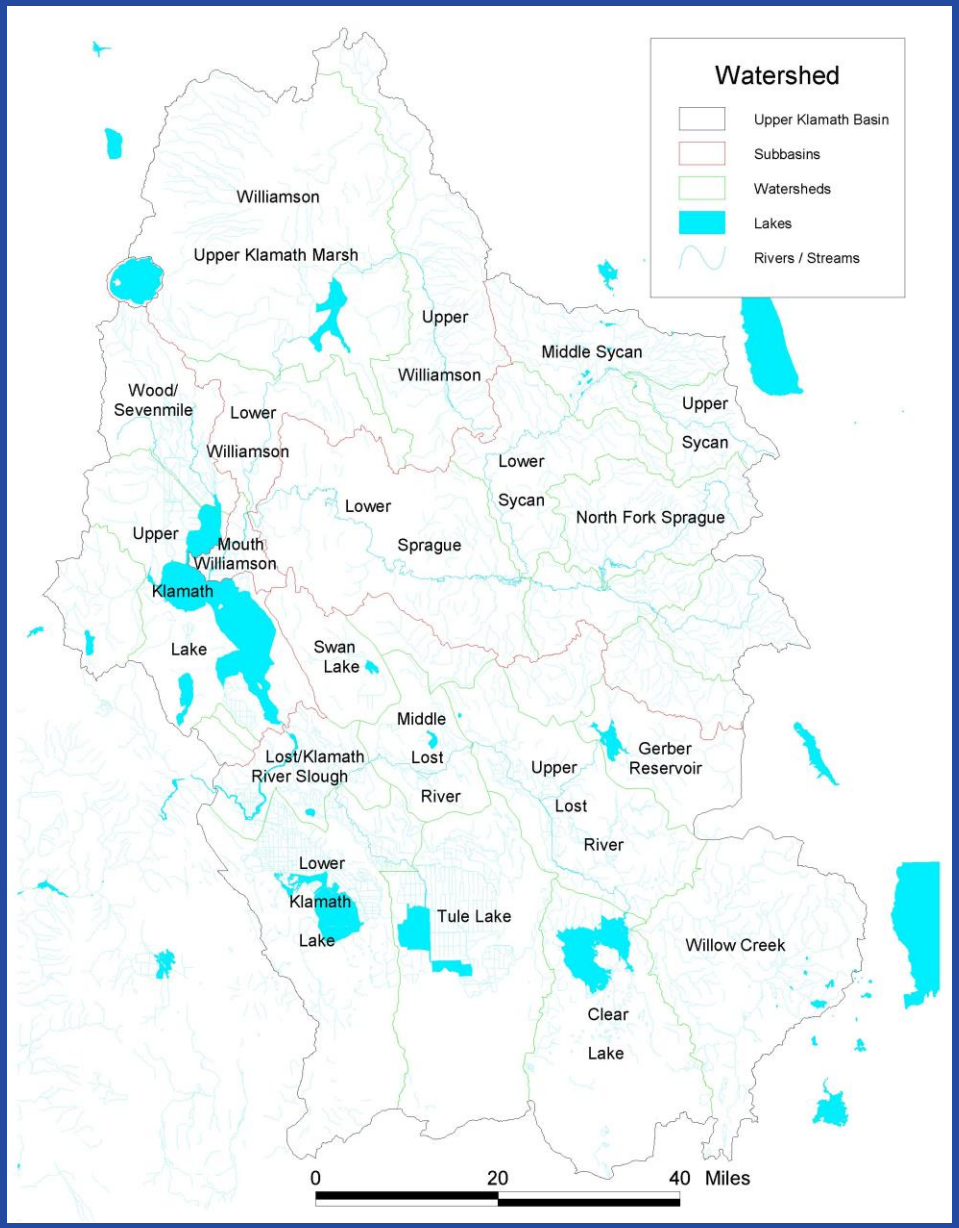
RECLAMATION
Managing Water in the West

Overview of the 2018 Proposed Action for operations of the Klamath Project

June 20, 2019

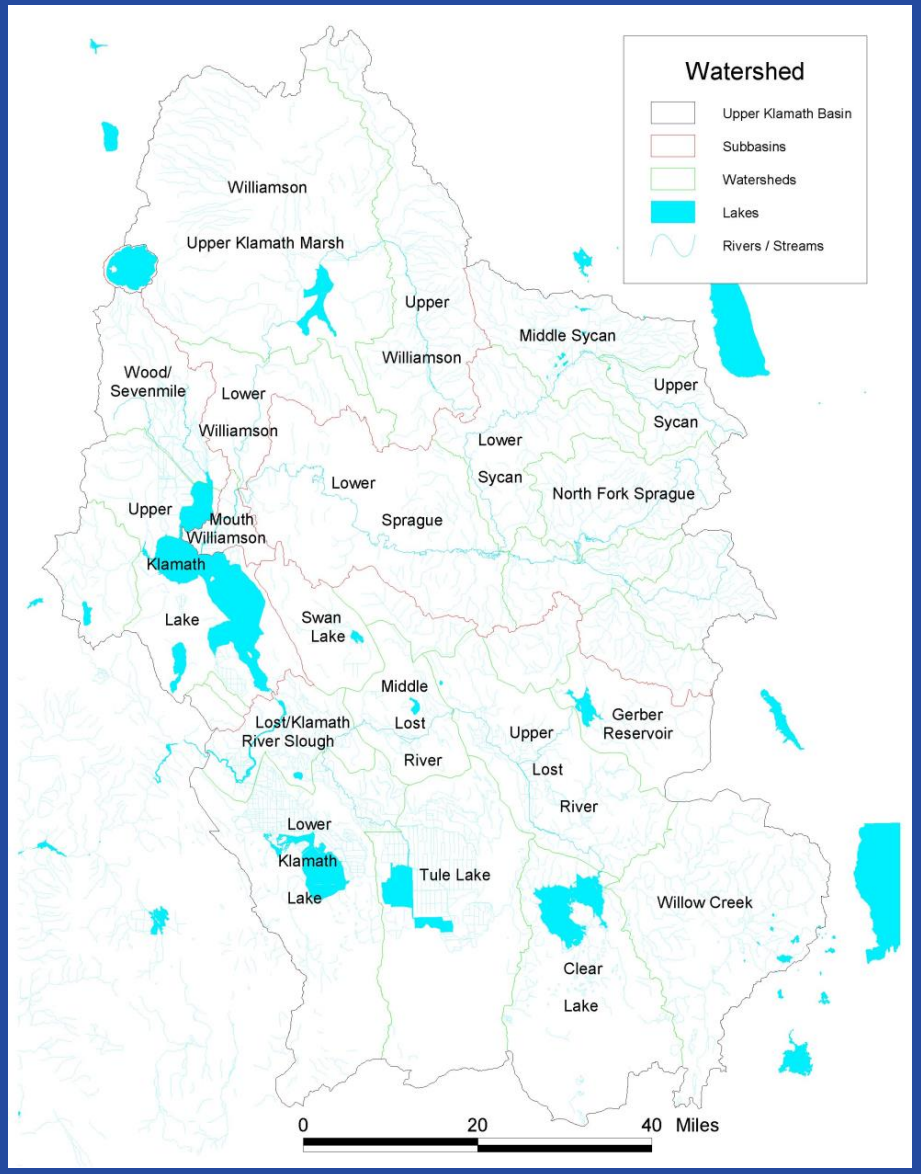
Upper Klamath Basin

- Watershed above Keno Dam
- Upper Klamath Lake is the major hydrologic feature of the Upper Basin
  - Surface area = 100 square miles, 62,000 acres
  - Maximum depth = 15 m (50 ft), mean depth = 4.2 meters (14 ft)
  - Hypereutrophic
  - Major tributaries include the Wood and Williamson rivers, smaller tributaries from the Cascade foothills
  - Outflow is the Link River



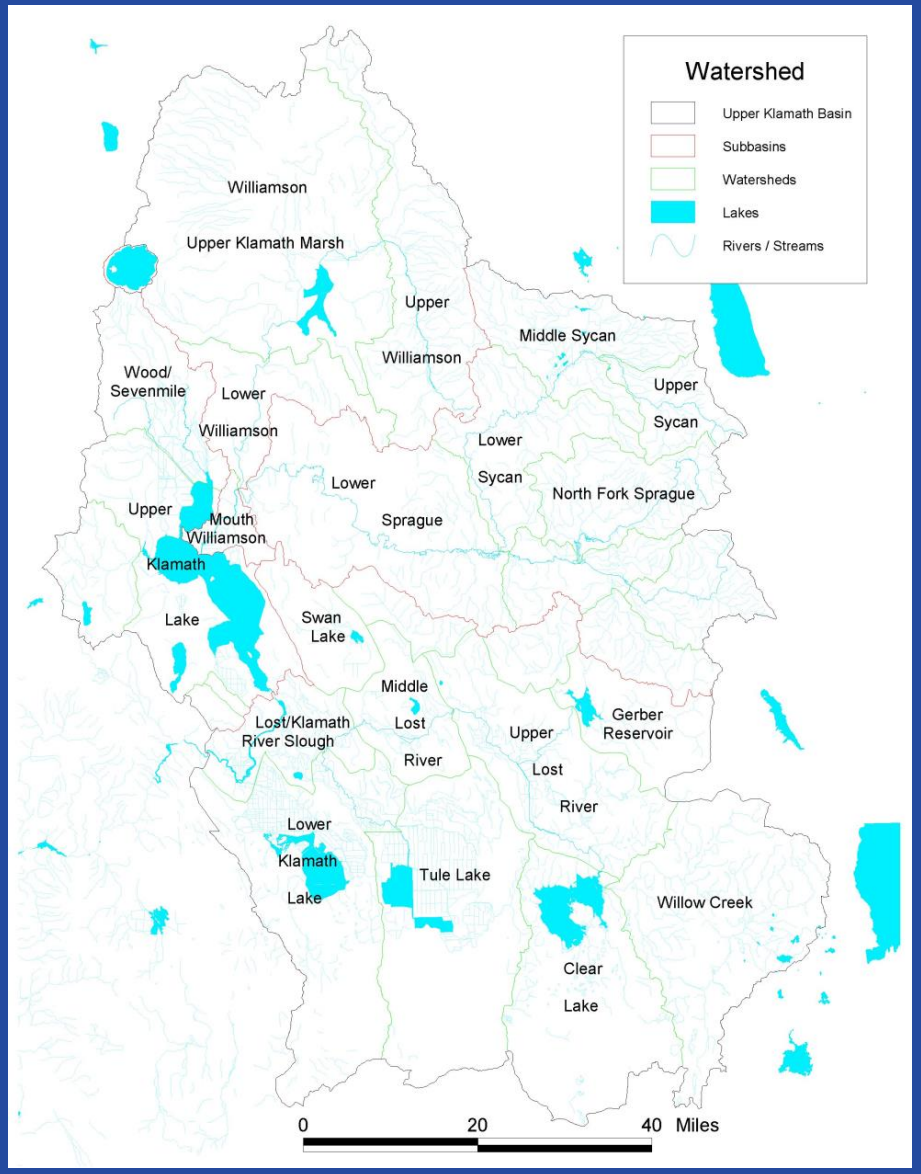
Upper Klamath Basin

- Lake Ewauna/Keno Impoundment
  - Water surface elevation managed within narrow range, similar to pre-development, to support irrigation diversions and wetlands
  - Inflows include numerous drains/channels associated with agricultural activities



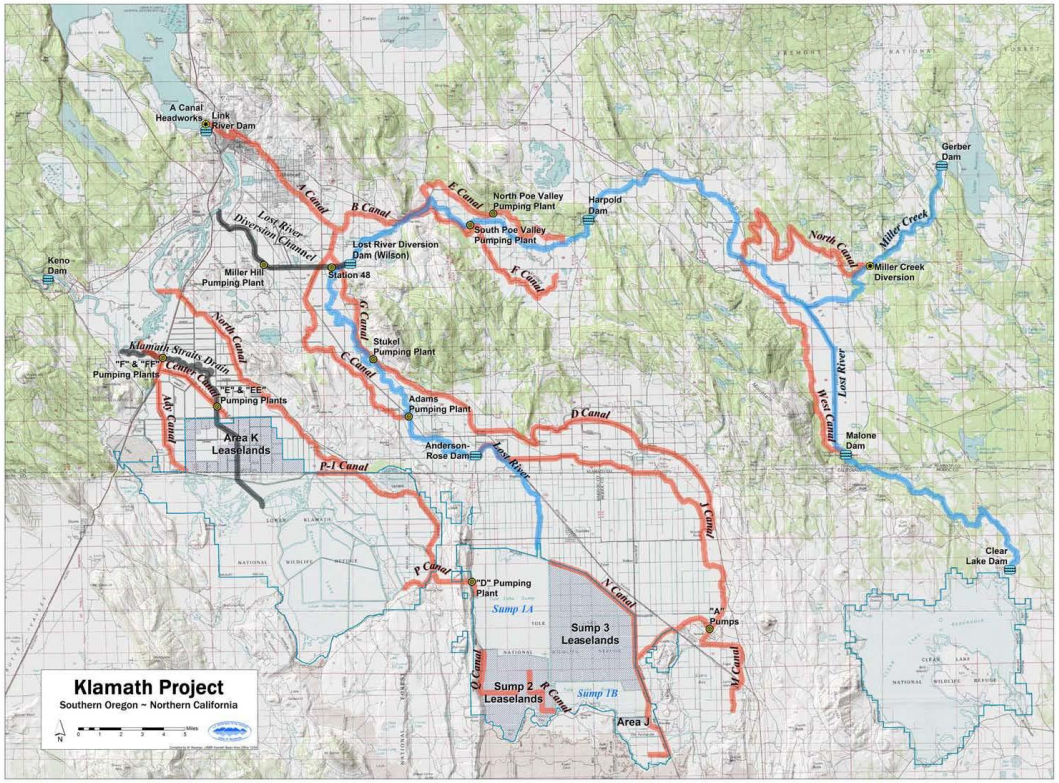
Upper Klamath Basin

- Lost River
  - Headwaters in Clear Lake Reservoir
  - Historically terminated in Tule Lake, with occasional hydrologic connection to the Klamath River via the Lost River Slough
  - Outside of irrigation season, Lost River predominantly flows to the Klamath River via the Lost River Diversion Channel, but some flow continues to the Tule Lake area during periods of high flow



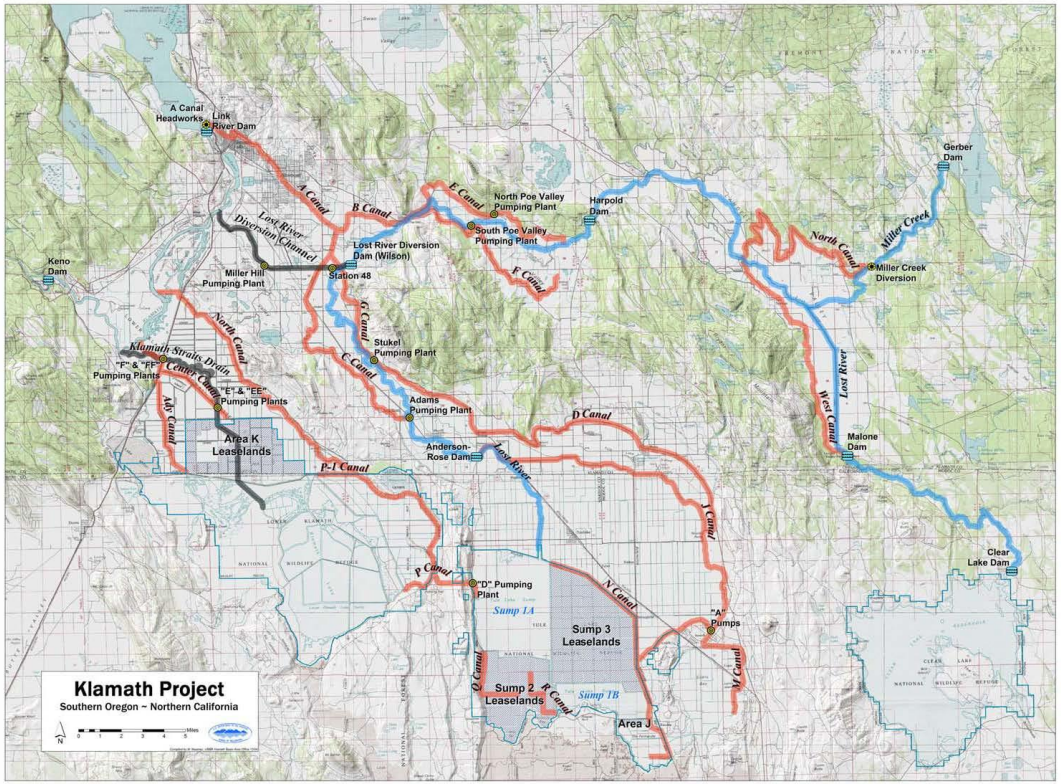
Klamath Project

- Authorized in 1905 to provide water for irrigation, domestic, and related purposes
- 230,000 acres of irrigable acreage
- Principal crops include potatoes, alfalfa hay, pasture, wheat, and barley
- Historical average Project irrigation season demand was ~400 TAF



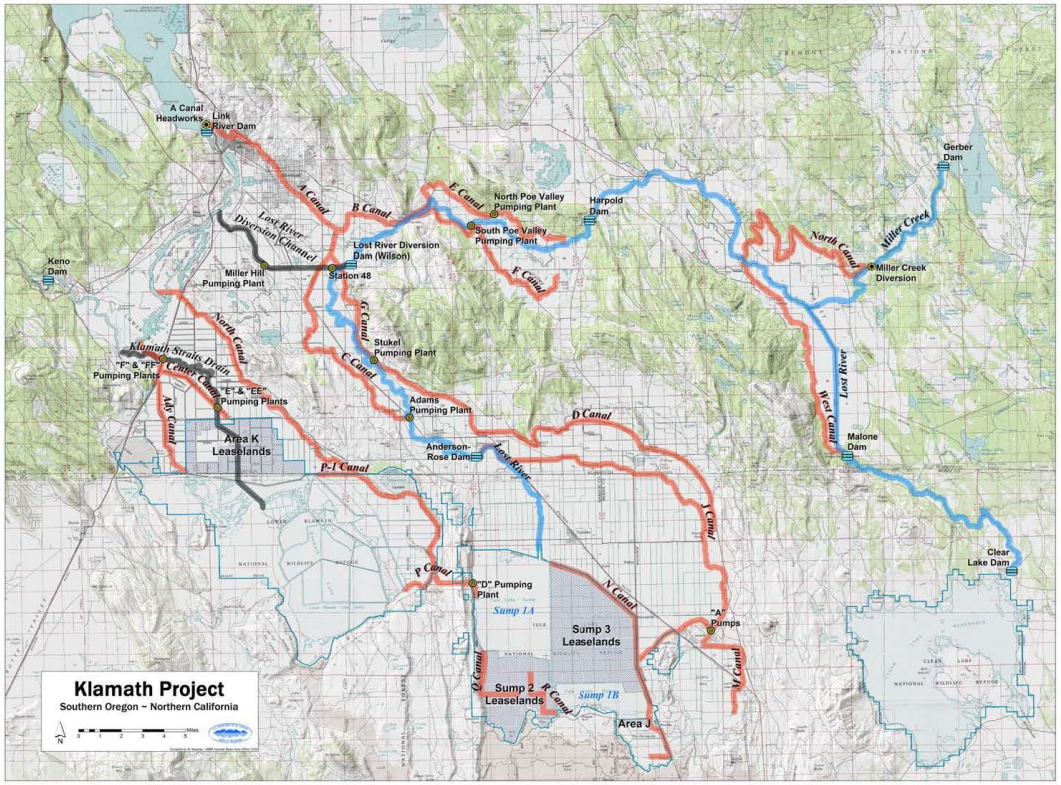
Klamath Project

- Major Reclamation-owned facilities include A Canal, Link River Dam, Lost River Diversion Channel, the Klamath Straits Drain, and Ady Canal
    - North Canal is not owned or operated by Reclamation, but is an important diversion and conveyance canal



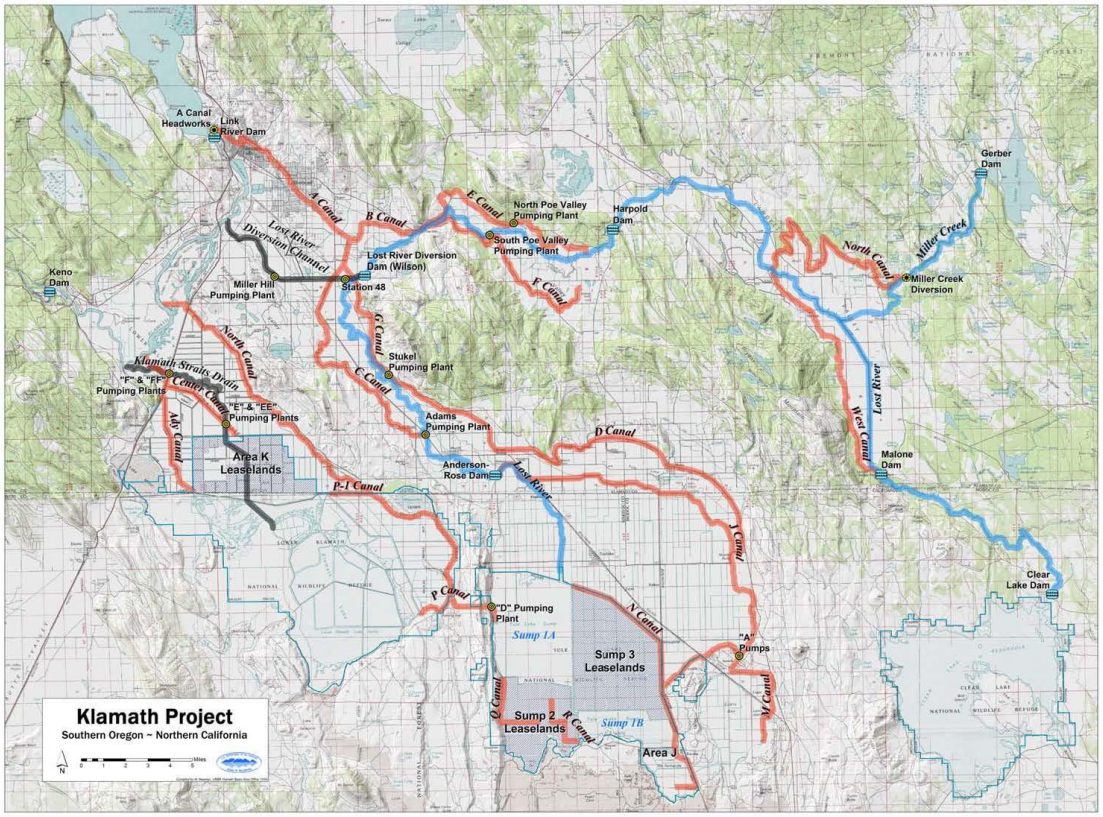
Klamath Project

- The Project is often divided into two segments for operations: the east side and the west side
  - East side is the area of the Project east of Harpold Dam
  - West side is the area of the Project west of Harpold Dam



Klamath Project

- Includes Lower Klamath National Wildlife Refuge
  - In each year, approximately 10,000 acres in LKNWR are used for production of grains, hay, and for grazing (the 5,500 acres in Oregon referred to as Area K)



2018 Proposed Action

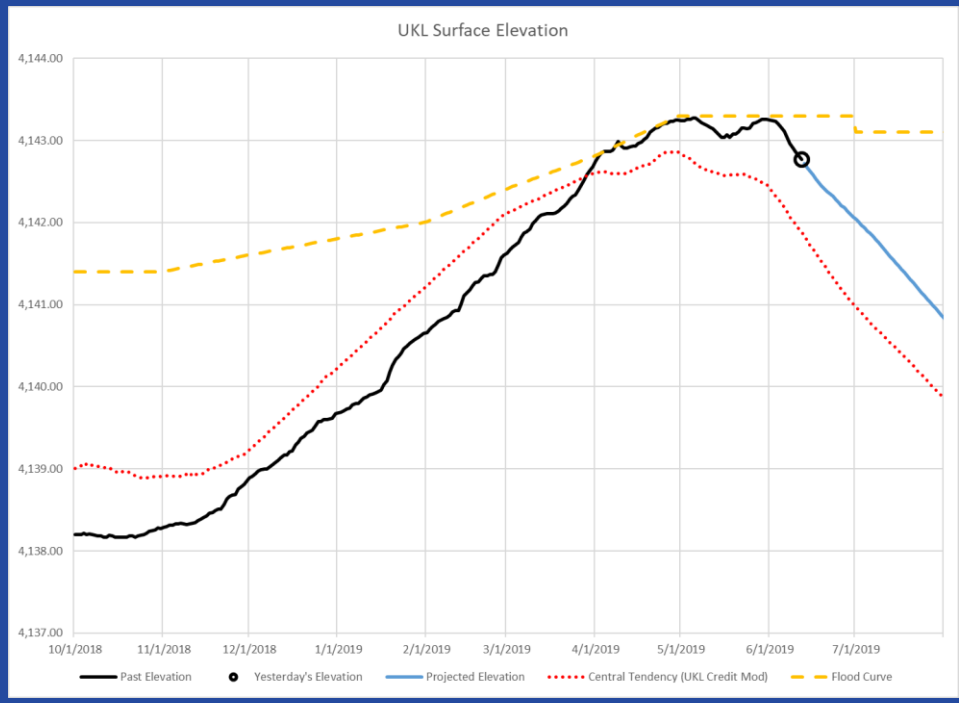
- Modelling approach
  - WRIMS water balance model
  - Utilized a period of record from water year 1981 – 2016
    - Used observed conditions (UKL inflows, Lost River Q, accretions Q, water supply forecasts, meteorological data, etc.) overlaid with proposed operations for UKL, Iron Gate Dam, and the Project
  - Model did not include east side Project operations, but rather just observed Lost River Q (i.e., outflow from the east side)

2018 Proposed Action

- Overview
  - Spring/summer operational period
    - Mar 1 – Sept 30 for Klamath River, Mar 1 – Nov 30 for Area A1, Mar 1 – Oct 31 for Area A2
    - Determine UKL Supply and distribute between Project Supply and the Environmental Water Account
  - Fall/winter operational period
    - Oct 1 – Feb 28/29 for Klamath River, Nov 1 – Feb 28/29 for Project
    - Employ a “formulaic” approach to Iron Gate Dam releases to meet Coho needs
    - Provide fall/winter water deliveries to the Project and LKNWR
    - Increase storage in UKL

2018 Proposed Action

- Overview continued
  - UKL control logic
    - Results in a central tendency line that adjusts up or down on a daily time step based on smoothed UKL inflow
    - Manages UKL elevations for suckers while ensuring adequate storage for both the river and the Project
    - Can result in reductions in daily river flow targets in both operational periods, and Project deliveries in the fall/winter period
    - Central tendency line is not a management target
  - Flood control operations
    - Reclamation operates UKL to a flood control curve adjusted to hydrologic year type (wet vs. dry, based on first NRCS inflow forecast in early January)



2018 Proposed Action

- Spring/summer ops
  - UKL Supply
    - Calculated early each month from March – June
    - Sum of March – Sept UKL inflow and end of February UKL storage, minus the end of September UKL storage target
    - UKL Supply is then divided between Project Supply and EWA
  - Project Supply
    - Updated with each new UKL Supply calculation
    - “Locked in” on April 1
    - Maximum Project Supply is 350,000 AF
    - In addition to Project Supply, the Project may also utilize LRDC and return flows from Klamath Straits Drain
    - LKNWR can receive a portion of Project Supply, but details of this operation are still in development

2018 Proposed Action

- Spring/summer ops continued
  - UKL Credit
    - If Project irrigators do not use portion of LRDC and/or KSD, no flood ops, and there's a resulting reduction in Link River Dam releases, UKL Credit accrues
    - Meant to protect UKL elevations against forecast decrease after April 1 lock-in
  - EWA
    - Updated with each new UKL Supply calculation
    - An Iron Gate Dam "flow target" is calculated for each day
      - From March 1 – June 30, based on EWA allocation, UKL control logic, smoothed UKL inflow, NRCS inflow forecast, forecast error, accretions, and whether or not there's been an under or over release of EWA in previous days
      - From July 1 – Sept 30, based on remaining EWA, the UKL control logic, and accretions
      - Iron Gate Dam minimums and ramp rates override target calculations
    - EWA can be "redistributed" through the FASTA Team process
    - Minimum EWA is 400,000 AF (407,000 AF in even years)
    - Flood control releases count against EWA

2018 Proposed Action

- Spring/summer ops continued
  - Surface flushing flows
    - 6,030 cfs for 72 hrs
    - Forced between March 1 and April 15 when March 1 or April EWA allocation is ≤ 576,000 AF
    - When EWA is > 576,000 AF, flow will be implemented opportunistically when certain criteria are met
    - Deep flushing flows (e.g., 11,250 cfs) are possible when hydrologic conditions, public safety allow
  - Enhanced May/June flows
    - If April 1 EWA allocation is ≤ 576,000 AF, an additional 20,000 AF is added to daily targets in May and June
  - UKL Credit
    - If Project irrigators do not use portion of LRDC and/or KSD, no flood ops, and there's a resulting reduction in Link River Dam releases, UKL Credit accrues
    - Meant to protect UKL elevations against forecast decrease after April 1 lock-in

2018 Proposed Action

- Fall/winter ops
  - Iron Gate Dam releases
    - An Iron Gate Dam “target” is calculated for each day based on smoothed UKL inflow, a variable that ensures UKL refill, accretions, and the UKL control logic
    - Iron Gate Dam minimums and ramp rates override target calculations
  - Fall/winter Project deliveries
    - Up to 28,910 AF to Klamath Drainage District
    - Up to 11,000 AF to LKNWR
    - Can be reduced if UKL elevation drops below the central tendency line

Questions or comments?