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WISDM

Watershed Integrated System Dynamics Modeling

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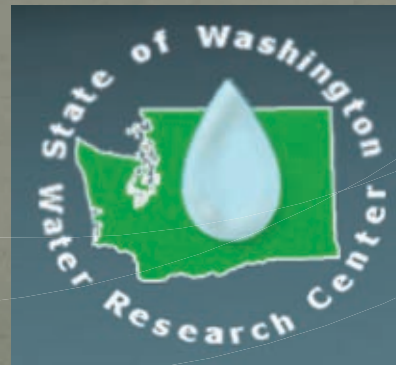


CLARK
UNIVERSITY

CWU Central
Washington
University
Learn. Do. Live.

University
of Idaho

Oregon State
UNIVERSITY OSU



BioEarth



Biosphere-relevant earth system model

Academic science vs Agency science

- **Academic science** is the primary way of knowing about the world
 - It is a **community** of people who work together to advance the state of knowledge in a particular field
- **Agency science** is the primary way of knowing about the world that is **driven by a specific need or goal**
 - It is a **community** of people who work together to advance the state of knowledge in a particular field
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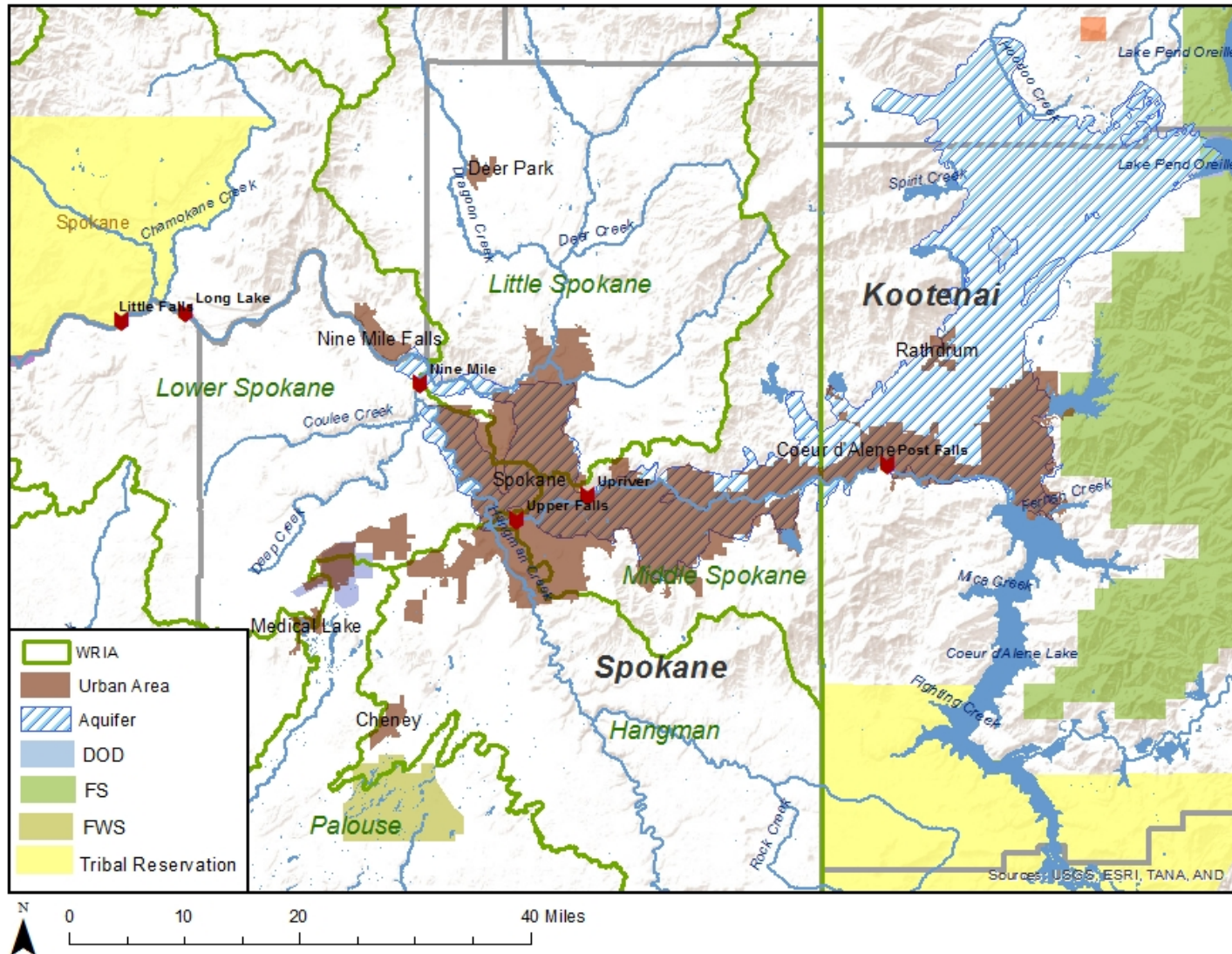
WISDM and BioEarth Stakeholder components

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? d??A?a??
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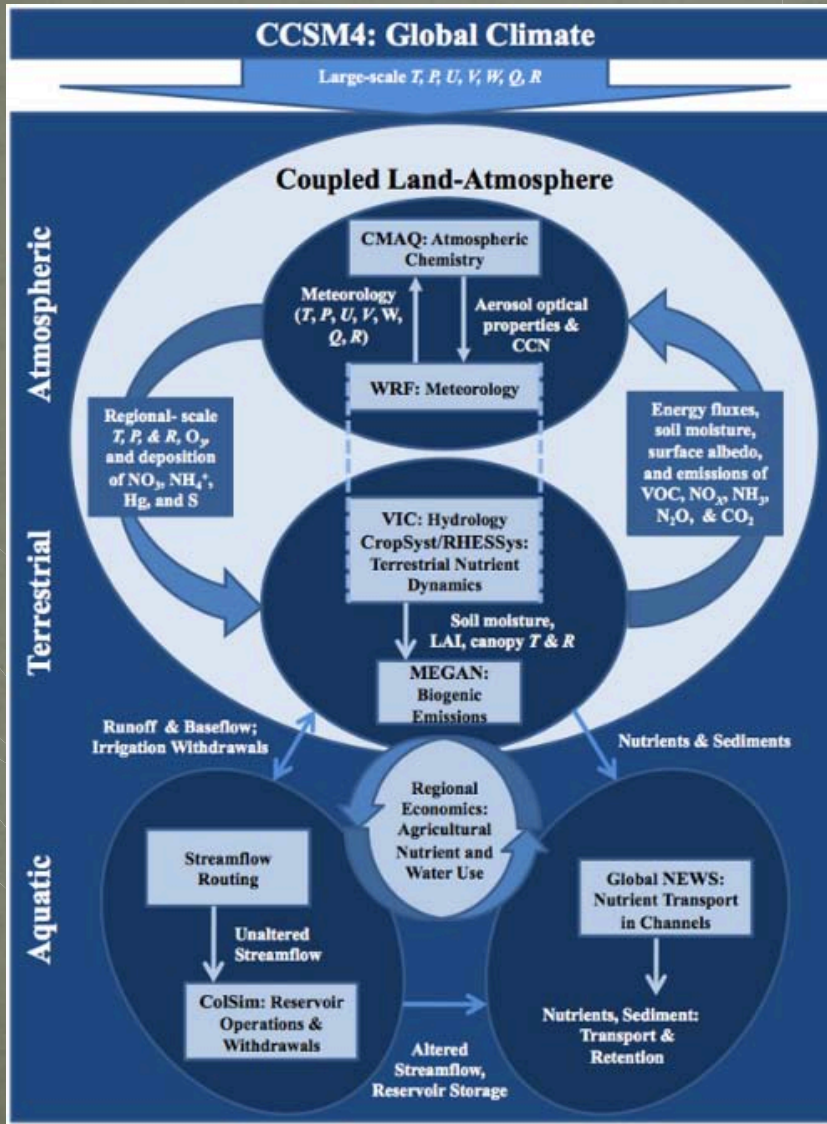
The WISDM mission

- The WISDM mission is a multi-wavelength survey of the sky, designed to measure the dark matter distribution and the evolution of galaxies. It will observe the sky in the optical, near-infrared, and radio bands, providing a comprehensive view of the universe.
- The WISDM mission will observe the sky in the optical, near-infrared, and radio bands, providing a comprehensive view of the universe. It will measure the dark matter distribution and the evolution of galaxies, and will provide a comprehensive view of the universe.
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Collaborative modeling in the SCC Envision a simulating Atlas



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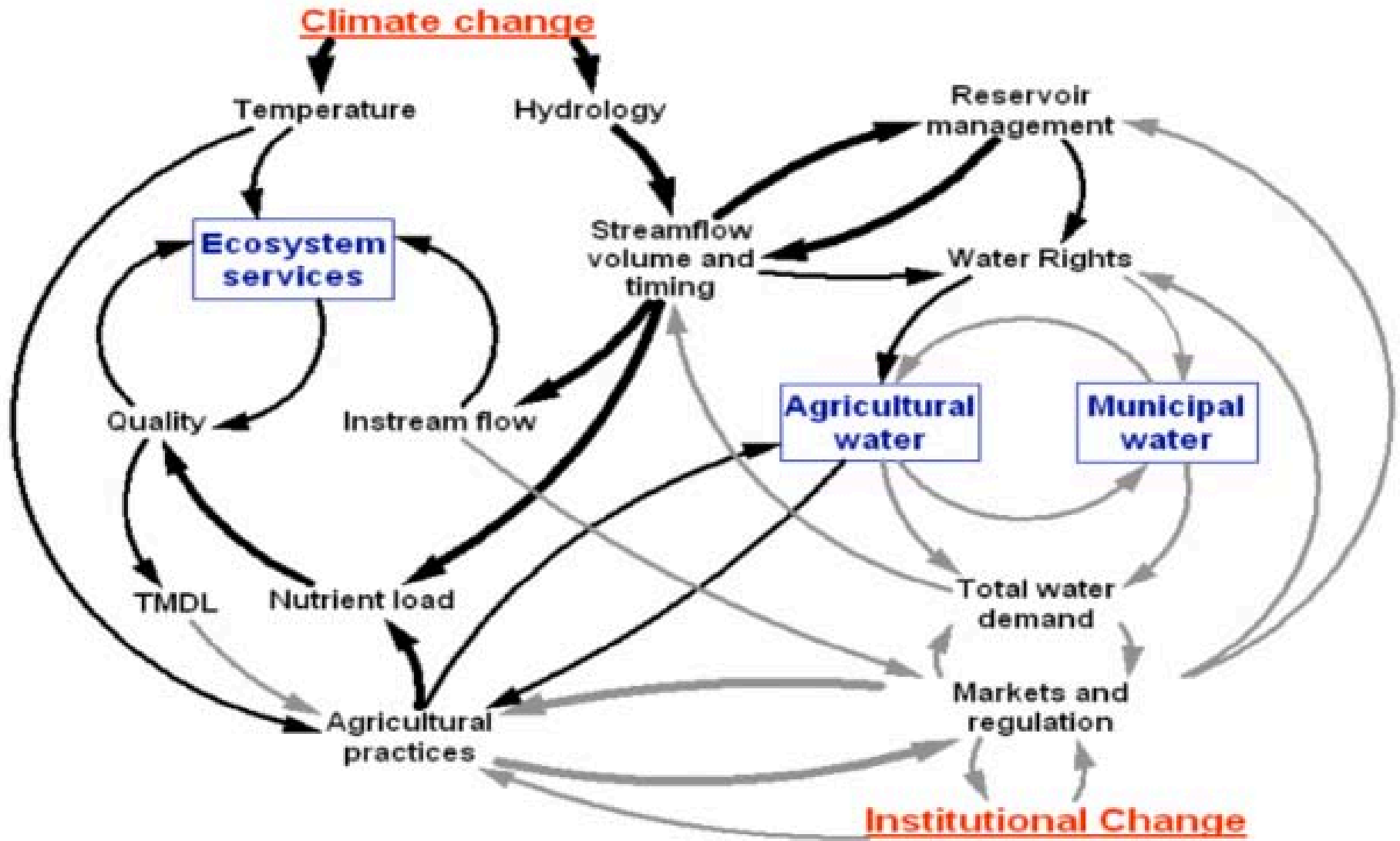
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Research and outreach

- Research due to its importance
- Evidence-based practice
 - We have a dedicated team at the University
- The MVII study
- The research is interdisciplinary and collaborative

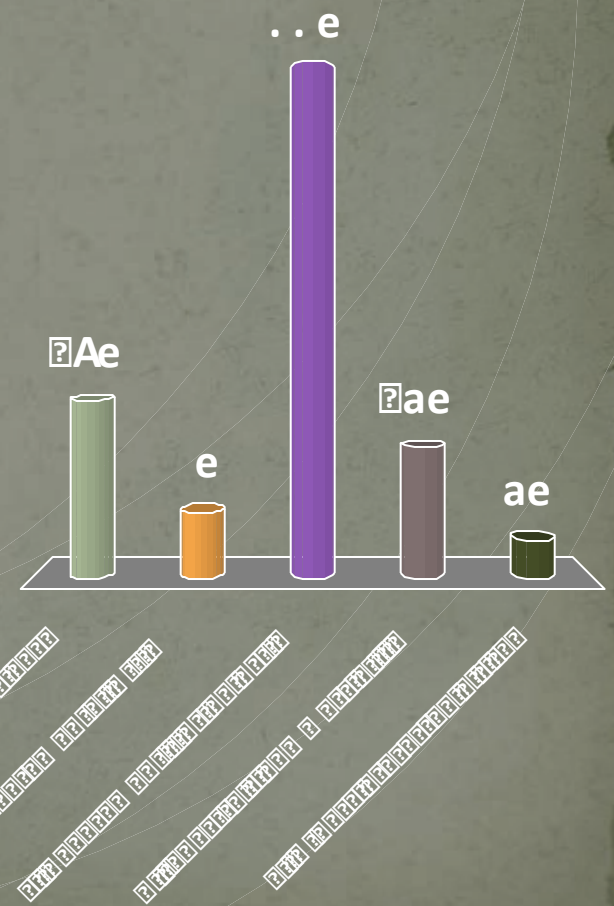


What is important to you?



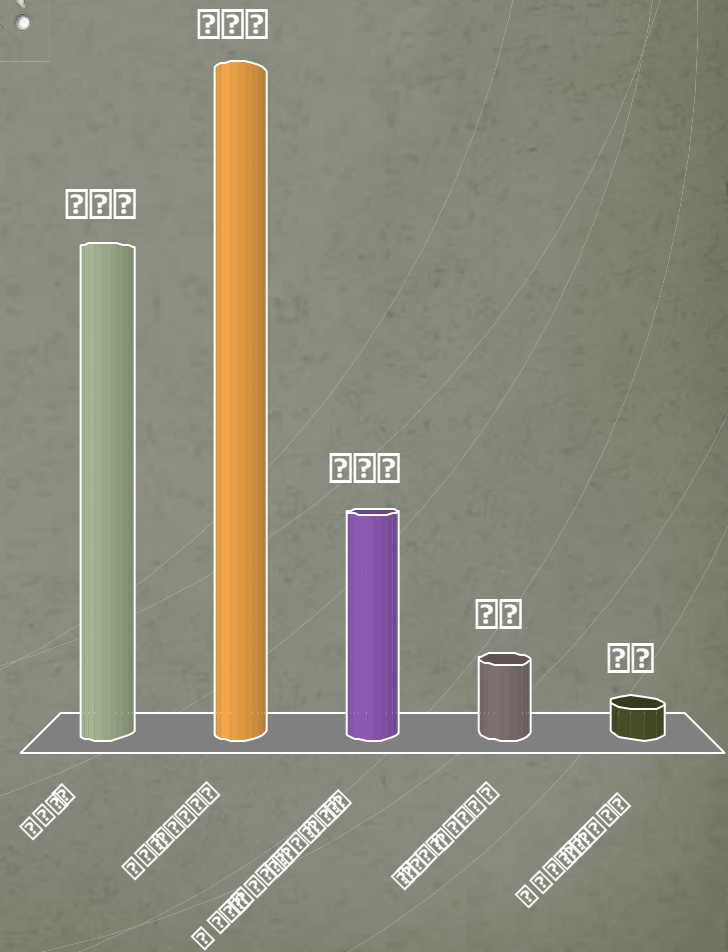
1. Which of these professional categories are you primarily associated with?

- [?] [?] [?] [?] [?] [?] [?] [?] [?] [?]
- [?] [?] da [?] du [?] ac [?] [?] [?]
- [?] [?] du [?] ac [?] [?] [?] [?] [?] [?] [?]
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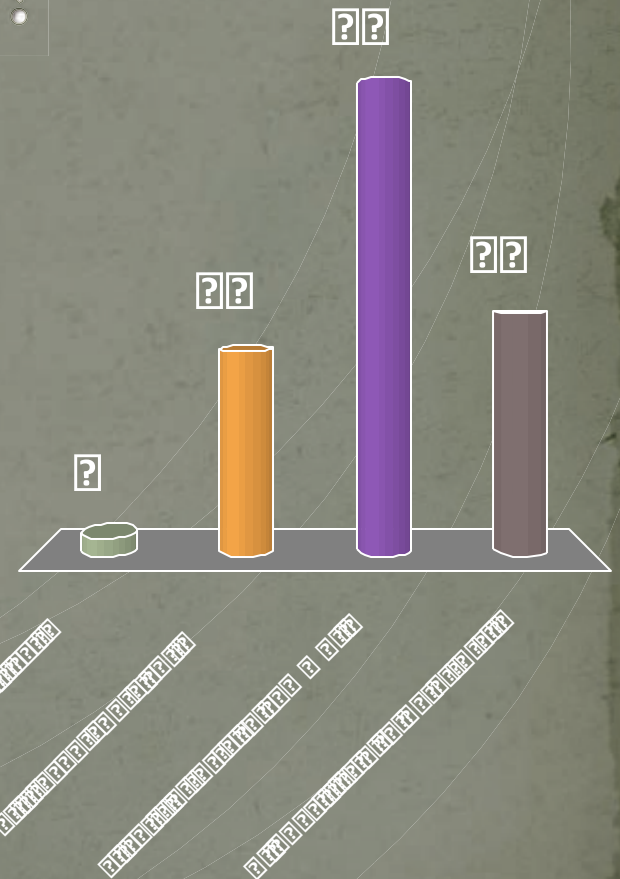
2. How relevant do you think academic research is to solving problems in this basin?

- a. Very?
- b. Relevant?
- c. Not particularly?
- d. Irrelevant?
- e. Don't know?



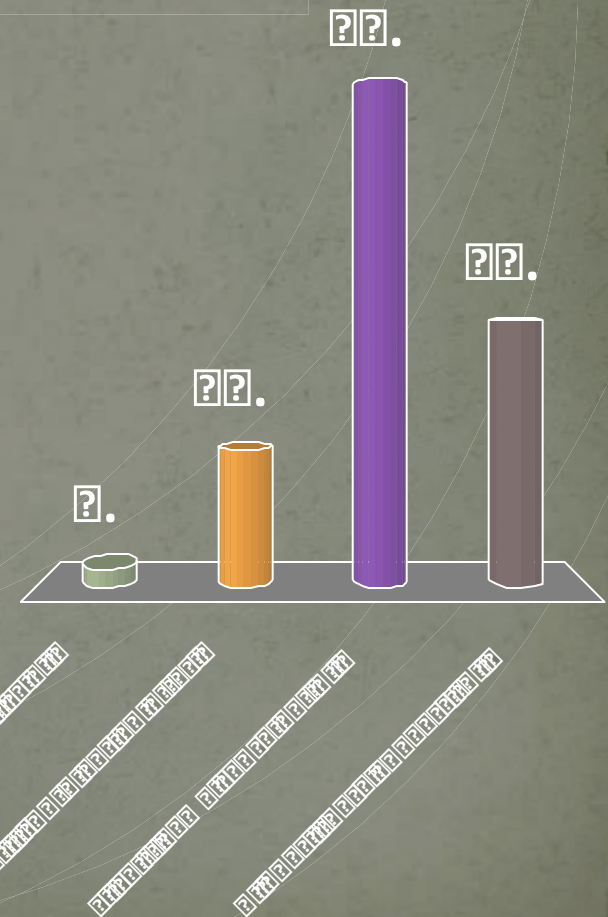
3. How well do you think researchers in academia communicate their findings to stakeholders?

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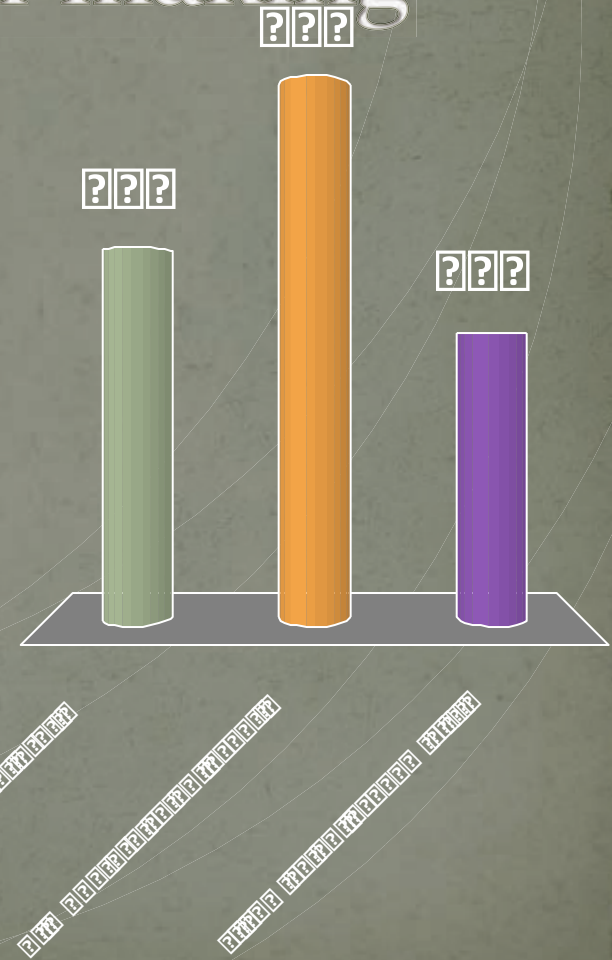
4. How well do you think researchers in academia communicate with each other?

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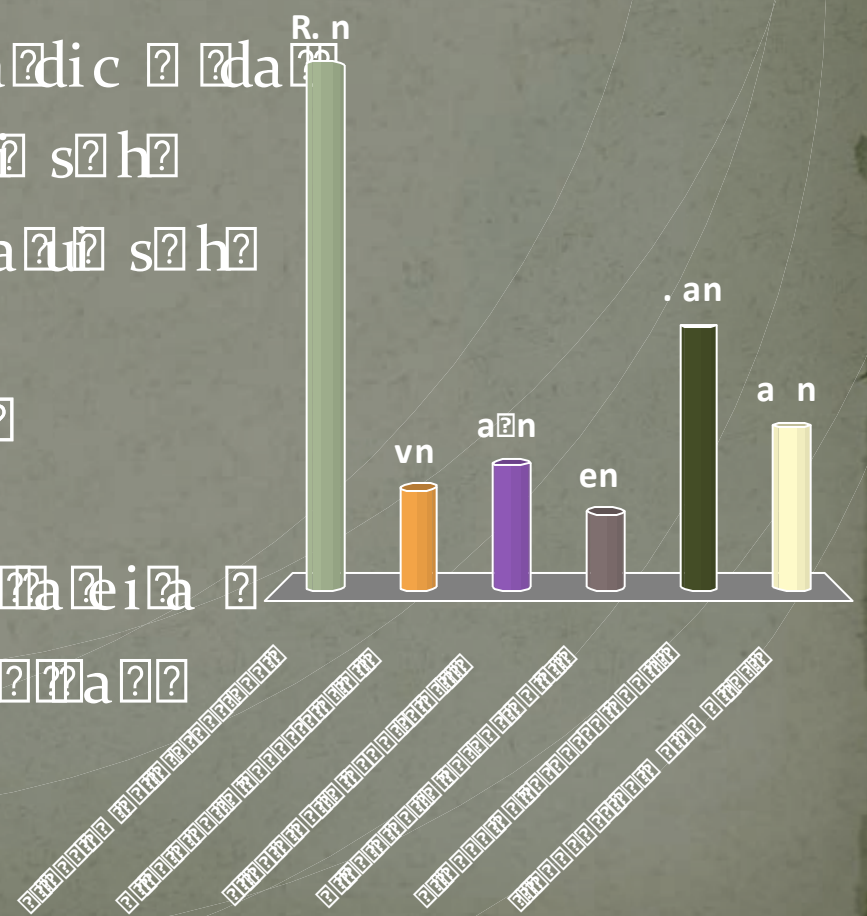
5. Which best characterizes your thoughts on the value of academic research in your decision-making processes?

- I think academic research is important in my decision-making process.
- I think academic research is somewhat important in my decision-making process.
- I don't think academic research is important in my decision-making process.



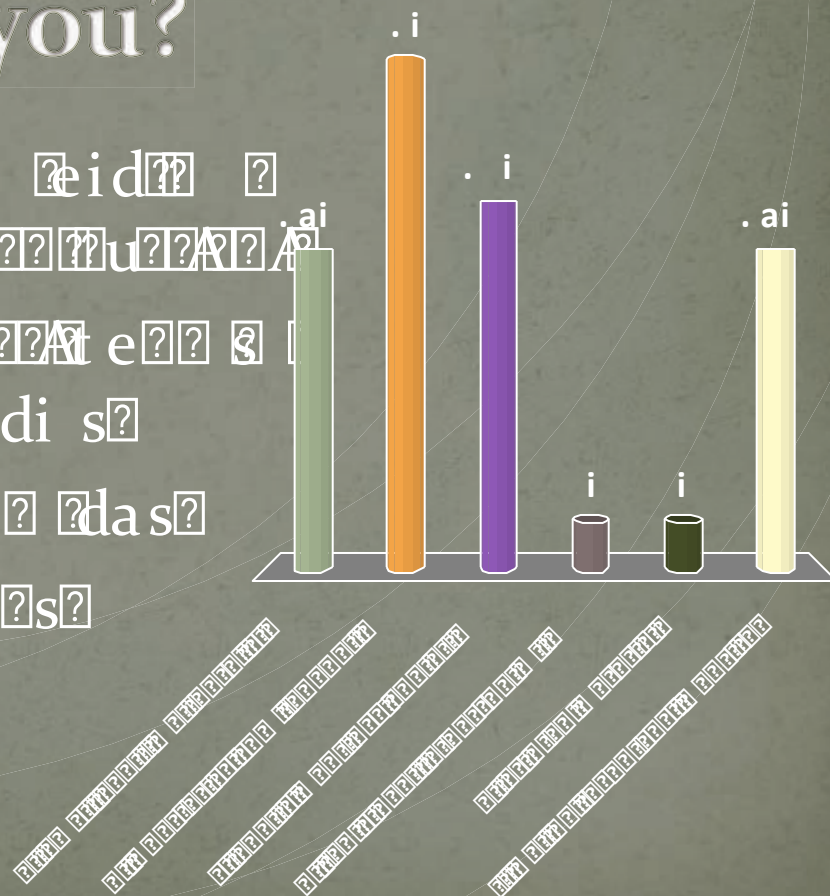
6. Where do you generally learn about academic research and scientific information?

- From my academic or research related database
- From a website search engine
- From a website search engine or internet database
- From a search engine or search engine
- From a search engine or search engine
- From a search engine or search engine
- From a search engine or search engine



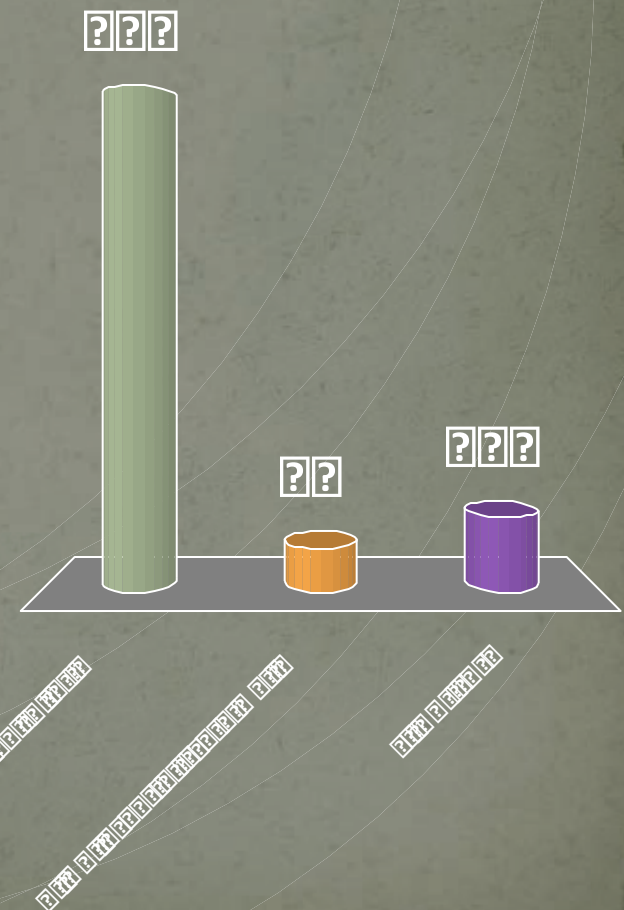
7. How could academic researchers at WSU and UI who are working in the Spokane River Basin best communicate with you?

- How can we best reach you? (e.g., email, phone, in-person, social media, etc.)
- What time of day is best to contact you? (e.g., morning, afternoon, evening)
- What language do you speak? (e.g., English, Spanish, etc.)
- How often would you like to be contacted? (e.g., once, twice, etc.)
- How do you prefer to receive information? (e.g., written, verbal, video, etc.)
- How do you prefer to provide information? (e.g., written, verbal, video, etc.)



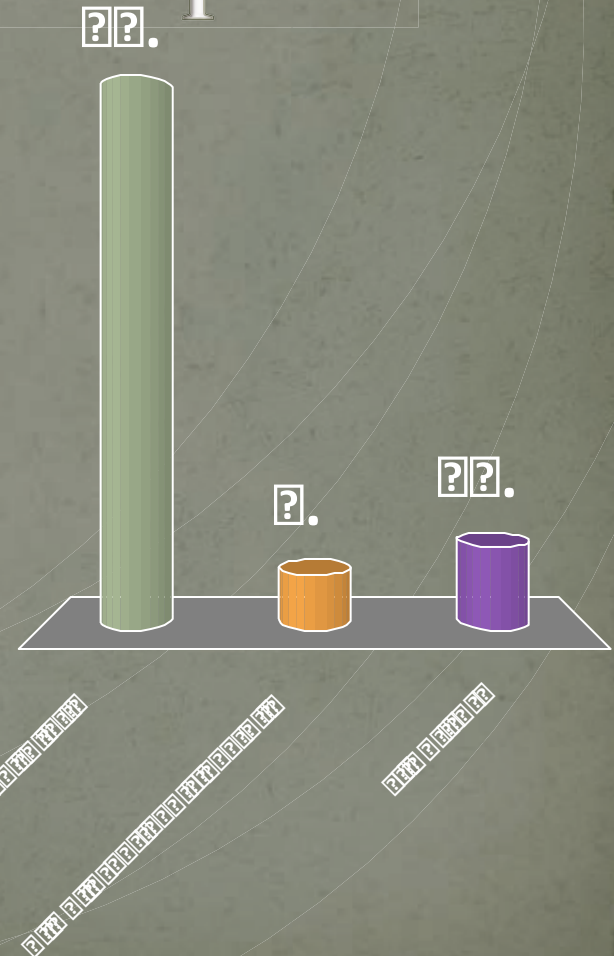
9. Are you interested in learning more about bi-state water management agreements used in the US?

- 100% very dt interested
- 100% dvt interested
- 100% dvt interested



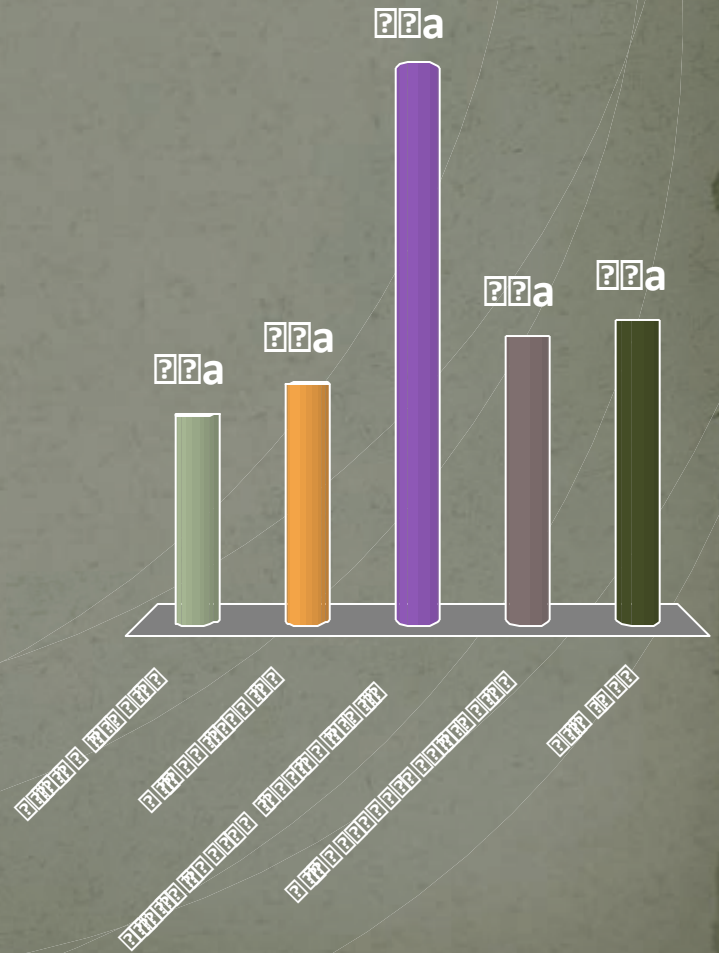
10. Are you interested in learning more about PCB and or toxics clean-up plans used in other parts of the US?

- How many of you are interested in learning more about PCB and or toxics clean-up plans used in other parts of the US?
- How many of you are interested in learning more about PCB and or toxics clean-up plans used in other parts of the US?
- How many of you are interested in learning more about PCB and or toxics clean-up plans used in other parts of the US?



8. Where should future research efforts in the Spokane River Basin be focused?

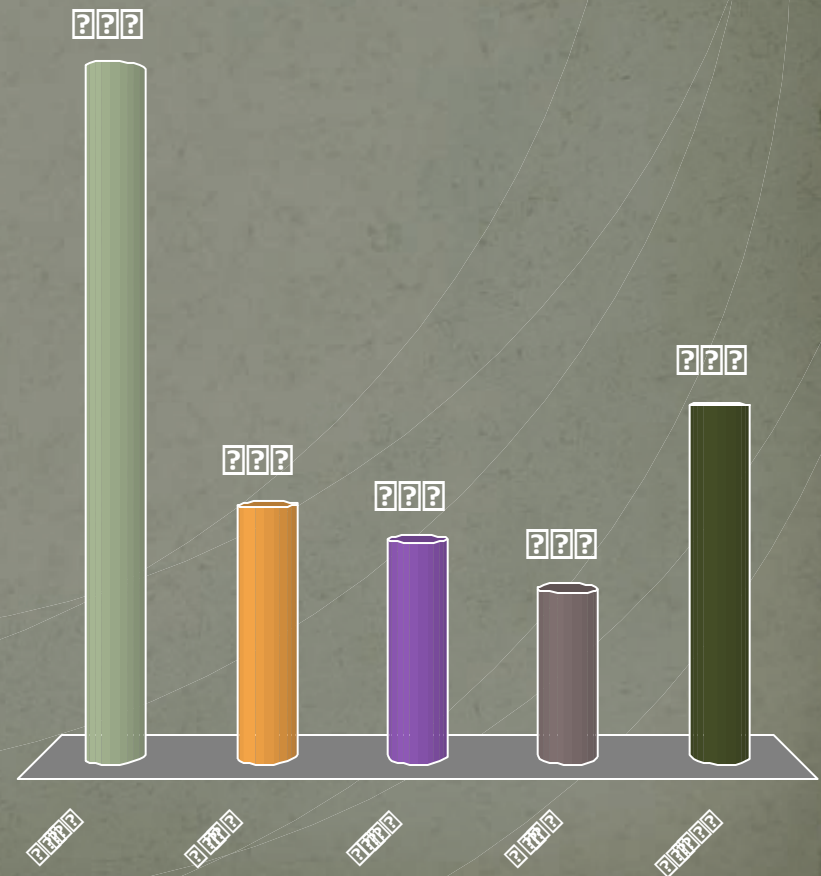
- **Water Quality**
- **Water Quantity**
- **Water Use**
 • **Water Conservation**
 • **Water Treatment**
- **Water Distribution**
 • **Water Infrastructure**
- **Water Policy**



II. In-stream Flows and Water Availability:

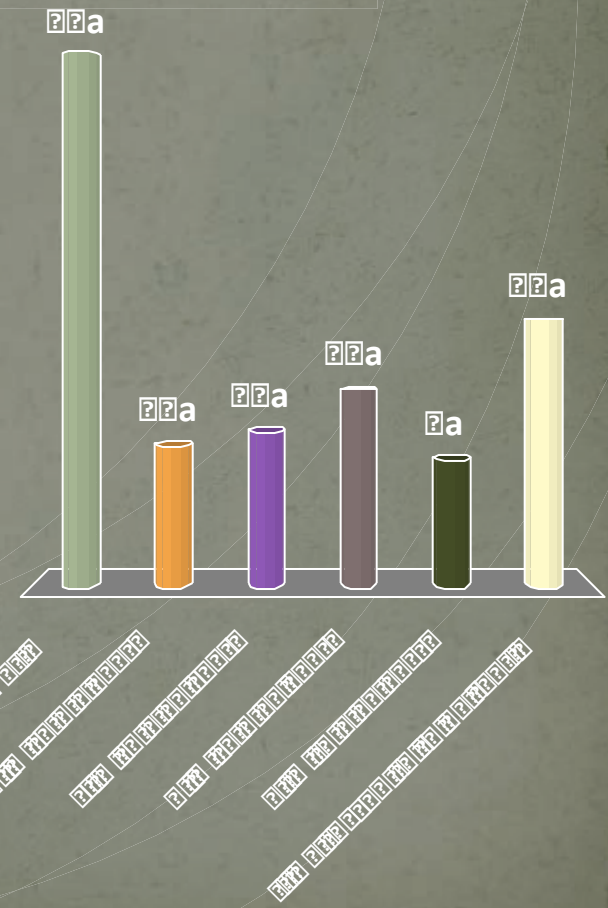
1. How much are you paying for 1000 gallons of water?

- [?] [b] [V] [S] [?]
- [?] [b] [M] [D] [?]
- [?] [b] [M] [M] [?]
- [?] [b] [M] [V] [?]
- [b] [?] [V] [S] [?]



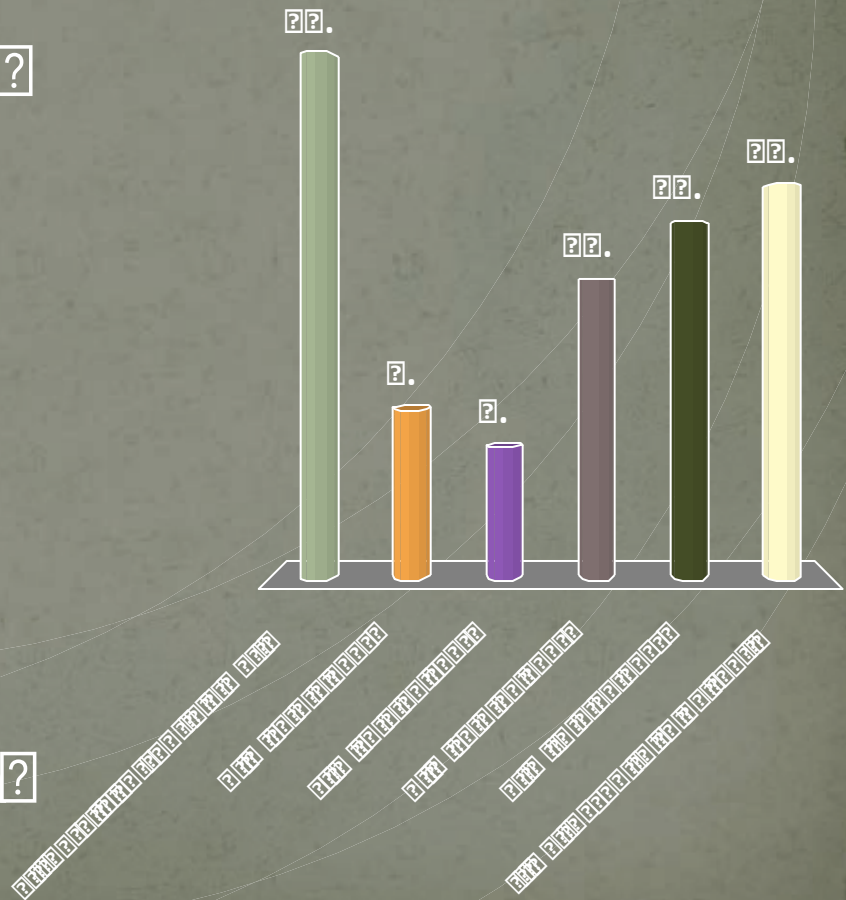
2. When do you predict there will be a surface water availability crisis in the Spokane River Basin?

- by 2025, 2030, 2035, 2040, 2045, 2050, 2055, 2060, 2065, 2070, 2075, 2080, 2085, 2090, 2095, 2100
- by 2025, 2030, 2035, 2040, 2045, 2050, 2055, 2060, 2065, 2070, 2075, 2080, 2085, 2090, 2095, 2100
- by 2025, 2030, 2035, 2040, 2045, 2050, 2055, 2060, 2065, 2070, 2075, 2080, 2085, 2090, 2095, 2100
- by 2025, 2030, 2035, 2040, 2045, 2050, 2055, 2060, 2065, 2070, 2075, 2080, 2085, 2090, 2095, 2100
- by 2025, 2030, 2035, 2040, 2045, 2050, 2055, 2060, 2065, 2070, 2075, 2080, 2085, 2090, 2095, 2100
- by 2025, 2030, 2035, 2040, 2045, 2050, 2055, 2060, 2065, 2070, 2075, 2080, 2085, 2090, 2095, 2100



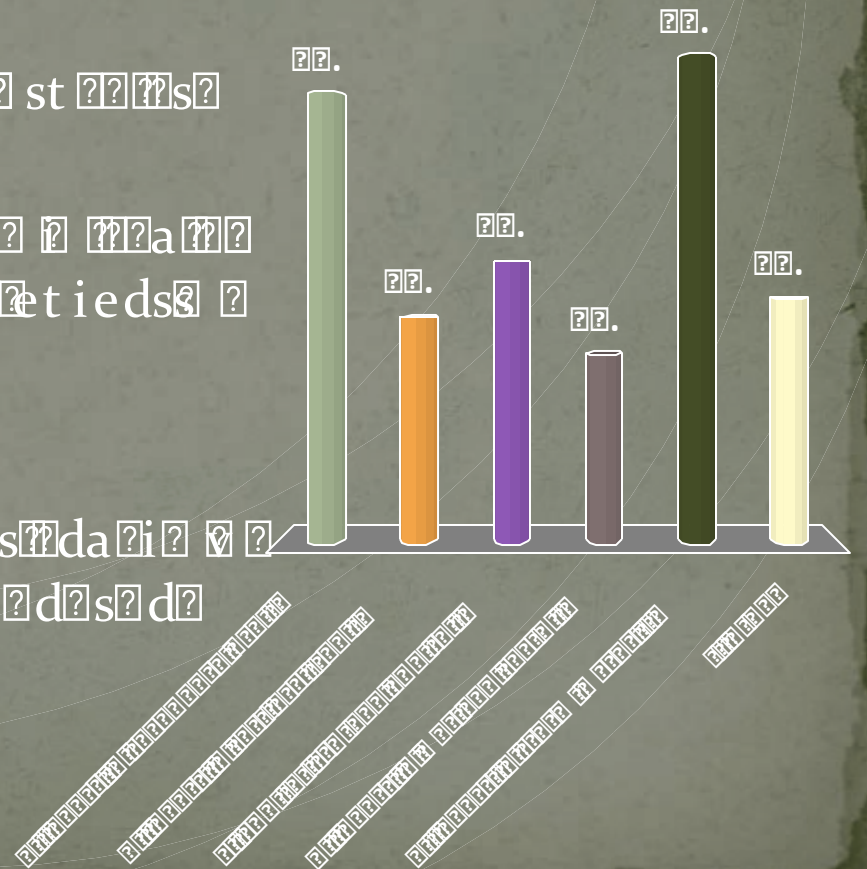
3. When do you predict there will be a ground water availability crisis in the Spokane River Basin?

- by 2010
- by 2020
- by 2030
- by 2040
- by 2050
- by 2060
- by 2070
- by 2080
- by 2090
- by 2100



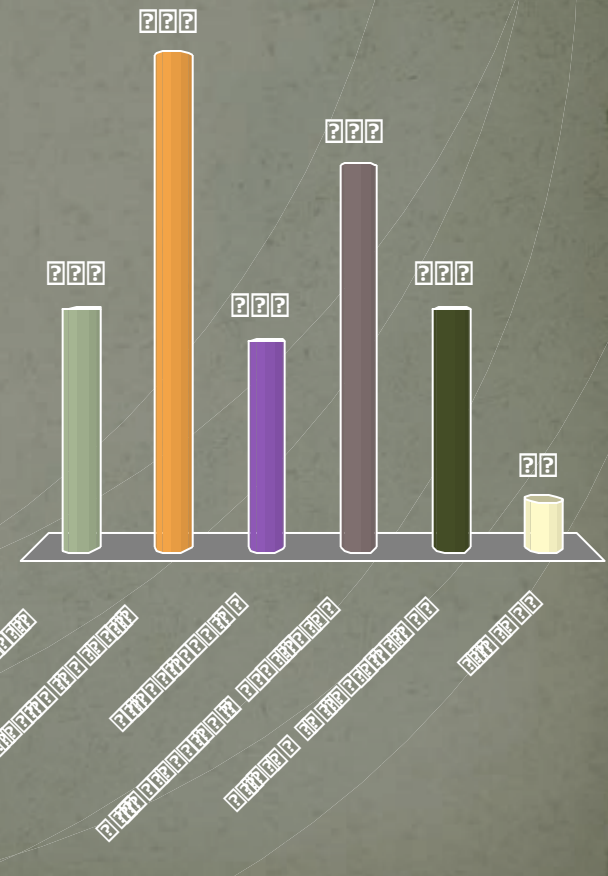
4. If a water supply crisis is imminent, which of these infrastructure measures should we take to address it?

- How much do you think it will cost?
- How much will it cost to maintain?
- How long will it last?
- How much will it cost to build?
- How much will it cost to operate?
- How much will it cost to decommission?
- How much will it cost to upgrade?



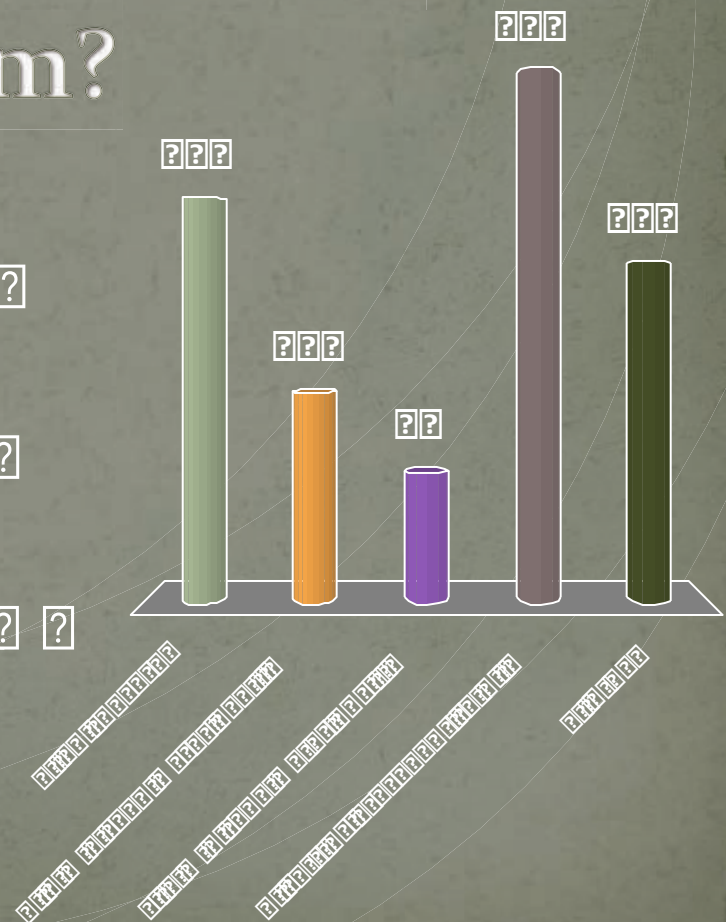
5. If a water supply crisis is imminent, which of these behavior measures should we take to address it?

- Turn off the shower when you are shaving
- Turn off the tap when brushing your teeth
- Turn off the water when you are washing dishes
- Turn off the water when you are washing your hands
- Turn off the water when you are washing your car
- Turn off the water when you are watering the lawn
- Turn off the water when you are watering the garden



6. What is your biggest concern about augmenting the SVRP aquifer with ground water from the Pend Oreille system?

- Bad taste and odor
- Increased salinity by the amount of added water
- Increased salinity by the amount of added water
- Loss of beneficial nutrients by the added water
- Bad taste and odor



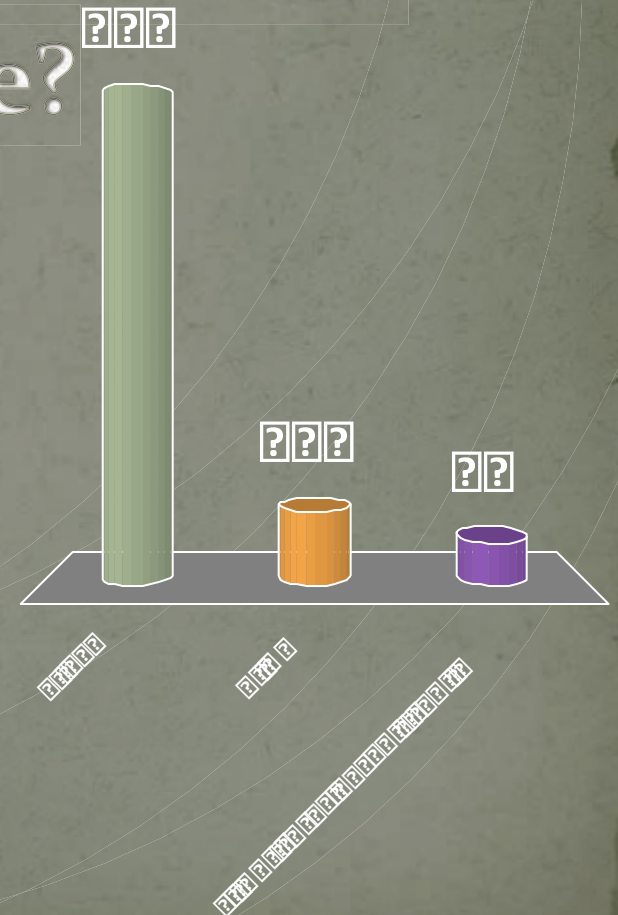
7. As laws currently stand, can ID do anything to help WA deal with low flows?

- [?] [?] [?] [?]
- [?] [?] d[?]
- [?] [?] d [?] [?] [?] [?] [?] [?] [?] [?] [?] [?]
[?] dt [?] [?] [?] dt [?] [?]



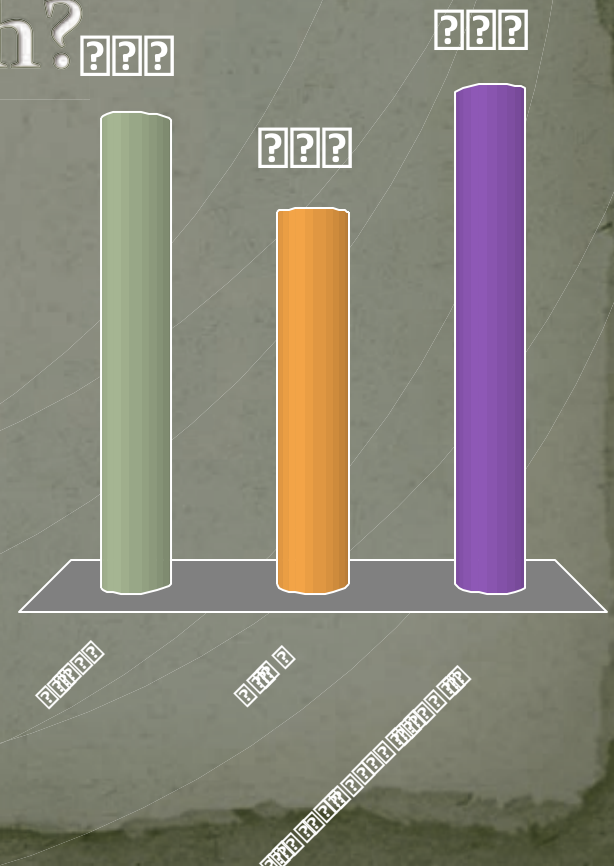
8. Idaho is adjudicating to better define current users and to manage future resources. Should Washington do the same?

- ? ? ? ? ?
- ? ? ? d ?
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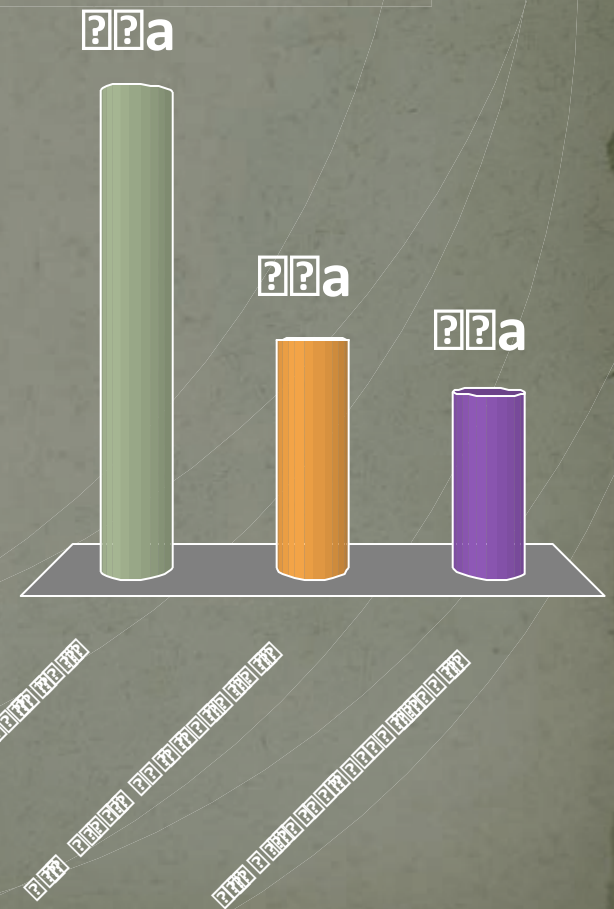
9. Do you think that during the period when leaking irrigation ditches were in heavy use (prior to their removal in the 1960s) Spokane River in-stream flows were artificially high?

- Yes
- No
- Not sure



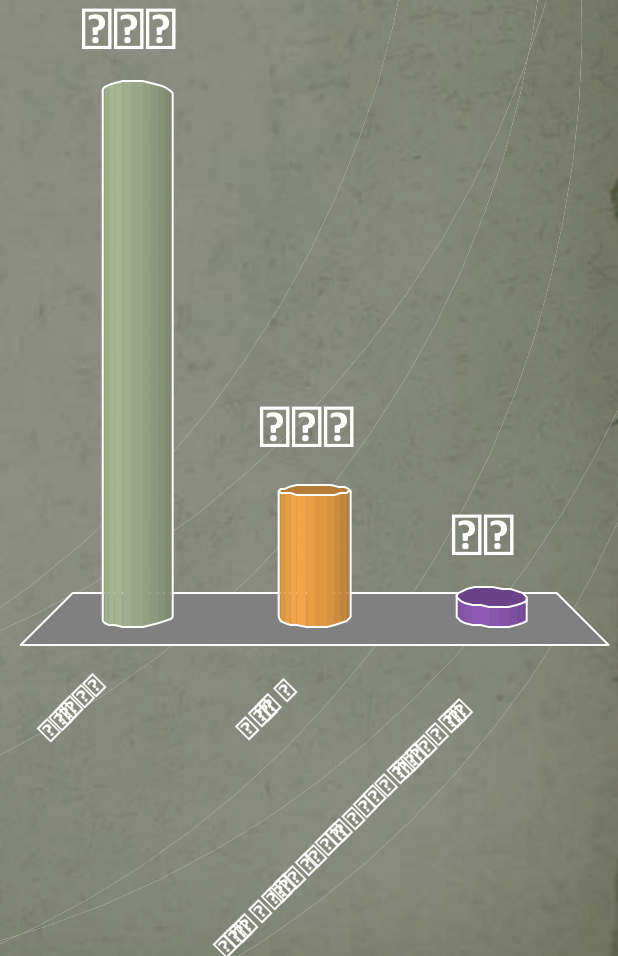
10. If flows at Post Falls Dam were increased during summer low-flow periods, what would the result be?

- **Increased flow during summer low-flow periods would result in increased sediment transport downstream, which could lead to increased sedimentation in the river channel and reservoirs, potentially reducing the efficiency of the dam and increasing the risk of flooding.**
- **Increased flow during summer low-flow periods would also result in increased erosion of the river banks, which could lead to increased sedimentation in the river channel and reservoirs, potentially reducing the efficiency of the dam and increasing the risk of flooding.**
- **Increased flow during summer low-flow periods would also result in increased erosion of the river banks, which could lead to increased sedimentation in the river channel and reservoirs, potentially reducing the efficiency of the dam and increasing the risk of flooding.**



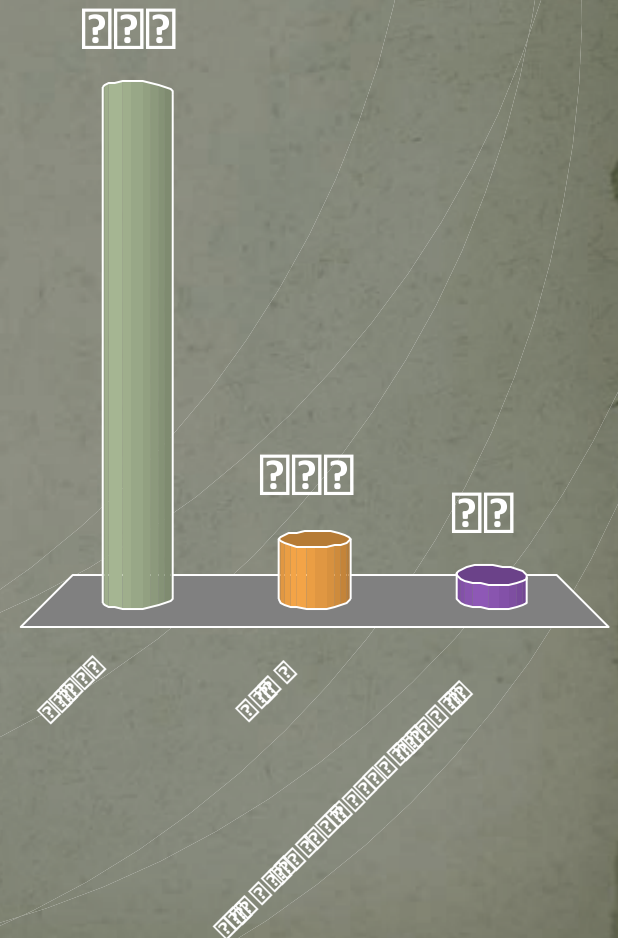
11. Are wells in Spokane contributing to low flow problems in the Spokane River?

- **What is the problem?**
- **What are the causes?**
- **What are the potential solutions?**
to address the problem?



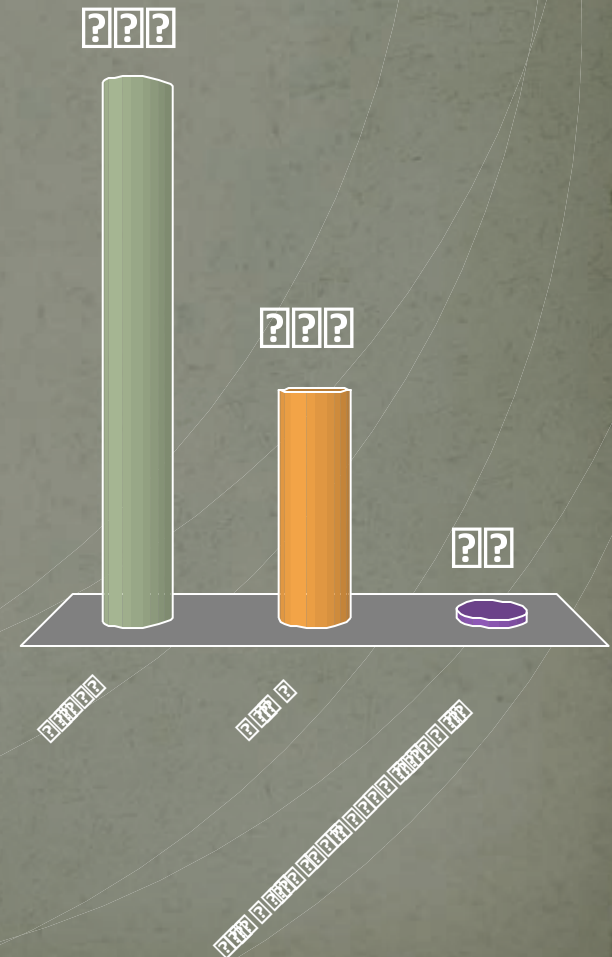
14. Is maintaining flows in the Spokane River a value to the basin at large?

- $\frac{dQ}{dt} = Q - R$
- $\frac{dQ}{dt} = Q - R$
- $\frac{dQ}{dt} = Q - R$ $\frac{dQ}{dt} = Q - R$



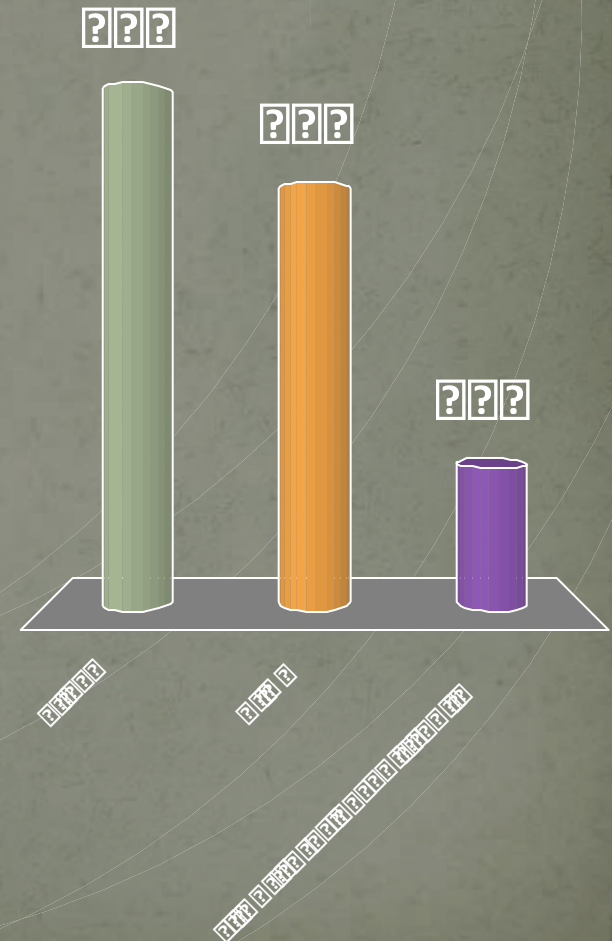
16. Is the possibility of an extended drought of concern?

- $\frac{1}{2} \frac{1}{2} \frac{1}{2} \frac{1}{2}$
- $\frac{1}{2} \frac{1}{2} d$
- $\frac{1}{2} \frac{1}{2} d \frac{1}{2} t i \frac{1}{2} \frac{1}{2} u a k$
 $\frac{1}{2} dt \frac{1}{2} \frac{1}{2} dt \frac{1}{2}$



17. Is there is sufficient information to predict the effect on water supply of an extended drought in the region?

- $\frac{dQ}{dt} = \frac{dQ_{in}}{dt} - \frac{dQ_{out}}{dt}$
- $\frac{dQ}{dt} = \frac{dQ_{in}}{dt} - \frac{dQ_{out}}{dt}$
- $\frac{dQ}{dt} = \frac{dQ_{in}}{dt} - \frac{dQ_{out}}{dt}$



III. Phosphorous and toxics

1. Where should funding for water treatment efforts be focused?

- **Water treatment plants** are the primary source of drinking water for most communities.

They are responsible for removing contaminants and ensuring the water is safe to drink.

- **Water distribution systems** are responsible for delivering water to homes and businesses.

- **Water conservation programs** are designed to reduce water usage and prevent leaks.

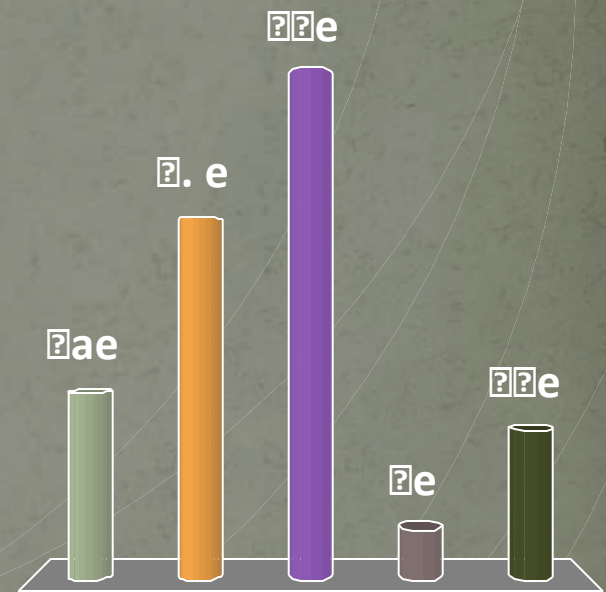
They help to reduce the amount of water that is wasted and ensure that the water that is used is efficient.

Water conservation programs can help to reduce the amount of water that is wasted and ensure that the water that is used is efficient.

- **Water quality monitoring** is essential for ensuring that the water is safe to drink.

- **Water infrastructure** is the backbone of the water supply system.

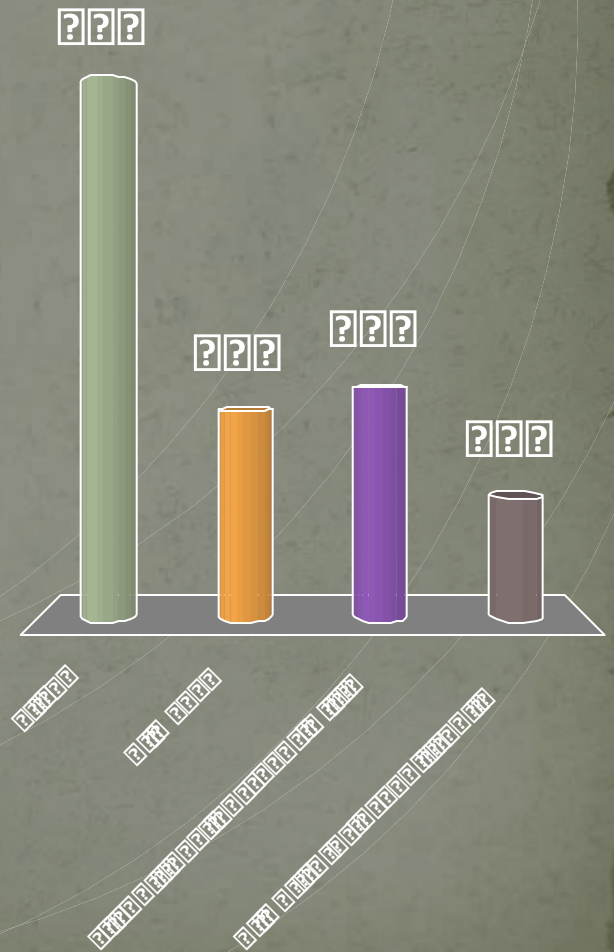
It includes pipes, pumps, and treatment plants that are responsible for delivering water to homes and businesses.



Water conservation programs are the most effective way to reduce water usage and prevent leaks. They can help to reduce the amount of water that is wasted and ensure that the water that is used is efficient.

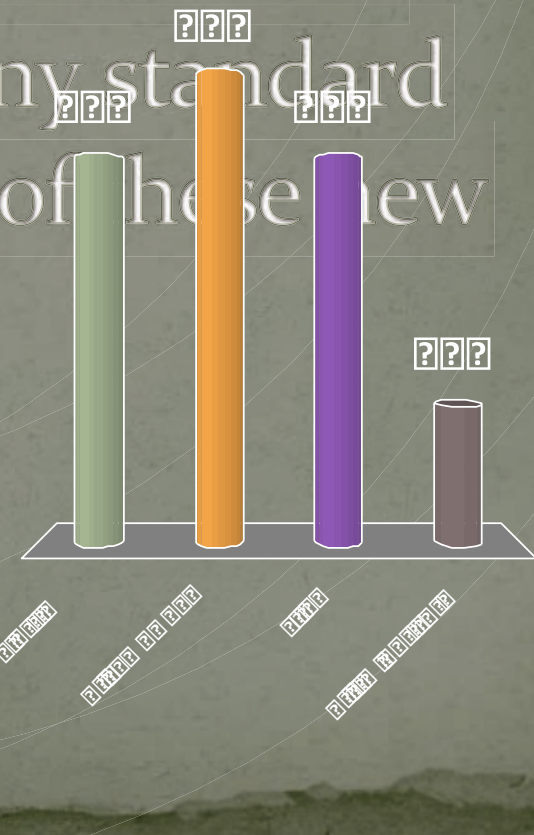
2. Will the upgrades required for P discharge reduction reduce other toxics?

- **What is the impact of the upgrades on other toxics?**
- **Will the upgrades required for P discharge reduction reduce other toxics?**
- **What are the potential benefits of the upgrades on other toxics?**
 The upgrades required for P discharge reduction are expected to reduce the discharge of other toxics, including heavy metals, organic chemicals, and nutrients. This is because the upgrades will improve the overall efficiency of the wastewater treatment process, leading to a reduction in the amount of wastewater that is discharged into the environment. Additionally, the upgrades will help to reduce the amount of energy and chemicals used in the treatment process, which can also lead to a reduction in the discharge of other toxics.
- **What are the potential risks of the upgrades on other toxics?**
 There are a few potential risks associated with the upgrades. First, the upgrades may increase the amount of wastewater that is treated, which could lead to an increase in the discharge of other toxics. Second, the upgrades may increase the amount of energy and chemicals used in the treatment process, which could lead to an increase in the discharge of other toxics. Finally, the upgrades may increase the amount of sludge produced, which could lead to an increase in the discharge of other toxics.



3. If it is more cost effective for waste water treatment plants to “land apply” waste water for golf courses park and other places than to discharge how concerned are you about keeping toxics and phosphorous in the system that compliance to any standard could never be met because of these new nonpoint sources?

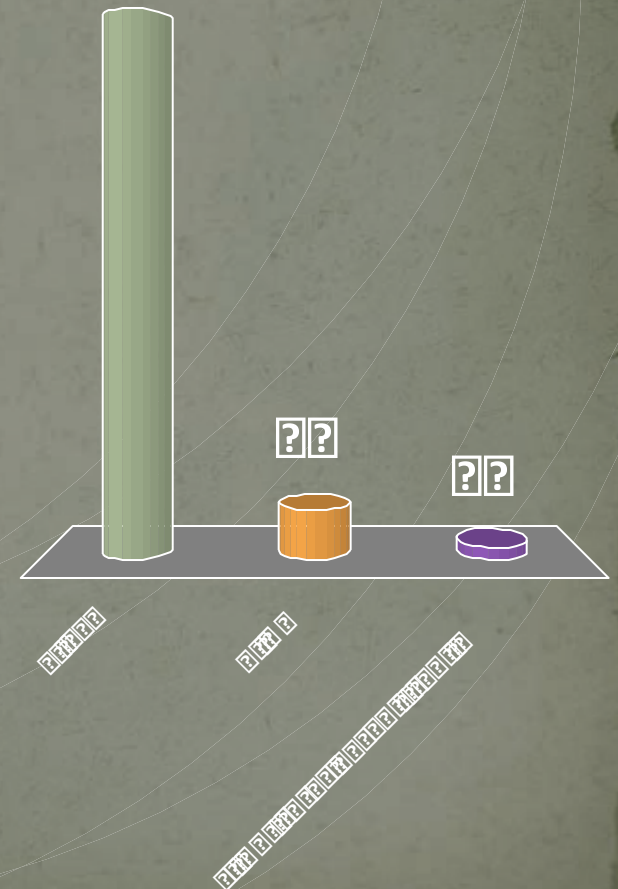
- Not concerned at all
- Somewhat concerned
- Very concerned
- Extremely concerned



IV. Collaboration:

2. Should establishing a plan for basin-wide water resources management be a priority in the SVRP?

- **Water quality**
- **Water quantity**
- **Water quantity distribution**
 at the basin level



3. If you answered yes to the previous question, indicating that basin-wide management should be a priority, how soon do you think that those management plans could be established?

- by 2015
- by 2020
- by 2025
- by 2030
- by 2035
- by 2040
- by 2045
- by 2050
- by 2055
- by 2060
- by 2065
- by 2070
- by 2075
- by 2080
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- by 2095
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- by 2445
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- by 2455
- by 2460
- by 2465
- by 2470
- by 2475
- by 2480
- by 2485
- by 2490
- by 2495
- by 2500



Thank you for your input

- The standard is a set of data that is used to measure the performance of a system. It is a set of data that is used to measure the performance of a system. It is a set of data that is used to measure the performance of a system.
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CWU Central
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University
of Idaho

Oregon State
UNIVERSITY OSU

Pacific Northwest
NATIONAL LABORATORY
NCAR
NATIONAL CENTER FOR ATMOSPHERIC RESEARCH

State of Washington
Water Research Center

NSF
USDA

NIFA

BioEarth



Biosphere-relevant earth system model