Leveraging community partnerships & intelligent technologies to address septic system water quality risks in the Flathead Basin

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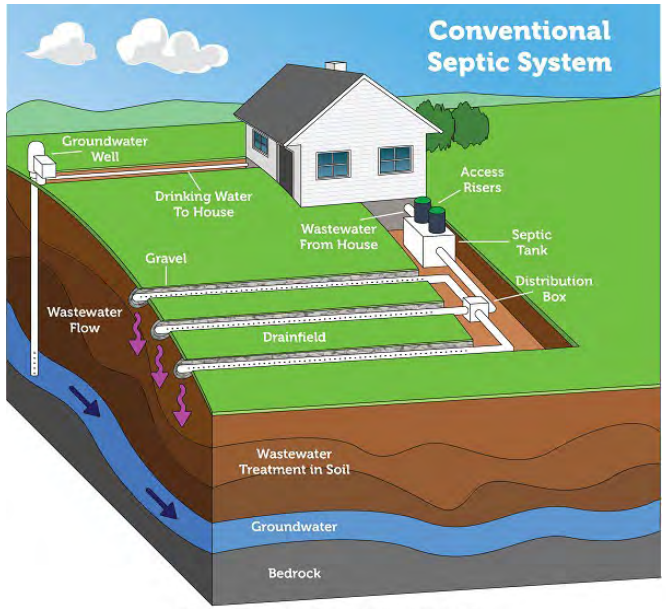
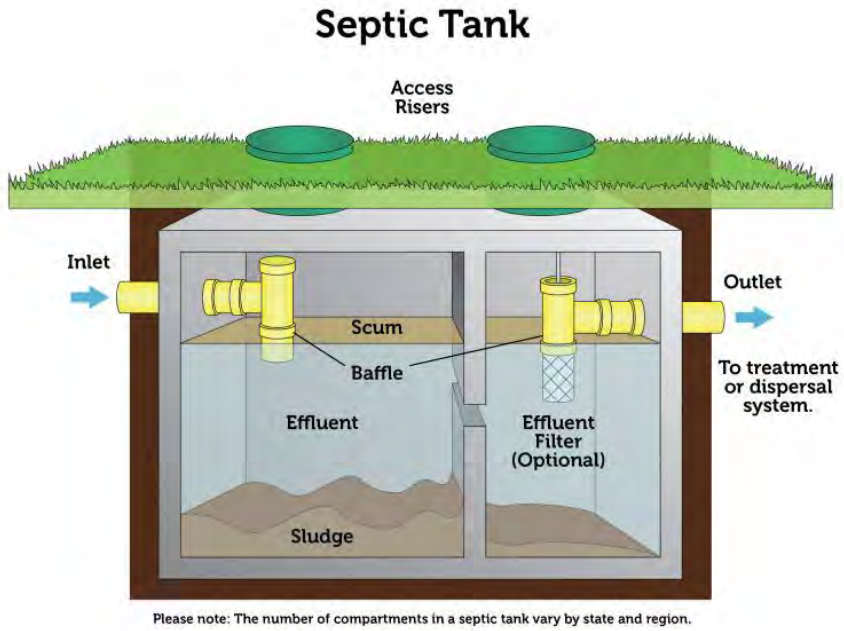
NSF Smart & Connected Communities Initiative

- Collaboration between researchers, basin stakeholders, government agencies and community partners
- Identification of knowledge gaps
- Expand solution-scape through socio-technical and scientific interventions to meet community-driven **need**
  - ***Actionable measures to reduce water quality impacts from septic leachate***



Please note: Septic systems vary. Diagram is not to scale.



Please note: The number of compartments in a septic tank vary by state and region.

More than **one in six households** in the United States depend on individual onsite wastewater treatment (septic systems) to treat their wastewater (EPA, 2022)

One half of the 428,000 households in Montana use septic systems (DEQ, 2018)

Septic system ↔ OSS

OUR PROJECT TEAM

University of Montana & Flathead Lake Biological Station:

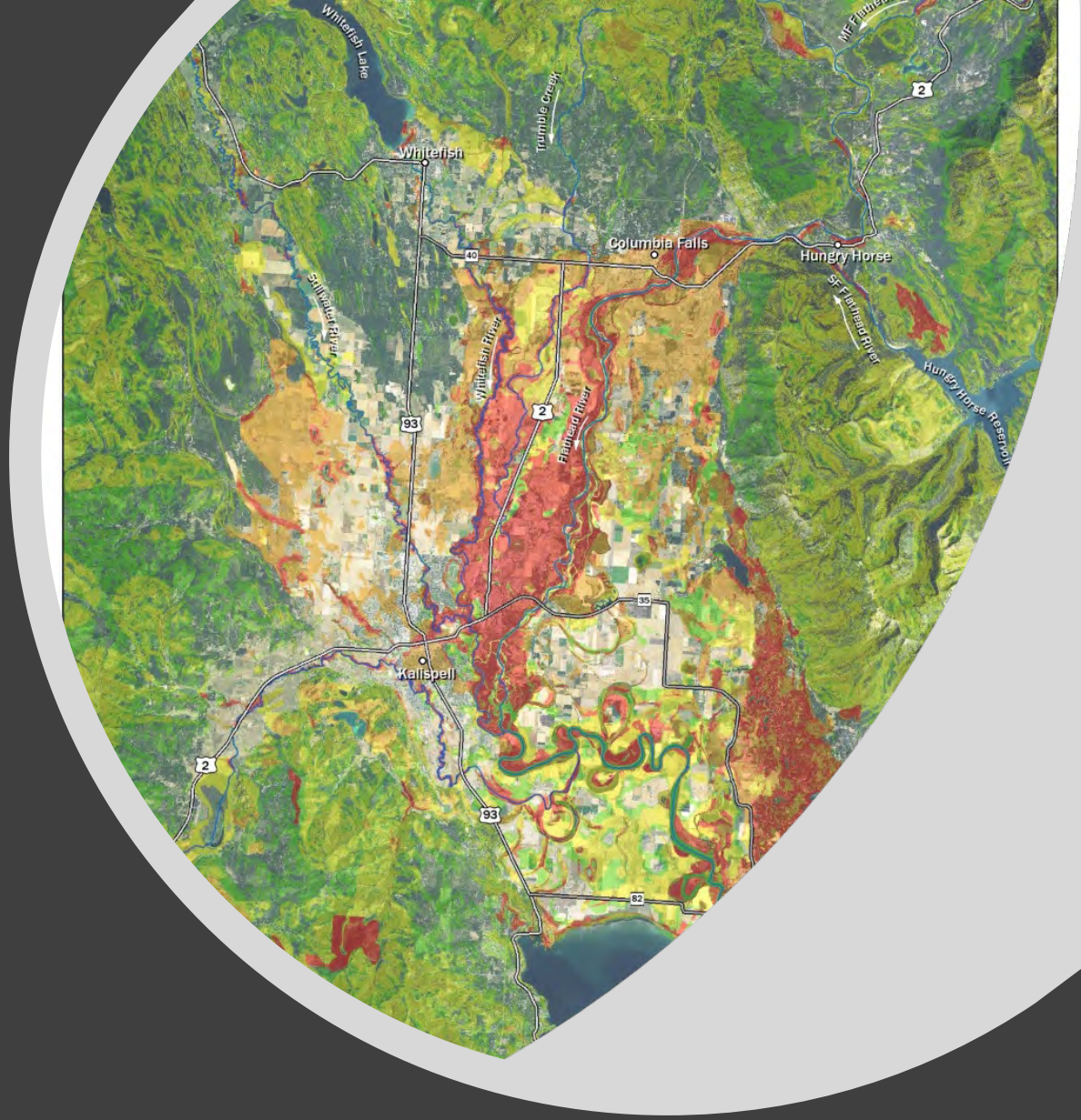
- Sarah J. Halvorson, geographer, environmental social scientist
- Nanette Nelson, economist, freshwater scientist
- Matt Church, aquatic microbial ecologist
- UM Graduate Students Marie Watson and Keely Larson

Community Partners:

- Mike Koopal, Executive Director, **Whitefish Lake Institute**
- Kate Wilson, Coordinator, **Flathead Basin Commission**

Project Goals

- June 2022 Workshop
- Pilot monitoring network to identify affected littoral areas
- Identify motivational factors for replacing OSS
- Assess policy and governance constraints
- Provide support to the FBC On-site Wastewater Treatment Committee



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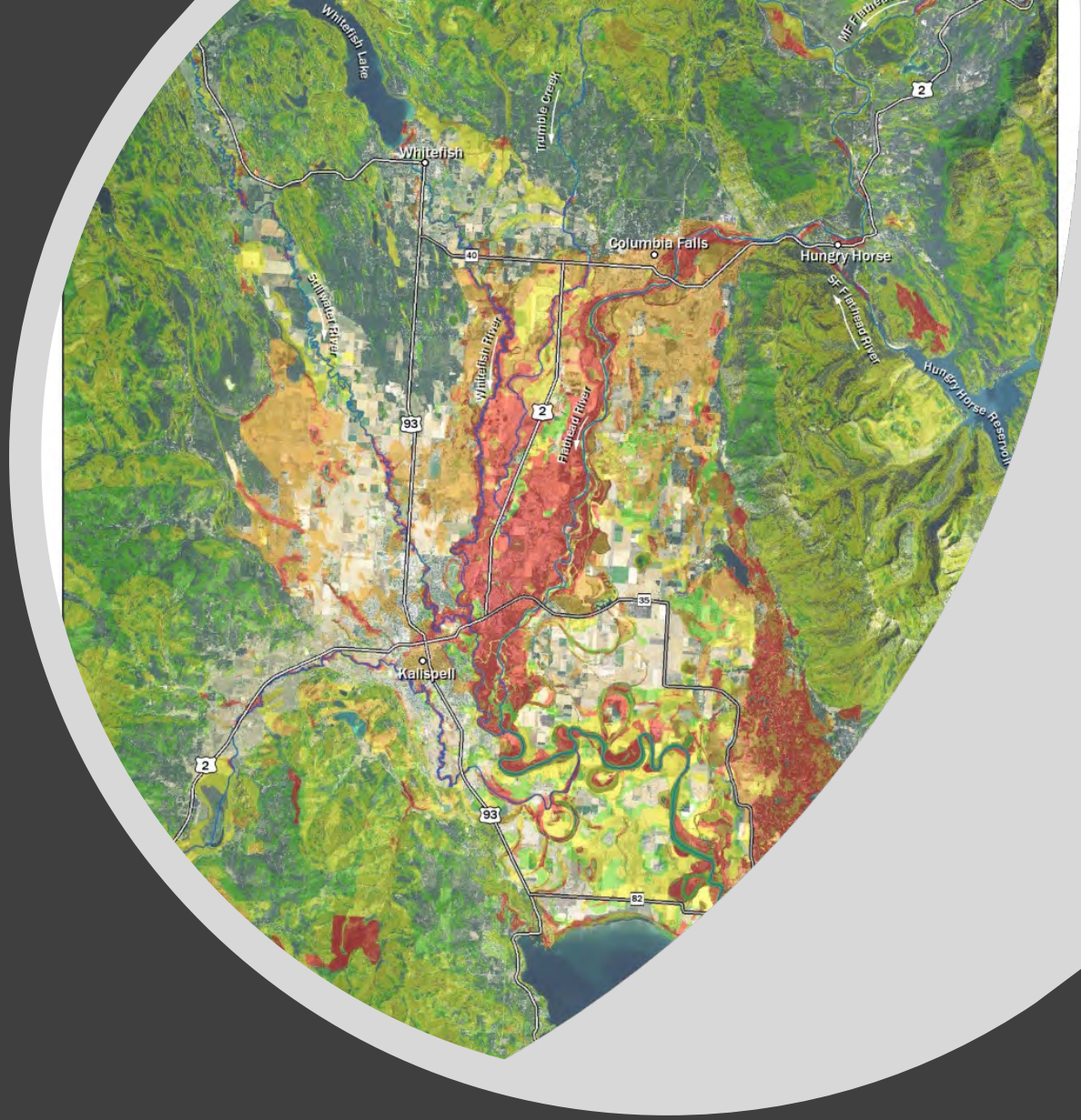


Septic Risks to Water Quality Workshop (June 2022)

What

Science-technology-policy-education connections; share lessons learned from programs & policies; define challenges & data gaps

How

Knowledge sharing; prioritize research and scalable technology; broadly-based stakeholder involvement

Who:

Association of Montana Since 1909 of Counties

Montana Trout Unlimited

The Great Seal of the State of Montana — Oro y Plata

Montana DNRC — Montana Department of Natural Resources & Conservation

Seal of Flathead County, State of Montana

Flathead Conservation District

The Confederated Salish and Kootenai Tribes of the Flathead Reservation

RDG River Design Group

Missoula County Montana

Flathead Lakers — Defenders of the Watershed

DEQ Montana Department of Environmental Quality

Lake County Conservation District

City of Kalispell

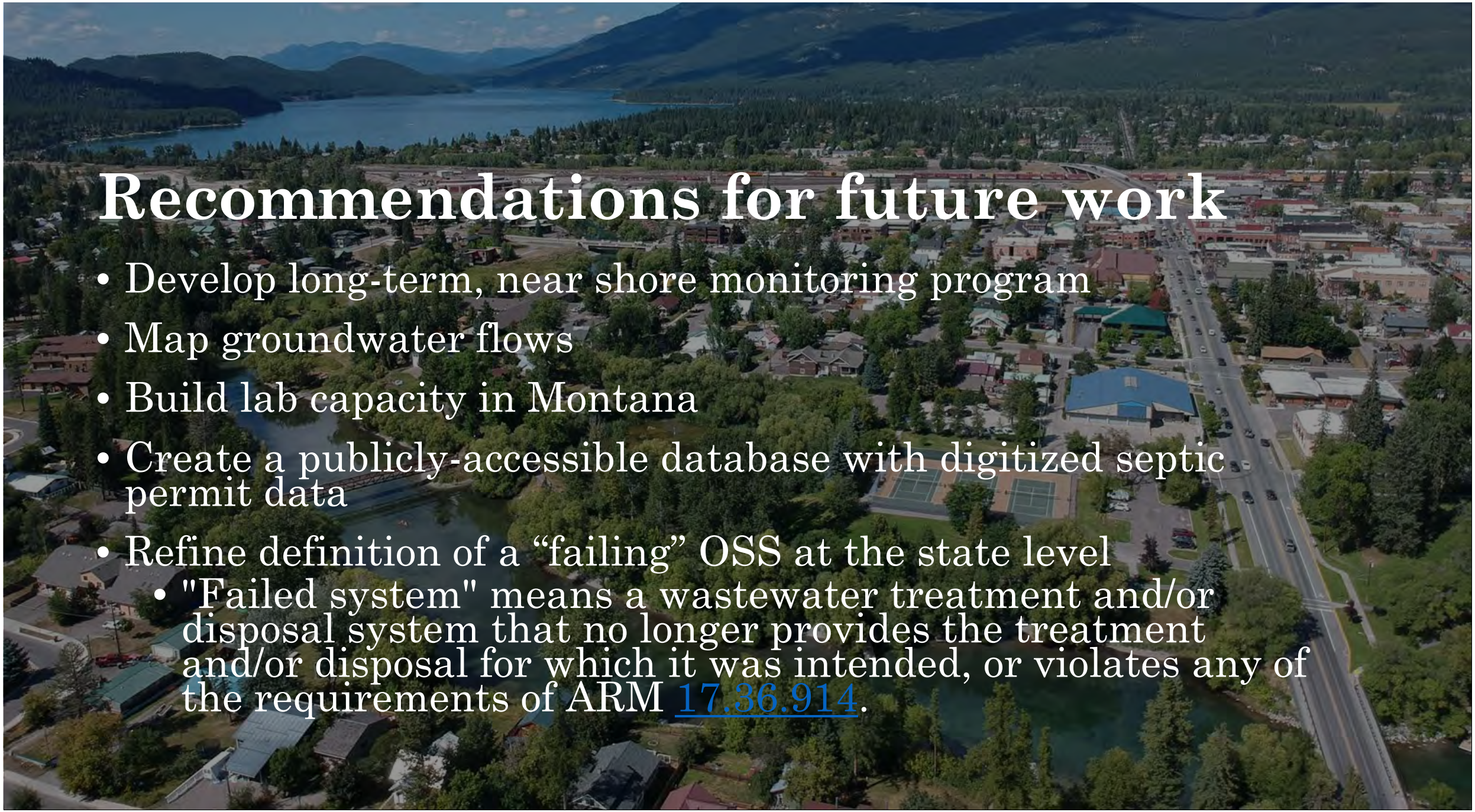
Key Discussion Topics

Natural Science

- Collect data that connects degradation directly to OSS
- Monitoring options
  - Costs, scalability, equitability & accessibility
- Near shore monitoring to establish a baseline
- Compiling & presenting data in a visual way

Social Science

- Barriers to adopting OSS BMPs
  - Costs
  - Knowledge
  - Fear of a changing community
- Options to address barriers
  - Increase public awareness & knowledge of OSS
  - Incentivize upgrading, replacing, or connecting to sewer
  - Support to digitize septic permit databases



Recommendations for future work

- Develop long-term, near shore monitoring program
- Map groundwater flows
- Build lab capacity in Montana
- Create a publicly-accessible database with digitized septic permit data
- Refine definition of a “failing” OSS at the state level
  - "Failed system" means a wastewater treatment and/or disposal system that no longer provides the treatment and/or disposal for which it was intended, or violates any of the requirements of ARM 17.36.914.

Workshop Outcomes

Flathead Basin Commission Road Show

- "Info Session" in Kalispell with planners, WWTP operators, environmental health staff & boards
- Presentation to Lake County Commissioners and invited municipal staff and leadership
- Presentation to CSKT Tribal Council with 4 NRD staff in attendance

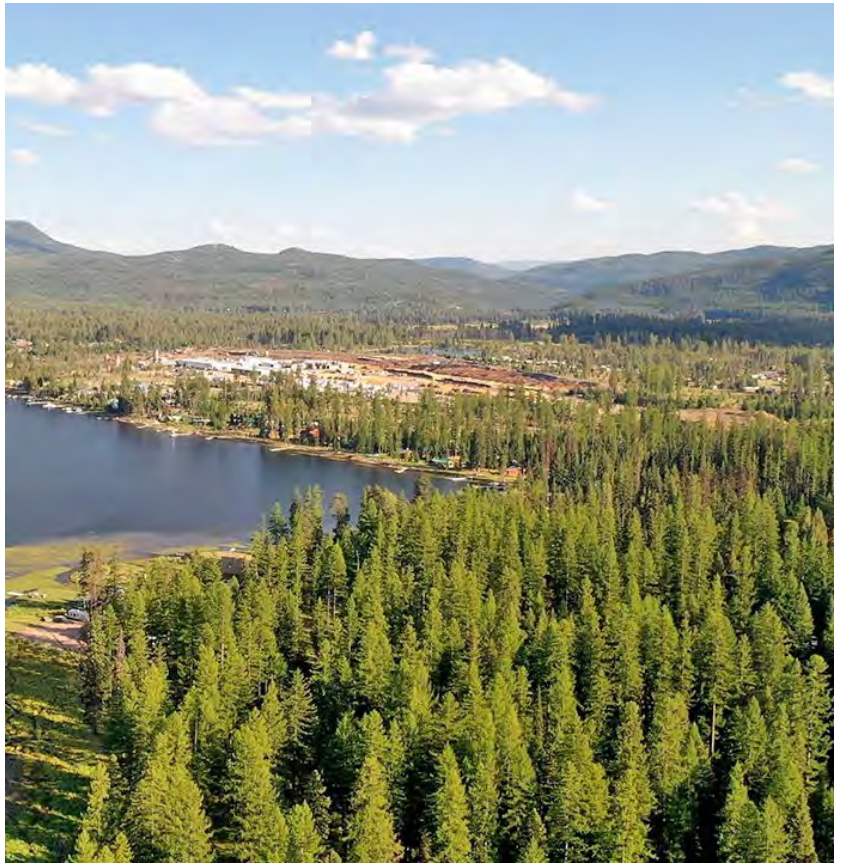
2023 Legislative Session

- State Senator Greg Hertz introduced SB 383
- Assemble information on septic systems for a centralized, statewide database
- Motivated, in part, by workshop

Policy & Governance Constraints

Impediments: Preliminary Observations

- **Paradigm shift: Drinking water and wastewater are often not considered part of a common cycle of consumption and waste**
- **Reframe problem: framing environmental problems only in terms of biophysical characteristics misses cultural and social factors**
- **Long-term vision: Current wastewater infrastructure fails to meet long-term community needs**
- **Financing: Federal funding applies to sewer systems and only covers capital for initial investment – communities are not prepared for long term operations and maintenance costs**
- **Community Identity: When faced with decisions about wastewater infrastructure, deep rooted concerns about development patterns and threats to community identify emerge.**



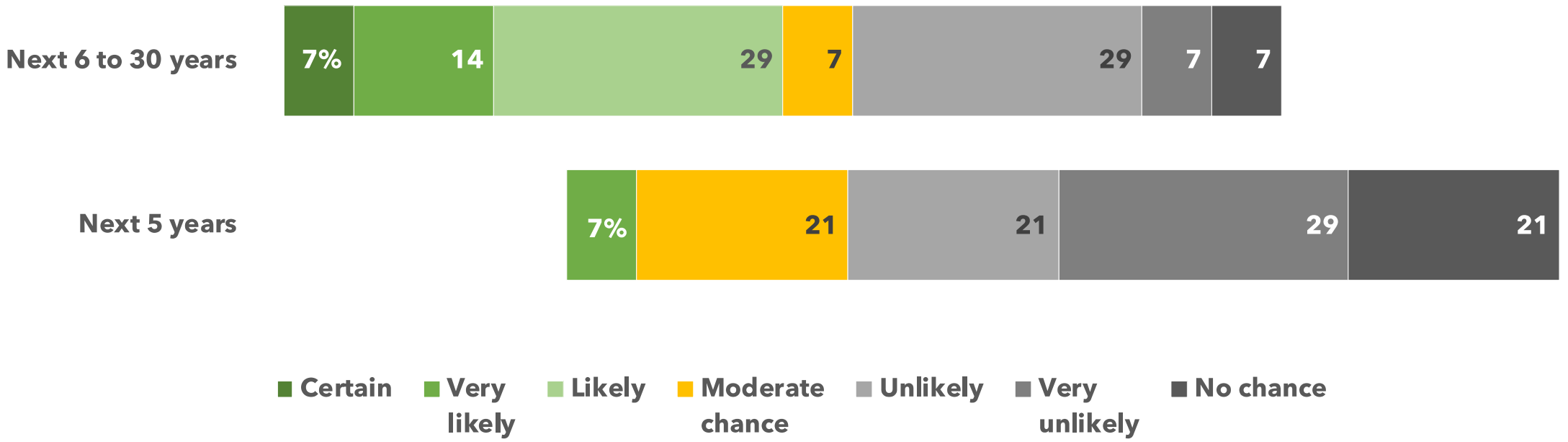
Cummings, Nathan A. (2022) Septic Shock: Wastewater Infrastructure, Urban Growth, and Local Exclusion, *Yale Law & Policy Review* 170-232, http://dx.doi.org/10.2139/ssrn.4201597.

Focus Group Results

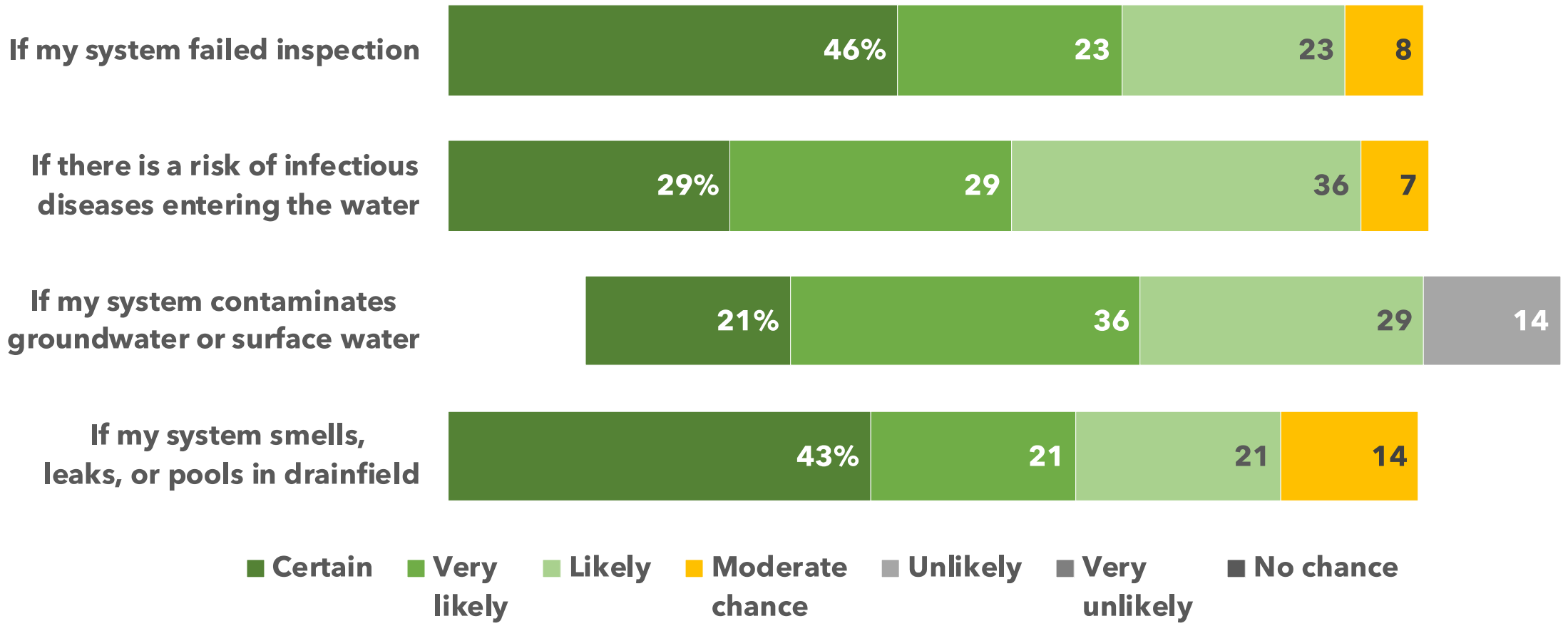
Focus group to measure relative strength of motivational factors to replace OSS

- Completed a survey adapted from a study measuring motivation of Swedish homeowners' to replace OSS (Wallin et al. 2013)
- 12 residents from Whitefish, 2 residents from Bigfork
- 12 full-time residents and 2 part-time
- Lived at current residence
  - 9 had lived 15+ years
  - 5 had lived fewer than 5 years
- Assume financially sound (income not asked)

Participants were more likely to replace their OSS in the long-term vs the short-term



Respondents were highly motivated to replace their OSS when its failing



Participants require data to replace their system

Q – Is protecting the environment an incentive to replacing your septic system?

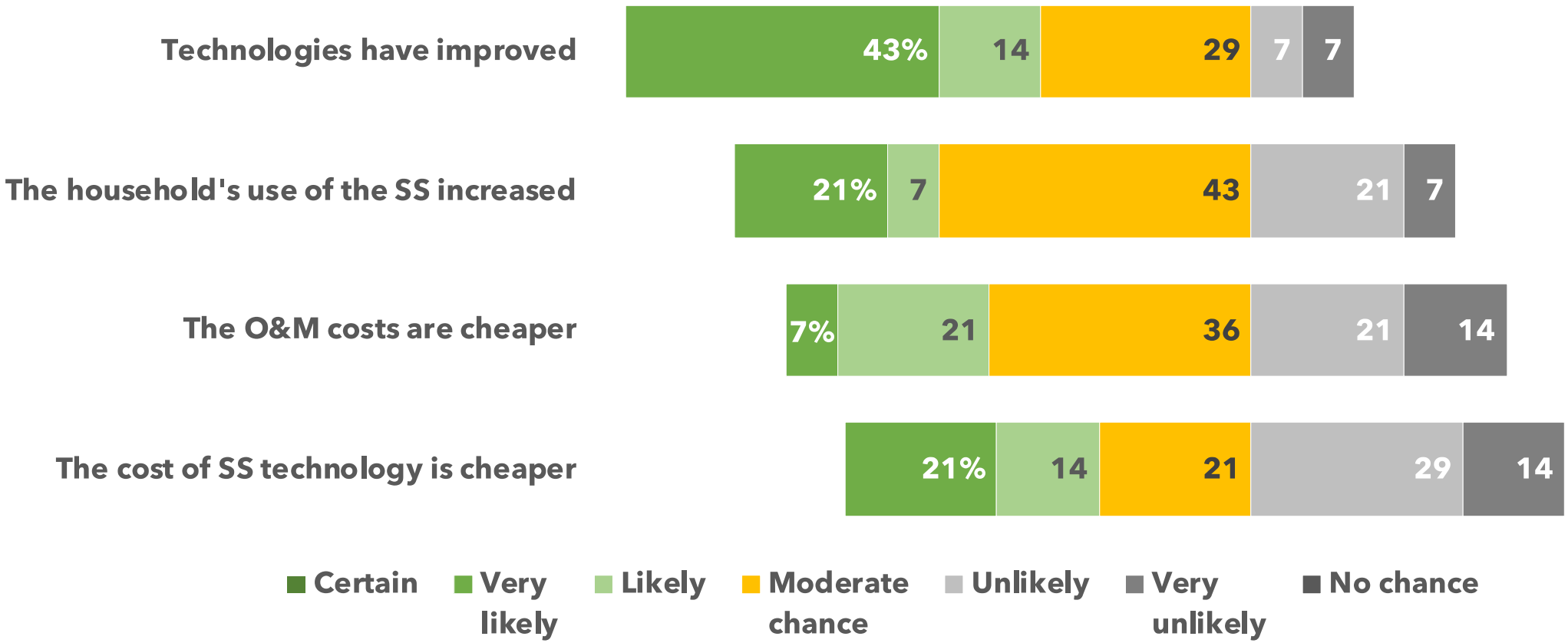
“Not if I can’t see it!”

Q – If you had data in hand that your house can be pinpointed as a source of septic pollution, would you replace your system?

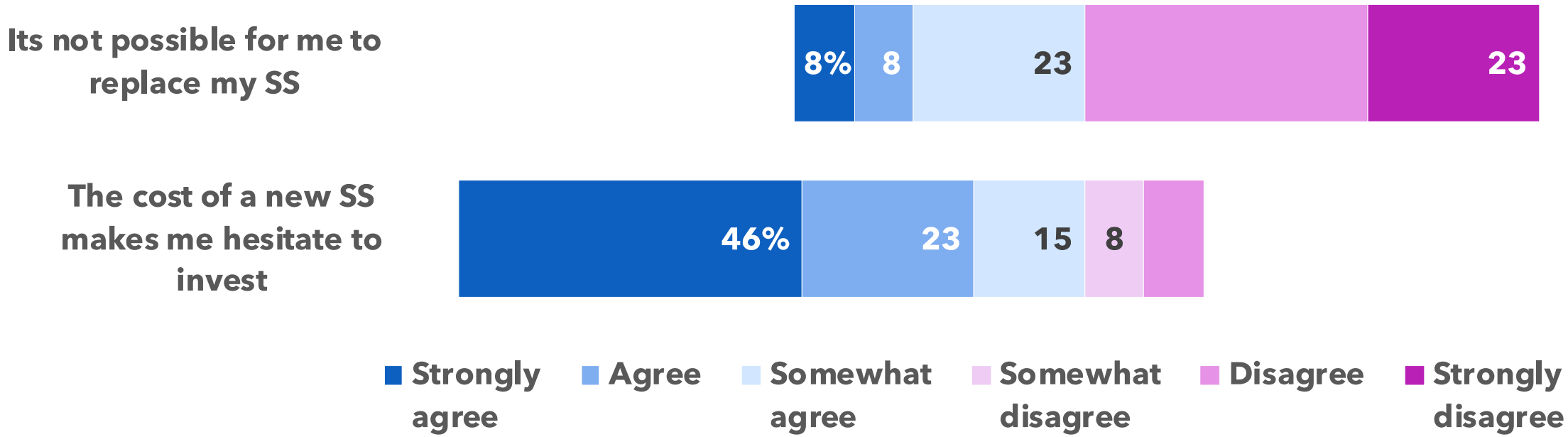
“I would consider it”

“I will not replace it unless there is data”

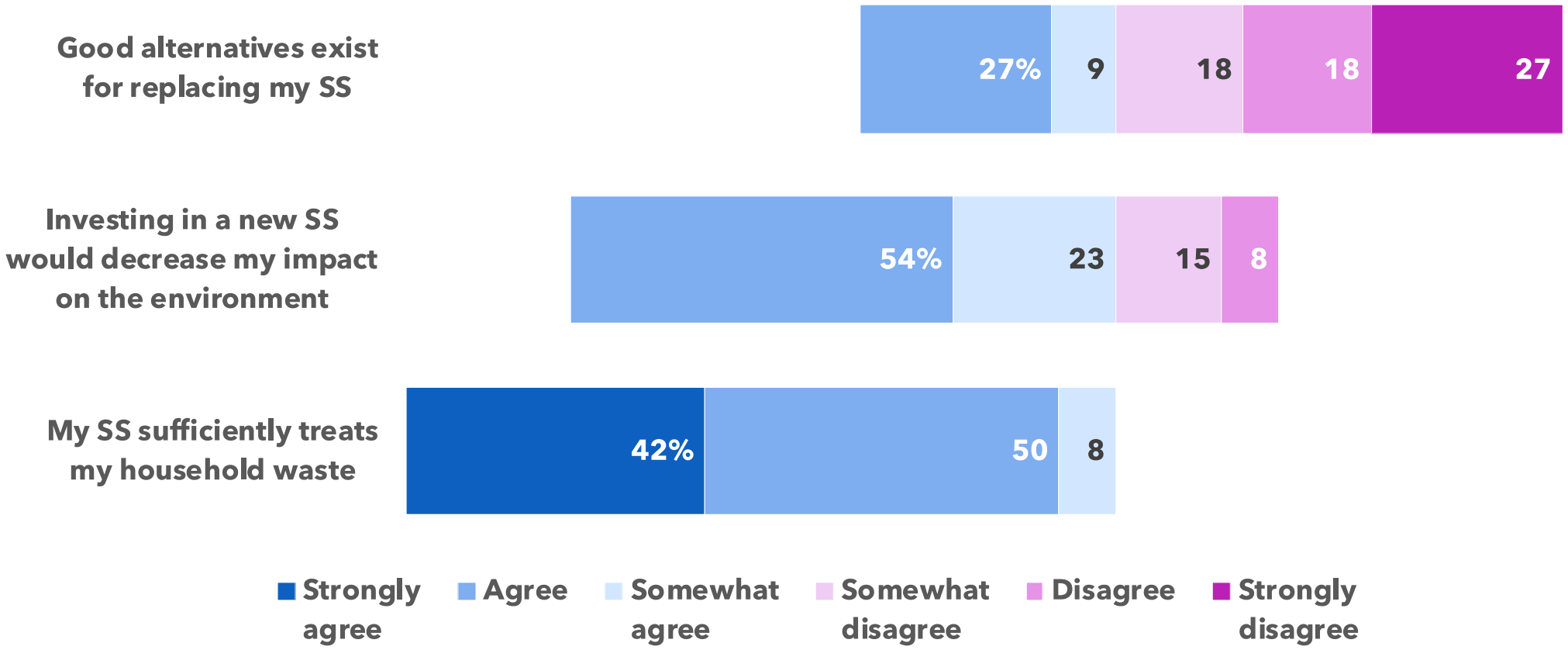
Lower costs, improved tech and increased use influenced participants likelihood of replacing their OSS



Cost was a factor in replacing an OSS, but it is not an obstacle for most participants

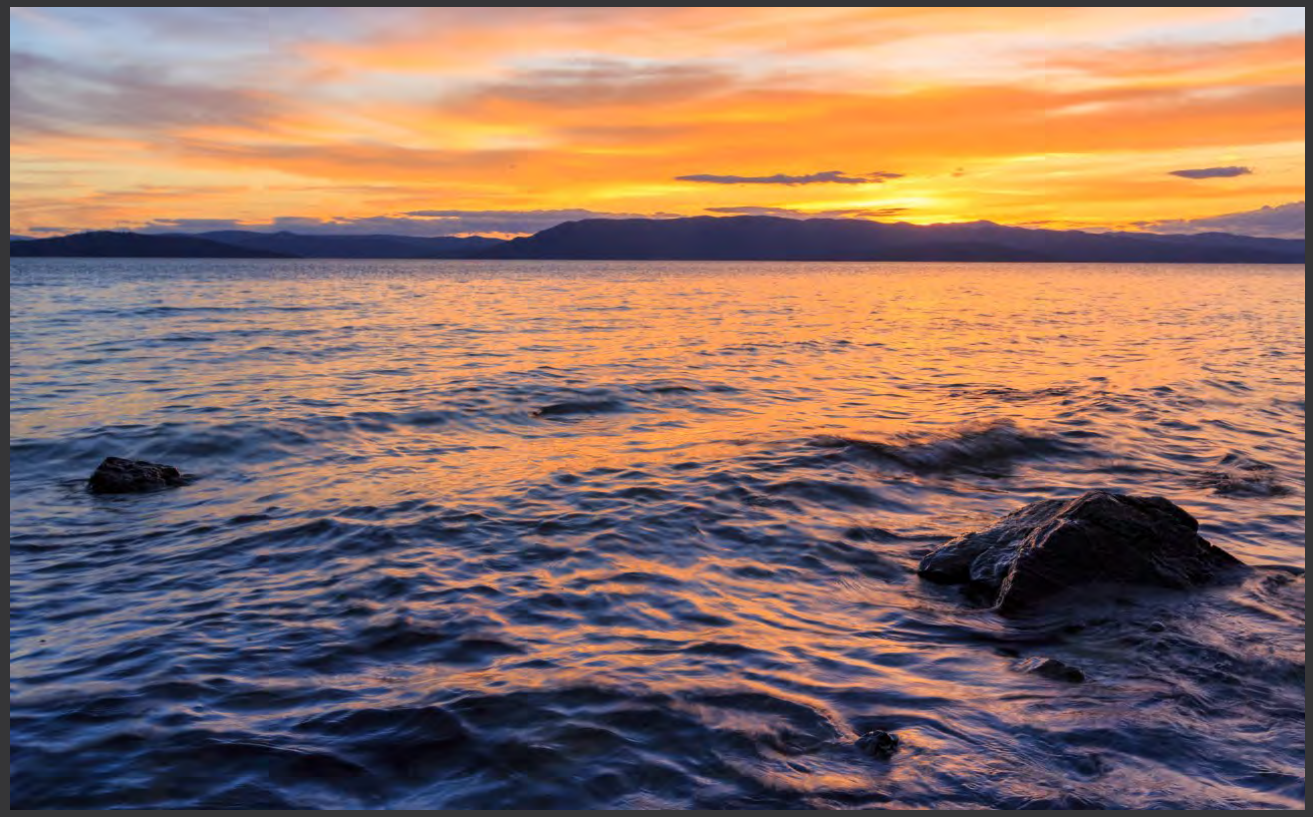


Participants tended to overate OSS performance while disagreeing that good alternatives exist



In sum, the following factors matter in participants' readiness to replace their OSS

- Inspection programs provide essential feedback on OSS performance
- Cost is a major factor but not necessarily an obstacle
- Belief that replacing OSS results in personal gain
- Economic incentives may influence readiness to replace OSS



Thank you!

We welcome your questions, reactions, and comments!

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