

# Regional Flood Forecasting

Northwest River Forecast Center

Steve King, Hydrologist



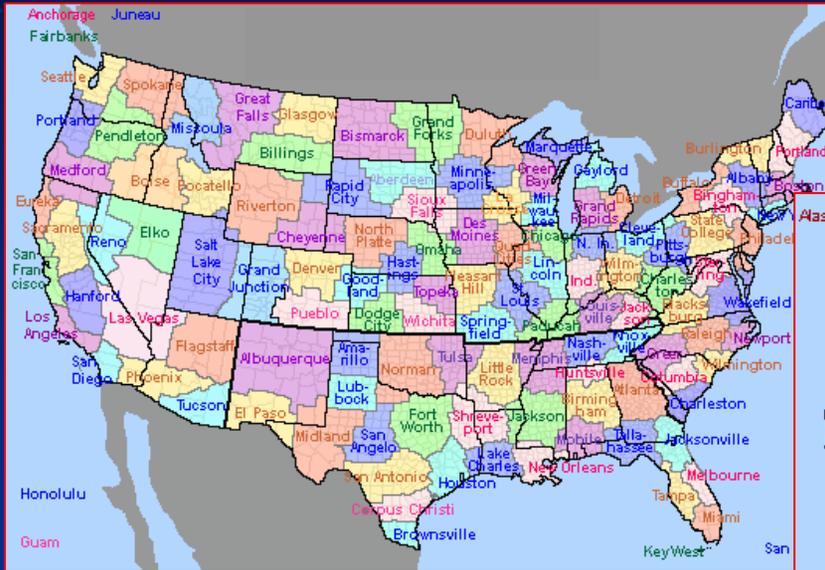


# National Atmospheric and Oceanic Administration

# National Weather Service



## 132 Weather Forecasts Offices (WFO's)



## 13 River Forecast Centers (RFC's)





# Mission of NWRFC



- **National Weather Service mission:**

Provide weather, hydrologic, and climate forecasts and warnings...  
...for the **protection of life and property**...  
...and the **enhancement of the national economy**.

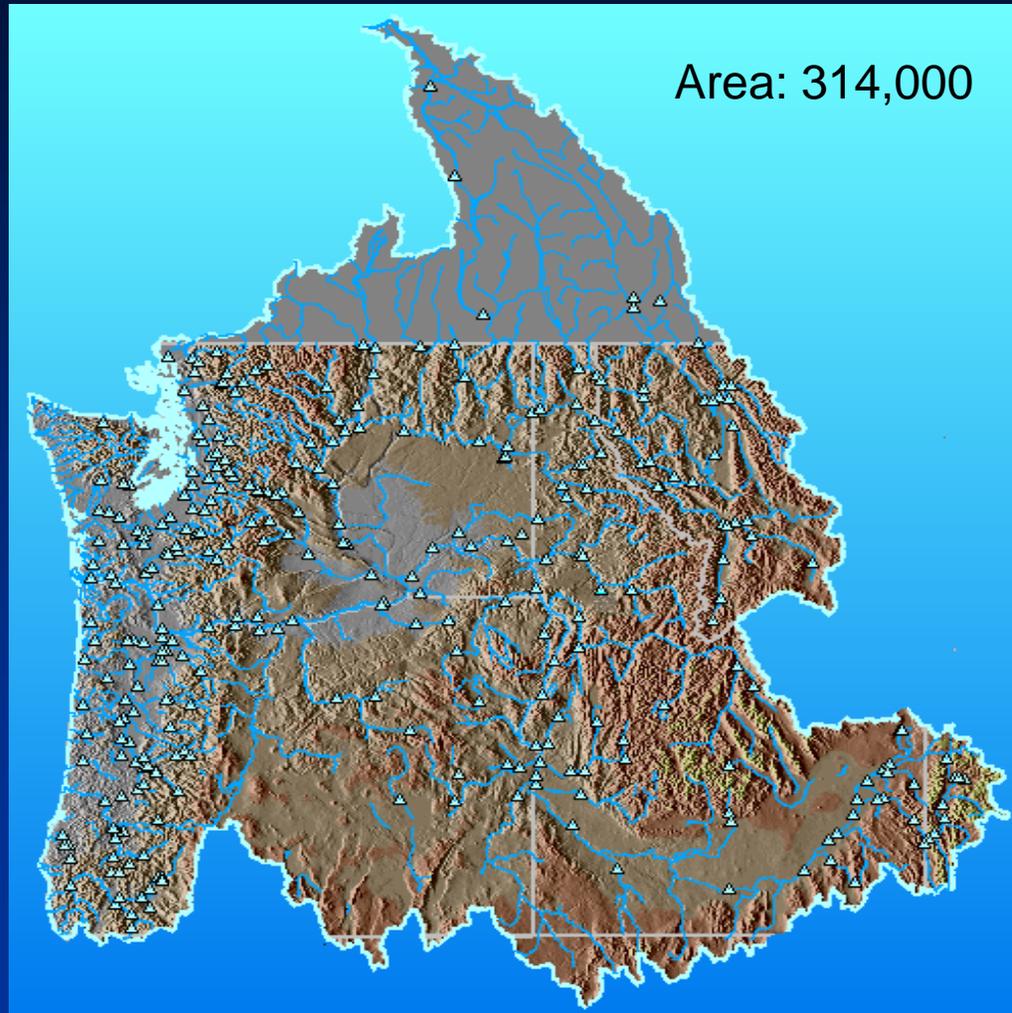
- **The NWRFC accomplishes the NWS mission by:**

Providing **unbiased hydrologic information** to a wide variety of users including:

**Short, Medium and Long Range River Forecasts**  
**Water Supply Volume Forecasts**  
**Unregulated Streamflow Estimates**



# Northwest River Forecast Center



Columbia Basin

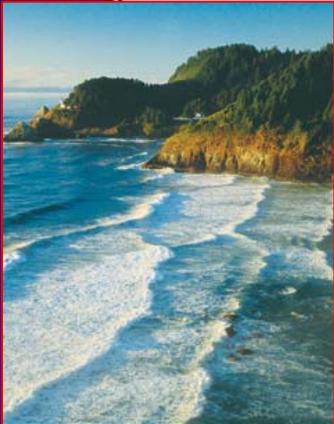
Coastal  
Drainages of  
Oregon and  
Washington

6 States &  
CANADA

9 NWS Field  
Offices (WFOs)



# Hydrologic Driver: Geography

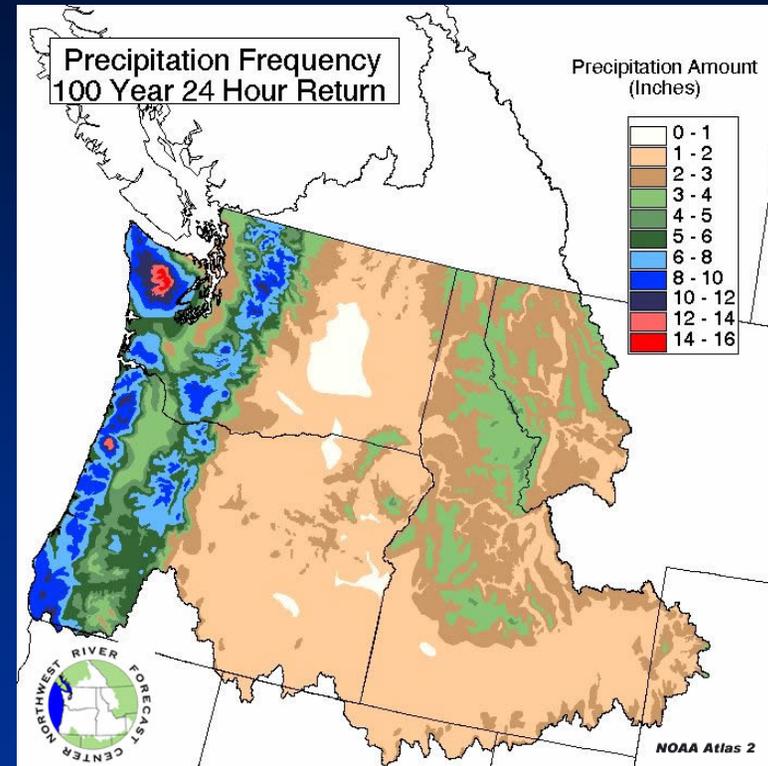
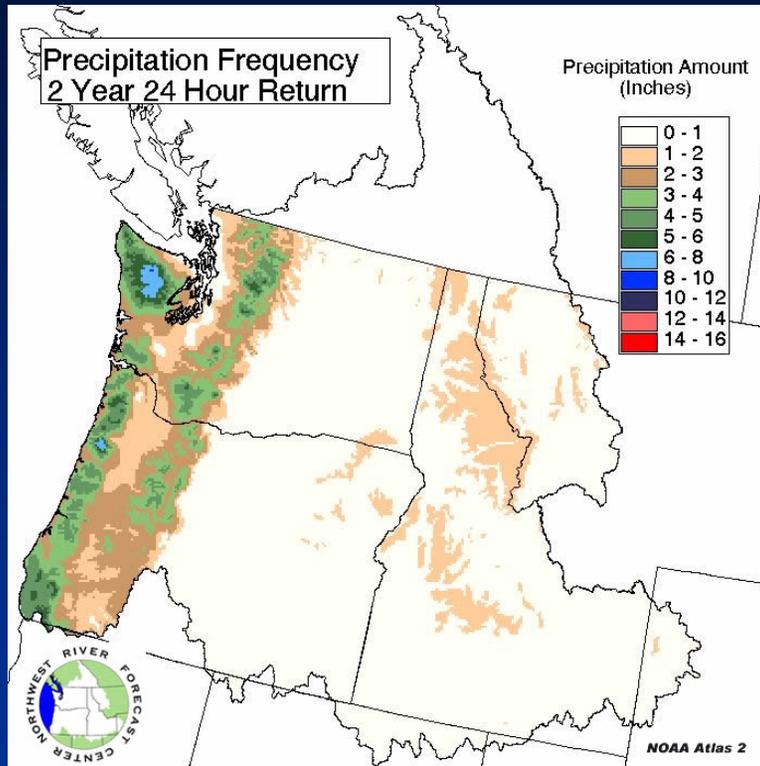


Kilometers  
0 150

Richland



# Hydrologic Driver: Precipitation





# Hydrologic Driver: Snowmelt





# Northwest Flood Examples: Flash Flood: Heppner 1903





## Northwest Flood Examples: Snowmelt / Levee Failure: Vanport 1948

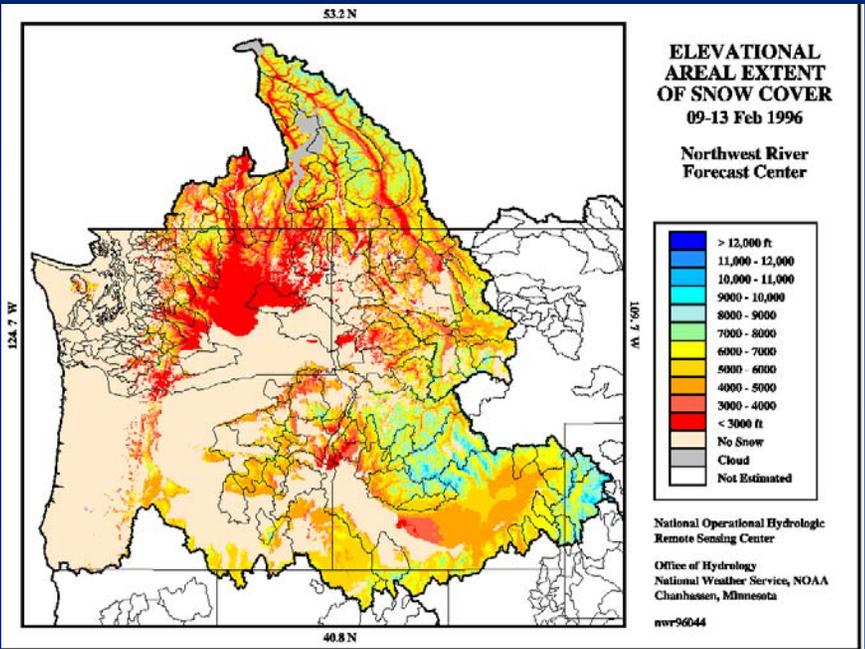
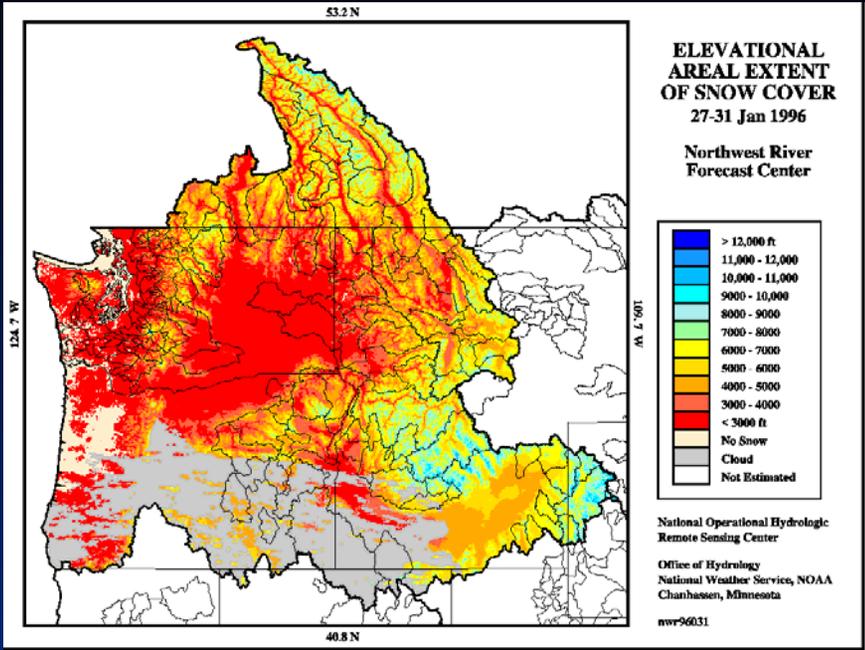




# Northwest Flood Examples: Rain/Snow: Willamette Valley, 1996



*Willamette River 1996 Flood*





# Northwest Flood Examples: Rain: Chehalis, WA 2007





# Historic Events: Teton Dam Failure 1976





# Historic Events: Teton Dam Failure 1976





# Historic Events: Teton Dam Failure 1976





# NWRFC Forecast Usage

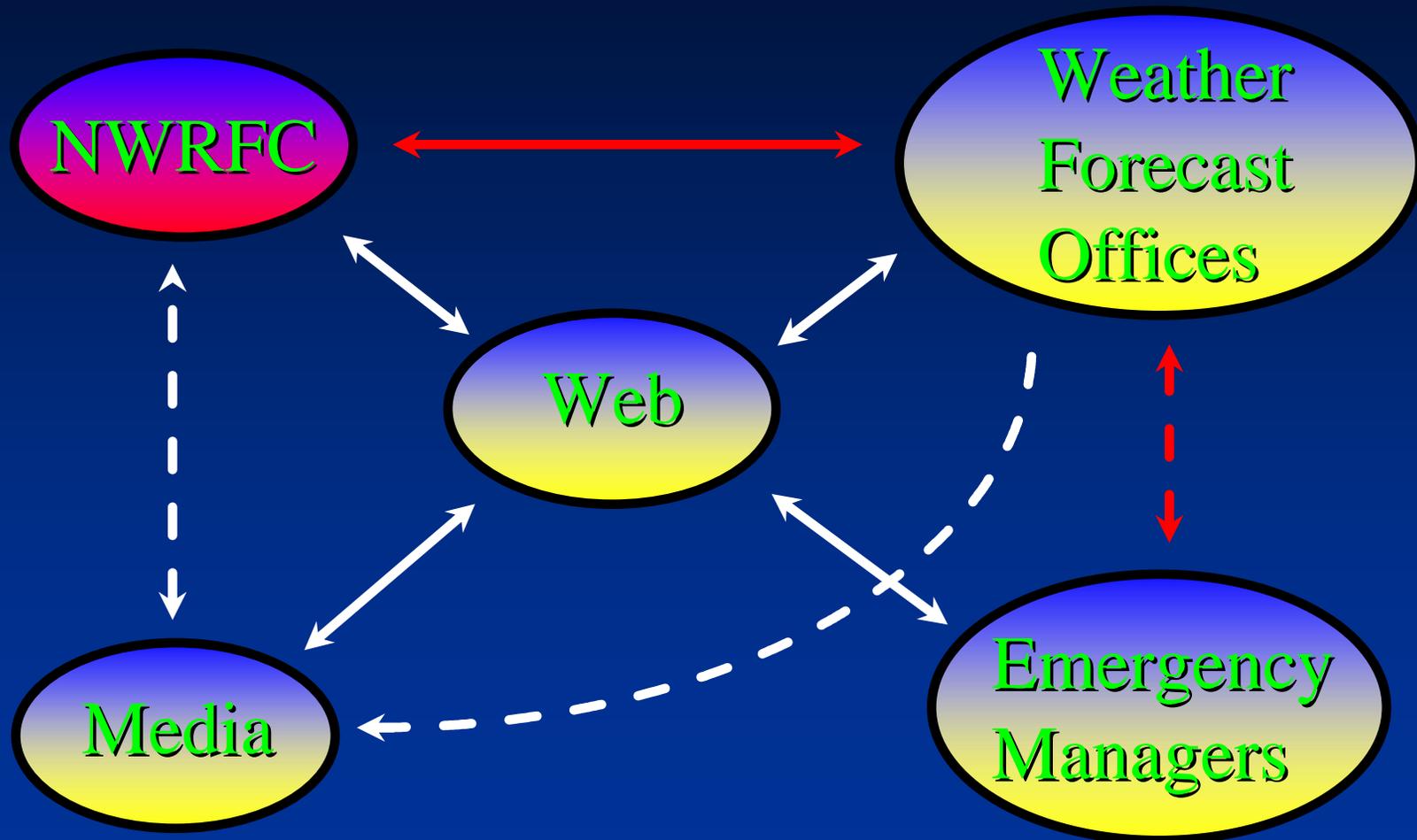


Emergency Management  
Recreation  
Navigation  
Water Resource Management  
Hydropower Generation  
Fish and Wildlife Conservation  
Energy Marketing / Speculation



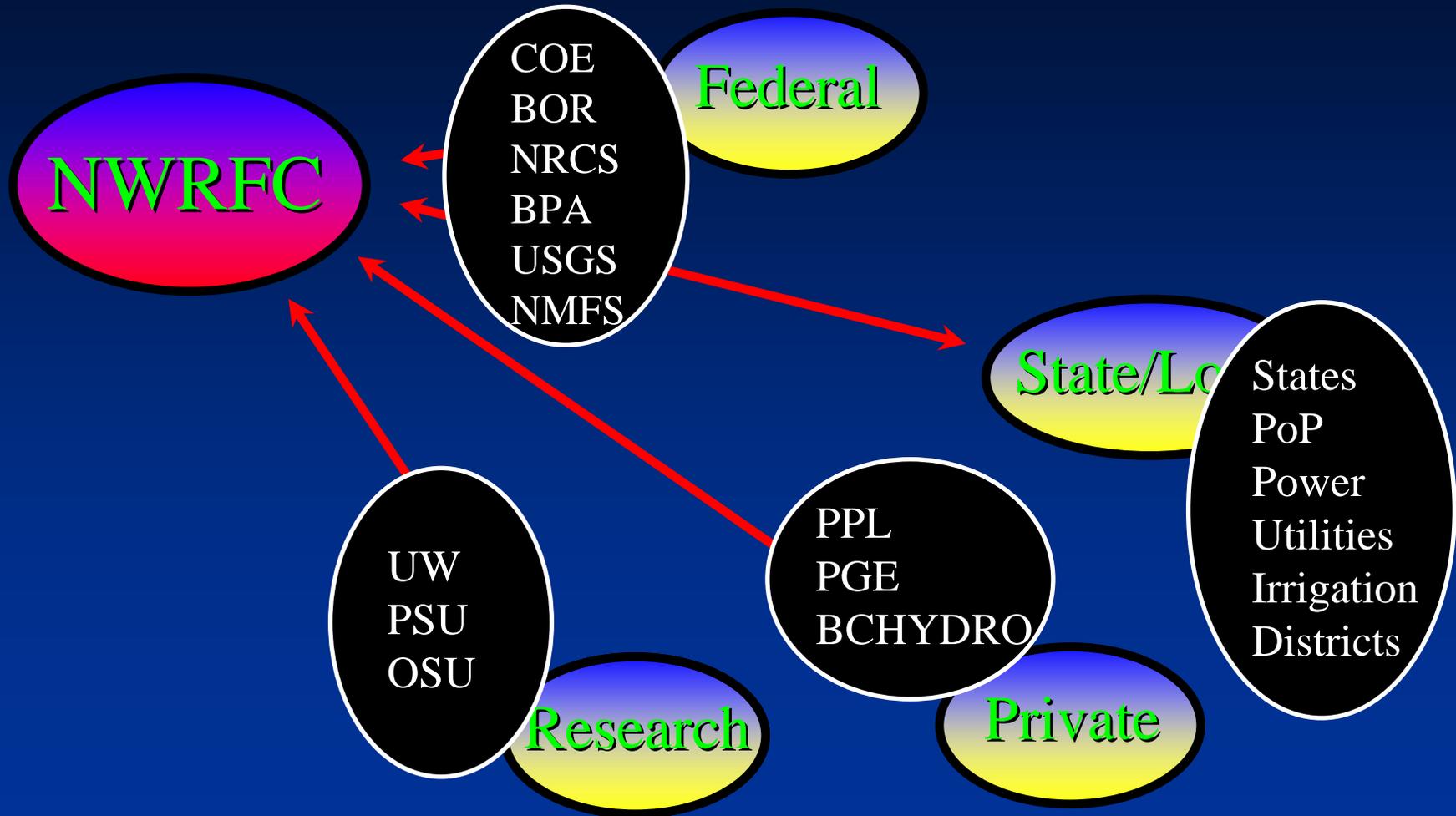


# Information Flow: Public



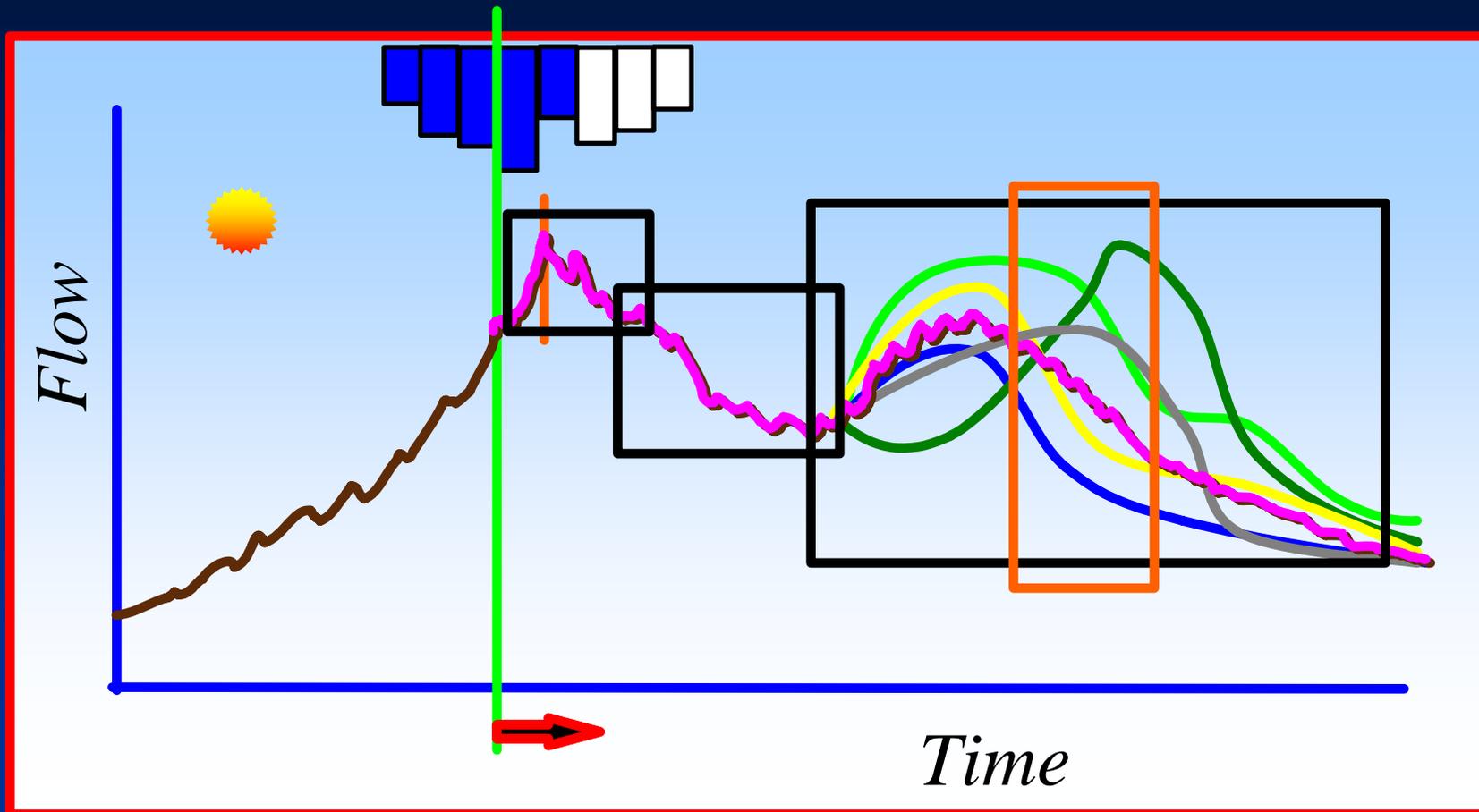


# NWRFC Cooperators





# Hydrologic Forecasting: Time Domains

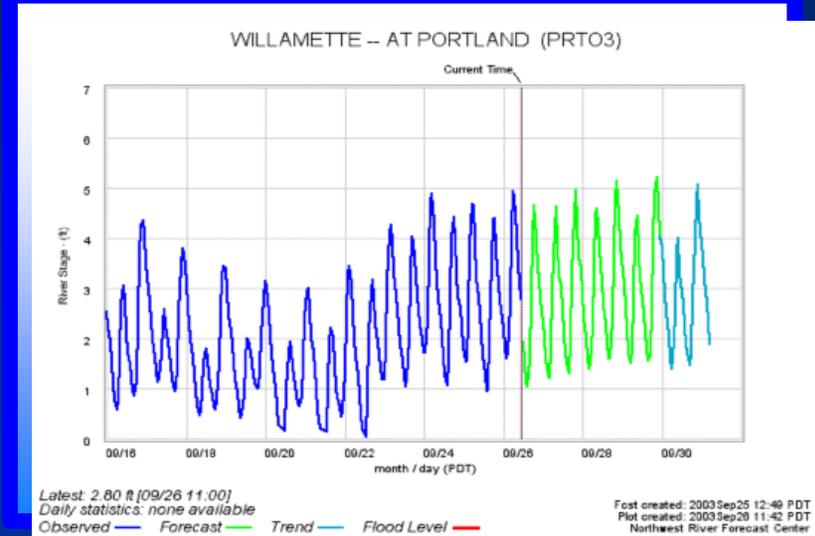
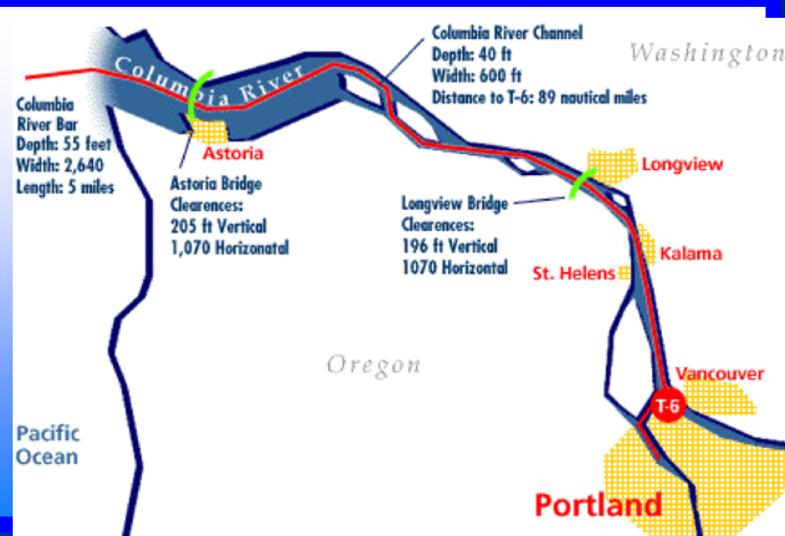




# Hydrologic Short Term Forecasts



## Example: Navigation Forecasts







# NWRFC Forecasting Models

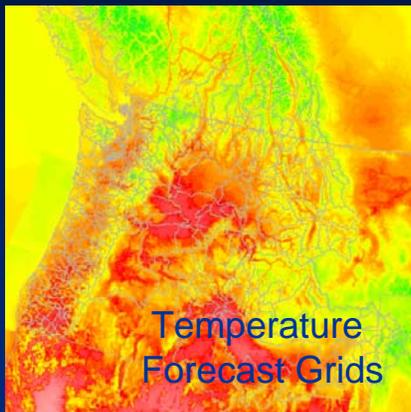


## NWS River Forecast System

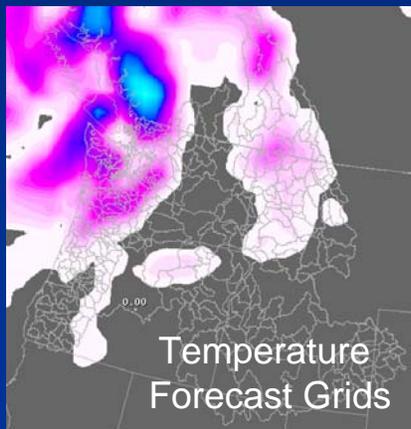
- **Short, Medium, and Longterm capabilities**
  - Lumped, Conceptual, Continuous
  - Run in deterministic *AND* ensemble (ESP) mode
  
- **Statistical Water Supply Model**
  - **Seasonal Volumetric Forecasts**
    - Regression techniques
    - Agency Coordinated



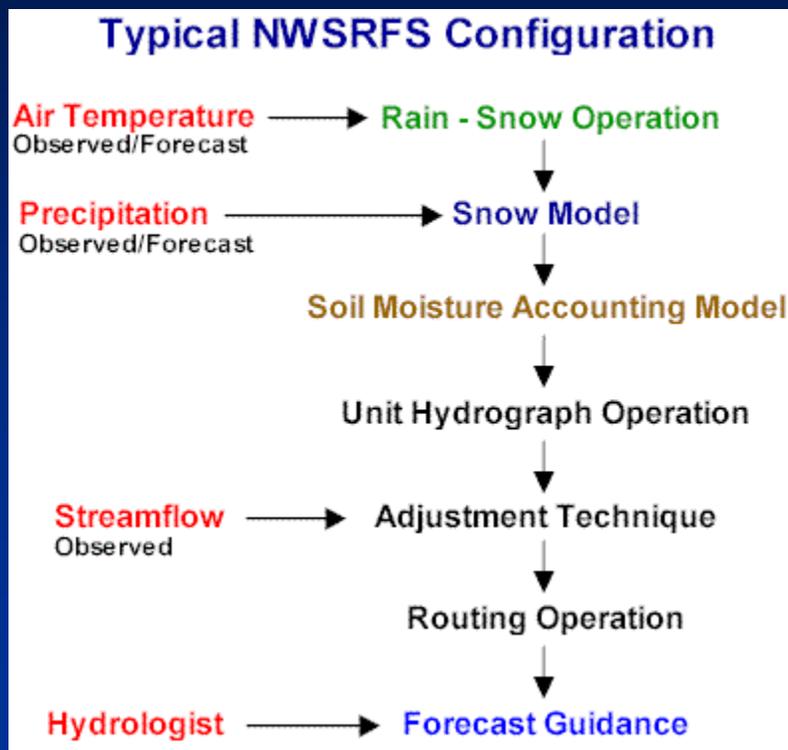
# NWS River Forecast System (NWSRFS)



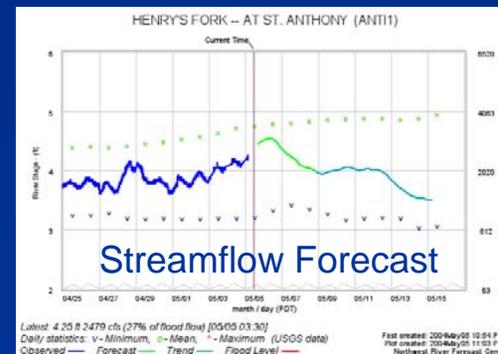
Temperature Forecast Grids



Temperature Forecast Grids

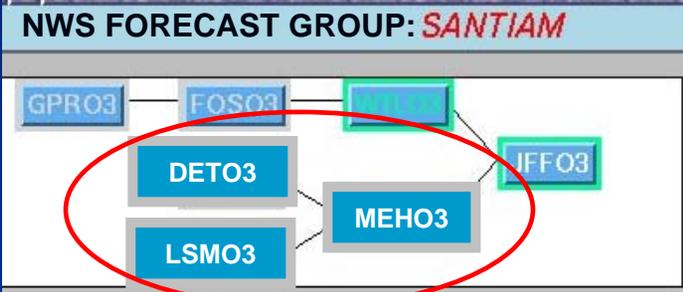


Forecast Procedure





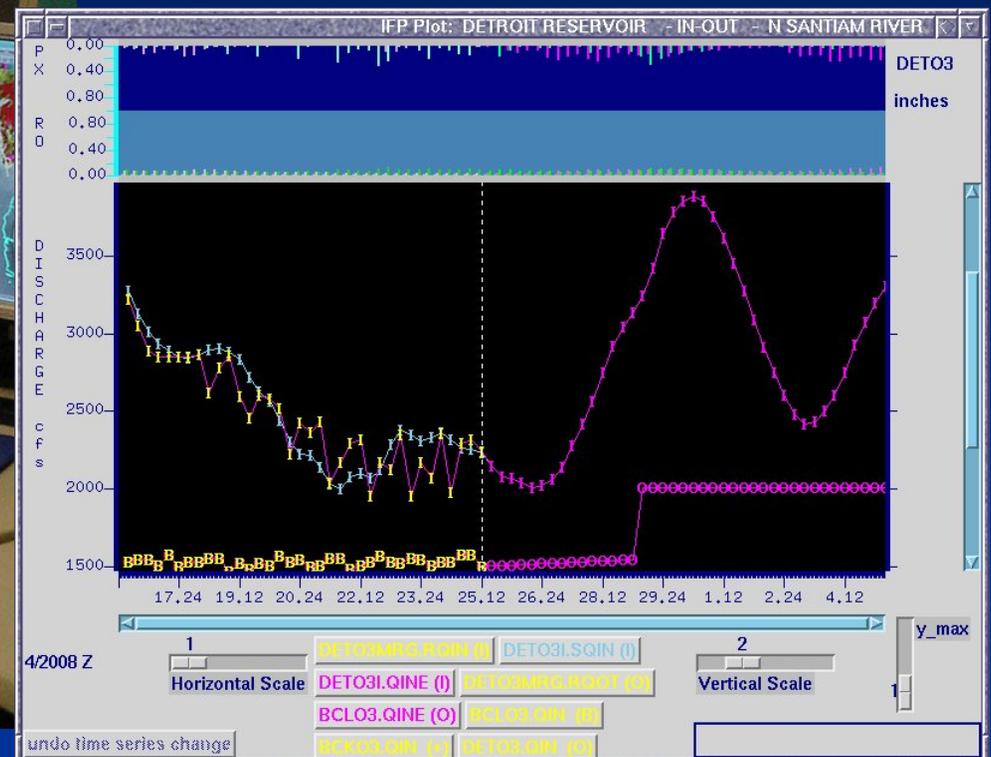
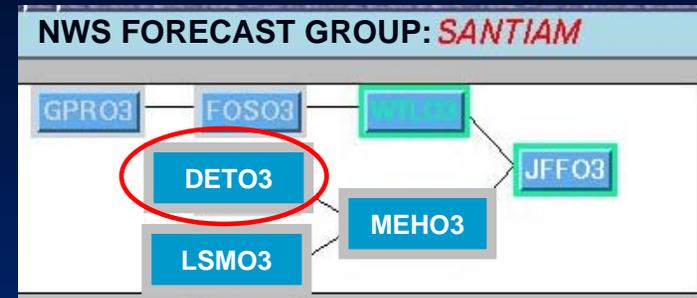
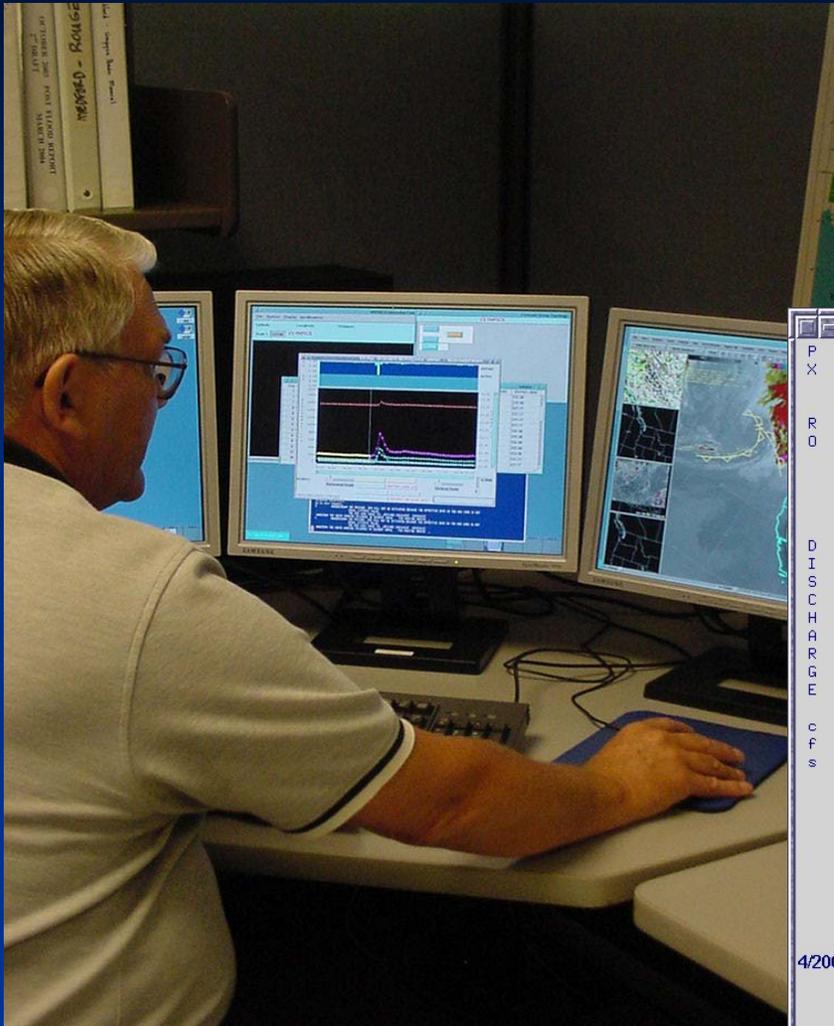
# NWS Operations Overview



DETO3 = Detroit Reservoir  
 LSMO3 = Little North Santiam  
 MEHO3 = North Santiam near Mehama

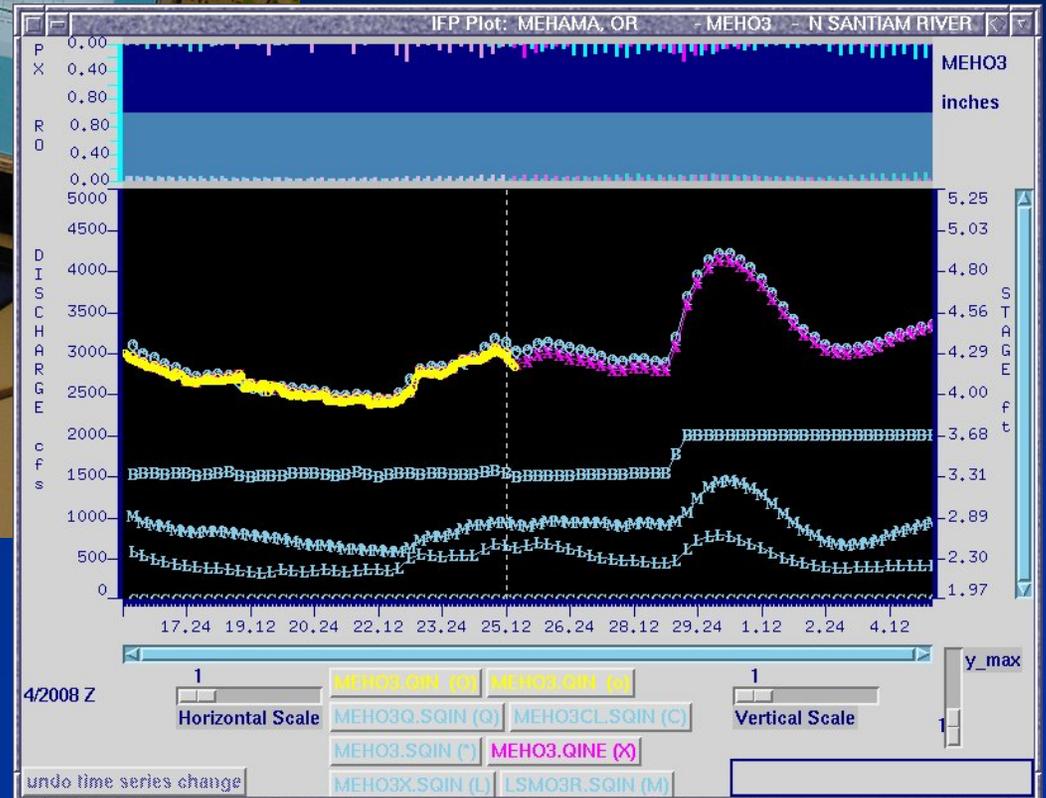
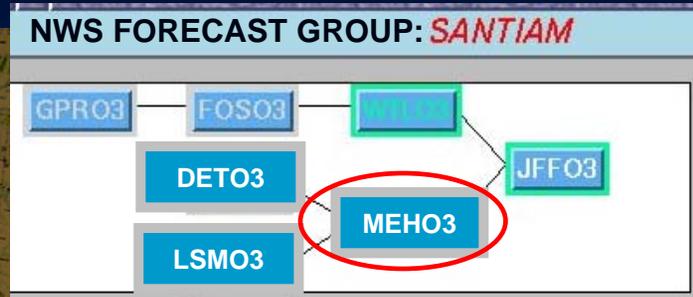


# NWS Operations Overview: Interactive Forecast Procedure





# NWS Operations Overview

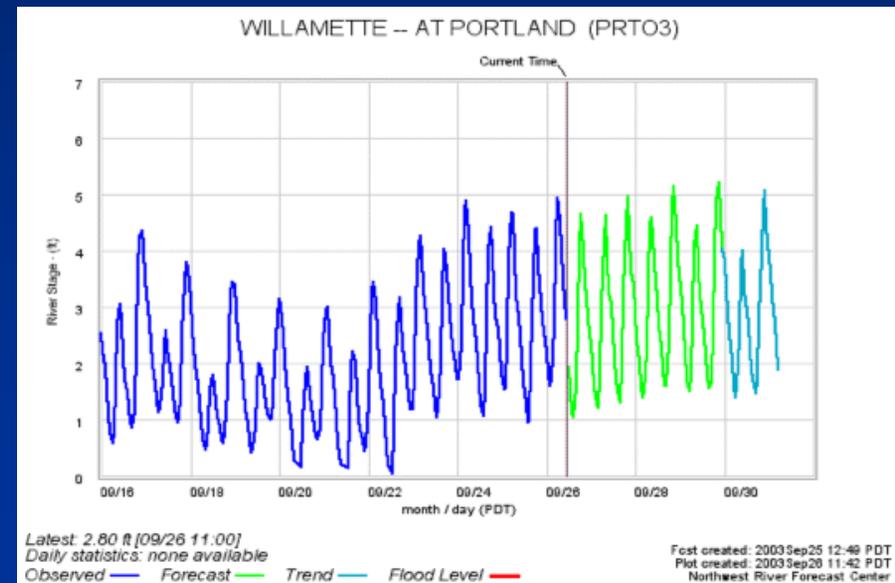
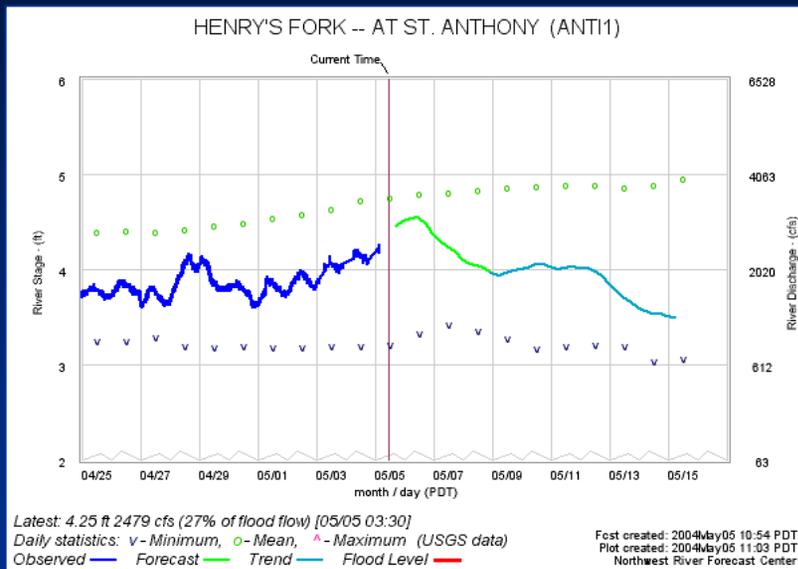




# NWSRFS Forecast Products



Short Term Deterministic  
Multiple Uses/Users  
Drives NWS Flood Warning Program



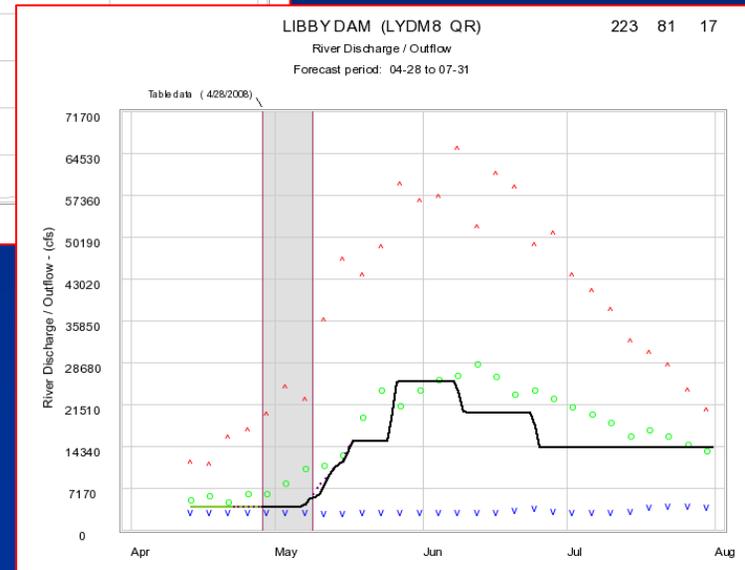
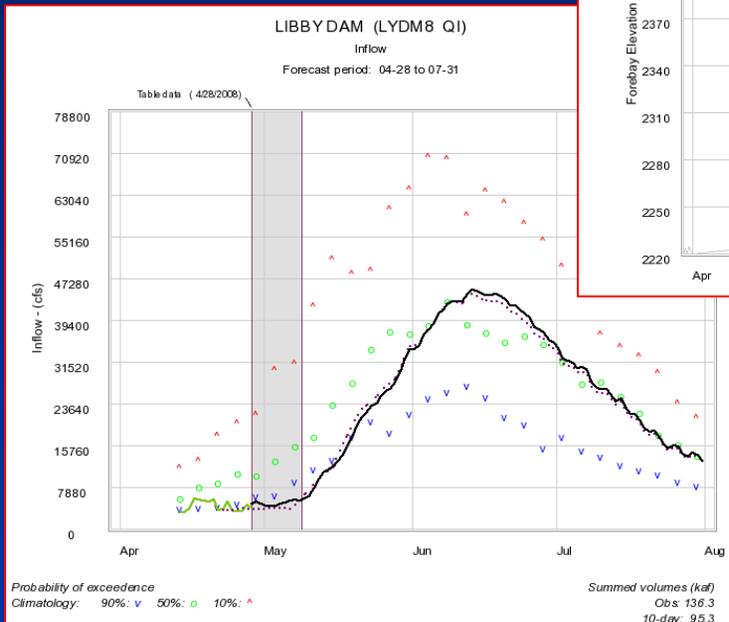
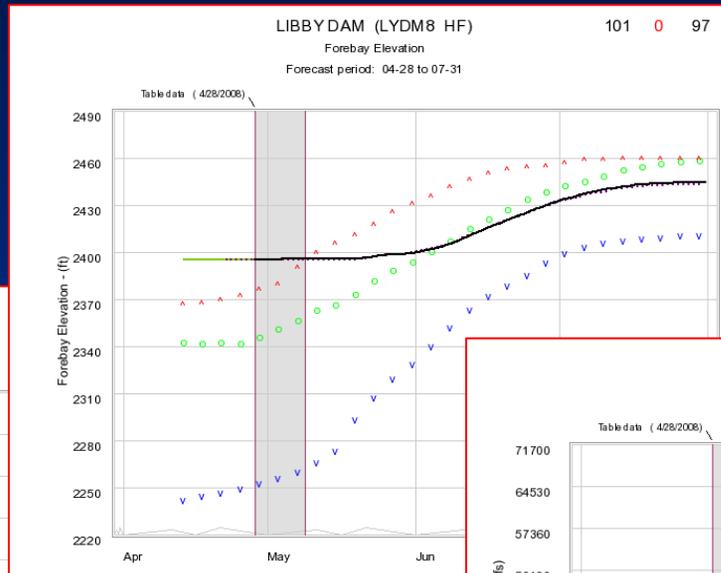


# NWSRFS Forecast Products



Medium to Long Term Deterministic  
(Single Trace Procedure)

Intended for long range planning/project regulation

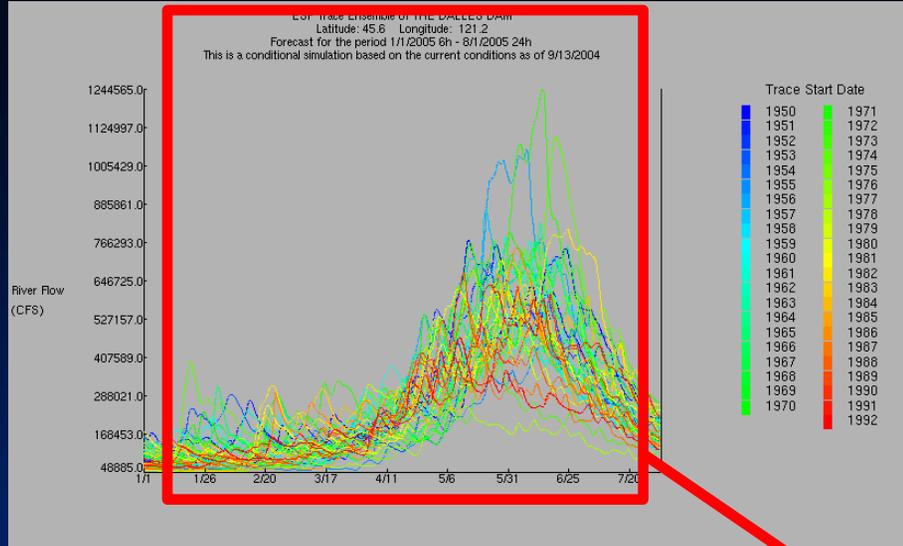


# NWSRFS Forecast Products

Long Term Probabilistic  
(Ensemble Streamflow Procedure)

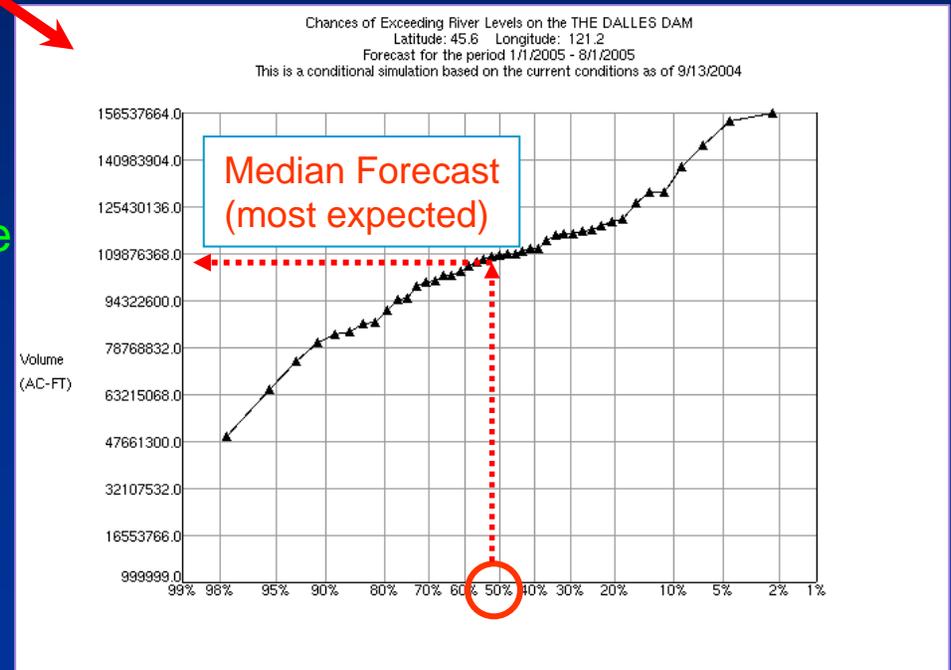
Example showing 42 traces outcomes for  
The Columbia River at The Dalles, OR

Traces represent ensemble of possible  
river flow behavior (Jan-Jul)



Exceedance probability plot  
of flow volumes = area under each trace  
(Jan-Jul period)

50% value is comparable  
to WS most probable forecast

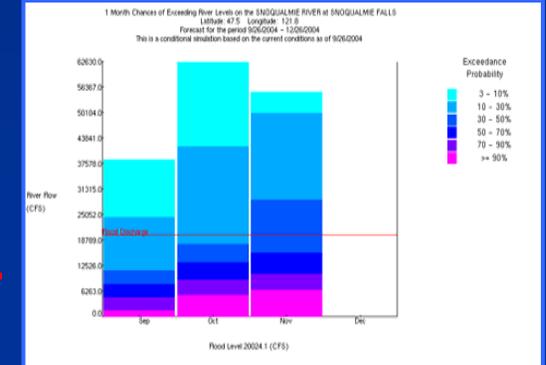
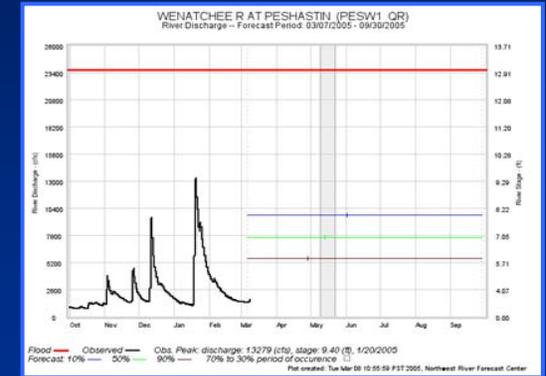
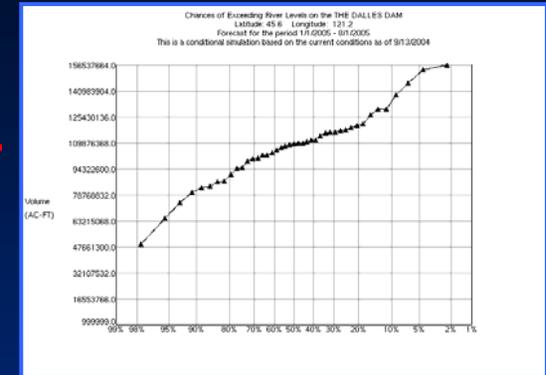
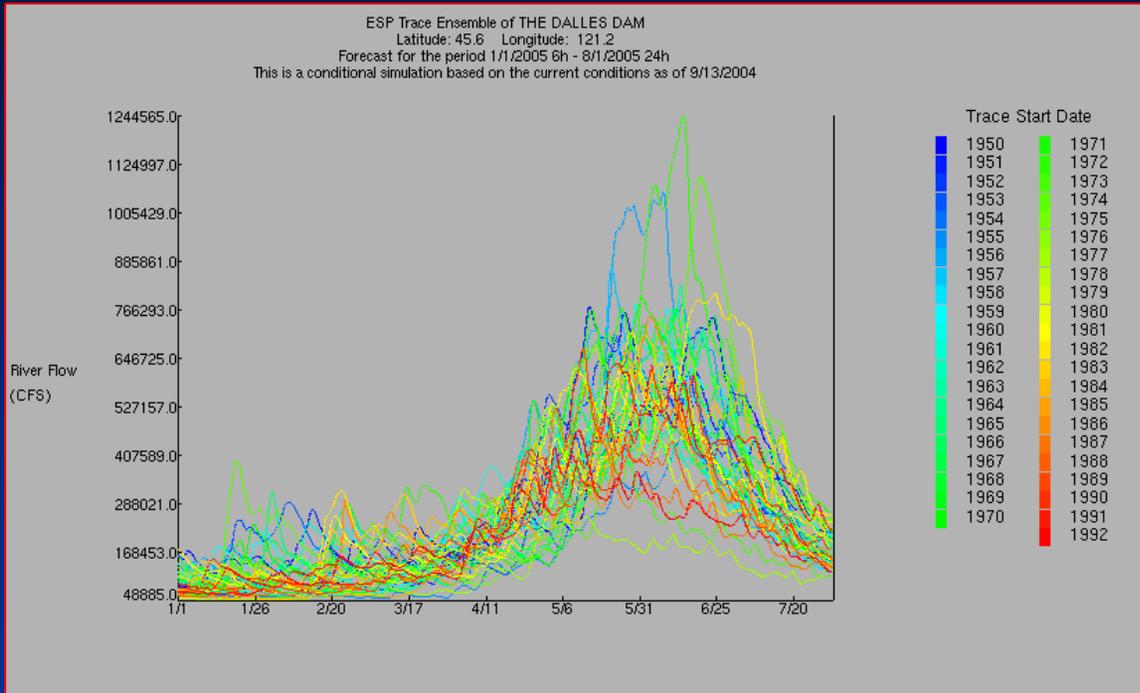




# NWSRFS Forecast Products



## Long Term Probabilistic (Ensemble Streamflow Procedure) Long Range Planning / Outlooks





# NWRFC Office Structure



## Staff

Hydrologist In Charge (HIC)

Development and Operational Hydrologist (DOH)

Administrative Assistant

(10) Hydrologists

(3) Hydrometeorologist and Supports (HAS)

Computer Specialist

Students / Interns

## Staffing

Daily and Seasonal Hours are EVENT driven (evaluated daily)



# NWRFC Hours of Operation

- October through June
  - 6:00 am - 6:00 pm, 7 days per week
- July through September
  - 6am - 4:30pm, 5 days per week
  - 6am - 2:00pm, weekends
- Evening and overnight coverage as dictated by events

# Northwest River Forecast Center

## www.nwrfc.noaa.gov

Home
Site Map
News
Organization

**Water**

Forecasts:  
 0 - 14 Days  
 14 - 120 Days  
 Water Supply  
 Peak Flow  
 AHPS

Watch & Warnings  
 Flood Outlook  
 Discussion

Past Floods  
 River Photos  
 Dambreak  
 Hydrologic Cycle

**Weather**

Snow  
 Observations  
 Forecasts  
 Exp Forecasts  
 Temp & Precip  
 Forecasts

**Climate**

Climate Forecasts  
 Drought  
 Assessment  
 Hazard  
 Assessment  
 Indexes  
 Monthly Means  
 Return Periods

**NWRFC Office**

Information  
 Internal Web  
 SDM  
 Schedule  
 Staff  
 Employment  
 Projects  
 Papers  
 Presentations  
 Contact Us

**Links**

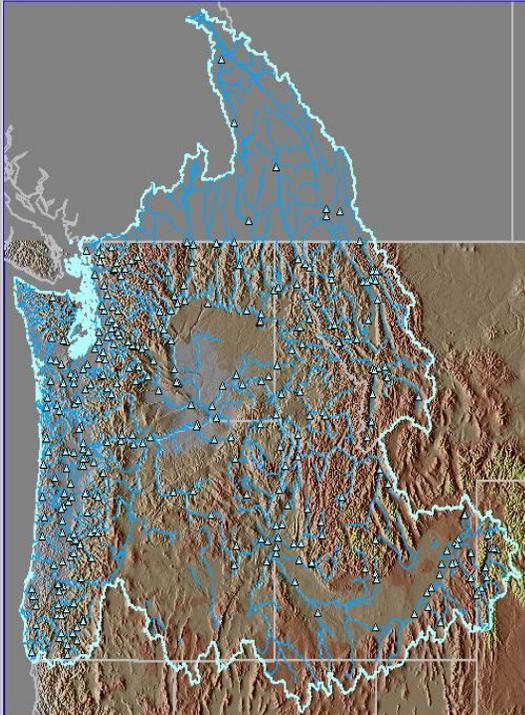
River Centers  
 Weather Offices  
 NWS Offices

### River Forecasts and Data

Map data updated 09/14.00:08 GMT, 09/13.17:08 PDT.

The following data is preliminary, may contain errors, and is subject to change

Click map on to zoom.  
 Click on Select Option for Station Info and Plots.  
**Click to:** Select | Zoom    **Zoom to:** 1x 4x 8x



--Rivers--    List Stations

National Weather Service  
 Northwest River Forecast Center (NWRFC)  
 5241 NE 122nd Avenue

**Legend**

**Hydrologic Indicator**

- 1 = Normal, 0 = No Data
- 2 = 80% of Bankfull
- 3 = 90% of Bankfull
- 4 = Above Bankfull
- 5 = Above Flood Stage
- Observed (Solid)
- Simulated (Striped)

**Quick Plot**

NWS ID:

Plot

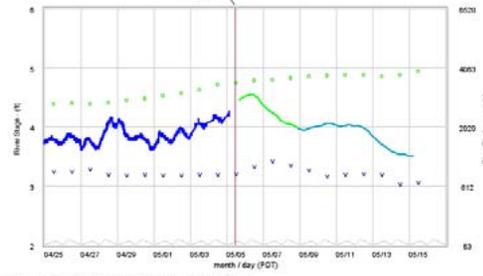
**Layers**

- Topography
- States
- RFC
- Rivers
- Basins
- Active Basins
- Data Points
- Forecast Points
- Active Points
- Point Labels

Update

**HENRY'S FORK -- AT ST. ANTHONY (ANT11)**

Current Time



Latest: 4.25 ft 2479 cfs (27% of flood flow) [05/05 03:30]  
 Daily statistics: v-- Minimum, o-- Mean, \*-- Maximum (USGS data)  
 Observed --- Forecast --- Trend --- Flood Level ---

Fast created: 2009-09-13 11:53 PST  
 Northwest River Forecast Center

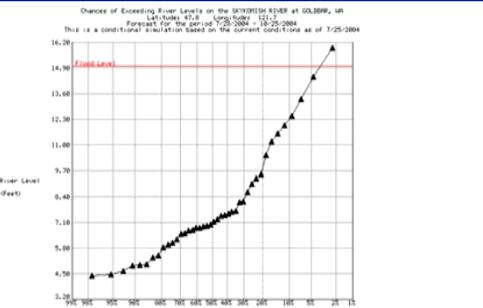
**JACKSON LAKE INFLOW, WY (1) (LJRW4)**

Water Year 2004, Forecast Period Apr - Jul



Forecast: Early, Flood, Midmonth, Current Month, Forecast Period to Date, Sum of normals, Year to date  
 Created: Mon May 19 16:55:47 PDT 2004, Northwest River Forecast Center

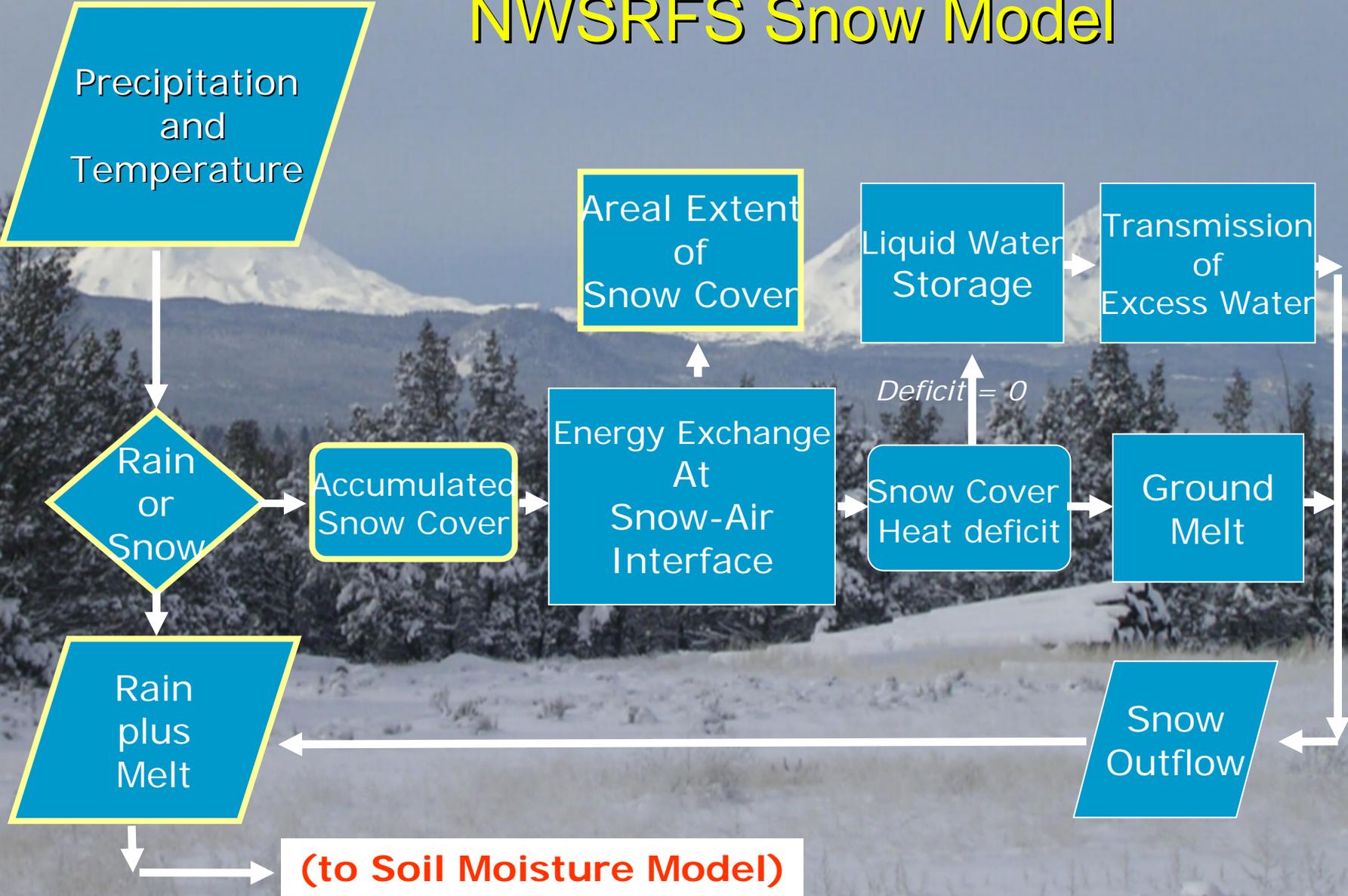
Chances of Exceeding River Levels on the STEWART RIVER at GOLDFP, WA  
 Let's take 47.8 - 4 mph River - 121.3  
 Forecast for the period 7/25-2004 - 10-25-2004  
 This is a conditional forecast based on the current Gold-Tone as of 7/25-2004



Flood Level 15 (feet)



# NWSRFS Snow Model





# NWSRFS Soil Moisture Model

