How Elk Selfies, Midnight Flowing Streams, and 150,000 Time-lapse Images Enabled Arizona to Probabilistically Assess Intermittent Streams for the First Time

Jason D. Jones, Senior Scientist
March 28, 2019
2016 Assessment of Intermittent Streams

Intermittent Stream Universe

6,051 stream miles
1,450 reaches

5% Assessed
Importance of Intermittent Streams

- Wildlife habitat and corridors
- Fish refuge and food source
- Move water, nutrients and sediment throughout watershed
- Hydrologic connections
- Dissipate stream energy during high flows
- Surface and subsurface water storage
Methods and Monitoring Design

1. Randomly Select 32 Sites

2. Photo Monitoring = 2 pictures per day plus motion

3. Collect chemistry quarterly

4. Collect bug and habitat data once

5. Process Photos to identify flow & wildlife
Continuous Improvement

Total Cost = $210.00

M-880 Moultrie Trail Camera

Solar panel and battery in one!
Total = 126 Streams

- NT - Map Error - Ephemeral: 44%
- NT - Map Error - Perennial: 4%
- NT - Map Error - Reservation: 2%
- NT - Regulated Flow: 2%
- T - Not Sampled - Access: 1%
- T - Not Sampled - Theft: 2%
- T - Not Sampled - Flooding: 18%
- NT - Barrier/Effort: 24%
- NT - Access Denied: 2%
Site Evaluation Results
Daily Flow and Precipitation for GENERAL SPRINGS

Precipitation (inches)

- Red line: Dry
- Blue line: Wet
Use of Intermittent Streams

- Human Encounters
- Wildlife Encounters

% Wet
- 80
- 60
- 40
- 20

Month:
- 01
- 02
- 03
- 04
- 05
- 06
- 07
- 08
- 09
- 10
- 11
- 12
- 01

Y-Axis:
- # of Encounters
- 0
- 50
- 100
- 150
- 200
- 250
- 300

Legend:
- Human Encounters
- Wildlife Encounters
- % Wet
Assessment of Arizona Intermittent Streams

Total = 39 Streams
Representing 6,051 miles or 1,450 reaches

82% Assessed versus 5% in 2016
Assessment by Use

Fish Consumption
- Supporting Use: 41
- Inconclusive: 38
- Not Supporting Use: 3
- Not Assessed: 19

Recreation
- Supporting Use: 32
- Inconclusive: 47
- Not Supporting Use: 3
- Not Assessed: 18

Aquatic Life
- Supporting Use: 21
- Inconclusive: 58
- Not Supporting Use: 3
- Not Assessed: 18

Agriculture
- Supporting Use: 56
- Inconclusive: 30
- Not Supporting Use: 3
- Not Assessed: 15
Lessons Learned

- Continue to sample **inconclusives** until an **impairment** or **attainment** decision reached
- Sample **macroinvertebrates** in the winter when flow is more likely to be present
- Incorporate longitudinal analysis of stream flow (**wet/dry mapping**)
- Staff gage each site to quantify flow