



September 27, 2023

TO: Flood Authority Members
FROM: Jennifer McAdoo, Staff and Scott Boettcher, Staff
SUBJECT: 2024 Flood Warning System Budget and County Shares

Purpose of this memo is to discuss and allocate 2024 Flood Warning System annual operations and maintenance costs (www.chehalisriverflood.com). We will discuss at Thursday's Flood Authority meeting.

We will walk through the following attachments:

- Attachment A1 (pg. 2) -- Breakdown and Comparison of Annual O & M Costs (2014 through 2025).
- Attachment A2 (pg. 3) -- Staff Recommendation.
- Attachment B1 (pg. 4) -- Flood Warning System Capital Improvement Plan.
- Attachment B2 (pg. 7) -- Staff Recommendation.
- Attachment C (pg. 8) -- Flood Authority Gages and Webcams.

Please feel free to contact either Jennifer (503/855-7060, Jennifer.McAdoo@icf.com) or Scott (360/480-6600, scottb@sbgh-partners.com) with any questions.

**Attachment A1
Breakdown and Comparison of Annual O & M Costs (2014 through 2025)**

Operations & Maintenance (O & M)													
2023/24 Theme --> <u>Transition: New people; New methods; New ideas; Greater prominence.</u>													
Breakdown of Annual O & M Costs		2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
WEST Consultants (Jeff et al)	<i>Gage/Webcam maintenance</i> -- 2024 (13 gages, 3 webcam locations). 2025 (13 gages, 3 webcam locations).	\$38,438	\$38,438	\$38,438	\$38,438	\$39,207	\$39,991	\$46,391	\$53,031	\$56,212	\$64,585	\$68,460	\$72,568
WEST Consultants (Dave, Cheryl, Peter, Andreas)	<i>Operational/Administrative support</i> -- On-going support for website monitoring and updates for both routine operations and during potential flood events.	\$11,336	\$11,336	\$11,336	\$11,336	\$11,563	\$11,794	\$12,030	\$12,270	\$13,007	\$13,787	\$14,614	\$24,696
WEST Consultants (Dave, Cheryl, Peter, Andreas)	<i>GIS support</i> -- On-going support, training for FWS GIS elements (ArcGIS gage alerts dashboard, ArcGIS Survey 123 alerts sign-up, Data.Wa.Gov "handshake," etc.) at \$8,684.											\$8,684	
WEST Consultants (Jeff et al)	<i>Spare parts inventory</i> -- Extra parts in event of broken or malfunctioning gages.		\$6,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000
Mobility Help Desk	<i>Webcam cell fees</i> -- 3 cell data plans.							\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500
OneRain (Conrail)	<i>Webcam subscription fees</i> -- 4 subscriptions.							\$1,260	\$1,260	\$1,260	\$1,680	\$1,848	\$1,848
OneRain (Conrail)	<i>Website</i> -- One-rain annual subscription (291 basin sensors).	\$3,811	\$3,811	\$5,261	\$5,261	\$5,500	\$5,877	\$6,000	\$6,500	\$6,500	\$6,500	\$7,000	\$7,000
WEST Consultants (Jeff et al)	<i>Removal/Relocation of Gages</i> -- Relocate Chehalis River below Thrash Creek near Pe Ell.											State Capital Budget ~\$5K	State Capital Budget ~\$42K
Lewis County (Lee, Sarah)	<i>Billing and processing.</i>		\$900	\$900	\$900	\$900	\$900	\$900	\$900	\$900	\$900	\$900	\$900
Total -->		\$53,585	\$60,485	\$57,935	\$57,935	\$59,169	\$60,562	\$70,081	\$78,461	\$82,379	\$91,952	\$106,007	\$111,512
<p>Note 1 -- <i>Gage maintenance</i> and <i>Operational/Administrative support</i> increased 2% for 2018-21, 6% for 2022-23, and are proposed to increase 6% for 2024. <i>Operational/Administrative support</i> is additionally proposed to increase \$8,684 for ongoing GIS support.</p> <p>Note 2 -- Conrail webcam subscription fee increased \$168 for 2024.</p> <p>Note 3 -- Conrail website subscription fee increase \$500 for 2024.</p> <p>Note 4 -- Thrash Creek gage relocation estimate = ~\$47K. State Capital Budget --> 2024 (~\$5K for reconnaissance of four locations and GOES testing). 2025 (~\$42K for demo of existing site, installation of new site with radar sensor, installation of WWG, updating Weyerhaeuser access agreement, and two-years calibration).</p>													

Attachment A2 Staff Recommendation

I. Recap of 2014-2023 Allocation Approach

Annual costs for 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, and 2023 were allocated among Flood Authority counties as follows:

- Grays Harbor County -- 22%.
- Lewis County -- 64%.
- Thurston County -- 14%.

The method behind this allocation was as follows:

- 50% of the allocation was based on populations of communities prone to flooding.
- 50% was based on historic FEMA flood insurance payments.

This allocation approach was unanimously supported by Flood Authority beginning in 2014 (see [here](#)).

II. Staff Recommendation

- a. Flood Authority agrees to use the same allocation approach as last year (see [here](#)) on the basis that relatively little has changed in the Basin in terms of population shifts and/or exposure to flood risk, i.e., Lewis County still has largest population and risk exposure in the Basin.
- b. 2024 annual costs are proposed in the same manner as 2023 with Grays Harbor County paying 22% of costs, Lewis County paying 64% of costs, and Thurston County paying 14% of costs, and still employing an inflation factor of 6% as described.

	2023	2024	Difference
Grays Harbor County (22%)	\$20,229	\$23,321	\$3,092
Lewis County (64%)	\$58,849	\$67,844	\$8,995
Thurston County (14%)	\$12,873	\$14,841	\$1,968
Total →	\$91,952	\$106,007	\$14,054

- c. Staff and Lewis County (as fiscal agent) are directed to implement and prepare payment schedules (1st half due 3/31/2024; 2nd half due 7/31/2024).

Note: Lewis County, acting as Flood Authority's fiscal agent, has historically handled billing and processing for costs with Flood Warning System. It is assumed this practice will continue for 2024.

**Attachment B1
Flood Warning System Capital Improvement Plan**

Flood Warning System Capital Improvement Plan (From <u>2023 Basin Gage Plan</u> and <u>Current Known Needs</u>)				
Phase I -- Immediate and Known <u>IT/Data Communication</u> Improvement Needs			10/01/2013 - 12/31/2023	
WEST	Migrate Gage Alerts Data Dashboard and On-Line Alert Sign-Up System from Lewis County GIS to WEST GIS		Hours	Cost
1	Transfer and update Gage Alert Data Dashboard and On-Line Alert Sign-Up Tool (Survey 123) from Lewis County GIS to	36		\$5,832
2	Monitor and update Gage Alert Data Dashboard and Data.Wa.Gov (data "handshake") on weekly basis to ensure	26		\$4,212
3	Monitor and update Dashboard and ArcGIS Maps to ensure successful migration.	8		\$1,296
4	Hold monthly meeting with client to update on migration, calibration, and sign-up progress.	6		\$972
			<i>Sub-Total --></i>	\$12,312
WEST	Basin Gage Plan (Critical Update) -- Relocate the Chehalis River below Thrash Creek Gage		Hours	Cost
5	Secure funding for reconnaissance in 2024 of four locations and GOES testing.			\$5,000
			<i>Sub-Total --></i>	\$5,000
WEST	Improve Data System Communication Between Ecology and Contrail		Hours	Cost
6	Basin Gage Plan (Important Upgrade) -- Develop a Data Agent between Ecology and Contrail.			
			<i>Sub-Total --></i>	<i>tbd</i>
WEST	Upgrade To Contrail Server		Hours	Cost
7	Basin Gage Plan (Important Upgrade) -- Research Pros/Cons Moving to Contrail Server.			
			<i>Sub-Total --></i>	<i>tbd</i>
			TOTAL -->	\$17,312

**Flood Warning System Capital Improvement Plan
(From 2023 Basin Gage Plan and Current Known Needs)**

Phase II -- Near-Term <u>Usability</u> Improvement Needs		Summer 2024	
WEST	Improve Website Usability, User Interface, Integration, and Alternative Formats (e.g., Spanish)	Hours	Cost
1	Basin Gage Plan (Low Cost Enhancement) -- Improve Website User Interface.		
2	Website Interface Testing.		
3	Basin Gage Plan (Low Cost Enhancement) -- Add Website Training,		
4	Basin Gage Plan (Low Cost Enhancement) -- Standardize Flood Alert Messaging.		
5	Translate Website Features/Pages/Documents to Spanish.		
6	Basin Gage Plan (Important Upgrade) -- Upgrade to Contrail Server.		
	<i>Sub-Total --></i>		<i>tbd</i>
WEST	Improve Inundation Maps	Hours	Cost
7	Basin Gage Plan (Important Upgrade) -- Explore Ways to Communicate Uncertainty in Inundation Maps		
8	Basin Gage Plan (Low Cost Enhancement) -- Improve Inundation Maps (adding depth of flooding features).		
9	Basin Gage Plan (Important Upgrade) -- Develop Inundation Maps for Bucoda.		
	<i>Sub-Total --></i>		<i>tbd</i>
WEST	Incorporate Post-Flood Action Planning	Hours	Cost
10	Basin Gage Plan (Low Cost Enhancement) -- Develop a Post-Flood Action Plan (establish HW mark collection initiative, institute post flood survey of community members .		
11	Basin Gage Plan (Low Cost Enhancement) -- Introduce Citizen Science for some applications (e.g., HW marks).		
	<i>Sub-Total --></i>		<i>tbd</i>
	TOTAL -->		tbd
Phase III -- Longer-Term Infrastructure <u>Improvement</u> Needs		2025-27 Biennium	
WEST	Basin Gage Plan (Critical Update) -- Relocate the Chehalis River below Thrash Creek Gage	Hours	Cost
1	Demo of existing site, installation of new site with radar sensor, installation of WWG, updating Weyerhaeuser access agreement, and two-years calibration.		\$42,000
	<i>Sub-Total --></i>		<i>\$42,000</i>
	TOTAL -->		\$42,000

Remaining To Incorporate/Consider From 2023 Basin Gage Plan and Current Known Needs

Basin Gage Plan (Low Cost Enhancement) -- "Low-hanging fruit" that are quickly and inexpensively achievable.

- o Add new sensor data from existing gages.
- o Implement Forecast High Water Alerts.
- o Add QR Code Stickers to Highly Visible Gages linked to the FWS website.

Basin Gage Plan (Important Upgrade) -- Key upgrades critical for long-term system performance and success.

- o Verify Rating Curves at Chehalis River (CENW₁) and Skookumchuck River (CTAW₁).
- o Investigate Water Level Discrepancies at Skookumchuck Reservoir.
- o Investigate Feasibility of Adding Gap-Filling Rain Gages.
- o Improve Transient Snowpack Monitoring.

Basin Gage Plan (Strategic Initiatives) -- Recommendations that require cooperation and, potentially, joint funding by regional stakeholders which include various local regional, state, and/or federal agencies.

- o Improve Forecasting on the Lower Chehalis River (Primarily a National Weather Service function).
- o Install Flow Gaging Sensor on the Lower Chehalis River to Support Modeling and Forecasting (Expensive gage to install, operate, and maintain. USGS is the logical lead agency with potential funding from a variety of other agency stakeholders.).
- o Improved Flow Forecasts for Skookumchuck Reservoir near Bucoda (Primarily a National Weather Service function).

Basin Gage Plan (Tasks on the Horizon) -- Upcoming events that may trigger work projects.

- o Skookumchuck River at Centralia Bridge Replacement.
- o Develop Capital Investment Strategy for Gage Obsolescence and Technology Change.

Attachment B2 Staff Recommendation

1. The Flood Authority's Flood Warning System has become increasingly popular (and used) in recent years.
 - Gage alert sign-ups increased by 183% last year alone (Gage Alerts Data Dashboard, [here](#)).
 - "During the January 2022 event, in the largely rural basin with just 175,000 residents, more than 25,000 unique logins to the Flood Warning System website were recorded. The flood inundation map pages received approximately 73,000 hits in two days, January 6-7. (Figure 11) Social media posts about the website and inundation maps by a local newspaper (The Chronicle) and the Washington Emergency Management Department (Figure 12) helped drive traffic to the website and inundation maps based on NWS forecasts." (Dave Curtis, [here](#))
2. The Flood Authority's Flood Warning System is the first line of defense against flooding impacts. "**Be Aware, Be Prepared**" is the Flood Warning System's motto.
3. Looking to the future through capital improvement planning is a reasonable and responsible activity. Technology changes. User expectations and needs change. Markets and demographics change.

Recommendation:

- #1. Flood Authority staff should work with West to confirm costs for Phase I items 1 through 5 and secure such funding.
- #2. Flood Authority staff should work with West to develop and bring to the November 16, 2023 Flood Authority meeting a Flood Warning System Capital Improvement Plan (Phase I, II, and III) with:
 - Costs.
 - Schedule.
 - Activity descriptions.
 - Outcomes to achieved.
 - Funding recommendations.

**Attachment C
Flood Authority Gages and Webcams**

WEST Site Visit Location (O&M)	FWS Link (Gage)	2022	2023	2024	2025
1. BEEVILLE RAIN GAGE - (MATLOCK 3NE) (D15015CE)	https://chehalis.onerain.com/site/?site_id=16001&site=dea82a7e-dd7a-45be-b2db-4da22fa2236f	Y	Y	Y	Y
2. CEDAR CREEK RAIN GAGE NR LITTLEROCK, WA (D1503322)	https://chehalis.onerain.com/site/?site_id=17367&site=caeb6ab8-a310-4204-8203-0258de5a51e9	Y	Y	Y	Y
3. CHEHALIS RIVER AT CENTRALIA, WA (GOES) (D1501B1C)	https://chehalis.onerain.com/site/?site_id=22812&site=49db3831-6517-40a1-9bdd-c86300c495e2	Y	Y	Y	Y
4. CHEHALIS RIVER BELOW THRASH CREEK NEAR PE ELL, WA (D15080AC)	https://chehalis.onerain.com/site/?site_id=17410&site=cf9d5aa9-fedc-4118-90f9-9ac04d914acf	Y	Y	Y	N/A
5. CHINA CREEK ABOVE FCS AT CENTRALIA, WA (D1503DFo)	https://chehalis.onerain.com/site/?site_id=24401&site=4356a8f1-d3bd-42ed-9bfa-37c2fceb694	N/A	N/A	N/A	Y
6. DOTY HILLS RAIN GAGE (D150635E)	https://chehalis.onerain.com/site/?site_id=24334&site=6f656139-2131-43ef-a9f5-3bae55c4ca3c	Y	Y	Y	Y
7. MASON FD13 AT CLOQUALLAM (D1502E86)	https://chehalis.onerain.com/site/?site_id=24316&site=bccbfcd-d664-487f-b2f2-8205514f478a	Y	Y	Y	Y
8. NEWAUKUM RIVER FOOTHILLS (D1507028)	https://chehalis.onerain.com/site/?site_id=24435&site=1467d60d-50a9-4ed1-aa5b-34e22178c735	Y	Y	Y	Y
9. RIVERSIDE RAIN GAGE (RFA-STA8) (D15045B2)	https://chehalis.onerain.com/site/?site_id=16003&site=4b1029bc-782a-452e-9a13-bd9474560d7a	Y	Y	Y	Y
10. SKOOKUMCHUCK RAIN GAGE (D15056C4)	https://chehalis.onerain.com/site/?site_id=17406&site=6e19c135-9699-49b4-ae8f-a5fbdecfa9d9	Y	Y	Y	Y
11. SKOOKUMCHUCK RIVER AT CENTRALIA, WA (GOES) (D150086A)	https://chehalis.onerain.com/site/?site_id=22804&site=23a7ceaa-7d6c-4453-b695-5bed3b415b94	Y	Y	Y	Y
12. WEATHERMAX RIDGE RAIN GAGE (D15006B8)	https://chehalis.onerain.com/site/?site_id=16002&site=7c58d8e1-8a10-4a04-a2e1-50b8e65a4c04	Y	Y	Y	Y
13. WEST FORK SATSOP RIVER AT COUGAR SMITH ROAD NEAR SATSOP 13NNW (D1502054)	https://chehalis.onerain.com/site/?site_id=15970&site=7407b97b-a7dc-4591-8fbb8f1515339e	Y	Y	Y	Y
14. Willapa Hills (D15093DA)	https://chehalis.onerain.com/site/?site_id=24332&site=d313b69b-263e-439a-a866-0af35309a00f	Y	Y	Y	Y
15. WEBCAM -- Wynoochee River at Montesano, WA	https://chehalis.onerain.com/dashboard/?dashboard=4a77124f-3311-4f07-963f-a3f302bf8335	Y	Y	Y	Y
16. WEBCAM -- Chehalis River at Centralia, WA	https://chehalis.onerain.com/dashboard/?dashboard=4a77124f-3311-4f07-963f-a3f302bf8335	Y	Y	Y	Y
17. WEBCAM -- Wishkah River at Aberdeen, WA	https://chehalis.onerain.com/dashboard/?dashboard=4a77124f-3311-4f07-963f-a3f302bf8335	Y	Y	Y	Y