

# EWS Newsletter

*Early Warning System Program  
News and Announcements*

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EWS Camera Installation

## Early Warning System Program Adopts Webcam Technology

In this issue of the Early Warning System (EWS) Newsletter, several topics will be covered: the new camera installations, latest equipment upgrades, new system installations, EWS Training Workshop, and planned work for next year.

Some of the most exciting news is the integration of webcam technology with the EWS. Webcams allow dam tenders and operators to remotely monitor dams.

As the national EWS program continues to expand with new installs, better technology and more training, we hope this newsletter will help to keep users more informed of current activities and exciting future plans!

# Webcam Rollout

Seven cameras were installed to monitor dams on Tribal lands this year. These cameras take images of a dam every five to fifteen minutes, and transmit the images to the EWS website using either local Wi-Fi or Verizon's cellular data network. Some example images are shown to the right.

The cameras are off-grid and powered by batteries. These batteries are recharged by a solar panel during the day. The cameras have Pan-Tilt-Zoom (PTZ) lenses, and Infrared (IR) technology for viewing images taken at night.

All images taken from the camera are stored and accessible on the EWS camera website. Timelapse videos of the images at a dam are automatically created in two formats: a daily timelapse that is stored for 60 days, and an ongoing historical snapshot timelapse of every day at a specific timestamp for the lifetime of the camera.



*Real-time camera images are sent over Verizon Wireless Cellular data via a LTE Wireless Gateway to be displayed in the EWS*

Public webcams can also be integrated with the EWS website. Images and timelapse videos from these cameras are stored and accessed on the EWS camera website.

Webcams can help dam tenders and operators remotely verify conditions at Bureau of Indian Affairs (BIA) Safety of Dams (SOD) Program dams. The EWS team hopes to continue expanding the number of cameras installed across the BIA dam inventory.



Pushmataha Dam



Elgo Dam



Mescalero Dam



Neopit Dam



White Clay Dam



10-22-2019 Tue 11:06:01 Cow Creek Weir Building

# Site Upgrades: Two-Way Technology

In 2017, the code managing data within the datalogger was updated to have "two-way" capability. This means new configuration files can be remotely uploaded to the datalogger through the satellites. This increases a user's control over the sensors without physically visiting the site. Additionally, the sensors can be remotely queried to assess their status and functionality, allowing diagnostics and testing without traveling to remote locations.

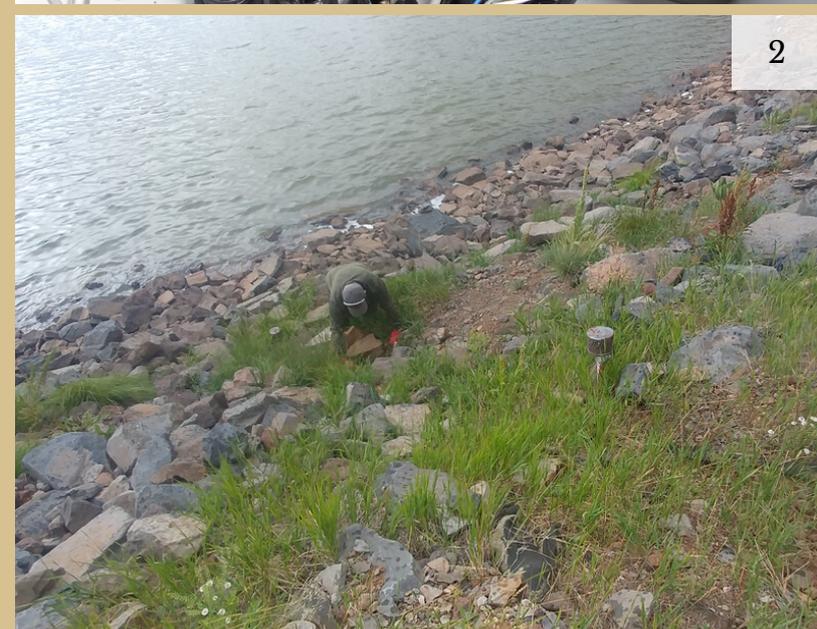
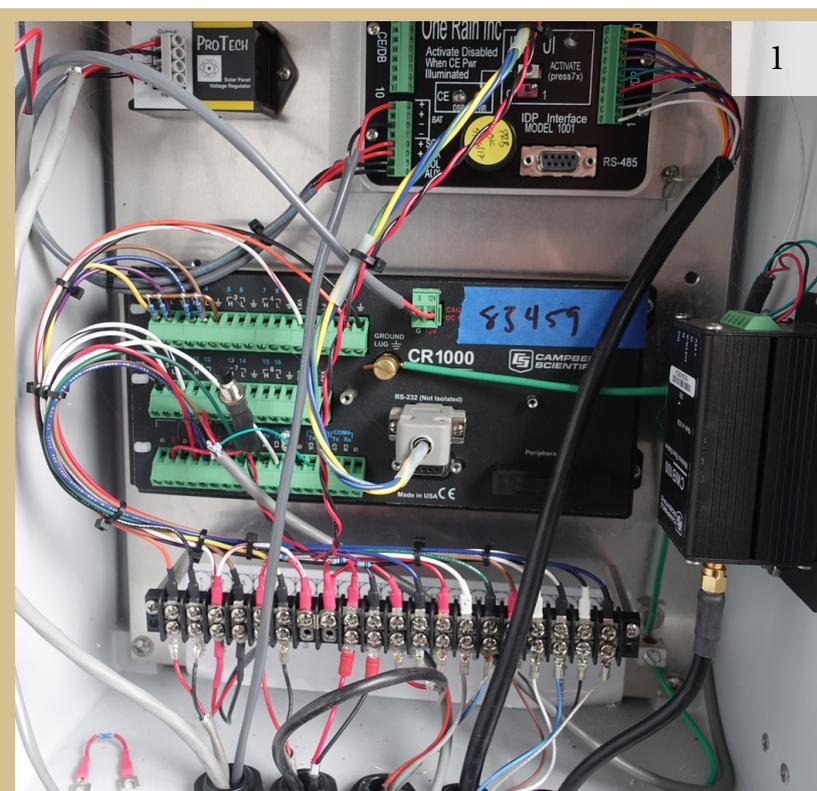
If a sensor begins to send erroneous data, the two-way technology allows the BIA to remotely log into the sensor and change how often the sensor transmits data (e.g. if a pressure transducer is in frozen water and a starts over-reporting "bad" data, we can temporarily deactivate the sensor).

If the configuration file that a user sends to the datalogger fails in any way, the datalogger reverts back to the original configuration file.

There were over 40 two-way EWS backplane upgrades in 2019, with the entire EWS planned to be switched over to the new technology within the next few years.

*Images from top to bottom, left to right:*

- 1) completed two-way datalogger installation
- 2) checking the pressure transducer functionality at a dam site
- 3) updating the datalogger software at an EWS site
- 4) checking the wire connections and batteries at an EWS site



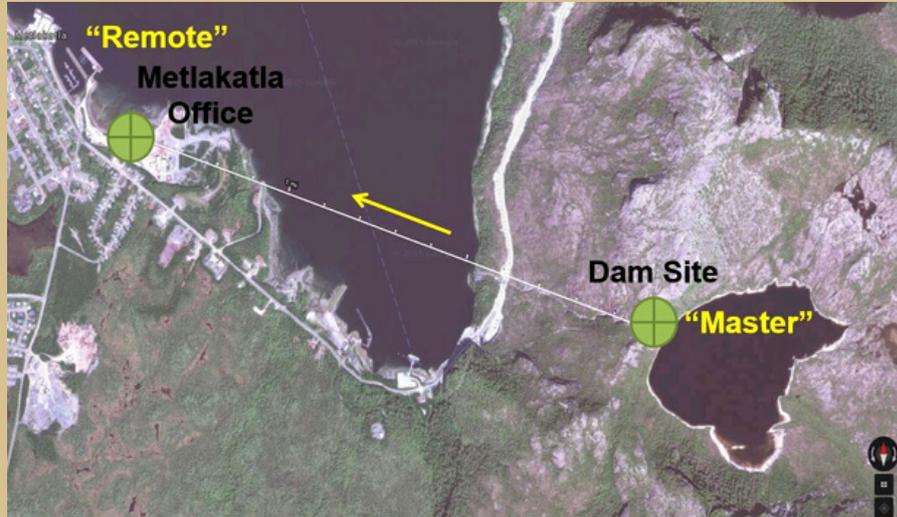
# New Installation

## Chester Lake EWS

Annette Island, Metlakatla, Alaska - By Genelle Winter

The Metlakatla Indian Community (MIC) is very thankful for the BIA Safety of Dams Program for the Chester Lake EWS. This system is unique because it provides data on not only high- and mid-level lake height, but also low water warnings. This is essential in drought conditions in this area, as the data collected is used to provide

day-to-day management of resources at Chester Lake. Metlakatla Power & Light uses the information to lower or increase the volume of water for hydropower use balancing this with the community's municipal needs.



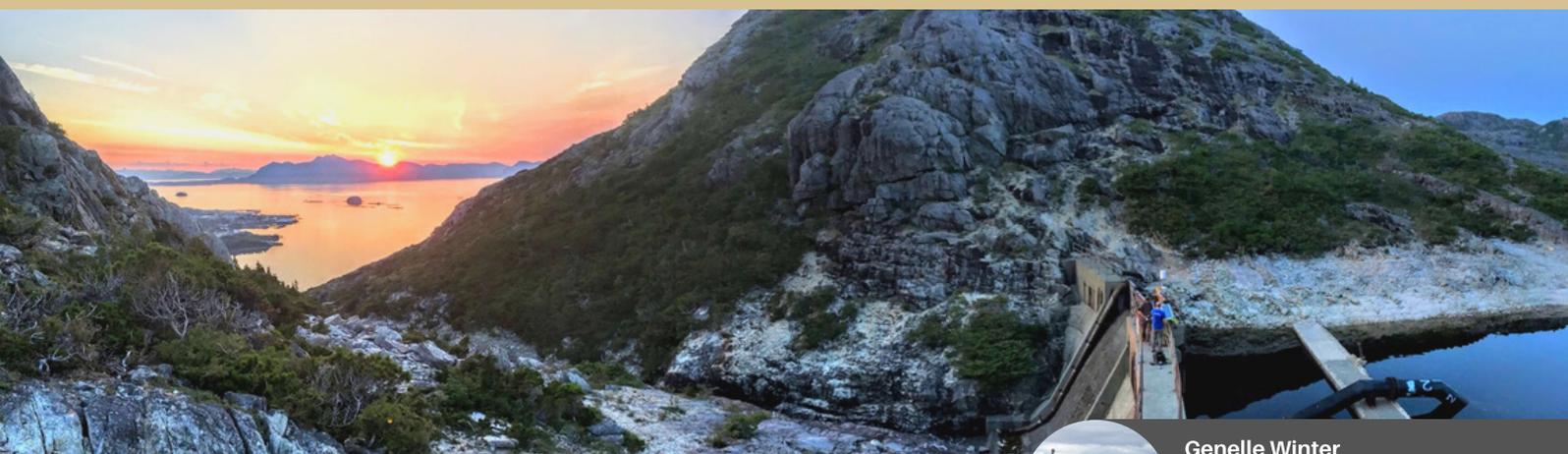
Left: Installation site location map for the new EWS system at Chester Lake. Right: Helicopter flying in equipment for the new EWS site

The only access to the dam is along a steep rugged trail, which makes the data especially valuable during hazardous weather conditions. To get equipment to the installation site, a helicopter was used to lift a tote to the dam (see above picture on the right).

The Chester Lake EWS consists of a monitoring site at the dam along with a station in Metlakatla to display information manually in case of an internet outage on the island. The dam site has a pressure transducer to measure reservoir elevation, three float switches to verify reservoir levels, and a rain gauge to measure precipitation.

The dam site sends data via satellite telemetry and communicates to the office site via radio. The pressure transducer was installed well below the penstock so that the community can be notified for both high water levels for dam safety, and low water conditions for hydropower/municipal water supply.

The MIC staff appreciate being able to log onto the website to regularly share the data with stakeholders and the public. Having the readily available water level helps to validate the ongoing conservation education. Without this system, MIC staff would still be hiking up to the lake to take measurements. Maintaining consistency while taking measurements is challenging and can be dangerous depending upon the weather conditions. For the installation of the Chester Lake EWS, we were blessed with beautiful weather, which facilitated the install and made the technicians lifelong fans of the idyllic island.



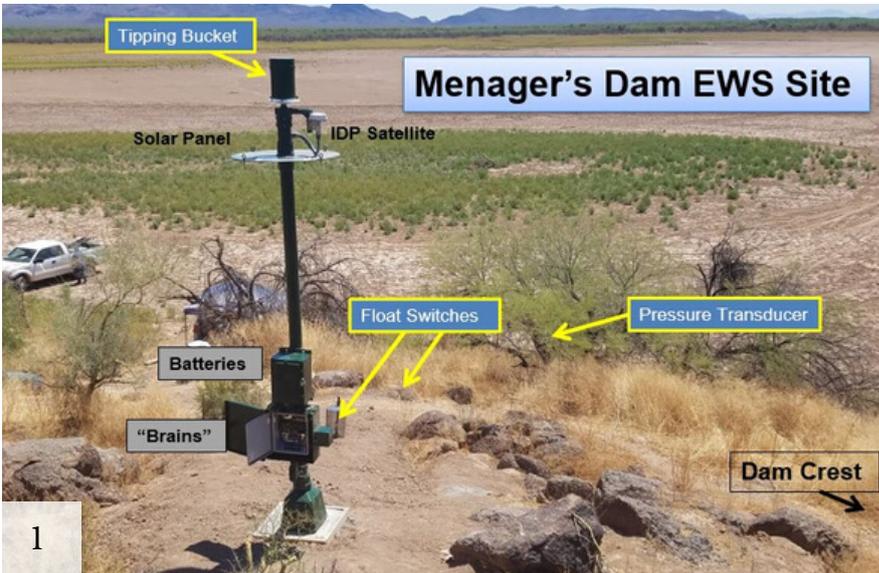
Chester Lake dam at sunset



# Menager's Dam EWS Installation

Tohono O'odham Nation, Arizona

The BIA installed new EWS sites at Menager's Dam (picture 1). The work also included installing a site upstream of the dam to monitor contributing flows from one of the major washes flowing into the reservoir (picture 2).



# Earl Park Dam EWS Installation

Fort Apache, Arizona

Earl Park Dam was recently added to the SOD Program, and a new EWS site was installed. During the installation, the BIA worked in partnership with the White Mountain Apache Tribe to finish updating all of the dataloggers and float switch technology to the latest two-way technology for the EWS entire system on the reservation (see pictures below).



Verifying the data from the Earl Park EWS

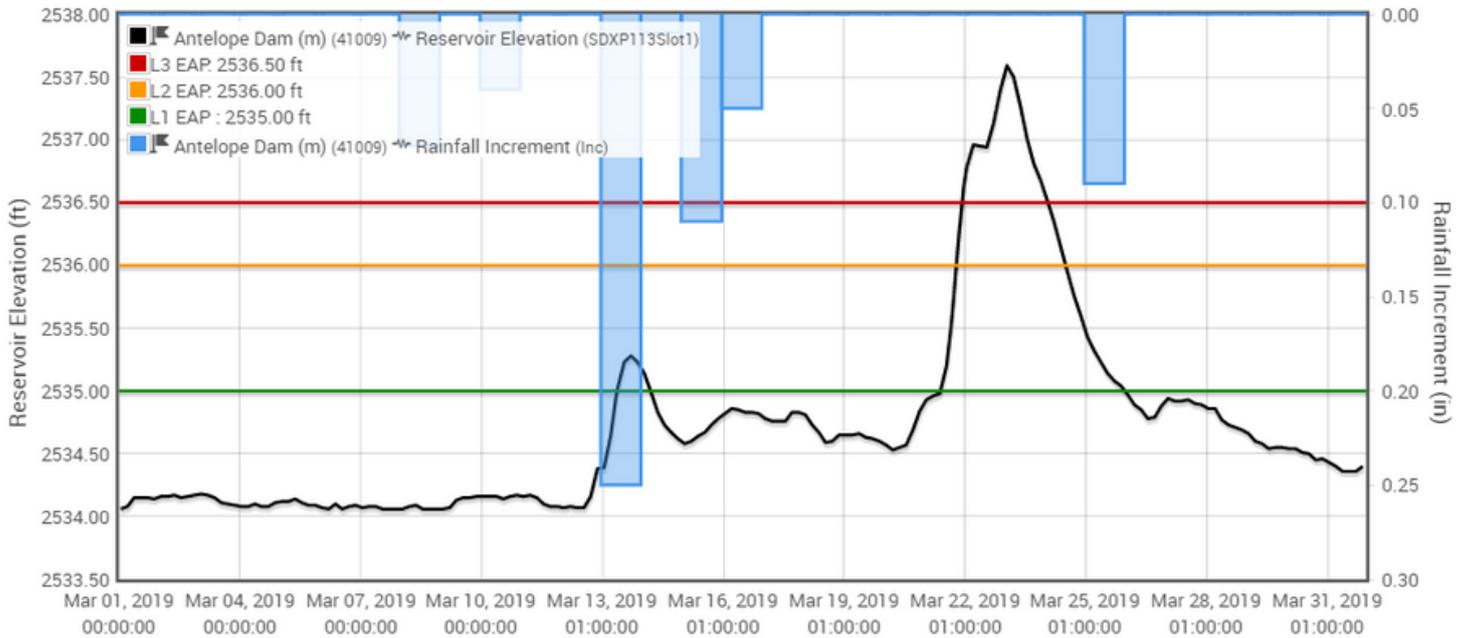
Concrete baseplate for Earl Park's EWS Site

EWS site installation for Earl Park

# Success Story: Rosebud Sioux Reservation

March 2019

In March of 2019, the Great Plains Region, including the Rosebud Sioux Reservation, experienced a large flood event. Subsequent snow accumulation created blizzard conditions after the rainfall event. The flooding triggered EWS alarms at multiple dam sites, and the Tribe initiated the appropriate emergency response.



Data plot from the EWS illustrating all three EAP thresholds crossed at Antelope Dam during the event

Rosebud dams appear to have operated as intended. Several spillways activated during the event and increased downstream flooding.

Rosebud EWS technicians and dam tenders were in close communications with BIA SOD staff and the Regional BIA SOD Officer during the incident. All reservoir water elevation levels were eventually lowered below emergency levels.



Emergency responders at night



High streamflow after the event



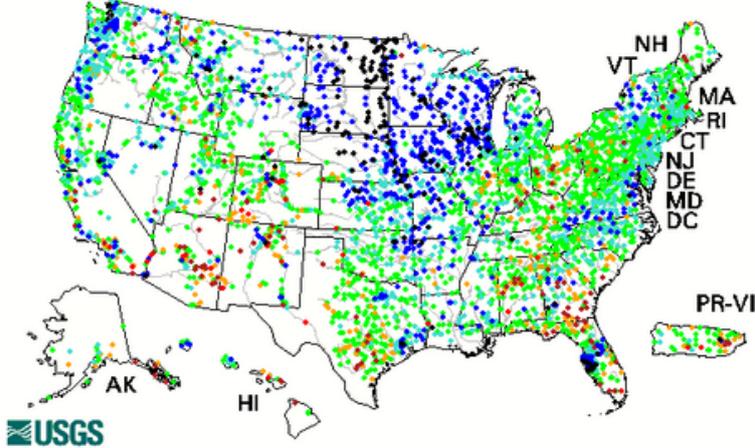
Dam spillway activated during the event

# Current Hydrologic Conditions

October, 2019

## Streamflow Conditions

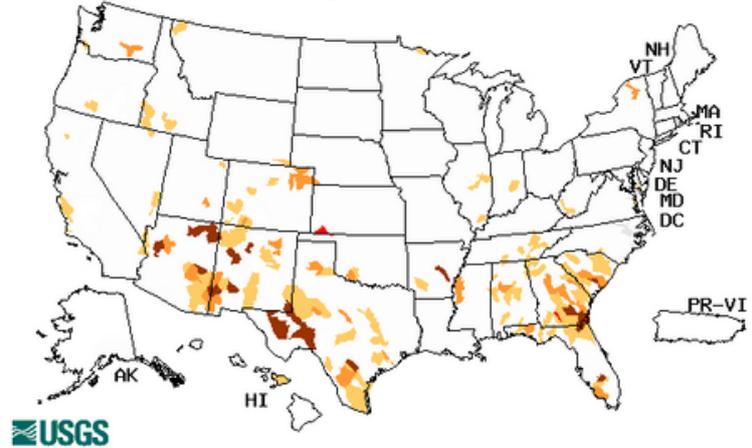
Monday, October 21, 2019 16:30ET



Explanation - Percentile classes						
<span style="color: red;">●</span>	<span style="color: red;">●</span>	<span style="color: orange;">●</span>	<span style="color: green;">●</span>	<span style="color: cyan;">●</span>	<span style="color: blue;">●</span>	<span style="color: black;">●</span>
Low	<10	10-24	25-75	76-90	>90	High
	Much below normal	Below normal	Normal	Above normal	Much above normal	

## Drought Conditions

Sunday, October 20, 2019

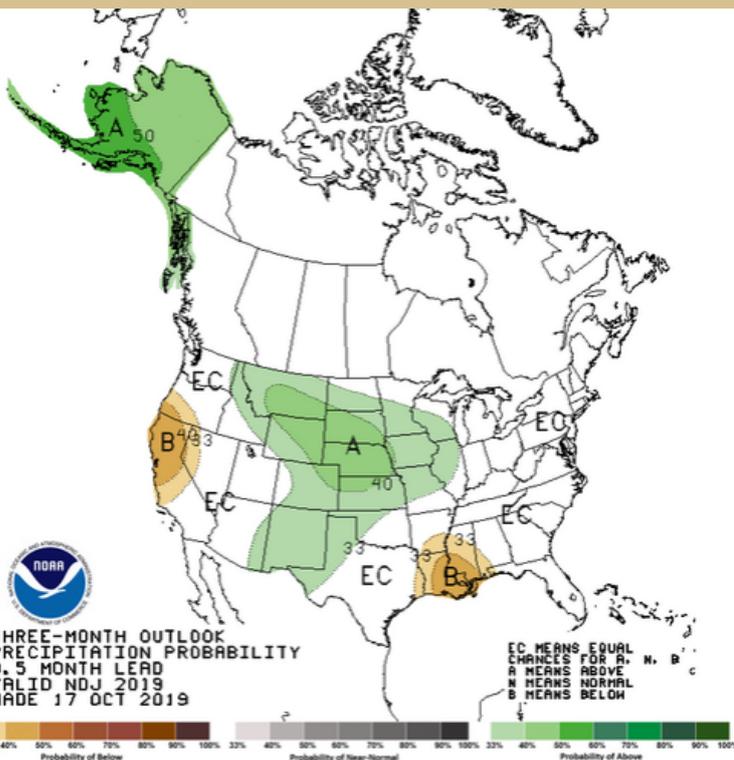


Explanation - Percentile classes			
Low	≤5	6-9	10-24
Extreme hydrologic drought	Severe hydrologic drought	Moderate hydrologic drought	Below normal

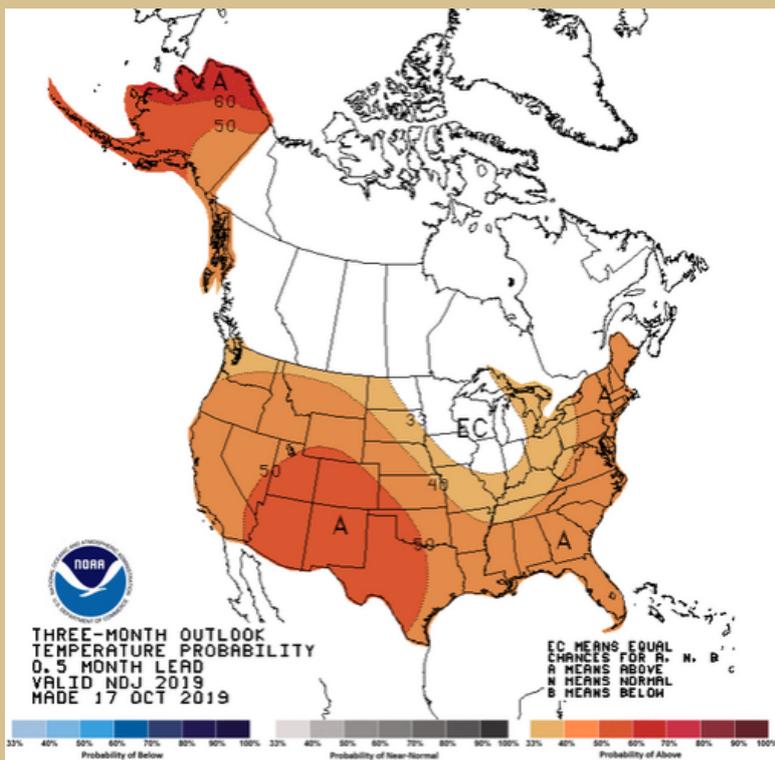
Source for streamflow and drought conditions: United States Geological Survey (USGS)

## Climate Prediction Center, National Center for Environmental Prediction, and the National Weather Service's El Niño Diagnostic:

El Niño is *not* currently active. Neutral conditions are favored in the Northern Hemisphere fall, (~85% chance) and expected to continue through spring 2020 (55 - 60% chance). This means the fall, winter, and spring months are not expected to be particularly wet or dry.



3-Month Precipitation Outlook (October)

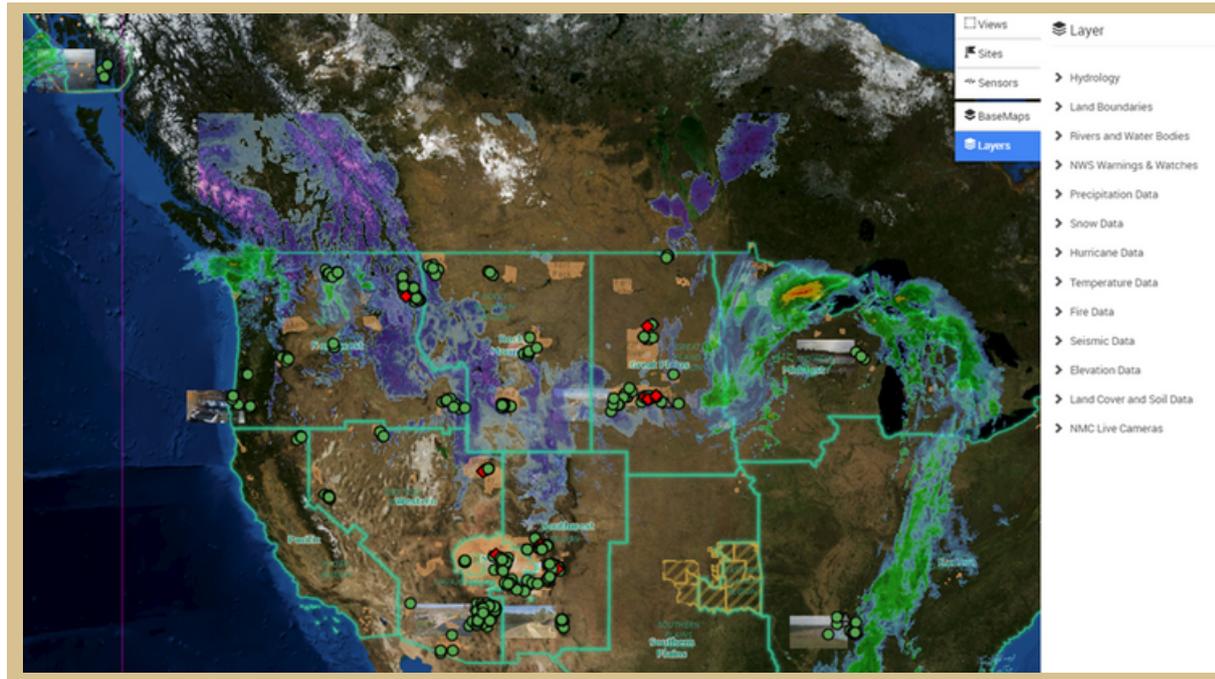


3-Month Temperature Outlook (October)

Source for precipitation and temperature outlook: National Oceanic and Atmospheric Administration (NOAA)

# Website Map Layer Updates

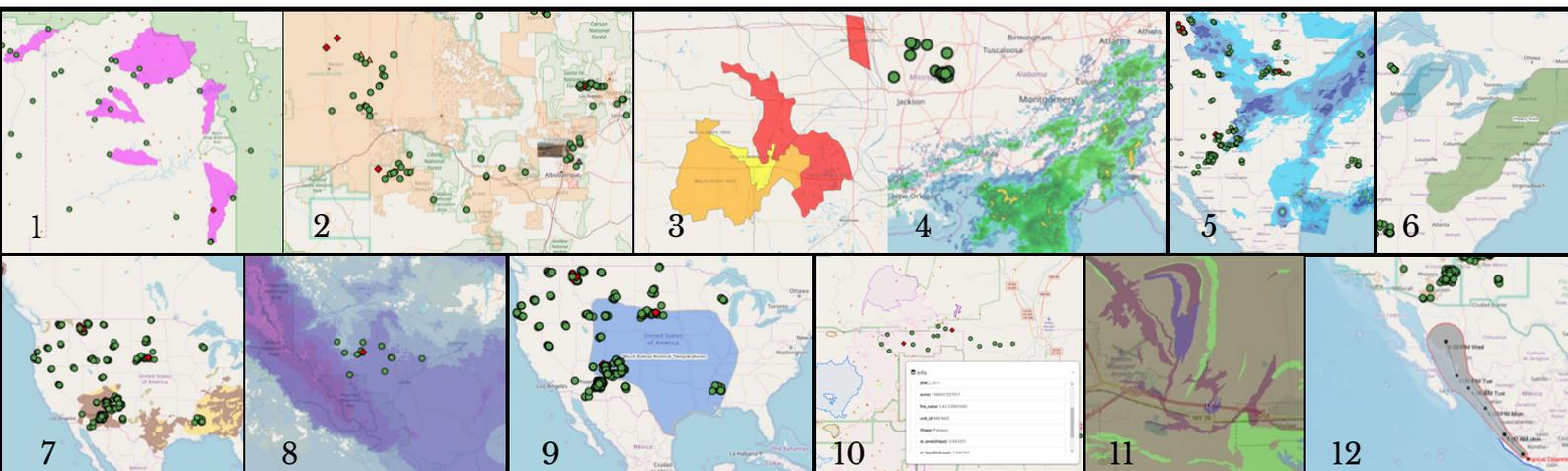
Multiple new map layers were added to the EWS website. These layers help dam tenders, hydrologists, managers, tribe members, and field technicians better understand conditions near and at the dam sites.



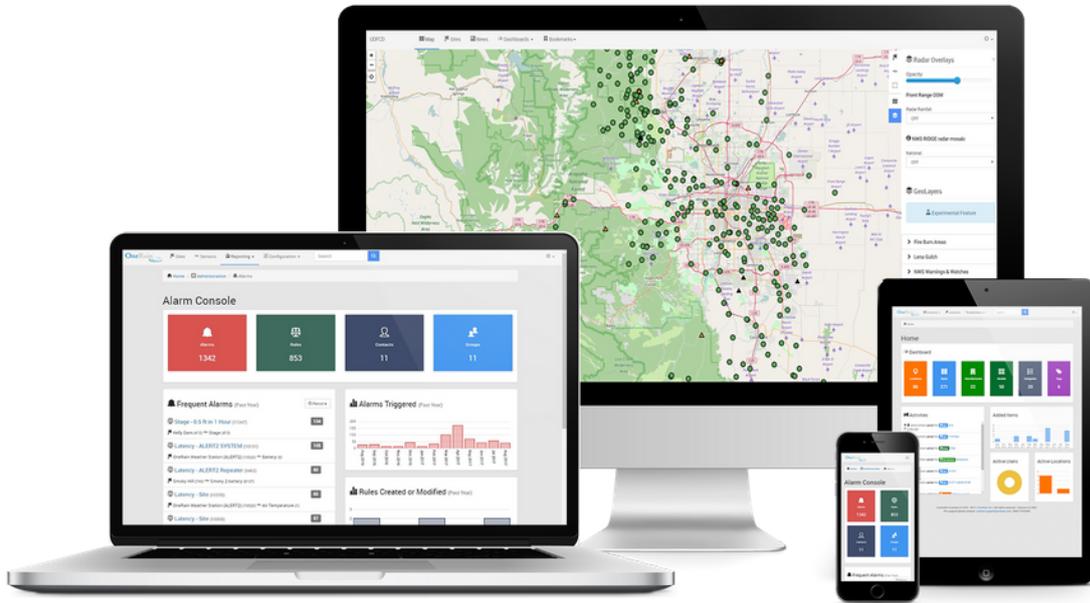
Multiple layers turned on within the EWS map to help understand hydrologic conditions

Listed are some of the available map layers. Layers with numbers in parenthesis have image references below.

- Contributing watersheds for the dams (1)
- Tribal land area representations (LARs) (2)
- BIA office locations and regional boundaries
- Precipitation radar grids (4)
- Quantitative precipitation estimates (QPE) (5)
- Average annual precipitation and temperature
- Flooding (3), precipitation (6), temperature (9), drought (7), and wildfire outlook forecasts
- Snow water equivalent (SWE) Grids (8)
- Hurricane data - forecasted Eastern Pacific and Atlantic/Caribbean hurricane tropical storm paths (12)
- Monthly climate snapshot
- Historical and active fire perimeters (10)
- Faults
- Significant earthquakes within the last 30 Days
- Elevation grids
- Mountain locations
- Soil type grid (SSURGO) (11)
- Land cover grid
- Impervious surfaces grid
- Wetland locations
- EWS camera images



# Complimentary Online EWS Training



There are free monthly webinars available to anyone who wants to refresh or expand their knowledge of "Contrail," the software behind the EWS, and how to manage and understand their EWS data. The live webinars cover topics about flood prediction, data analysis, decision support, and the management, dissemination, and communication of alerts, as well as precipitation processes.

All of the sessions provide a great chance to ask questions. These sessions also provide the opportunity to learn about any recent updates and enhancements to the software and technologies. Estimated duration is 45 minutes to 1 hour.

**Link to register and view upcoming webinars:**

<https://onerain.com/support/contrail-online-training-series/>

# EWS Training Workshop

In April 2019, EWS trainees from multiple tribes and regional offices attended the third annual EWS Training Workshop in Longmont, Colorado. The trainees learned the basics of EWS maintenance.

*"I find this training very beneficial and fun. The labs were the best part." - participant*



2019 EWS Training Workshop attendees

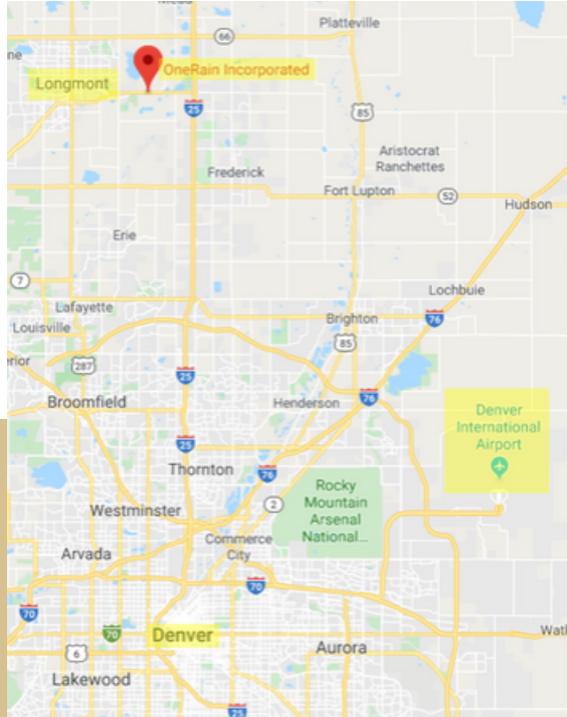
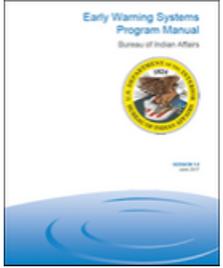
Knowledgeable local staff provide a great benefit to the BIA's EWS Program. For the workshop, hands on learning stations were set up to demonstrate actual scenarios found in the field, followed up by Q&A sessions to enhance understanding of the material. Online how-to videos are available to provide additional guidance to all attendees after the course.

The next EWS Training Workshop is tentatively scheduled for:

*"The best thing for EWS that I have attended." - participant*

**April 07 - 09, 2020**

If interested in attending, please email [lee.mauney@bia.gov](mailto:lee.mauney@bia.gov)



*"I feel more confident to go apply what I learned in the classroom and shop breakouts." - participant*



From left to right:  
EWS site troubleshooting demonstration; workshop training class lecture; map to workshop location

**Additional online training videos are available here:**  
[https://www.youtube.com/channel/UCIG\\_3LHqN2YHK6JHwjC2wmA/videos](https://www.youtube.com/channel/UCIG_3LHqN2YHK6JHwjC2wmA/videos)





# Upcoming Events

Dates	Sponsoring Organization	Training Title	Location
Nov 5-6, 2019	BIA-DSSEM	BIA/Tribal Safety of Dams Workshop	Lakewood, CO
Nov 5-6, 2019	NHWC	Annual NHWC Texas Workshop	San Marcos, TX
Nov 11-14, 2019	Campbell Scientific	CRBasic DataLogger and LoggerNet Training	Logan, UT
Nov 12, 2019	ASDSO	Intro to Overtopping Protection Systems	Webinar
Nov 19-21, 2019	DOI	Consulting with Tribal Nations	Albuquerque, NM
Dec 3-5, 2019	DOI	Consulting with Tribal Nations	Anchorage, AK
Dec 9-12, 2019	Campbell Scientific	CRBasic DataLogger and LoggerNet Training	Logan, UT
Dec 9-13, 2019	AGU	2019 Fall Meeting – includes sessions on flood hydrology	San Francisco, CA
Dec 10, 2019	ADSO	Overtopping Protection Systems	Webinar
Dec 10-11, 2019	USBR	Dam Operator Training	Idaho Falls, ID
Dec 12, 2019	USBR	Canal Operator Training	Idaho Fall, ID
Jan 6-9, 2020	Campbell Scientific	CRBasic DataLogger and LoggerNet Training	Logan, UT
Jan 7-9, 2020	DOI	Consulting with Tribal Nations	Albuquerque, NM
Jan 14, 2020	ASDSO	Filters and Drainage Systems for Embankments and Embankment Penetrations	Webinar
Jan 28-30, 2020	DOI	Consulting with Tribal Nations	Anchorage, AK
Feb 10-13, 2020	Campbell Scientific	Structural and Geotechnical Instrumentation Training	Logan, UT
Feb 11, 2020	ASDSO	Scour of Rock Downstream of Dams	Webinar
Mar 10, 2020	ASDSO	Modifications Made to the Oroville Spillway	Webinar
Mar 23, 2020	ASDSO	Stability Analysis of Embankment Dams	Phoenix, AZ
Apr 7-9 (tentative), 2020	BIA-DSSEM & OneRain Inc.	EWS Training Workshop	Longmont, CO
Apr 20-24, 2020	USSD	2020 USSD Conference and Exhibition	Denver, CO
May 4-8, 2020	DOI	Safety of Dams Training	Denver, CO
Sep 20-24, 2020	ASDSO	Dam Safety Conference	Seattle, WA

## Recommended Online Training for Dam Tenders/Operators:

- Review of the online Dam Safety 101 information provided on the Association of State Dam Safety Officials (ASDSO) website. [www.damsafety.org](http://www.damsafety.org)
- Ten Training Aids for Dam Safety (TADS) modules on dam safety inspection. <https://www.fema.gov/media-library/assets/documents/13602>
- ICS-100: Introduction to ICS. <https://emilms.fema.gov/IS100c/curriculum/1.html>
- ICS-200: ICS for Single Resources and Initial Action Incidents. <https://emilms.fema.gov/IS0200c/curriculum/1.html>
- ICS-700: National Incident Management System, An Introduction. <https://emilms.fema.gov/IS0700b/curriculum/1.html>



# Photo of the Day

Every EWS newsletter features a 'Photo of the Day' submitted from the readers.

This issue features multiple photos from the new web camera installations.

Some of the cameras have captured wildlife (a bobcat was spotted at Santa Ana Dam, pictured top-right) people fishing, cows grazing (bottom image), changing weather conditions -- all caught on camera! The images look great at night and capture enough detail to even read a reservoir staff gage (second image from the top).

Please send EWS photos to be featured with a short description to [lee.mauney@bia.gov](mailto:lee.mauney@bia.gov), or [katharine.anderson@bia.gov](mailto:katharine.anderson@bia.gov).



*A bobcat spotted at Santa Ana Dam*



*Santa Ana Dam*

*Santa Ana Dam's camera image at night can read the staff gage*



*Pushmataha Dam's camera image on a cloudy morning*



*Cows grazing on White Clay Dam*