

Timescales of response on streams treated with Artificial Beaver Dams, Silvies River, OR



River Restoration Northwest 2015

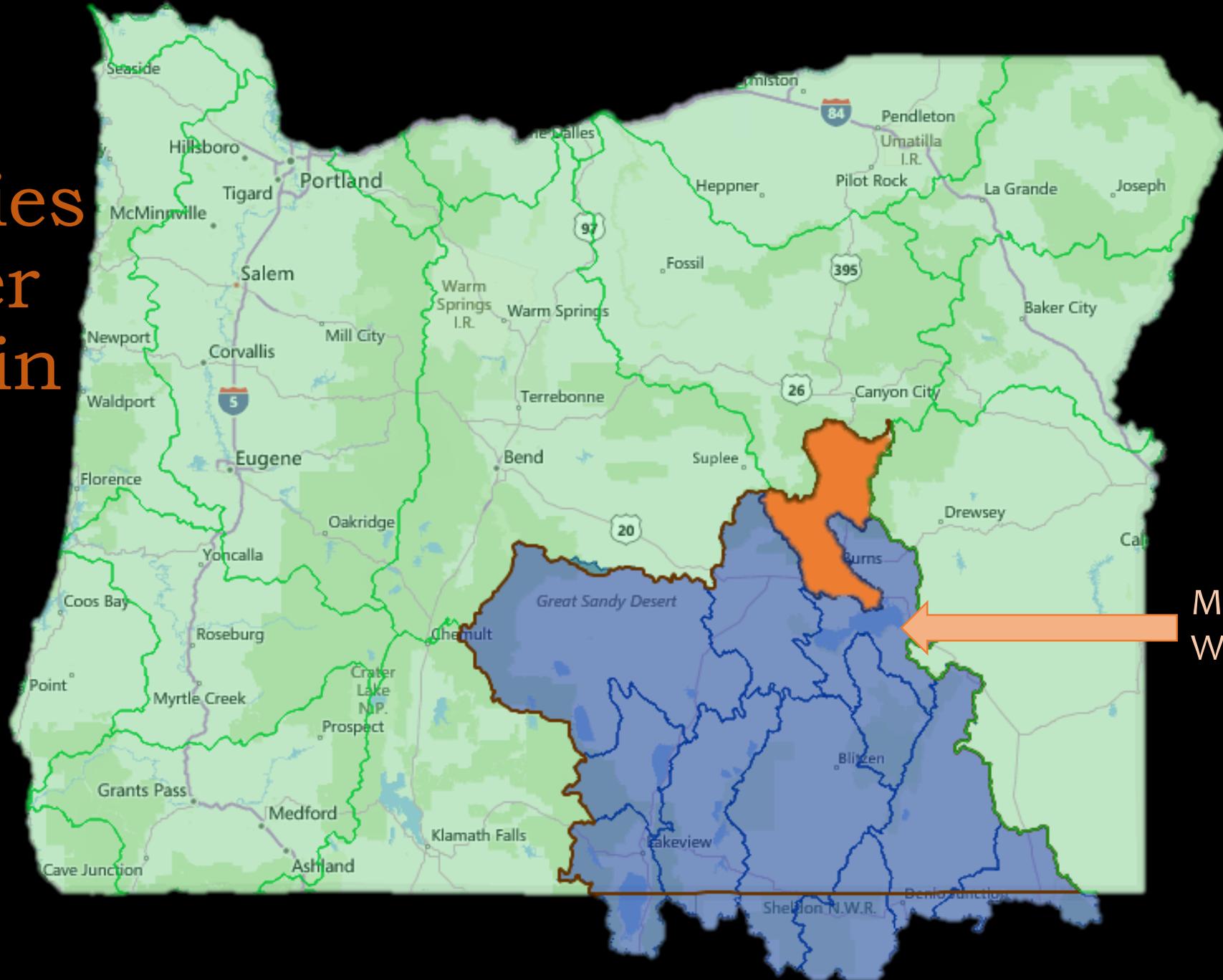
Caroline Nash, Oregon State University

Gordon Grant, USDA Forest Service PNW Research Station

Scott Campbell, DVM, Silvies Valley Ranch



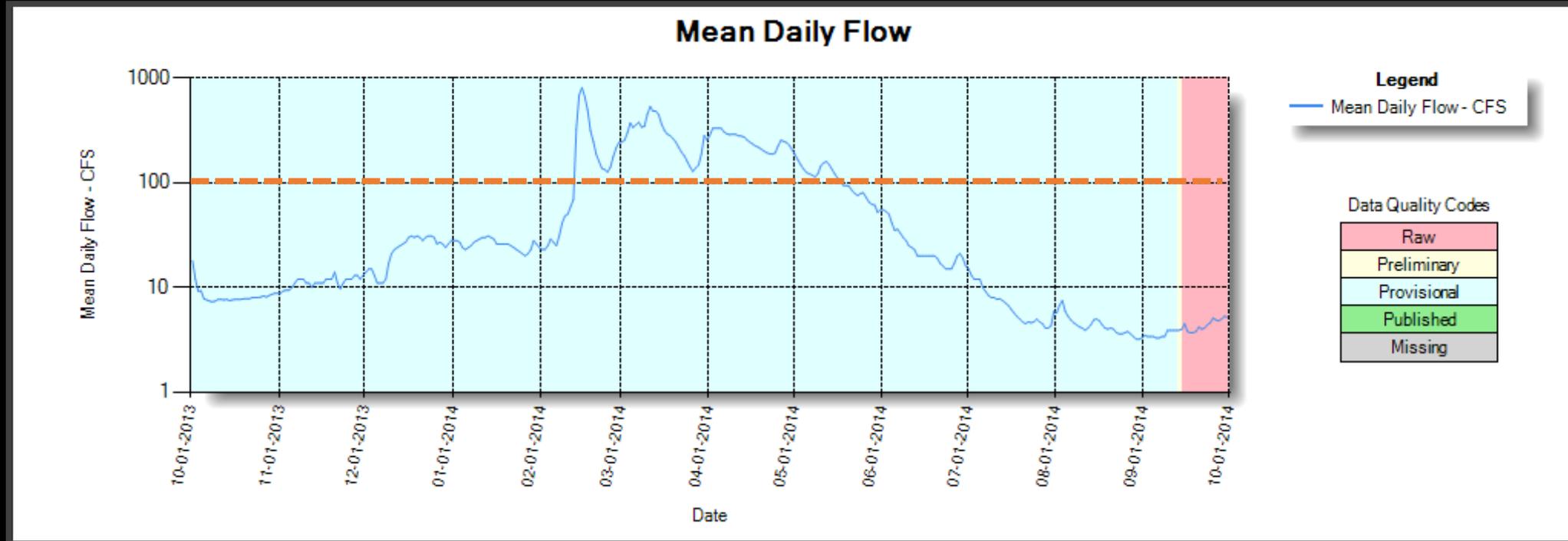
Silvies River Basin



Malheur Lake Wildlife Refuge

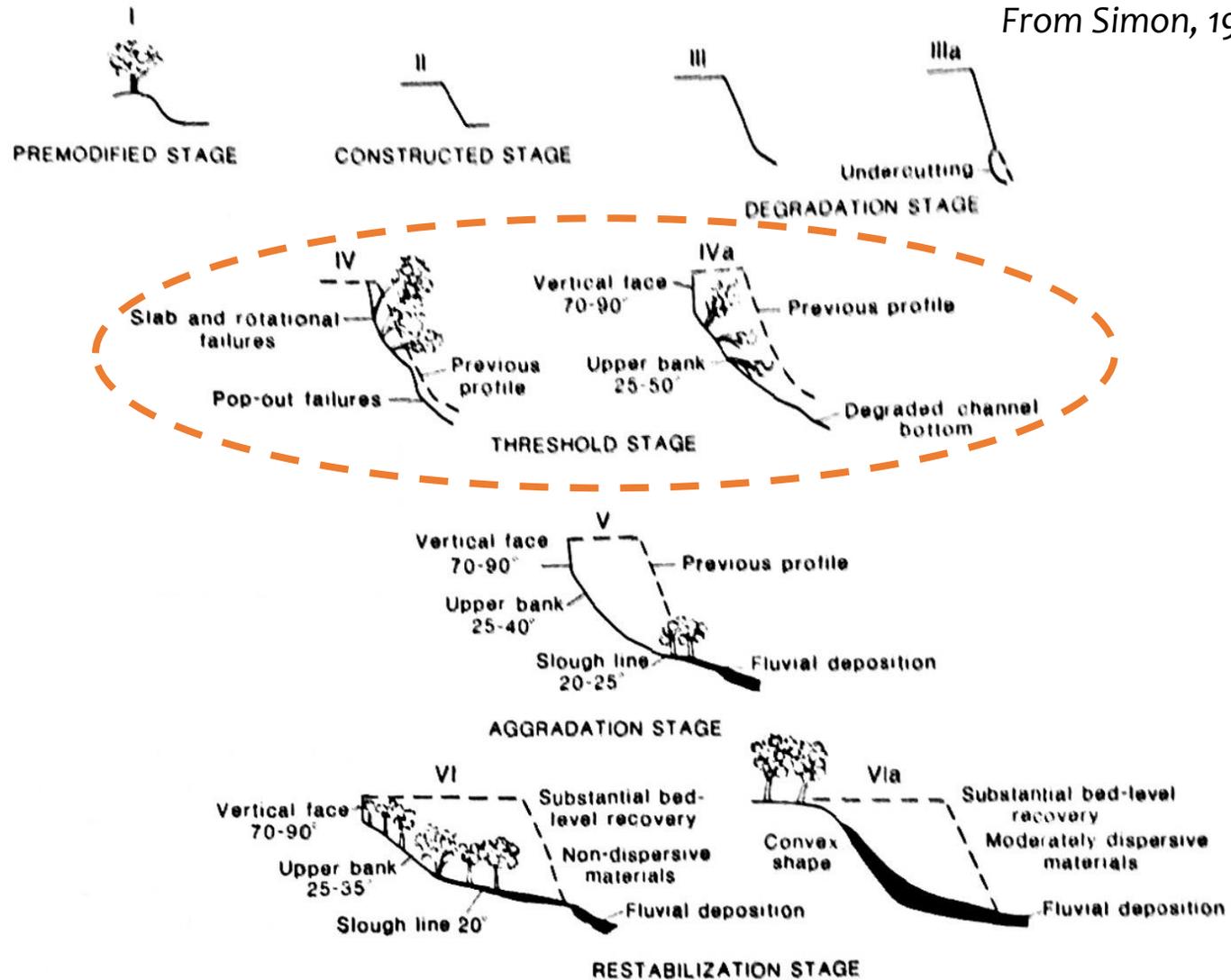
Climate in the Silvies River Basin

2014 Water Year



From OWRD station 10393500, Near Burns, OR

Outside of Paulina, OR



Note: Scale is relative.

Figure 5. The six stages of bank-slope development





... x 40,000

Silvies River, OR

Is this a “reversible” process?



1930s – Idaho City

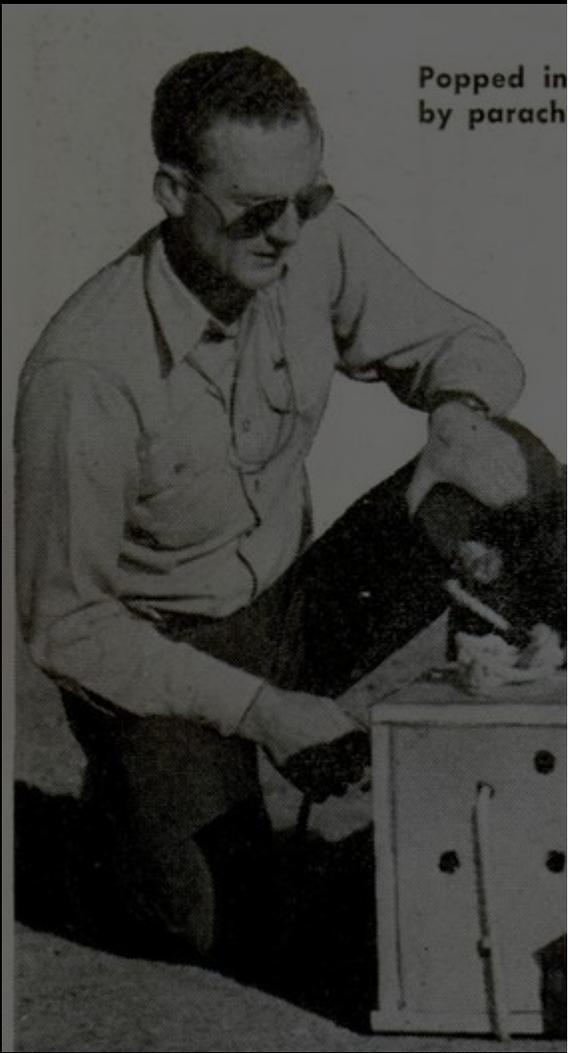
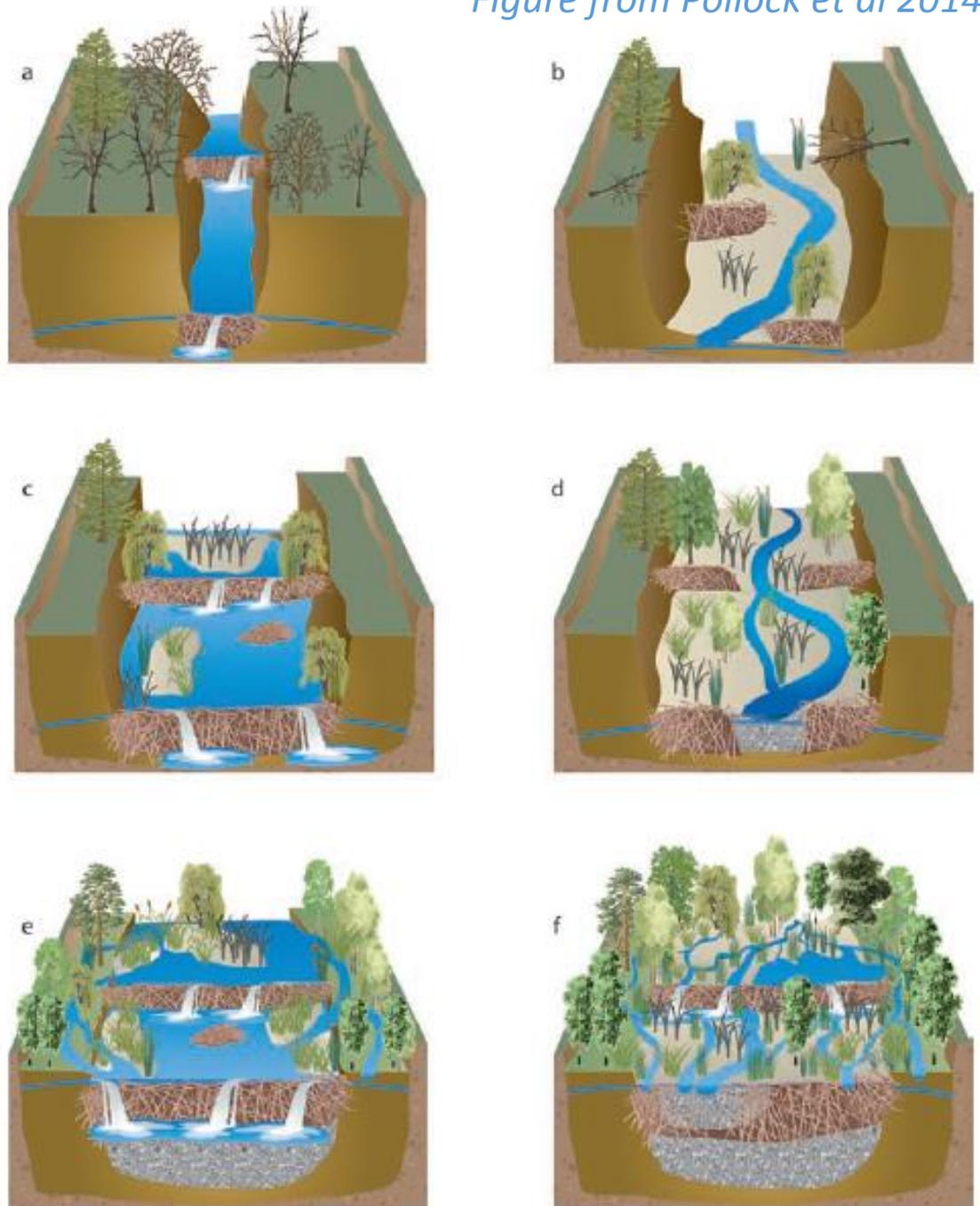


Figure from Pollock et al 2014



1930s – John Day River

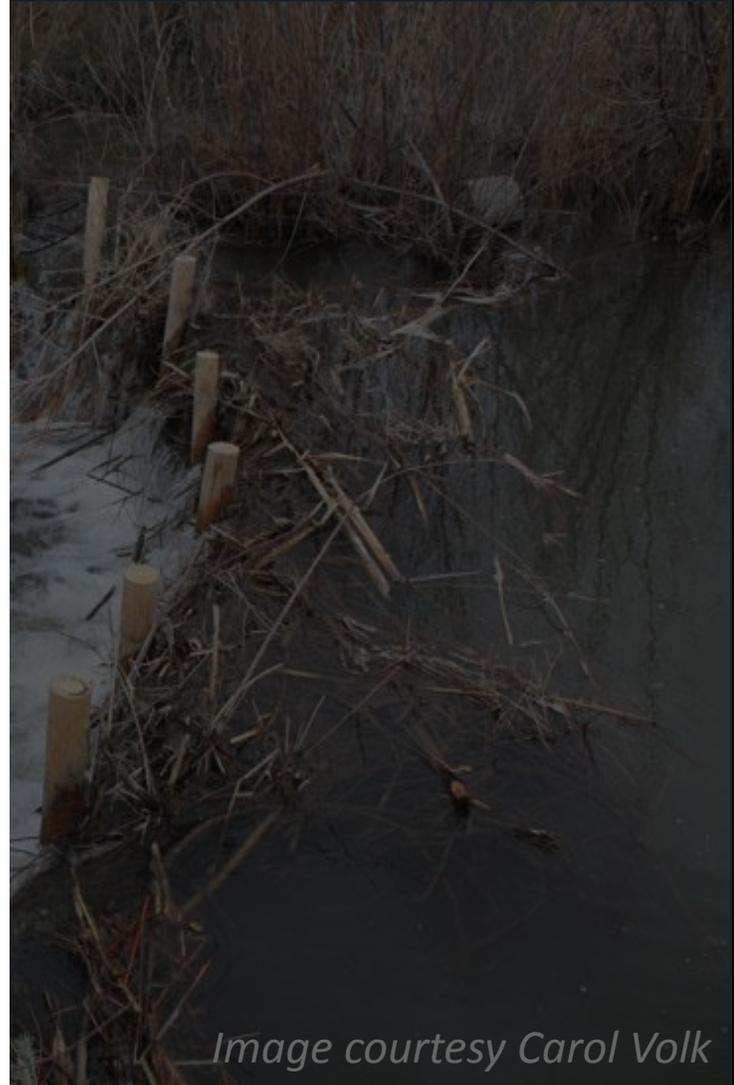


Image courtesy Carol Volk

- 1st and 2nd order tributaries
 - Upland species encroachment
 - Limited transport capacity
 - Ephemeral – flow following snowmelt
- OR
- Year-round – small average flow (1 cfs)



***Cottonwood Creek
Silvies River Basin, OR***

- Perennially wet
- Reservoirs of water for subsurface flow
- Trap sediment
- Create conditions for growth of meadows and riparian trees



Max. water depth ~ 11.5 feet



***Camp Creek
Silvies River Basin, OR***

2 years post-construction



6 years post-construction



12 years post-construction



9/1/2002

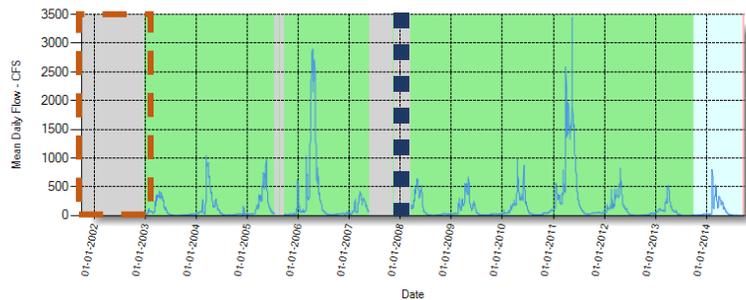
September 1, 2002



Image © 2014 DigitalGlobe

Google earth

SILVIES R NR BURNS, OR Mean Daily Flow



Legend Mean Daily Flow - CFS

Data Quality Codes	
Raw	Pink
Preliminary	Yellow
Provisional	Light Blue
Published	Green
Missing	Grey

Imagery Date: 9/1/2002 44°03'00.25" N 118°59'50.20" W elev 4668 ft eye alt 6803 ft

4 years prior to restoration

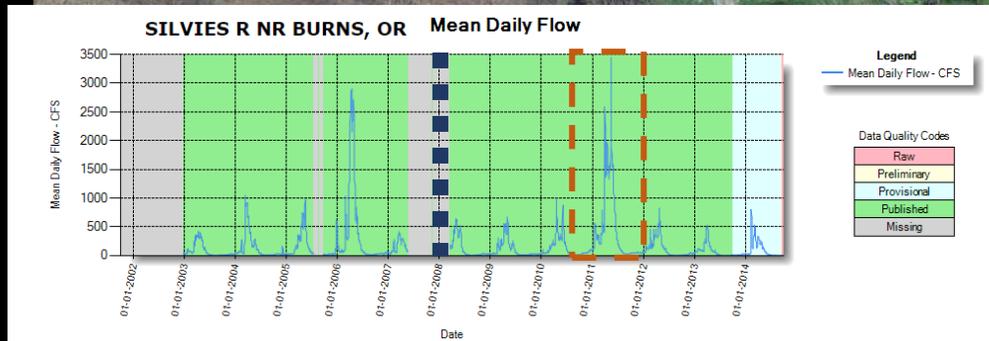
Camp Creek Silvie River Basin, OR

8/22/2011

August 22, 2011



Imagery Date: 8/22/2011 44°03'00.25" N 118°59'50.20" W elev 4668 ft eye alt 6803 ft



3.5 years after restoration

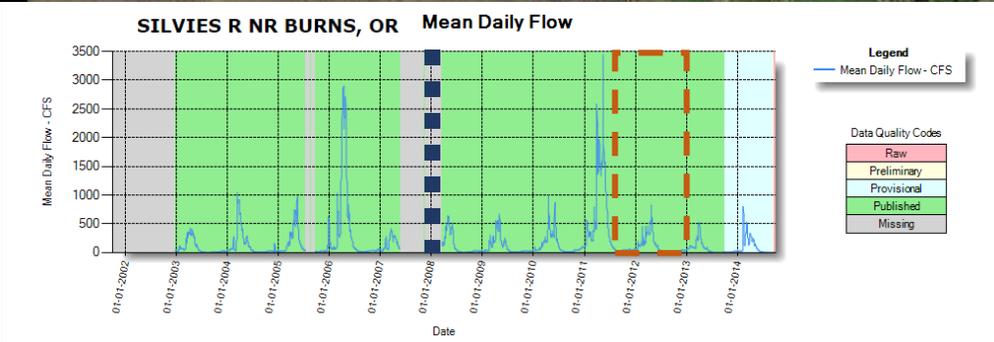
**Camp Creek
Silvies River Basin, OR**



September 10, 2012



Imagery Date: 9/10/2012 44°03'00.25" N 118°59'50.20" W elev 4668 ft eye alt 6803 ft



4.5 years after restoration

**Camp Creek
Silvies River Basin, OR**

Project Impacts

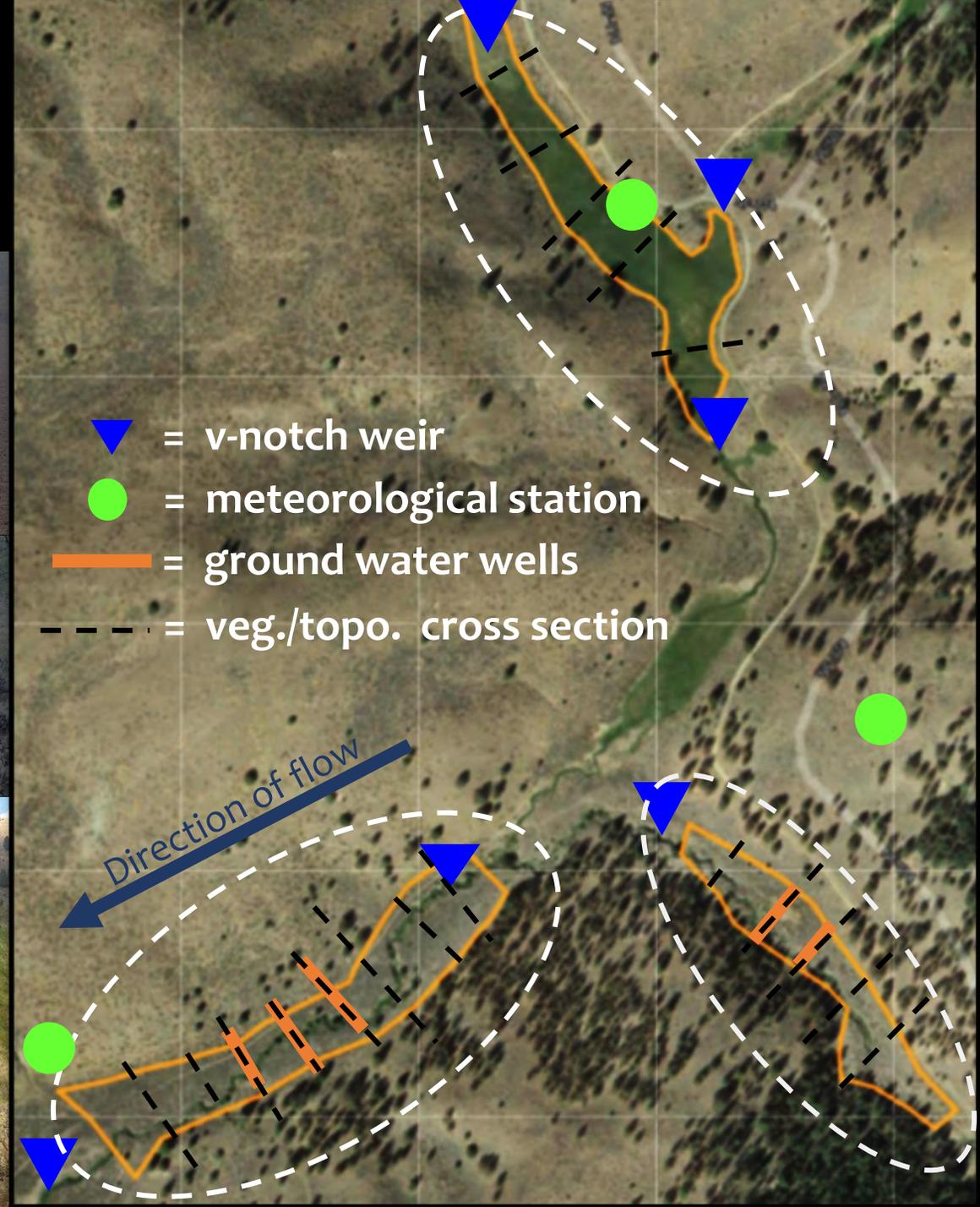


- Surface Water: **+600%**
- Av. riparian width: **+ ~ 100%**
- Cumulative deposition: **1-14 cm ***
- Late summer stream flow: **?**
- Groundwater flux: **?**
- Ecological Succession: **?**
- Knickpoint propagation: **?**
- Economic productivity: **+10%****

**No ground-truthed before data from which to measure*

***Improvement to entire ranch profitability from single creek's restoration*

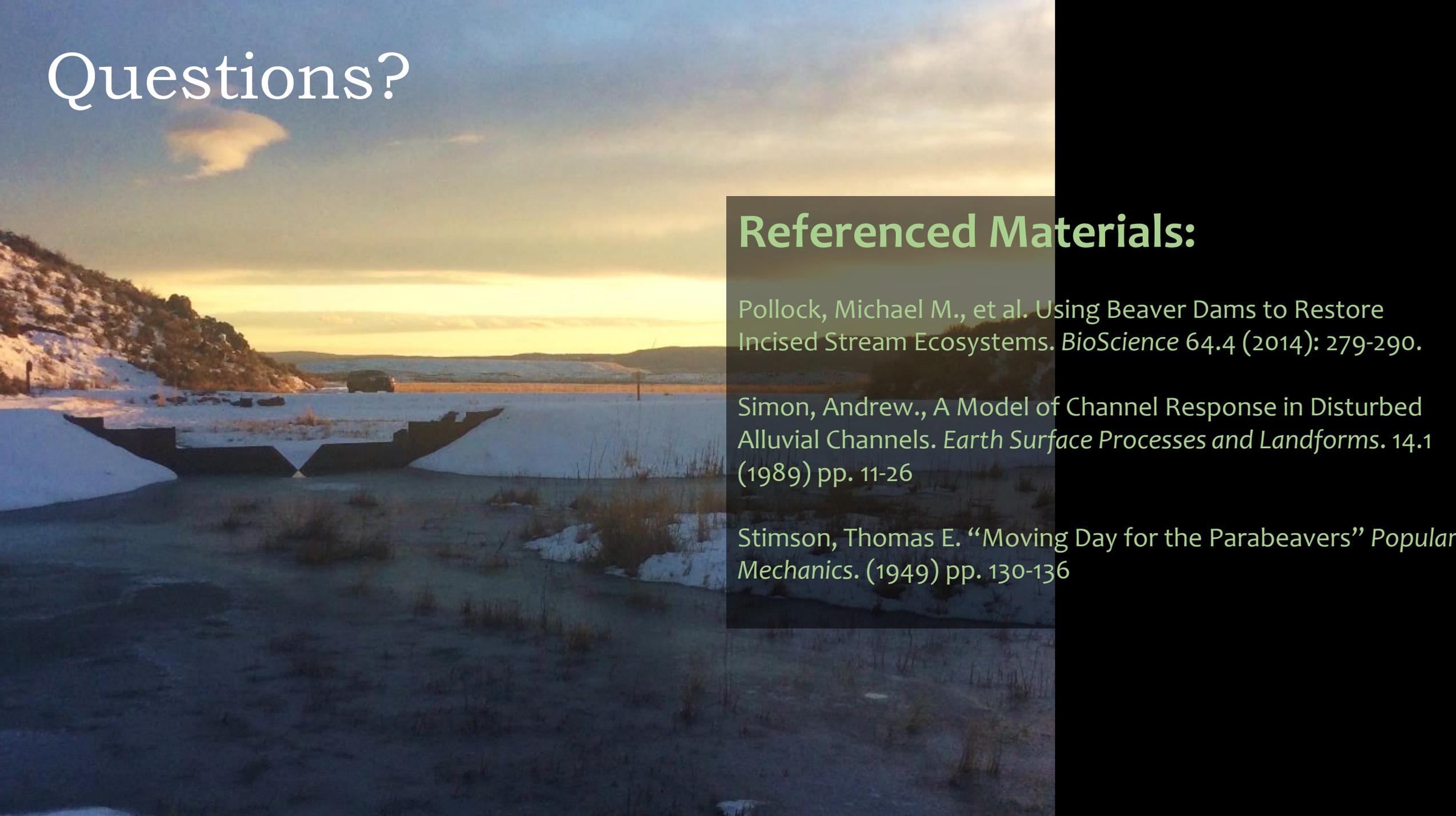
Cottonwood Creek Watershed Observatory



CCWO Research Questions

- **Mechanisms and timescales of incisional processes** through trends in channel planform, stratigraphy, sediment yields, and ecological succession;
- Evaluate the **hydrologic, geomorphic, and ecological impacts** of specific restoration projects intended to reduce or reverse channel incision;
- Predict **hydrologic sensitivity and resilience** of restored streams under a variety of **future climate scenarios**

Questions?

A landscape photograph showing a stream with a beaver dam in a snowy, hilly area during sunset. The sky is a mix of blue and orange, and the ground is covered in snow. The dam is a simple wooden structure across the stream.

Referenced Materials:

Pollock, Michael M., et al. Using Beaver Dams to Restore Incised Stream Ecosystems. *BioScience* 64.4 (2014): 279-290.

Simon, Andrew., A Model of Channel Response in Disturbed Alluvial Channels. *Earth Surface Processes and Landforms*. 14.1 (1989) pp. 11-26

Stimson, Thomas E. "Moving Day for the Parabeavers" *Popular Mechanics*. (1949) pp. 130-136