

# CONDITIONED FOOD AVERSION WITH ODOR ASSOCIATION TO MITIGATE HUMAN-BEAR CONFLICT



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Photo courtesy of the WSU Bear Center



## PROBLEM :

## READILY AVAILABLE HUMAN SOURCES OF FOOD LEAD TO CONFLICT

- Bears take advantage of calorie-rich foods to prepare for hibernation.
- These foods ensure survival of a threatened species because females have cubs during hibernation



## EXAMPLE PROBLEM AREAS:

- Corn fields in Millie's woods, Flathead Reservation, MT
- Corn fields in Mission Valley, MT
- Apple orchards in Troy, MT
- Livestock in Bonners Ferry, ID
- Wood River Valley, ID camping sites





PROBLEM :

## READILY AVAILABLE HUMAN SOURCES OF FOOD LEAD TO CONFLICT

- Property and resources lost annually → ECONOMIC IMPACT
- Repeat offenders are removed → POPULATION IMPACT



Farmer Greg Schock shows a clearing inside his cornfield made by grizzly bears in Mission Valley, MT. Fences were later built but were ineffective.



# CONDITIONED FOOD AVERSION (CFA)

## CONDITIONING:

- A single trial procedure where one learns to avoid foods that previously made them feel ill
- Pairing of food (Conditioned Stimulus; CS) with an agent causing illness (Unconditioned Stimulus; US) results in an aversion to that food (Conditioned Response; CR)
- Roots in classical conditioning with unique characteristics

## USES AND BENEFITS:

- Can be used to shape behavior in wild animals
- Aversion can last long term; even a lifetime (theoretically)
  - Supported by pilot studies at WSU



Photo courtesy of Heather Havelock, WSU

## CFA + ODOR (CFAO)

- **GOAL:** Associate odor with aversive effects
- Bears' reliability on their exceptional sense of smell may strengthen the aversion
- **OUTCOME:** Once conditioned, the **odor itself** can become the deterrent



- Past CFA studies
  - ✓ Coyotes (Ellins and Catalano 1980)
  - ✓ Black bears (Ternent and Garshelis 1999)
  - ✓ Grey Fox (Nielsen et al. 2015)
- **CFAO** studies have shown success in
  - ✓ Badgers (Baker et al. 2008)

**GAP IN RESEARCH: GRIZZLY BEARS**

## PRELIMINARY STUDIES



Photo courtesy of Heather Havelock, WSU

- Tested the effectiveness of CFAO with captive grizzly bears
- Thiabendazole (TBZ) used as aversive agent (US)
  - Tasteless odorless powder that induces sickness 'feeling'
- Lemon oil used as odor cue
  - Neutral oil that isn't likely found in bear habitat

### PREDICTIONS:

- Pairing US and an odor cue (CFAO) would enhance aversion to high-value foods
- CFA expression and persistence would be positively correlated to the amount of TBZ administered and/or the number of times a bear receives treatment

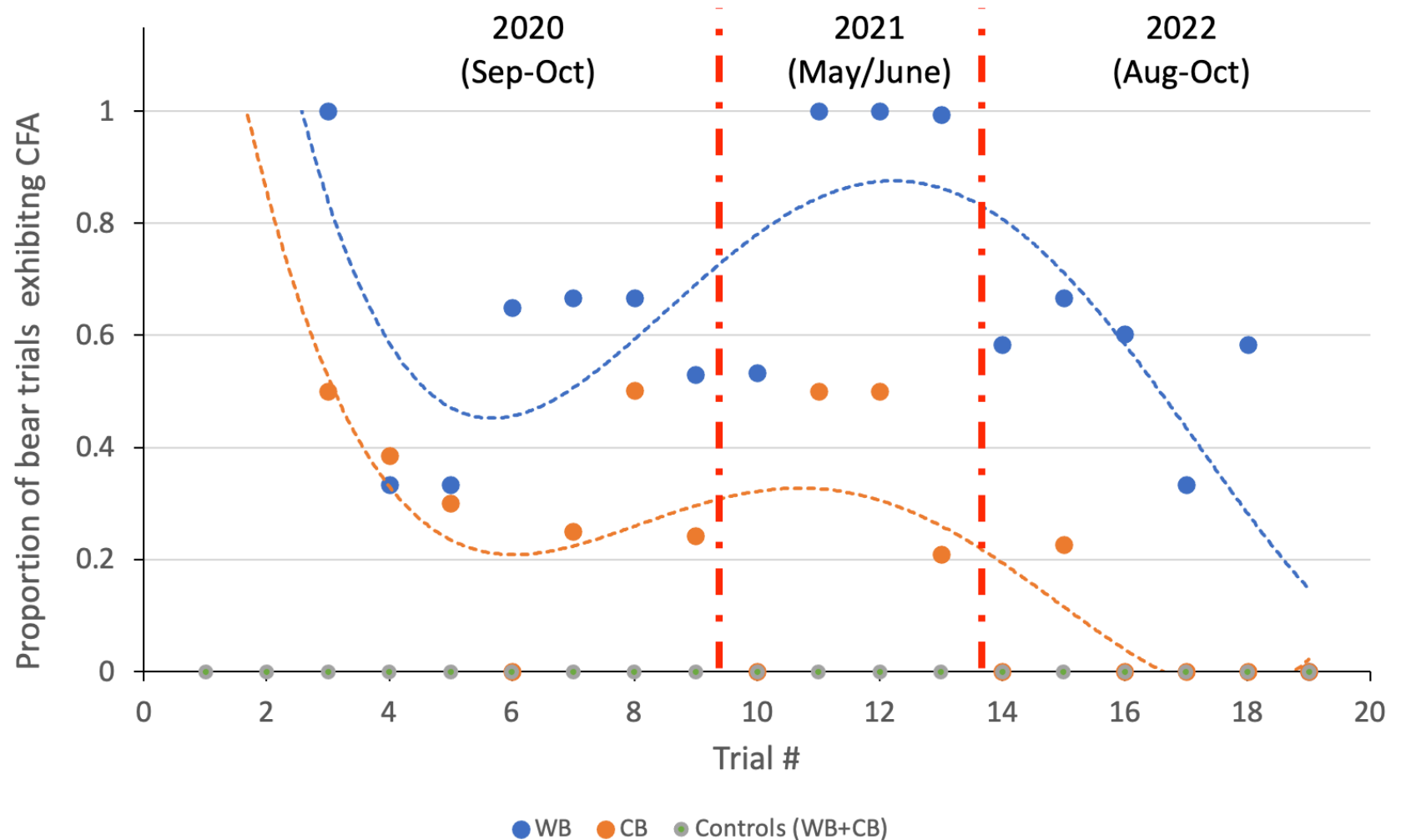


# PRELIMINARY STUDIES



## RESULTS:

- Wild-born bears learned aversion quicker than captive-born bears.
- 5 out of 7 treated bears demonstrated CFAO after one year (after hibernation)
- 4 out of 7 demonstrated CFAO after two years
- Fall hyperphagia may weaken, but not eliminate, aversion

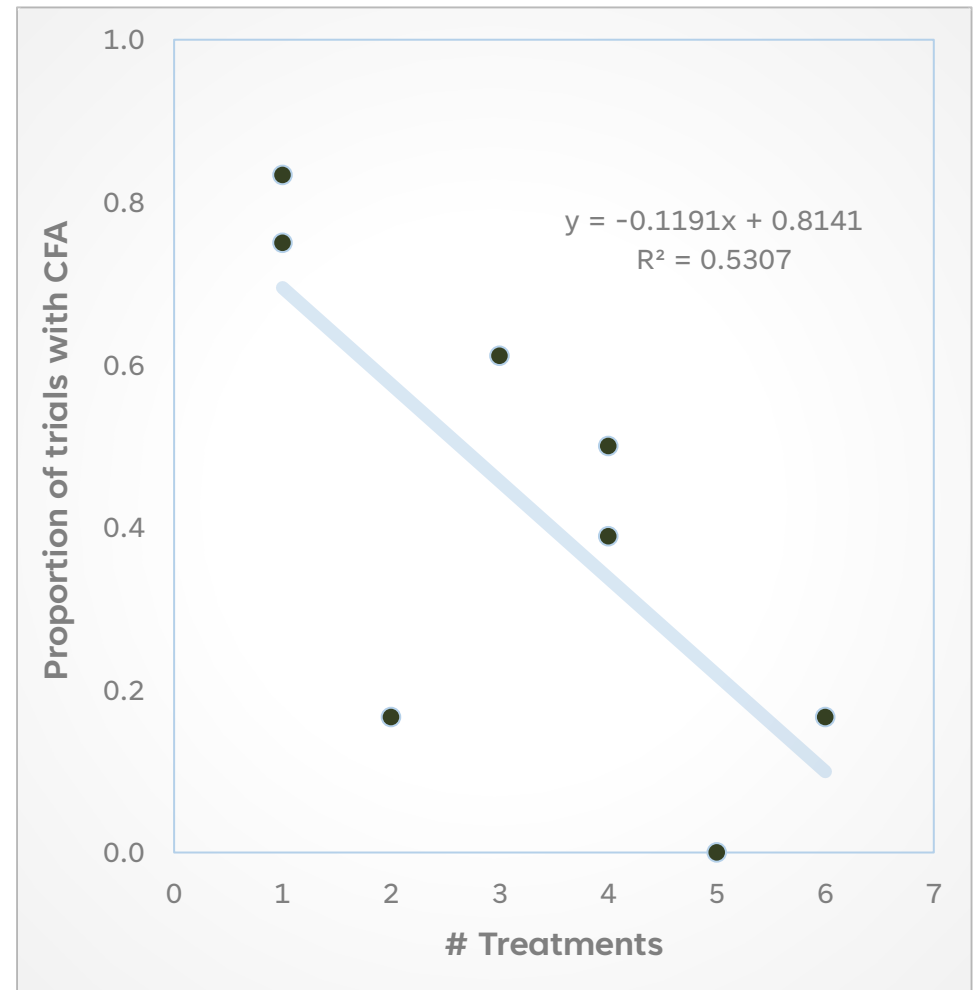


## PRELIMINARY STUDIES



### RESULTS (CONT'D):

- Inverse relationship between the number of treatments administered and the proportion of trials bears that displayed a CFAO
- Wild bears learned aversion with fewer treatments than captive-born bears.
- CFAO achieved with fewer treatments showed stronger aversions





# PROPOSED CFAO FIELD IMPLEMENTATION

## 1. CONDITIONING

- Bait stations with treated bait plus odor



- Monitor with trail cameras

## AVERSIVE AGENTS:

- Must be undetectable and effects must be temporary
- Common compounds in CFA literature:
  - Lithium chloride
  - Thiabendazole (TBZ)
  - Ivermectin?

## CFAO FIELD IMPLEMENTATION

### 2. POST-CONDITIONING

- Bait stations with untreated bait and odor **only**
- Camera trap review of video to confirm conditioning was successful
- Camera trap review of video to odor is an effective deterrent



### 3. APPLICATION

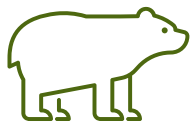
- Once conditioned, liquid odor **only** can be used as a bear deterrent
  - Lemon oil harmless to crops
- Treatments can be applied periodically to strengthen association and expose new bears





# BENEFITS OF CFAO

Using a bear's ecological role and unique physiology to inform long-term management strategies instead of short-term, often inefficient, ones



Less expensive and less dangerous than other deterrents and lethal methods of control



Preserve human and natural resources to aid local communities and reduce risk of conflict



Contribute to conservation of a threatened species



# PROPOSED TIMELINE OF FIELD STUDY

## 2024

### EARLY SUMMER

Order supplies  
Build bait  
stations

### MID SUMMER

Deploy camera  
traps  
Deploy bait  
stations

### MID-LATE SUMMER

Retrieve SD cards  
Review video  
ID bears

### FALL

Re-deploy bait  
stations with  
treatment+OIL

### MID-LATE FALL

Retrieve SD cards  
Review video  
ID bears



THE CONDITIONING COMPOUND (THIABENDAZOLE) WOULD COST APPROXIMATELY \$750 – THIS IS ENOUGH TO CONDITION 33 BEARS USING A SINGLE DOSE OF 150MG/KG OR ROUGHLY 16 BEARS AT 300MG/KG).

(WE MIGHT ALSO TRY IVERMECTIN (CHEAPER, BUT THE TASTE MAY NOT MAKE IT USABLE). TBZ IS A WORMER AND THUS ALREADY USED IN ANIMALS, ELIMINATED IN FECES AND HAS A SHORT HALF-LIFE.)

TRAIL CAMERAS – SETTING UP AT 4 SITES WILL DEPEND ON CAMERA SPECS (BATTERY LIFE, RESOLUTION, CELLULAR CAPABLE, ETC.). WILL NEED TO CONSULT WITH A VENDOR. PRICES CAN RANGE FROM ABOUT \$75-\$300 PLUS A MONTHLY CELLULAR CHARGE [UP TO \$10/MO] FOR CELLULAR PLAN TRAIL

**Budget estimate:**

**\$2000-\$2600**

4 BAIT STATIONS – COST ?? NEED TO DESIGN THEM IN SUCH A WAY TO MINIMIZE OFF TARGET SPECIES EXPOSURE (~\$250)

TRAVEL BETWEEN PULLMAN AND BONNER'S FERRY AREA TO COLLECT TRAIL CAM DATA AND REPLACE BATTERIES. FREQUENCY ?? (4 TRIPS @ \$75/TRIP [FOOD+GAS]) – NO LODGING

BEAR SPRAY – 2PK - \$100

A brown bear is the central focus of the image, standing upright in a field of tall, golden-brown grass. The bear's fur is a rich, dark brown, and it has a direct, steady gaze towards the viewer. The background is a soft, out-of-focus green, suggesting a natural, wooded or meadow environment. In the upper right quadrant, a bright green rectangular box contains the word "QUESTIONS?" in a bold, white, sans-serif font.

QUESTIONS?



# SPECIFIC POINTS (HEATHER)