
From Fisheries to Family Farmer: Improved Products for Communicating Water Supply, Drought and Climate Change Risk for Daily Decision Making Within the Klamath Basin
Focus Group & Concept Design
April 11 & 12, 2013
Klamath Falls, OR

# Outline for Today

- Presentation to share some ideas about concept product design
- Review focus group questions – do we have them right?
- Reaction & feedback on concepts for future direction

# Some Research Goals

- Identify stakeholder needs for information
- Develop “concepts” for meeting these needs
- Evaluate implementation feasibility

# Web Product Design Challenges

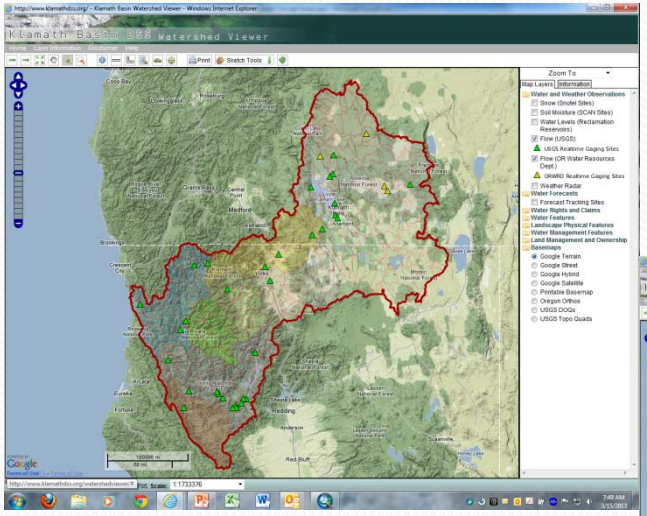
- Identifying and achieving user requirements
  - Multiple user needs and skill levels
  - Applications tailored to the user
  - Keeping the user experience intuitive
- Understandably displaying and interpreting data (i.e., how)
- Integration of decision criteria (action levels)
- Quantity of information, yet lack of integration
- Rapidly changing technology & devices

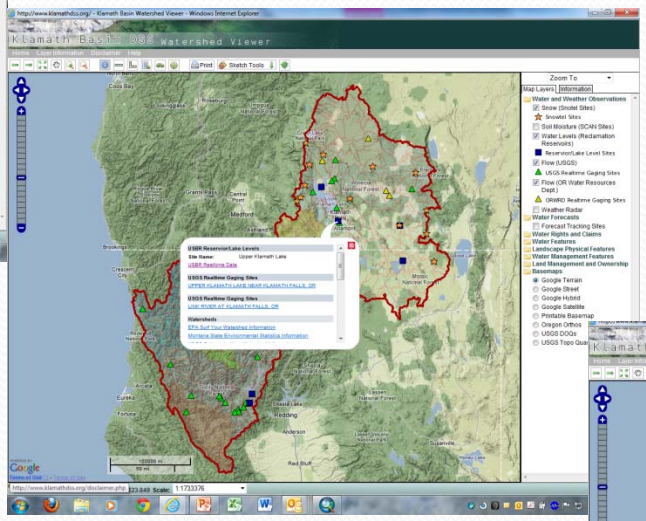
*Still need to resolve implementation feasibility*

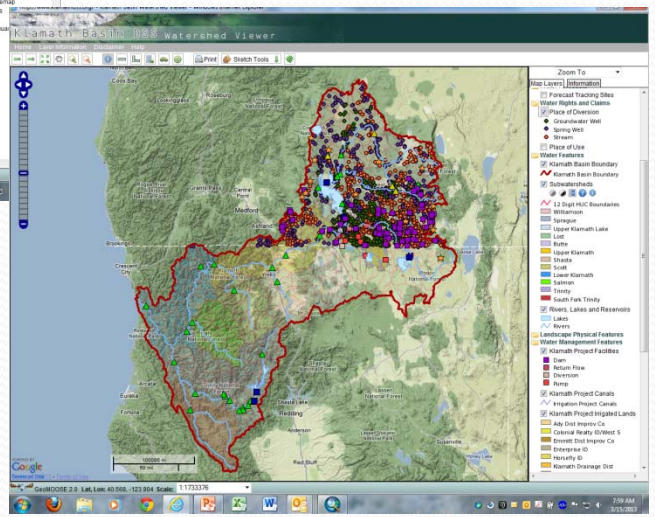
# Defining User Requirements

| Experience Level | Frequency of Use | Science & Technical Need |
|---|---|---|
| Novice (Public / Farmer?) | Infrequent | Low |
| | Occasional | |
| | Periodic | |
| | Frequent | |
| Practitioner & Resource Manager (Tribe?) | | High |

# Typical Design – Horizontal Separation

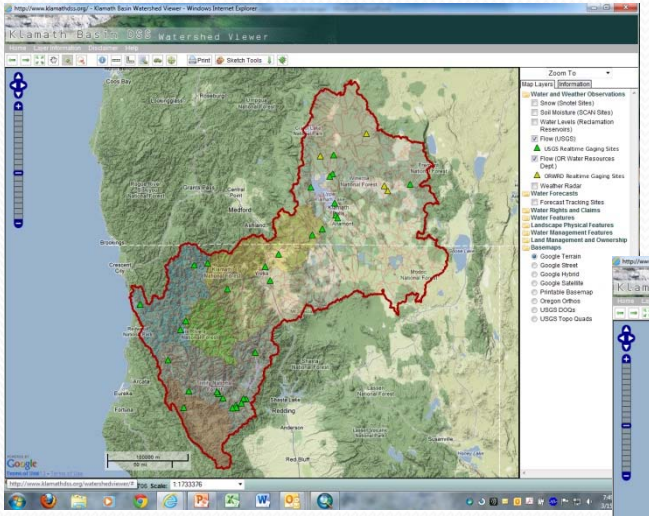




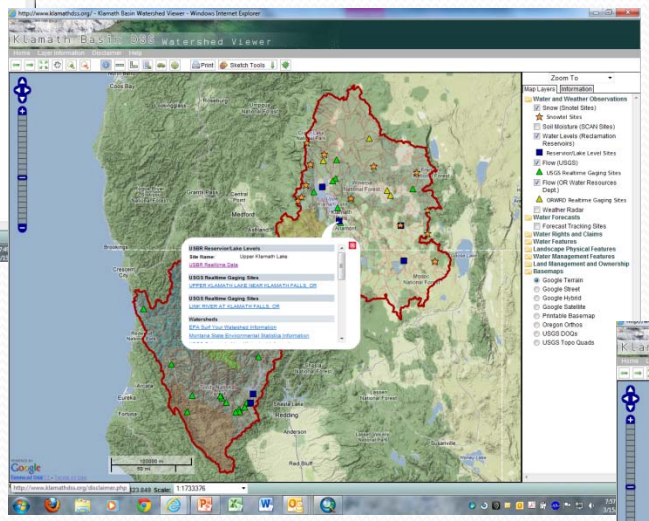


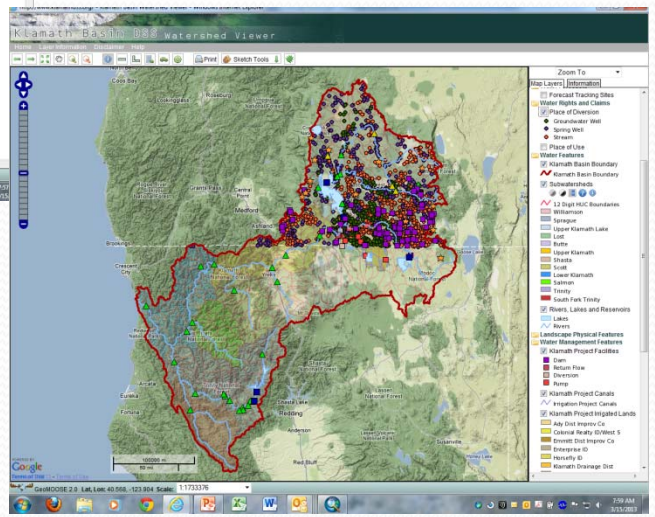
*Separate applications each focused on a specific user and their level of sophistication, with large table of contents*

# Proposed Design - Vertical Integration



No more than 3 clicks





End Here
(Frequent User)

Start Here
(Infrequent User)

*Single application which the user can tailor to their specific needs, organized by "item of interest" becoming more detailed by "drilling down."*

# Data Organization

- Hydrology
  - Measured
    - Surface Water
      - Reservoir and lake levels
      - Reservoir and lake volumes
      - River and stream levels
      - River and stream flow
    - Ground Water
      - Level
      - Volume pumped
  - Forecast
    - Surface Water
      - Reservoir and lake levels (Reclamation)
        - Upper Klamath Lake
        - Gerber Rervoir
        - Clear Lake Reservoir
        - Tule Lake (NWR)
      - Reservoir and lake useable storage (Reclamation)
        - Upper Klamath Lake
        - Gerber Rervoir
        - Clear Lake Reservoir
        - Tule Lake (NWR)
      - River and stream levels
        - Seasonal River and stream flow (NRCS-NWCC)
        - Daily River and stream flow (NWS)
    - Ground Water
      - Surface Water
      - Groundwater
  - Indices
    - Surface Water
      - Percent of normal
      - Deciles
      - Comparison to historical data (dry, wet period)
      - Surface Water Supply Index
      - Recalamation Drought Index
    - Drought
      - Vegetative Drought Response Index (VegDRI)
      - Palmer Drought Index (short term - month)
      - Crop Moisture Index (short term - week)
      - Palmer Z index (long term)
      - Palmer Hydrological Index (long term)
      - Drought index (NDMI)
    - Groundwater
      - Percent of normal
      - Deciles
      - Comparison to historical data (dry, wet period)

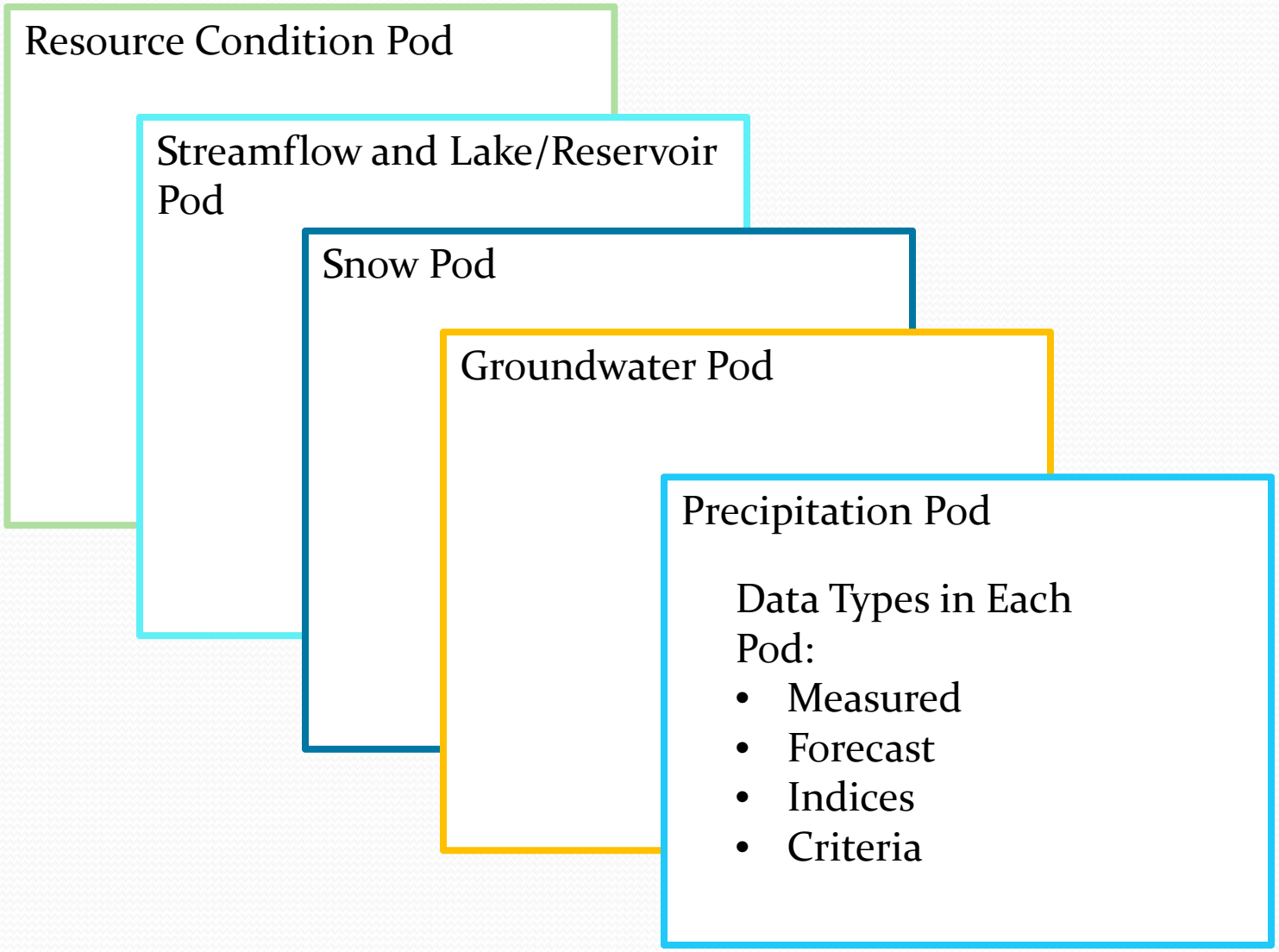
- Weather & Climate
  - Current Radar
  - Measured
    - Precipitation depth
    - Snow depth
    - Snow water equivalent depth
    - Temperature
    - Evapotranspiration
    - Wind direction
    - Wind speed
  - Forecast
    - Precipitation depth
    - Snow depth
    - Snow water equivalent depth
    - Temperature
    - Evapotranspiration
    - Wind direction
    - Wind speed
  - Indices
    - Precipitation
      - Percent of normal
      - Deciles
      - Comparison to historical data (dry, wet period)
      - Standard Precipitation Index
      - Deciles
    - Snow depth
      - Percent of normal
      - Deciles
      - Comparison to historical data (dry, wet period)
    - Evapotranspiration
      - Percent of normal
      - Deciles
      - Comparison to historical data (dry, wet period)
  - Alerts and Warnings

- Resource Condition / State
  - Current
    - Upper Klamath Lake Levels (Suckers)
    - Klamath River Flow (Coho)
    - Normalized difference vegetation index
    - Soil moisture percent of normal
  - Forecast
    - Upper Klamamath Lake Levels (Suckers)
    - Klamath River Flow (Coho)
    - Normalized difference vegetation index
    - Soil moisture percent of normal

# Organize Data Into "Pods" &"Palettes"

- 4 Data Types
  - Measured
  - Forecast
  - Indices
  - Criteria
- 3 Data Categories Divided into Pods
  - Weather and Climate
  - Hydrology
  - Resource Condition

# Data Pods (Categories)



# Precipitation Pod

**Precipitation Product Concept Design**

**Data**

- **Measured precipitation point values (user selectable 1d, 7d, 14d, 30d, 60d, 90d, MTD, YTD, WY) http://water.weather.gov/precip/**
- **Derived aerial precipitation**
  - **Isohyetal values across basin derived from point measurements**
  - **Subwatershed (NWS drainage boundaries**
- **Forecast (gridded QPF) (1d, 2d, 3d @ 6 hr increments) ftp://ftp.hpc.ncep.noaa.gov/pqpf/conus/pqpf_24hr/**
- **Point precipitation values values displayed using changeable graphic**
  - **Zoomed out - current condition simple circle**
  - **Zoomed in - Mark's new design design**

Functionality

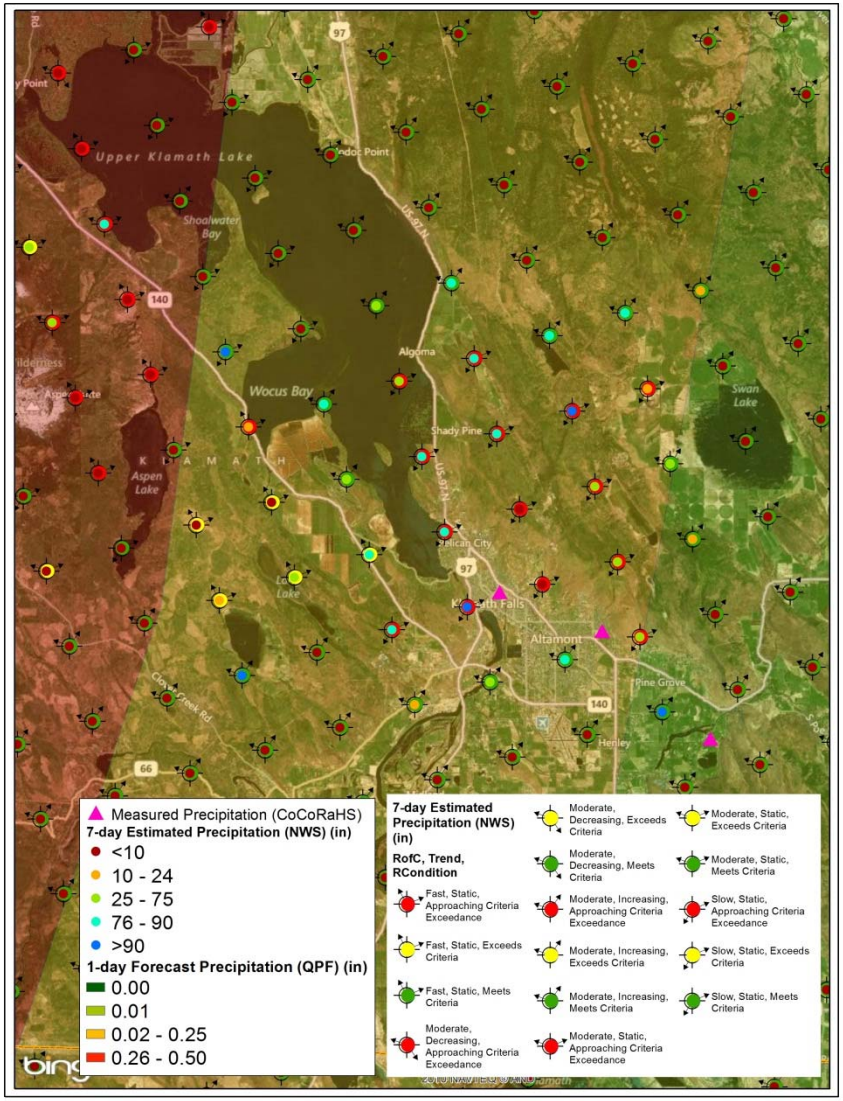
- Toggle layers on and off
- Graphic layer in background, simultaneously showing a single point value in foreground. Background layers
  - QPF grid
  - Isohyetal values
- Point layers
  - Measured precipitation
  - Subwatershed area-weighted total depth
  - Subwatershed area-weighted volume
- Clickable to detailed time series

# Precipitation Pod

- Measured
  - 1 day
  - 7 day
  - 14 day
  - 30 day
  - 60 day
  - 90 day
  - MTD
  - YTD
- Forecast (QPF)
  - 1 day
  - 2 day
  - 3 day

| Explanation - Percentile classes | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | |
| Low | <10 | 10-24 | 25-75 | 76-90 | >90 | High |
| | Much below normal | Below normal | Normal | Above normal | Much above normal | |

7 day departure from normal



Organize Pods into Palettes
User Selects Pods OR Pod Content Pre-staged
Could use selectable buttons on side to display a palette

Weather, Climate, and Water Supply Outlook

Agriculture Report

Upper Klamath Lake Water Balance

Basin Hydrologic Condition

Basin Climate and Drought Condition

Precipitation Pod

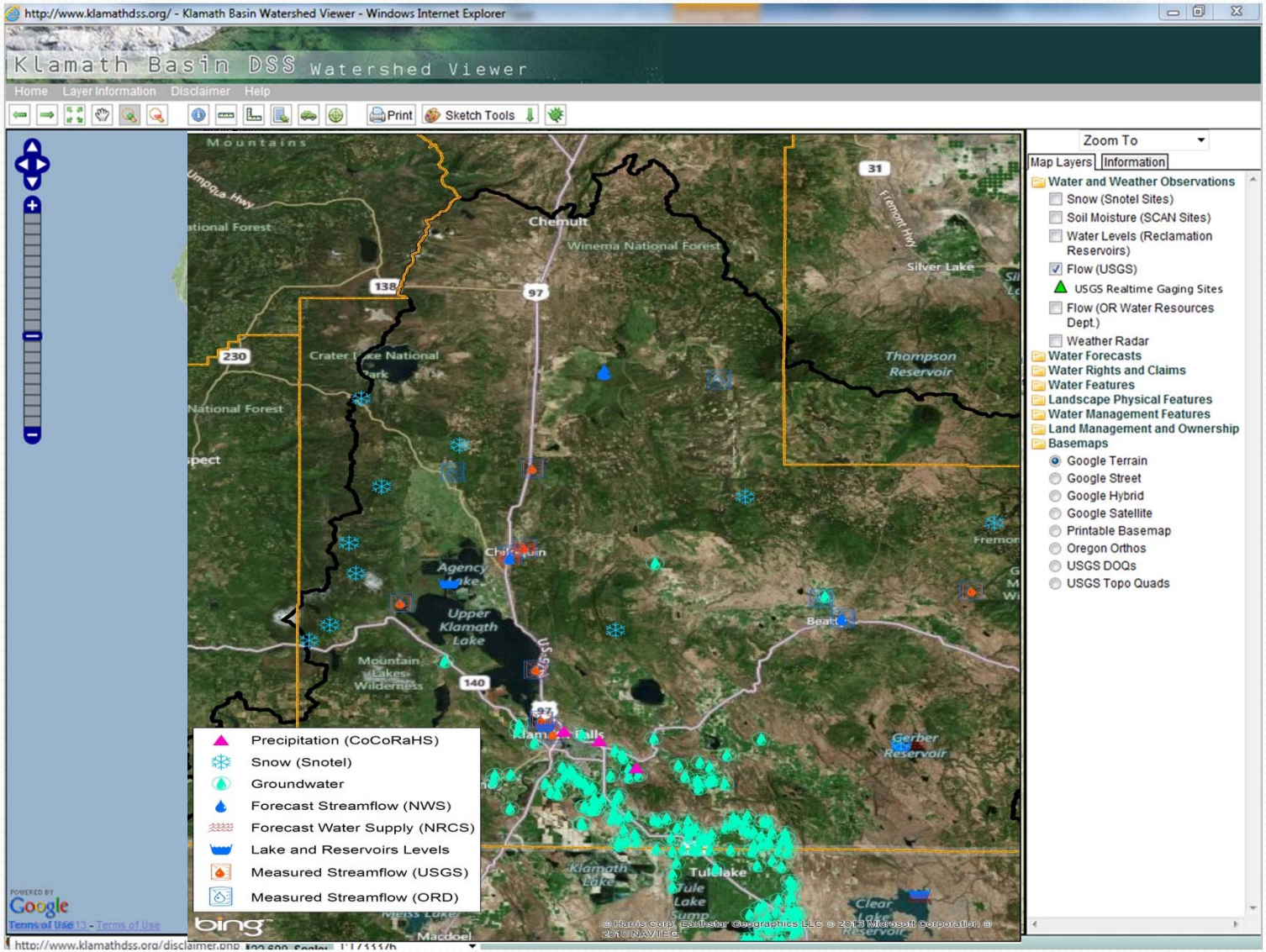
Groundwater Pod

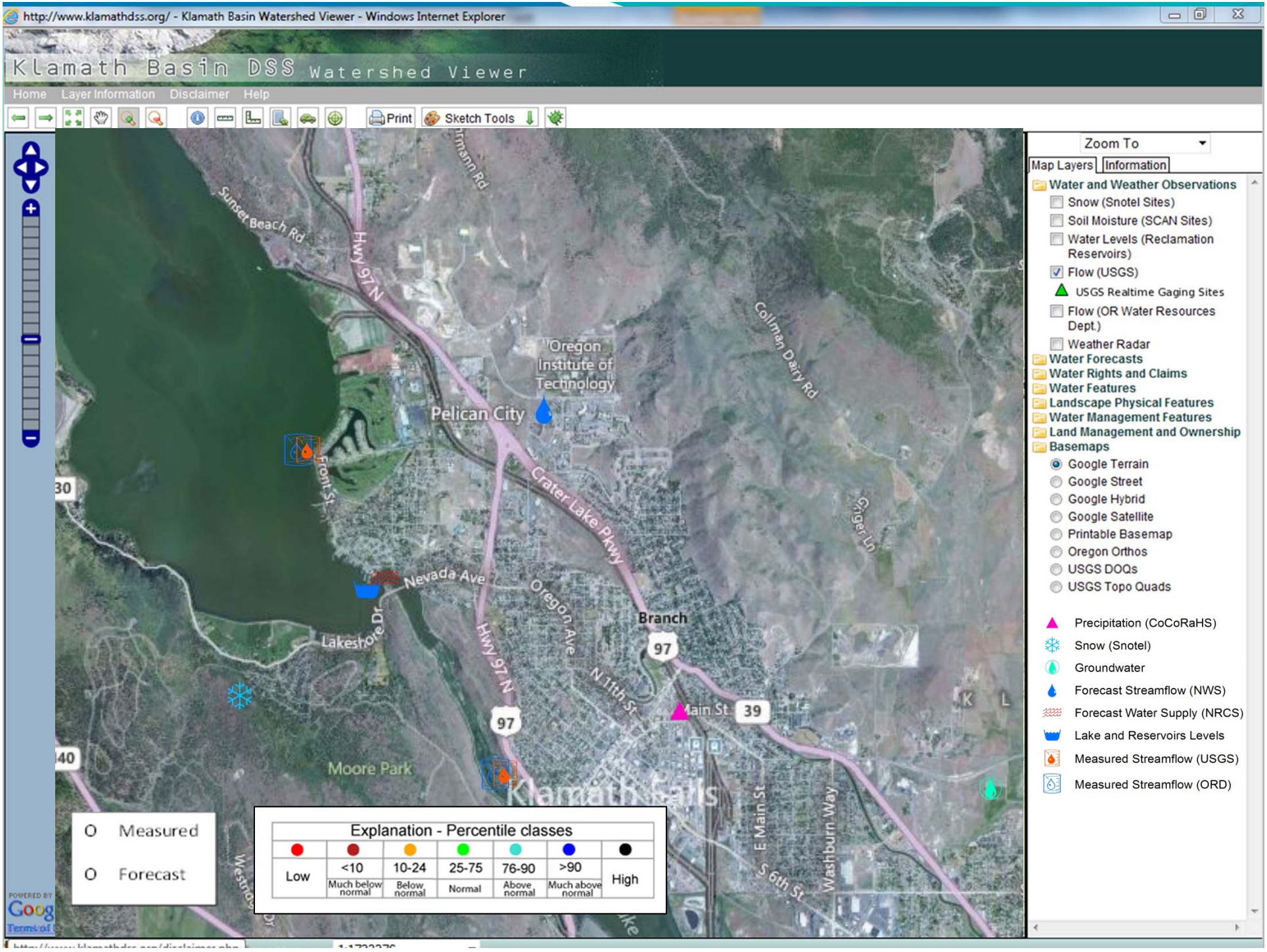
Snow Pod

Streamflow & Lake Level Pod

Resource Condition Pod

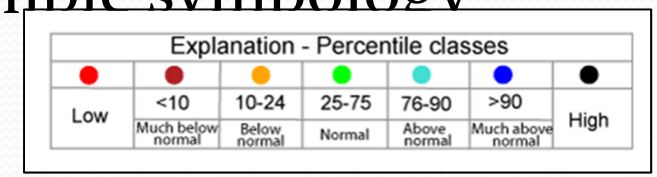
# Interactive Map Interface



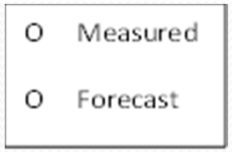

http://www.klamathdss.org/ - Klamath Basin Watershed Viewer - Windows Internet Explorer
Klamath Basin DSS Watershed Viewer
Home
Layer Information
Disclaimer
Help
Print
Sketch Tools
Zoom To
Map Layers
Information
Water and Weather Observations
Snow (Snotel Sites)
Soil Moisture (SCAN Sites)
Water Levels (Reclamation Reservoirs)
Flow (USGS)
USGS Realtime Gaging Sites
Flow (OR Water Resources Dept.)
Weather Radar
Water Forecasts
Water Rights and Claims
Water Features
Landscape Physical Features
Water Management Features
Land Management and Ownership
Basemaps
Google Terrain
Google Street
Google Hybrid
Google Satellite
Printable Basemap
Oregon Orthos
USGS DOQs
USGS Topo Quads
Precipitation (CoCoRaHS)
Snow (Snotel)
Groundwater
Forecast Streamflow (NWS)
Forecast Water Supply (NRCS)
Lake and Reservoirs Levels
Measured Streamflow (USGS)
Measured Streamflow (ORD)
Sunset Beach Rd
Hwy 97 N
Oregon Institute of Technology
Pelican City
Crater Lake Pkwy
Collman Dairy Rd
Front St
Nevada Ave
Lakeshore Dr
Oregon Ave
Branch
97
N 11th St
Main St
39
Moore Park
Klamath Falls
E Main St
Washburn Way
S 6th St
Measured
Forecast
Explanation - Percentile classes
Low
<10
Much below normal
10-24
Below normal
25-75
Normal
76-90
Above normal
>90
Much above normal
High

# Infrequent User (1st Click)

- Simple symbology

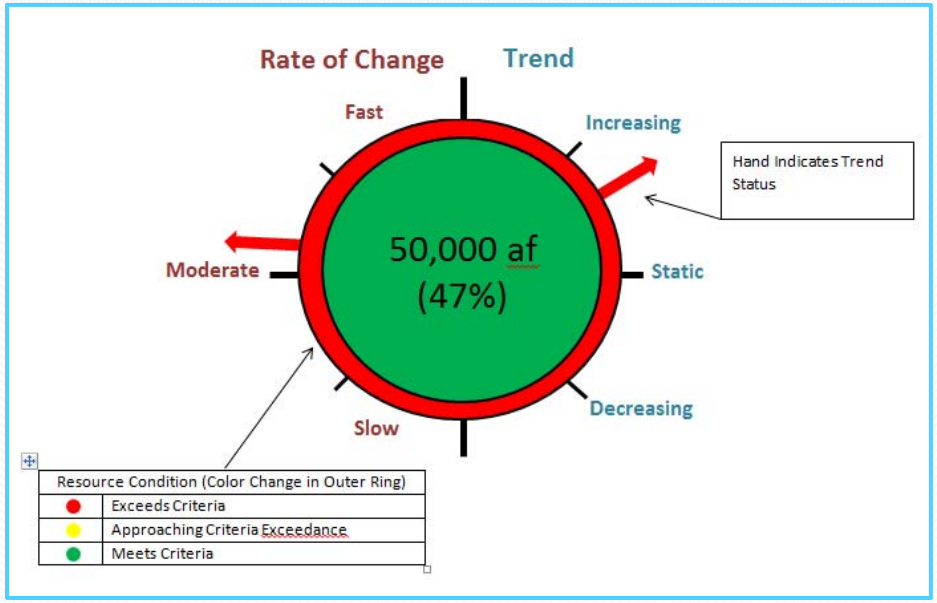



- Measured and Forecast Radio Button

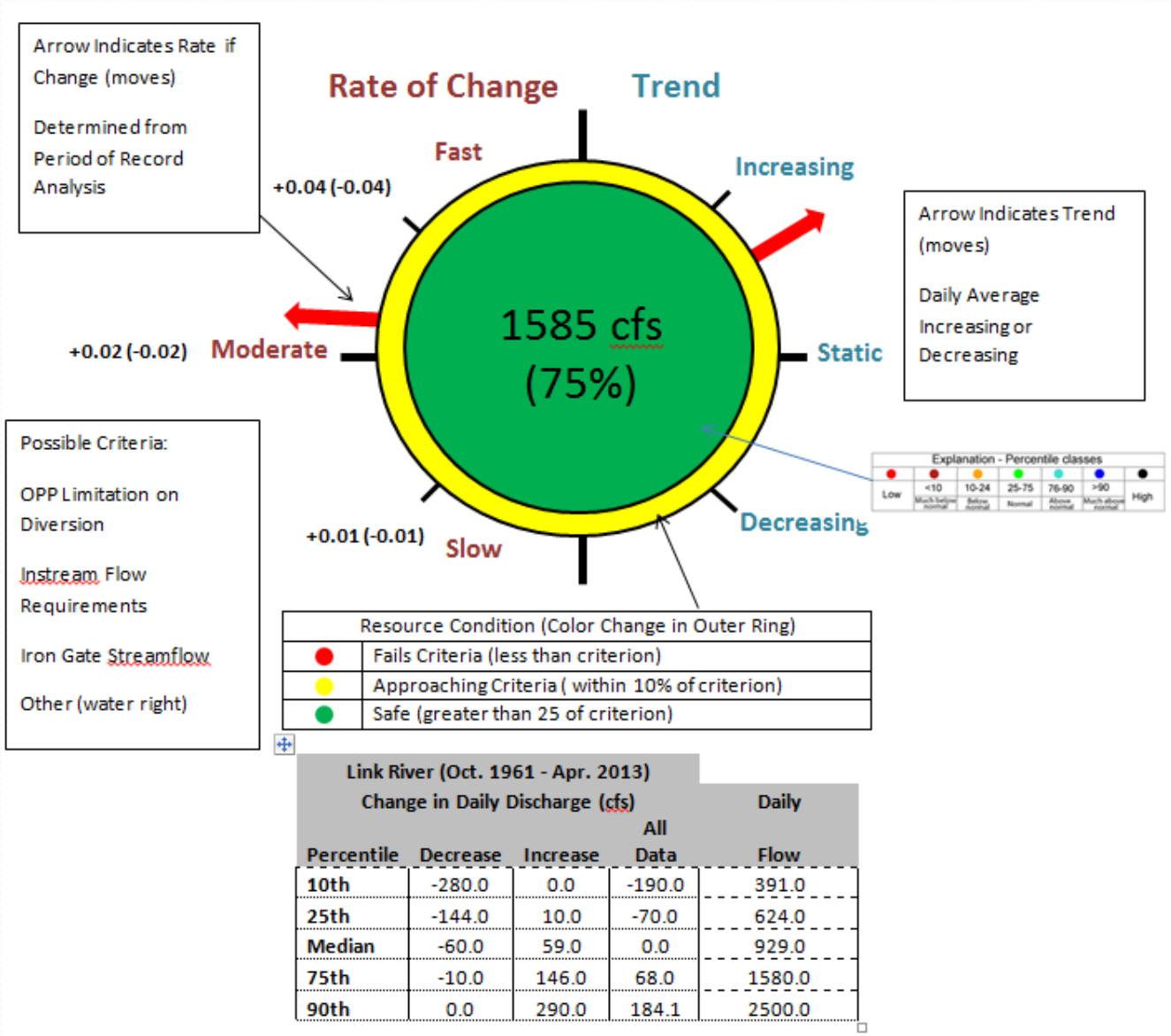


# Occasional User (2nd Click)

- Symbol showing
  - Current Value
  - Criteria / action level
  - Direction of Change
  - Rate of Change



# Link River Streamflow (measured) (2nd Click)



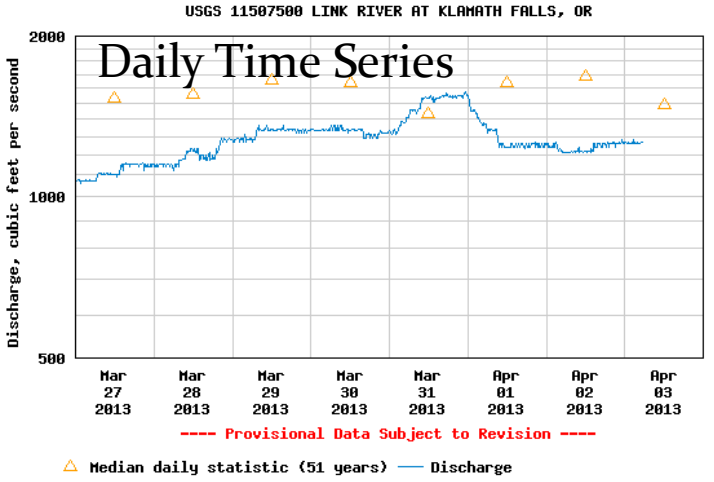

| Link River (Oct. 1961 - Apr. 2013) | | | | |
|---|---|---|---|---|
| | Change in Daily Discharge (cfs) | | | Daily |
| Percentile | Decrease | Increase | All Data | Flow |
| 10th | -280.0 | 0.0 | -190.0 | 391.0 |
| 25th | -144.0 | 10.0 | -70.0 | 624.0 |
| Median | -60.0 | 59.0 | 0.0 | 929.0 |
| 75th | -10.0 | 146.0 | 68.0 | 1580.0 |
| 90th | 0.0 | 290.0 | 184.1 | 2500.0 |

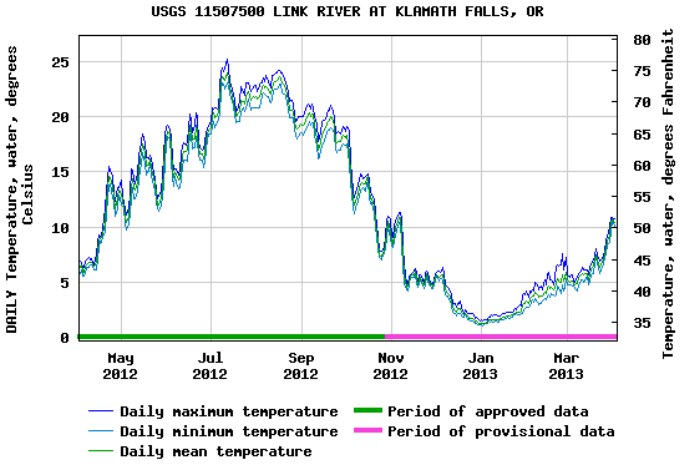
# Frequent User (3rd Click)

## Frequency Analysis

| Day of month | 00060, Discharge, cubic feet per second, Mean of daily mean values for each day for 51 - 51 years of record in, cfs (Calculation Period 1961-10-01 -> 2012-09-30) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| 1 | 1,600 | 1,640 | 1,600 | 2,110 | 1,560 | 1,130 | 913 | 751 | 784 | 728 | 1,110 | 1,340 |
| 2 | 1,610 | 1,650 | 1,650 | 2,140 | 1,480 | 1,170 | 908 | 748 | 806 | 741 | 1,190 | 1,320 |
| 3 | 1,680 | 1,620 | 1,650 | 2,060 | 1,480 | 1,190 | 879 | 751 | 812 | 748 | 1,190 | 1,330 |
| 4 | 1,690 | 1,630 | 1,630 | 2,090 | 1,480 | 1,210 | 833 | 768 | 799 | 775 | 1,150 | 1,400 |
| 5 | 1,730 | 1,650 | 1,620 | 2,140 | 1,490 | 1,240 | 810 | 774 | 791 | 849 | 1,160 | 1,420 |
| 6 | 1,750 | 1,620 | 1,620 | 2,110 | 1,470 | 1,210 | 795 | 768 | 774 | 877 | 1,200 | 1,420 |
| 7 | 1,780 | 1,600 | 1,680 | 2,050 | 1,460 | 1,120 | 832 | 739 | 802 | 898 | 1,200 | 1,410 |
| 8 | 1,760 | 1,560 | 1,690 | 1,990 | 1,500 | 1,080 | 847 | 757 | 800 | 893 | 1,200 | 1,450 |
| 9 | 1,720 | 1,510 | 1,690 | 1,980 | 1,490 | 1,040 | 844 | 765 | 816 | 930 | 1,180 | 1,480 |
| 10 | 1,650 | 1,460 | 1,740 | 1,970 | 1,470 | 1,030 | 822 | 761 | 772 | 913 | 1,160 | 1,500 |
| 11 | 1,590 | 1,440 | 1,790 | 2,000 | 1,480 | 999 | 799 | 771 | 751 | 925 | 1,120 | 1,490 |
| 12 | 1,550 | 1,410 | 1,810 | 2,010 | 1,530 | 998 | 821 | 782 | 726 | 903 | 1,170 | 1,460 |
| 13 | 1,560 | 1,360 | 1,840 | 2,040 | 1,600 | 1,010 | 837 | 774 | 702 | 930 | 1,200 | 1,430 |
| 14 | 1,550 | 1,300 | 1,910 | 2,030 | 1,640 | 1,070 | 796 | 753 | 703 | 952 | 1,230 | 1,430 |
| 15 | 1,520 | 1,360 | 1,920 | 1,980 | 1,640 | 1,070 | 805 | 751 | 735 | 922 | 1,220 | 1,450 |
| 16 | 1,530 | 1,390 | 1,890 | 1,870 | 1,610 | 1,070 | 829 | 770 | 729 | 910 | 1,240 | 1,480 |
| 17 | 1,550 | 1,400 | 1,890 | 1,820 | 1,560 | 1,060 | 806 | 776 | 732 | 916 | 1,200 | 1,500 |
| 18 | 1,550 | 1,420 | 1,880 | 1,790 | 1,520 | 1,060 | 764 | 754 | 743 | 917 | 1,210 | 1,540 |
| 19 | 1,580 | 1,500 | 1,940 | 1,750 | 1,430 | 1,010 | 753 | 761 | 736 | 957 | 1,250 | 1,530 |
| 20 | 1,620 | 1,560 | 1,970 | 1,720 | 1,370 | 982 | 729 | 767 | 731 | 985 | 1,290 | 1,480 |
| 21 | 1,650 | 1,590 | 1,950 | 1,710 | 1,320 | 960 | 735 | 756 | 756 | 981 | 1,300 | 1,490 |
| 22 | 1,670 | 1,570 | 1,900 | 1,700 | 1,310 | 958 | 754 | 739 | 765 | 988 | 1,290 | 1,480 |
| 23 | 1,720 | 1,620 | 1,840 | 1,720 | 1,270 | 955 | 781 | 735 | 738 | 1,010 | 1,260 | 1,500 |
| 24 | 1,770 | 1,660 | 1,880 | 1,650 | 1,230 | 949 | 768 | 738 | 729 | 1,030 | 1,240 | 1,530 |
| 25 | 1,730 | 1,690 | 1,940 | 1,570 | 1,230 | 933 | 766 | 712 | 743 | 1,030 | 1,250 | 1,590 |
| 26 | 1,710 | 1,650 | 1,940 | 1,570 | 1,210 | 935 | 774 | 722 | 742 | 1,040 | 1,280 | 1,620 |
| 27 | 1,710 | 1,660 | 2,000 | 1,540 | 1,200 | 954 | 781 | 750 | 735 | 1,050 | 1,290 | 1,610 |
| 28 | 1,720 | 1,600 | 1,980 | 1,560 | 1,210 | 937 | 772 | 723 | 753 | 1,080 | 1,310 | 1,600 |
| 29 | 1,730 | 1,430 | 1,960 | 1,590 | 1,170 | 921 | 746 | 702 | 760 | 1,100 | 1,350 | 1,580 |
| 30 | 1,710 | | 2,010 | 1,600 | 1,110 | 924 | 750 | 725 | 722 | 1,150 | 1,360 | 1,570 |
| 31 | 1,660 | | 2,080 | | 1,130 | | 762 | 745 | | 1,130 | | 1,600 |

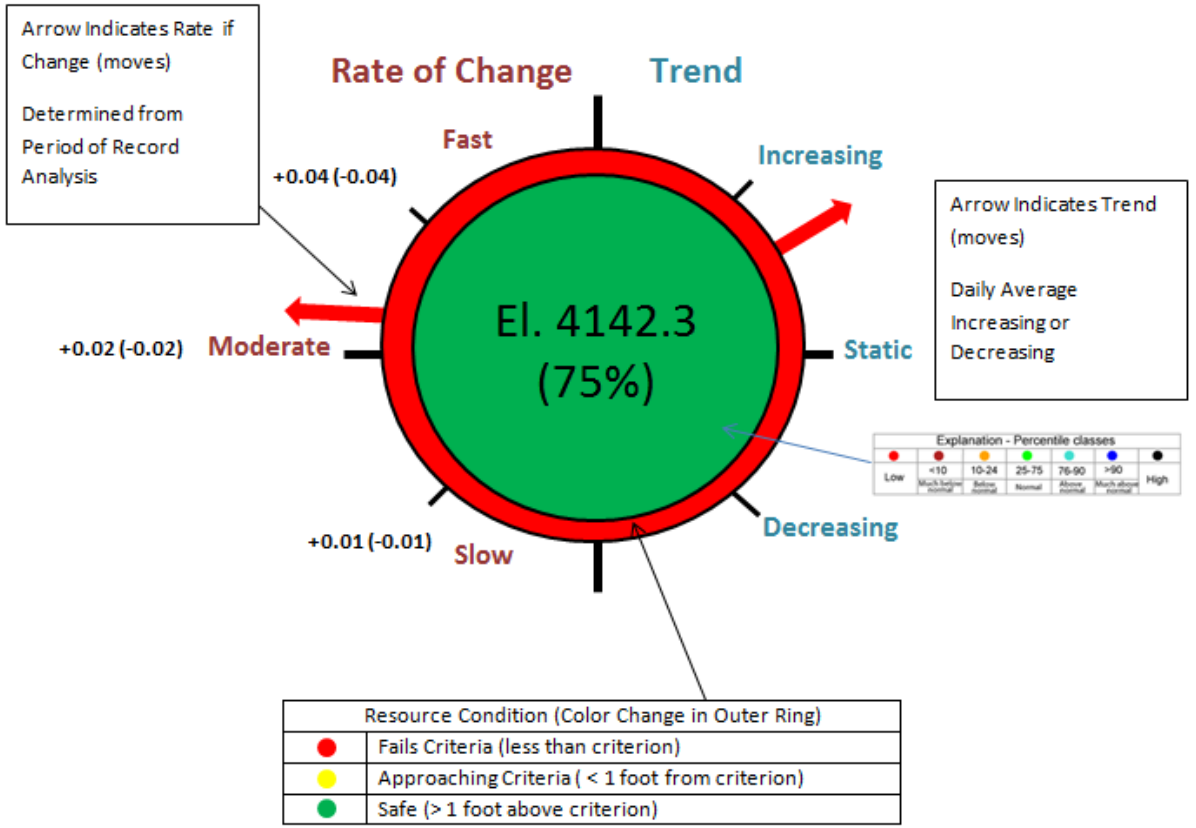
## Daily Time Series




## Storage

# UKL Level (measured) 2nd Click




| Resource Condition (Color Change in Outer Ring) | |
|---|---|
| ● | Fails Criteria (less than criterion) |
| ● | Approaching Criteria ( < 1 foot from criterion) |
| ● | Safe (> 1 foot above criterion) |

**Daily Upper Klamath Lake Levels (ft) 1/1/84-3/27/2013**

| Percentile | Decrease | Increase | All Data | Elev. |
|---|---|---|---|---|
| 10th | -0.050 | 0.000 | -0.050 | 4138.870 |
| 25th | -0.040 | 0.010 | -0.030 | 4139.730 |
| median | -0.020 | 0.020 | 0.000 | 4141.070 |
| 75th | -0.010 | 0.040 | 0.020 | 4142.300 |
| 90th | 0.000 | 0.060 | 0.050 | 4142.930 |

# Frequent User (3rd Click)

## Frequency Analysis

| 00062, Elevation of reservoir water surface above datum, feet, | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Day of month | Mean of daily mean values for each day for 37 - 38 years of record in, ft (Calculation Period 1974-10-01 -> 2012-09-30) | | | | | | | | | | | |
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| 1 | 4,140.54 | 4,141.14 | 4,141.78 | 4,142.51 | 4,142.79 | 4,142.74 | 4,142.07 | 4,140.95 | 4,139.88 | 4,139.48 | 4,139.53 | 4,139.95 |
| 2 | 4,140.56 | 4,141.16 | 4,141.81 | 4,142.51 | 4,142.80 | 4,142.73 | 4,142.05 | 4,140.91 | 4,139.85 | 4,139.47 | 4,139.53 | 4,139.97 |
| 3 | 4,140.58 | 4,141.18 | 4,141.84 | 4,142.52 | 4,142.80 | 4,142.72 | 4,142.01 | 4,140.87 | 4,139.82 | 4,139.46 | 4,139.54 | 4,139.99 |
| 4 | 4,140.60 | 4,141.20 | 4,141.86 | 4,142.53 | 4,142.81 | 4,142.71 | 4,141.98 | 4,140.83 | 4,139.80 | 4,139.46 | 4,139.56 | 4,140.01 |
| 5 | 4,140.62 | 4,141.21 | 4,141.90 | 4,142.54 | 4,142.82 | 4,142.71 | 4,141.94 | 4,140.79 | 4,139.77 | 4,139.45 | 4,139.56 | 4,140.03 |
| 6 | 4,140.64 | 4,141.22 | 4,141.93 | 4,142.55 | 4,142.82 | 4,142.69 | 4,141.91 | 4,140.75 | 4,139.74 | 4,139.44 | 4,139.57 | 4,140.05 |
| 7 | 4,140.66 | 4,141.24 | 4,141.95 | 4,142.56 | 4,142.81 | 4,142.68 | 4,141.88 | 4,140.72 | 4,139.72 | 4,139.43 | 4,139.58 | 4,140.07 |
| 8 | 4,140.67 | 4,141.26 | 4,141.97 | 4,142.57 | 4,142.82 | 4,142.66 | 4,141.84 | 4,140.68 | 4,139.69 | 4,139.42 | 4,139.60 | 4,140.09 |
| 9 | 4,140.69 | 4,141.28 | 4,141.99 | 4,142.58 | 4,142.82 | 4,142.64 | 4,141.80 | 4,140.64 | 4,139.67 | 4,139.41 | 4,139.60 | 4,140.10 |
| 10 | 4,140.71 | 4,141.29 | 4,142.02 | 4,142.59 | 4,142.82 | 4,142.63 | 4,141.76 | 4,140.61 | 4,139.65 | 4,139.41 | 4,139.59 | 4,140.12 |
| 11 | 4,140.74 | 4,141.30 | 4,142.05 | 4,142.60 | 4,142.82 | 4,142.61 | 4,141.73 | 4,140.56 | 4,139.63 | 4,139.41 | 4,139.60 | 4,140.14 |
| 12 | 4,140.76 | 4,141.32 | 4,142.06 | 4,142.61 | 4,142.81 | 4,142.59 | 4,141.69 | 4,140.53 | 4,139.60 | 4,139.40 | 4,139.64 | 4,140.16 |
| 13 | 4,140.78 | 4,141.35 | 4,142.08 | 4,142.62 | 4,142.80 | 4,142.57 | 4,141.65 | 4,140.49 | 4,139.58 | 4,139.39 | 4,139.65 | 4,140.18 |
| 14 | 4,140.81 | 4,141.37 | 4,142.11 | 4,142.63 | 4,142.80 | 4,142.56 | 4,141.61 | 4,140.46 | 4,139.56 | 4,139.39 | 4,139.67 | 4,140.20 |
| 15 | 4,140.83 | 4,141.40 | 4,142.14 | 4,142.63 | 4,142.80 | 4,142.54 | 4,141.57 | 4,140.42 | 4,139.55 | 4,139.40 | 4,139.67 | 4,140.24 |
| 16 | 4,140.86 | 4,141.42 | 4,142.17 | 4,142.64 | 4,142.80 | 4,142.51 | 4,141.53 | 4,140.38 | 4,139.53 | 4,139.40 | 4,139.68 | 4,140.27 |
| 17 | 4,140.88 | 4,141.46 | 4,142.19 | 4,142.66 | 4,142.79 | 4,142.48 | 4,141.49 | 4,140.34 | 4,139.52 | 4,139.40 | 4,139.71 | 4,140.29 |
| 18 | 4,140.90 | 4,141.48 | 4,142.22 | 4,142.68 | 4,142.79 | 4,142.46 | 4,141.45 | 4,140.30 | 4,139.51 | 4,139.40 | 4,139.73 | 4,140.30 |
| 19 | 4,140.93 | 4,141.53 | 4,142.25 | 4,142.67 | 4,142.78 | 4,142.43 | 4,141.42 | 4,140.27 | 4,139.50 | 4,139.41 | 4,139.74 | 4,140.32 |
| 20 | 4,140.94 | 4,141.55 | 4,142.26 | 4,142.69 | 4,142.78 | 4,142.41 | 4,141.39 | 4,140.24 | 4,139.50 | 4,139.42 | 4,139.75 | 4,140.34 |
| 21 | 4,140.96 | 4,141.59 | 4,142.28 | 4,142.71 | 4,142.77 | 4,142.38 | 4,141.36 | 4,140.20 | 4,139.48 | 4,139.43 | 4,139.78 | 4,140.35 |
| 22 | 4,140.98 | 4,141.62 | 4,142.32 | 4,142.72 | 4,142.77 | 4,142.35 | 4,141.32 | 4,140.17 | 4,139.47 | 4,139.43 | 4,139.80 | 4,140.37 |
| 23 | 4,141.00 | 4,141.64 | 4,142.34 | 4,142.73 | 4,142.77 | 4,142.32 | 4,141.29 | 4,140.14 | 4,139.45 | 4,139.44 | 4,139.82 | 4,140.37 |
| 24 | 4,141.01 | 4,141.67 | 4,142.37 | 4,142.75 | 4,142.77 | 4,142.29 | 4,141.25 | 4,140.11 | 4,139.44 | 4,139.45 | 4,139.84 | 4,140.38 |
| 25 | 4,141.02 | 4,141.69 | 4,142.38 | 4,142.75 | 4,142.76 | 4,142.26 | 4,141.22 | 4,140.08 | 4,139.43 | 4,139.47 | 4,139.86 | 4,140.40 |
| 26 | 4,141.04 | 4,141.71 | 4,142.39 | 4,142.77 | 4,142.76 | 4,142.23 | 4,141.18 | 4,140.05 | 4,139.42 | 4,139.48 | 4,139.88 | 4,140.41 |
| 27 | 4,141.06 | 4,141.74 | 4,142.41 | 4,142.77 | 4,142.75 | 4,142.20 | 4,141.14 | 4,140.02 | 4,139.42 | 4,139.48 | 4,139.89 | 4,140.43 |
| 28 | 4,141.07 | 4,141.75 | 4,142.44 | 4,142.78 | 4,142.75 | 4,142.16 | 4,141.10 | 4,139.99 | 4,139.41 | 4,139.49 | 4,139.91 | 4,140.44 |
| 29 | 4,141.08 | 4,141.68 | 4,142.46 | 4,142.79 | 4,142.75 | 4,142.13 | 4,141.06 | 4,139.96 | 4,139.40 | 4,139.50 | 4,139.92 | 4,140.46 |
| 30 | 4,141.10 | | 4,142.47 | 4,142.79 | 4,142.74 | 4,142.11 | 4,141.03 | 4,139.94 | 4,139.39 | 4,139.51 | 4,139.93 | 4,140.48 |
| 31 | 4,141.11 | | 4,142.49 | | 4,142.74 | | 4,140.99 | 4,139.91 | | 4,139.52 | | 4,140.51 |

## Storage

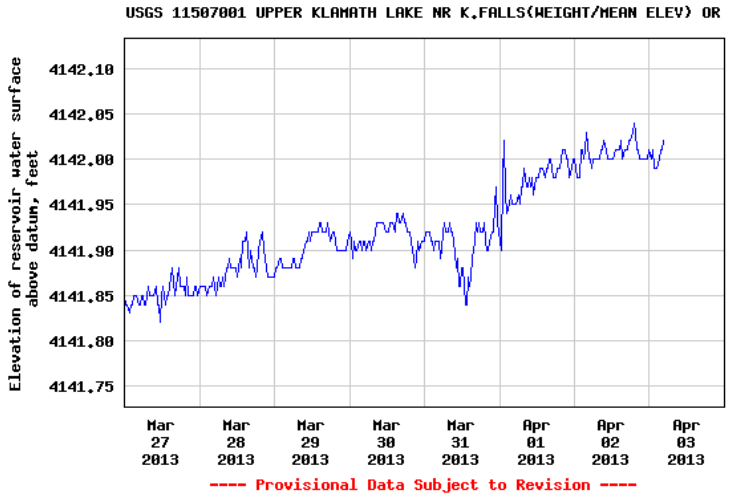
KLAMATH BASIN
Reservoir Storage (1000AF) End of February

| Reservoir | Usable Capacity | ********** Usable Storage ********** This Year | Last Year | Average |
|---|---|---|---|---|
| CLEAR LAKE (CALIF) | 513.3 | 106.6 | 152.0 | 224.2 |
| GERBER | 94.3 | 26.6 | 37.5 | 54.5 |
| UPPER KLAMATH LAKE | 523.7 | 421.0 | 415.6 | 402.6 |

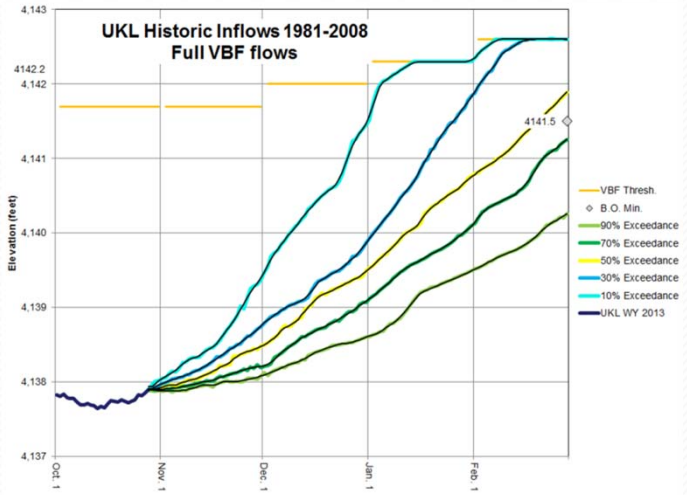
## Daily Time Series

**Elevation of reservoir water surface above datum, feet**

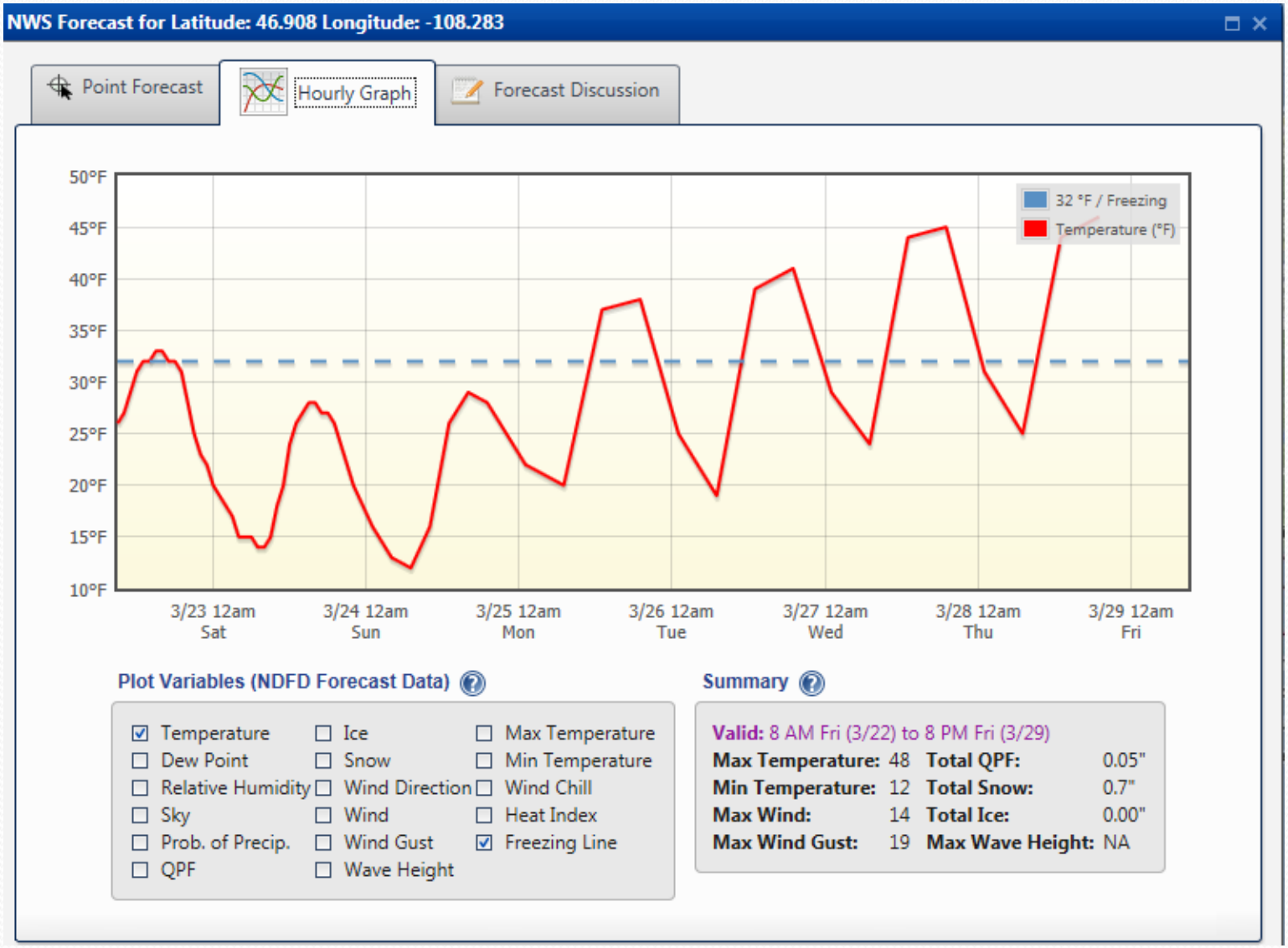
Most recent instantaneous value: 4,142.02 04-03-2013 04:30 PDT



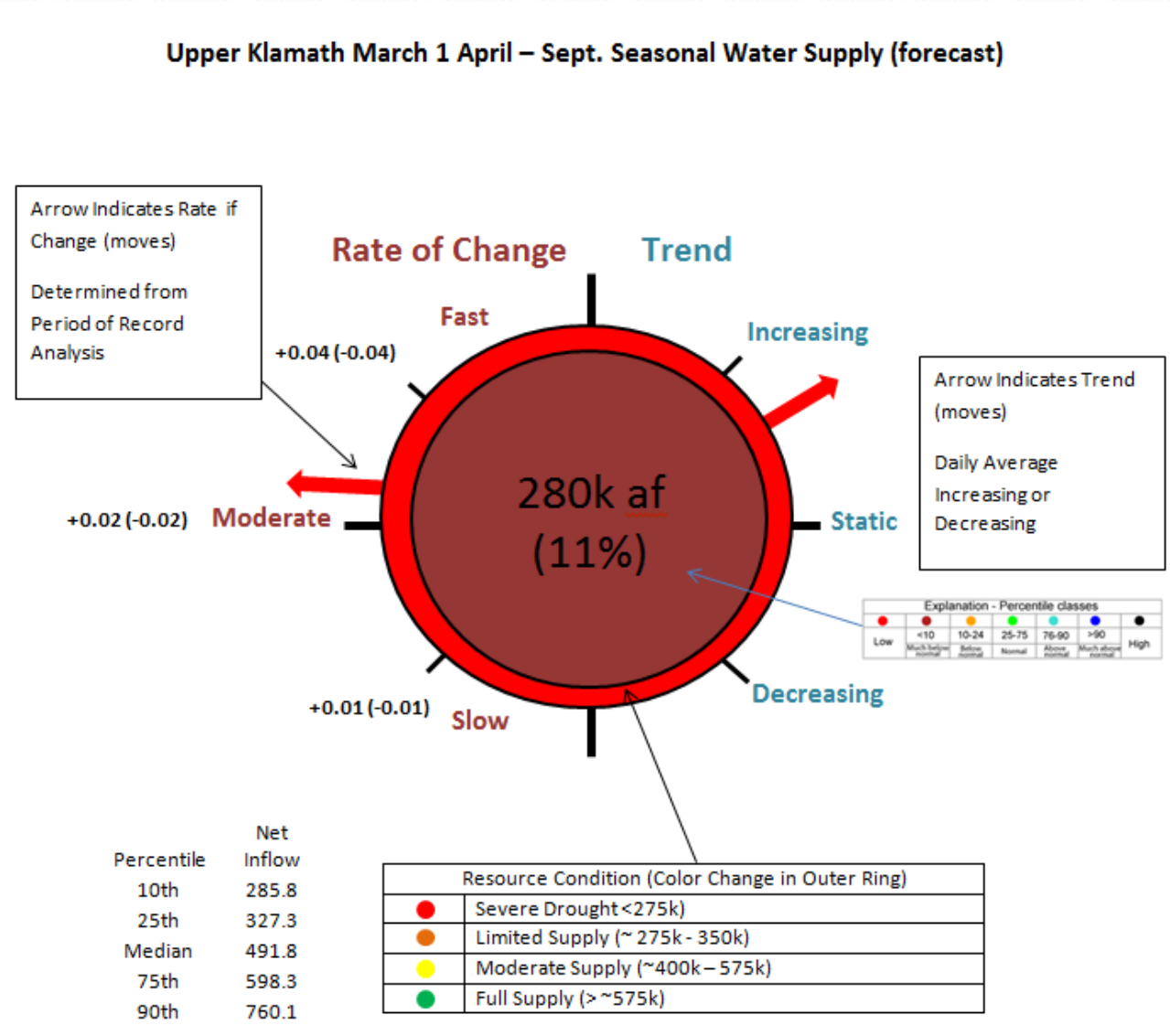

## Reclamation Forecast



# Customizable Graph



# UKL Net Inflow Water Supply (forecast)



# Frequent User (3rd Click)

KLAMATH BASIN
Streamflow Forecasts - March 1, 2003

| Forecast Pt / Forecast Period | <=== Drier === Future Conditions === Wetter ===> Chance of Exceeding * 90% (1000AF) | 70% (1000AF) | 50% (Most Prob) (1000AF) | 50% (% AVG.) | 30% (1000AF) | 10% (1000AF) | 30 Yr Avg (1000AF) |
|---|---|---|---|---|---|---|---|
| CLEAR LK Net Inflow (2) | | | | | | | |
| MAR-JUL | 0.8 | 4.8 | 15.0 | 19 | 28 | 48 | 80 |
| GERBER RESERVOIR net Inflow (2) | | | | | | | |
| MAR-JUL | 0.4 | 3.4 | 9.0 | 24 | 14.6 | 23 | 37 |
| SPRAGUE R nr Chiloquin | | | | | | | |
| MAR-JUL | 52 | 99 | 130 | 47 | 161 | 208 | 275 |
| APR-SEP | 46 | 84 | 110 | 48 | 136 | 174 | 230 |
| UPPER KLAMATH LK net Inflow (1) | | | | | | | |
| MAR-JUL | 127 | 273 | 340 | 54 | 407 | 553 | 625 |
| APR-SEP | 94 | 222 | 280 | 54 | 338 | 466 | 515 |
| WILLIAMSON R nr Chiloquin | | | | | | | |
| MAR-JUL | 134 | 206 | 255 | 58 | 304 | 376 | 440 |
| APR-SEP | 113 | 180 | 225 | 58 | 270 | 337 | 385 |

* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual flow will exceed the volumes in the table.

(1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
(2) - The value is natural flow - actual flow may be affected by upstream water management.

Banner

Quick Layers

Palatte

- Basin Climate & Water Outlook
- Agriculture Report
- Upper Klamath Lake Water Balance
- Basin Hydrologic Condition
- Basin Climate and Drought Condition

Data

- Observed
- Forecast

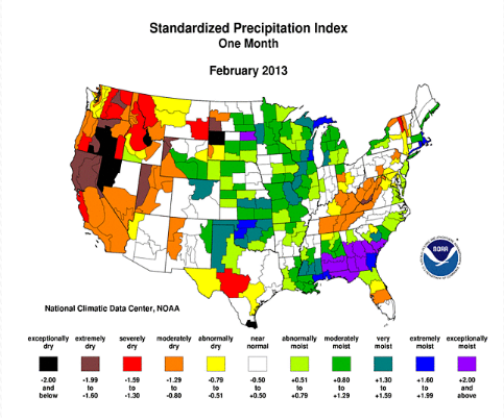
Agriculture Report

Basin Climate and Drought Condition

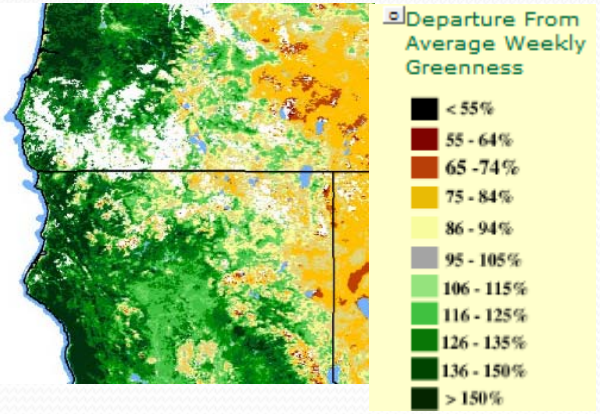
- Precipitation Pod
- Groundwater Pod
- Snow Pod
- Streamflow & Lake Level Pod
- Resource Condition Pod

Interactive Map

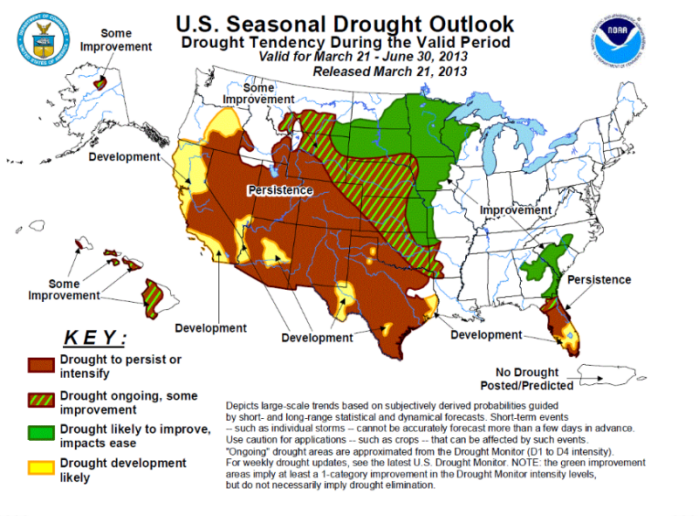
# Basin Climate and Drought

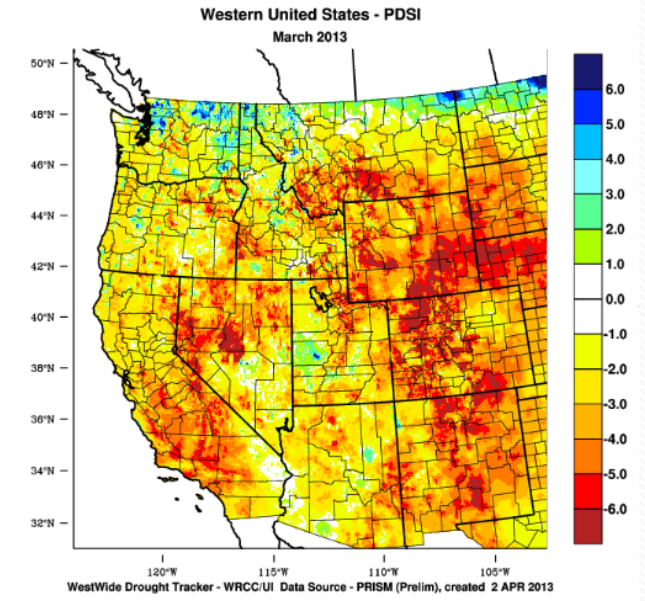



Vegetation Vigor



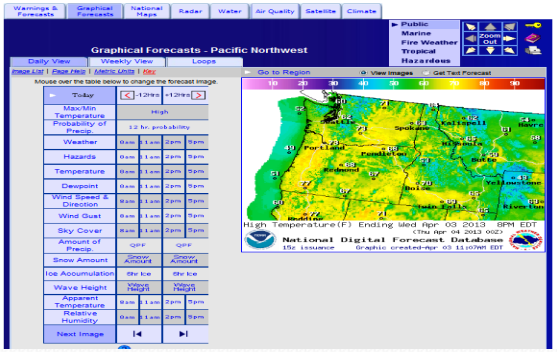

Precipitation Pod



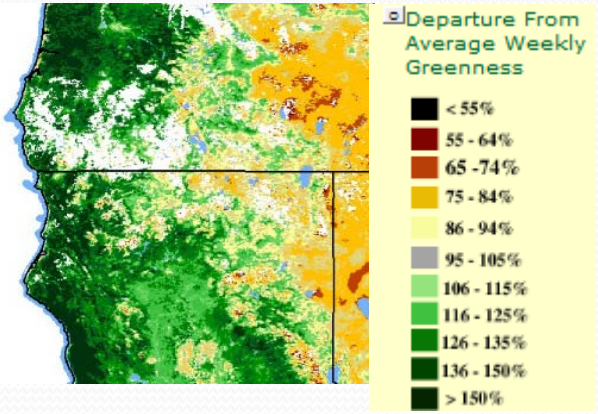



# Agriculture Report

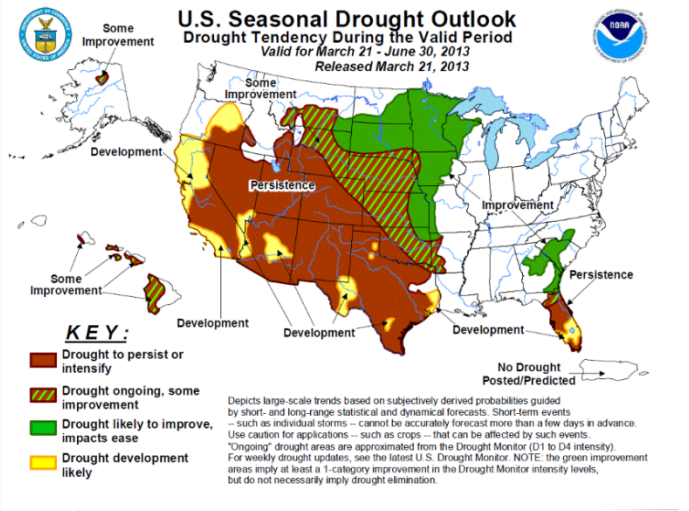
## Current Weather

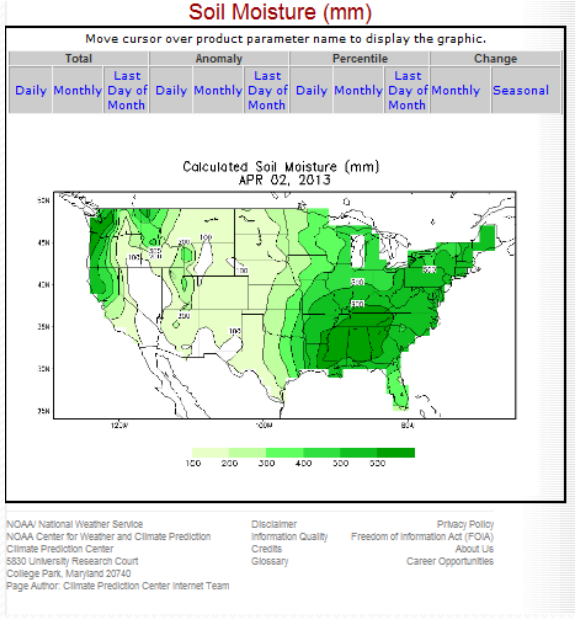



## Vegetation Vigor




## Precipitation Pod



# Need for Robust Design

# Focus Group Questions

- Did we get them right? Is anything missing or not needed?
- Proportion of needs met by having these data.

# Next Steps and Wrap Up

- Review of questions – if you had the information to answer the questions would your needs be met.
- General thoughts about how the information is being presented. Any ideas? Too complex?
- Prioritized needs – are one or two information needs priority (UKL levels?); drought condition?
- Development of written document.

# Thanks for participating.

David C. Garen, Ph.D., Hydrologist
United States Department of Agriculture
Natural Resources Conservation Service
National Water and Climate Center
1201 NE Lloyd Boulevard, Suite 802
Portland, Oregon 97232
USA

Phone: (503) 414-3021
David.Garen@por.usda.gov

Rob Hartman, Hydrologist In Charge
National Weather Service
California-Nevada River Forecast Center
3310 El Camino Avenue, Room 227
Sacramento, CA 95821-6373

Phone: (916) 979-3056
Robert.Hartman@noaa.gov

Mark R. Deutschman, Ph.D., P.E.
Houston Engineering, Inc.
Suite 130, 6901 East Fish Lake Road
Maple Grove, MN

Phone: (763) 493-4522
mdeutschman@houstongengineeringinc.com

## Agriculture Report Pod

- **Initial Display (1st click)**
  - **Point Data (on map interface with symbol) ("current state - measured")**
    - **Measured**
      - **Surface air temperature**
      - **Surface wind speed**
      - **Surface wind direction**
      - **Measured precipitation (select duration)**
      - **Streamflow**
      - **Lake and reservoir levels**
      - **Lake and reservoir storage**
    - **Forecast**
      - **Precipitation (QPF) (select duration)**
      - **Streamflow**
      - **Lake and reservoir levels**
    - **Criterion**
  - **Polygon Data (background layer in map interface) Current soil moisture condition**
    - **Soil moisture departure from normal**
    - **Vegetation vigor**
    - **Vegetation vigor departure from normal**
- **2nd Click ("Change")**
  - **Air temperature departure from normal**
  - **Precipitation departure from normal**
  - **Estimated future river flow relative to future demand**
- **3rd Click**

Functionality

- Toggle layers on and off
- Graphic layer in background, simultaneously showing a single point value in foreground. Background layers
  - QPF grid
  - Isohyetal values
- Point layers
  - Measured precipitation
  - Subwatershed area-weighted total depth
  - Subwatershed area-weighted volume
- Clickable to detailed time series

## Snow Product Concept Design

**Data**

- **Current (modeled) snow water equivalent (SWE)**
- **Current (modeled) snow depth (DEPTH)**
- **Current measured snow point SWE**
- **Current measured snow point depth**
- **Point precipitation values values displayed using changeable graphic**
  - **Zoomed out - current condition simple circle**
  - **Zoomed in - Mark's new design design**

Functionality

- Toggle layers on and off
- Graphic layer in background, simultaneously showing a single point value in foreground. Background layers
  - QPF grid
  - Isohyetal values
- Point layers
  - Measured precipitation
  - Subwatershed area-weighted total depth
  - Subwatershed area-weighted volume
- Clickable to detailed time series