Pit-Fill Decision Model

RWBJV Info Seminar

February 1, 2018 – Grand Island, NE

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Wetland water budgets developed using actual weather and soils data can be used to evaluate the hydrologic effects of filling irrigation reuse pits in the upland areas of playa basins.

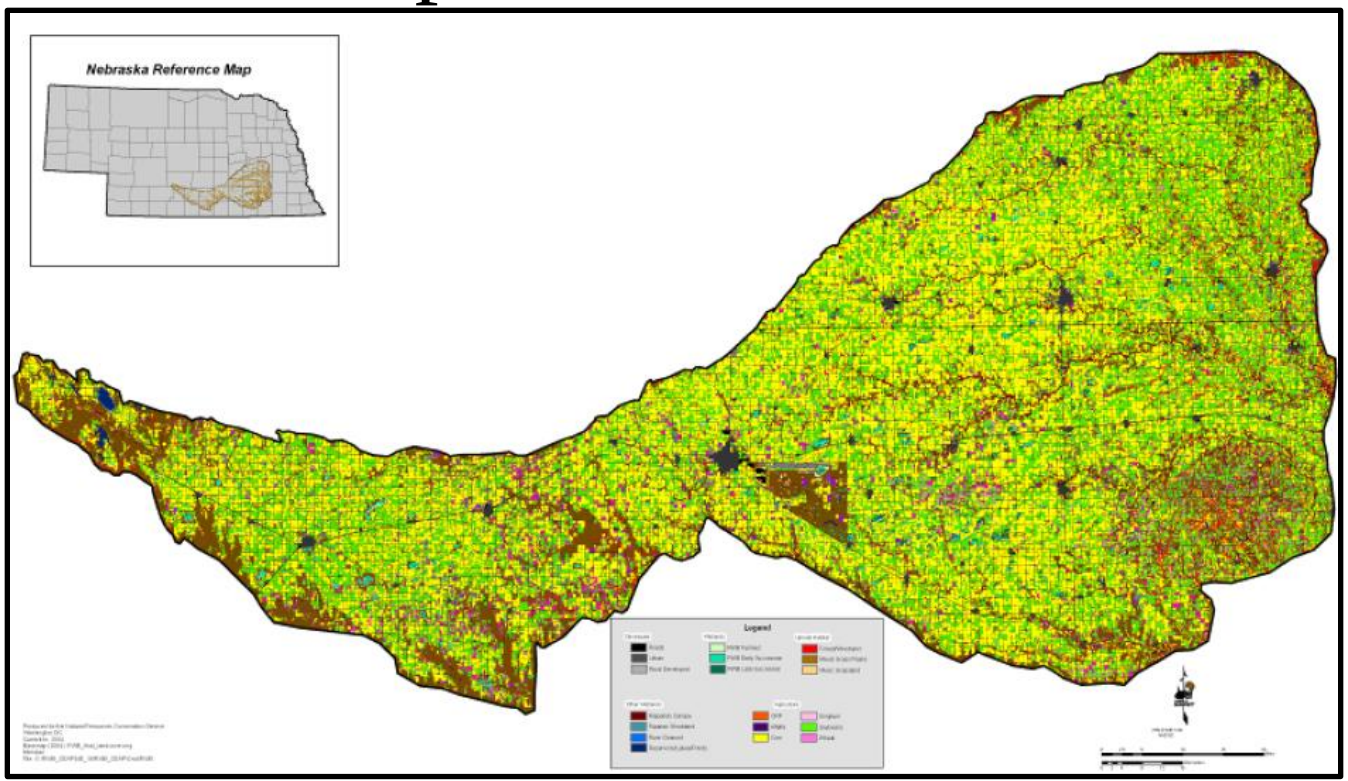
What's a PIT?

Tailwater Recovery System

How Many PITs?

2008 Inventory

- 65% of the RWB is being irrigated
- 10,217 pits



Where's the PITs?

Where's the PITs?

Upland Pit Fill "Watershed Initiative"

Wildlife Benefit:

Filling pits would provide 5.6 acre feet of water to a watershed and flood 9 to 15 acres of wetland habitat in the spring.

Production Benefit:

Additional farmable acres and eliminates an obstacle in the field.

Upland Pit Fill "Watershed Initiative"

Projects based on:

1. Ratio of pit volume to wetland volume.
2. Proximity of the pit to the wetland.

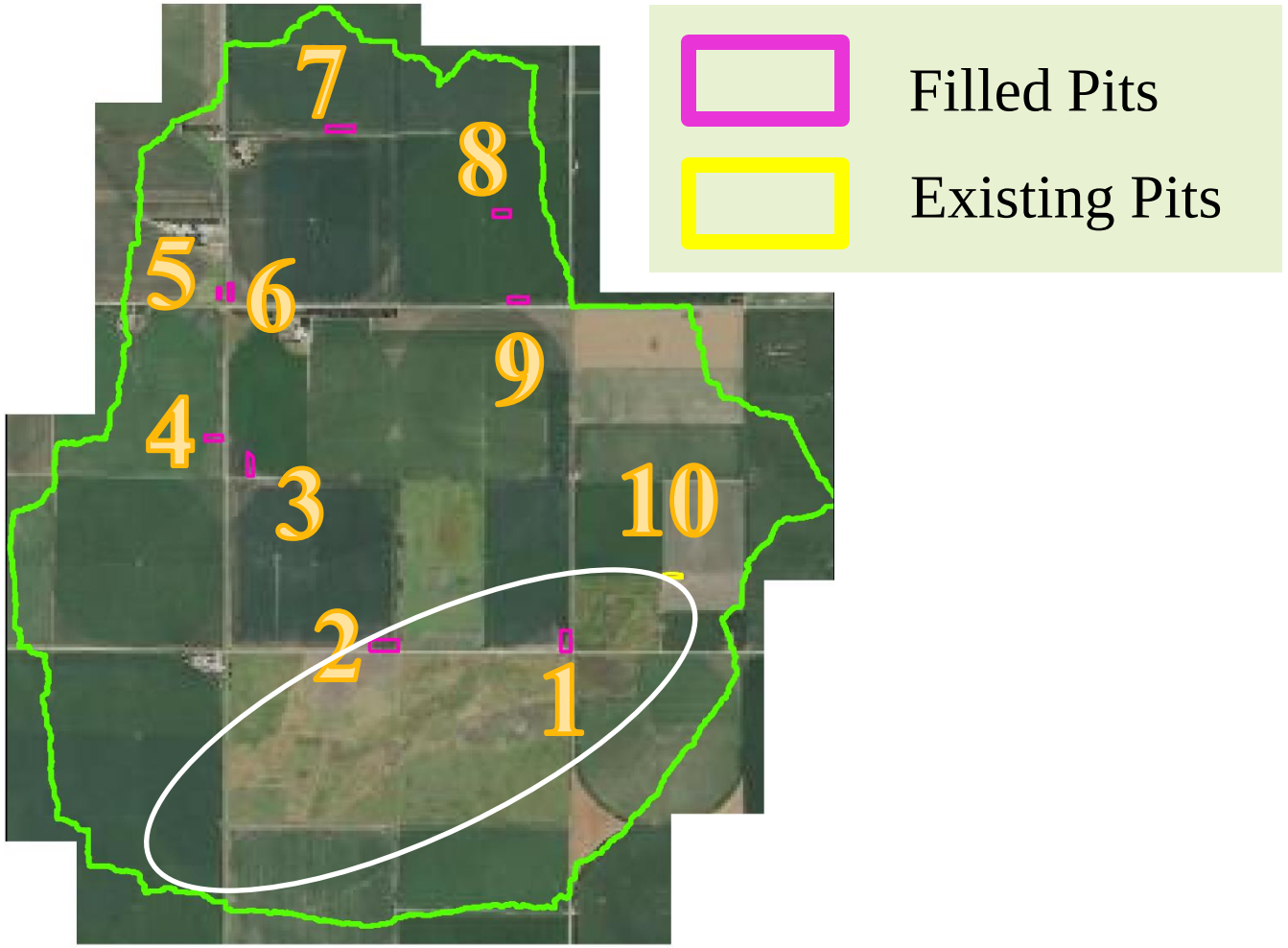
Upland Pit Fill Hydrologic Impact

Using Wetland Water Budgets:

1. Develop a field tool identifying the effectiveness of the pits.
2. Quantify the net impact of filling pits on the actual wetland playa.

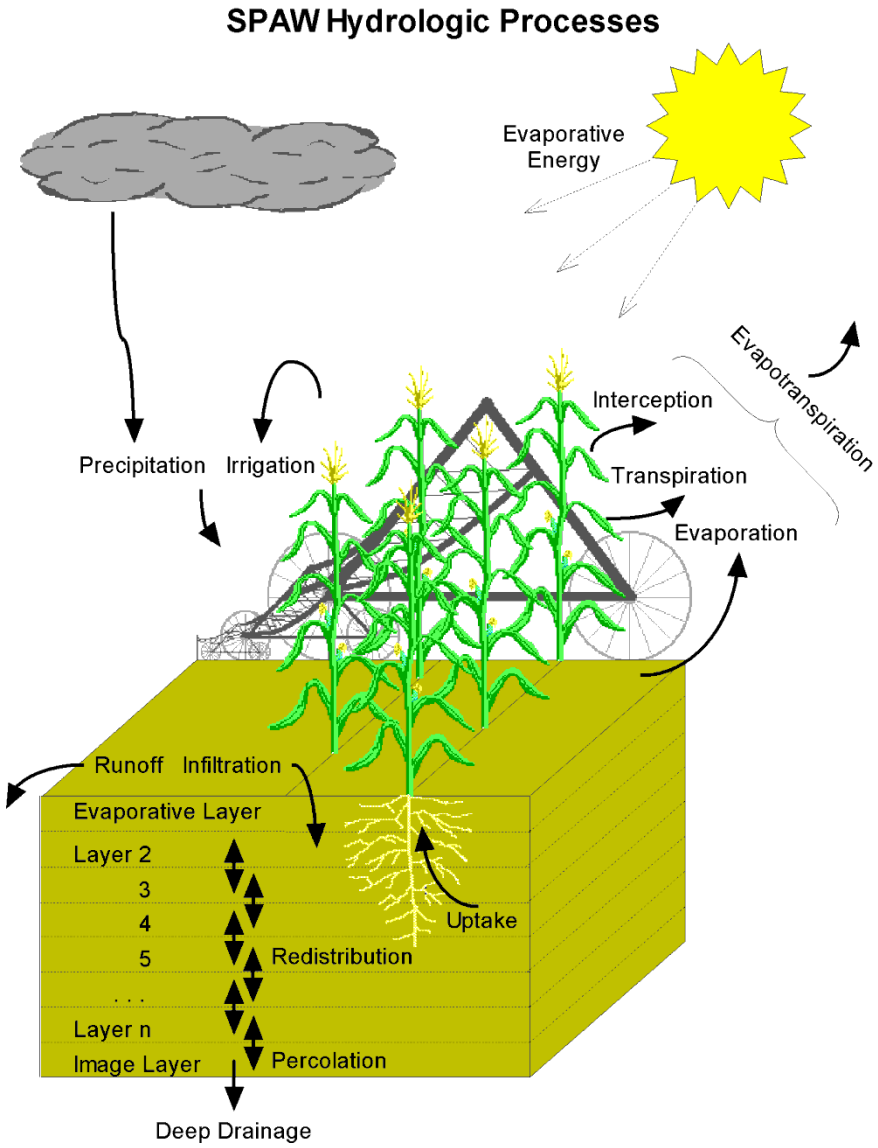
Clark Pit Fill Initiative

http://rwbjv.org/for-landowners/projects/filling-pits-to-restore-clark-wpas-watershed/

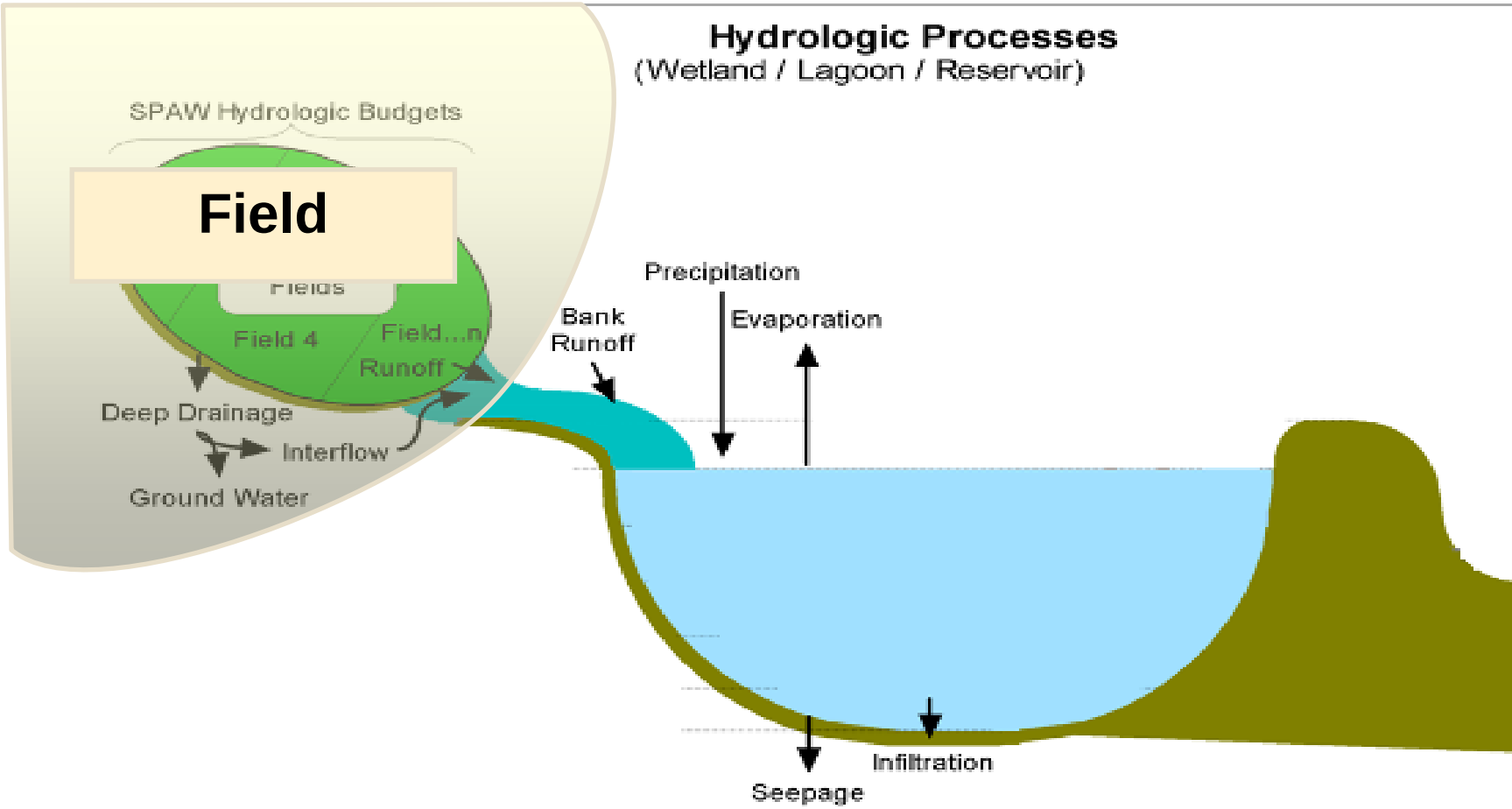


SPAW – Soil Plant Air Water

- **Rainfall (30-yrs Daily)**
- **ET (TR-34)**
- **Interception (Chow)**
- **Infiltration (WSS)**
- **Runoff (SCS CN)**
- **Deep Percolation**



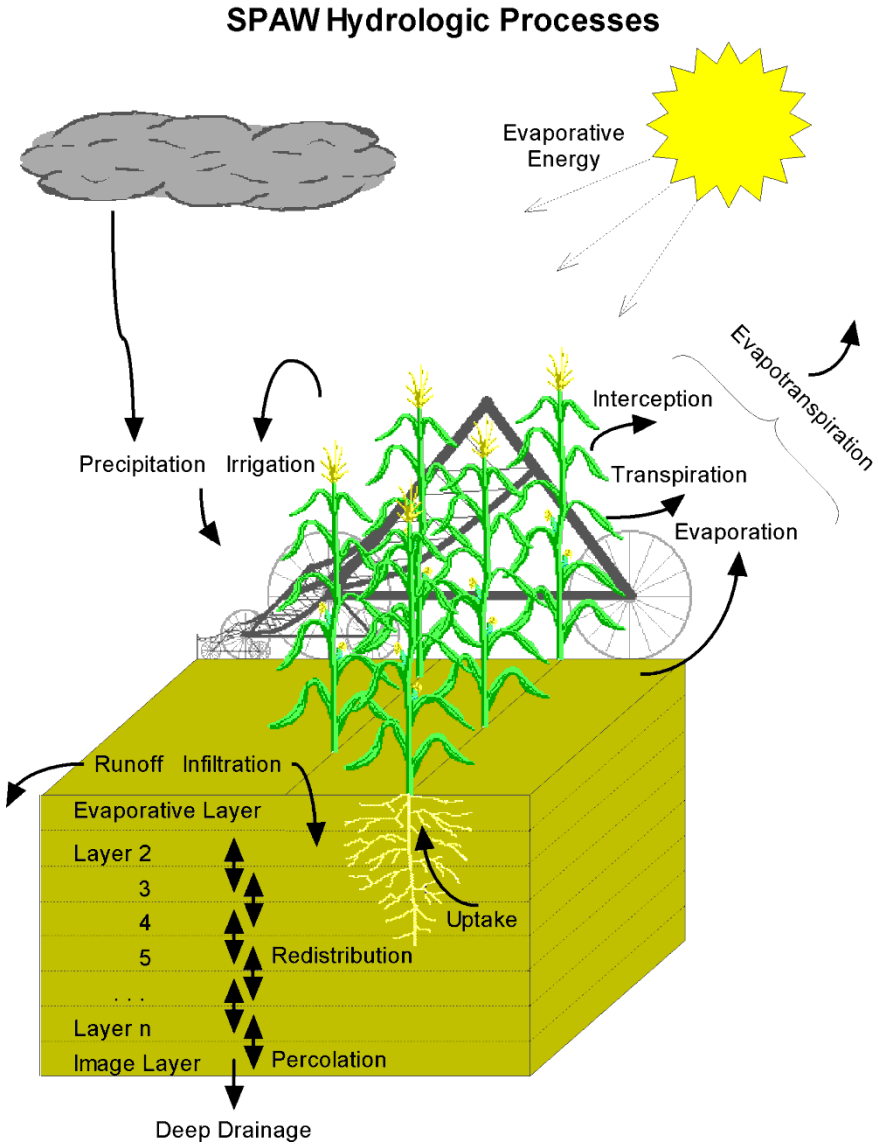
SPAW – Soil Plant Air Water



SPAW – Soil Plant Air Water

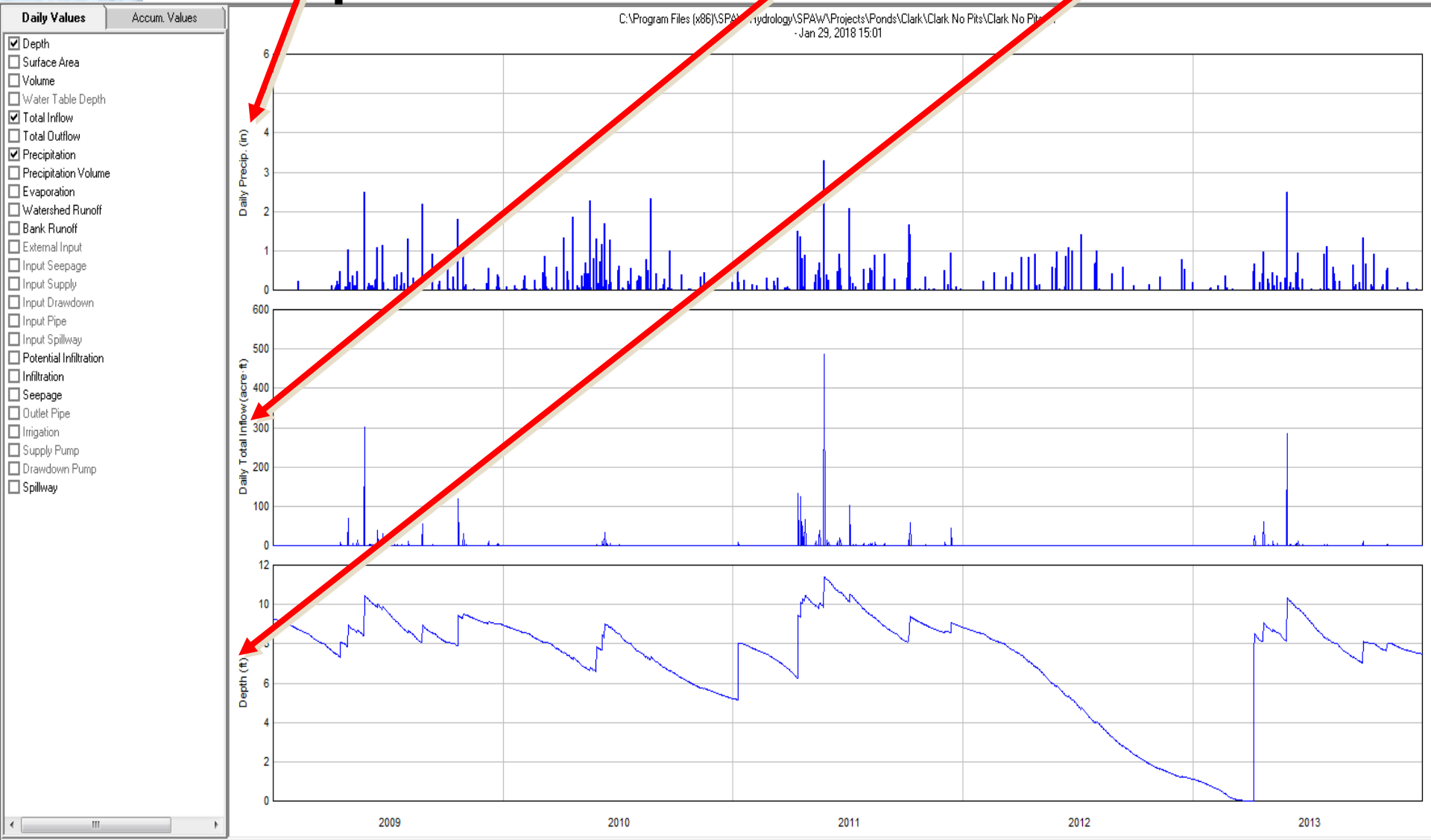
Assumptions:

- **LiDAR Topography**
- **No Channel Routing**



DAILY SPAW Information

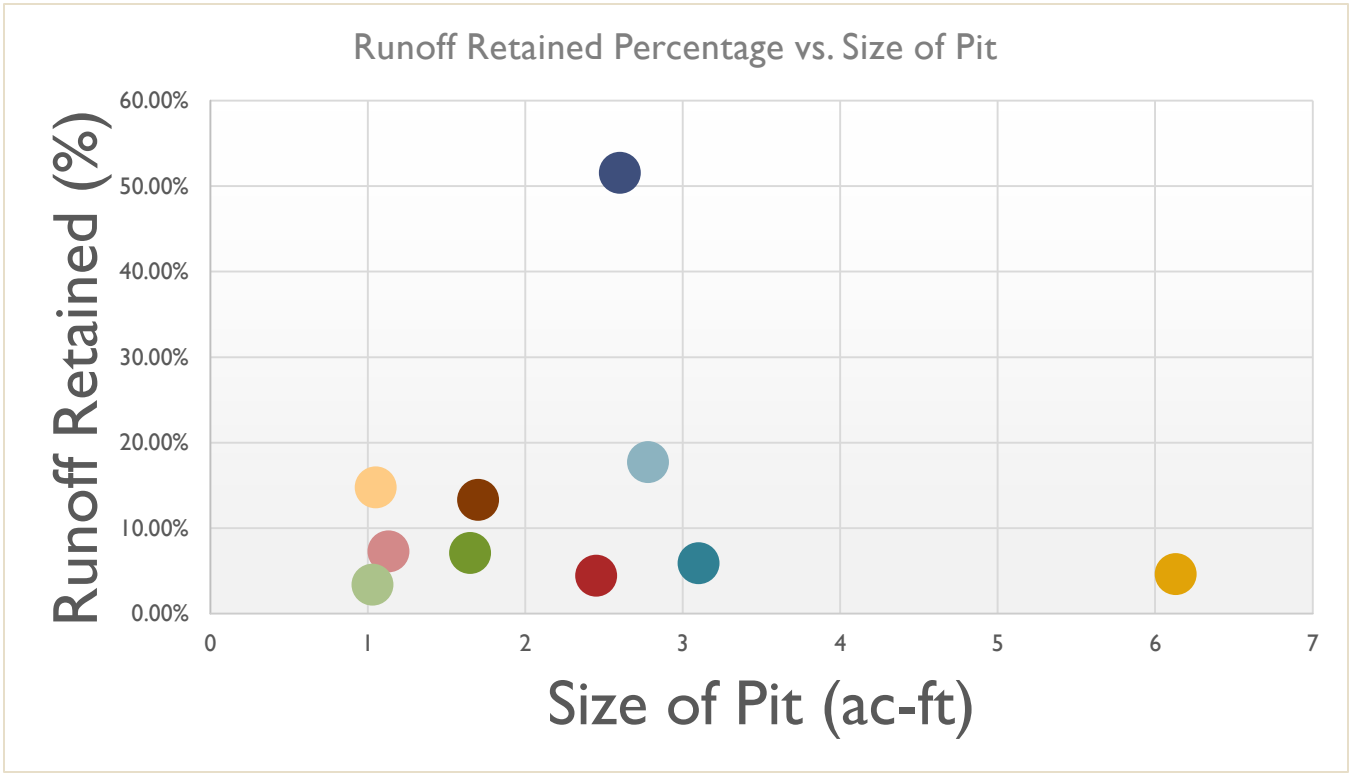
Precipitation **Inflow** **Depth**



INDIVIDUAL PIT EVALUATION

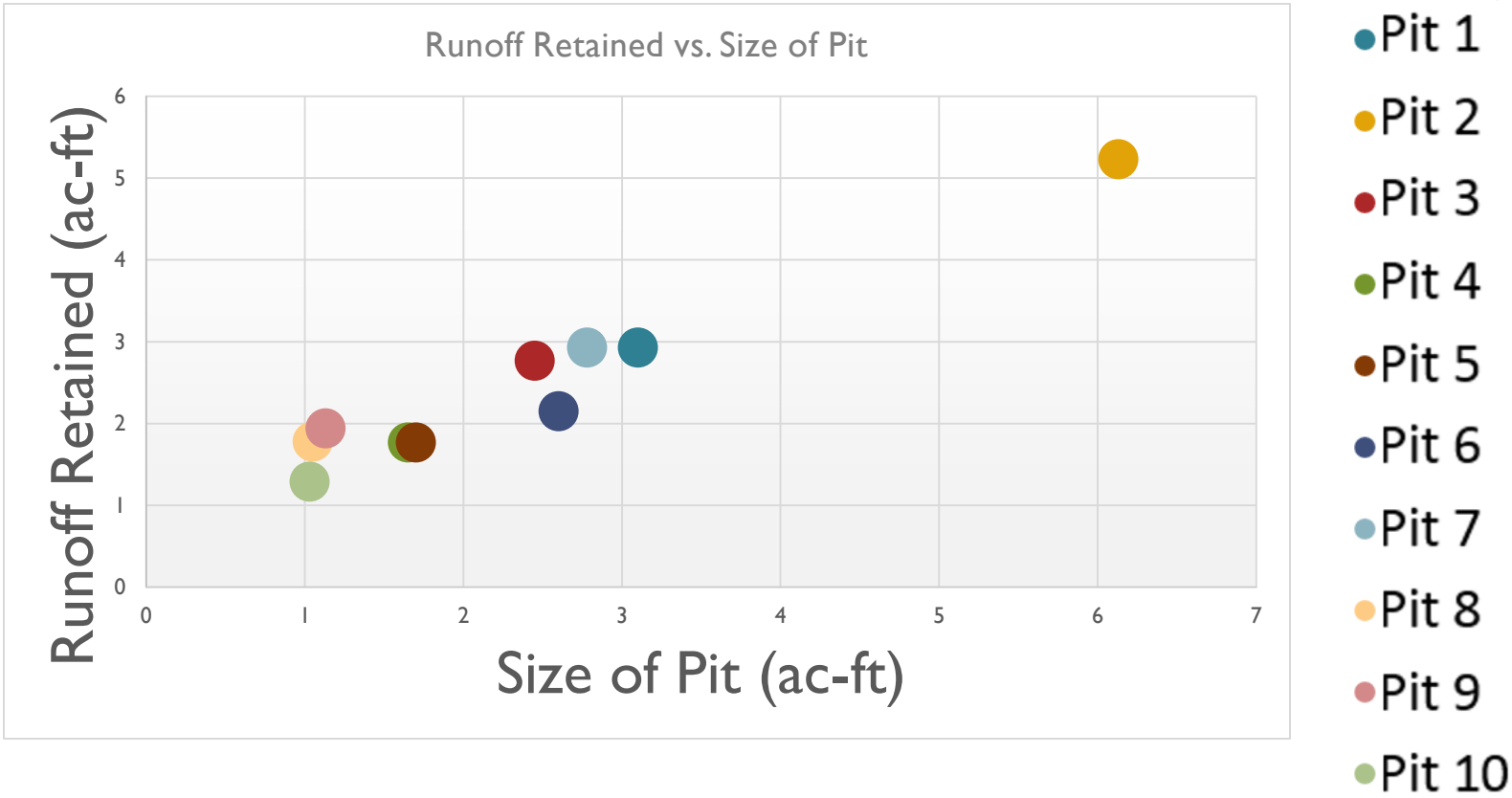
Runoff Retained % vs. Size of Pit

Where % = (Inflow – Spillway) / Inflow x 100%



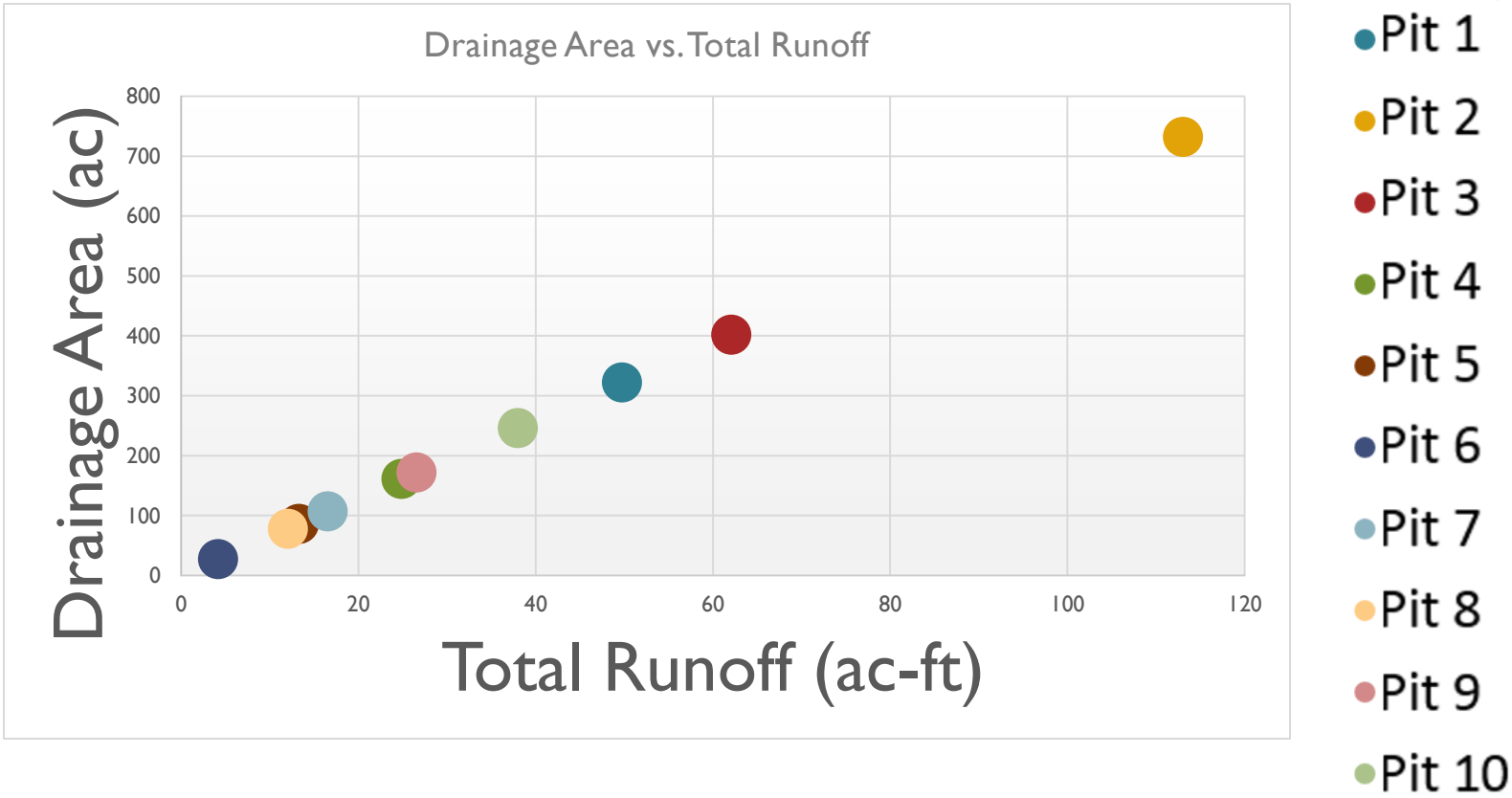
INDIVIDUAL PIT EVALUATION

*Runoff Retained **Vol** vs. Size of Pit*



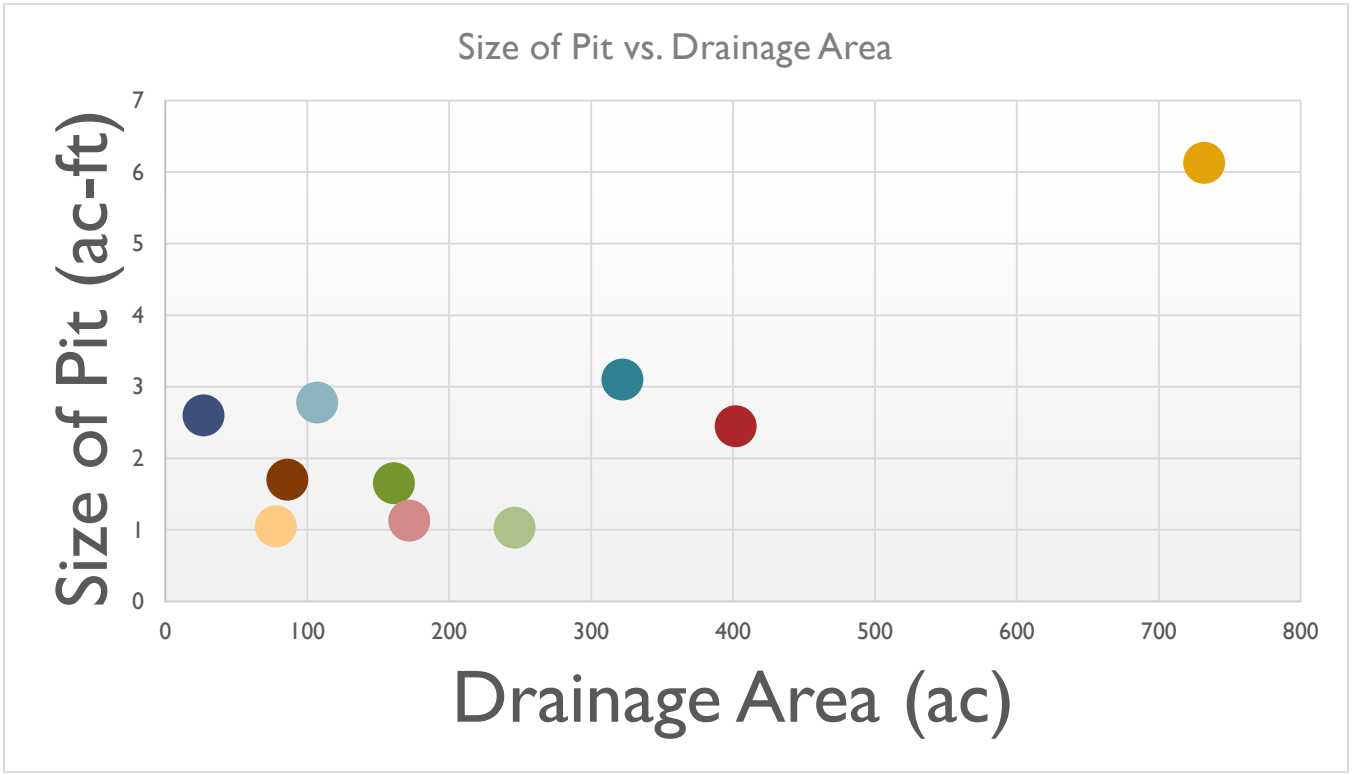
INDIVIDUAL PIT EVALUATION

Runoff Total *vs. Drainage Area*



INDIVIDUAL PIT EVALUATION

Size of Pit vs. Drainage Area



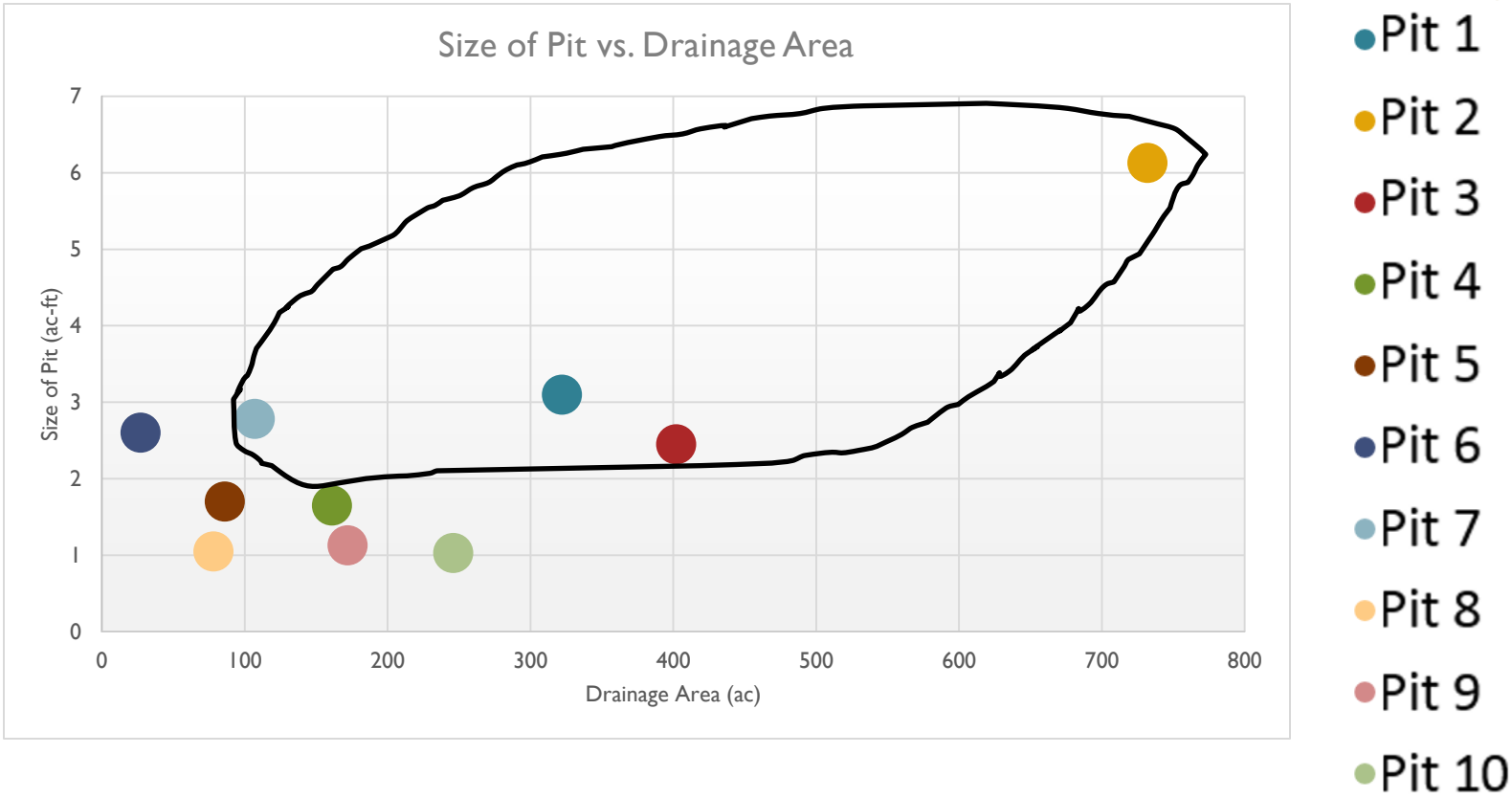
INTERPRETING DATA

RESULTS:

1. The ten pits combine annually to retain an average of 24.56 ac-ft of water or 6.8% of total runoff.
2. Pits 1, 2, 3, and 7 combined to account for 56.4% of the retained water.
3. Pit 10, third largest DA, pit volume is the smallest, only accounts for 5.3% of the water retained.
4. Pits 4 and 6 have the fifth largest pit volumes yet because of their small drainage areas only account for 8% respectively of the retained water.

INTERPRETING DATA

CONCLUSION: A pit with a large drainage area and a large pit volume will retain more water.



Upland Pit Fill Hydrologic Impact

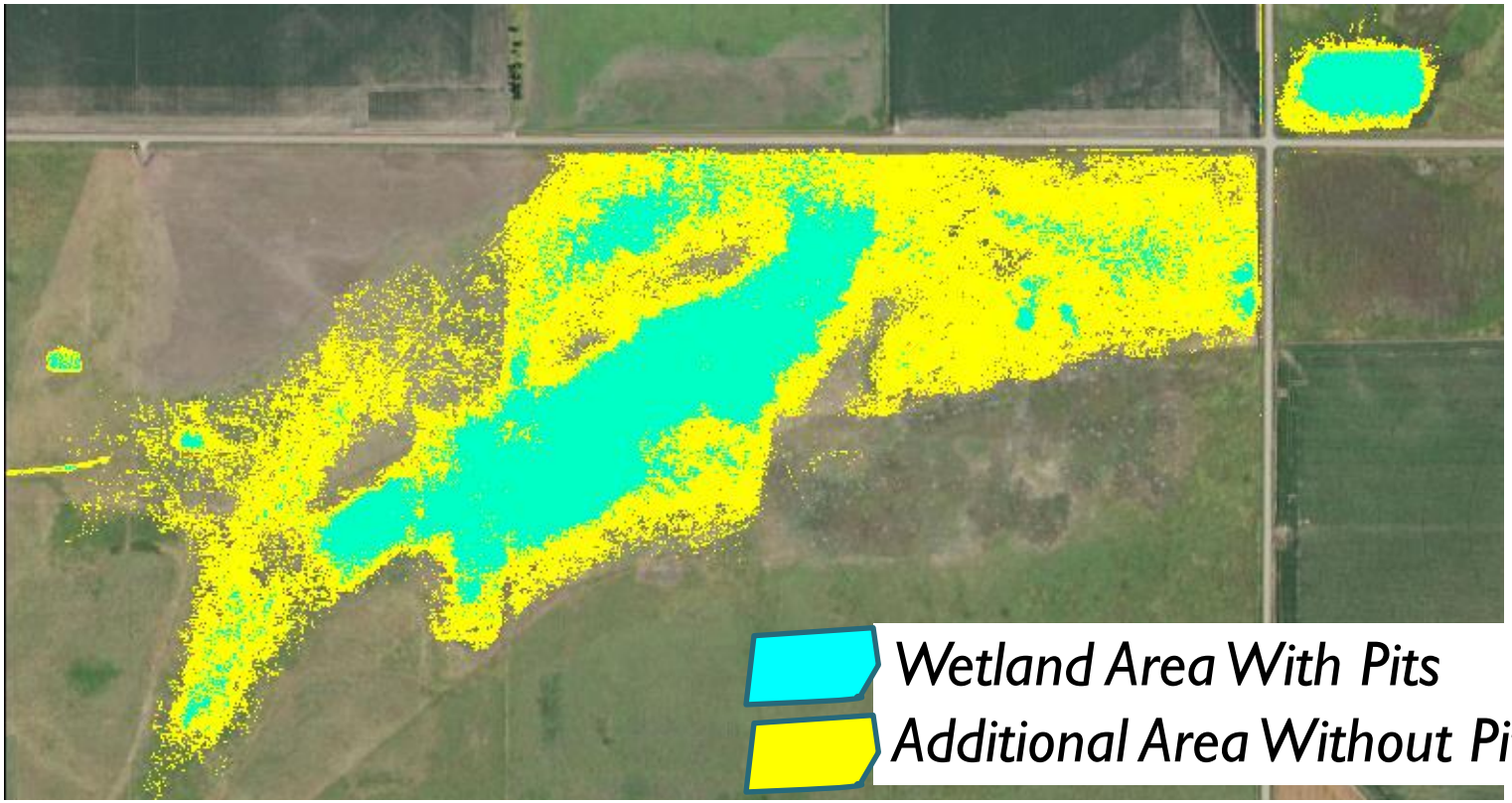
Using Wetland Water Budgets:

1. *Need more data*
   For now, model each watershed
2. Quantify the net impact of filling pits using wetland inundation and duration.

Upland Pit Fill Hydrologic Impact

Compare inundation depths (7 consecutive days) during the average year BEFORE & AFTER FILLING PITS.

- Wetland Size grew from 53 ac to 76 ac (24 ac)
- Inundation depth increased 3.6 inches



Upland Pit Fill "Watershed Initiative"

Summary:

1. A pit with a large drainage area and a large pit volume is best candidate for filling.
2. Site-specific modeling is necessary.
3. Pit-fills can have an impact on restoring wetland hydrology.

Upland Pit Fill "Watershed Initiative"

Next Steps:

1. Additional SPAW models using survey
2. Adjust ranking criteria to include pit drainage area, pit size and proximity
3. Cost/Benefit of filling pits based on proximity and location of borrow.
4. Hire William Walker permanently.

Pit-Fill Decision Model

References

http://rwbjv.org/financial-incentives-available-to-fill-abandoned-irrigation-pits/

Richard D. Wilson; Evaluating Hydroperiod Response in the Rainwater Basin Wetlands of South-Central Nebraska

Rex Robichaux, Lisa M.B. Harrington ; *Env Conditions, irrigation reuse pits, and the need for restoration in the RWB wetland complex, Nebraska*

Ele Nugent, *Why We Pay to Increase Farm Acres:*
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Bishop, A.A., and M. Vrtiska. 2008. *Effects of the Wetlands Reserve Program on Waterfowl Carrying Capacity in the Rainwater Basin Region of South-Central Nebraska*. USDA Natural Resource Conservation Service.