Eco-geomorphology for Stream Restoration:
Using Ecosystem Services to Initiate Positive Feedback Loops and Dynamic Resiliency
Wolves Change Rivers?
“The beaver has a major image problem. A chubby rodent with goofy buckteeth and a tail that looks like it was run over by a tractor tire – it’s no wonder beavers prefer to work under the cover of darkness.”

Frances Backhouse, *Once They Were Hats*
2. Examples

By the end of this section, your audience should be able to visualize:

➔ What is the pain you cure with your solution?

➔ Who Show them a specific person who would benefit from your solution.
Just one!

Your own.

(With a little help from your smart phone)

Tip

Remember. If something sounds like common sense, people will ignore it.

Highlight what is unexpected about your topic.
The Google Translate app can repeat anything you say in up to NINETY LANGUAGES, from German and Japanese to Czech and Zulu.
Bridge Creek, Oregon

- 10 year study
- Beaver dam analogs
- NOAA funding - objective is to improve salmonid habitat
Know a 2nd language? Make Google Translate even better by joining the community.

Tip: Inspire your audience to act on the information they just learned. Depending on your idea, this can be anything from downloading an app to joining an organization.
Meet Mike Pollack
A translation barrier left Alberto feeling lonely and hurt Marco's business.

Tip: Ideally, speak of people in very different situations, but where each could benefit from your solution.
Outside the box thinking

Direct flows into the hillside

Widens the floodplain and spreads out energy

Beaver dams trap sediment and raise the floodplain, establish wetlands, creating food sources

“Fight fire with fire”
Worldwide distribution of beaver

- *Castor canadensis* (N. America)
- Historically, 60–400 million pre-European settlement (Seton 1929)
- Currently, 6–12 million (Naiman et al. 1988), but estimates are crude
- Spatial distribution approaches its historical range
- *C. fiber* (Eurasian beaver)
- More limited current distribution, but expanding back to parts of its historical range

300 year history of beaver extirpation in US - economic, not necessarily biological extirpation
Dam building activity drives the ecological feedbacks that beaver are known for:

- Shallow water table
- Increased groundwater moisture
- Forest species composition and size distribution
- Multi-stemmed growth
- Woody species regeneration

Photo: www.mar5nezebeavers.org
What are the effects of beaver dam building activity on the landscape?

Pollock et al. 2014
Beaver Restoration Guidebook: A Practitioners Guide to Working with Beaver to Restore Streams, Wetlands and Floodplains

Available at USFWS website: http://www.fws.gov/oregonfwo/ToolsForLandowners/RiverScience/Beaver.asp

Greg Lewallen -- University of Saskatchewan
Michael Pollock, Chris Jordan — NOAA Northwest Fisheries Sciences Center
Kent Woodruff — US Forest Service
Janine Castro — US Fish and Wildlife Service & NOAA Fisheries
Meet Ken Woodruff
Methow Beaver Project Leader
From outsider to star

Alberto scored 30 goals in 21 games. He is now being scouted by several professional clubs in the Premier League. And he's a favorite of the other boys on the team.

See a short video on Alberto's story

Tip: Stories become more credible when they use concrete details such as the specific complex moves Alberto learned through Translate and his 30 goals in 21 games performance stats.
4. Closing

Build confidence around your product or idea by including at least one of these slides:

➔ Milestones
What has been accomplished and what might be left to tackle?

➔ Testimonials
Who supports your idea (or doesn’t)?

➔ What’s next?
How can the audience get involved or find out more?
What people are saying

Translate has officially inspired me to learn French

Abby Author, NYC

With this app, I'm confident to plan a trip to rural Vietnam

Wendy Writer, CA

Visual translation feels like magic

Ronny Reader, NYC

Quotes for illustration purposes only
Stream Restoration Design for the Long Now Beaver

- Disperse energy across the ENTIRE floodplain
- Leave open wet meadow and scrub shrub habitats to promote herbaceous growth
- Plant food sources and regenerative species - willow, alder, dogwood
- Easement across the floodplain
- Knowledge is good - educate land owners and managers about beaver ecosystem services
State of the Beaver Conference

Feb 22-24, 2017

Bringing Back Beavers to Bring Back Life.

Agents of Regeneration
Beavers in Devon

Enclosed Beaver Project

In 2013 a male and female beaver were introduced into a three hectare fenced enclosure in the Tamar headwaters, where their impacts are being studied in detail. Most of the results presented in this document are from this research site.

The Enclosed Beaver Project is situated on private land in the headwaters of the River Tamar and upstream of Roadford Lake.

The beavers live in a specially designed structure, which has been designed to prevent them becoming too accustomed to the location. The enclosure was designed to be a safe haven for the beavers, but within it they are also able to interact with the water in order to maintain their natural food sources.

Since 2013, 12 years of detailed research has been conducted on the beavers. The detailed engineering of the watercourses in this area has provided a unique opportunity to study the impacts of beaver activity on a wide range of other subjects.

The beavers are owned and managed by the Devon Wildlife Trust. Additional funding has been provided by the Natural Environment Research Council and the National Charitable Foundation.

In 2013, the project team began funding the project showing the University of Exeter in order to carry out additional research work on the Freshwater and water quality implications of the beaver dam.

Funding is currently being sought to continue this project.

Partners and funders

The Enclosed Beaver Project is run by the Devon Wildlife Trust in partnership with the University of Exeter, the Devon Climate Change and the Devon Beaver Society. The project has been made possible by the Natural Environment Research Council, the Freshwater and Water Quality Implications of the Beaver Dam. Funding is currently being sought to continue this project.
Devon Beaver Project: Overview

- Fenced 1.8 ha site in North Devon, UK
- 1st order tributary draining from IMG
- A pair of beavers introduced in 2011
- Dramatically changed site from small first order tributary running through wet woodland, to a diverse mosaicked wetland environment.
Devon Beaver Project Results – water quality

Storm monitoring (17 events, 178 samples above, 119 below), suggests site may act as a sink or filter for diffuse water pollutants from agriculture (suspended sediment, nitrogen and phosphate).

However, more organic matter in the site, so potentially results in a greater loss of dissolved organic carbon than comparative agricultural land.
Can we have our cake and eat it too?

Takeaways:

- **Long Now** design anticipates and celebrates beaver
- Ecological and generational amnesia is a challenge
- Beaver CREATE positive ecological feedback loops
- Ecological restoration is a process, not an event
“Move Forward Dam It”

Good Reads:

*Once They Were Hats* by Frances Backhouse  
*The American Beaver and His Works* by Lewis Henry Morgan  
*Fur, Fortune, and Empire, The History of the Fur Trade in America* by Eric Jay Dolin  

*The Clock of the Long Now, Time and Responsibility*, by Stewart Brand

Upcoming conferences:

The State of the Beaver 2019 – Agents of Regeneration, Seven Feathers Convention Center, Canyonville, Oregon.  

Ecosystem Services Conference – MD 2018?