

Decision Making

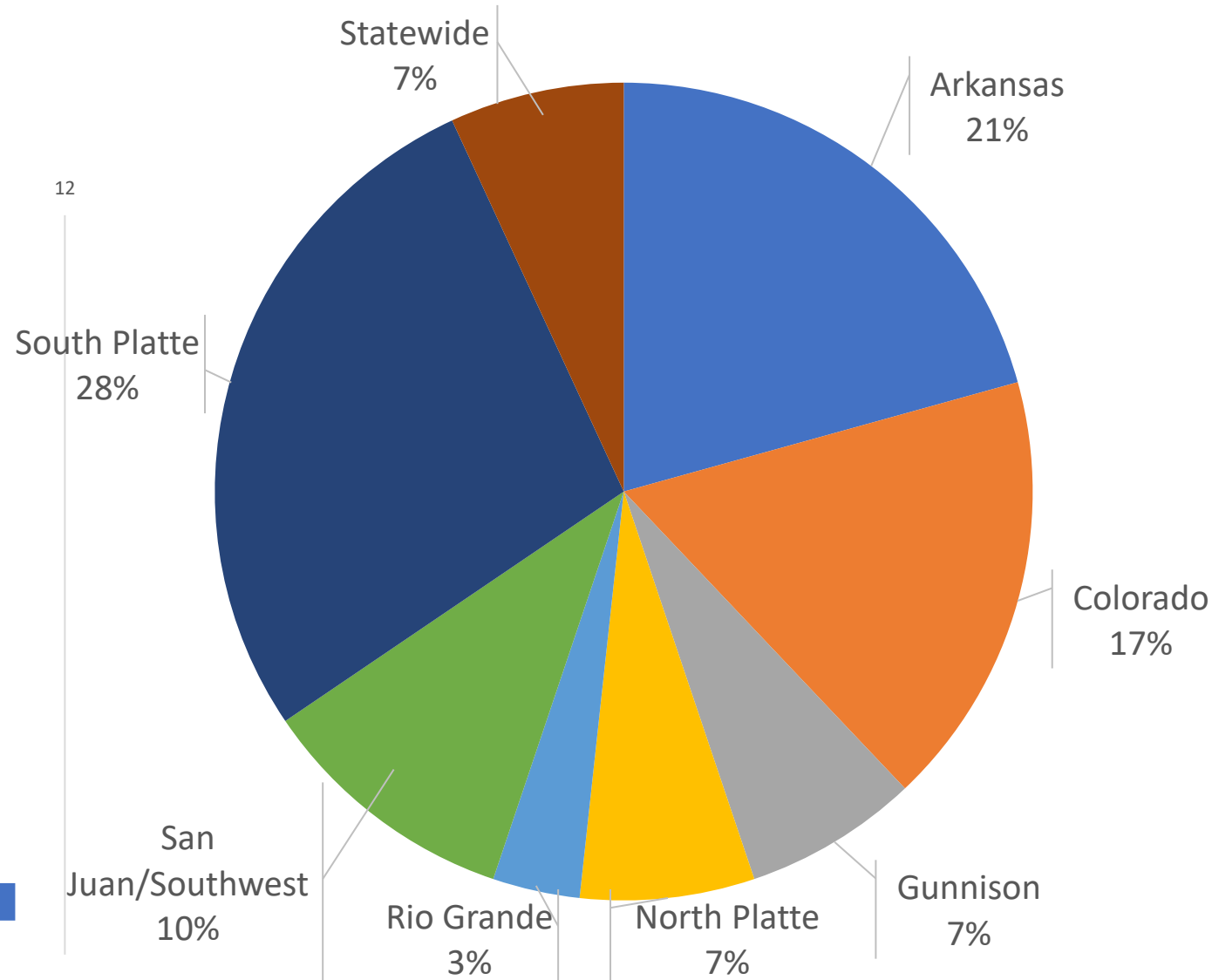
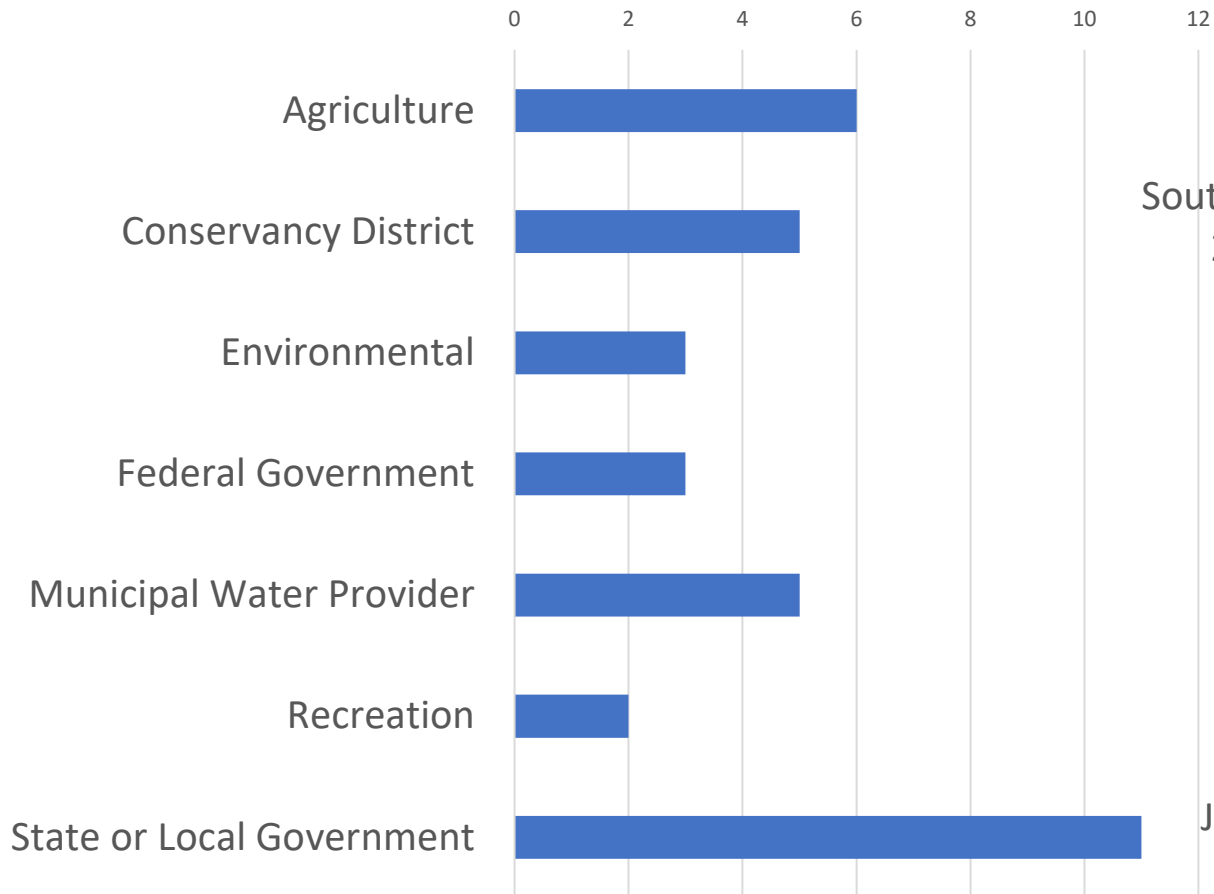
Insights on how members use snowpack and streamflow forecasting tools, ASO data, and other products to make decisions



Survey Results

22 survey responses

Respondent's sector(s)



High-Level Summary

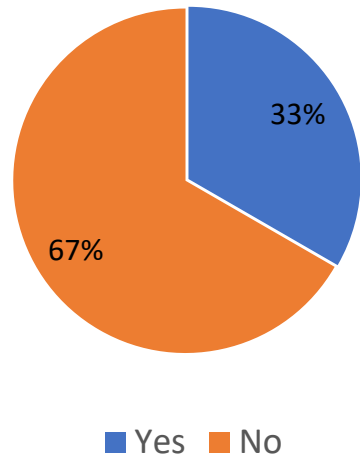
- Higher accuracy, earlier forecasts, and easy to integrate data are priorities for users
- Data is abundant; each agency uses and integrates data in various capacities
- Snowpack levels and streamflow forecasting are most important during extreme high or low years
- Recent years and changing climate conditions have changed the way users make decisions regarding water supply



ASO products



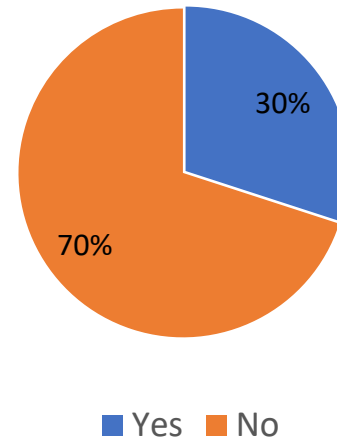
Did you use ASO snowpack data this year?



Used for:

- Qualitative comparison
- Verification

Did you use ASO snow albedo (i.e., how dirty is the snow surface) data this year?

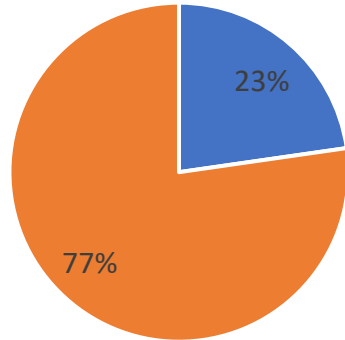


Used for:

- Anticipating speed of runoff and peak timing

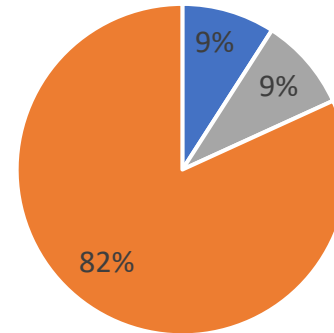


Did you use the experimental CBRFC ASO-informed streamflow forecasts in your decision making operations this year?



■ Yes ■ No

Did you use ASO/NCAR WRF-Hydro streamflow forecasts in your decision making operations this year? If so, how did you use these forecasts?



■ Yes ■ Looked at but did not integrate ■ No

Used for:

- Qualitative comparison
- Verification



What challenges have you experienced with accessing and interpreting ASO data/data reports?

- Hard to use with models that weren't calibrated with historical ASO data
- Not available in real-time
- No data available in my area



For the stakeholder group that you represent (i.e. water utility, agriculture, rafting, etc.), in what ways could CASM do a better job of distributing ASO data and improved streamflow forecasts to that group?

- More communication that data are released and available to review
- Data should be available through a portal/online dashboard
- Support for water conservancy districts to help disseminate data to smaller groups
- Summarized document by basin
- Data formatted in excel or csv file rather than pdf



Aside from improving the accuracy of streamflow forecasts, how could streamflow forecast products be more useful to you?

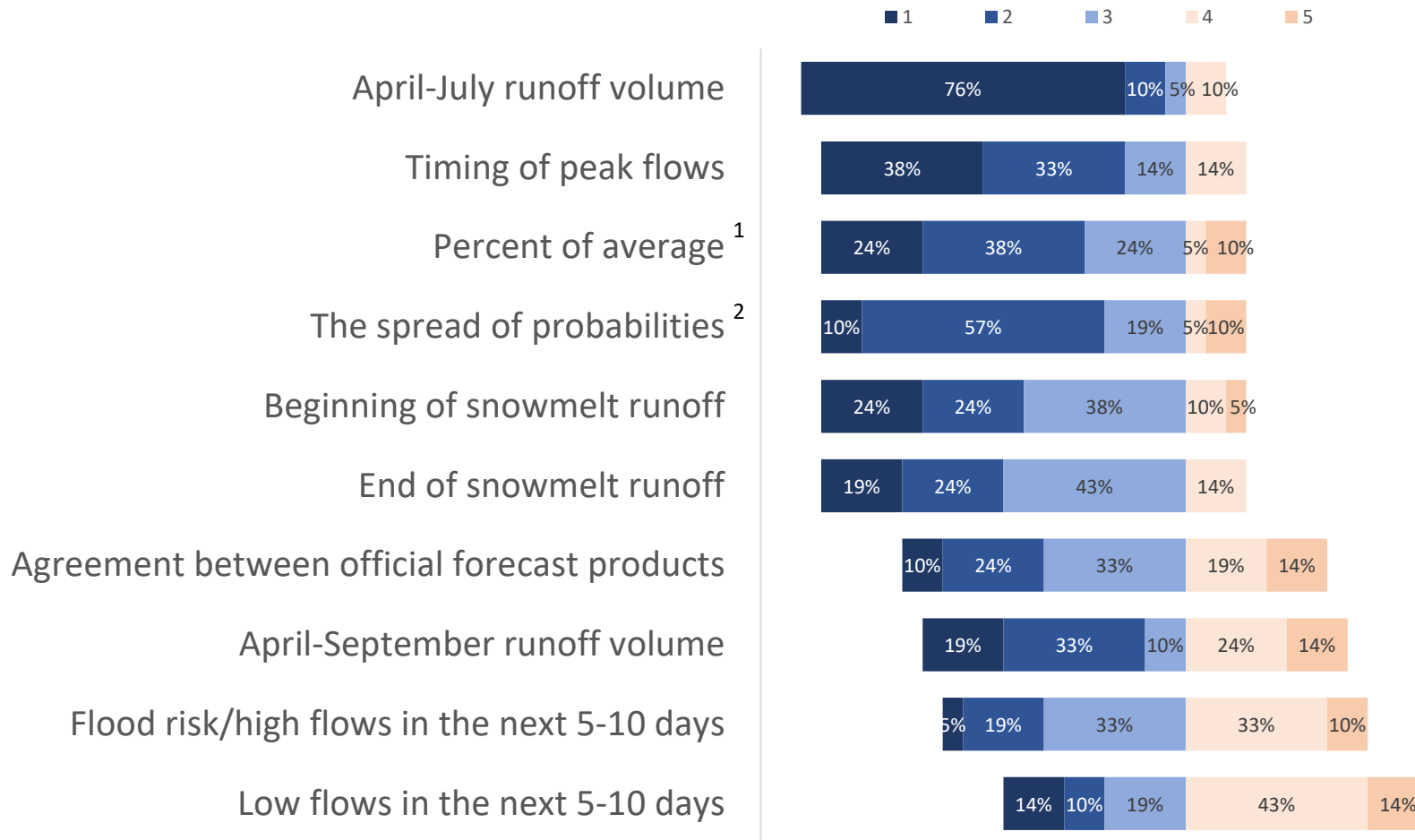
- Integration of monsoon season flows
- Potential call scenarios
- More site-specific forecasts
- More advance notice
- Integration of relevant water rights into the forecast (e.g. Could a forecast say that water rights prior to XXXX year have a very low change of getting into priority)



Streamflow forecasting



Rank the information that is most important to you in a streamflow forecast, with 1 being the most important and 5 being the least important.

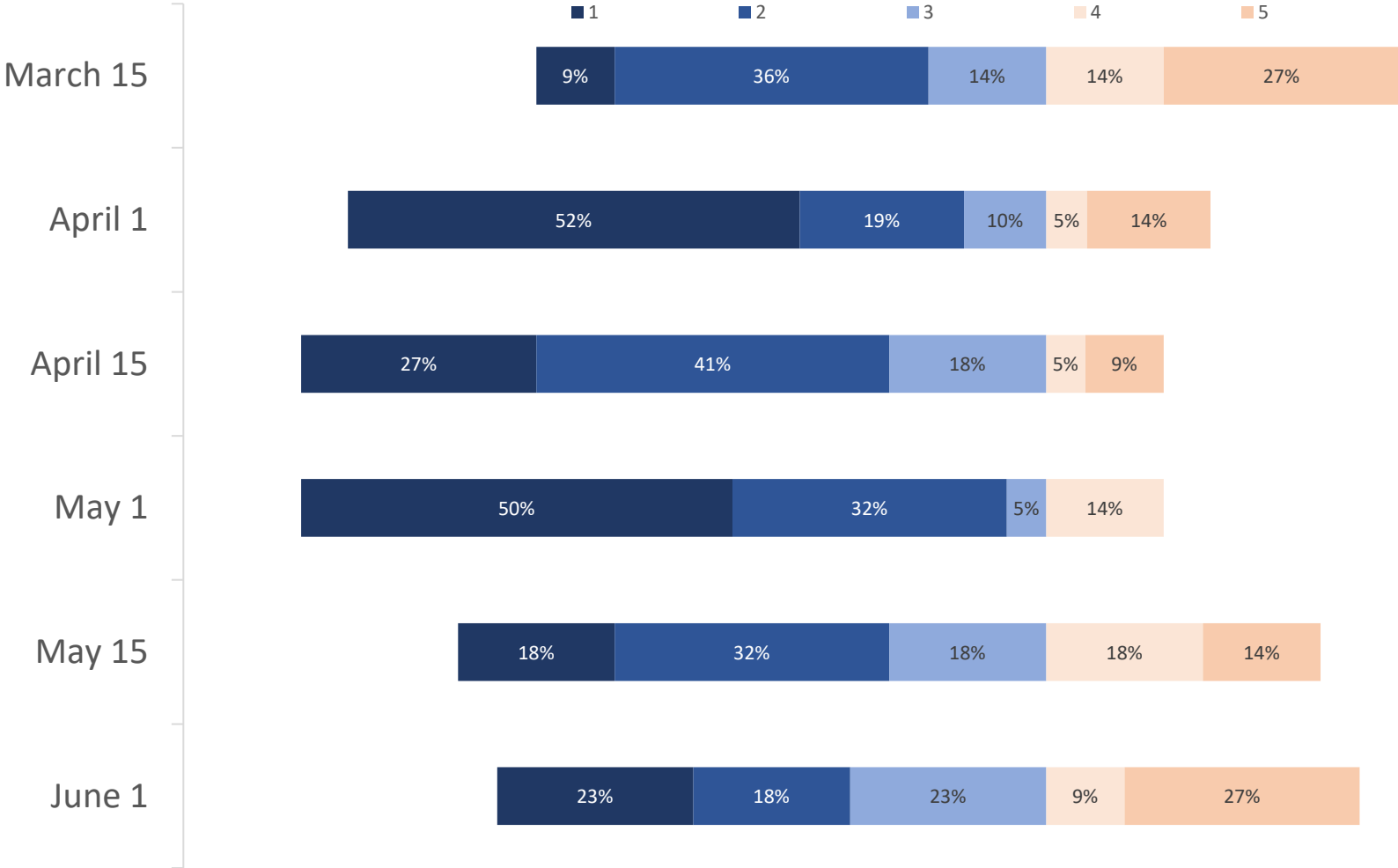


¹ e.g., below average/average/above average compared to historical conditions

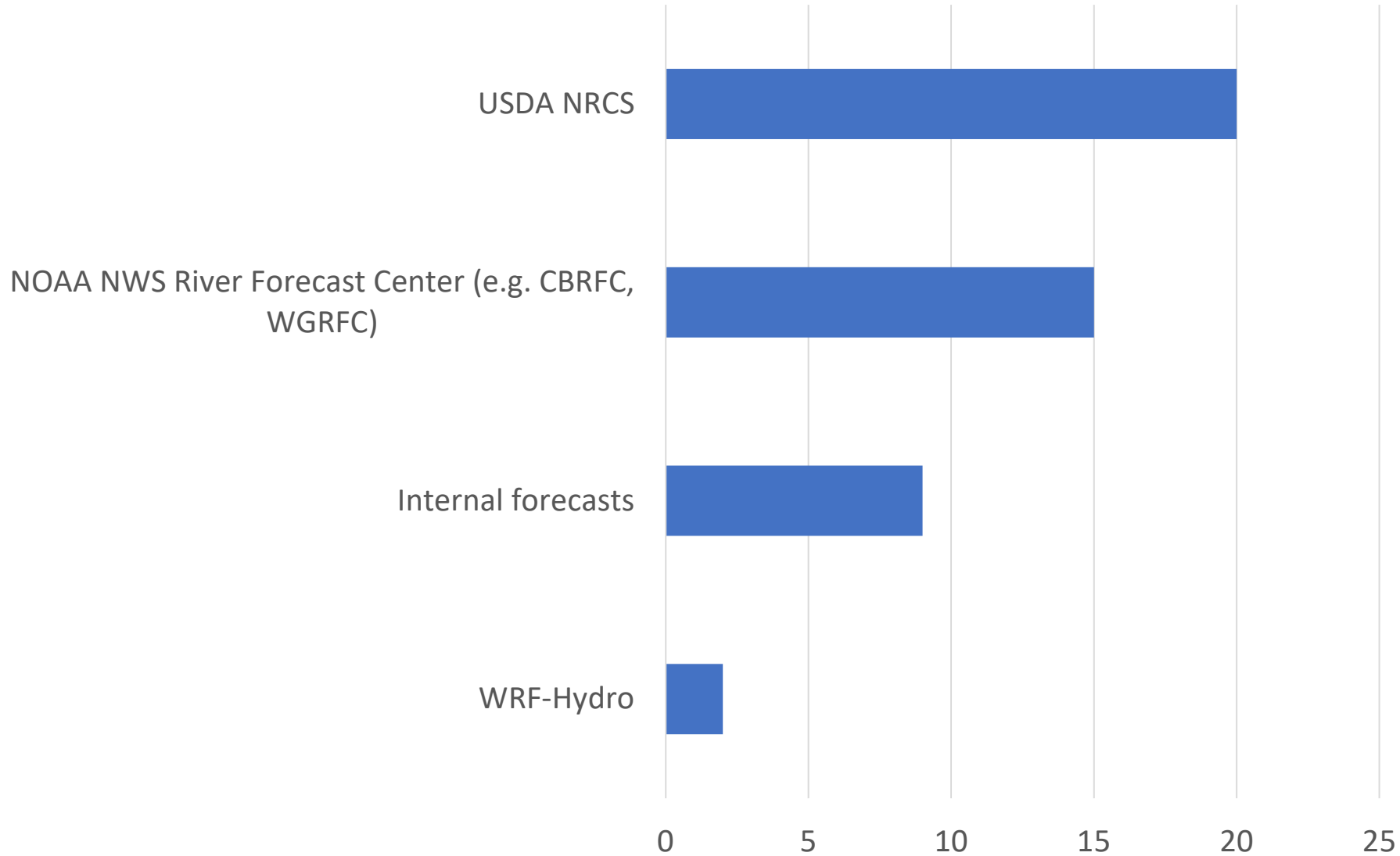
² e.g., is it a very certain or highly uncertain forecast?



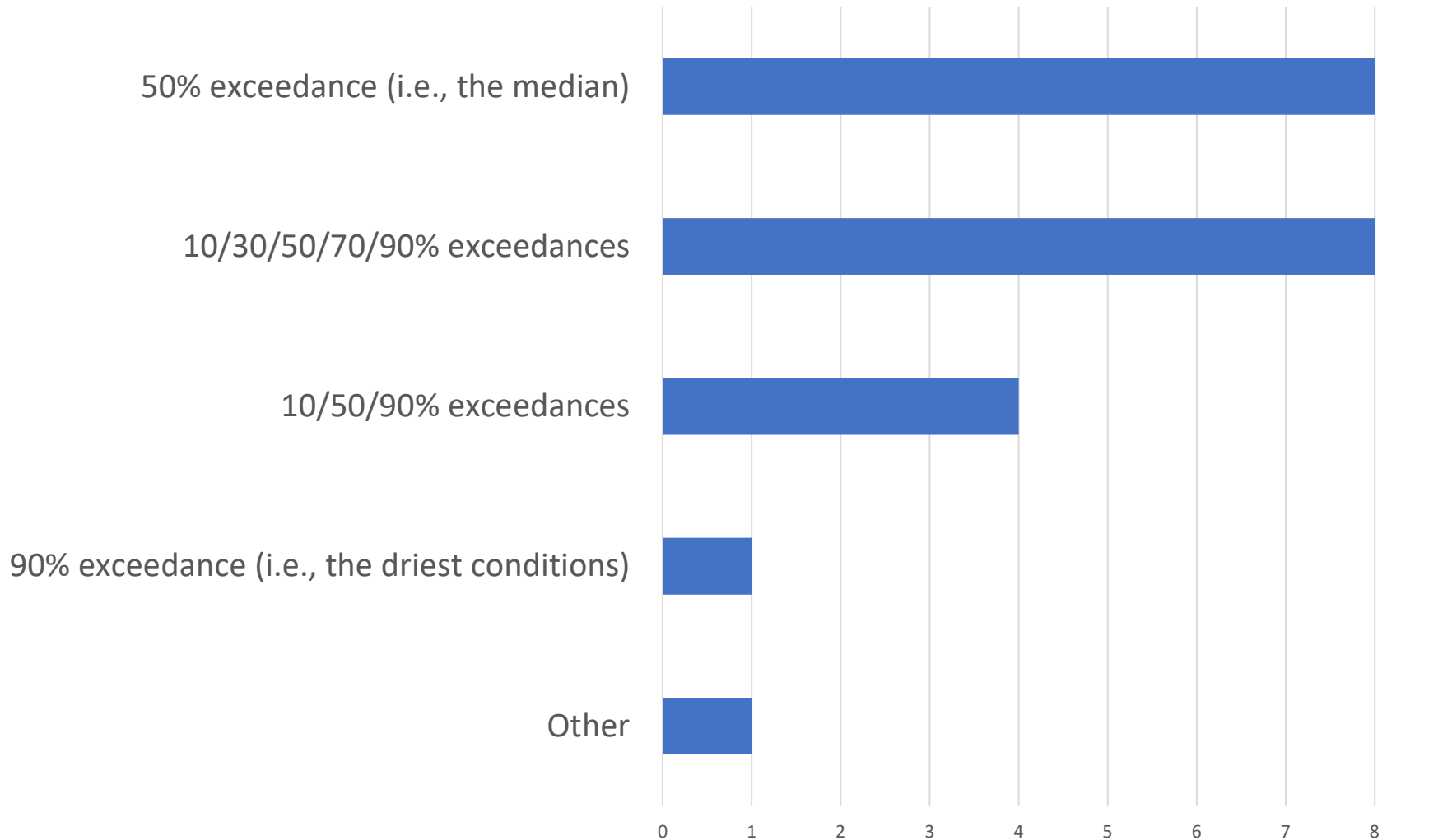
Rank the dates when seasonal forecasts are most important for decision making, with 1 being the most important and 5 being the least important.



What seasonal water supply forecasts do you use in your decision making?



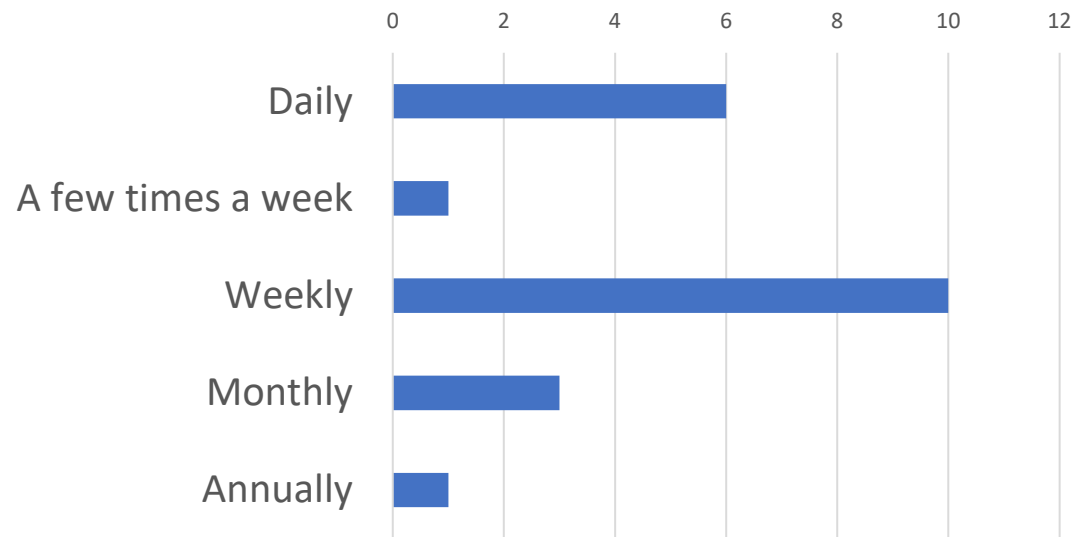
When making operational decisions based on these water supply forecasts, what exceedance probabilities are most helpful to you?



How do you use SNOTEL, Snow Course, or other manual snowpack measurement data to inform your decisions?

- Monitor specific sites, not entire basin, as certain sites are better indicators of actual runoff
- As early warning system for type of upcoming year
- Statistical and machine learning models
- To determine reservoir releases and water sales
- Reservoir operation planning, potential water supply
- Linear regression relates SNOTEL sites to yield
- To calculate projected storage, which helps determine drought stages

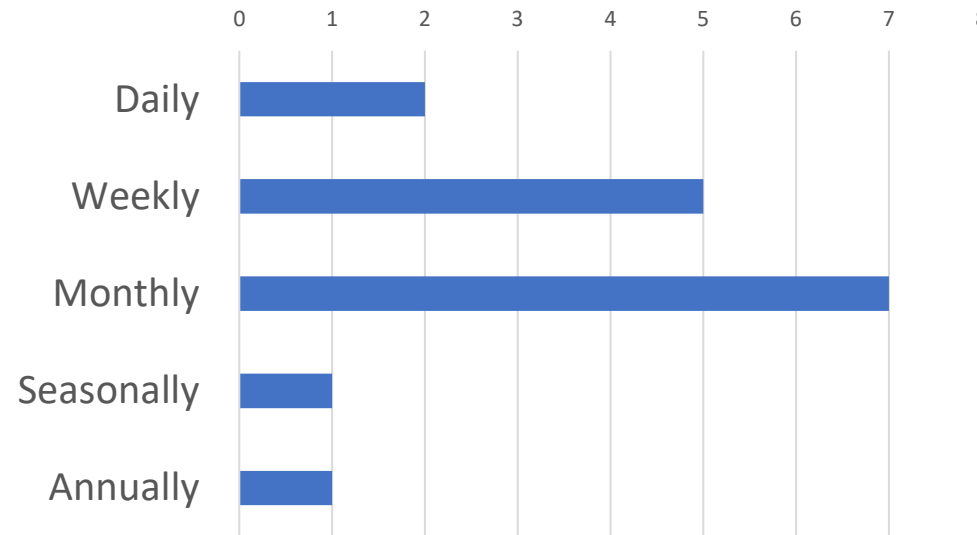
How often do you review SNOTEL, Snow Course, or other manual snowpack measurement data?



How do you use River Forecast Center Forecasts or NRCS runoff forecasts to inform your decisions?

- Just for review
- Incorporated into our suite of forecasts we use
- To help determine reservoir releases, contractual obligations, allocations, operations

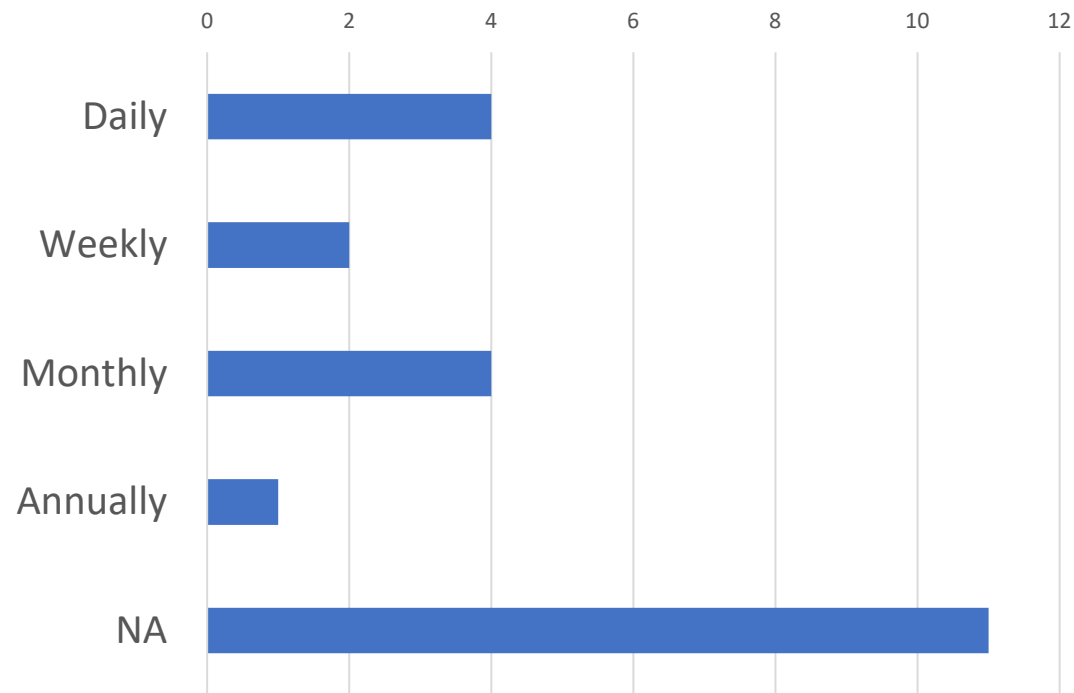
How often do you review River Forecast Center Forecasts or NRCS runoff forecasts?



From what other water agencies do you use information from to inform your decisions?

- BOR
- CDSS calls
- State streamflows
- Homestake catchment snow data
- Northern Water quota allocation
- Center for Snow and Avalanche Studies
- C-BT and Windy Gap projects

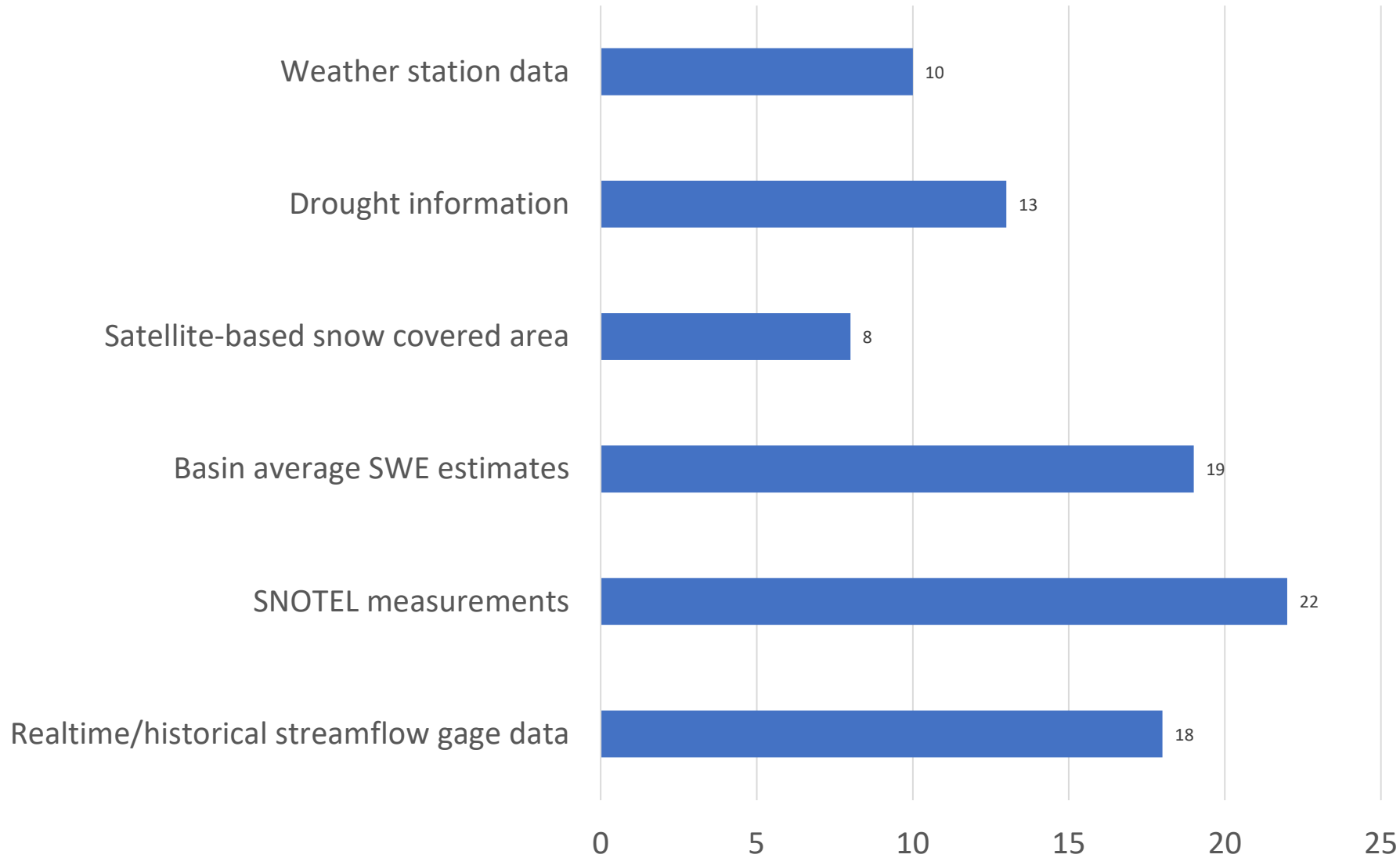
How often do you review data from other water agencies?



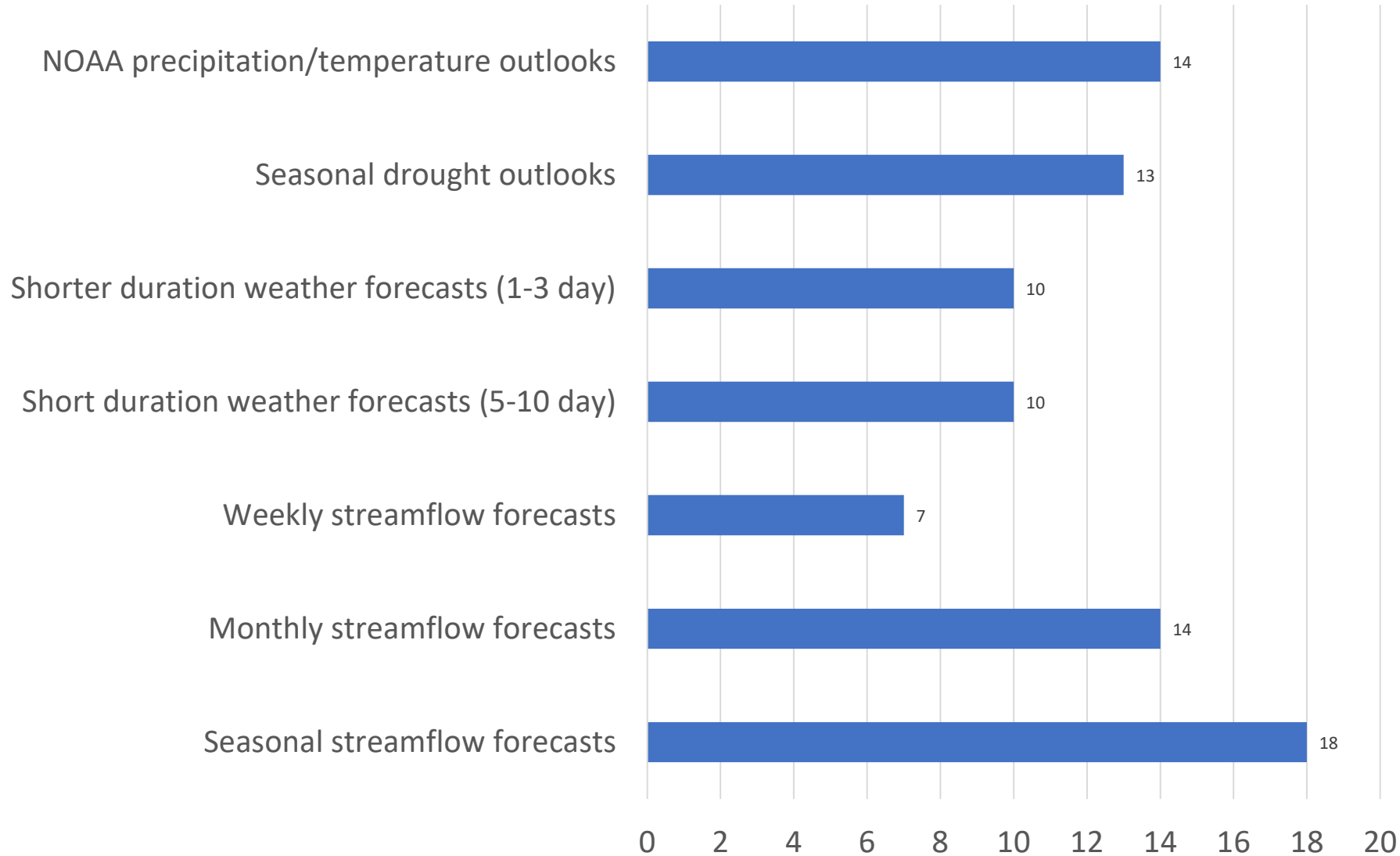
Decision making



To make your water resources planning decisions,
which of these observations do you use?



To make your water resources planning decisions, which of these forecast types do you use?



How does snowpack information and/or streamflow forecasting guide your decisions in determining...

- drought stage and drought response measures?
- regional water supply planning?
- reservoir operations (releases, storage, exchanges, leases, etc)?
- irrigation water supply and/or agricultural planning?
- actions for flood control?
- project operations and possible funding needs?
- compact obligations or water rights obligations?
- environmental flow planning?
- boating/rafting/angling decisions?



How does snowpack information and/or streamflow forecasting guide your decisions in determining...

regional water supply planning?

- Compacts rely on snowpack and streamflow forecasting to determine how much we can use in Colorado as opposed to sending it down to other states
- Snowpack info helps us plan C-BT rental revenue and water sharing agreements
- Helps us determine how much water we rent versus store
- We must plan for less hydroelectric during drought, so we have to fill gap with wind and solar
- Drives anticipated allocations
- Helps us anticipate C-BT quota
- Helps us determine alternative water supply availability

