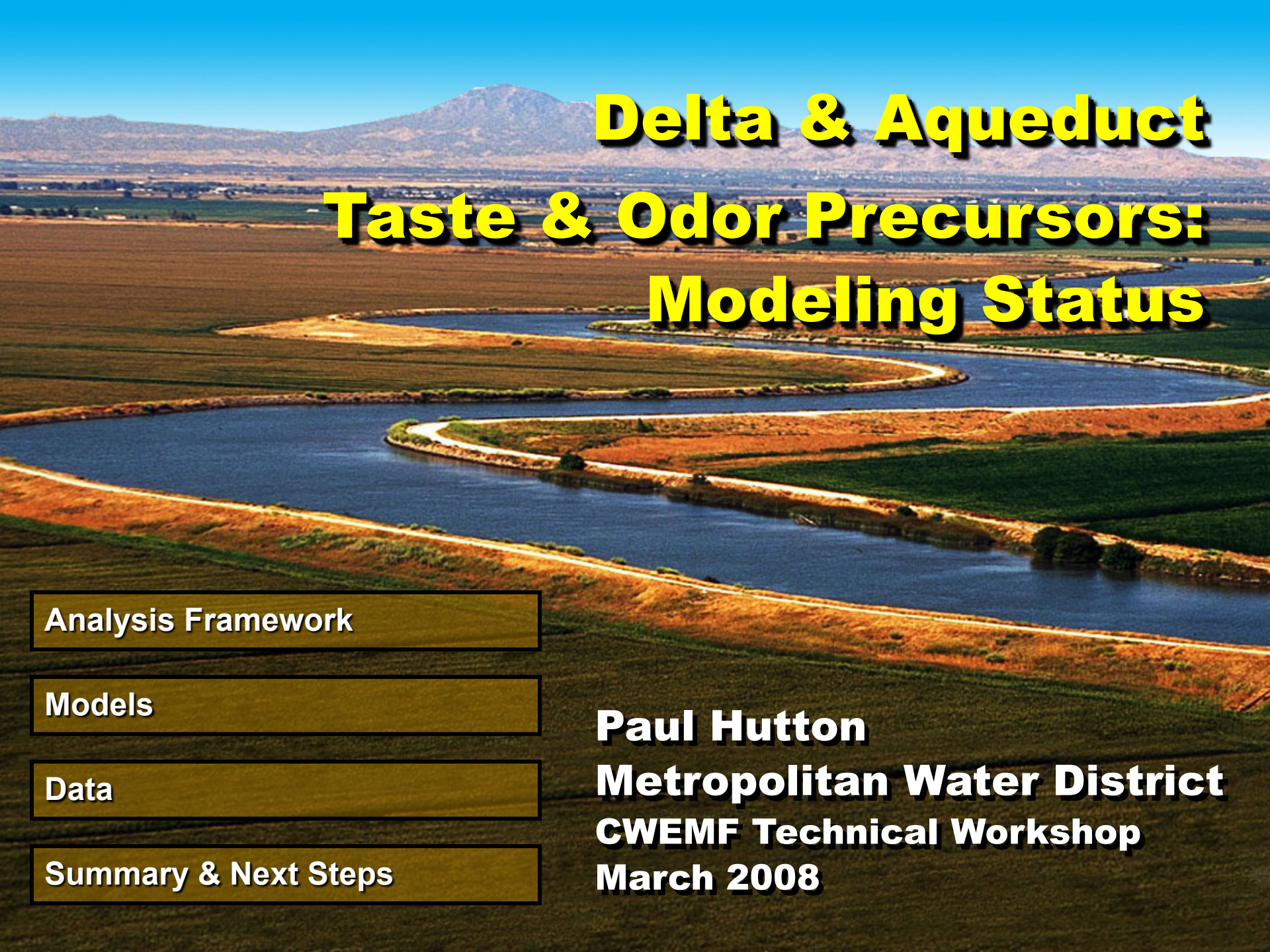
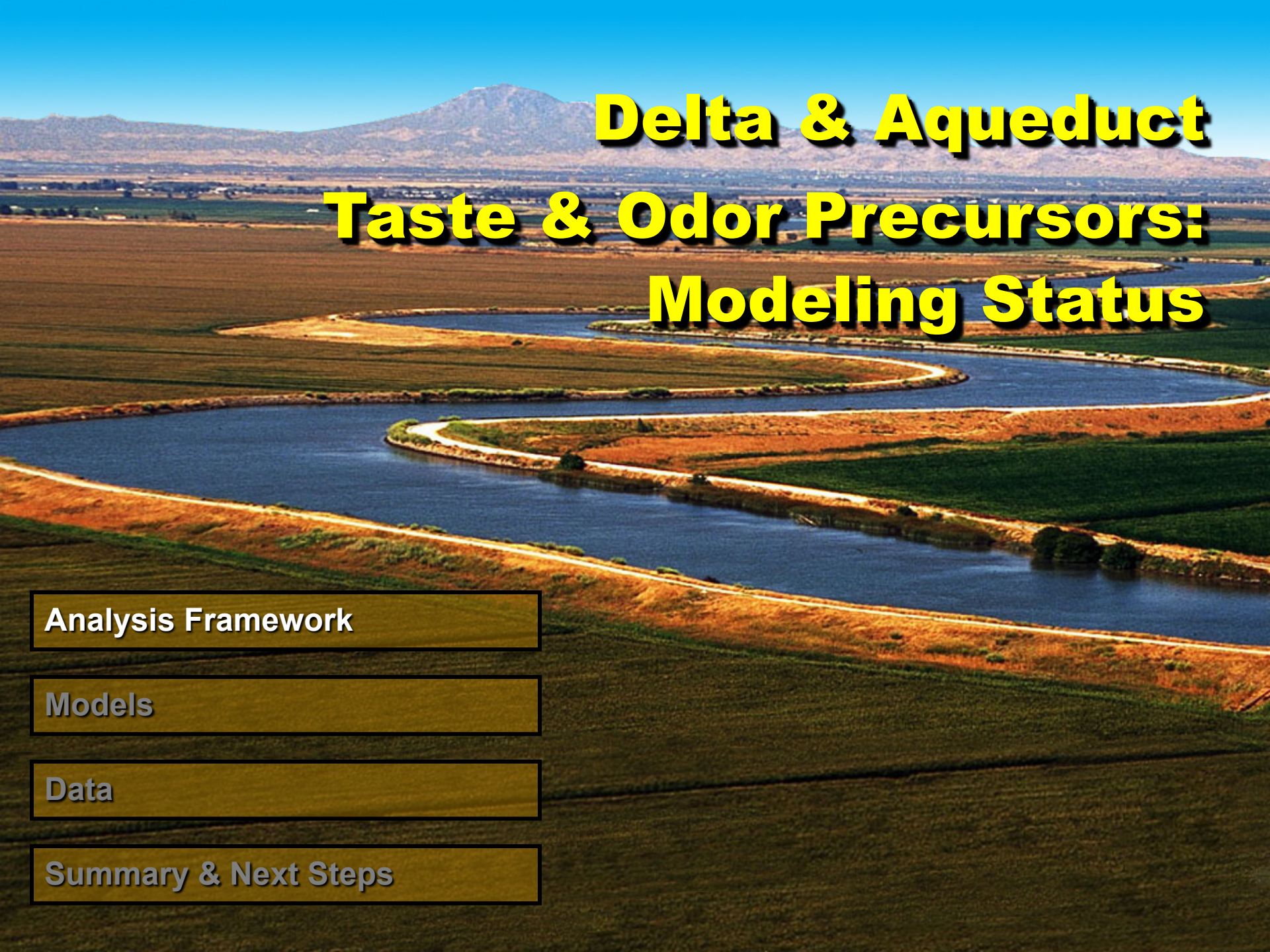


Delta & Aqueduct Taste & Odor Precursors: Modeling Status

- Analysis Framework
- Models
- Data
- Summary & Next Steps

Paul Hutton
Metropolitan Water District
CWEMF Technical Workshop
March 2008



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Taste & Odor Precursors

Nutrient Loading

?

Nutrient Fate & Transport

??

??

Ecological Response
(Chlorophyll)

???

???

Taste & Odor Events

A key component of a nutrient management program is the development of models that will enable management agencies and the public to reliably predict and assess the changes in nutrient-related water quality characteristics in the Delta and in downstream domestic water supplies that would be expected to occur as a result of various nutrient control strategies and flow management options.

From "Development of the Workshop" by
G. Fred Lee

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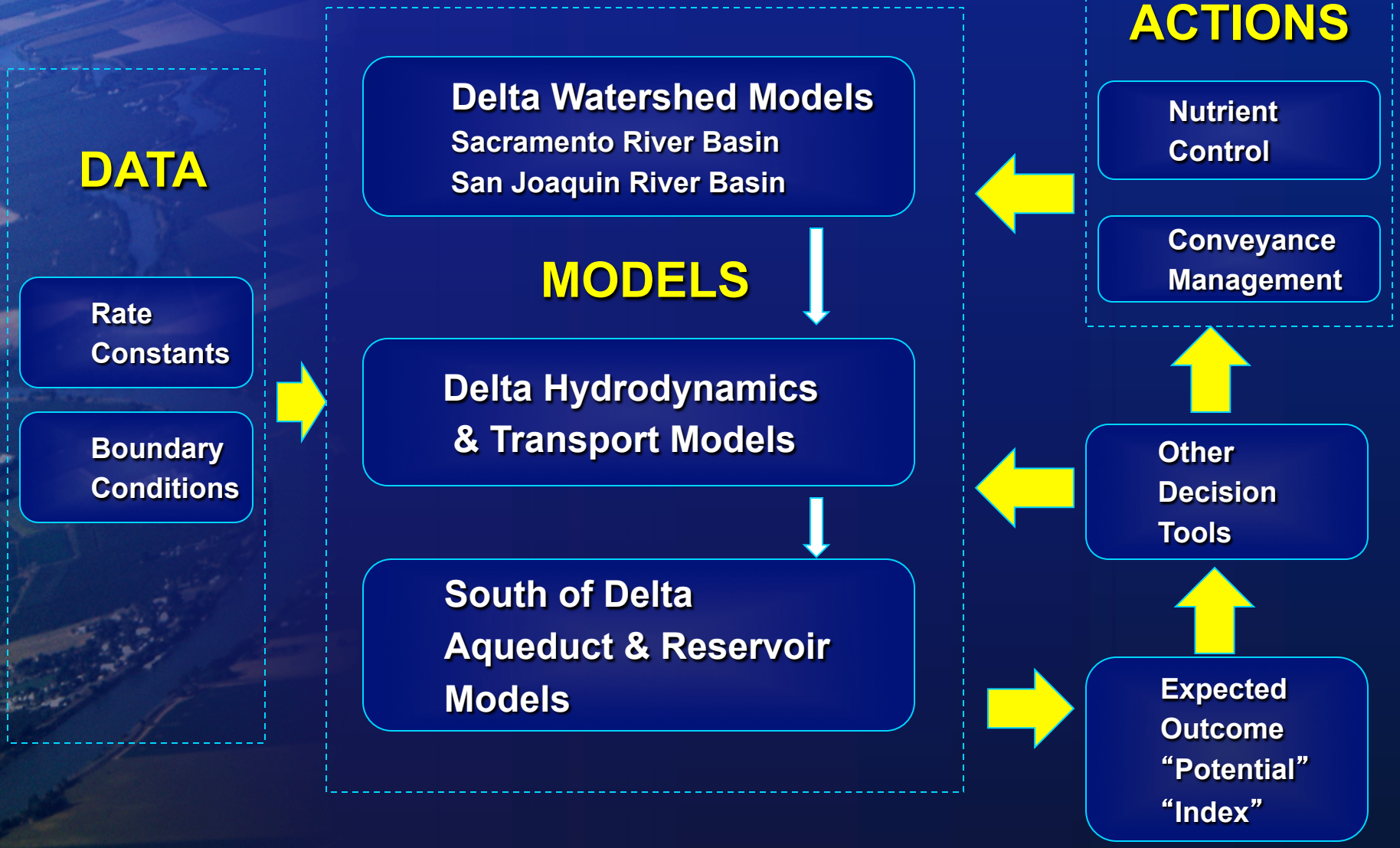
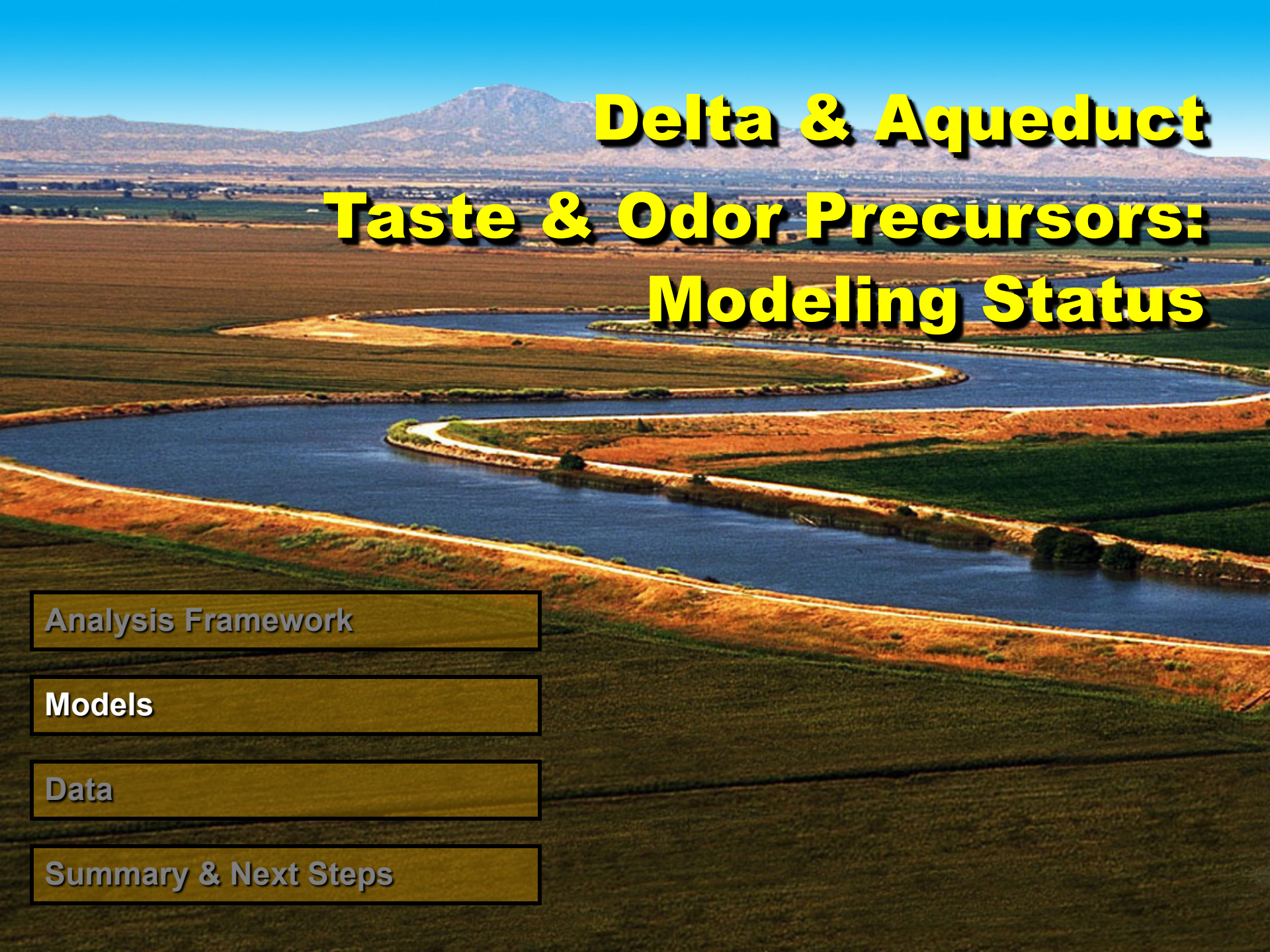
Analysis Framework





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Available Water Quality Models

Model	Licensor			
		Delta Watersheds	Delta	South of Delta
DSM2	DWR (Public Domain)	San Joaquin Basin	1-D	California Aqueduct + DMC
WARMF	USEPA (Public Domain)	San Joaquin Basin (mass balance)		
RMA11	RMA		2-D	
MIKE21	DHI		2-D	
Link Node Model	Systec		1-D (limited)	
DYRESM-WQ	Flow Science			Southern California Reservoirs

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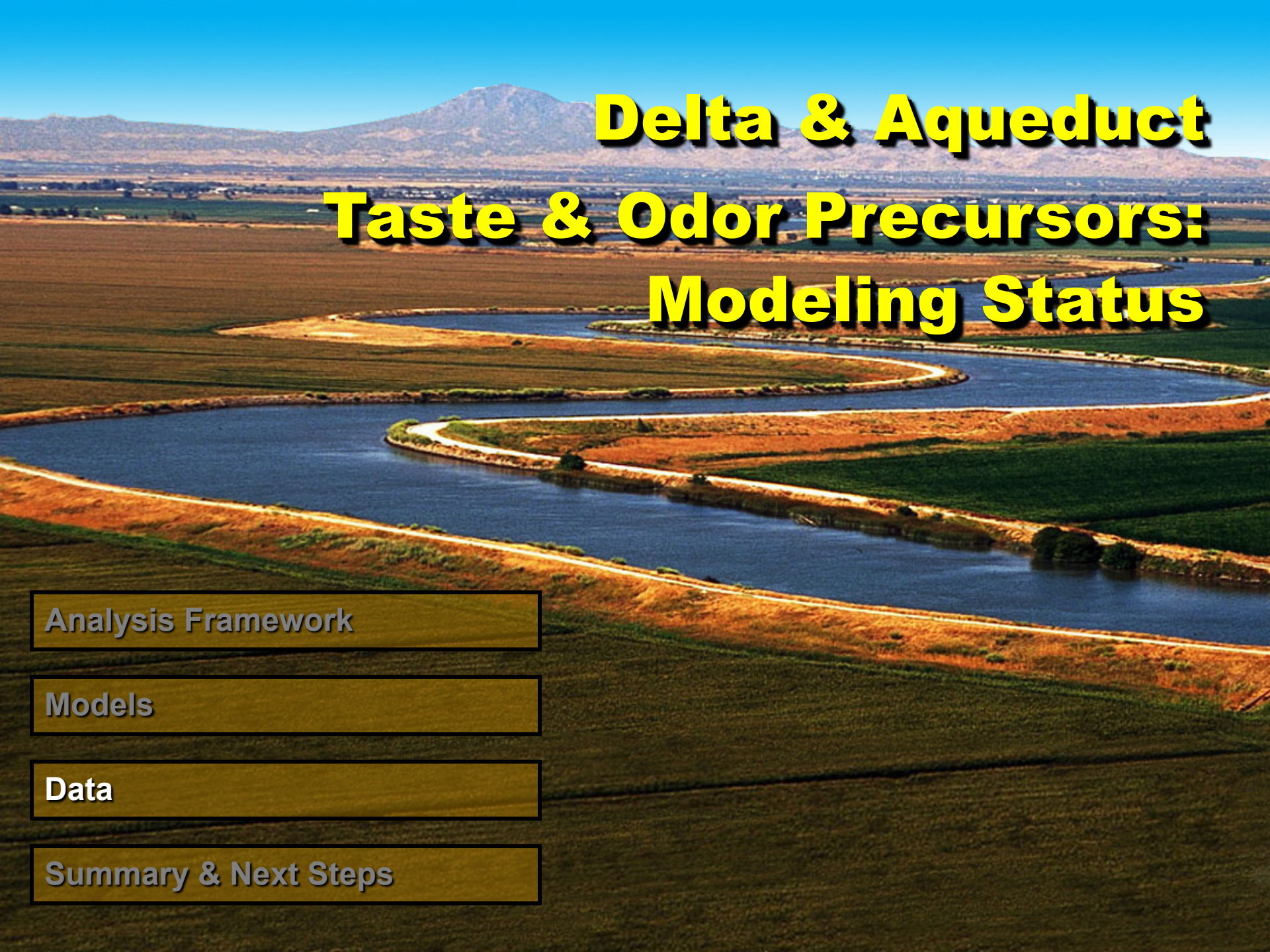

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Data Requirements

Analysis Type	Rate Constants	Boundary Conditions		Downstream Conditions	
		Flow	Water Quality	Flow	Water Quality
Model Calibration	X	X	X	X	X
Historical Simulation Model Validation		X	X	X	X
Long Term Planning Impact Assessment		X	X		

Data Requirements

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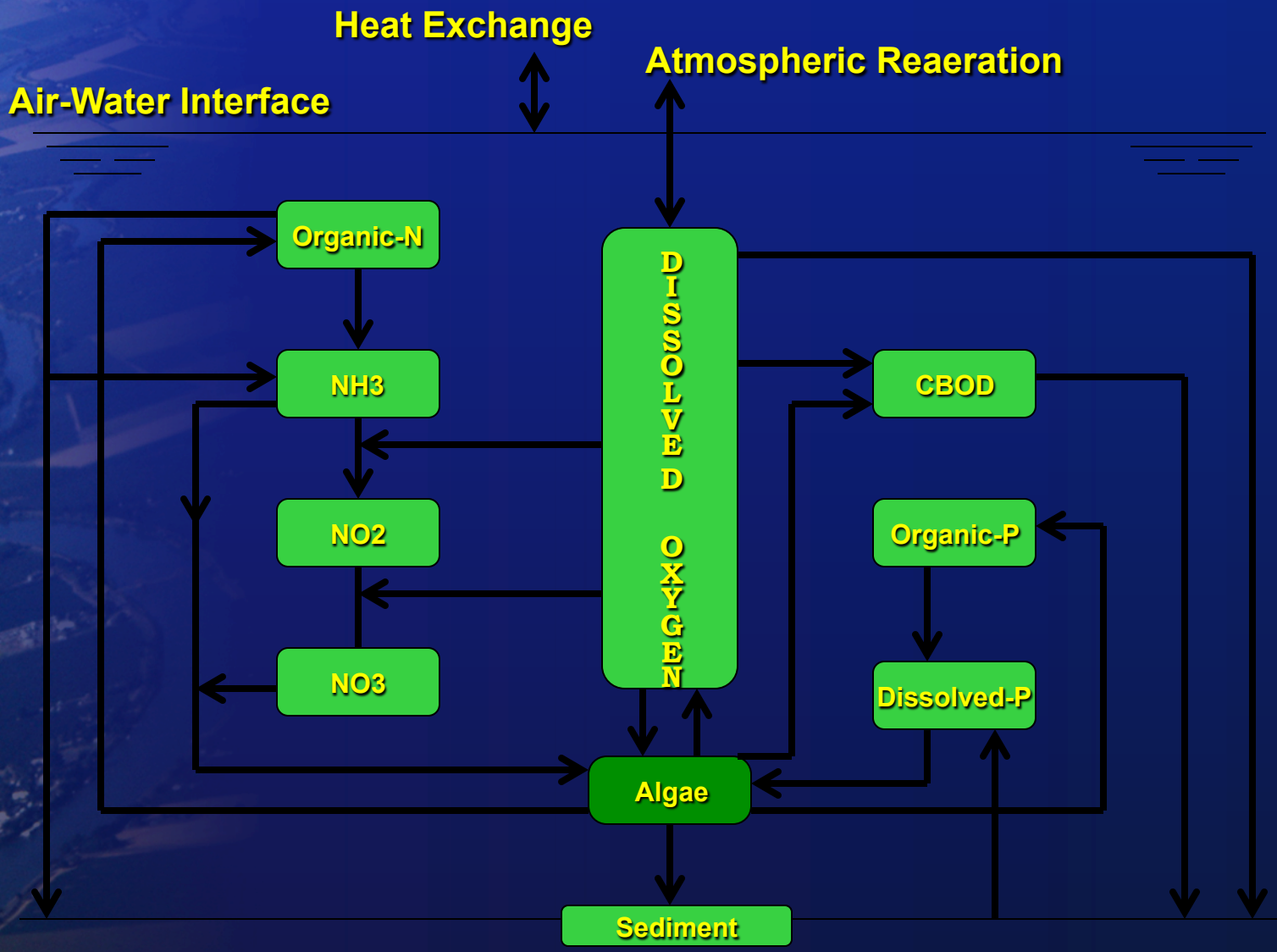
Model Calibration	X	X	X	X	X
Historical Simulation Model Validation		X	X	X	X
Long Term Planning Impact Assessment		X	X		
Reconnaissance (Fingerprinting)		X			

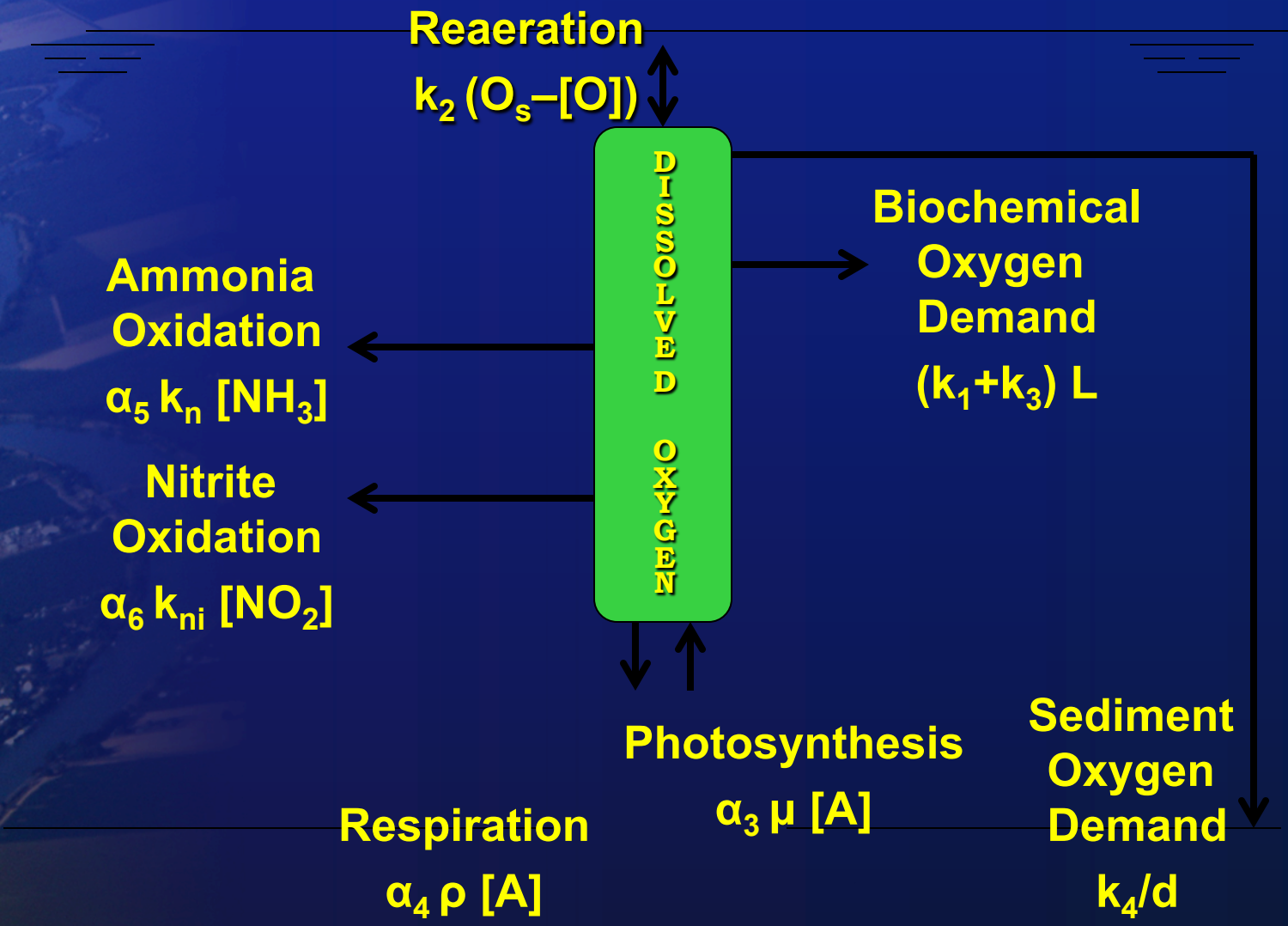
DO Sources and Sinks



Compliments of Dr. Hari Rajbhandari, DWR

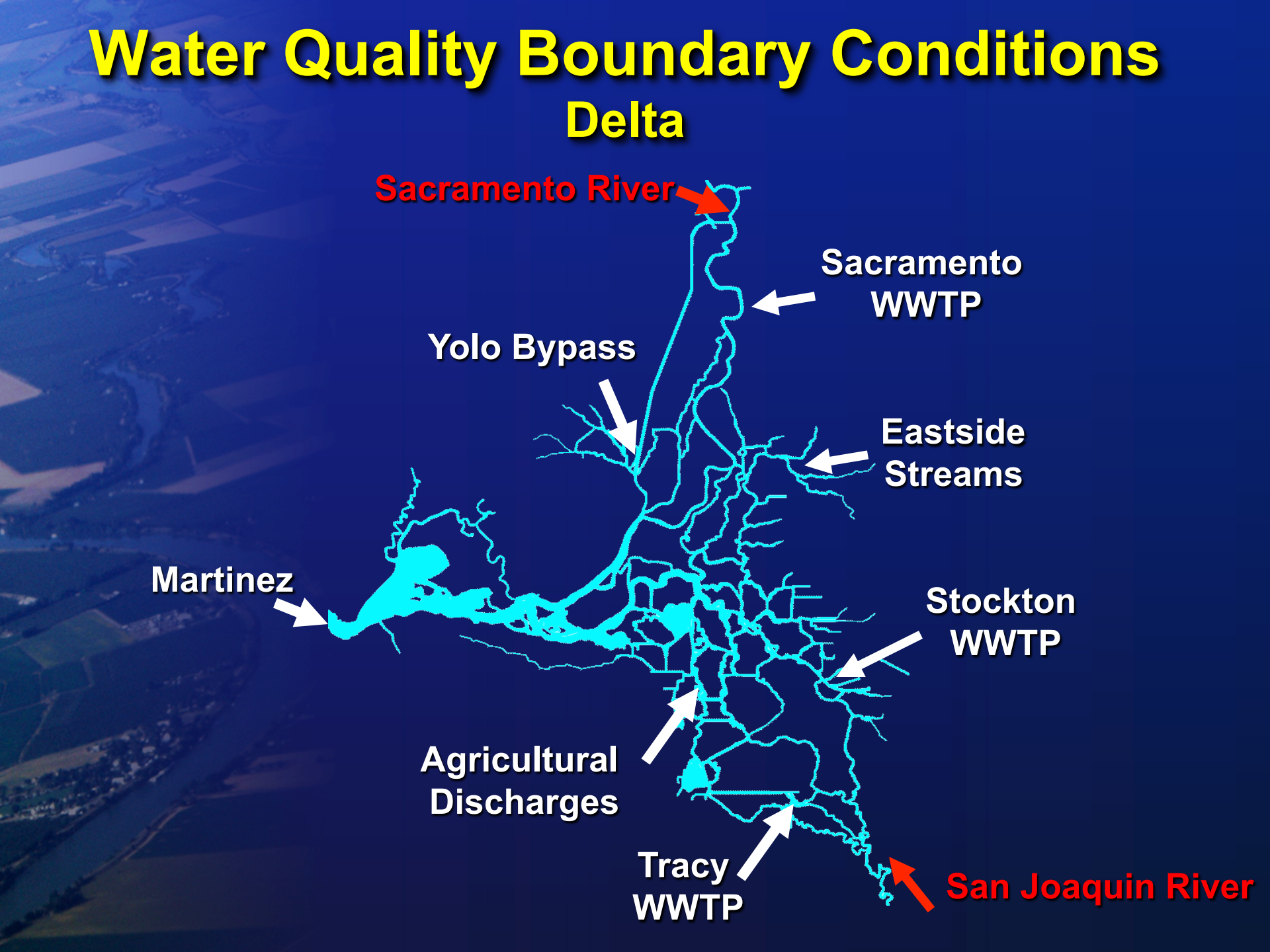
Example Rate Constants

Dissolved Oxygen Mass Balance



Water Quality Boundary Conditions

Delta



Water Quality Boundary Conditions

Sacramento River Watershed

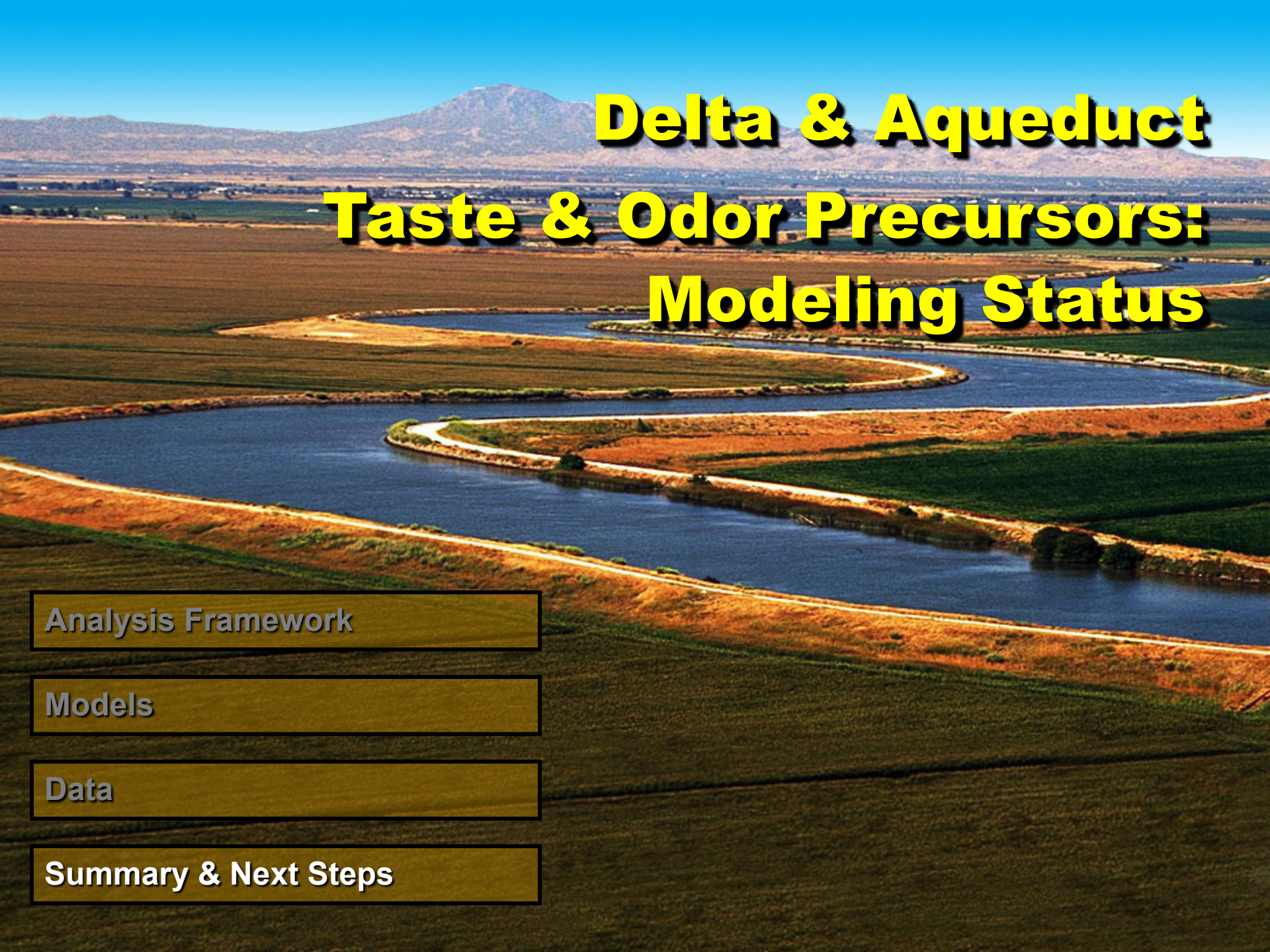
- Shasta Releases
- Feather River
- American River
- Colusa Basin Drain
- Sacramento Slough
- Natomas East Main Drain
- Others?

San Joaquin River Watershed

- SJR @ Lander Ave.
- Mud and Salt Sloughs
- Other West Side Inflows
- Stanislaus River
- Tuolumne River
- Merced River
- Others?

South of Delta Aqueducts

- Banks Pumping Plant
- Jones Pumping Plant
- Kern River Interie
- Miscellaneous Inflows (e.g. groundwater pump-ins, storm water inflows)



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Summary

- Models status
- Data status

Possible Next Steps

- Expand focus beyond Stockton DWSC to entire Delta
- Identify promising actions through "fingerprint" analysis
  - Spatial characteristics
  - Temporal characteristics
- Conduct a multi-year historical simulation (e.g. model validation)
  - Don't be afraid to be wrong (you will be)
  - Identify information gaps

Possible Next Steps (cont'd)

- Fund, design & implement long-term monitoring program
  - Characterize sources (boundary conditions)
  - Calibrate rate constants
- Fund long-term model development & maintenance

Extra Slides

DSM2-Aqueduct Model Schematic