



University of Missouri

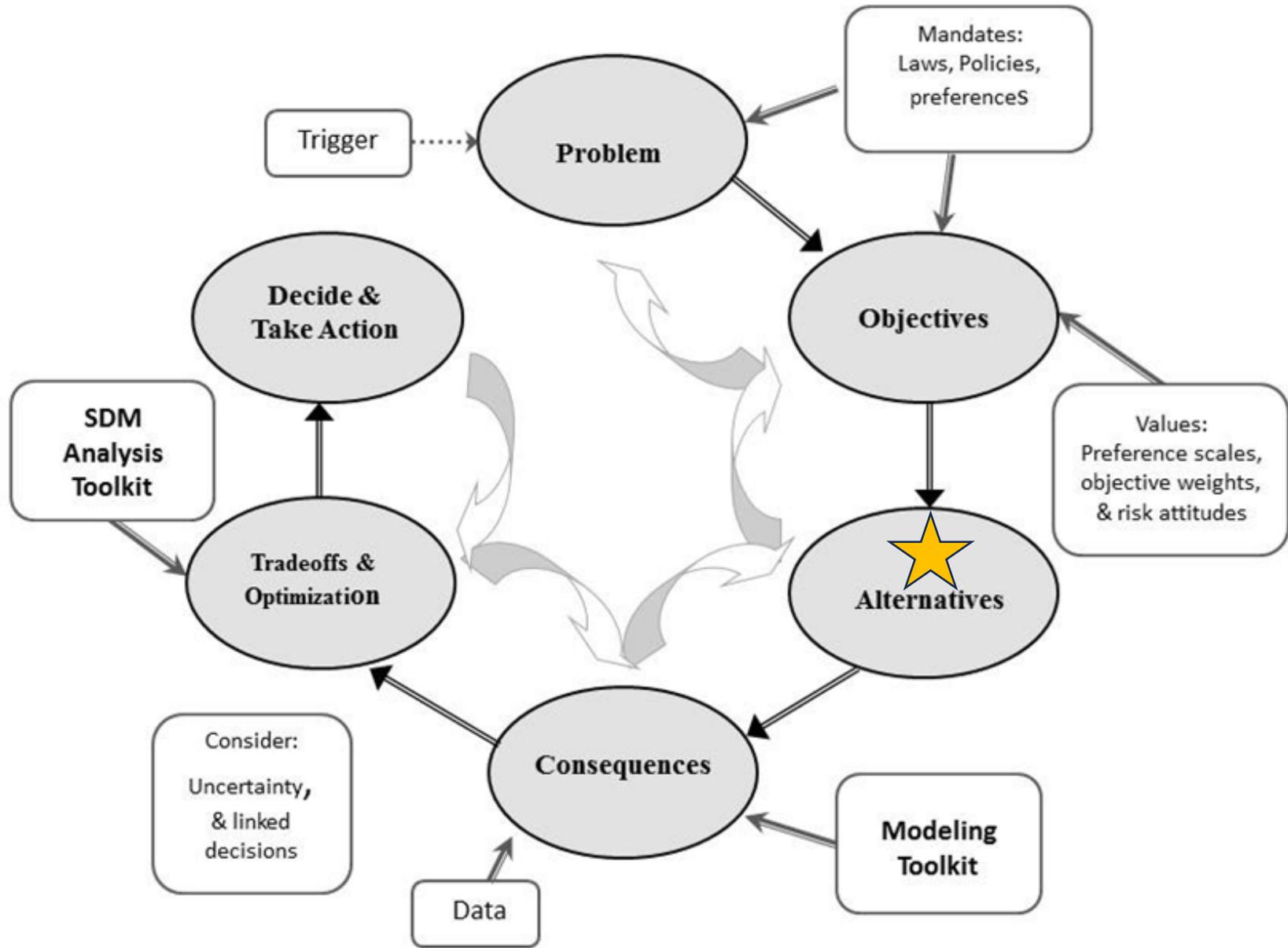
# Alternatives

## **Module 4:**

Brielle K Thompson & Michael E Colvin

Workshop: An overview of Structured Decision Making for natural resources,  
Midwest Fish and Wildlife Conference 2025, St. Louis, MO

Modified from: Fundamentals of Structured Decision Making TWS Conference Workshop 2023 & an  
Overview of Structured Decision-Making Washington Department of Fish and Wildlife 2022-2023



Source: Jean Fitts Cochrane



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# Importance of good alternatives

- A good alternative is one that provides a good chance of achieving objectives
- Good alternatives are:
  - Values-focused
  - Fully specified
  - Internally coherent
  - Distinct



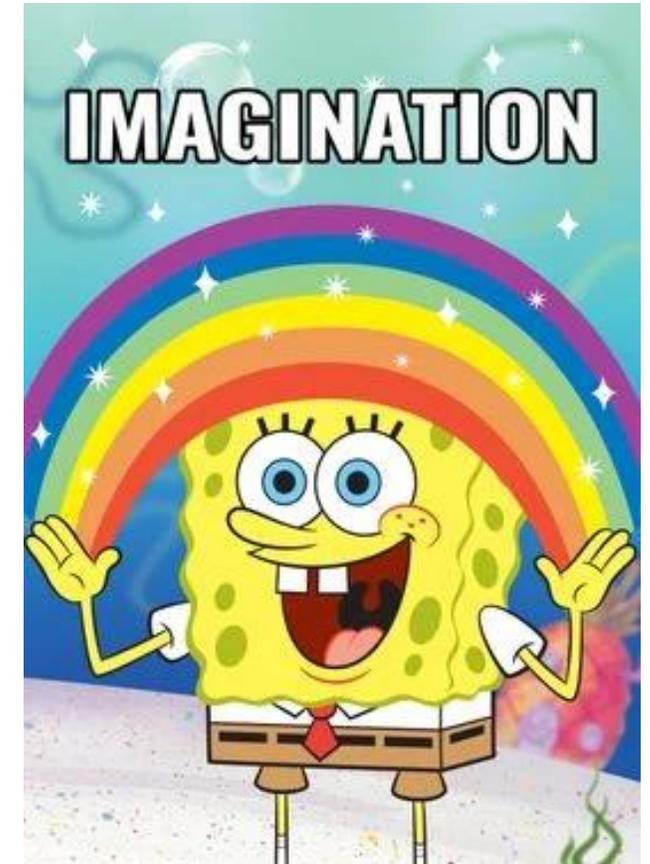
# Good alternatives require

- **Imagination**

- Beware of the tendency to limit our ideas to what are thought to be 'practical' alternatives

- **Creativity**

- Think of the widest range of possible alternatives
- Don't let preconceived ideas or constraints be limiting



Displate



# Challenges to identifying alternatives

- Falling prey to cognitive biases (e.g., status quo bias)
- Accepting real or perceived constraints
- Evaluating alternatives prematurely

**DON'T  
STICK  
TO THE  
STATUS  
QUO**

Tenor

# Suggestions to identify alternatives

1. Focus on fundamental objectives and address conflicting objectives
2. Challenge constraints
3. Visualize
4. Create groups of alternatives
5. Revisit objectives

# 1. Focus on fundamental objectives and address conflicting objectives

- Create alternatives to achieve the best possible consequences for each fundamental objective, one at a time.
- Then, create hybrid alternatives to satisfy more than one objective. Include conflicting objectives.

# 1. Focus on fundamental objectives and address conflicting objectives

## Example: Rare Snakes

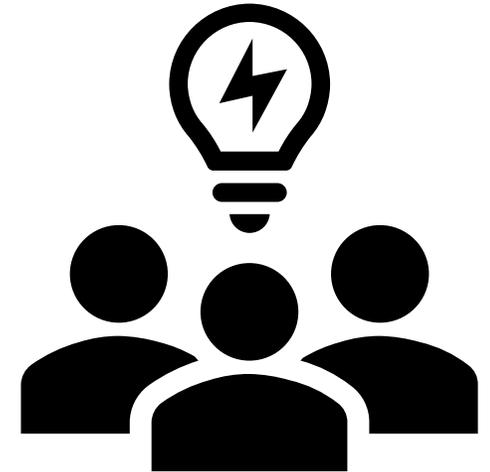
- Problem/concern:
  - Many rare snakes are killed during capture
- Objectives:
  - Minimize capture mortality
  - Maximize pet industry
- Alternatives:
  - Status quo – do nothing
  - Ban sale of snakes
  - Others?



## 2. Challenge constraints

### Tips:

- Distinguish real and perceived constraints
- Don't anchor on initial set of options
- Don't evaluate – just develop
- Give people time and permission to be creative



## 2. Challenge constraints

### Example: Bird translocation

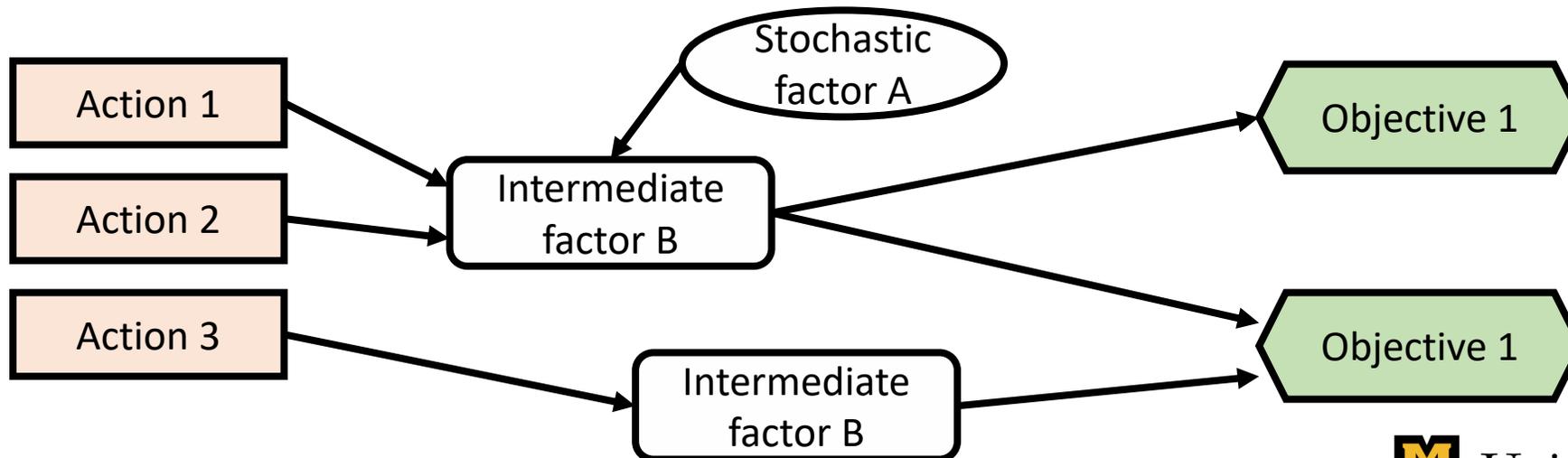
Which of several islands should an endangered bird be translocated?

- Perceived constraint: Introduced predators on Island A make it unsuitable
- What are some creative alternatives?



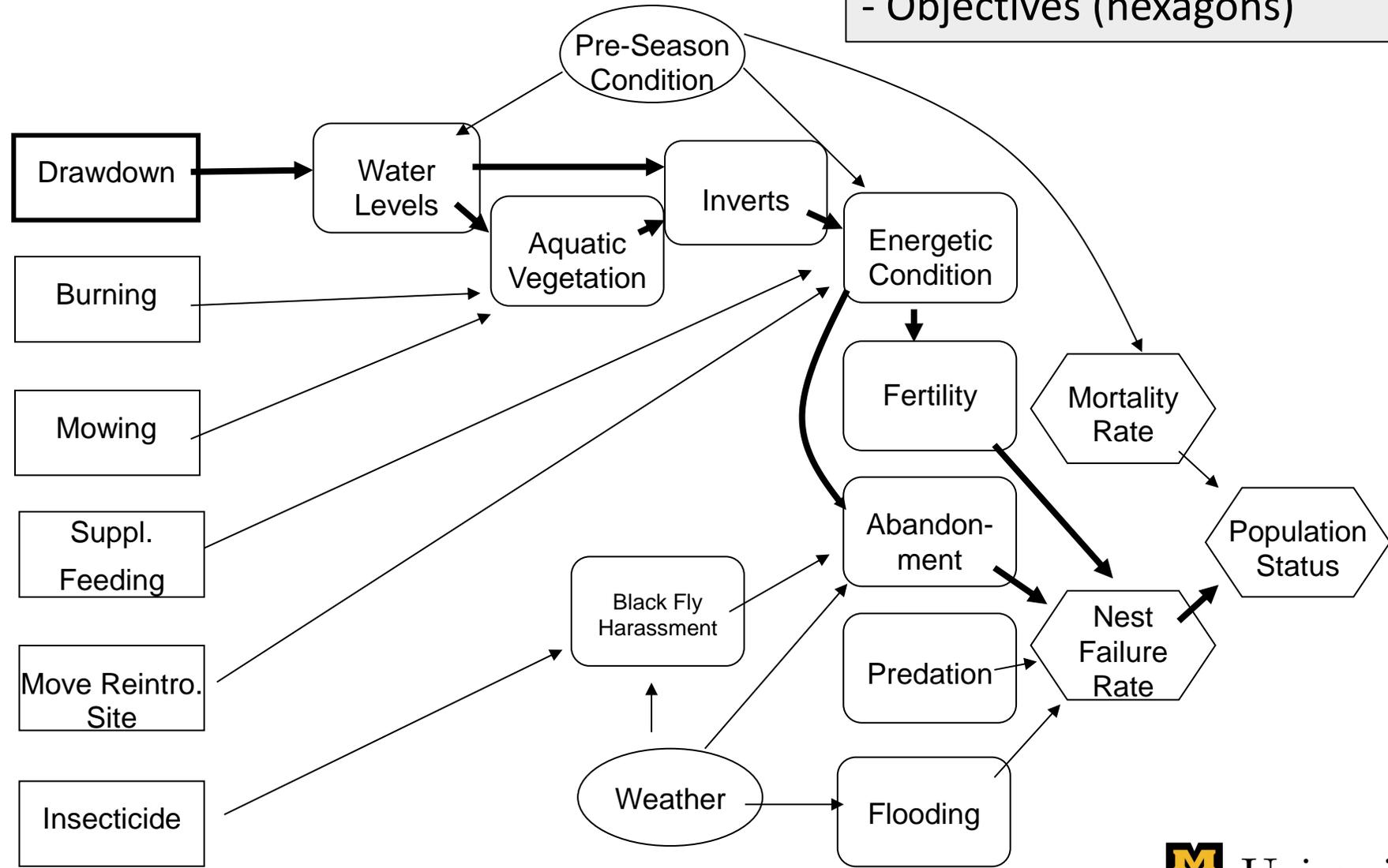
# 3. Visualize

- Use influence diagrams to sketch key relationships in the system
- Visualizing relationships can help generate new ideas
- Influence diagrams can then serve a role in the next step (Consequences) as conceptual models
- Influence diagram:



# Example: Crane Nest Failure

- Actions (rectangles)
- Stochastic factors (ovals)
- Intermediate factors (rounded rectangles)
- Objectives (hexagons)



## 4. Create groups of alternatives

- Groups of alternatives includes portfolios and strategies

### JARGON ALERT!!

- **Alternatives** = general term for complete, comparable solutions to a decision problem
- **Actions** = alternatives formed by individual options
- **Strategies and Portfolios** = alternatives formed by combinations of actions

## 4a. Creating portfolios

- Portfolio: a combination of **like** elements arranged in a set
- The elements themselves can be actions
  - e.g., set of research projects, funding allocation
- The combination now represents a single alternative
  - e.g., stock portfolio
- Constraints often limit number of possible portfolios
  - e.g., total budget for allocation across projects

## 4a. Creating portfolios

Example: portfolios for invasive species removal

Objectives: maximize acres restored and minimize cost

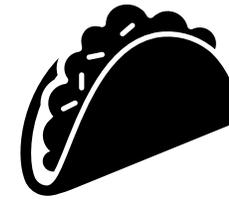
Target sp.	Costs (\$K)	Acres restored
A	15	14
B	7	18
C	3	7
D	12	32
A+B	(15+7 ≠) 18	(14+18 ≠) 29
...	...	...
B+C+D	20	40
A+B+C+D	30	52



## 4b. Creating strategies

- Strategy: alternative combining multiple **unlike** elements:
- Strategy table:
  - 1) Group similar actions into themes (columns)
  - 2) Create distinct strategies that represent different approaches or emphasize different objectives
  - 3) Select the actions in each column/theme that fit each strategy
  - 4) Combine selected elements into an alternative
  - 5) Repeat steps 2-4 for each strategy

# 4b. Creating strategies

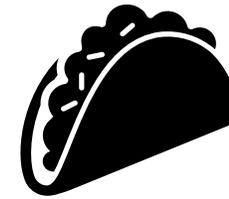


- Strategy table: Chipotle menu

<i>Themes of ingredients:</i>	<i>Meat</i>	<i>Rice, Beans, and Veggies</i>	<i>Top It Off</i>
	None	Brown rice	None
	Steak	White rice	Salsa (Mild)
	Carnitas	Black beans	Salsa (Hot)
	Chicken	Pinto beans	Sour cream
	Barbacoa	Fajita veggies	Tomatillo
			Chili-Corn salsa
			Lettuce
			Guacamole
			Cheese



# 4b. Creating strategies

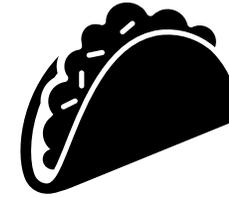


- Strategy table: Chipotle menu

<i>Themes of ingredients:</i>	<i>Meat</i>	<i>Rice, Beans, and Veggies</i>	<i>Top It Off</i>
Strategies (aka burritos): <u>“Brielle’s favorite”</u>	None Steak Carnitas <u>Chicken</u> Barbacoa	<u>Brown rice</u> White rice <u>Black beans</u> Pinto beans <u>Fajita veggies</u>	None <u>Salsa (Mild)</u> Salsa (Hot) Sour cream Tomatillo Chili-Corn salsa <u>Lettuce</u> <u>Guacamole</u> <u>Cheese</u>



# 4b. Creating strategies

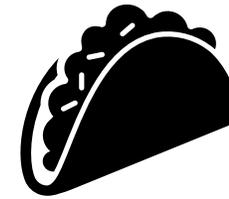


- Strategy table: Chipotle menu

<i>Themes of ingredients:</i>	<i>Meat</i>	<i>Rice, Beans, and Veggies</i>	<i>Top It Off</i>
Strategies (aka burritos): <u>"The Barnyard"</u>	None <u>Steak</u> <u>Carnitas</u> <u>Chicken</u> Barbacoa	Brown rice <u>White rice</u> Black beans <u>Pinto beans</u> Fajita veggies	None Salsa (Mild) <u>Salsa (Hot)</u> Sour cream Tomatillo Chili-Corn salsa Lettuce Guacamole Cheese



# 4b. Creating strategies

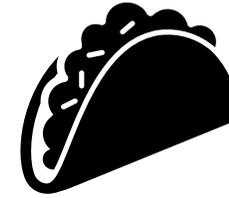


- Strategy table: Chipotle menu

<i>Themes of ingredients:</i>	<i>Meat</i>	<i>Rice, Beans, and Veggies</i>	<i>Top It Off</i>
Strategies (aka burritos): <u>“The Veggie”</u>	<p><b><u>None</u></b></p> <p>Steak</p> <p>Carnitas</p> <p>Chicken</p> <p>Barbacoa</p>	<p><b><u>Brown rice</u></b></p> <p>White rice</p> <p><b><u>Black beans</u></b></p> <p><b><u>Pinto beans</u></b></p> <p><b><u>Fajita veggies</u></b></p>	<p>None</p> <p><b><u>Salsa (Mild)</u></b></p> <p>Salsa (Hot)</p> <p><b><u>Sour cream</u></b></p> <p>Tomatillo</p> <p><b><u>Chili-Corn salsa</u></b></p> <p><b><u>Lettuce</u></b></p> <p><b><u>Guacamole</u></b></p> <p><b><u>Cheese</u></b></p>



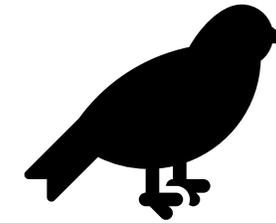
## 4b. Creating strategies



- Final strategy table: Chipotle menu

Themes→ ↓ Strategies	<i>Meat</i>	<i>Rice, Beans, and Veggies</i>	<i>Top It Off</i>
Brielle's Favorite	Chicken	Brown rice, Black beans, Veggies	Salsa (mild), Chili-corn, Lettuce, Guacamole, Cheese
The Barnyard	Steak, Carnitas, Chicken	White rice, Pinto beans	Salsa (hot), Cheese
The Veggie	None	Brown rice, Black beans, Pinto beans, Veggies	Salsa (mild), sour cream, Chili-corn, Lettuce, Guacamole, Cheese

# 4b. Creating strategies

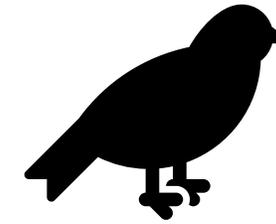


- Example: Threatened species recovery

<i>Themes:</i>	<i>Habitat Protection</i>	<i>Predator Control</i>	<i>Enhance Population</i>	<i>Alternative Economic Activity</i>
	Status Quo	Status Quo Harvest (5%)	None	None
	Ban logging in critical habitat	Increase harvest rate of predator to 10%	Maternity Pens	Promote sustainable harvest of species through lottery
	Develop linkage corridors	Increase harvest rate of predator to 50%	Captive Breeding Translocate	Promote non-consumptive recreation



# 4b. Creating strategies



- Final strategy table for threatened species recovery,

Themes→ ↓ Strategies	<i>Habitat Protection</i>	<i>Predator Control</i>	<i>Enhance Population</i>	<i>Alternative Economic Activity</i>
Status Quo	Status Quo	Status Quo Harvest (5%)	None	None
“On the Go” (Dispersal)	Develop linkage corridors	Increase harvest rate of BNEG to 10%	Translocate	Promote non-consumptive recreation
Increase Pop to Carrying Cap	Ban logging in critical habitat	Increase harvest rate of BNEG to 50%	Captive Breeding	Promote non-consumptive recreation



# 5. Revisit objectives

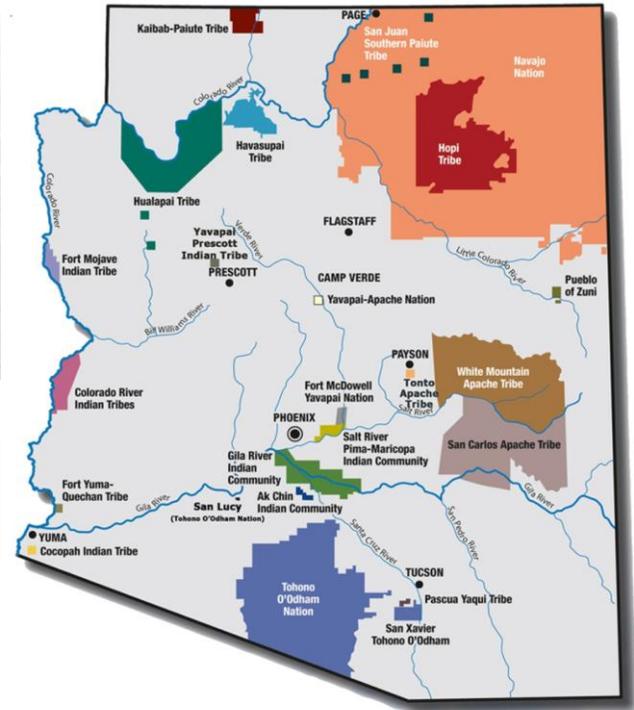
- Once an initial set of alternatives you may want to:
  - Be sure you've properly separated fundamental from means objectives
  - Clarify the statement of objectives
  - Identify if additional objectives exist

# General tips:

- SDM is iterative, don't stop looking for alternatives
- Create first, evaluate later
- Consider alternatives that ...
  - Are an ongoing process
  - Gather more information
- Treat 'unique' alternatives as real and subject to the same evaluation as other alternatives

# Case study: (Runge et al. 2011)

- See attachment of case study description (CaseStudyDescription.pdf)



Arizona Department of Education

## Exercise: Generate Alternatives

### Hint:

- Revisit objectives
- Be creative
- Consider whether alternatives are portfolios or strategies

