# NEW WATER DATA NEEDS IN CONTEXT OF CLIMATE CHANGE

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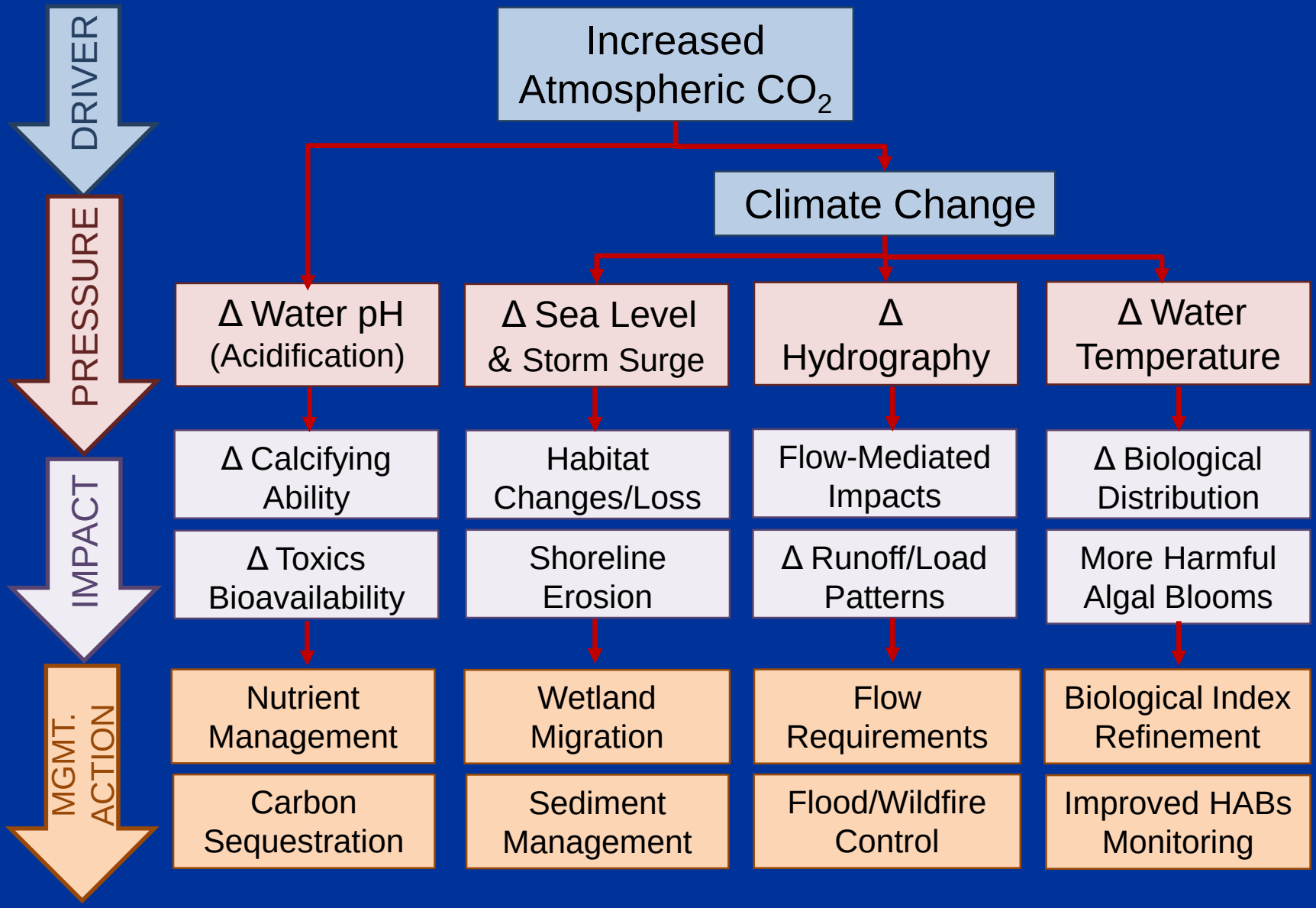
# CONCEPTUAL MODEL



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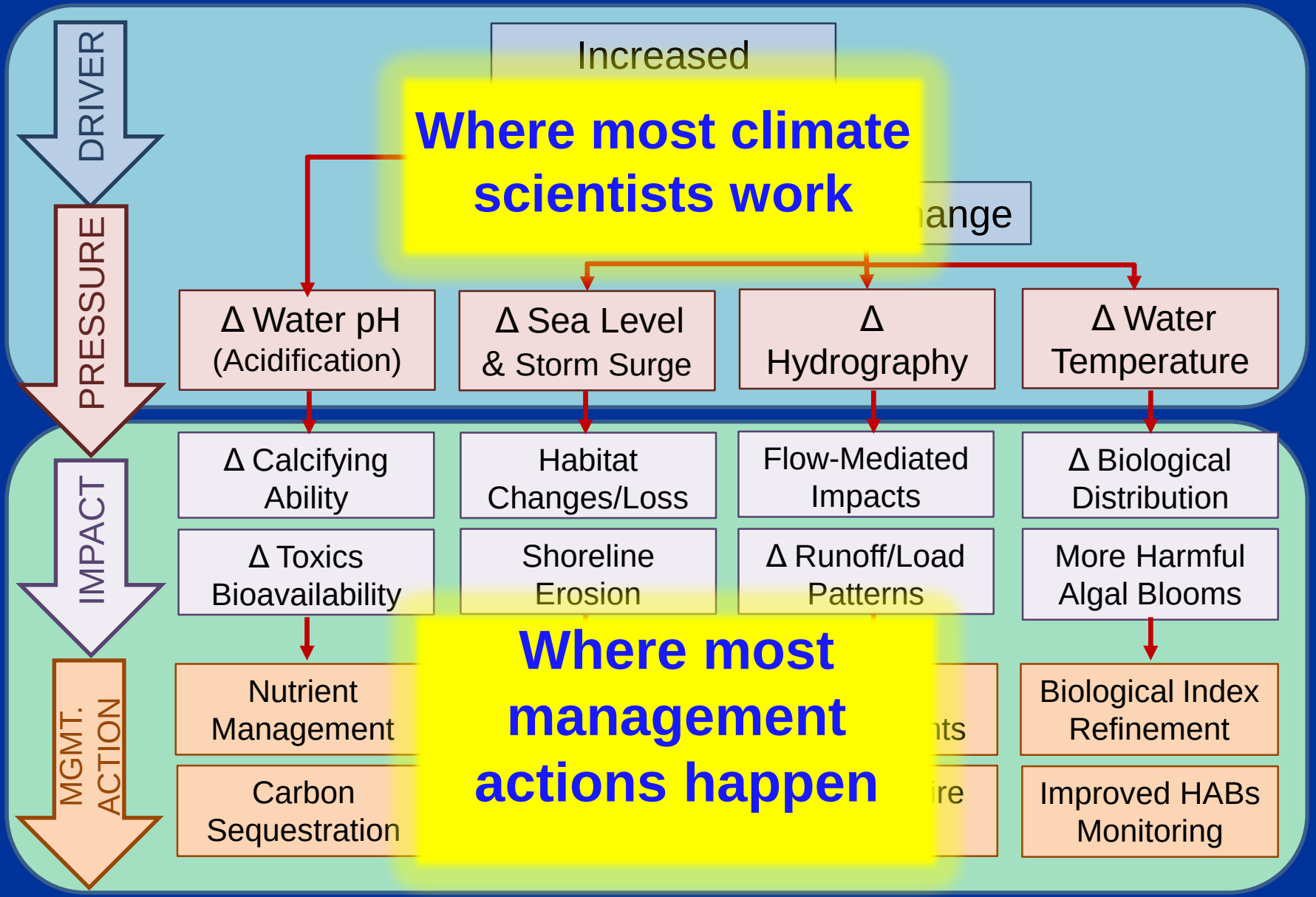

# OCEAN ACIDIFICATION

- **The ocean is acidifying**
  - We are already seeing the effects on shelled organisms
- **We are only beginning to think about this from a science and management perspective**
  - We don’t have acidification management targets
  - Also don’t know whether management of local nutrient and carbon inputs would be meaningful
- **The defining threat to ocean health for the my generation**
  - This stress operates at a west-coast wide scale (or larger)
  - Recovery past a tipping point may not happen because of that spatial scale of impact

# CLIMATE CHANGE AFFECTS HYDROGRAPHY

- **Changing rainfall patterns**
  - Predictions are for fewer, but more intense, rainfall events
  - More dry days, with precipitation falling during a shorter rainy season
  - More interannual variability
- **Changing snowmelt patterns**
  - More runoff in the spring, less in the summer
- **Higher temperature leads to more evaporation**
  - Fewer and smaller stream pools
  - More ephemeral streams

# THERE ARE ALSO CHANGES IN THE DEMAND PORTFOLIO

- **Reuse**
  - Many wastewater treatment facilities are diverting discharge for reuse
  - This means less flow to streams
- **Conservation**
  - We've done a great job in reducing overwatering of lawns
  - But this means less flow to streams
- **Recapture**
  - Stormwater managers are doing more groundwater recharge
  - Again, less water for downstream flow

# THESE DRIVE NEW SCIENCE NEEDS

- **What are the flow needs for biota?**
  - Which parts of the flow regime are most important for biological community response?
  - What are critical thresholds for those flow characteristics?
  - How do these answers differ among regions of the State?

- **How do we build climate ready bioassessment tools?**
  - How does reference condition change under different flow regimes?
  - How do we extend bioassessment to ephemeral streams?

- **How do we interpret flow as a stressor in causal assessment?**

# THIS IN TURN DRIVES SOME NEW MONITORING NEEDS

- **More and better hydrologic information**
  - Co-located with biological measures
- **Measurement of additional biological endpoints**
  - Many biota are more sensitive to flow conditions than the macroinvertebrates that are the present monitoring focus
- **More habitat metrics**
  - How does change in flow patterns affect stream morphology?
  - Some biota may be more affected by flow-mediated changes in riparian habitat than by daily flow conditions

# REGULATORY FLOW IMPLICATIONS

- **The State Water Board has an interesting paradox**
  - They support both maximizing use of recycled water and protection of instream beneficial uses
  - This potential conflict is recognized in the new recycled water policy
  - Wastewater change petitions (1211 Order) are being submitted
- **Dam operations**
  - Not just how much flow to release, but the seasonal timing of that release
- **How does this affect new uses**
  - You have heard talks about Cannabis water needs

# A BROAD SUITE OF FLOW METRICS

- **Magnitude**
  - Streamflow (mean, max)
  - Median annual number of high flow events
- **Variability**
  - Median percent daily change in streamflow
  - Interannual variability (min, max, median)
- **Duration**
  - Storm flow recession
  - Duration above baseflow
- **Timing**
  - Month of minimum streamflow
  - Frequency of high flow events

Evaluate for multiple climatic conditions

- Average years
- Wet years
- Dry years
- All years