

DWR Implementation Plan

From Permits to Execution



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What is going on in DWR

- Hydrology Flood Operation (HFO) Office
- Re – Organization
 - Hydrology Branch
 - Res-Ops (Now Emergency Operations Decision Support Branch)
 - Snow Surveys
 - River Forecasting
 - Statewide Monitoring Network (New)





Statewide Monitoring Network

- Solely focus on the weather stations and professional data acquisition methods.
- Created to focus on process improvement and variation reduction.
- Advance and set new bar for continued maintenance and operations.
- Create an implementation plan for installing gages



Planning – Three Phase

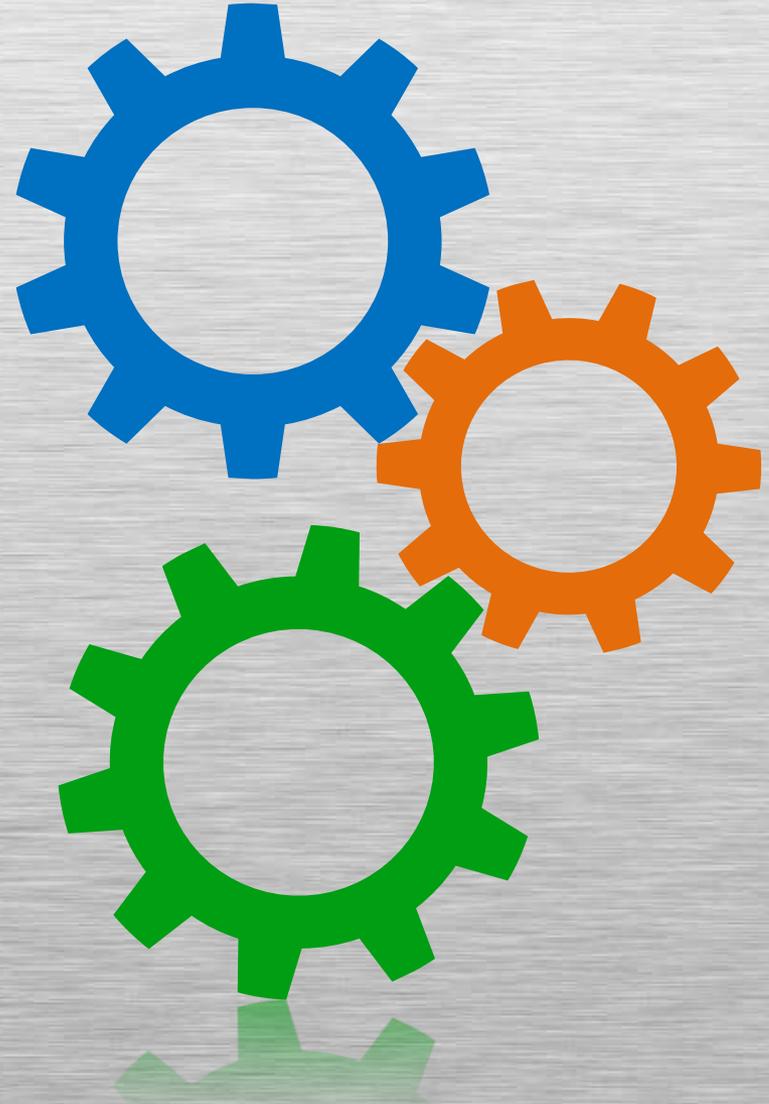
A Three Phase Planning Process

OBJECTIVE: Design New Modern Weather Stations to meet the growing needs of Water Resources Decisions.

Phase 1: Proof of Concept

Phase 2: Permits

Phase 3: Structure Installation





Each Phases Role

Driving force

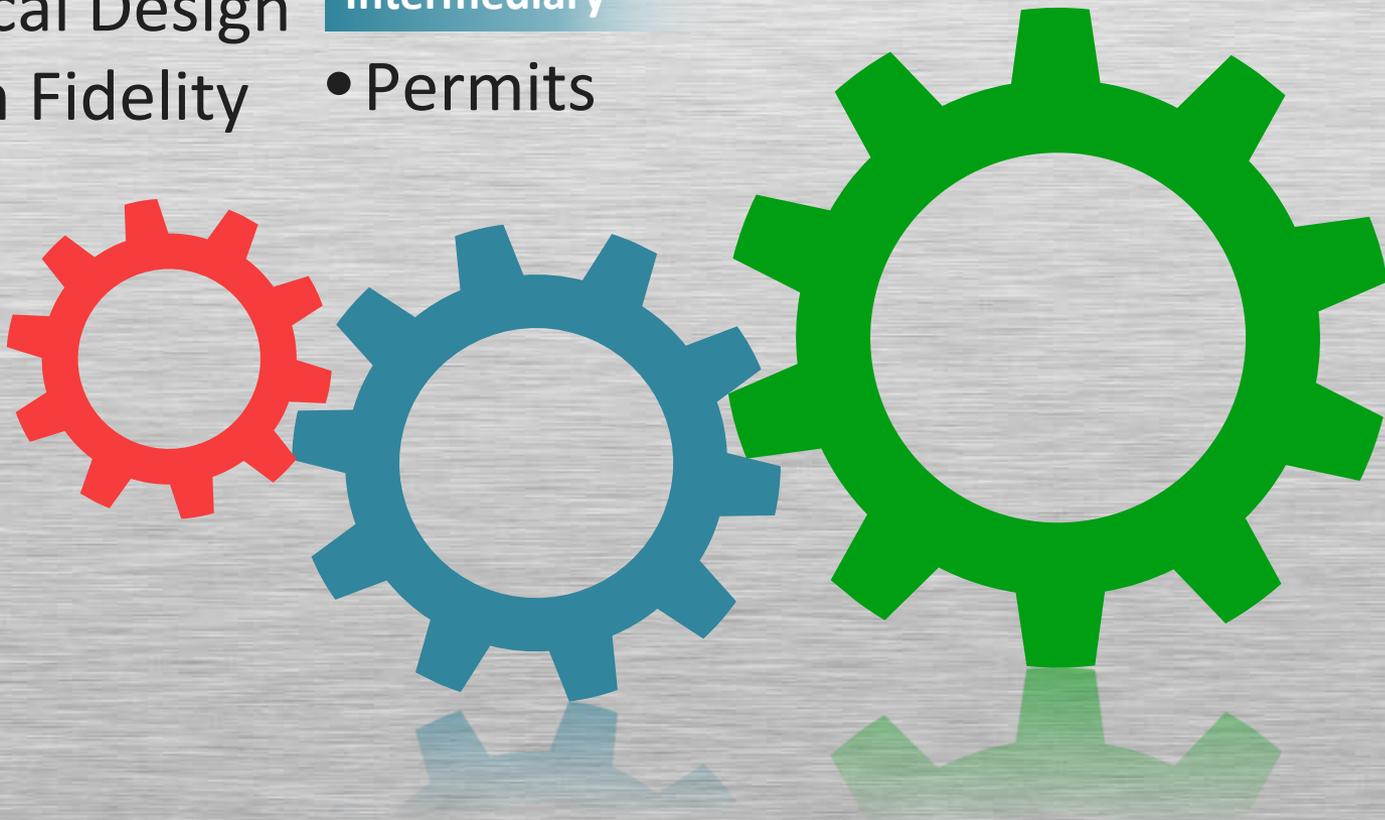
- Electrical Design
- Station Fidelity

Intermediary

- Permits

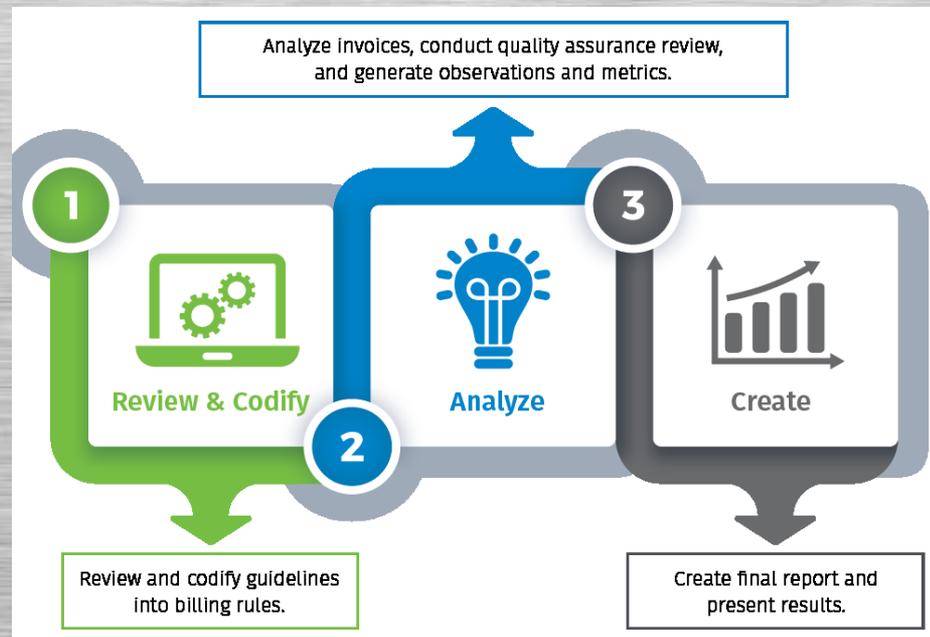
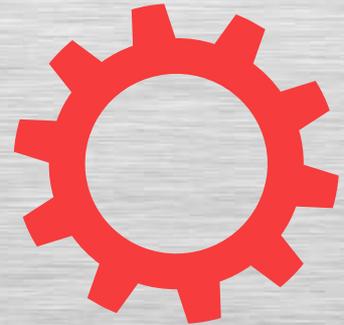
Success

- Structural Installation



Phase 1 – Proof of Concept

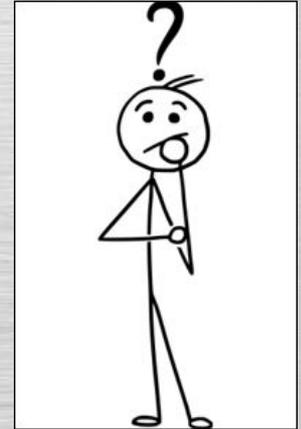
- Snow Surveys sites
- Cooperators Approval
- Install One Station – Pilot Station





Phase 1 Continued

- Electrical Design
 - Sensor Agnostic
 - Information Based
 - Multiple Vendors – What are my options?
 - Multiple Agencies – Who is using what and why?
 - NRCS, USGS, NWCG, PGE, SCE, SMUD, LADWP, USFS, NPS, EID, TID, MID, NID, DES, CIMIS, NREL, NASA/JPL, ARS, and ESAC.
 - Needs to meet needs for current water resource methods/procedures as well as upcoming advancements
 - Lifecycle /Calibration/Harsh Environment Sustainability



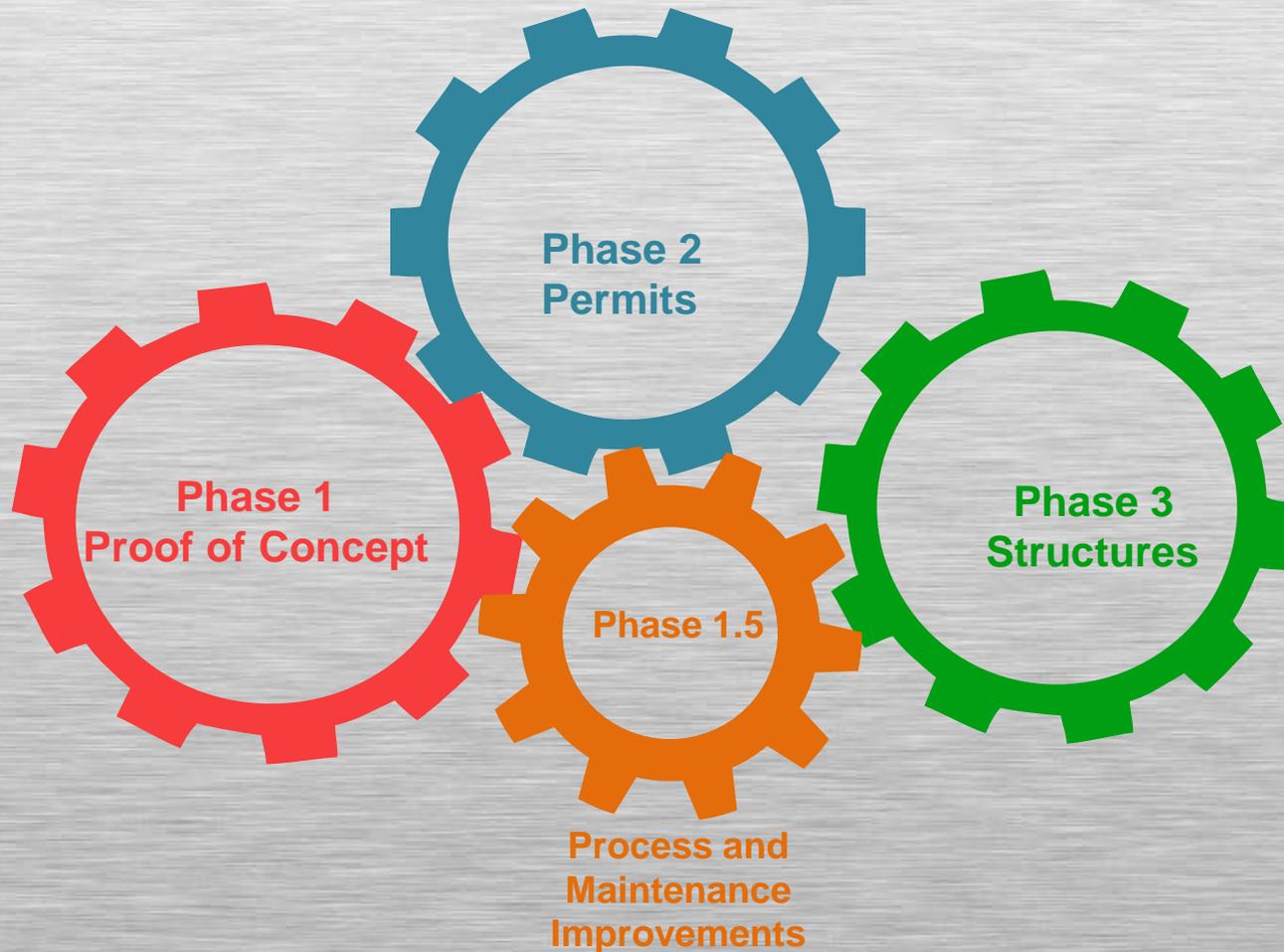


Phase 1 – Complete (HHM) 2016





Another Piece – Phase 1.5



Phase 1.5

Process and Maintenance Improvements



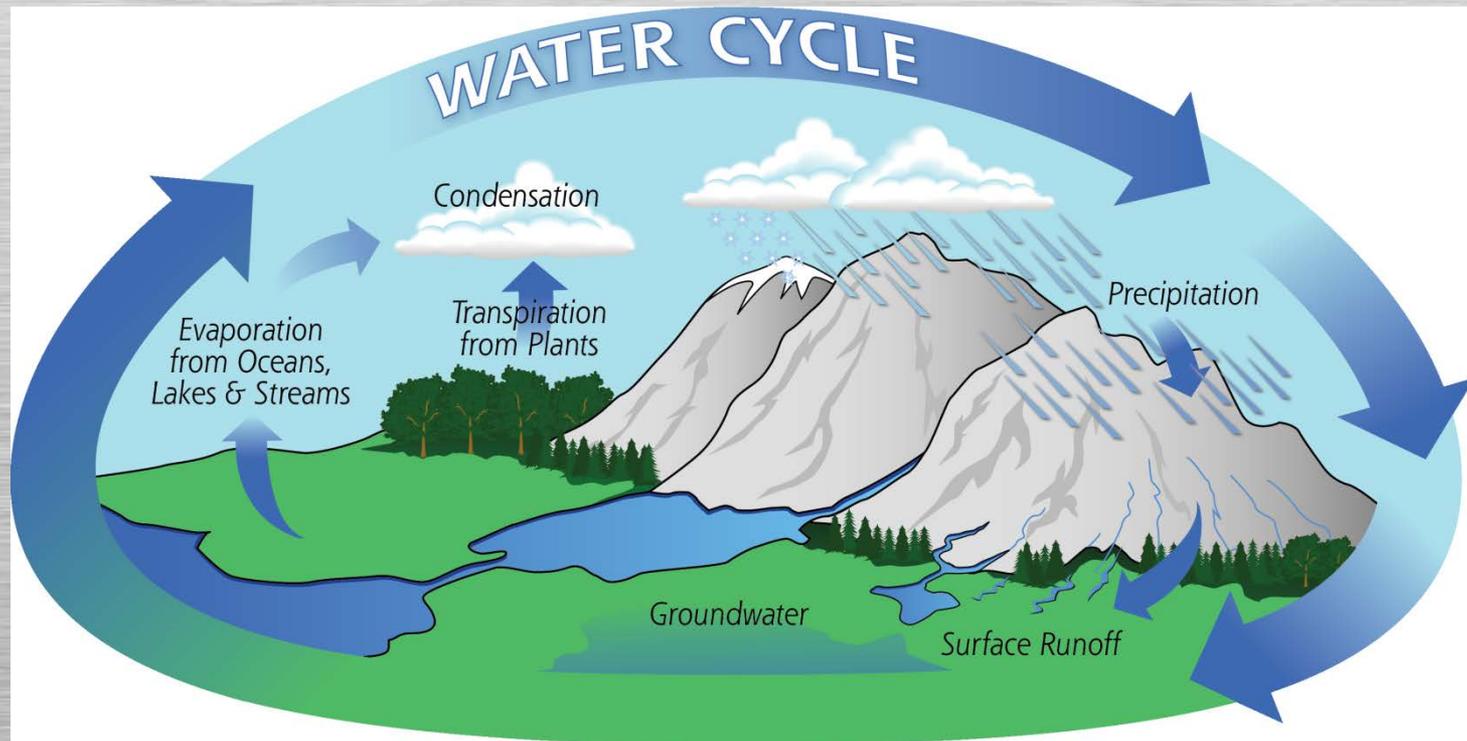
Process and
Maintenance
Improvements

- Step Back
 - Objectives
 - (What Is The End Goal)
 - Results
 - What Information can be learned to not repeat past mistakes?
 - What feedback is clearly present?
 - Execution Plan
 - (Stick to a plan, execute and create baseline for metrics)



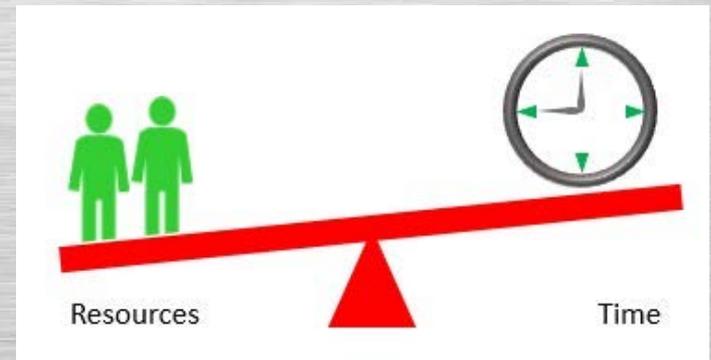
Phase 1.5

- **OBJECTIVE:** Design New Modern Weather Stations to meet the growing needs of Water Resources Decisions.



Phase 1.5 – Results

- **Results** – What information was gathered during work to design around?
 - Limited Reliability
 - Difficult Data to work with
 - Limited Work Force
 - Station Variability
 - Creates Higher Risk of Maintenance Failure
 - Unsafe Structures
 - Wilderness Impact and Wilderness Character
 - Backcountry Logistics and time
 - Diverse Data Uses (Common Key Use = Hydrology)



Phase 1.5 - Execution

- Execution Problems:
 - State Procurement Process – 3 to 4 stations per year (21 Year Deployment for 87 stations)
 - Low Production and Sustainability
 - No Quality Assurance
 - Access/Logistics
 - Low Work Force
 - Structures/Permits





Phase 1.5 – Execution Continued

- Execution Solutions:
 - Procurement Solution: Mass Procurement
 - Pro's – More equipment in Stock for Installation (Currently 30 stations)
 - Con's – Lots of Paperwork 10month Turn Around Time, pushed back project timeline.





Phase 1.5 – Execution Continued

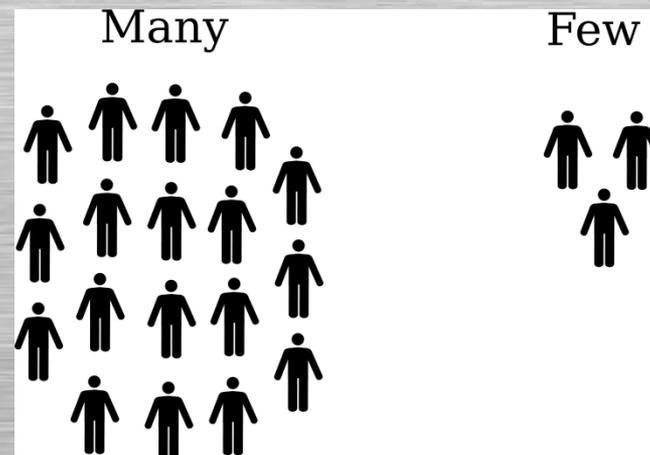
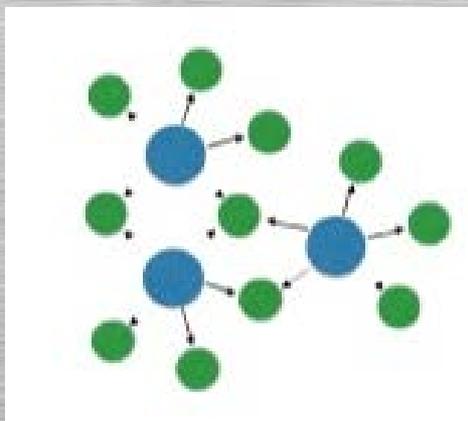
- Production and Sustainability Solution:
 - Create Assembly, Installation and Quality Control Instructions.
- Access/Logistics Solution:
 - Increase foot travel, decrease needs for horses except large maintenance needs every few years.





Phase 1.5 – Execution Continued

- Low Work Force Solution:
 - Share the load with California Cooperative Snow Surveys Program or Third Party.
 - Create Software
 - Easy To use, simple training, increase qualified people.
 - Limit Climbing/Specialized Training
 - Few Turn into Many





Phase 1.5 – Execution Continued

- Structures/Permits Solution
 - Install New Sensors on sites that are safe
 - Complete permits and add structures to worst sites first
If possible.



Phase 1.5 – Execution Continued

- Proposed Outcome:
 - Improve maintenance process and variation reduction
 - Create Baseline Stations
 - Operational
 - Research/Science Communities
 - Station Fidelity
 - Create Critical Gage List
 - Advancements in model accuracy and forecasting



Phase 2 – Permits

Current Phase

- Objective: Create a streamline process for mass permitting.
 - Delivery of document
 - Easy Communication between USFS and DWR
 - Accepted Method across all USFS.
 - Solution: Master Permit
 - One Permit per forest
 - GPS Location of station
 - Actionable Items (Structures, Soil Moisture Probes..etc)
 - Scope of work per station
 - Maintenance SOP included

Phase 2 – Permits Continued

- How it works

- Forest/NPS

- Receives Permit
 - Cross References with current documentation to check for Compliance:
 - Cultural
 - Archeological
 - Aquatic Species
 - NEPA/CEQA
 - Returns to DWR with Compliance Feedback
 - DWR creates compliance scope and execution plan.
 - Install at stations that are up to date and approved first.





Phase 3 - Structures





Phase 3 - Structures and Safety

- Poles and Ladders
- Moment Arms
- Depth over Pillow
 - External Pressure
- DWR fabricating collapsible pole for depth.
- Looking into other options.





Phase 3 – Structure and Safety continued

- Multiple Agency Use
- Harness Types
- Safety Liability
- DWR Safety Standards





Structure Choices – Pros/Cons

Rohn Tower – Training Required



Glen Martin – No Fall Training Needed





Structure Choices – Pros/Cons continued

Hinged Pole – DRI Design



Ski Lift Pylon – Mammoth Mountain





Structure Choices - Continued

Mammoth Mountain Sesame





Structure Choices – Pros/Cons continued

Tower with Rails/Platform

- Raise/Lower instrument platform on Rohn Tower
- Design in House
- Outsource Building

Platform Type





Phase 3 – Structures Continued

- Permits are completed:
 - All parties are in agreement, including DWR Safety
- Ideal Start Date summer 2019
- Realistic Start Date 2020
- Structures will be installed by 3rd party
- Instruments will be taken down from old structure, held onsite and re-installed.
 - Fast turn around time, limited data down time



What's Next and the Big Picture

- Funding and Grants
 - FCO
 - SGMA
- CCSS Round Table for Weather Stations
 - problems, solutions
 - instrumentation/sensor installation and coding.
 - Share what each agency is doing.
- Bi – Annual Report to Cooperators?



What is DWR Doing right now?





More Storage



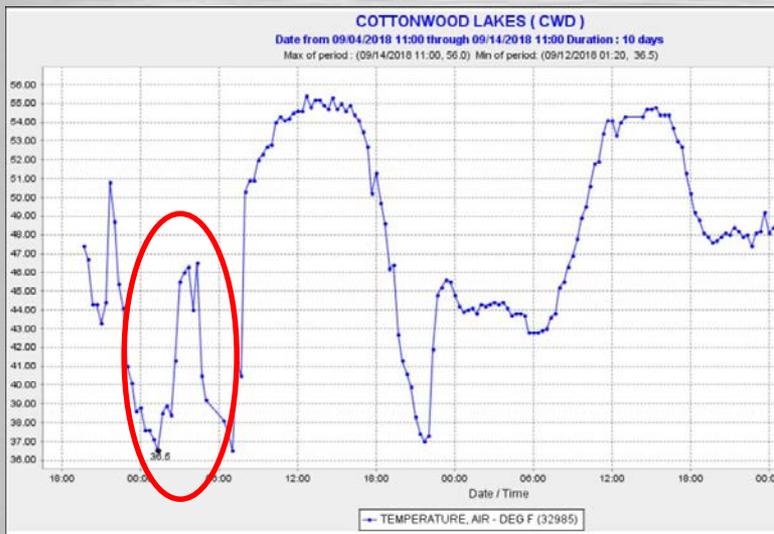
Weather Station Stocking



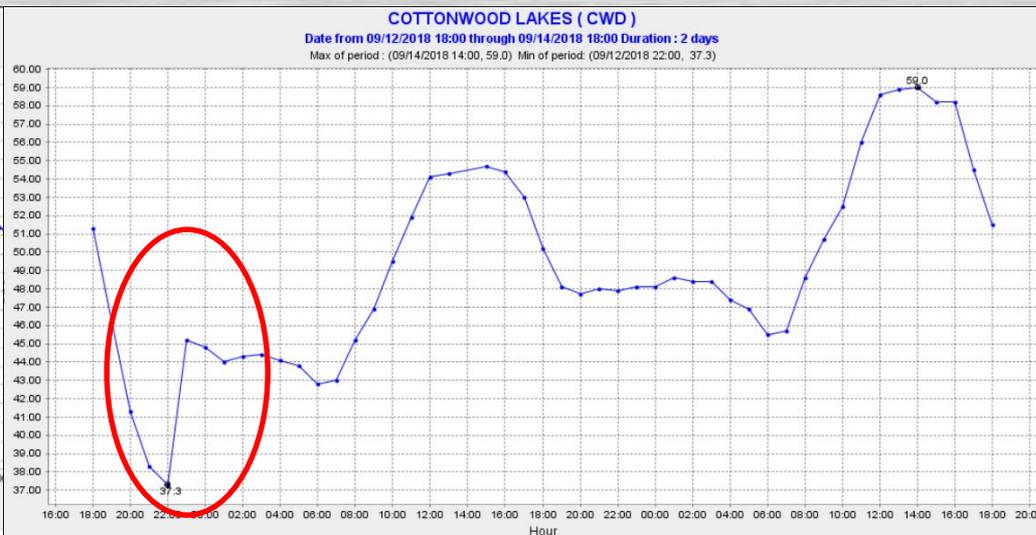


Statistical Anomalies – Outer Innies

CWD 20 Min Data



CWD Hourly Data





Station Data and Communication

- QA/QC
 - Station can have active equipment that is inaccurate.
 - Station can have equipment that looks different but is accurate.
 - End User Information

➔ Telemetry Sites Status

Legend:
● Station is 100% working.
● One or more items is uncalibrated or broken or needing repair – however the primary sensors are still in tact.
● Station failure, or primary sensor failure.

Sort Filter

Site ID	Site Name	Status	Notes	Last Visit
ADR	AUBURN DAM RIDGE	●		12/16/2016
AGP	AGNEW PASS	●	visited 7/25/18 - Brush at 2ft in meadow. Pillows intact, bear broke net. Will replace and upgrade in 2019.	07/25/2018
ALY	ALLEGHENY	●		02/09/2018
ANG	ANGWIN	●		11/09/2016
ARC	AARCATA	●	Temp bad	02/07/2018
ATL	ATLAS PEAK	●		03/19/2014
BCB	BLACKCAP BASIN	●	Visited Station with PGE, replaced Battery. Station works but not transmitting due to poor cable and old DCP. 2018 upgrade.	01/30/2018
BCC	BLACK CREEK NR. COPPERPOLIS	●		06/09/2010
BCH	BEACH MEADOWS	●	Precip was Reset 5/30/2018	05/30/2018
BDM	BALD MOUNTAIN	●		01/10/2018
BFL	BIG FLAT	●		08/10/2017
BGP	BIG PINE CREEK 3	●	Replaced SWE Pressure Transducer 8/15/17	08/15/2017
BGV	BRIDGEVILLE PRECIP	●		02/15/2018
BIM	BIG MEADOWS	●	Visited: 9/5/18 - Erected Temporary structure. Installed FSP5 Snow Scale, Temp/RH, and Laser Depth Sensor	09/05/2018
BLA	BLACKS MOUNTAIN	●		11/01/2017
BLC	BLUE CANYON	●	DCP failure	05/30/2018



Questions?

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