

Verification / Administration of Water Rights Transfers

Stephen Smith, PhD
Regenesis Management Group
Colorado, USA

<https://www.regenmg.com>

Presentation:

- Comments from a “practitioner” of the science of remote sensing.
- Background on western water rights under prior appropriation.
- Water rights transfers in the west.
- Consideration of alternative farming practices.
- Implementation strategies.

Who we are:

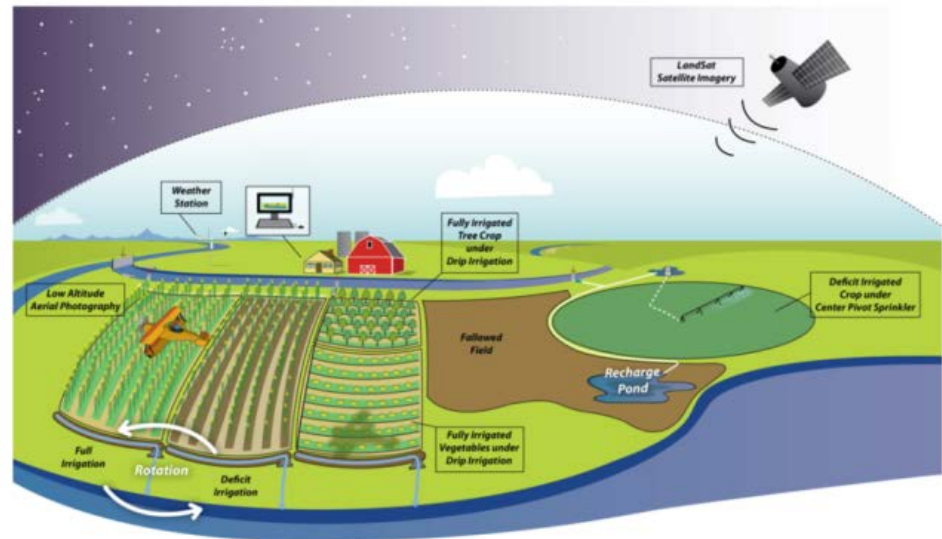


Underpinned by researchers and CWCB:



Focus today is on the “insurmountable opportunity” of remote sensing in water rights transfers.

From a practitioner ...

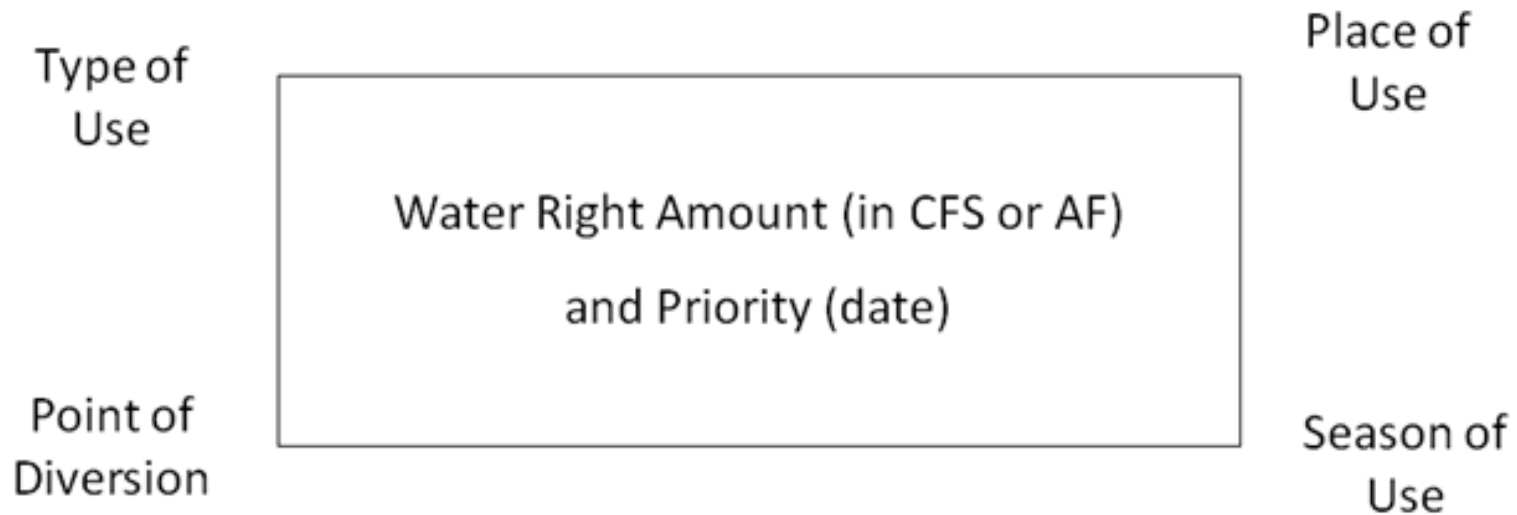


Agriculture to urban water transfers:

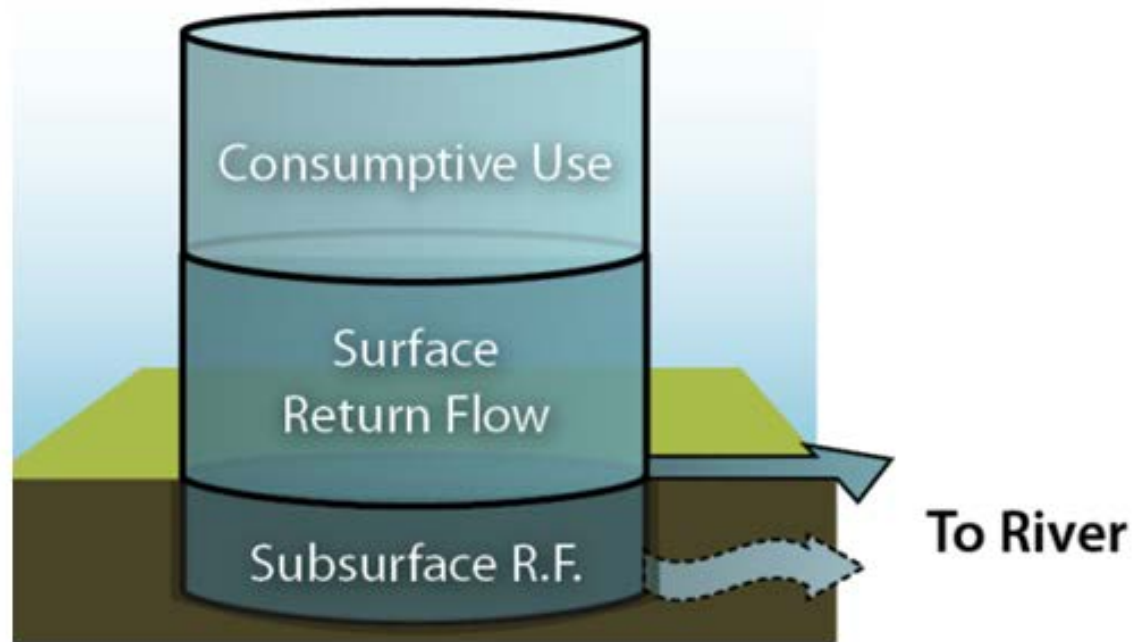
- Driven by population growth and municipal needs for a safe yield.
- Often accomplished with “buy and dry” strategies.
- Can we avoid “buy and dry”?

More specifically, can we transfer a proportional amount of the CU water within a farmer's water right, if they wish, to avoid "buy and dry" and keep the farmer in business?

Direct Flow or Storage Water Right



Decreed Water Rights under Prior Appropriation



Quantification of Historic Consumptive Use Water

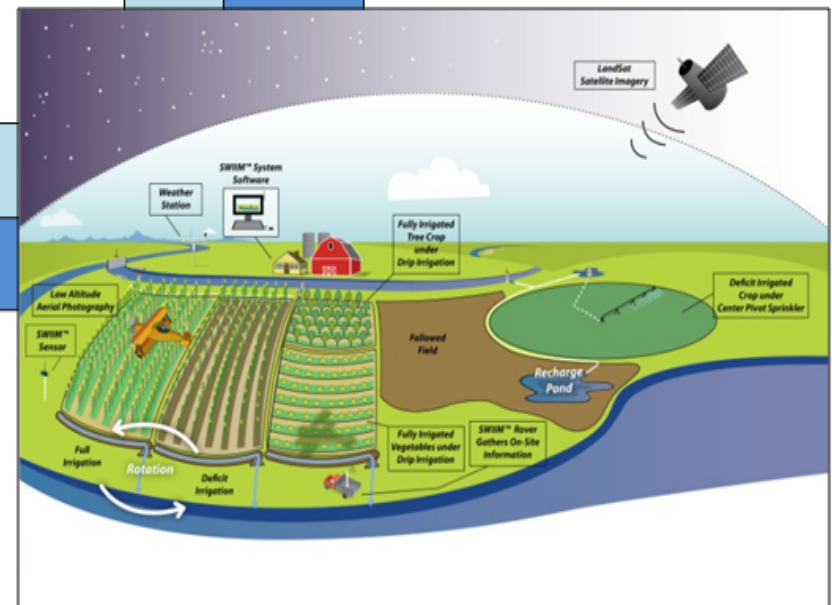
SWIIM™ System

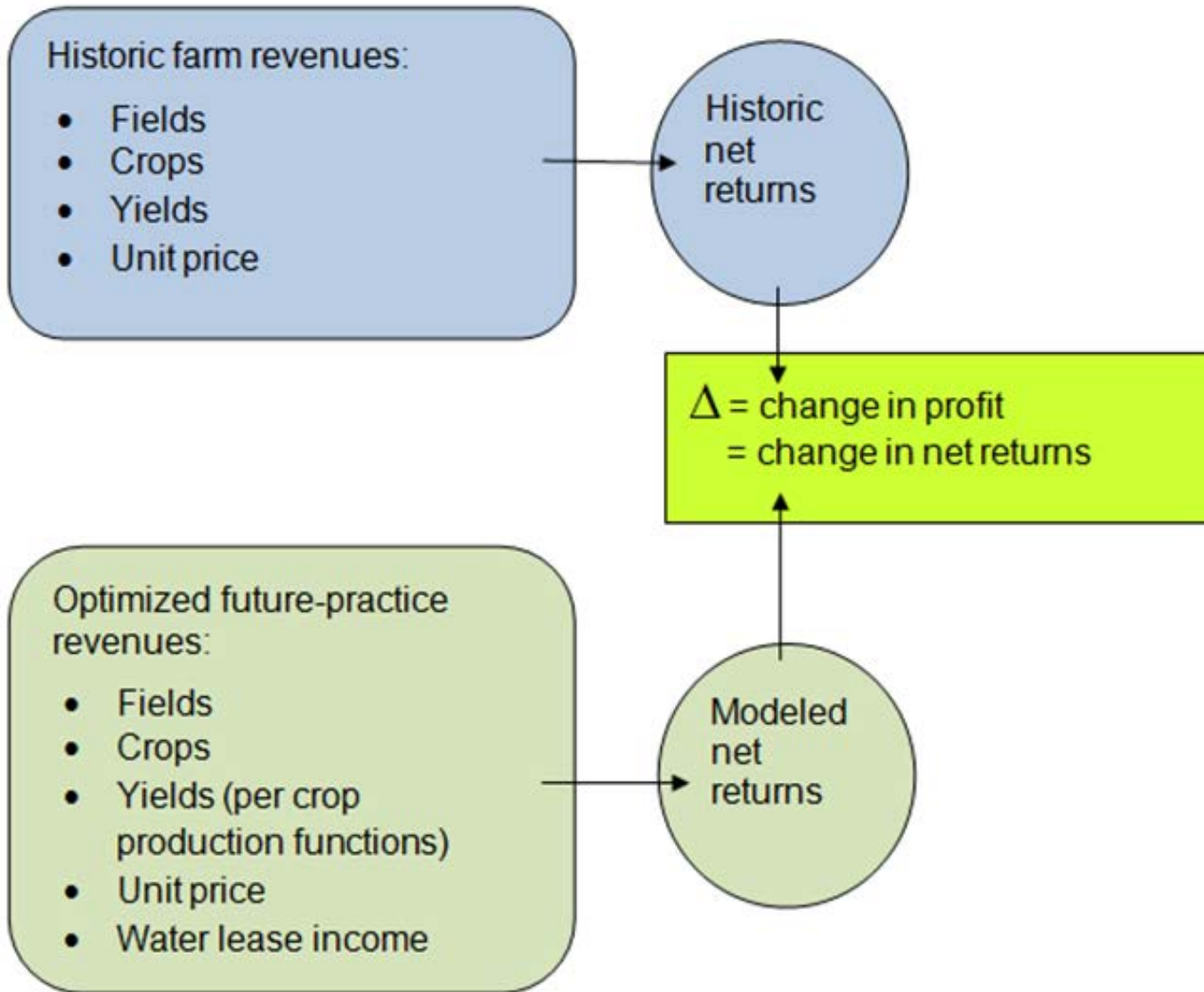
SWIIM Planner

- GIS farm data entry
- Historic net returns
- Acceptable practices
- Mathematical optimization

SWIIM Manager

- SCADA Monitoring
- Water balance reporting
- Soil moisture sensing
- Remote sensing





Potential for changed farming practices:

- Deficit irrigation of selected crops.
- Crop rotations.
- Introduction of new crops including perennial crops.
- Permanent fallowing or rotational fallowing.
- Introduction of dryland crops.
- Continued full irrigation of selected crops.
- Combinations of the above.

What is
deficit irrigation?

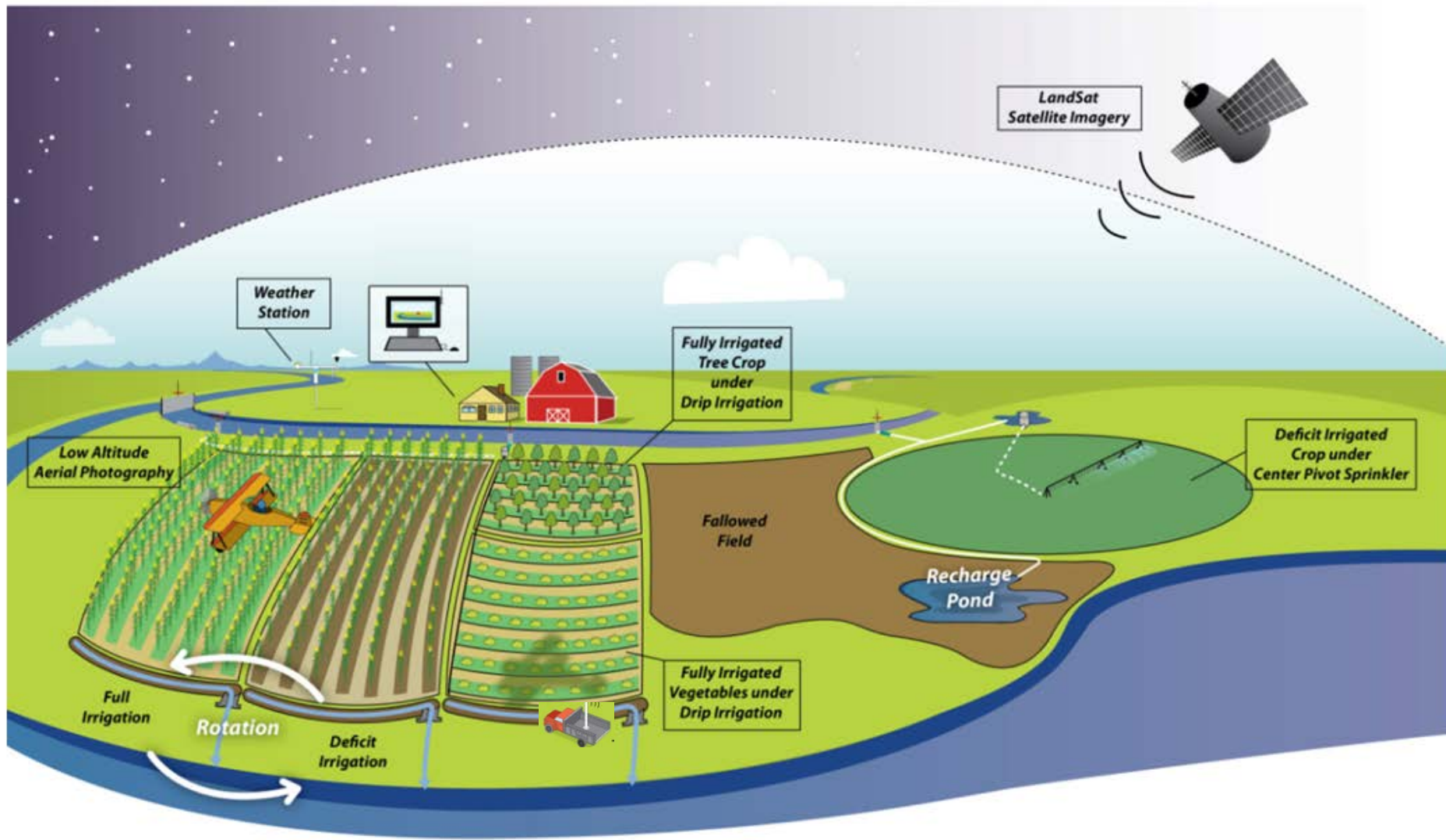
Deficit irrigation ...

Irrigation that allows stress in a significant fraction of the (field) at times during the season.

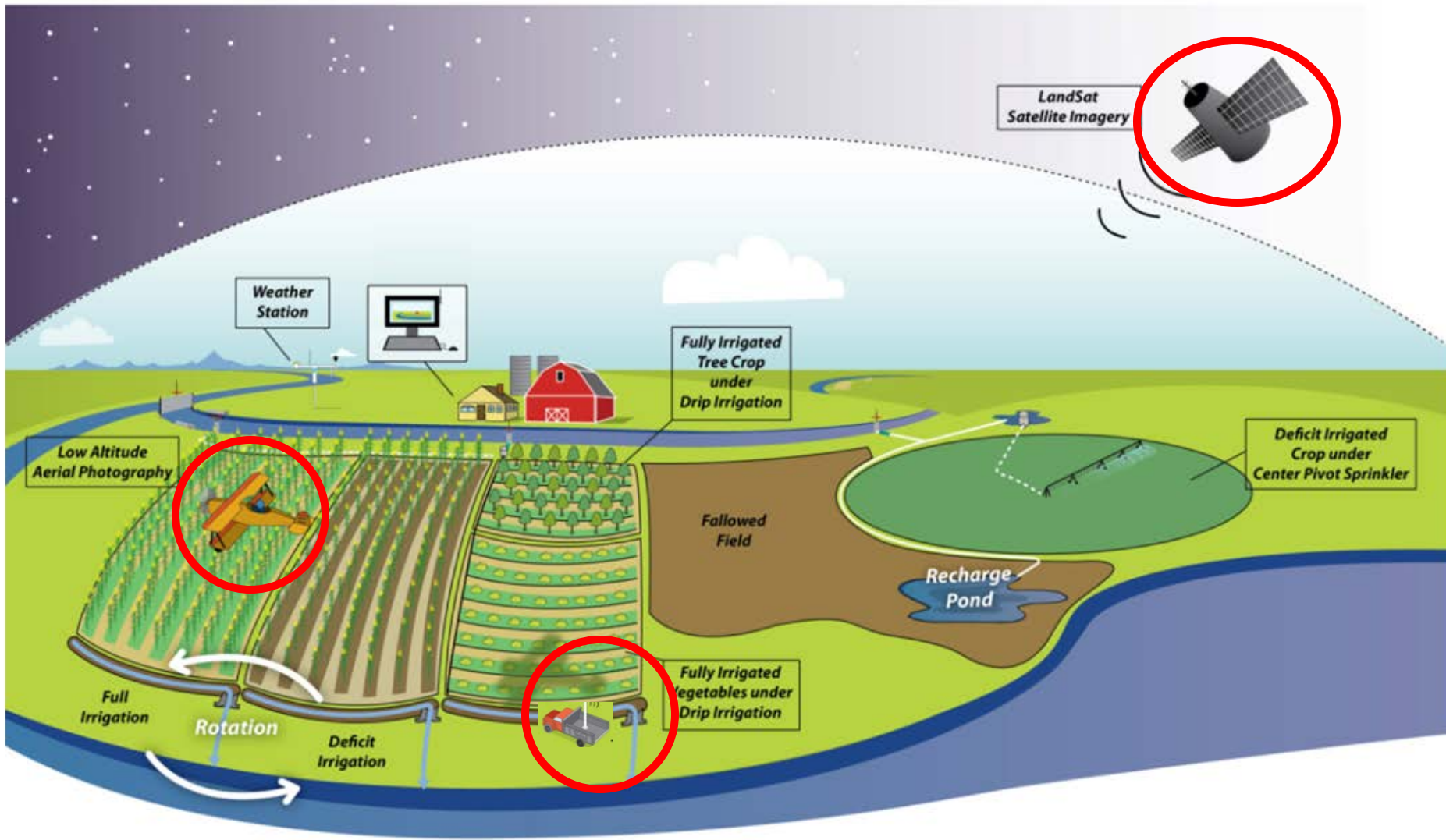
– Marshall English, Oregon State Univ.

Deliberately tolerating stress for maximizing the productivity of water. -- Sam Geerts, Univ. of Leuven, Belgium

Irrigation at a level under the expectation of reduced crop yield with economics justifying the deficit. -- Freddie Lamb, Kansas State Univ.



A characterization of a full single-farm SWIIM[®] implementation.



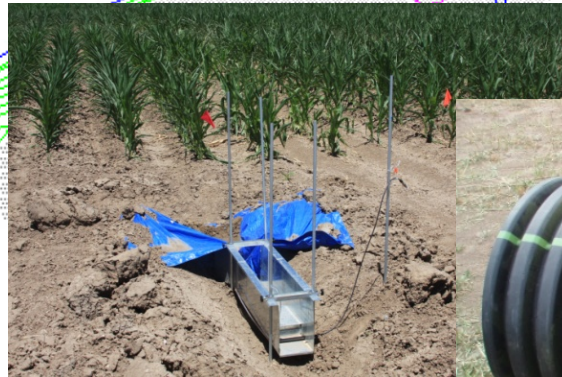
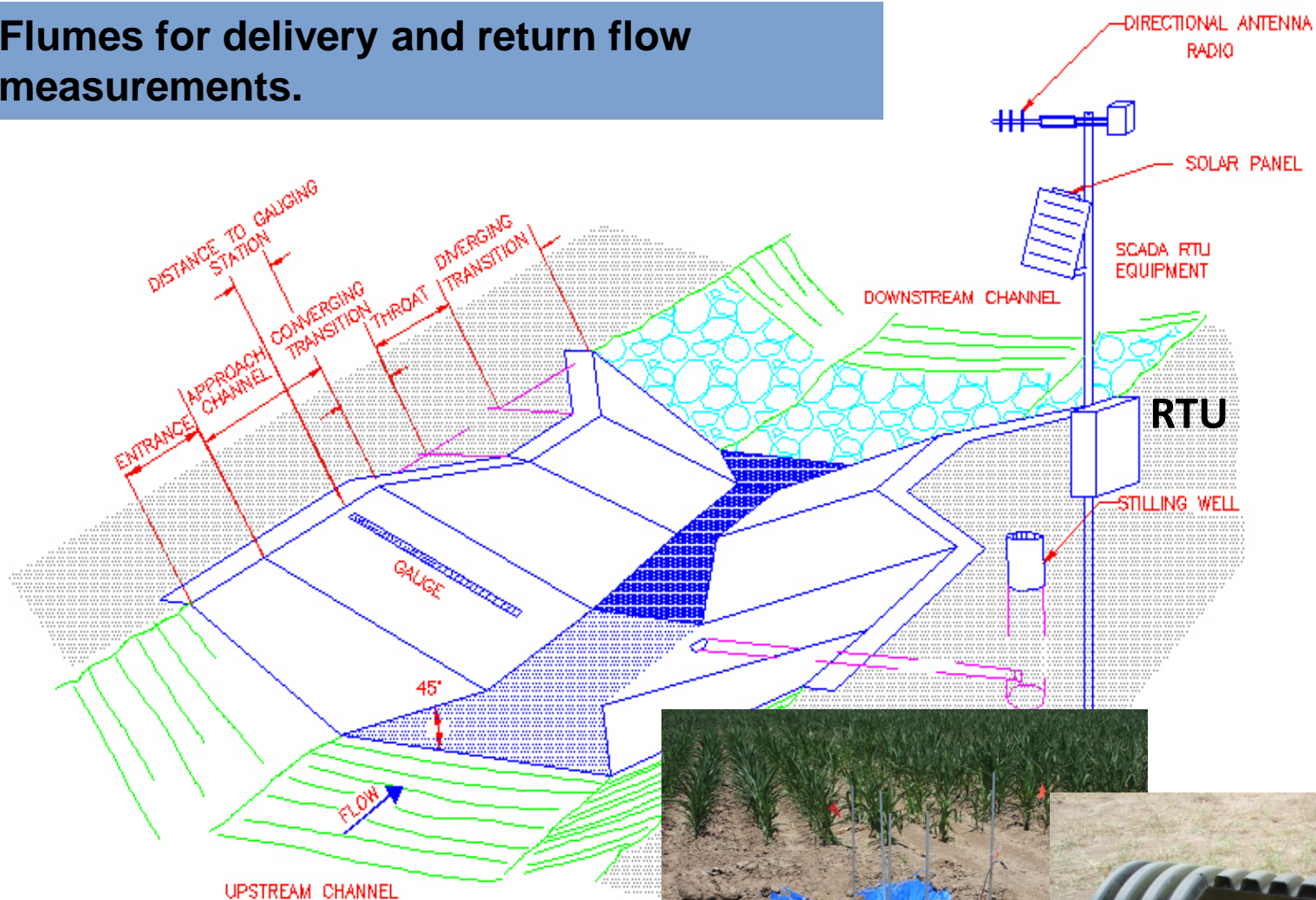
A characterization of a full single-farm SWIIM[®] implementation.

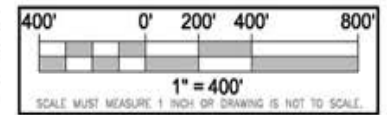
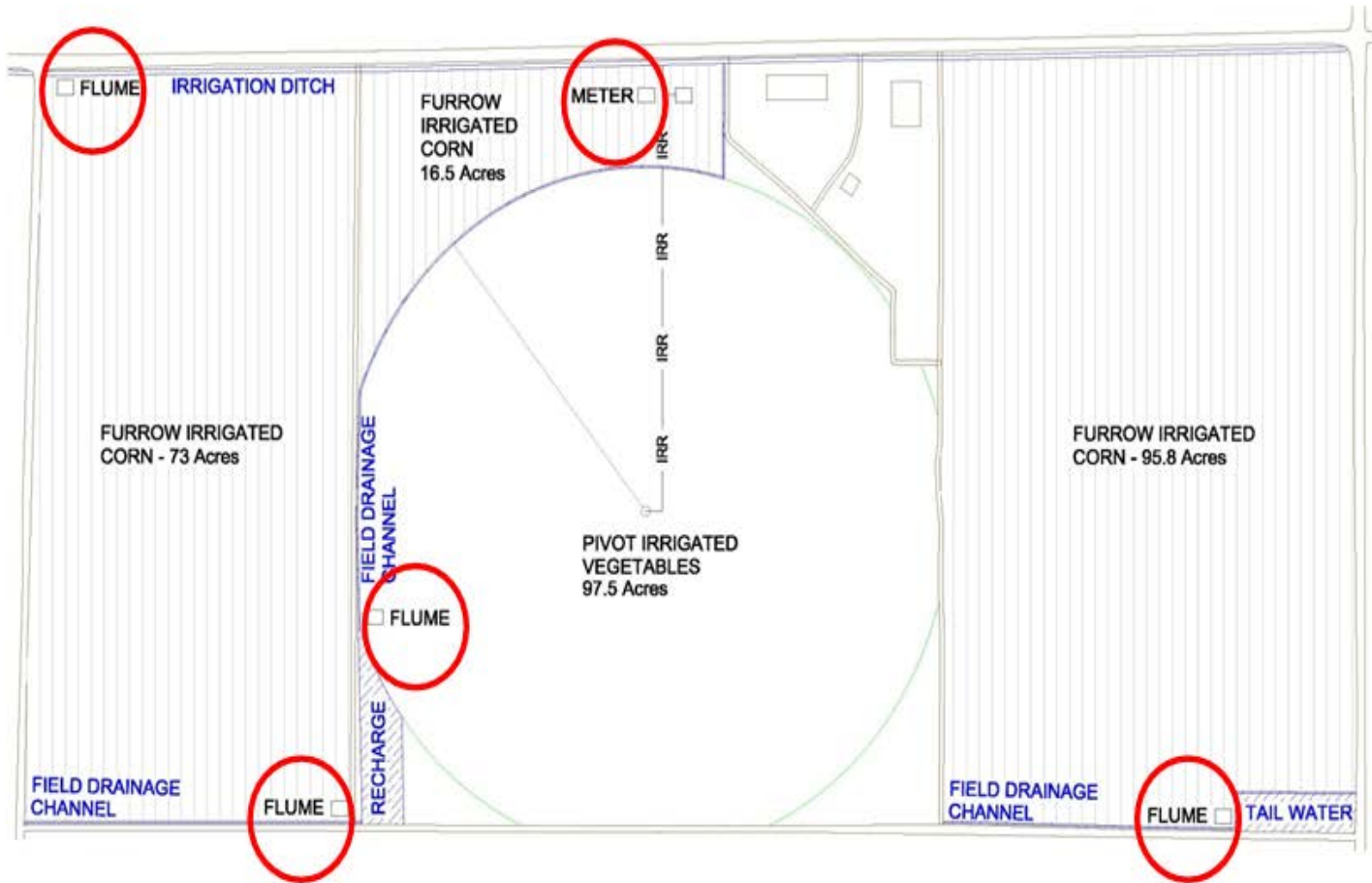
Instrumentation:

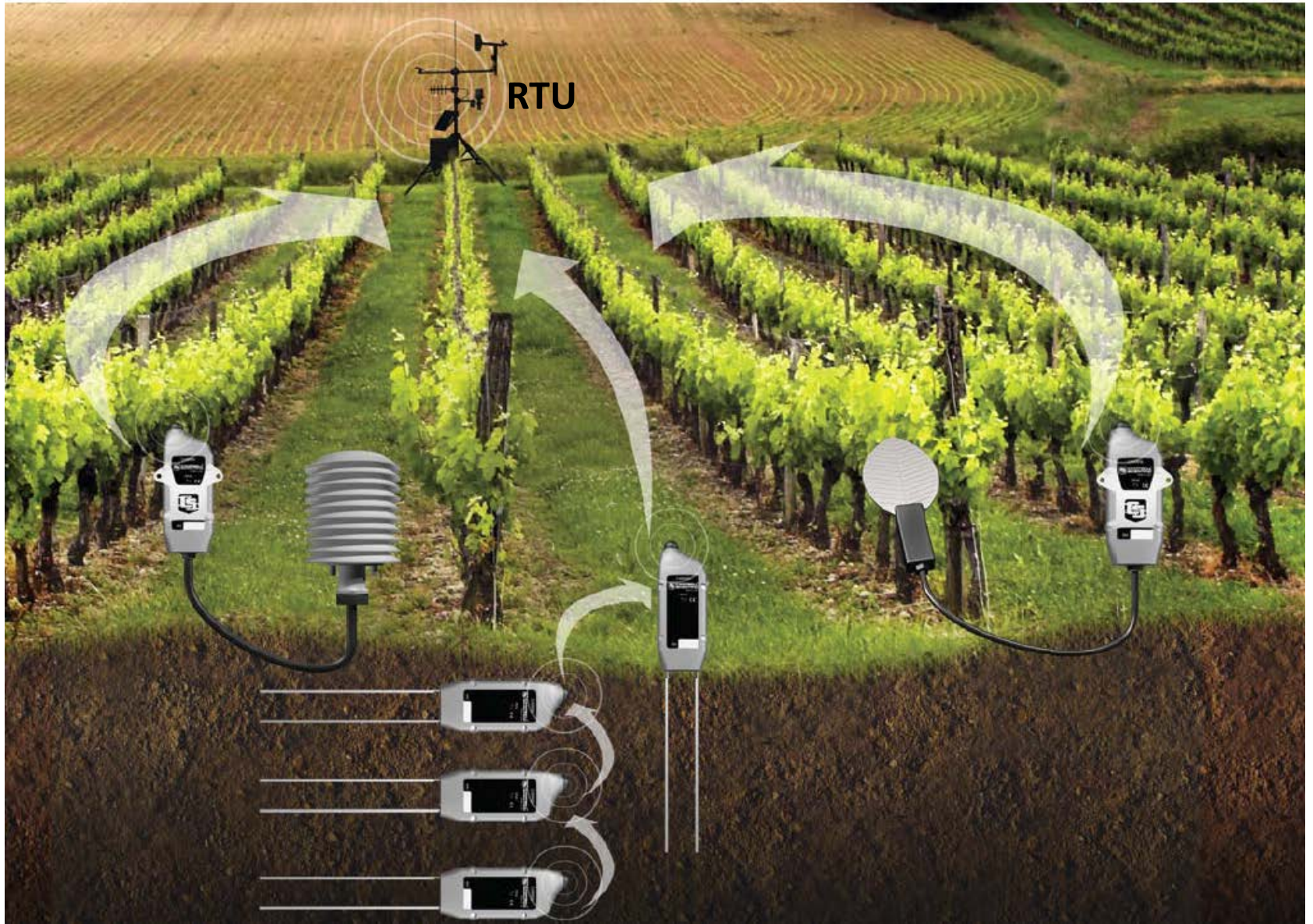
- Weather station(s).
- Soil moisture monitoring.
- Ground truth for stress conditions.
- Flumes.



Flumes for delivery and return flow measurements.



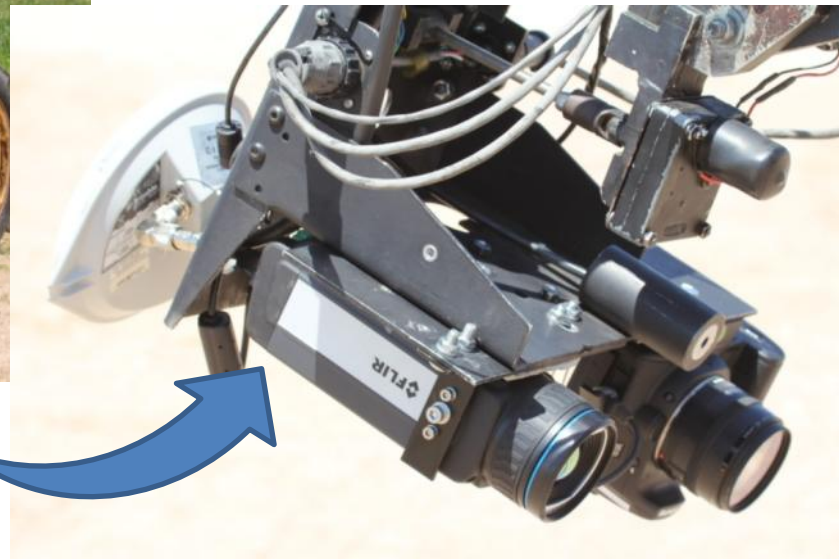




Graphic provided by Campbell Scientific

SCADA is very affordable for this circumstance -- we're monitoring and not actuating.

So, what about the
remote sensing?





Sources for aerial imagery:

- UAV (unmanned aerial vehicle) imagery.
- Low elevation aerial imagery from conventional aircraft.
- Satellite imagery.





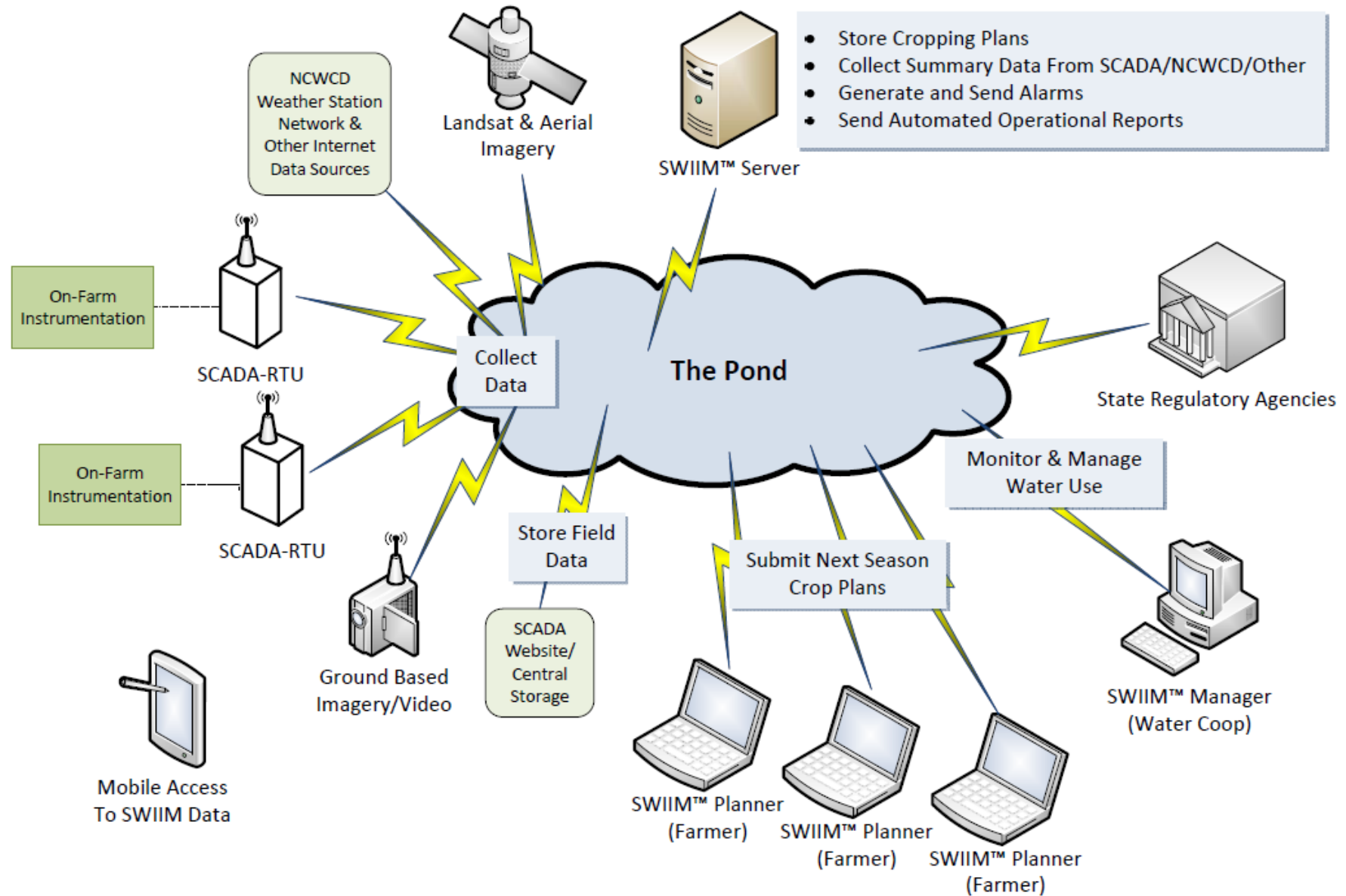




GeoVantage strut mount and setup for Cessna 150, 172, and 182.



SWIIM™ Instrumentation Architecture



Stephen Smith, PhD
Regenesis Management Group
swsmith@regenmg.com
<https://www.regenmg.com>
<http://www.swiimsystem.com>

