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Key Science Needs Identified by the Delta Independent Science Board's Climate Symposium

J.Obeysekera¹, A. Michalak¹, L. Wainger¹, J.
Huang², E. Yu²

¹Delta Independent Science Board

²Delta Stewardship Council

Presenter: Dr. I. Werner, Chair DISB



Delta
Independent
Science Board

DELTA STEWARDSHIP COUNCIL

Who are we?



Dr. Inge Werner
Ecotoxicology



Dr. Diane McKnight
Biogeochemistry



Dr. Lisa Wainger
Economics



Dr. Tanya Heikkila
Governance



Dr. Jayantha Obeysekera
Engineering



Dr. Anna Michalak
Engineering



Dr. Kenny Rose
Fisheries



Dr. Steve Lindley
Fish Ecology



Dr. Cathleen Jones
Geophysics



Dr. Peter Goodwin
Engineering



What we do?

The Delta ISB:

- ☐ Provides oversight of Delta scientific research, monitoring, and assessment that supports adaptive management
- ☐ Generates independent reviews and advice on plans and programs

Emerging Climate Symposium Highlights

- Occurred from September 16-17 at UC Davis
- Over 250 attendees across two days (virtually & in-person)
- **Purpose:**

Understand the current climate projections for the region and related uncertainties



Review how the current state of climate science is being integrated into decision-making in the Delta



State of Science: Key Takeaways

➤ Warming Trends

- Globally 1.3-1.5°C. Possibly 3°C by 2100. California has warmed rapidly since 1980s
- Accelerating (nonlinear) atmospheric and hydrologic response to warming
- Expanding moisture storage in the atmosphere (~7% per °C)

➤ Intensifying Hydro-Climate Variability

- Storms may be fewer but more intense and clustered, especially atmospheric rivers
- More severe droughts due to higher evaporative demand
- Rapid succession of a flood followed by a drought ("Hydro-Climate whiplash")

➤ Snowpack and Runoff Regime Shift

- Changes in runoff timing and magnitude due to less snow and more rain
- Rain on snow. Increased flood risk due to flashier runoff ('snow-eater' heatwaves)
- Growing loss of snowpack, our 'natural water storage,' especially after 2050
- More intense wildfires leading to increased runoff, and sediment delivery

➤ Accelerating Sea Level Rise

- Local rise in the Bay-Delta is influenced by ice sheet melt potentially exceeding current high-end estimates
- Higher seas will increase levee stress, salinity intrusion, and flood exposure

Scientific Advances (Last 5-10 Years)



Improved sub-seasonal forecasting (near-term, 2-3 weeks) for extreme events



Better understanding of rare events (e.g. atmospheric rivers) driving system-wide changes



Recognition of flash droughts, hydroclimate “whiplash” and wildfire connections



Enhanced climate model reliability and assessment. Potential benefits of using AI



Understanding of timing of transition to low-to-no-snow conditions

Additional Concerns

- Pacific Decadal Oscillation and ENSO changes under warming
- Dynamic vs. thermodynamic precipitation changes
- Medieval drought recurrence potential
- Infrastructure vulnerability assessment
- Ecosystem tipping points and forest transitions



Adaptation Strategies



Nature-based solutions:

Headwater restoration,
floodplain restoration,
forest management



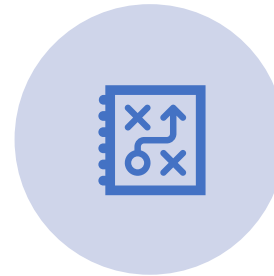
Technology integration:

Forecast-informed reservoir
operations (FIRO), advanced
early warning systems



Multi-benefit approaches:

Flood-MAR combining flood
control with groundwater
recharge

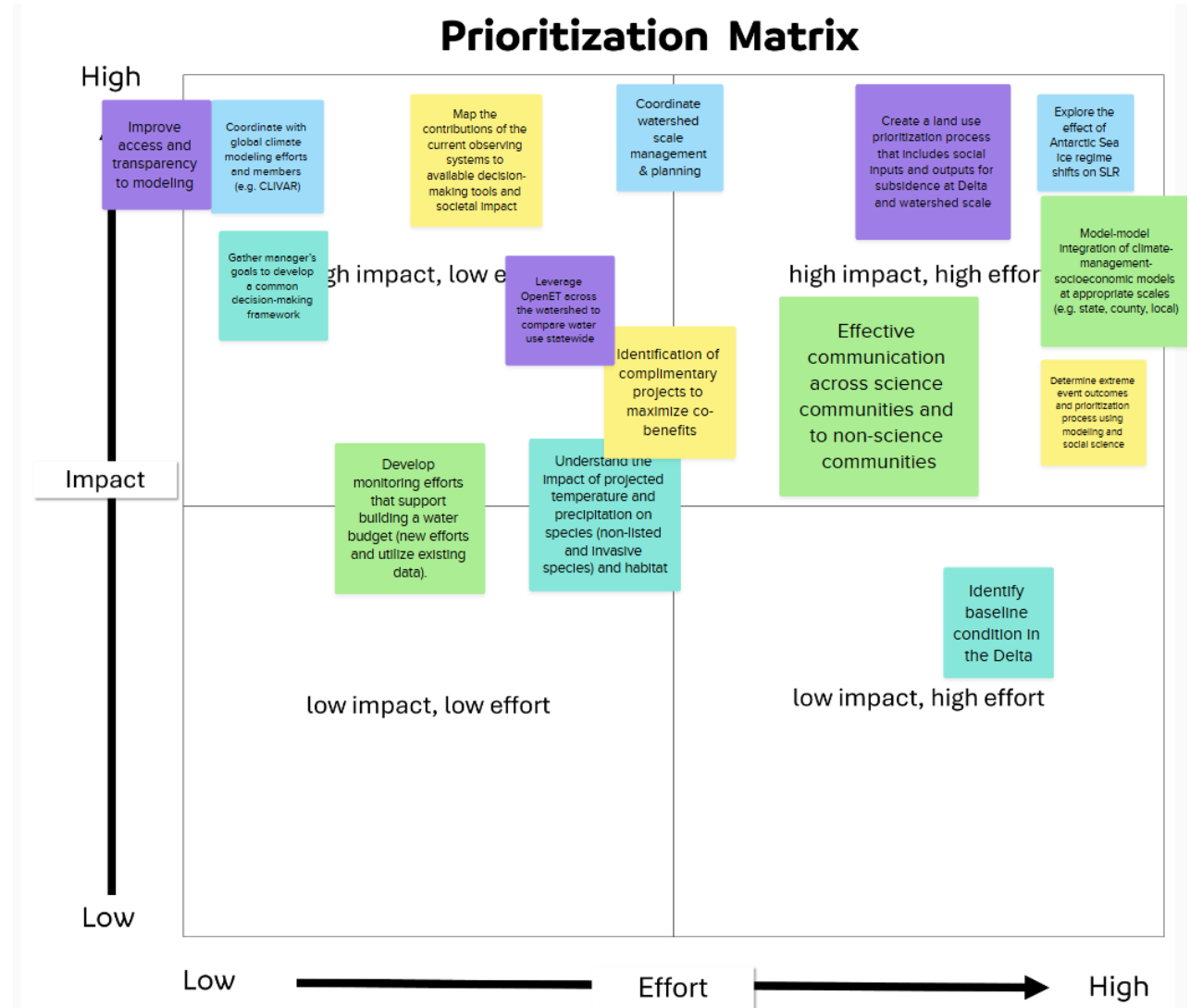


Adaptive management:

Flexible planning with
regular updates and trigger
points

Current Needs & Considerations Identified

- a) Expand monitoring networks, especially for vertical land motion
- b) Develop more scenario-based planning exercises
- c) Focus on win-win interventions beneficial even without climate change
- d) Consider upstream watershed management as part of Delta solutions



What more should be done?



Considering the extremes and not rely on averages (“Manage Floods to get through Droughts”, and vice versa)



Greater community engagement and co-production of knowledge



Improved cross-agency coordination



More integration of compound risks (climate + seismic + subsidence, hydroclimate whiplash)



Create tools with end-user focus

Next Steps

Share & Present Highlights

- Delta Stewardship Council Meeting – **October 23**
- California Natural Resources Agency Secretary Speaker Series – **October 27**
- State of Estuary Conference – **October 28**

Additional Follow Up

- What more can be done with the science
- How to facilitate thinking more at a system level
- How science is absorbed and integrated into practice

Develop Products

- Short memo with key highlights of what was learned
- Proceedings
- Perspective piece for peer review publication (**potentially**)

Thank you!

If you want to learn more...



Watch recordings from the symposium



Email disb@deltacouncil.ca.gov with
comments and questions