PARTNERING WITH BEAVER IN RESTORATION

Utah Division of Wildlife Resources Workshop:

Sponsored by Utah AFS

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BEAVER HISTORY, ECOLOGY & DAM BUILDING BASICS

Nick Bouwes & Joe Wheaton

© Cadel Wheaton
I. History

II. Bit of Beaver Biology

III. Why do Beaver Build Dams?
Ubiquitous within Northern hemisphere in temperate ecosystems

- *Castor fiber* (Eurasian beaver)
- Limited current distribution, but expanding back to parts of its historical range.

**Castor canadensis**

- Spatial distribution approaches its historical range
- Historically, 55–400 million pre-European settlement (Seton 1929, Pollock et al. 2003)
- Currently, 6-12 million (Naiman et al. 1988)

"CONTINENTAL" COCKED HAT. (1776)

"NAVY" COCKED HAT. (1800)

ARMY. (1837)

CLERICAL. (Eighteenth Century)

(THE WELLINGTON.) (1812)

(THE PARIS BEAU.) (1815)

(THE D'ORSAY.) (1820)

(THE REGENT.) (1825)

MODIFICATIONS OF THE BEAVER HAT.

Figure copywritten by btashoemuseum.ca
Timing of Beaver Trapping in the Lower 48 States

1600-1700
1700-1800
1800-1850
1850-1900

Recreated from Jim Sedell, USFS 2001
WYOMING FUR TRADE...

Mountain Man Rendezvous
1825-1840
(11/16 in WY)

Beaver Trapping

Year (1800's)

Hudson Bay Co.

Slide courtesy of Mark McKinstry
ANECDOSE OF EXTENT OF TRAPPING

Beaver Removal

- Ogden 1828, 1829 Humboldt River, NV
  - 125 mi, trapped 627 beaver, 5.1 beaver/mi
  - 93 mi, trapped 519 beaver, 5.6 beaver/mi
- “Common” in Yellowstone now Ecologically Absent
  - over trapping
  - ungulate overgrazing - poor habitat


Slide courtesy of Mark McKinstry
BEAVER WERE THE MAIN REASON EUROPEANS CAME HERE!

- From 1600s to 1800s beaver essentially extirpated...
- Their pelts were ‘worth more than gold’
- Beaver Wars
- Today, a pelt goes for $12-$20... even in 1700s they went for $30!

Fascinating read
Dolin (2011)
BEAVER ECOLOGY & DAM BUILDING

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Bridge Creek © Wheaton

From: http://www.howstuffworks.com/beaver-dam.htm
THE COLONY

• Colony unit = 6–8 related individuals
• Avg. litters = 2–5 kits
• Young stay with parents at least 2 years
• Adults (>2 yrs) disperse to establish new lodge
• Territories marked with scent mounds
• Home ranges tend to follow shorelines
A HABITAT GENERALIST, AND HIGHLY ADAPTABLE

- Lakes
- Rivers and streams
- Abandoned channels on floodplains
- Wetlands
FROM BOREAL FORESTS....
...TO DESERTS

http://www.rv-boondocking-the-good-life.com/
EVEN SOME UNLIKELY PLACES...

- Estuaries
- Glacier outwash streams

Mendenhall Glacier, AK  (Photo Bob Armstrong)

Beaver Dam Creek, Long Island, NY
COMMON HABITAT INGREDIENTS:
WATER + TREES

- Northern tundra and treeline range boundary: wood limitation
- Southern desert range boundary: perennial streamflow and/or wood limitation
WHAT DO BEAVER EAT?

- Spring/Summer: herbaceous plants, incl. aquatic and riparian forbs, grasses, grains and row crops
- Fall/Winter: tubers, bark and cambium of cached woody plants
- Woody plants comprise ~85% of winter diet; ~15% of summer diet
WOODY FOOD CONSIDERATIONS

- Maximizes energy intake with low costs
- Easy digestibility; short gut retention time
- Avoid bad-tasting secondary compounds
- Willows, aspen most commonly preferred; conifers avoided
A BEAVER FOOD CACHE...
A CLASSIC ‘CENTRAL PLACE’ FORAGER

- Animals forage to maximize net energy intake per unit time (Schoener 1979)
- Because provisioning costs increase with distance, animals should forage more selectively farther from their central place (i.e., the lodge).

↑ Food quality; ↓ Foraging time

Nicola Plowes, ASU
GENERAL FORAGE PREFERENCES
(BUT HIGH SYSTEM SPECIFICITY)

- Forage preferences depend on what is available
  - Aspen, willow, cottonwood, and alder (Denny 1952)


- Increase selectivity with increased distance from pond (Raffel et al. 2009)
2-5 CM STEMS MOST PREFERRED
(harvested farthest from the pond)

Most-preferred: 2-5 cm stems

Opportunistic: <2 and 5-10 cm
Non-preferred: >10 cm

Harrison & Stella 2010
TREE BROWSING PROMOTES SHRUBBY GROWTH HABIT

Photos: Anna M. Harrison
HIGHER SEEDLING REGENERATION WHERE THE CANOPY IS BROWSED BACK

Photo: Bill Dunker

All species

r² = -0.466

Average seedling density (ha⁻¹)

Distance from pond (m)

Canopy cover proportion

Harrison & Stella 2010;
Not for distribution
(Contact J. Stella, stella@esf.edu)
WHY GO FOR THE BIG ONES?

Fresh wood shavings... Why aren’t they eating this?
CAN THEY MOVE A WHOLE TREE?

Practice logs for kits?

Future part of dam?
RANDOM OR SYSTEMATIC?

All bark chewed off
BEAVER ARE LIKE ROTATIONAL CROP FARMERS

- They will *selectively* work an area hard for 2-3 years
- Then let it lay fallow and move upstream or downstream
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Bridge Creek © Wheaton

From: http://www.howstuffworks.com/beaver-dam.htm
SO WHY DO THEY BUILD DAMS?
AQUATIC HABITAT IS CRITICAL TO THEIR SUCCESS

- Beaver more agile in water than on land; maximize time in the water
- Ponds provide cover from predators and foraging pathways
- Lodge includes underwater entrance, nest area above water
LODGES

- Bank lodge vs. Central Above Ground

Bank den (Colorado Natural Heritage Program)

Mid-stream lodge in Hinsdale County, CO (Colorado Natural Heritage Program) Slide from John Stella

Mid-lake lodge
AN EXPOSED LODGE

- They dig lots of tunnels
THE LODGE AND FOOD CACHE

- Active lodges indicated by fresh food cache in fall
- Active lodges spaced at least 0.5–1 km apart
- Colony saturation densities vary with landscape and region
- Max. density ranges 0.5–5 colonies/km² (Hill 1976, Novak 1987, Baker and Hill 2003)
LEFT OVER FOOD CACHE...

Lodge w/ underwater entrance

Left over food cache from winter
DAMS & BUILDING MATERIALS

- Created to impound water around lodge
- Dam location cued by running water
- Dams constructed of wood and available debris (e.g., plastic, metal)

Photo by Anna M. Harrison
WHY SO MANY DAMS?

- How many dams do you see?
- Why are some bigger than others?
- Where is(are) the lodge(s)?
DAM/POND COMPLEXES

- Multiple dams create safe transportation corridors to connect large ponds
- Dams complexes grow over time, allowing beaver more access to food sources
- Canals constructed to float materials in...
WHAT PURPOSE DOES THIS SECONDARY DAM SERVE?
DAM COMPLEXES....
Of the things we just talked about (foraging, harvesting, dam building, lodges, etc.) what do you see?
TAKE AWAYS...

- Beaver were primary driver of North American exploration & settlement → Extirpated in many places
- Beaver need water and wood... not dams
- Beaver can survive in many different environments
- Most critical requirements:
  - Underwater entrance to lodges (water depth)
  - Herbaceous or woody vegetation for nutrition
  - Woody vegetation to wear down incisors
- Where streams or rivers don’t provide habitat they need, they build dams (ecosystem engineers)