Idaho Power Stream Gaging

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June 11, 2009

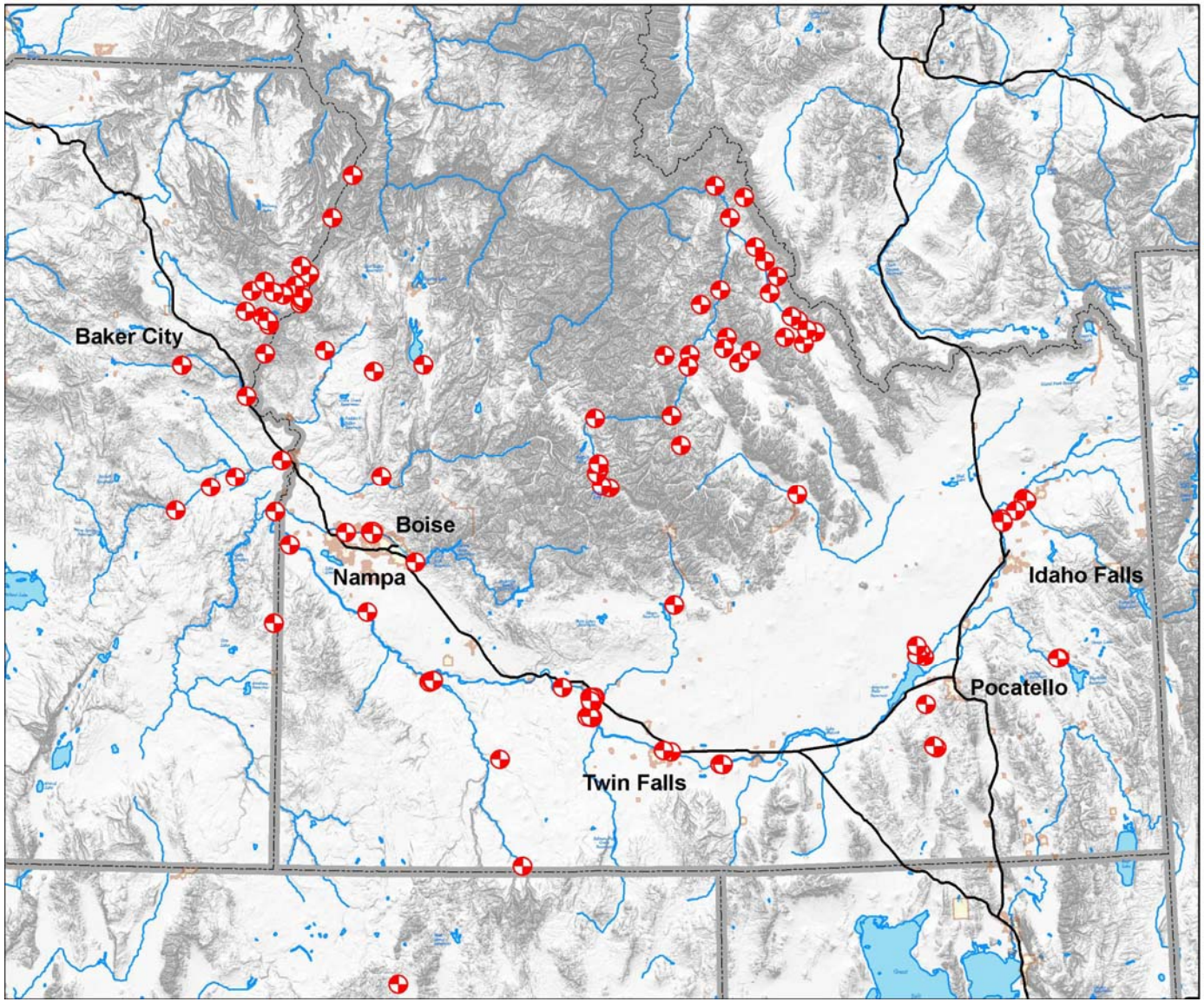
Purpose

Present a review of Idaho Power Company's streamflow gaging program & the role we play in the streamflow gaging industry.

Outline

- Introduction
- Review of IPC Gaging Program
  - History
  - Personnel
  - Cooperators
- Types of Flow Monitoring Stations
- Flow Measurement Equipment
- Data Processing / Storage
- Collaborative Multi-Agency Projects
- Summary

IPC Stream Gage Network



IPC Stream Gaging

[redacted]

Gaging Program History

- 1996 - program established
- 1997 - maintain 4 gages for the State of Idaho
- Use USGS standards
- We have successfully completed contract work for:

Gaging Program History (continued)

- Currently, over 100 streamflow gages
- Over 13 years, we have accumulated a wealth of:
  - Knowledge
  - Experience
    - 7 individuals
    - 74 years of combined experience
  - Equipment
- We are respected as:
  - Leaders
  - Innovators

Water Management Personnel

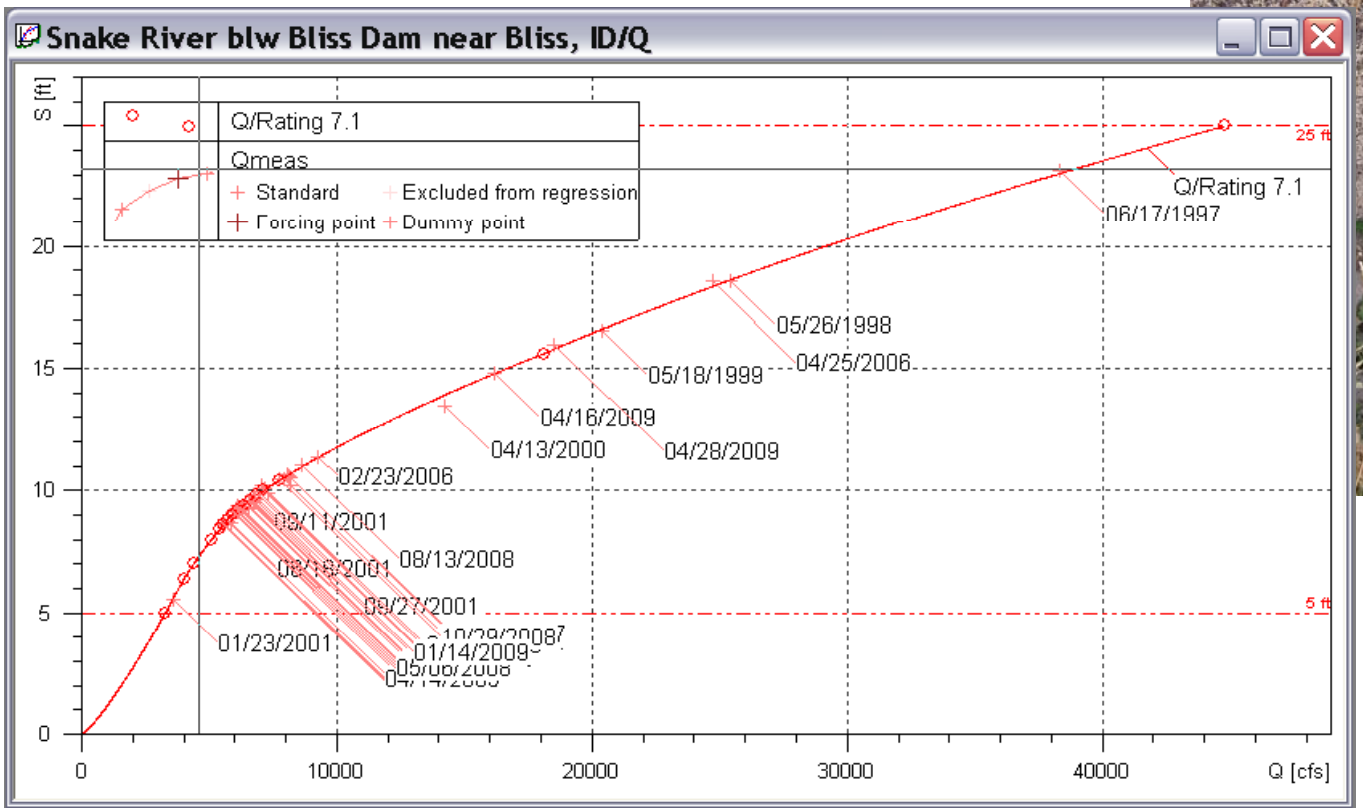
- Engineers
- Hydrologists
- Water Resource Specialists
- *Vast pool of other specialists*
  - *GIS Analysts*
  - *Electronic Technicians*
  - *Biologists*

Types of Flow Monitoring Stations

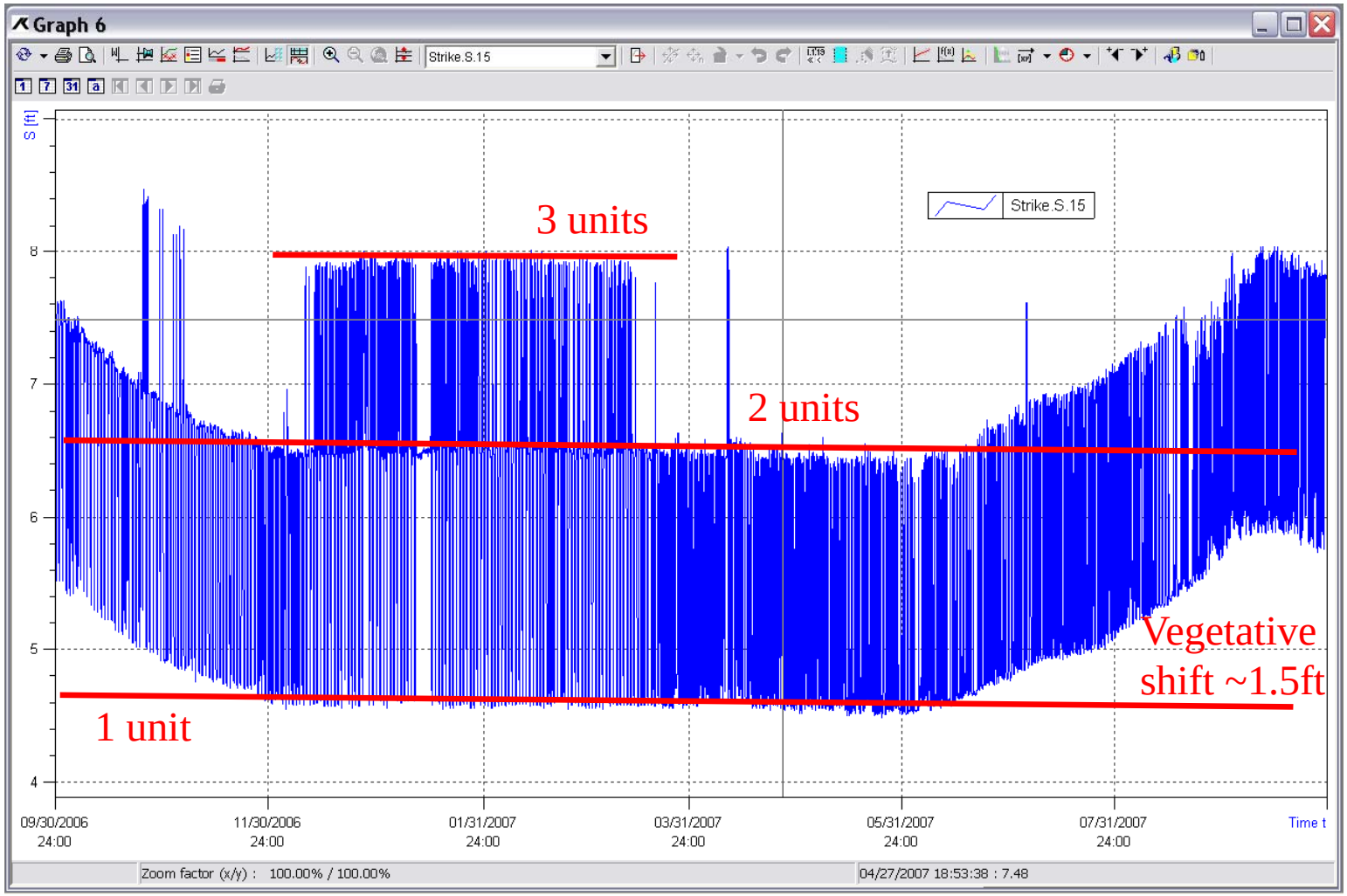
- Stage – Discharge Relationship
  - Vs –
- Velocity Index Methodology

Snake River below Bliss Dam near Bliss, ID

Stage discharge relationships: 90% of all gages



Snake River below CJ Strike Dam near Grand View, ID



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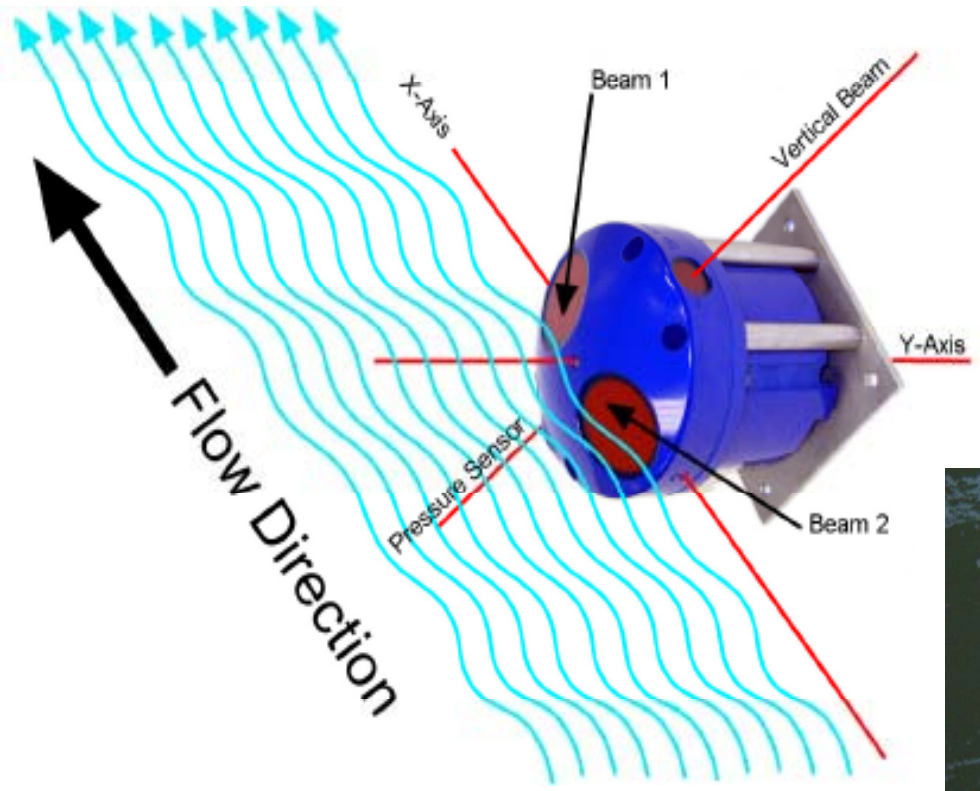

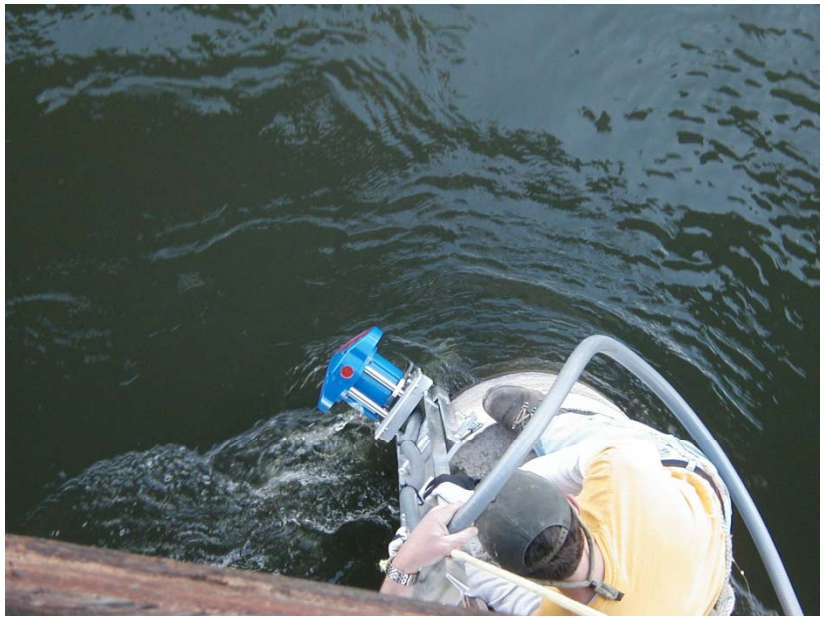

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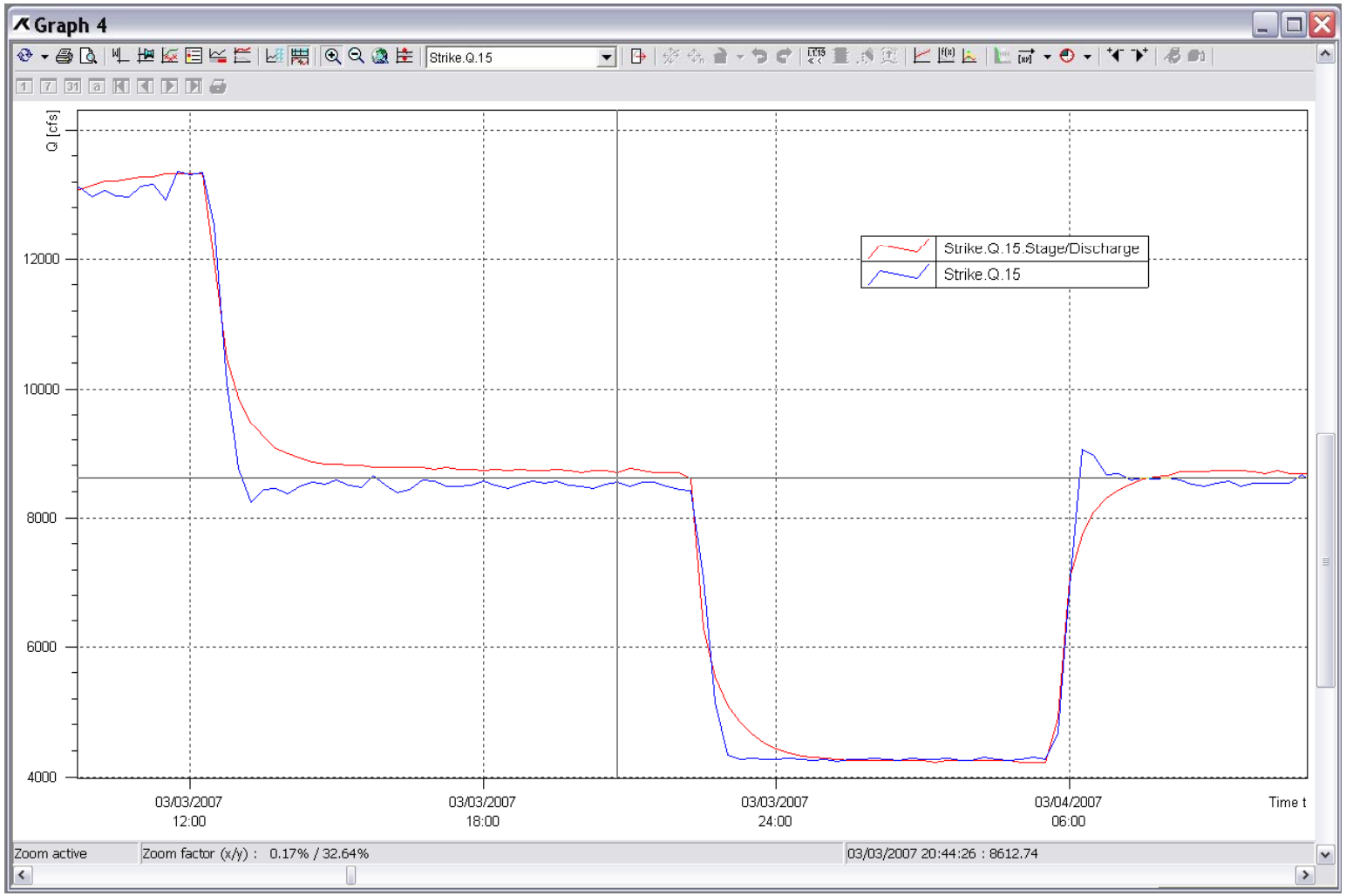


Flow Measurement Equipment

- Wading Measurements
- Moving Boat Measurements
- Other

Mechanical Current Meter and ADV Wading Methods

IPC's Moving Boat Platforms

Tri-Hull Boats (unmanned)

Jet Boat

Kayak(s) for Moving Boat Measurements

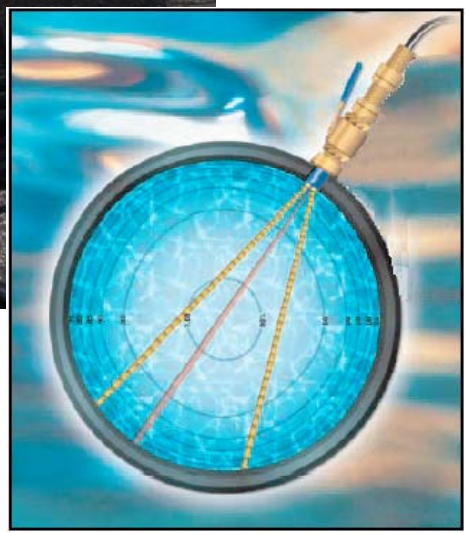
Moving Boat Measurement

Remote Controlled Cable Traveler

Cable Pulley System

Current Meter Measurement

Acoustic Doppler Flow Meter (ADFM)



Creative Solution at Brownlee

When flows are less than 40,000 cfs at Snake River below Brownlee Dam, a side-looking acoustic Doppler sensor collects velocity data to compute flows

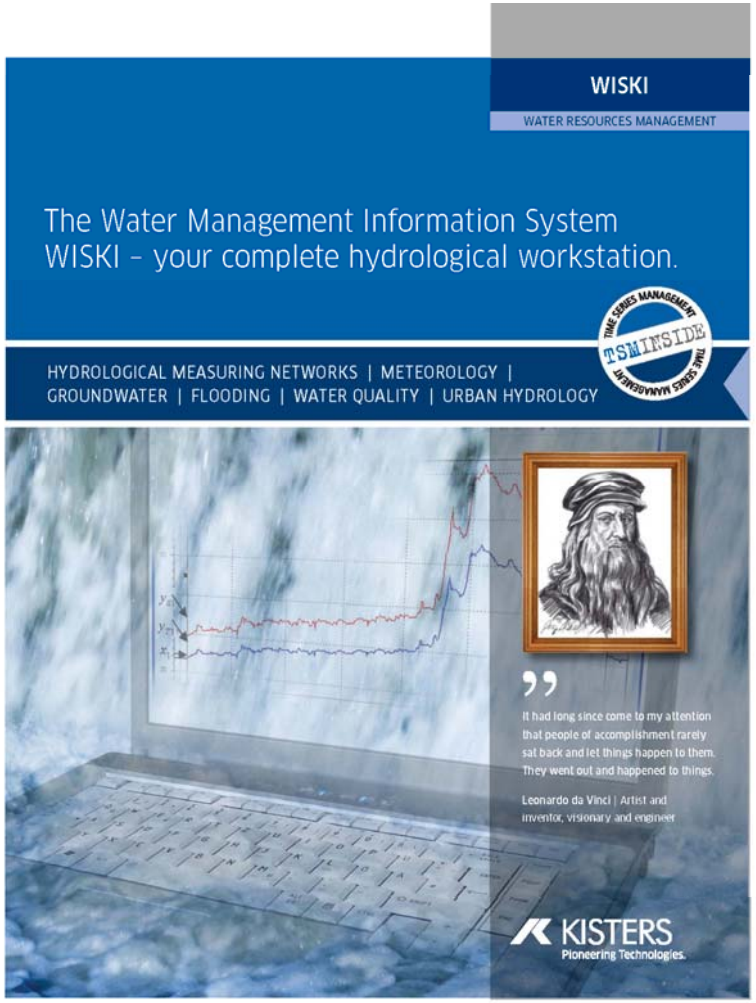
Creative Solution at Brownlee

During spill events, when flows are above 40,000 cfs, entrained air in the water limits the functionality of Doppler instruments

Creative Solution at Brownlee

To overcome the limitations of the ADP sensor, surface velocity is sampled using radar technology

Data is stored and managed in WISKI (a suite of programs…)



Water

Information

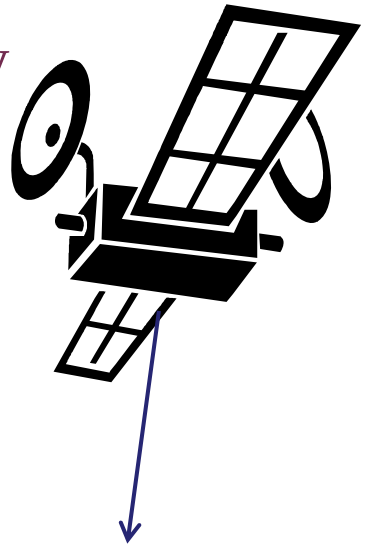
System

KISTERS (family name)

- Idaho Power: first company in the U.S. to acquire WISKI
- Currently dozens in U.S.
  - Federal agencies
  - State agencies
  - Engineering firms

WISKI: storage (a database)

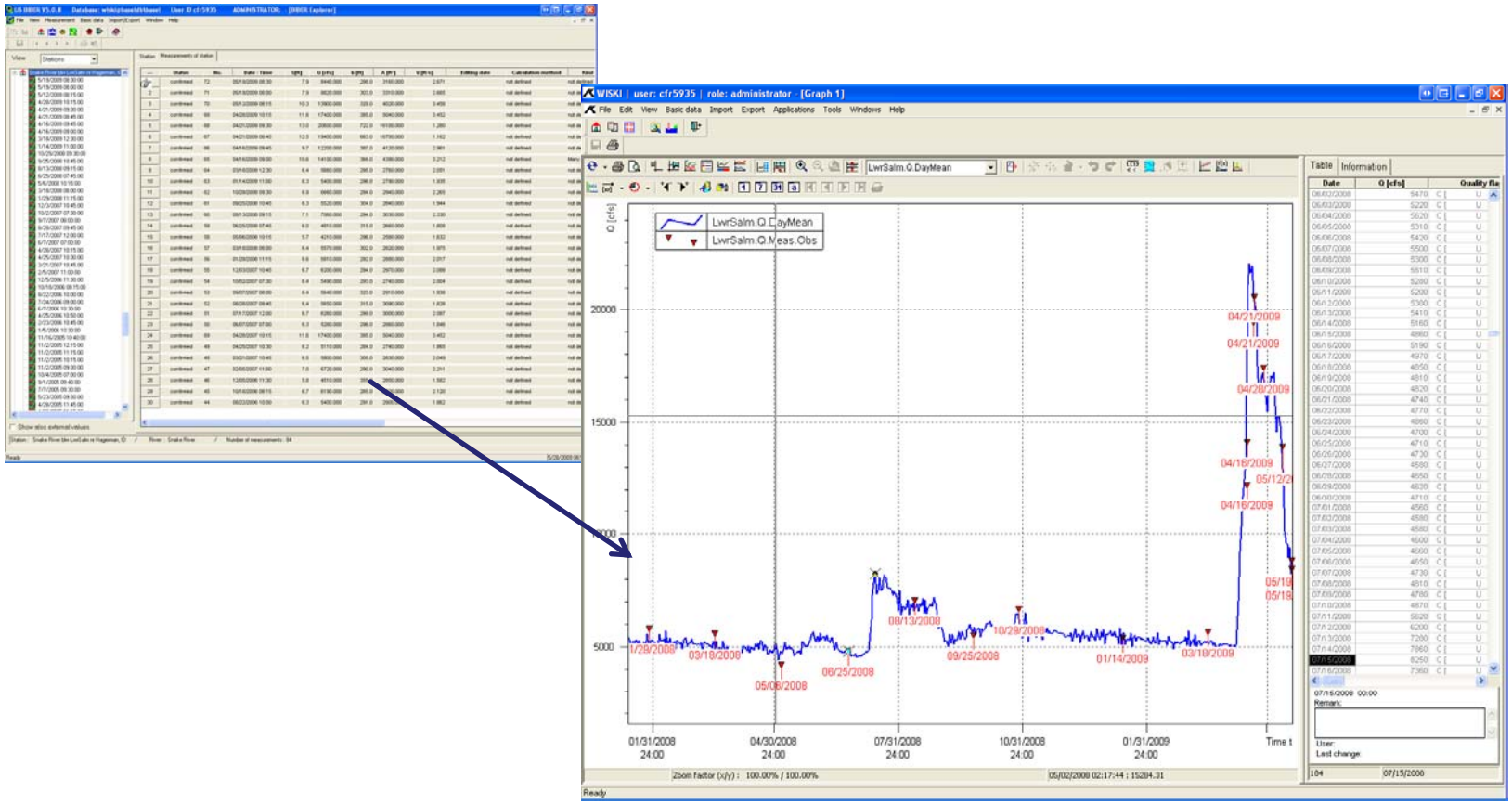
- Data imported live
  - Modbus Radios
  - GOES radios
  - Satellite Modems
- Data is backed up regularly (clustered server: 5 minute recovery).
- Data from gages is also downloaded regularly
  - eliminate possible communication gaps
  - improves gage data quality



WISKI

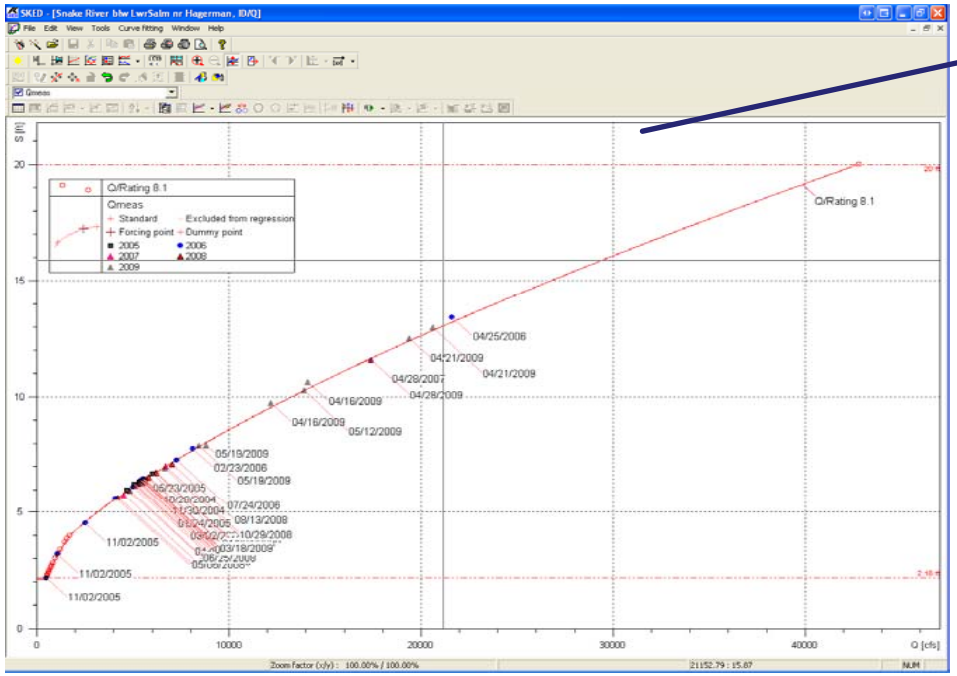
WISKI functions…

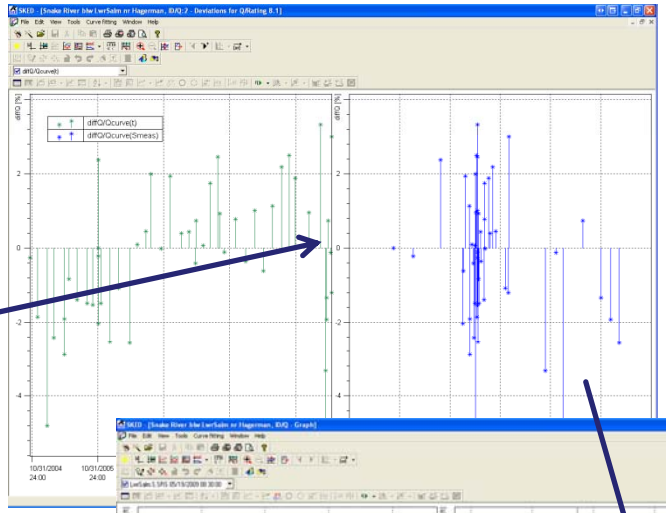
- BIBER: discharge measurement storage and analysis program

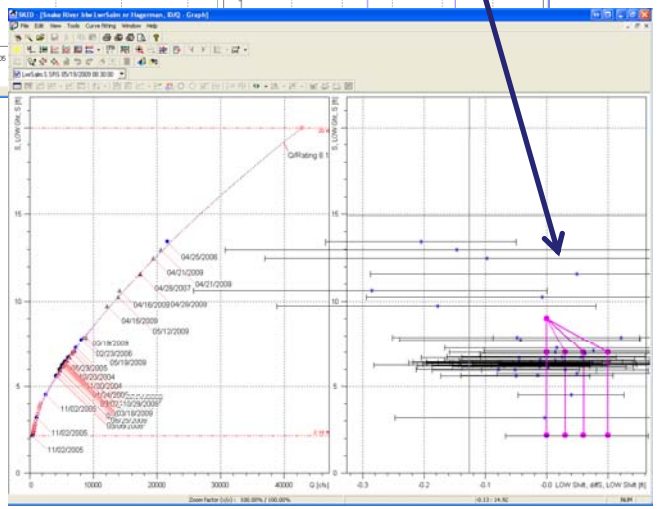


WISKI functions…

- SKED: rating curve development and analysis program
  - computes discharge from stage
  - regression tools to fit curves
  - view channel changes over time
  - compute shift curves

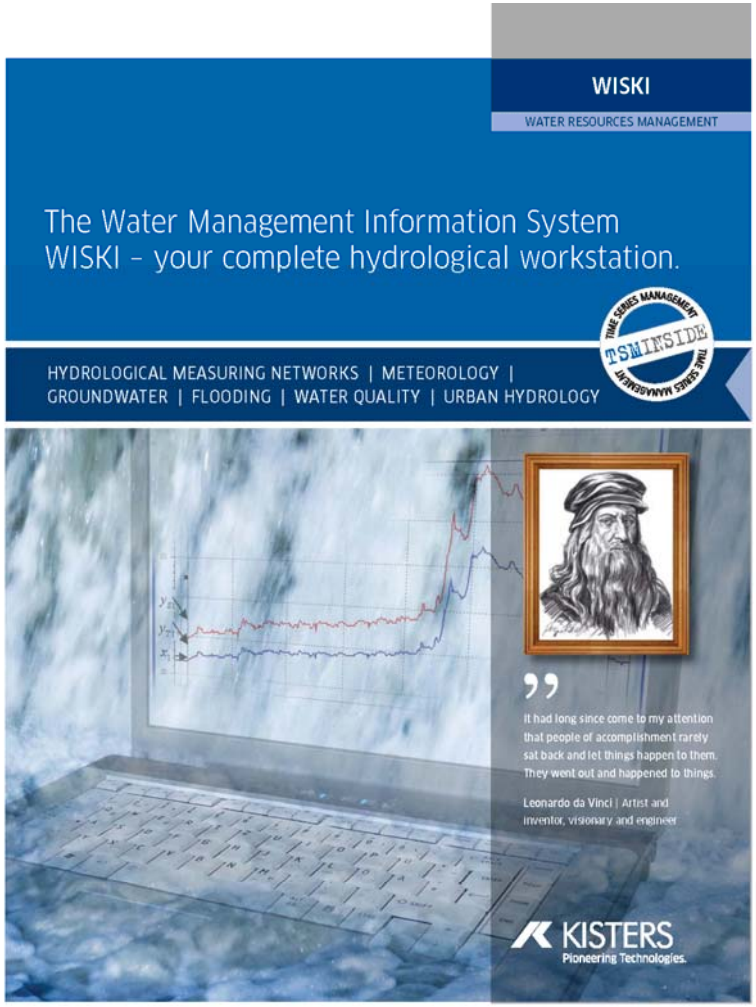






WISKI

- Easily share data
  - Tabular
  - Graphical
  - Web www.IdahoPower.com
- Powerful analytical tools
  - Regression analysis
  - Duration curves
  - Statistical analysis
  - Custom Alerts…



Alert System

- Improves gage data reliability
- Plausibility checks defined in WISKI
  - Missing data, flat lines, values are too high or low
- Alerts notify individuals or group
- Email or text messaging

Collaborative Multi-Agency Projects

Collaborative Data Collection Efforts

- Gathering of 20 scientist - October 2008
- USGS, USBR, University of Idaho, University of Iowa
- Test experimental methods
- Test experimental equipment
- Result: Modifications to instrumentation prior to final release
- Formation of Snake Basin Hydro Acoustic Work Group

Seepage Study on the Henrys Fork and Snake River, Idaho

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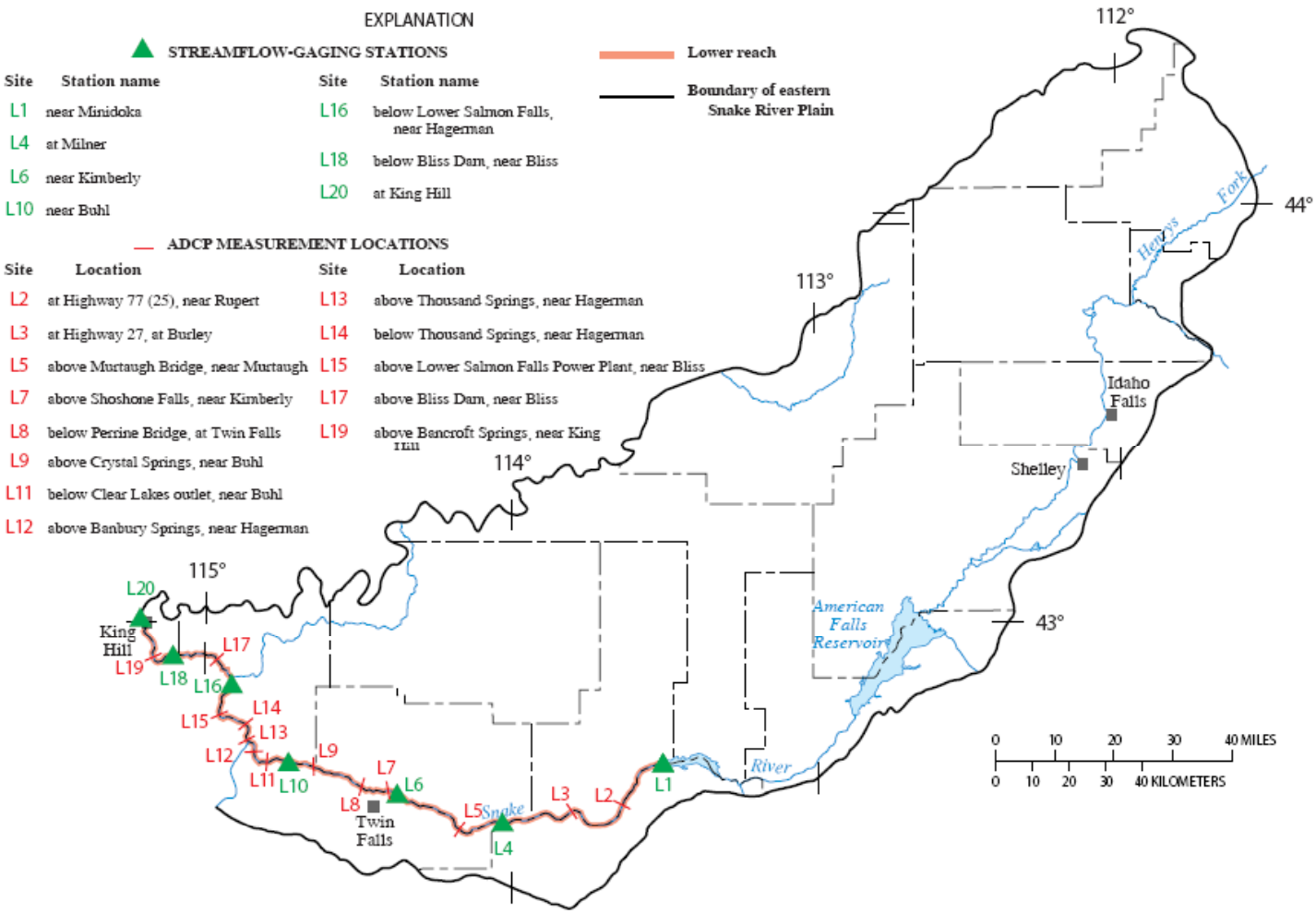
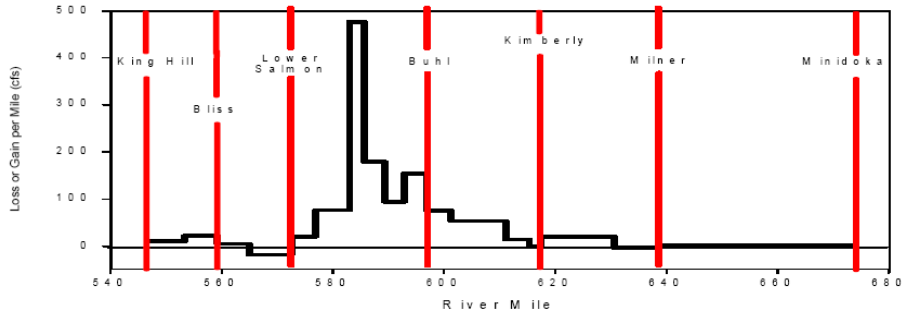
August 15, 2003

Seepage Study on the Henrys Fork and Snake River, Idaho

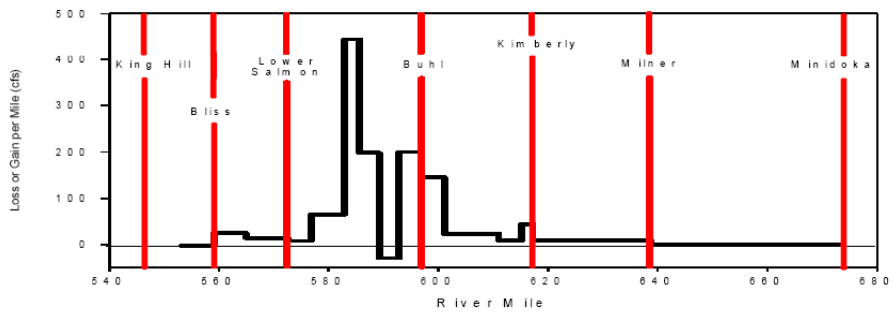


Summary Graphs

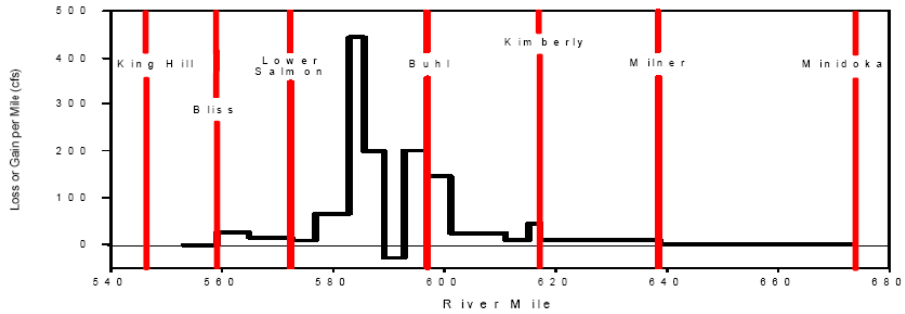
Spring 2001



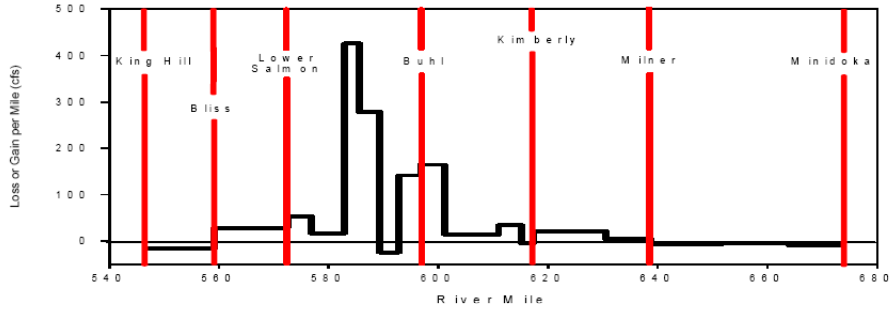
Spring 2002



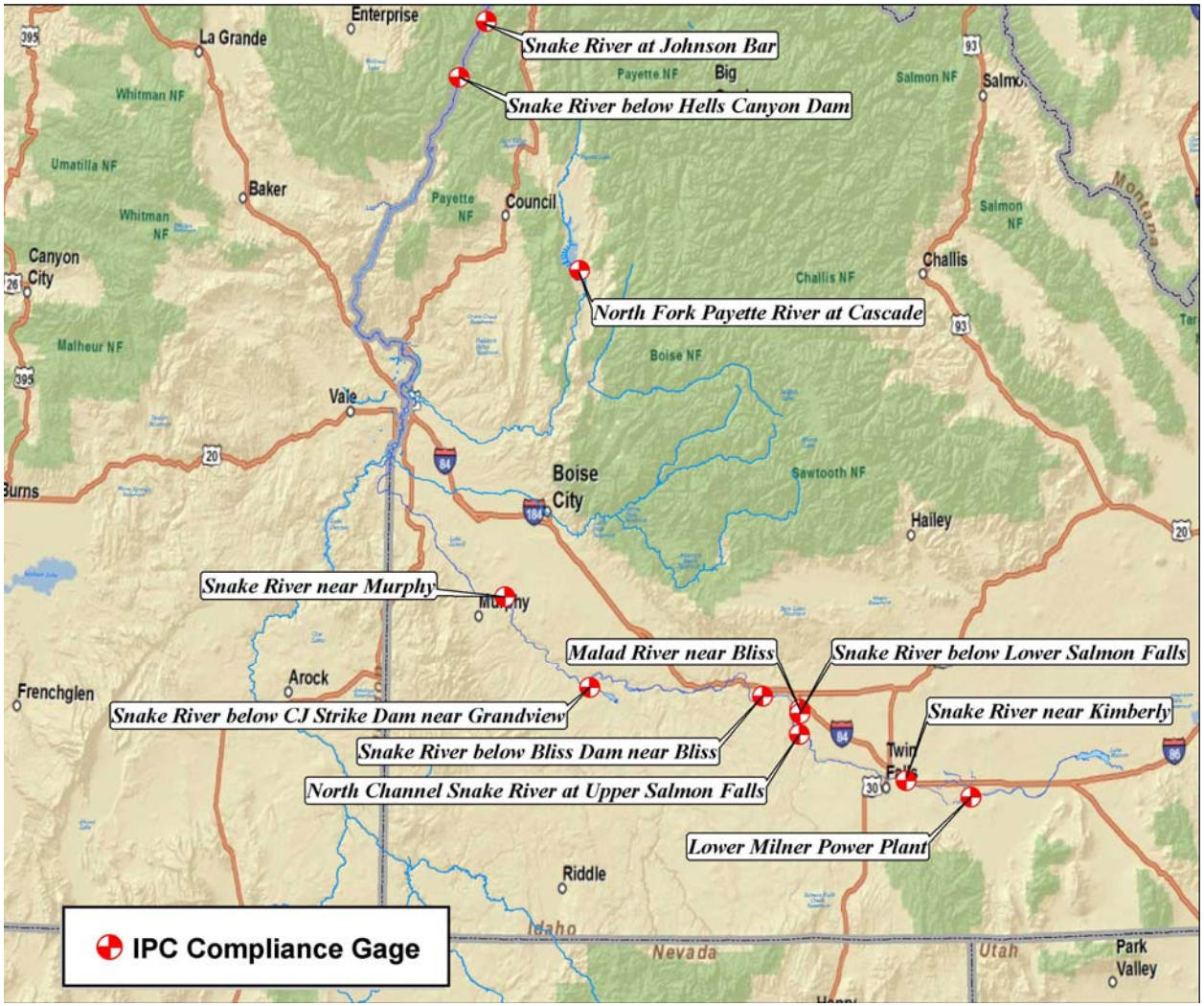
Fall 2001



Fall 2002



Operational Compliance Monitoring (USGS QA Sites)



Operational Compliance Monitoring (USGS QA Sites)

- USGS Measurement QA and Records Review
  - Two check measurements made each year per site
  - Review of annual records computations
- To ensure the gages are operated in a manner consistent with USGS policies and guidelines

Summary

Idaho Power Streamflow Gaging Program

- *"Creative Solutions to Difficult Problems"*
- *"Accurate, Efficient, High Quality Information"*