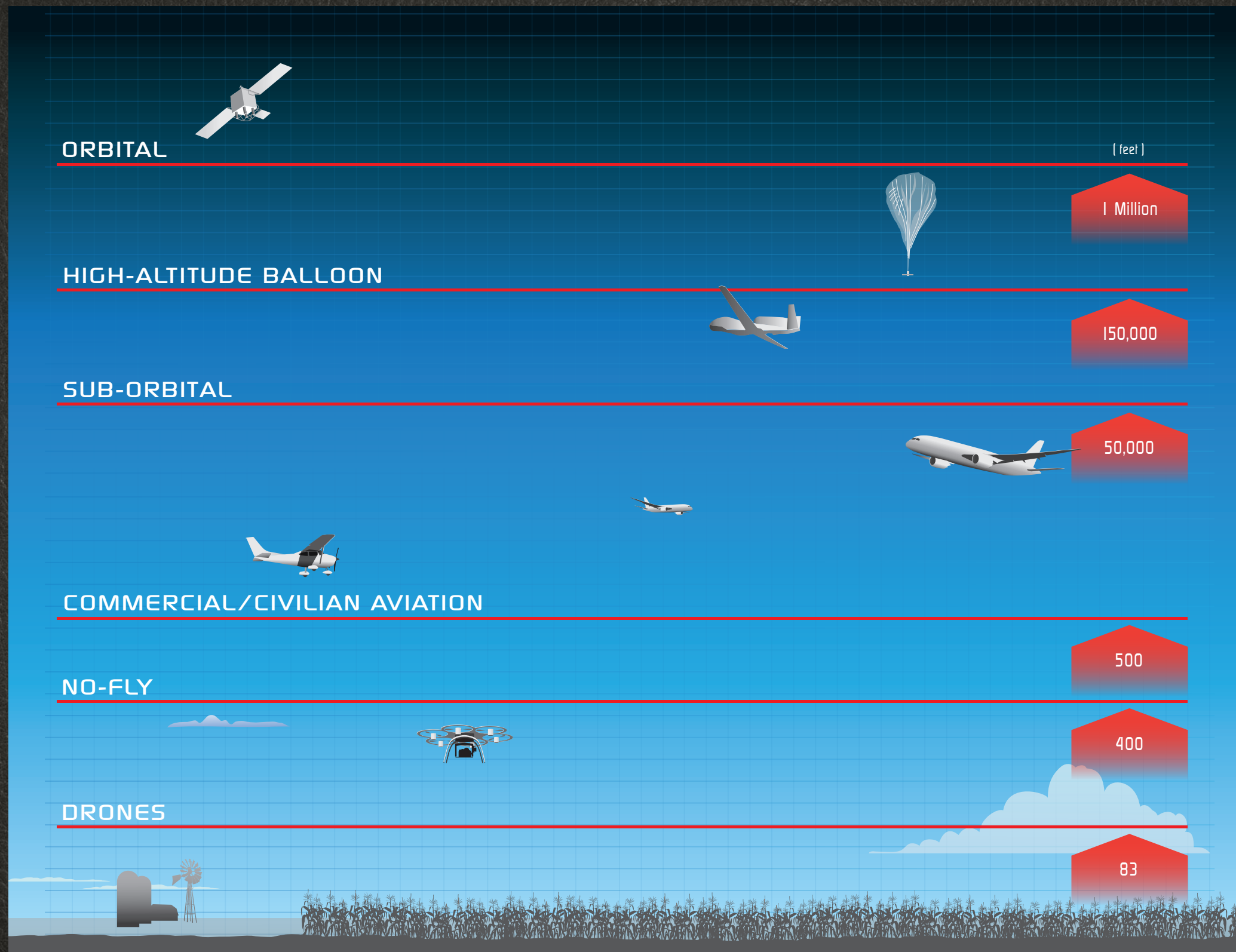


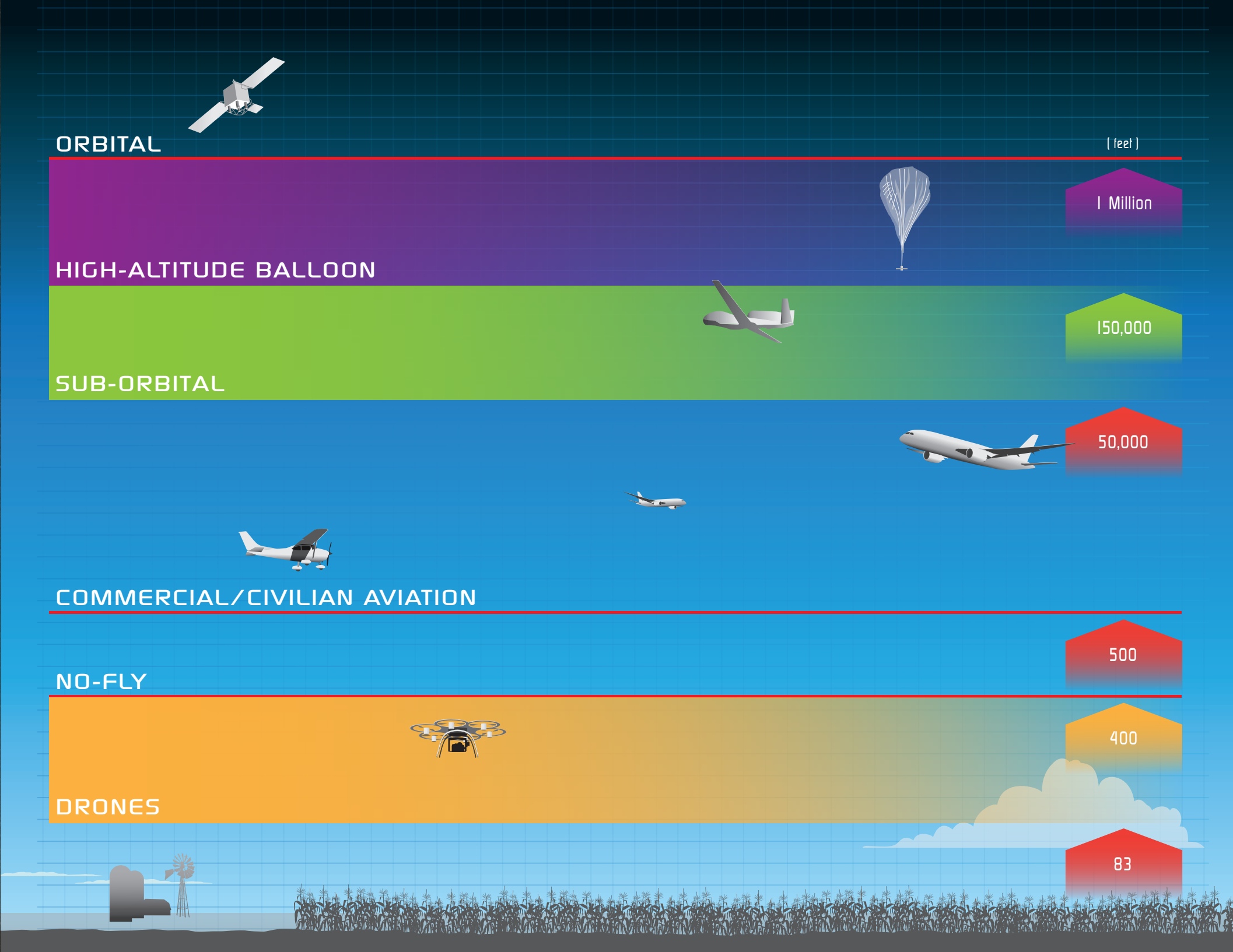


Drones a undervalued technology for water management
Gary Darling - California Department of Water Resources - Western
States Water Council Information Management Systems Workshop

Ways Of Acquiring Imagery



Drone Zones



Concept

- A constellation of lightweight, solar powered unmanned aircraft that stay aloft for months
- Operates at approximately 60,000 to 65,000 feet AGL
- A suite of miniaturized, low power consumption high resolution imaging sensors
- Flexible and deployable
- Reconfigurable, repairable, upgradeable
- Fraction of the cost of an imaging satellite
- Technology is here, today



Environmental

- Fish monitoring
 - Salmon / Steelhead Reds
 - Stranded Salmon Smolts
- Turbidity Monitoring
 - Transition Zone Location
 - “Clean Water Barrier” at SWP pumps
- Vegetation
 - Invasive Species - Identification and control
 - Vegetation monitoring and documentation

Flood Management

- ◆ Levee Management
- ◆ Flood Monitoring - Before, During and After
- ◆ Historical Flood Extent / Flood Model Calibration

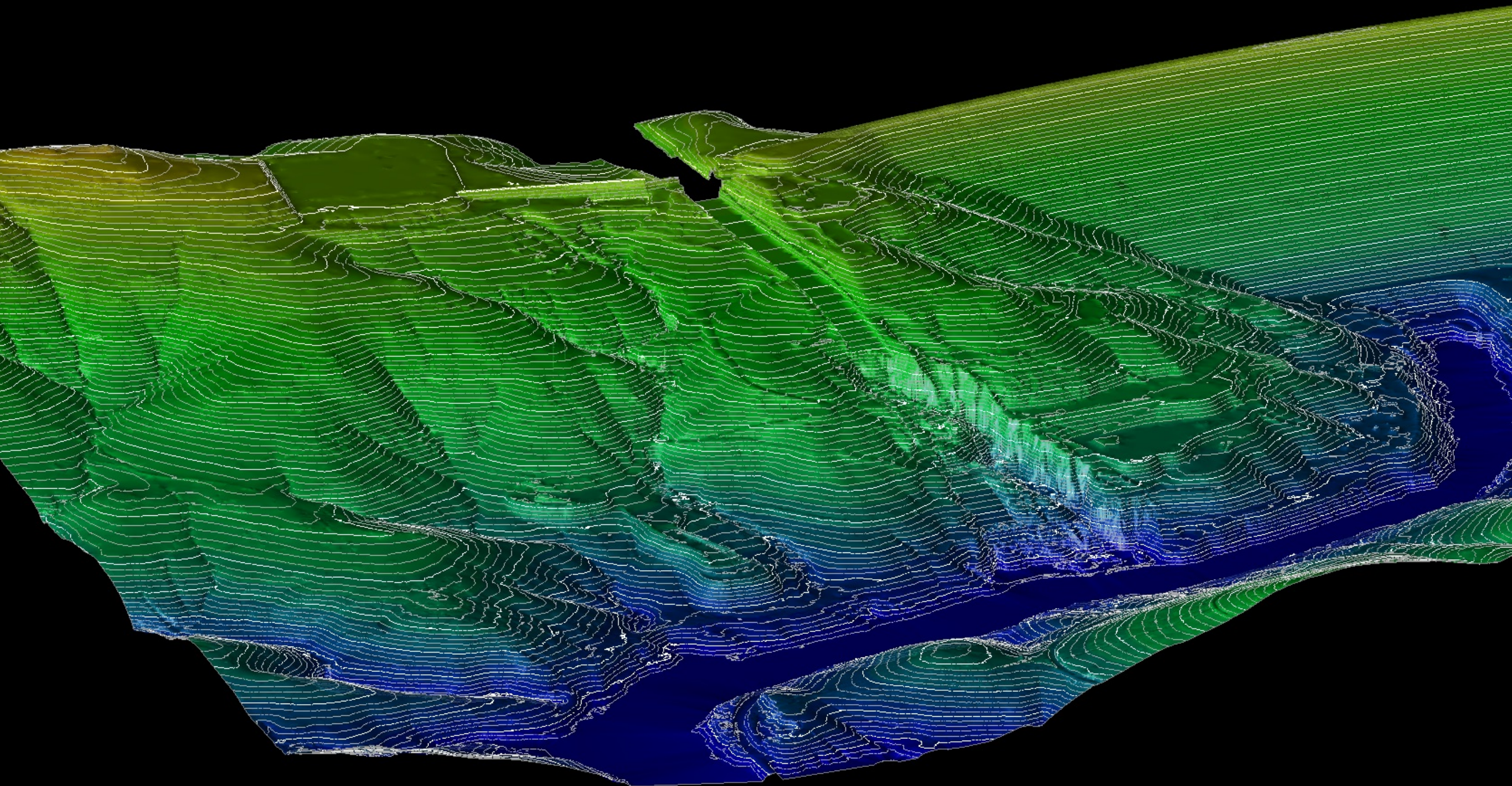
Construction, Operations and Maintenance

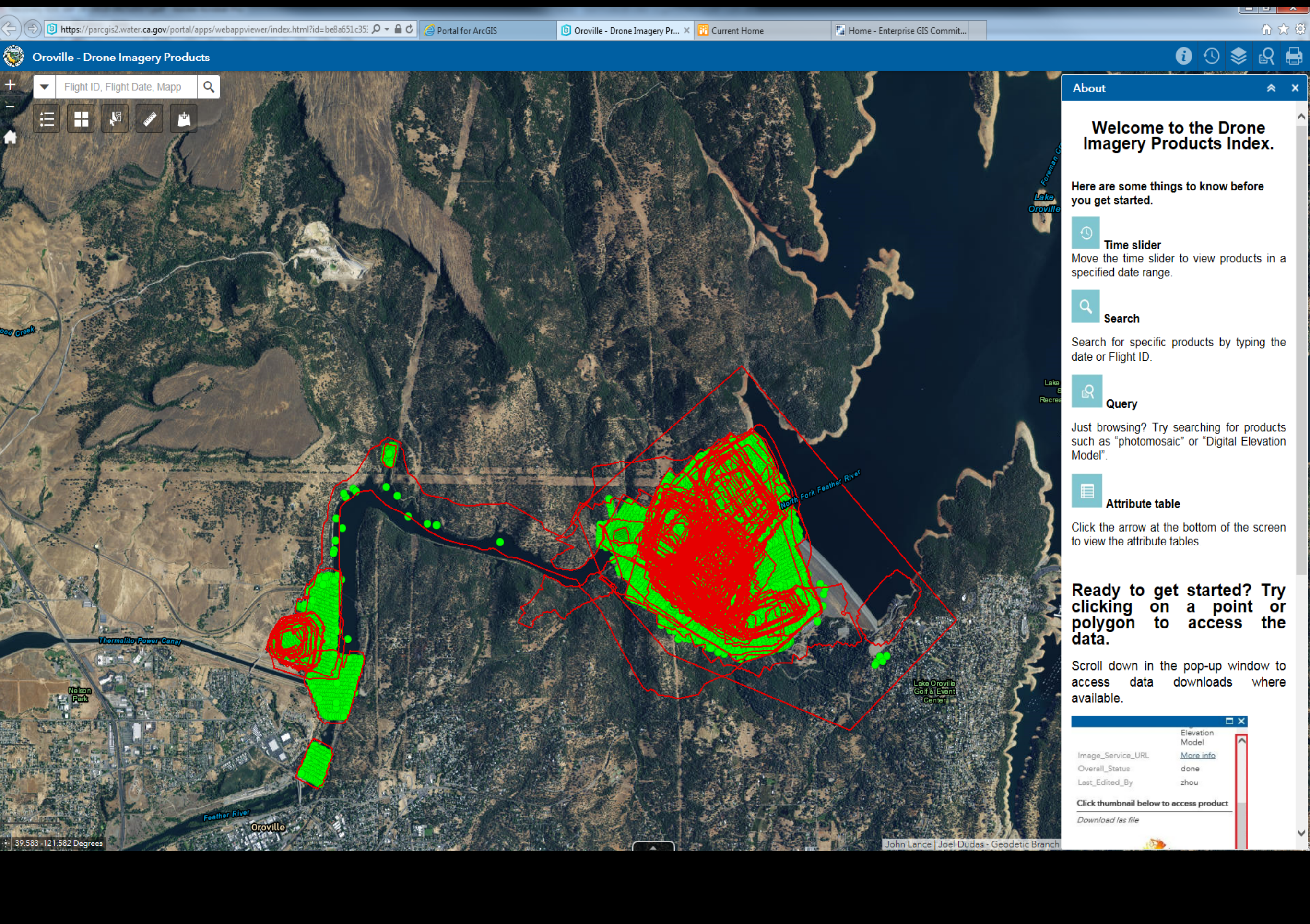
- ◆ Monitoring and inspection - land subsidence
- ◆ O&M Dam Surveillance
- ◆ Reservoir rim stability
- ◆ Project Planning - site reconnaissance
- ◆ Security - Monitoring critical infrastructure
- ◆ Construction
- ◆ Dredging - Shallow areas causing conveyance problems, sediment transport





Project Surfaces





Hydrodynamic Modeling

- ◆ Intertidal Zone
- ◆ Tidal wetland

Energy

- ◆ Thermal sensors to identify defective solar panels
- ◆ Power lines - Monitoring of transmission, distribution and generation assets

Senate Joint Resolution No. 18

CHAPTER 43

Relative to small unmanned aircraft systems.

[Filed with Secretary of State May 20, 2016.]

LEGISLATIVE COUNSEL'S DIGEST

SJR 18, Wolk. Small unmanned aircraft systems.

This measure would request the President of the United States and the United States Secretary of Transportation to allow for the operation of small unmanned aircraft systems by farmers and rangeland managers pursuant to emergency rules adopted by the administration, as specified.

Fiscal Committee: no

WHEREAS, In the western United States, water is a vital and scarce resource, the availability of which has and continues to circumscribe growth, development, economic well-being, and environmental quality of life; and

WHEREAS, The wise use, conservation, development, and management of our water resources is critical to maintaining human life, health, safety, and property; and

WHEREAS, The western United States is currently experiencing serious drought conditions that are predicted to worsen; and

WHEREAS, Agricultural irrigation uses a significant amount of water, making the agricultural sector one of the most important sectors to examine when considering water conservation; and

WHEREAS, Even modest improvements in agricultural water use can result in significant amounts of water not being depleted regionwide, which can then be utilized elsewhere; and

California Senate Joint Resolution 18

Precisión Agriculture

- ◆ Assumptions
 - ◆ 10% reduction of applied water from optimal irrigation scheduling
 - ◆ 10% adoption rate for precision agriculture drones

Precision Agriculture

- ◆ Water Conservation
 - ◆ Over the four years of the drought across the Western US 3 MAF could have been saved with UAS
 - ◆ 1.5 Billion dollars at \$500.00 AF

Energy/Greenhouse gases

- ◆ 1.27 TW/H from reduced ground water lifts

Ag salts / Toxics

- ◆ Less applied water, less salinization
- ◆ Reduction in pesticide use

Nitrates

- ◆ Reductions in fertilizer use
- ◆ Potentially large groundwater benefit



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