

Case Study

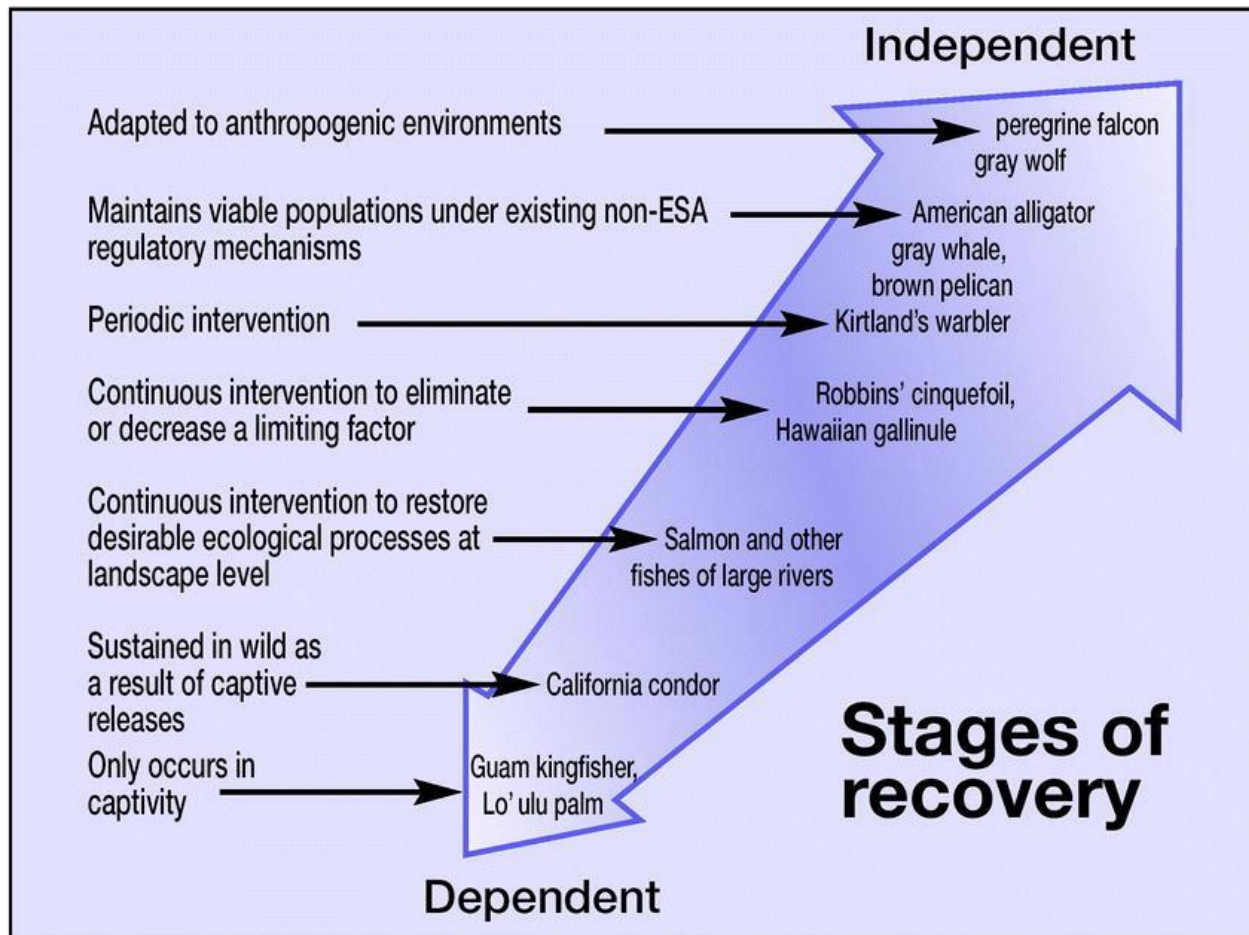
You are responsible for the captive breeding program intended to supplement Kamehameha Butterflies across the islands. This species is not listed as endangered, but DLNR would like to increase numbers since it has a close relationship with native plants such as mamane. How will you design your captive breeding and release program?





Conservation-Reliant Species

- ▶ For many endangered species, full recovery is not attainable
- ▶ Recovery should be viewed as a continuum



Conservation-Reliant Species

- ▶ “Conservation-reliant species” can maintain self-sustaining populations with ongoing management
- ▶ Ongoing management ensures that necessary conservation actions will continue following delisting
- ▶ Cooperative relationships between state governments, federal agencies, and private landowners will be required



Special Considerations for Managing Listed Species

- ▶ Permits are required for any hands-on management or research
- ▶ Take permits, listing or delisting decisions, and critical habitat designation are subject to public review
- ▶ Management programs for listed species tend to receive intense public scrutiny



Captive breeding & Translocation

- Captive propagation entails breeding and rearing animals in captivity
- Translocation is any movement of animals from one area to another
- Types of translocations include:
 - ▶ Introductions
 - ▶ Reintroductions
 - ▶ Re-stocking

Conservation Strategies

- *Ex situ* – recovering endangered or threatened species by removing them from their natural habitat (i.e., captive propagation)
- *In situ* – recovering endangered or threatened species within their natural habitat
- Regardless of strategy, ultimate goal is a self-sustaining wild population

Captive Propagation and Translocation

- Expensive, labor intensive, and logistically difficult
- Requires long-term investment
- Usually results in low success rate

Factors to Consider

- Factors for consideration:
 - Does the wild population need to increase
 - Is there an appropriate source population
 - Have the original causes for the species decline been addressed
 - Is there adequate habitat to support the species
 - Do necessary collaborators support propagation and translocation efforts
 - Is there a clear scientific protocol with quantifiable benchmarks for evaluating success

Captive Propagation

- Appropriate when:
 - ▶ Species doomed in the wild and *in situ* management not possible
 - ▶ Orphan species
 - ▶ Genetic and demographic manipulations most successful in captivity
 - ▶ Wild population does not have sufficient size for translocations



Mauritius kestrel

Translocations

- Using stock from wild source populations relative to captive populations:
 - ▶ Less expensive
 - ▶ Less labor intensive
 - ▶ Less intervention into the lives of animals involved
 - ▶ Translocated individuals may acclimate to new habitat quicker



Laysan ducks

Before Proceeding...

- *In situ* should be considered before *ex situ* management
- Genetic and demographic tools (i.e., PVA) should guide decisions
- Suitability of habitat(s) for translocation should be evaluated (i.e., Habitat Suitability Index)



Puerto Rican parrot

Captive Propagation Goals

- Establishing self-sustaining population capable of becoming source population for translocations
- Avoiding inbreeding depression
- Minimizing accumulation of deleterious mutations
- Maintaining genetic fitness of individuals released to the wild
- Minimizing threats of demographic stochasticity

Captive Propagation: Founder Phase

- ▶ Ideally, should be established without compromising wild population
- ▶ Founders should be composed of 20-30 “good” individuals
- ▶ Oftentimes, less than ideal founders cause complications
- ▶ Husbandry techniques must be developed



Jeff Humphrey / USFWS

Black-footed ferret

Captive Propagation: Growth Phase

- ▶ Goal is rapid growth of captive population
- ▶ Develop multiple captive populations
- ▶ Need to minimize loss of genetic variation
- ▶ Effective population size (N_e) and actual population size (N) should be as close as possible



Desert tortoise

Captive Propagation: Carrying Capacity Phase

- ▶ Goal is to manage for a stable breeding population
- ▶ Want to maximize effective population size (N_e) to minimize rate of loss of genetic variation
- ▶ Smaller populations and shorter stays in captivity vs. larger populations and longer stays



California condor

Captive Propagation: Release Phase

- ▶ Must manage conflict between what is best for captive population and translocated population
- ▶ Want to maximize effective population size (N_e) to minimize rate of loss of genetic variation
- ▶ Species-specific pre-release conditioning may be necessary
 - Finding food in the wild
 - Appropriate reactions to predators



North Island saddleback

Release Types

- Soft release
 - ▶ Help animals acclimate to release site
 - ▶ Water, food, and/or shelter provided
- Hard release
 - ▶ No provision of water, food, or shelter
 - ▶ Releasing translocated animals immediately upon arrival at release site



Hard release of parrots



Swans in soft release pen

Numbers to Release

- ▶ Number of released individuals for success is variable
- ▶ Larger release groups generally more successful than smaller release groups
- ▶ For mammals and birds, release size may vary between 20 individuals to more than 100
- ▶ No guidance for herps



Release Group Demographics

- Familiarity of individuals within a release group may affect success
 - Species with strong social bonds
 - Species that demonstrate aggression upon release
- Effects from age-related differences are species- specific
- Sex ratios for translocated individuals should match ratio for wild population



Gopher tortoise

Selecting the Release Site

- ▶ Best choice for release site is that which most closely resembles one from which source population originated
- ▶ Must contain suitable habitat quality and size
- ▶ Translocation sites should be evaluated for:
 - Predator-prey presence and relationships
 - Food, water, and shelter availability



Columbian sharp-tailed grouse

Other Factors to Consider at Release Site

- ▶ Fidelity to release site related to habitat quality and success of translocation
 - Dispersal
 - Migration
 - Homing
- ▶ Releases into core historical range preferred
- ▶ Presence/absence of conspecifics, competitors, and/or predators may affect translocation success



Timing of Release

- Timing can be species-specific
- Factors for consideration
 - Predator abundance
 - Food and shelter availability
 - Weather
 - Species life cycle



Greater prairie-chicken

Evaluating Success

- ▶ Must define variables for success *a priori*
 - Self-sustaining population
 - Sex ratios
 - Adult/juvenile ratios
 - Increased public awareness and knowledge
- ▶ Monitoring individuals post-release critical for adaptive management
- ▶ Evaluation may require establishing short-, mid-, and long-term goals



Houston toad