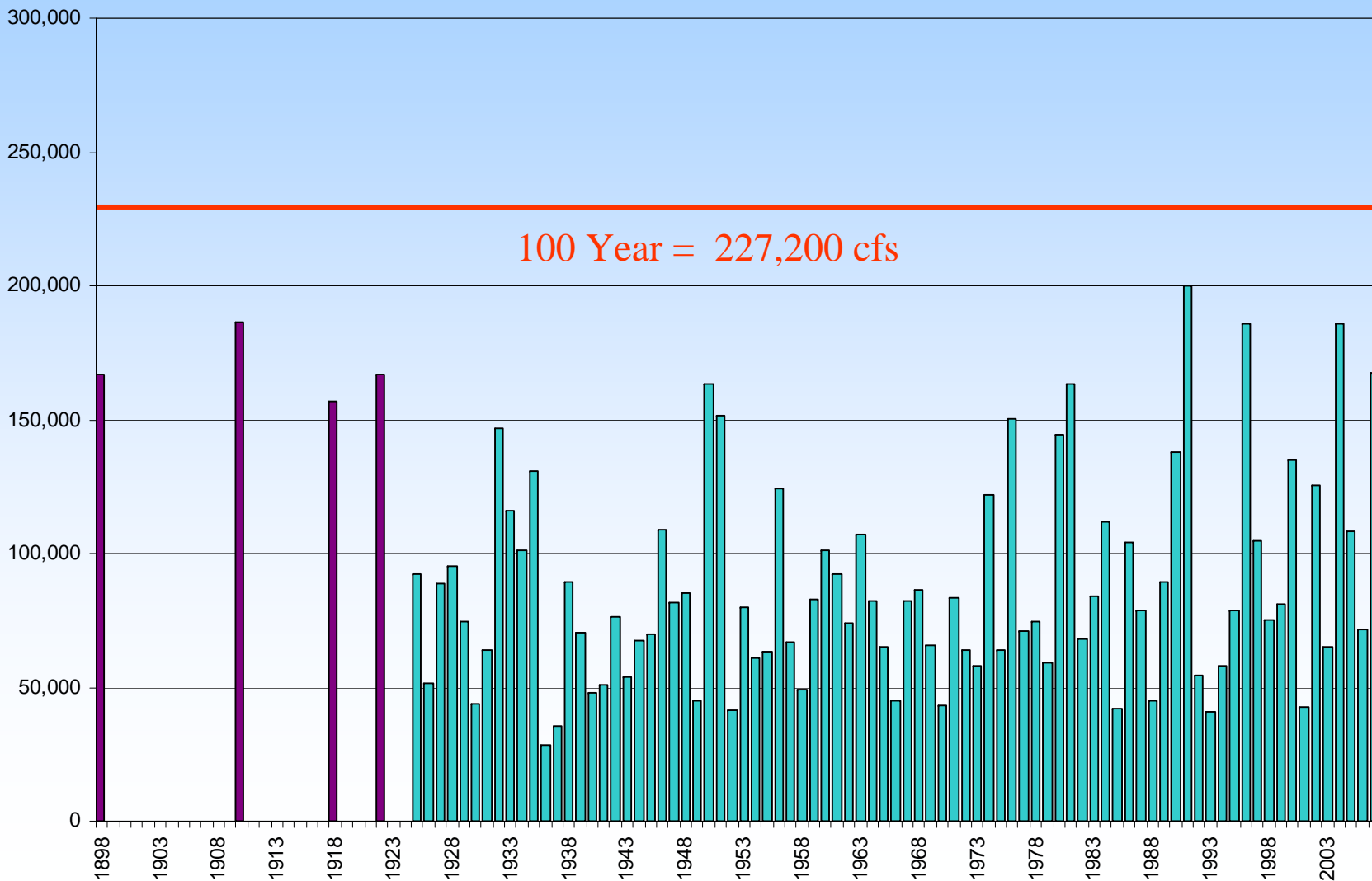
# Winter Unregulated Annual Peak Flows Skagit River Near Concrete: PI Engineering Data Set w/ Sedro Woolley Historic Peaks



# Winter Unregulated Annual Peak Flows Skagit River Near Concrete w/ Adjusted Sedro-Woolley Historic Estimates



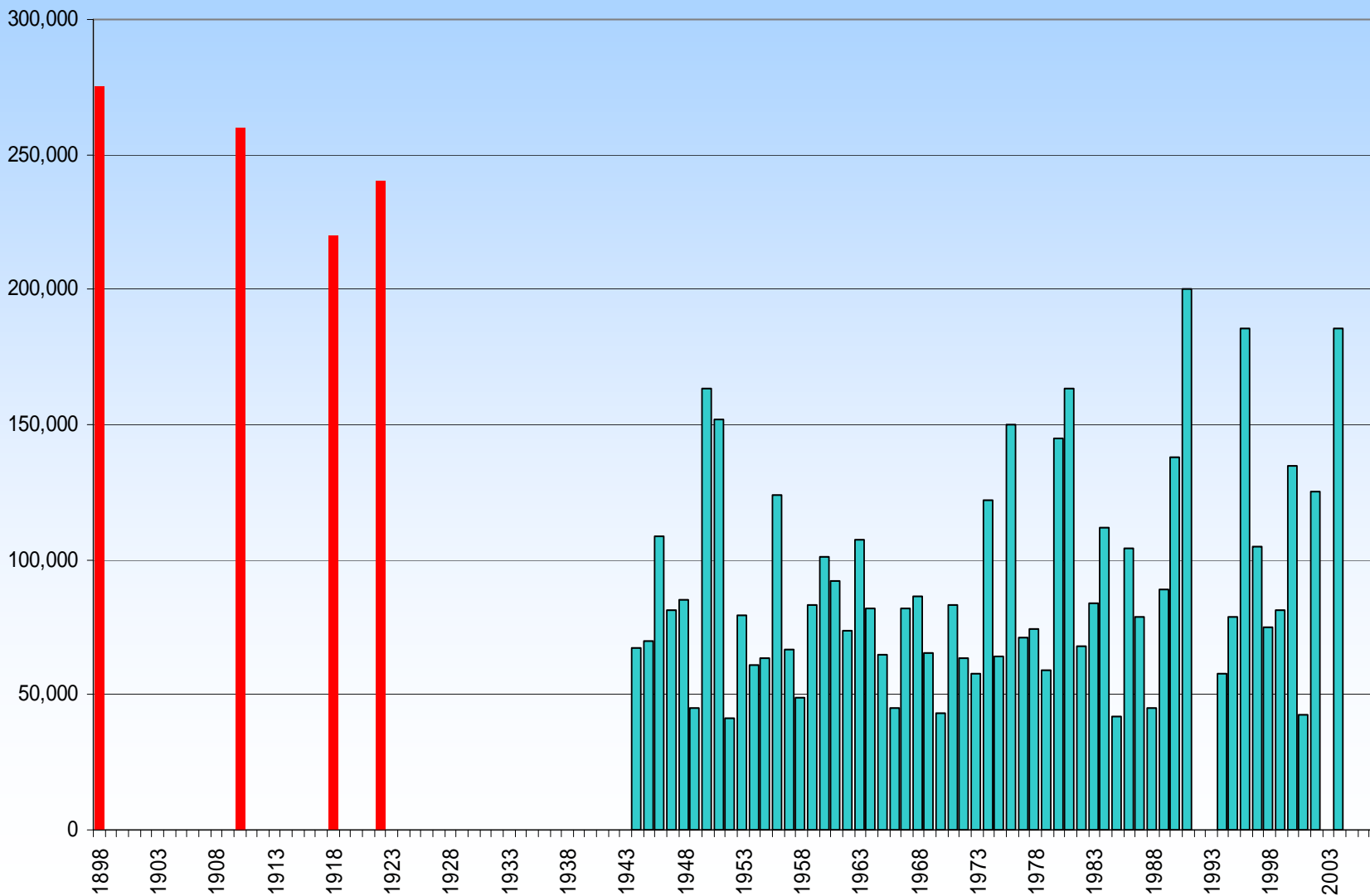
# Winter Unregulated Annual Peak Flows Skagit River Near Concrete: **Draft Revised PI Engineering Input Data**



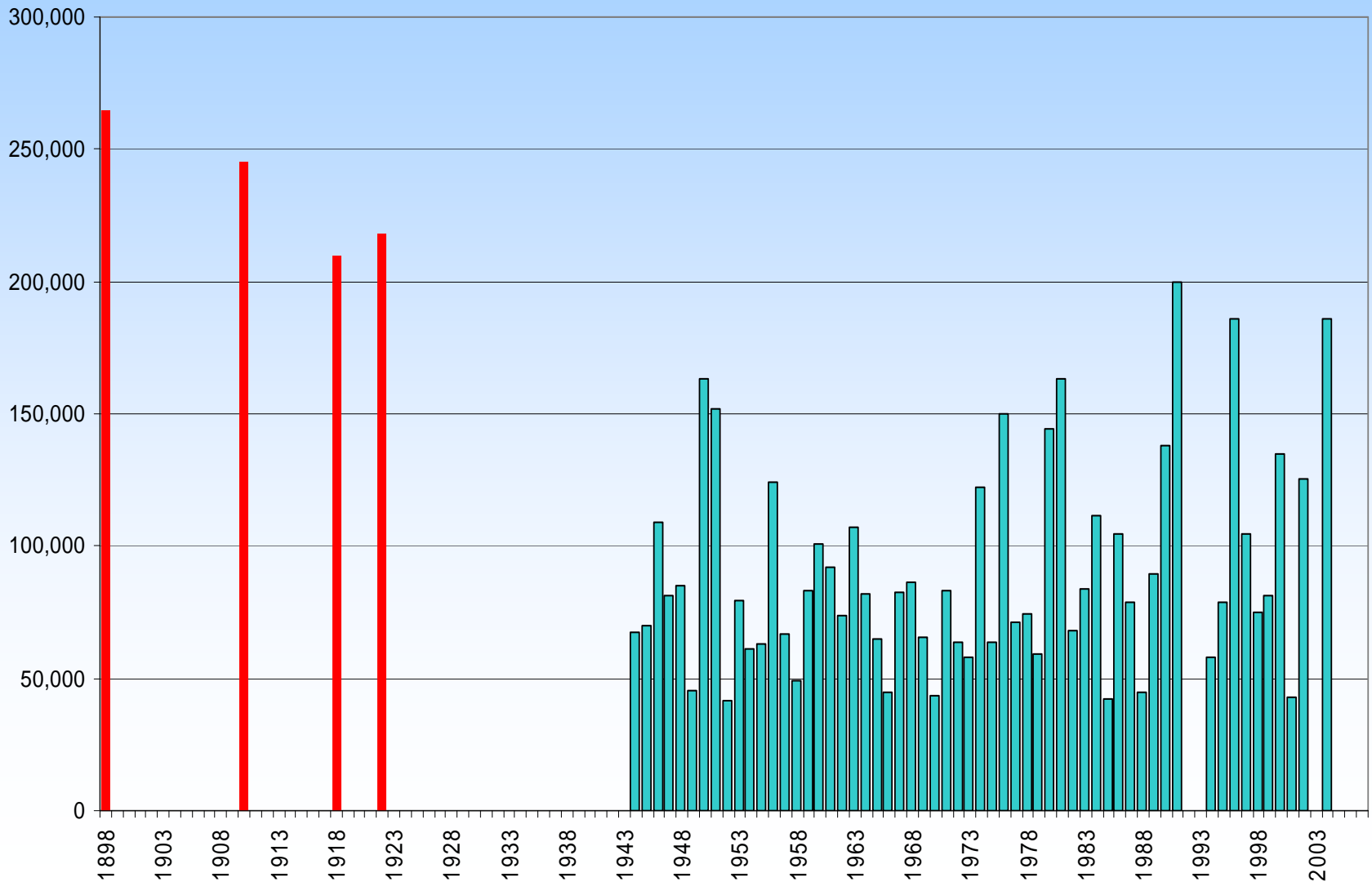
# ISSUE

- What about the recently reduced USGS historic flood estimates at Concrete?

# Winter Unregulated Annual Peak Flows Skagit River Near Concrete: Corps of Engineers Data Set

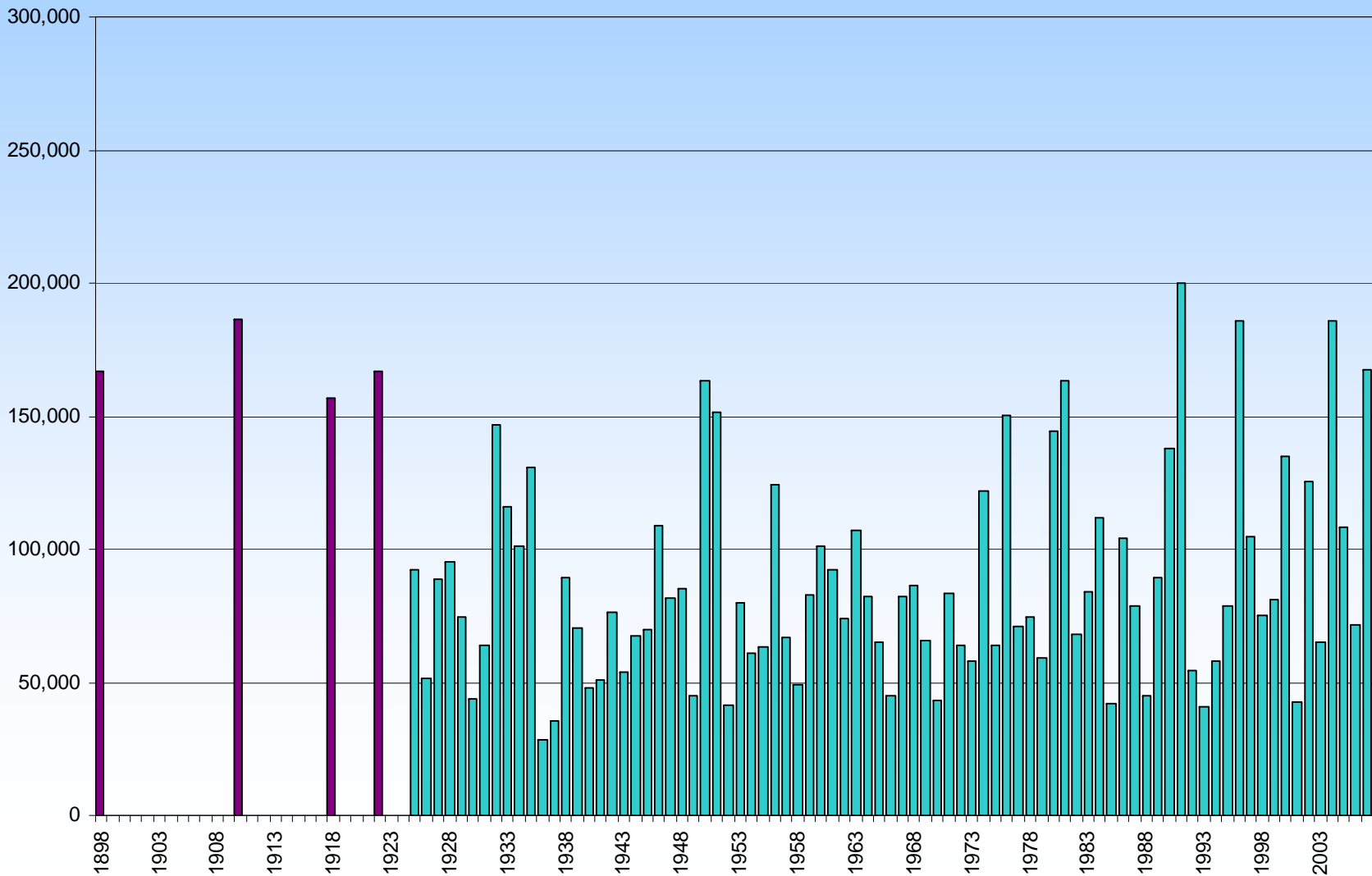


# Winter Unregulated Annual Peak Flows Skagit River Near Concrete: Corps of Engineers Data Set w/ Modified USGS Historic Estimates





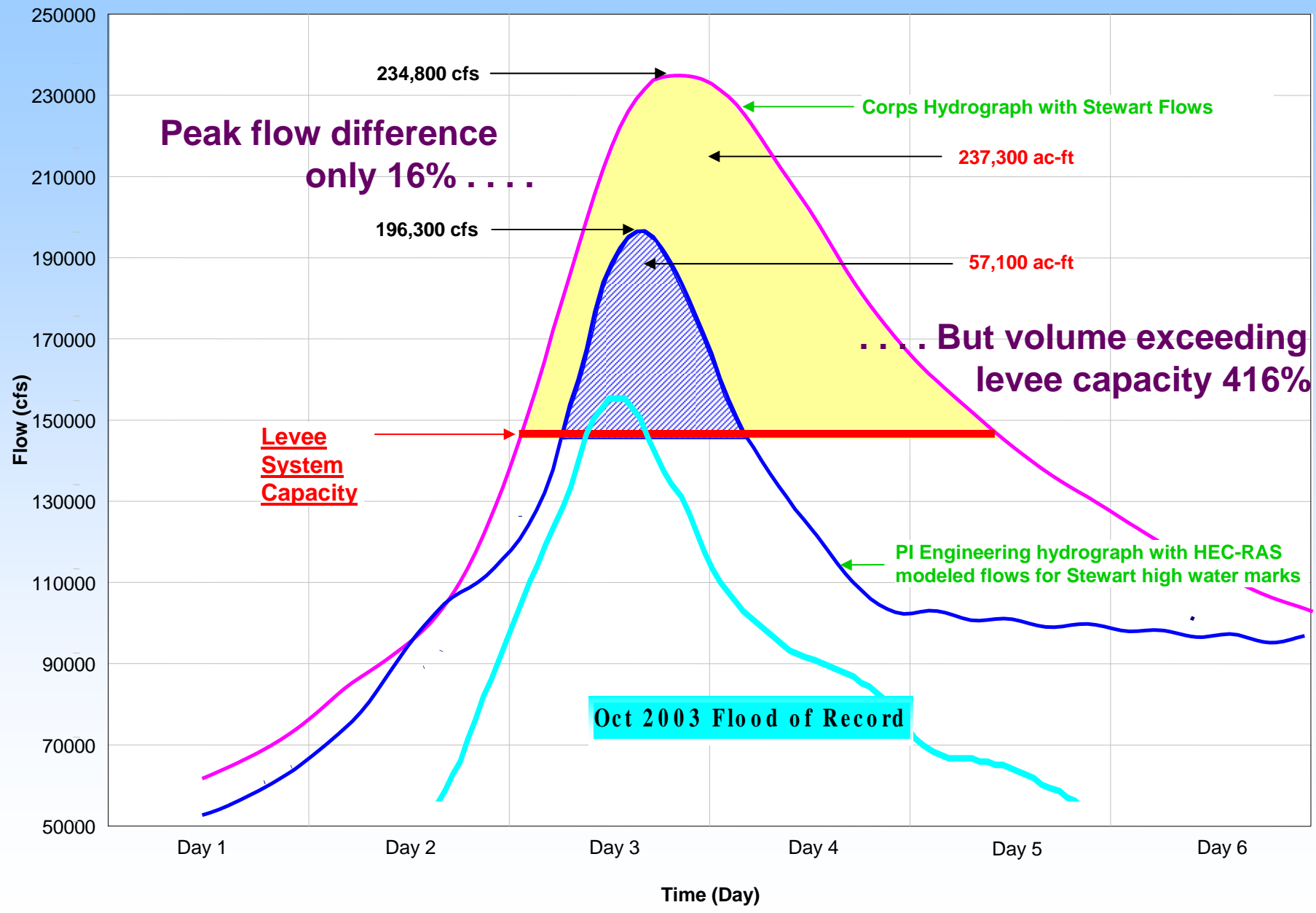
# Winter Unregulated Annual Peak Flows Skagit River Near Concrete: **Draft Revised PI Engineering Input Data**



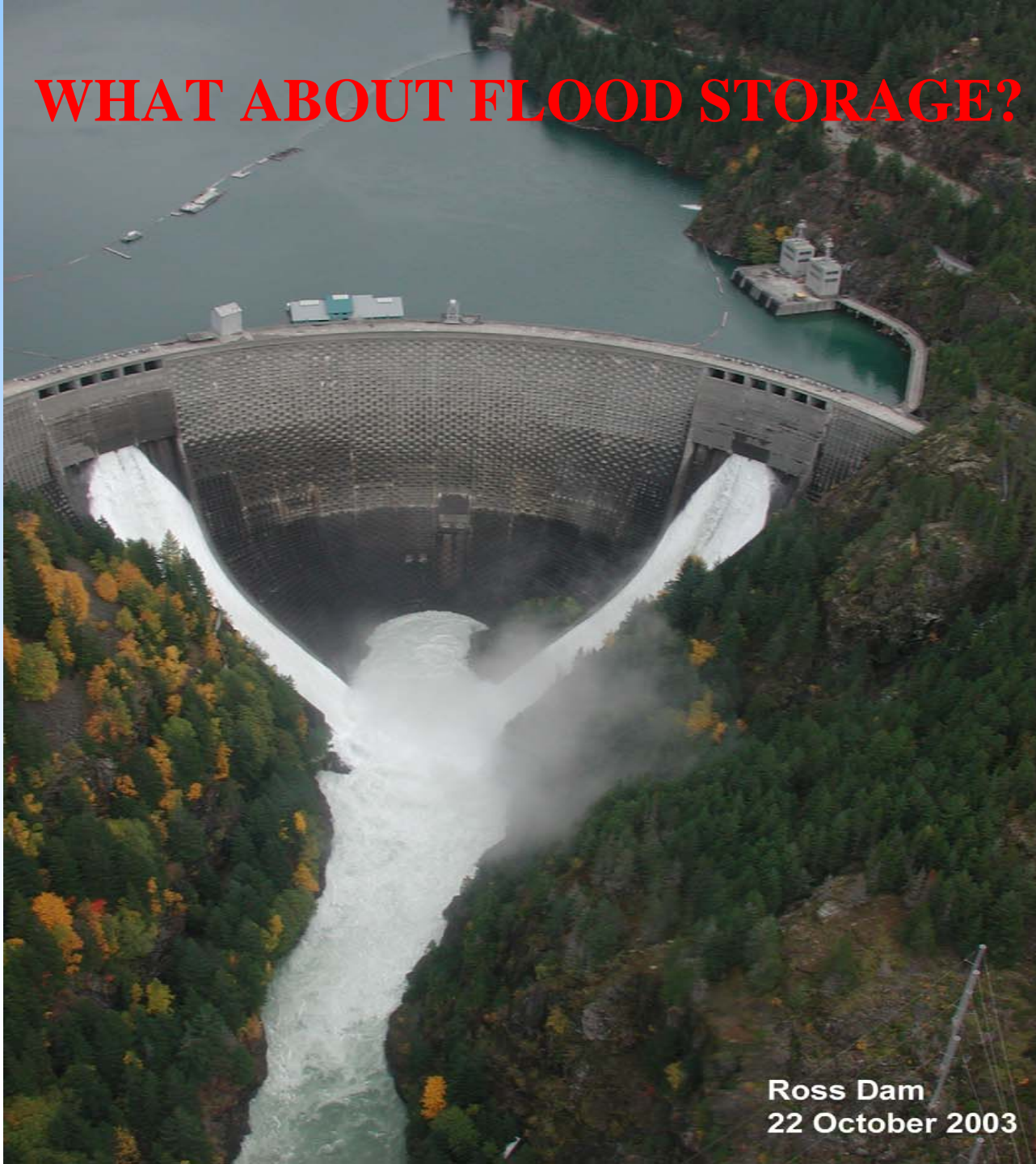
# ISSUE

- What is the effect of the Corps of Engineers data set, compared to the PI Engineering data set?

# FEMA 100-year Flood Hydrographs at Sedro Woolley (with existing flood storage)



# WHAT ABOUT FLOOD STORAGE?

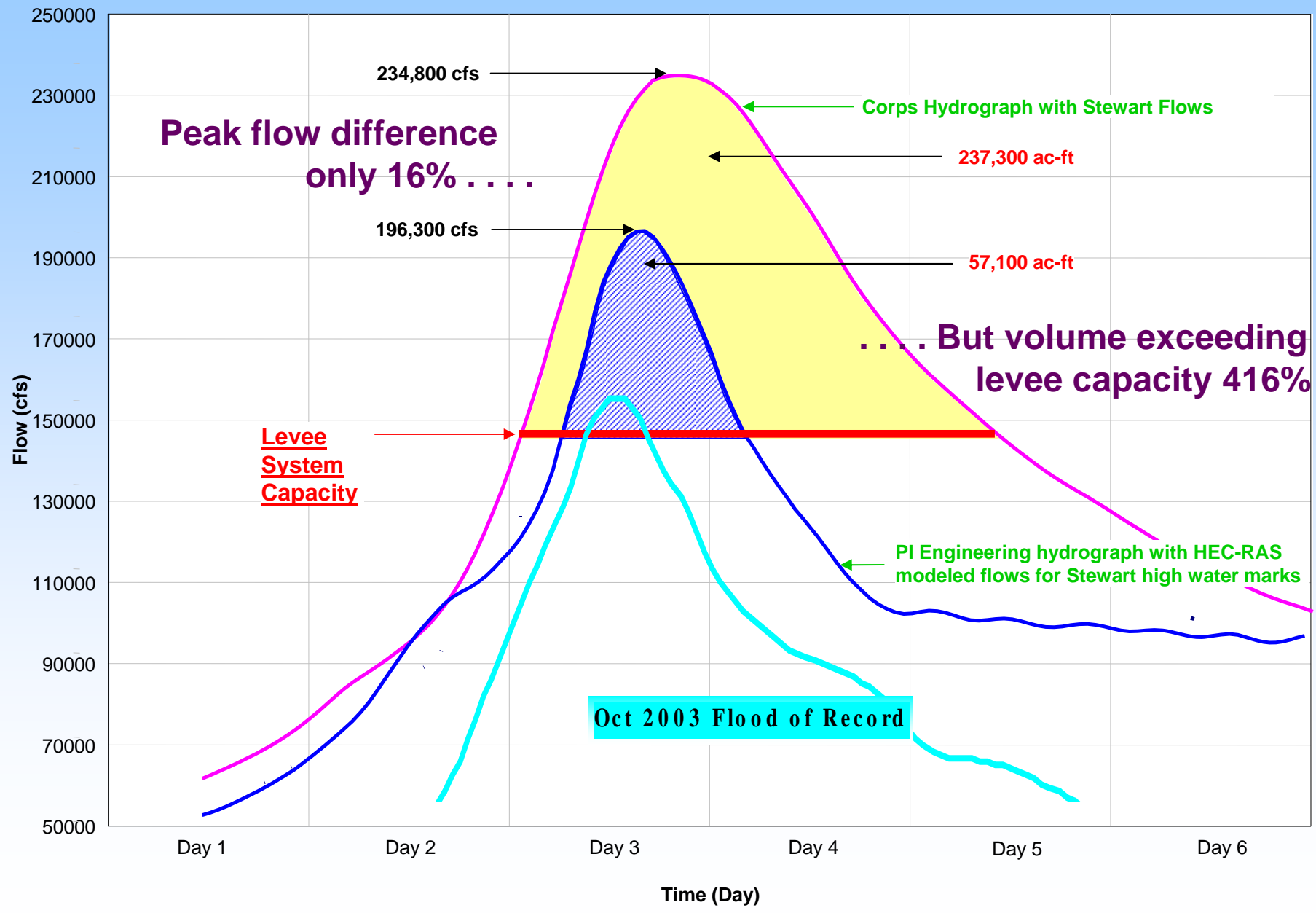


Ross Dam  
22 October 2003

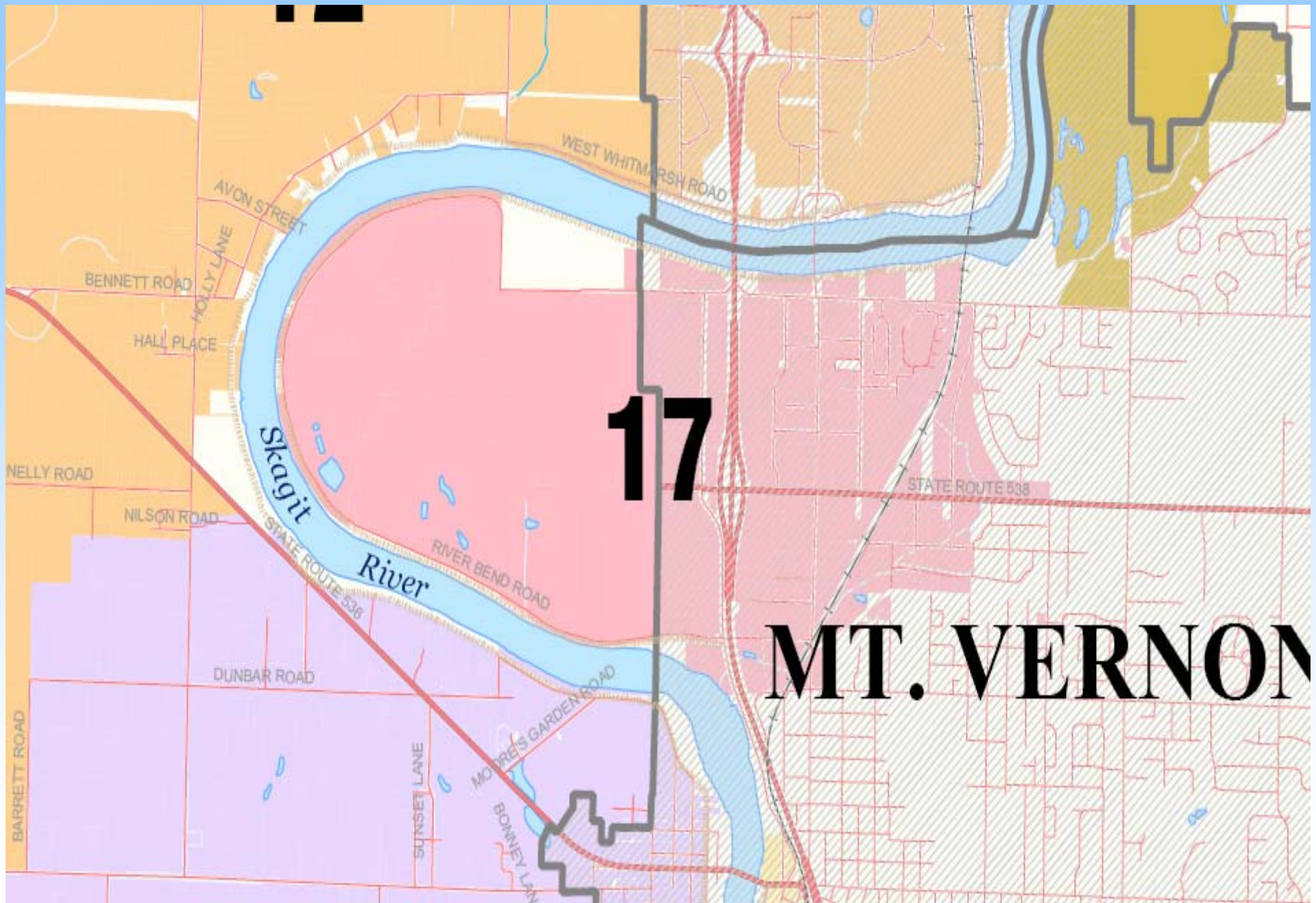
**More Baker flood storage is needed, but  
the Corps GI study will reject it.**



# FEMA 100-year Flood Hydrographs at Sedro Woolley (with existing flood storage)



# **Example: Flood Risk and Dike 17**



17

MT. VERNON



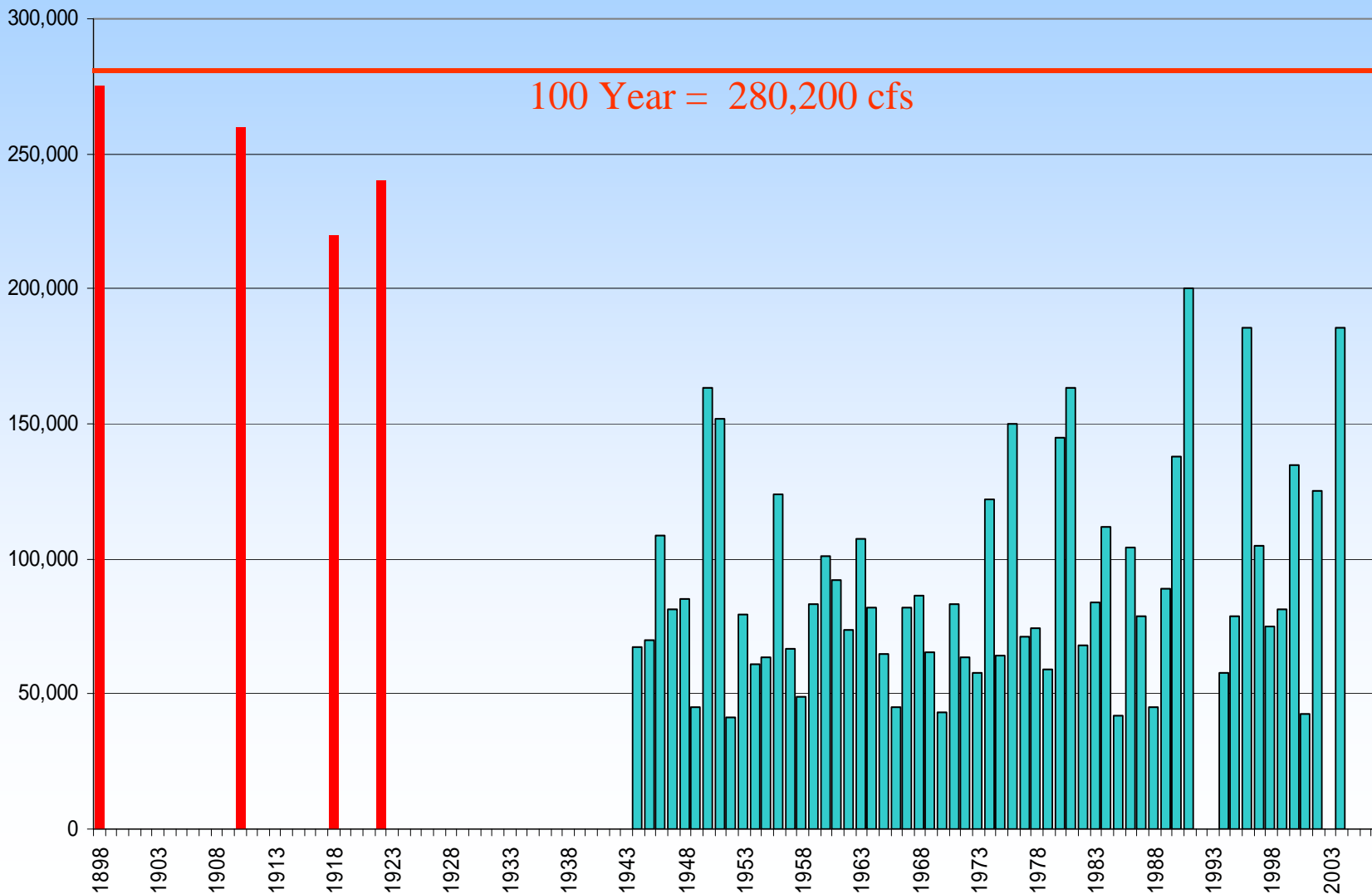
# Example: Flood Risk and Dike 17

- Dike 17 protects a key commercial/industrial center for Mount Vernon.
- We know there is a serious flood risk there.
- Corps analysis will preclude any reasonable levee certification project. Is this safer?
- Reminder: no flood over the past 84 years, with the existing flood storage in place, would have exceeded the current capacity of the Dike 17 levees.
- With the Corps analysis, there is virtually no chance that the flood elevations can be brought back down.

# So, what is going to happen?

1. The overestimated historic flood events (see red bars) will skew the hydrologic and hydraulic analyses too high.

# Winter Unregulated Annual Peak Flows Skagit River Near Concrete: Corps of Engineers Data Set



# So, what is going to happen?

2. This skewed analysis then drives base flood elevations higher than they should be, which will result in:
  - a) reduced development,
  - b) reduced redevelopment, and
  - c) much lower growth in property tax base.



DO NOT  
BLOCK  
INTERSECTION

← I-5 SOUTH  
Seattle

Approx. 11 feet above ground

I-5 Bridge over College Way

NAVD 1988 Ground Elev. 29.8 ft., Flood Elevation 40.5 ft.



Approx. 11 feet above ground

College Way block between Riverside Drive and Urban Avenue

NAVD 1988 Ground Elev. 29.8 ft., Flood Elevation 40.5 ft.



Approx. 11 feet above ground

College Way at Riverside Drive and Urban Avenue  
NAVD 1988 Ground Elev. 29.8 ft., Flood Elevation 40.5 ft.



**Approx. 11 feet above ground**

**College Way at Riverside Drive**

**NAVD 1988 Ground Elev. 29.8 ft., Flood Elevation 40.5 ft.**





Approx. 11 feet above ground



College Way at Riverside Drive

NAVD 1988 Ground Elev. 29.8 ft., Flood Elevation 40.5 ft.



Approx. 13 feet above ground

Behind Ace Hardware

NAVD 1988 Ground Elev. 27.8 ft., Flood Elevation 40.5 ft.



Approx. 3.5 feet above ground

Fairhaven & Burlington Boulevard

NAVD 1988 Ground Elev. 34.0 ft., Flood Elevation 37.5 ft.



**Approx. 7.7 feet above ground**

**Fairhaven & Burlington Boulevard**

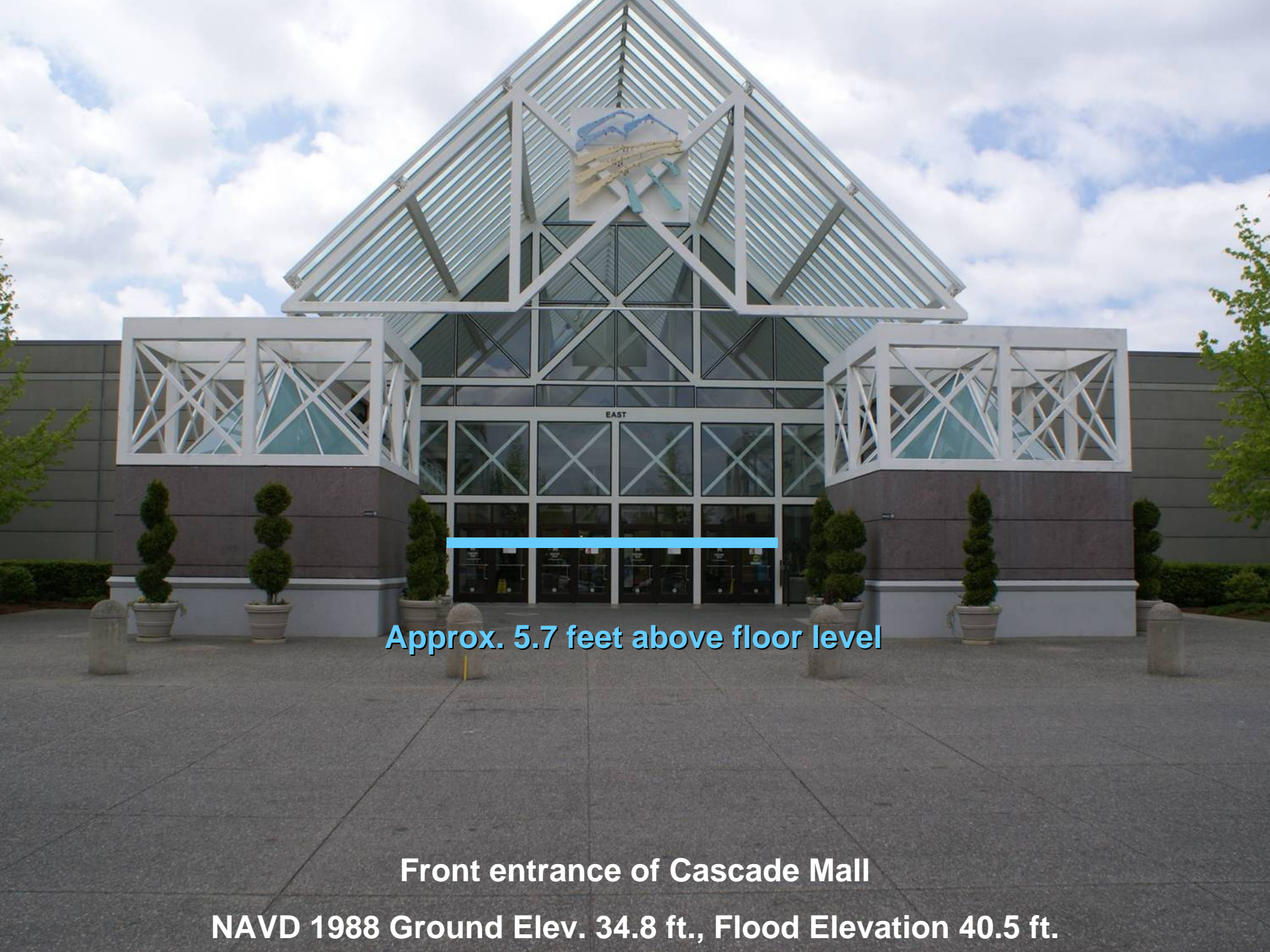
**NAVD 1988 Ground Elev. 34.3 ft., Flood Elevation 42.0 ft.**



Approximately 7.7 feet above ground

Wendy's (Burlington Blvd. near Pease Rd. in front of Kmart)

NAVD 1988 Ground Elev. 33.8 ft., Flood Elevation 41.5 ft.



Approx. 5.7 feet above floor level

**Front entrance of Cascade Mall**

**NAVD 1988 Ground Elev. 34.8 ft., Flood Elevation 40.5 ft.**

# So, what is going to happen?

1. This cannot be fixed! While the property tax growth slows (bringing sales tax with it), the cost to protect against the skewed theoretical hydrology increases prohibitively. The community will be left with:
  - reduced tax base growth, and
  - increased cost to protect against the theoretical 100-year flood.

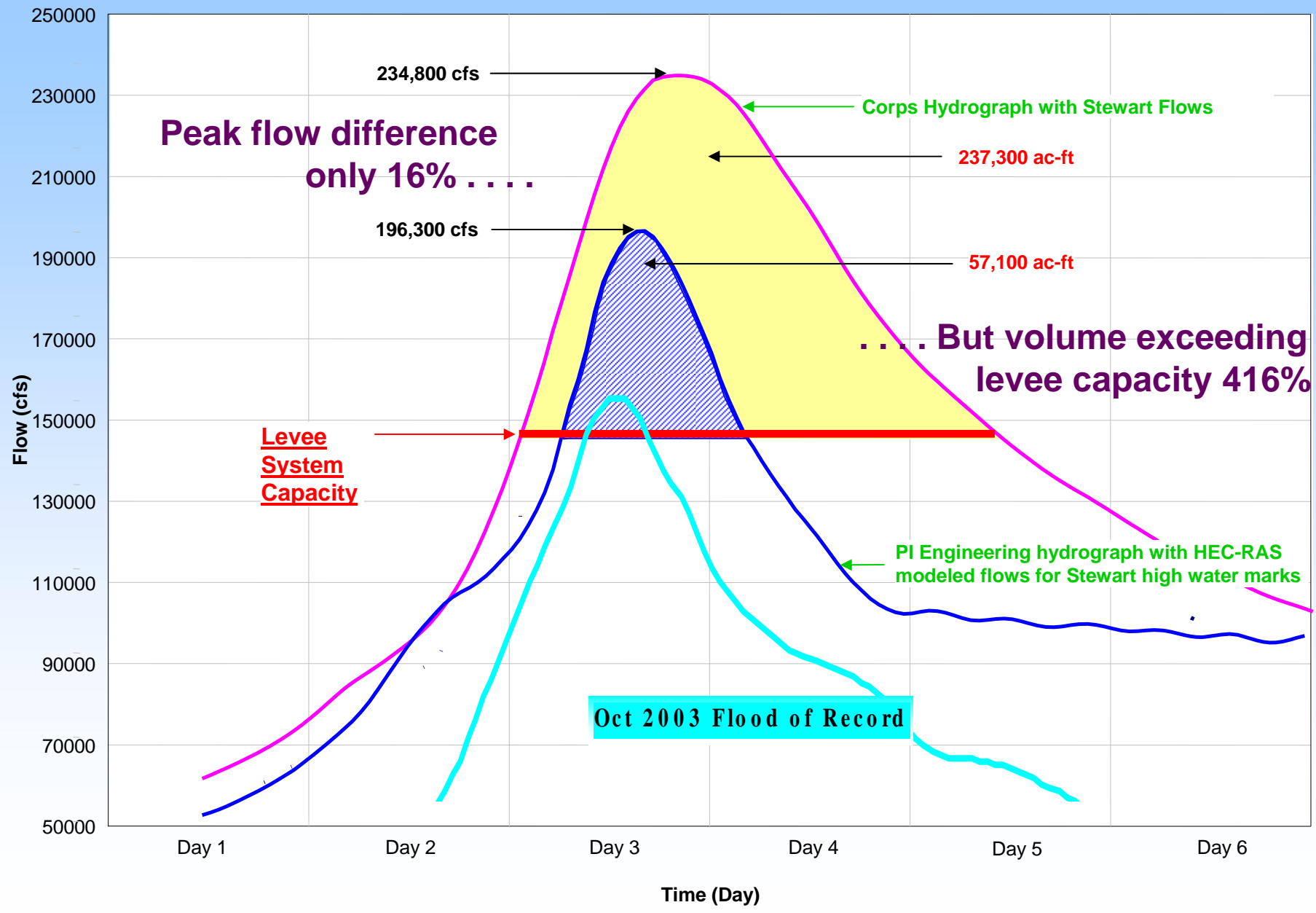
**(Important note: even with the correct hydrology, it will still take 10-20 years to bring higher flood elevations back down)**

# So, what is going to happen?

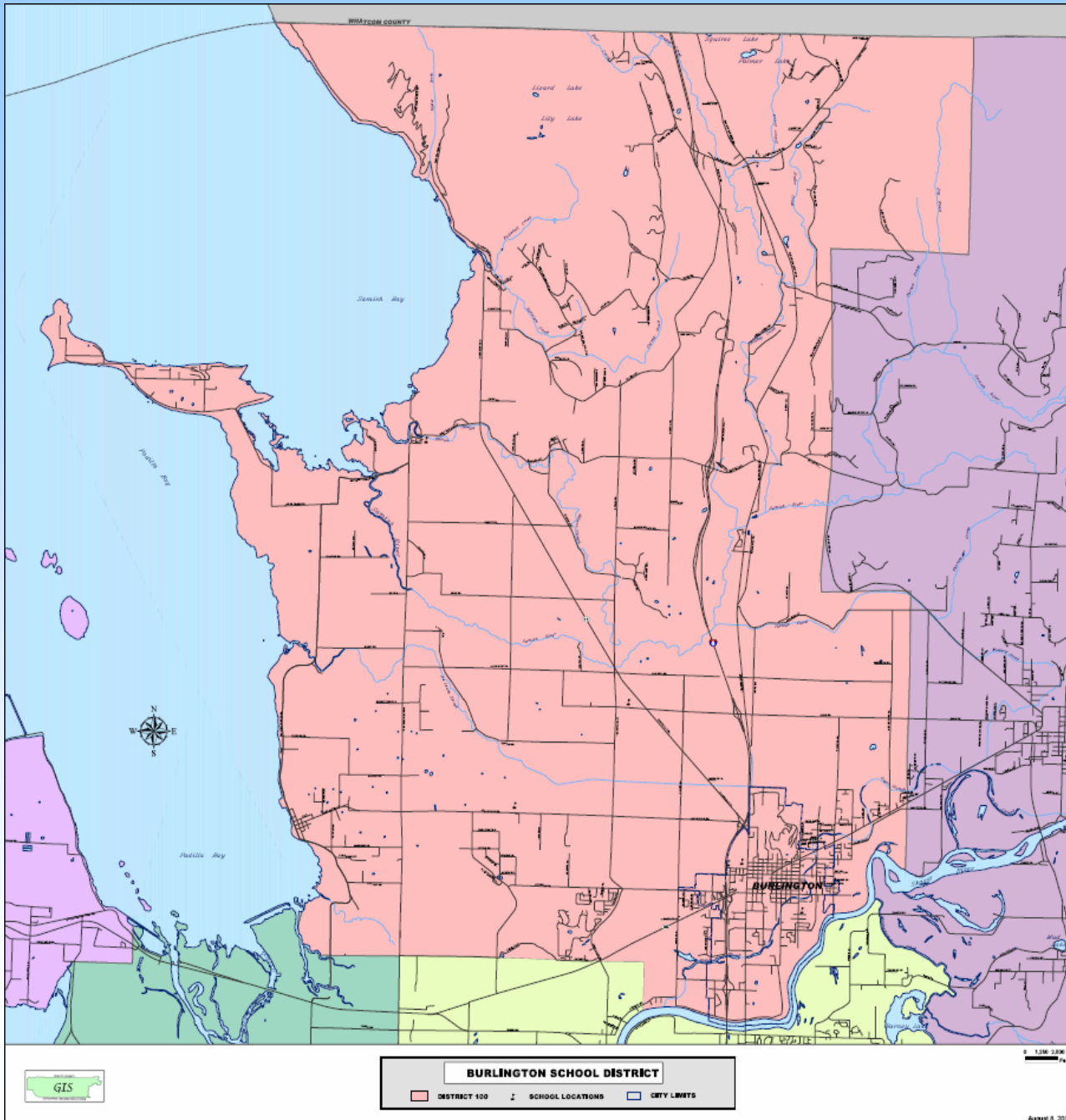
4. As an added penalty: Too much theoretical water will paradoxically trigger the Corps to de-select additional Baker storage as a flood control option, thereby making the problem even worse.

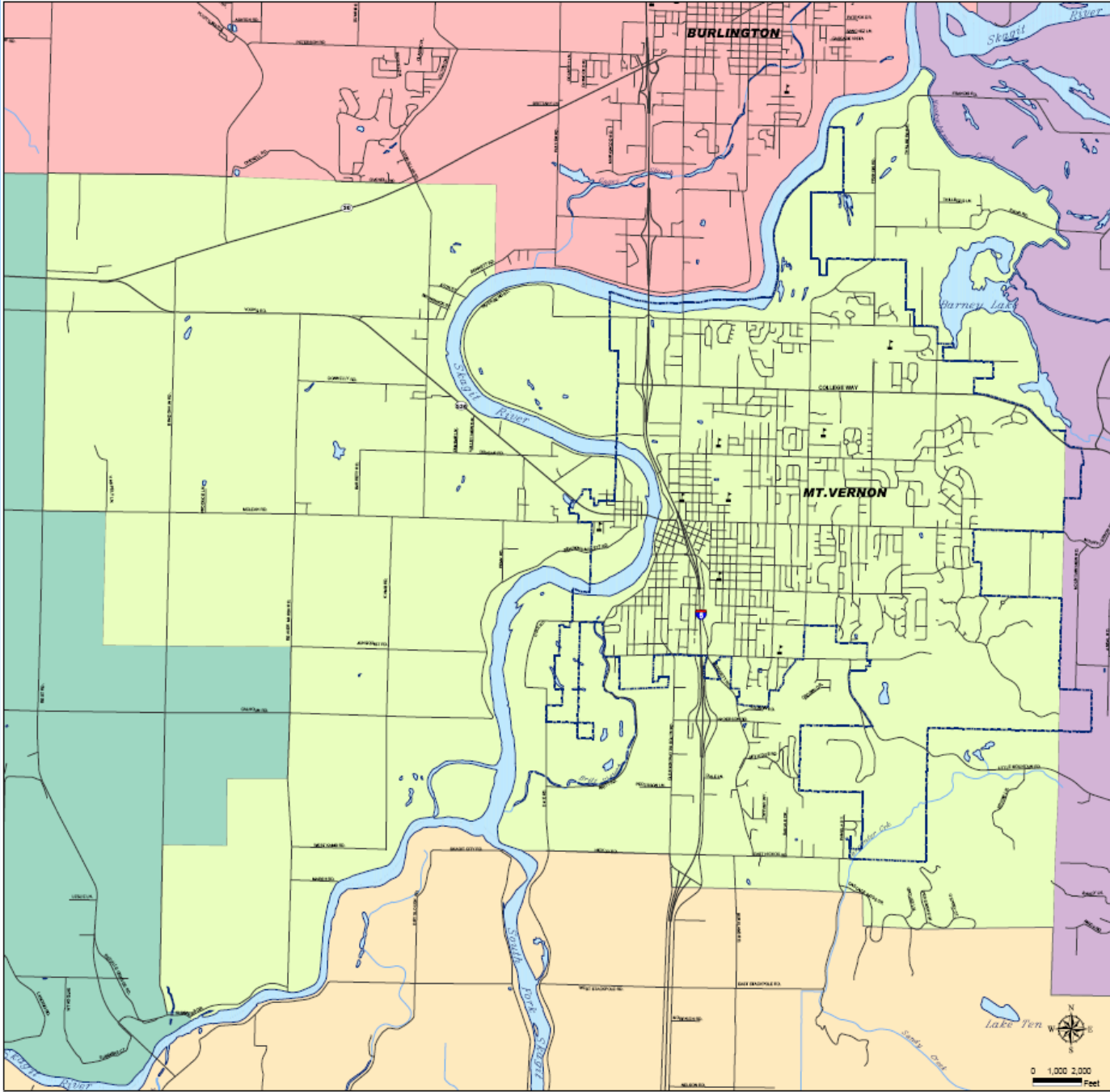


# FEMA 100-year Flood Hydrographs at Sedro Woolley (with existing flood storage)



**Concern:**  
**Schools and Property Tax Base**





MT.VERNON SCHOOL DISTRICT		
<span style="display:inline-block; width:15px; height:10px; background-color:lightgreen; border:1px solid black;"></span>	DISTRICT 320	
<span style="display:inline-block; width:10px; height:10px; background-color:lightblue; border:1px solid black;"></span>	SCHOOL LOCATIONS	
<span style="display:inline-block; width:15px; border-bottom:1px solid black;"></span>	CITY LIMITS	

# So, what is going to happen?

## Most likely outcome:

1. New FEMA flood elevations, based on the flawed technical analysis, will be put in place.
2. Appeal by Mount Vernon, Burlington and the Dike Districts will be unsuccessful.
3. Dramatically higher base flood elevations will cause growth to slow substantially, causing tax base growth to lag behind inflation.
4. The City of Burlington will work with Dike District 12 to certify its levees against the Corps hydrology. This will take 20 years and likely not be effective until the next FEMA mapping update in 2035.
  - Development and redevelopment will be significantly impacted for decades.
5. The City of Mount Vernon will be unable to work with Dike District 17 to certify its levees. It will not be possible to do it.
  - Development and redevelopment inside the Riverbend will be dramatically and permanently impacted.

# So, what is going to happen?

## Best Possible outcome (unlikely):

1. New FEMA flood elevations, based on the correct technical analysis, will be put in place. Base flood elevations will still go up, substantially in many areas.
2. No appeal will be necessary. Instead, focus will shift positively toward the goal of building flood measures to protect urban areas.
3. Higher base flood elevations will still cause growth to slow; however, there will be more options to address the flood elevations.
4. The City of Burlington will work with Dike District 12 to certify its levees against the Corps hydrology. This will take 10-20 years.
5. The City of Mount Vernon will work with Dike District 17 to certify its levees. It will be challenging and expensive, but doable in 10-20 years.
  - Development and redevelopment inside the Riverbend will still be significantly impacted for two decades.

# One More Penalty

# Floodway Issue

- FEMA has oddly been reluctant to address the floodway issue, stating it could “be addressed later.”
- But if it is the official position of FEMA that 234,000 cfs is indeed the 100-year event that is headed toward Burlington, then it is not responsible to ignore the floodway issue. Because we all know our levee system cannot withstand that much water.
- Point: Not a single flood event in the past 84 years, with existing storage in place, would have exceeded the current levee capacity of Dike 12 and Dike 17’s levees.



**Finally . . .**

**We are hopeful the strength of our technical analysis, which we believe is conservative and responsible, will convince Federal authorities and avoid the cascade of bad outcomes described here.**

**But . . .**

**This issue may already be lost, thereby penalizing our community for decades to come, by putting us at an economic disadvantage.**

# **YOUR HELP IS ESSENTIAL!!!!!!!**

## **1. Our vital interests:**

- a. Citizen health and welfare**
- b. Schools**
- c. Government Services**
- d. Property Tax base and Sales Tax revenue**
- e. Transportation infrastructure (I-5)**
- f. Environmental issues and opportunities**

## **2. You can help by:**

- a. Getting smart on the technical, political and financial issues**
- b. Be a strong voice for a more even-handed approach by state and federal agencies (i.e. – let us use our studies)**
- c. Conveying to our federal delegation our deep concerns about the incorrect analysis, and the long term economic ramifications**
- d. Keeping in mind: this is a survival issue! (For some reason, people seem to underestimate how important this is to us)**

# Questions