## Using wildlife fright information to inform trail planning

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## **Purpose of Literature Review**

- Metro owns 17,000+ acres of natural areas
- Increasing pressure to open for mountain bikers, equestrians
- Need a scientific foundation to inform public access
- Reviewed research on hikers, mountain bikers and equestrians on trails, habitat and wildlife (~700 papers)
- This talk focuses on wildlife fright distances

# Perceptions about wildlife & nature

- People don't understand their own impacts
- Blame other user groups for impacts and conflicts
- "I saw wildlife, so I must not be disturbing them"
- "I didn't see any wildlife, so I must not be disturbing them"
- Environmental values/knowledge are related to age, gender, education

# **Bottom line for wildlife**

- Building trails in natural areas will negatively affect wildlife.
- Acknowledge it and try to minimize effects.
- Positive effects are rare and favor "urban adapted" species.



# What are fright distances?

- Alert distance (AD): the distance between you and an animal where the animal first visibly shows a response (> FID)
- Flight initiation distance (FID): the distance at which the animal begins to flee

# Humans disturb wildlife

- Physiological stress before visible impacts
- Elk, carnivores, other sensitive species shift activities to night or leave the area
- Good veg cover can help!



## Wildlife fright distance data

- Field studies
- Species native to the US (but not all studies done in US)
- 129 original research papers
- 190 unique species
- 644 individual records

# **Fright distance disclaimers**

- Generalizations; not prescriptive
- Habitats, geographies, species, individuals differ
- May depend on recreational user group
- Findings subject to new data

# Many factors can increase fright distances

- Animals are not used to you
- In more open habitat
- Larger animals
- In larger groups
- Pregnant or with young (alone or in groups)
- Migratory (predictability)
- Less mobile

# Factors increasing fright distances, cont'd

- You are off trail
- They think you can see them (vegetative screen!)
- You are staring at them (birders, photographers...)
- There are more of you/you are noisy/have kids
- You are moving fast
- It's hunting season (predator shelter effect)
- You have a dog

#### **Example: What changes fright distance for deer?**



**Behavioral habitat "fragmentation"** *These are some of the most sensitive species* 

Trail users create zones of avoidance – larger for:

- Carnivores (gray fox and larger; no studies on smaller spps)
- Migratory and area-sensitive species
- Raptors, esp. Bald Eagles & ground nesters
- Pregnant animals or those with young
- Sandhill Cranes, heron rookeries
- Certain shorebirds and songbirds

## Stankowich & Blumstein review, 2005

"Humans on foot were far more evocative than terrestrial vehicles, aircraft, or anthropogenic noise." Generalized relative effects of different recreational user groups on wildlife



#### Mean fright distances (FID or AD, m) for types of wildlife that occur in the US





### **Amphibian notes**

- Short FIDs; not very mobile
- Habitat may be more important than type or amount of trail use – although note mortality risk
- When cutting trees to install trails, leave logs alongside trails
- VA salamander study averse to crossing pathways
- Bioswales can provide connectivity

#### **Fright distances:**



#### Fright distances for birds of prey (m)



#### Fright distances for mammal groups (m)



# Mean fright distances for five groups of ungulates (m)





## "Dose-dependent" response

#### Colorado lowland riparian, paved multi-use recreational trails

 # trail users explained 60% of occurrence of low-foraging species and nearly 90% of ground-foraging species

#### Bald Eagles on Skagit River, WA in winter

- Hikers disrupted foraging; ~20 hikers/hour threshold after which eagles were slow to resume feeding
- After 40 hikers/hour, took 4 hrs to resume foraging vs. 36 minutes after boats

#### Effect also documented for deer, elk, other wildlife species

## Habituation and sensitization

- Habituation: Animals get used to you; fright distances decrease (tend to be generalists)
- Sensitization: Animals become increasingly frightened of you over time; fright distances increase
  - Interferes with "activities of daily living" such as foraging
  - May include leaving a site or switching to night

## More on habituation

- "Habituation" may not really mean a given species/individual isn't bothered by people; stress hormones, heart rates
- Urban / busy rec areas select for bolder individuals
- Predator shelter effect
- Lack of food resources may lower fright distances



# Who let the dogs out...

- Subspecies of wolf
- Prey species recognize predators
- Dog urine is a wildlife repellant
- Leash & poop laws often disregarded
- Off-leash is worse (unpredictable)
- Trend: sensitization, not habituation



#### On average, adding a dog increases fright distances by 60%





#### BIRDS Banks & Bryant 2007, 90 forest sites in Australia Dog walking led to 35% reduction in diversity, 41% in abundance



### MAMMALS IN COLORADO FORESTS

Lenth, Knight & Brennan 2008; pellets, tracks, cameras



# **Unauthorized (user-created) trails**

- Especially disturbing: Unpredictable + more trail miles
- Sometimes > half of all trails
- GIS methods to measure "fragmentation"
- Esp. near entry points, roads, neighborhoods
- Edge effects, invasive species
- The current review suggests effects = strongest for mammals)

**Vegetation gaps = barriers to wildlife movement** 

- 45-50 m: many species willing to cross
- 200 m: most species unlikely to cross
- Songbirds highly mobile but don't like veg gaps ~50m

How can I use this info? Select a species or species group

- Buffer (GIS) fright distance around trails to consider area of influence
- Compare potential effects between proposed trail alignments
- Assess problem areas for existing recreational sites
- Prioritize unauthorized trail removal
- Add vegetative screen in select areas w/sensitive species
- Areas around key breeding habitat consider protective buffers or seasonal trail closures



# 80 meters

# Fright distances to inform wildlife corridor planning

- Situation and species dependent
- What's your habitat like?
- What are your species of interest?
- What are you most worried about?
- Appropriate right distances x 2, plus a modest buffer
- Example: Grassland songbirds = (22m x 2)+5m on each side = 54m wide

\*Please don't align your trail down the middle of a wildlife corridor if you can help it\*



# For further reading

- 2006 Stankowich review: https://www.researchgate.net/publication/7446865\_Fear\_in\_animals\_A\_metaanalysis\_and\_review\_of\_risk\_assessment
- 2020 USFS rec ecology review: https://www.fs.fed.us/pnw/pubs/pnw\_gtr993.pdf
- 2017 Recreation Ecology literature review: https://www.oregonmetro.gov/recreation-ecology-literature-review
- Dogs: https://www.oregonmetro.gov/sites/default/files/2017/09/28/impacts-of-dogs-on-wildlife-water-quality-science-review.pdf
- Wildlife Crossings Guidebook: https://www.oregonmetro.gov/sites/default/files/2018/12/19/Wildlife-Crossings-providing-safe-passage-for-urban-wildlife-08012009.pdf
- Habitat connectivity: https://www.oregonmetro.gov/sites/default/files/2019/08/22/wildlife-corridors-and-permeability-report-April-2010.pdf
- Green Trails Guidebook: https://www.oregonmetro.gov/green-trails-guidelines-environmentally-friendly-trails

#### **Thanks for listening!**

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#### Additional slides of potential interest below



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#### **EXTRA SLIDES OF POTENTIAL INTEREST**

# Artificial lighting effects

- Bats: Hudzik thesis 2015
  - Ohio bicycle trail lighting gradient
  - 3 bat species used lit trails, but threshold effect beyond which they did not occur
- Wilsonville lighting study: Bliss-Ketchum et al.
  - Deer, deer mice, opossums associated with unlit areas
  - Artificial light may pose connectivity barrier
- Large carnivores tend to avoid artificial light (2 studies)

### **On- and near-trail effects**

- Horses = most trail damage
- Hikers/mountain similar but (nuanced)
- Recent conversations w/land federal land managers: mt. bikers causing a lot of off-trail damage



# **Edge effects**

- Trails create edge habitat
  - All user groups bring in weed seeds
  - More sunlight favors weedy plants
  - Increased nest depredation (cowbirds, jays, crows)
- Weeds
  - Generally within 20m of trail
  - Implications for user-created trails

# Signage to change behavior

**Most effective:** Tell them what they <u>shouldn't</u> do, and why: *"To protect sensitive habitat, please do not go off the trail."* 

#### Less effective:

"Please stay on the trail" (less memorable)

"Many visitors in the past have left the established trail, changing the natural vegetation in this park" (presents bad behavior as the norm)