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OWRD's Surface Water Information Modeling System (SWIMS)
Technical Advisory Group Meeting (TAG) #2 – MEETING SUMMARY
Date: January 6, 2026, 9:00 – 11:00 am
Location: Virtual

WELCOME: https://youtu.be/Gscu3rdGu7Y?t=330
Each Oregon Water Resources Department (OWRD) staff member and Technical Advisory Group (TAG) member made their introductions.

PROJECT STAFF	TAG MEMBERS
Ryan Andrews, Senior Hydrologist	Adam Stonewall, USGS (OWSC), Surface Water Specialist
Jordan Beamer, Assistant Surface Water Section Manager	Christopher Konrad, USGS (WWSC), Research Hydrologist (retired)
Cortney Cameron, Senior Hydrologist	Jon Haynes, USGS (OWSC), Hydrologist
Annette Liebe, Technical Services Division Administrator	Sayantan "Monty", Desert Research Institute, Assistant Research Professor
Junjie Chen, Hydrologist (Water Availability Analyst)	Spencer Sawaske, ODFW, Deputy Habitat Administrator
Cheng Wei Huang, Senior Water Resources Data Developer	Peyman Abbaszadeh, PSU, Assistant Professor
Rachel LovellFord, Surface Water Hydrology Program Manager	Rick Parsons, Parsons Water, Certified Water Right Examiner
Linda Ray, TSD Admin Specialist, Meeting Recorder	Rob Annear, Annear Water Resources, Certified Water Rights Examiner
Cameron Greenwood, Hydrologist	Terra Metta, ODEQ, Hydrogeologist
Estelle Robichaux, Policy and Portfolio Analyst	Ken Eng, USGS (WRMA), Hydrologist
	Kristin Mikkelson, USBR, Hydrologic Engineer
	Sean Fleming, Program Scientist, NASA Western Water Action Office
	Angus Goodbody, Forecast Hydrologist, NRCS-USDA

Absent members: Sara Goeking

Jordan Beamer gave a brief overview of the purpose for SWIMS TAG meetings and ground rules: https://youtu.be/Gscu3rdGu7Y?t=1208

HYDROLOGIC INVESTIGATION SERIES
https://youtu.be/Gscu3rdGu7Y?t=1332

Model Workflow Overview

Workflow used to calculate components of water availability equation:

- Natural streamflow
- Expected demands
- Water Availability

Inform requirements for each step via hydrologic analyses

- Data selection
- Assumptions
- Methods
- Model selection

What we expect to investigate in more detail

- Data selection
  - Evaluate gaged streamflow data to determine data requirements (quantity, quality)
  - Analysis and literature review to determine common predictor variables for modeling flow
- Watershed framework
  - Evaluate possible extent of model coverage and resolution based on available data accuracy requirements (i.e., how many points of interest can we accurately model?)
- Expected demands
  - Evaluate methods for computing consumptive use for various water use types (irrigation, municipal, etc)
  - Evaluate methods for quantifying impacts of groundwater use on natural streamflow and water availability
- Natural stream flows
  - Determine approach for computing natural flow hydrographs for gaged watersheds
  - Compare modeling approaches for estimating natural streamflow in ungagged watersheds

FEEDBACK
https://youtu.be/Gscu3rdGu7Y?t=1666
A member asked staff to define the words "data" and "model". Cheng Wei Huang explained this further in his presentation but stated that "data" meant real data from measurements that had been taken in the field. "Model" is the modern framework being developed from that data to predict water availability that the department uses to appropriate water.

INVESTIGATIONS TO SUPPORT STREAM GAGE SELECTION
The theme of today's discussion relates to:

1. Selecting gaging stations that provide data appropriate for developing model to estimate natural streamflow.
2. Inform assumptions regarding model outputs
3. Natural streamflow represents flow that is unaffected by consumptive use or reservoir storage (establish reference condition)

HYDROLOGIC DISTURBANCE INDEX | Ryan Andrews
https://youtu.be/Gscu3rdGu7Y?t=2157
Ryan shared the purpose, background, and goals regarding the use of a Hydrologic Disturbance Index (HDI). Ryan's full presentation can be found as **Attachment A** included in this meeting summary. Staff need input from TAG members as they make decisions on;

- Establishing disturbance tolerance thresholds
- Identifying gages measuring natural or near-natural conditions

THE HDI DEVELOPMENT | https://youtu.be/Gscu3rdGu7Y?t=2299

- Mimics GAGES data
- 631 gaged watersheds (OWRD, USGS) having at least three years of data since 1950.
- Seven disturbance variables were found: dam density, dam storage, surface water withdrawal, irrigated lands, fragmentation, roads and hydrologic modification.

Staff results from findings were significant regional differences in degree of impacts (west/east sides of the state) and withdrawals do not include groundwater.

The outcomes from the HDI development revealed there were variables (how to correct the system for impacts caused by withdrawal and storage), preliminary thresholds of 5% annual yield for storage and 10% of annual yield for surface water withdrawal. 51 gages were analyzed with data from 1991-2020 (29 gages west of the Cascade range and 22 from the east side). Results were also used to inform gage network expansion.

GAP TOLERANCE ASSESSMENT | Cheng Wei Huang
https://youtu.be/Gscu3rdGu7Y?t=2684
Cheng Wei shared the purpose, background, and goals regarding the analysis of gap tolerance. Cheng Wei's full presentation can be found as **Attachment B** included in this meeting summary. Staff need input from TAG members as they make decisions on determining the minimum data requirements for gaging stations to qualify as index stations and to identify gaging stations that can be considered index stations.

DATA is defined as:

- Mean daily streamflow data
- Relied on disturbance index to select minimally disturbed gaged watersheds
- 51 gaging stations measuring minimally disturbed streamflow
- SW withdrawal <=10% of mean annual natural flow (natural flow from NHDPlus V2.1)
- Storage <=5% of mean annual natural flow

Methods used are:

FDC calculation

- Complete, continuous mean daily flow records from 1991 to 2020
- Compute 80%, 50%, and 20% FDC characteristics

Random sampling

- Random select 15 of 30 years
- Randomly remove percent of daily values (10-75%)
- Remaining 15 years stay intact
- Iterate 100 times for each gage and FDC characteristic

Evaluating Results

- Build FDC: Average the 100 FDCs to get a mean curve; use +1 standard deviation as the uncertainty band
- Compare to baseline: at 20%, 50%, and 80% exceedance, check whether the entire mean +1 SD band stays within +15% of the baseline FDC
  Pass/Fail: Pass = with +15% at all three exceedance flows. Fail + any point exceeds +15%
- Tolerance: Largest gap that still passes

Results concluded by staff on the gap tolerance analysis is:

- For most index gages, >80% overall retention keeps 20/50/80% exceedance within +15% (mean + 1 SD vs. baseline)
- Sensitive (low-entropy, skewed) regimes need higher retention – typically >90% to meet the same +15% rule

The outcomes from this analysis include gages with less than complete 30 years of record throughout base period to accurately represent conditions. In conclusion, the pool of index gages can likely be expanded (>=24 years)

STATIONARITY ANALYSIS SUMMARY | Cortney Cameron
https://youtu.be/Gscu3rdGu7Y?t=3089
Cortney shared the purpose, background, and goals regarding the analysis of stationarity. Cortney's full presentation can be found as **Attachment C** included in this meeting summary. Staff need input from TAG members as they make decisions on identifying data (temporally) that are best to use for updating a model (base period).

The methods used for this analysis were:

- Data (51 low-disturbance, long-term stations same as used for gap tolerance analysis
- Temporal scales (POR & WYs 1991-2020, Annual and monthly)
- Quintiles (0.2, 0.5, 0.8)
- Stationarity tests
    - Quantile regression – calculates quintile from annual/monthly mean
    - 10-year moving windows (Mann Kendall) – calculated on 10-year moving quintile
    - Autocorrelation (lag-1) – calculated from annual/monthly mean
- False discovery rate corrections (applied for each method-period-percentile-month group – 182 families, each within 51 stations)

The results from staff analysis were as follows:

- For mean annual flows, the majority of trends were non-significant
- For monthly flows, many of the summer months were significantly downward
- For spatial patterns, there was significant stations that tended to occur along the eastern Cascades

The outcomes from staff analysis was to establish a base period suggesting water years 1991-2020 on the balance of data availability, meteorological standard practice, and streamflow data publishing timelines. Other considerations were that many basins are already fully allocated in the summer months and the need for more frequent model updates.

DISCUSSION AND FEEDBACK FROM TAG MEMBERS
https://youtu.be/Gscu3rdGu7Y?t=3611

HYDROLOGIC DISTRUBANCE INDEX

Question: would staff consider identifying gages seasonally instead of year-round (irrigation use is one example of a factor that can affect gage data)
Answer: Staff have been debating seasonal gage data and will continue to discuss how to identify particular months throughout the year to monitor and collect data.

Question: Have staff considered climate disparities and how that can affect stationarity.
Answer: Climate change will be considered as a factor and is a limitation on analysis. Staff is looking to evaluate.

Question: Will staff consider using the model error for model outputs when computing disturbance index (annual outflow) and if so, will those and other model outputs considered when computing disturbances. (Data vs. model output)
Answer: The error will not be carried forward into any meaningful calculations. This is to approximate use.

Suggestion: It would be good to communicate about the flow disturbance index that it is least disturbance instead of most disturbance since it is percentile based.

Suggestion: Consider adding groundwater pumpage data to the index.

Question: were indexed metrics weighed equivalently?
Answer: The metrics were (percentile) weighed equally based off mean annual flow. Staff is trying to understand the threshold to identify natural flow. Should we consider other variables like disturbance.
Follow-up question: Road density, fragmentation index, artificial stream pathway metrics were not included in the final evaluation.
Answer: correct, staff welcome feedback on whether to consider disturbance variables. Staff defined those as "natural streamflow" when considering characteristics.

GAP ANALYSIS

Question: What was the threshold for making the decision on the analysis
Answer: 2.0 was highly skewed and can't be used. Larger than 3-3.5 is closer to uniform distribution.

Question: What about using a rolling 30-year window instead of fixed to try and keep up with the changes as they occur? That would allow for more updated information on a regular basis.
Answer: Staff hope to perform more regular updates in line with other agencies to gather data more frequently.

Question: Are the random selection of dates biased towards high and low flow? Are there ways to look at missing data and see if there are biases that may not be reflected in the 50/80% collection.
Answer: Staff used data from 51 gaging stations in the form of random samples from 30 years of data. Data from gage stations that had missing entries was not used.

Question: How did staff assess that 20/50/80% were sufficient to characterize the flow duration curve?
Answer: These are the three commonly used requirements used for exceedance levels for water rights.
Suggestion: That is an administrative requirement, not a scientific requirement. So, allowing for other percentages might capture lower end of the curve. Expanding the percentiles or exceedance values may simulate reality more accurately.

Question: Are flow duration curves calculated for 1991-2020 water years (30-year period).
Answer: Yes, they were calculated monthly (30 years of data for each calendar month)
Follow-up question: How does that get translated into 80% reliability
Answer: Every month had to pass the criteria.
Suggestion: If using single flow duration curve that indicates wet/dry years, it will be important to provide what 80% reliability means so public can know what to expect year to year.

STATIONARITY ANALYSIS

Concern/suggestion: Using water years 1991-2020 as a base period is a good idea that considers warming temperatures on the hydrological curve. But looking ahead, staff may want to maintain signal given loss of snow. The conditions from 2000-present have been dry so there could be a bias on the choice of time period that has been selected.

Concern/suggestion: stationarity data is not biased if there are varying conditions. Establishing a threshold may be beneficial.

Question: Why is there a 10-year Mann Kendall analysis instead of year by year?
Answer: staff would have preferred to use 30-year percentile but that would result in few data points. So, ten was intermediate, closest way to collect duration curve. Staff saw that variance for the time series was easier to capture at a smaller rate and pick up more subtle trends on more annual series.

Follow-up response: Adam Stonewall has information on more approaches to gather that information and will follow up with Cortney.

Spencer: stationarity analysis – cascades (east side), but some of the data was significantly west side of cascades during summer months.

Cortney: number of plots there were few significant results except on east side. The appendix will reflect more data on both sides of the cascade. Moving window analysis resulted in west side.

Suggestion: If staff are interested in using other non-stationarity analysis other ideas. Sean Fleming has some resources he can share like AIC (trend/no trend) to give a better balance of evidence. Staff is open to more discussion on other ideas.

Suggestion: Several members did not agree with considering excluding streams that have significant trends (low/high). There is a lot of uncertainty unless you can identify non-climate disturbance. Members cautioned eliminating gages based on that.

GAP AND STATIONARITY ANALYSIS FEEDBACK

Suggestion: Gap and stationarity analysis could be less separate. Bring them together more. (i.e. Random sampling of gap analysis is basically buffering against non-stationarity. So alternatively take contiguous 10-year periods which is more realistic for short record sites. This also helps with climate oscillations and could potentially identify short periods that are more normal climate conditions. Recommendation to expand the number of gage stations that can be used.

Concern: Staff should look at significance of using non-stationarity data since it might present as a bias. Recommend staff proceeds cautiously with that data.

Other feedback: Since there is data needed in the Klamath area, there was recommendation to use information from the Klamath tribes since water rights enforcements took place in 2017.

Question: Are these historical or dynamic statistical models?
Answer: This model is not a forecasting model. Historical information was used to represent near-term conditions. WARS relies on geostatistical information.

Suggestion: Recommendation to consider using a dynamic model.
Response: Staff is trying to achieve the business needs within scope of the project but are looking at PRMS for physical approaches and understand how we can use that to support this project.

Question: Were there more lengthy reports or appendices that are available for TAG members to receive for GAP and Stationarity analysis?
Answer: Staff will reach out with a method for members to receive larger files in the future and the analysis appendices mentioned in today's meeting.

NEXT MEETING

- The next TAG meeting will be on April 7, 2026.

Members are encouraged to reach out to Ryan Andrews, Ryan.M.Andrews@water.oregon.gov if they have questions or concerns.