

# A Vision For More Effective Management of Free-Ranging Cats

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**Alliance for Contraception in Cats & Dogs  
(Scientific Advisory Board)**



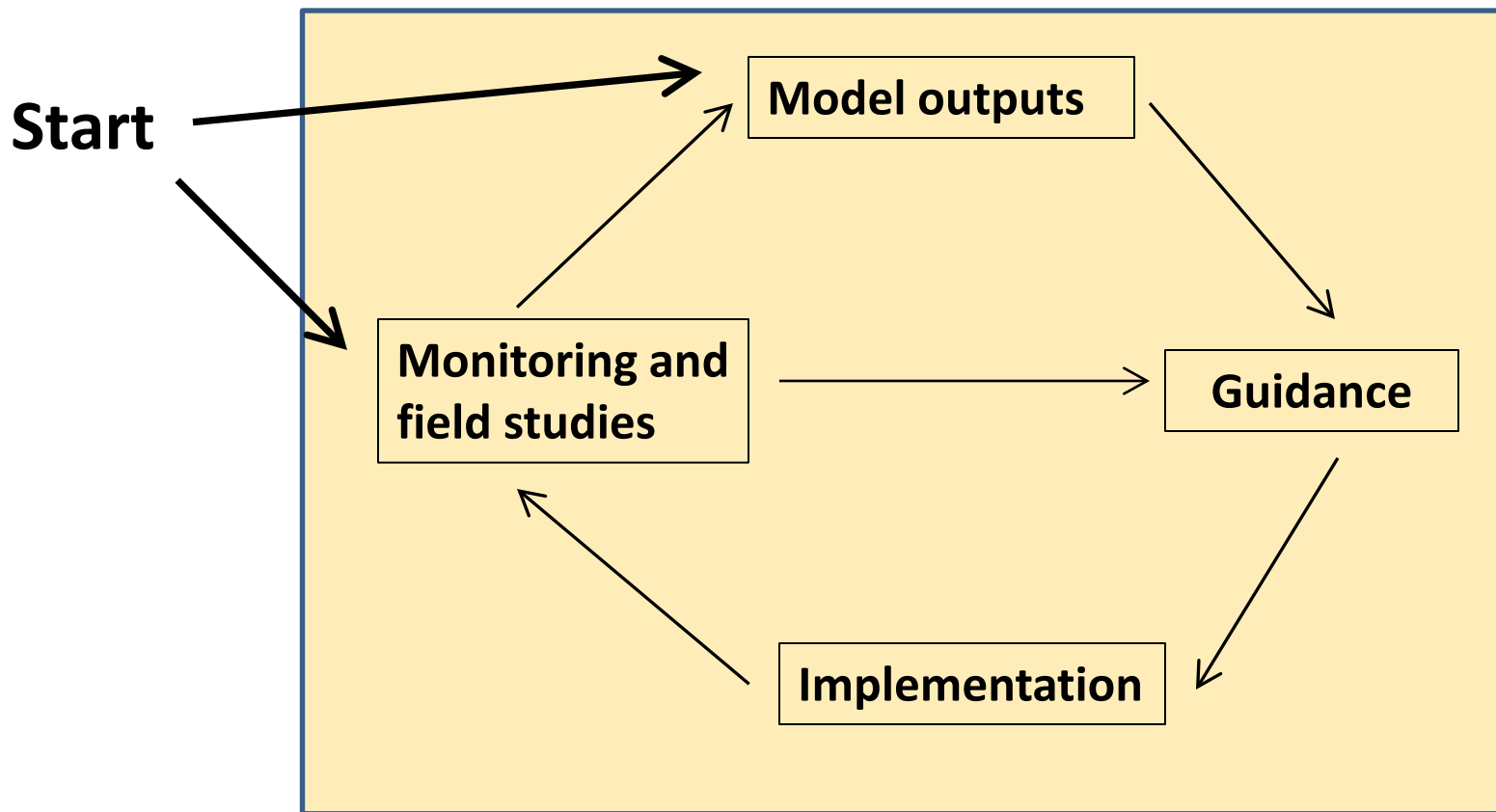
# ACC&D Cat Population Modeling Working Group

Funding by ACC&D, ASPCA, Found Animals, and others

- Joyce Briggs, ACC&D
- Steven Zawistowski, ASPCA
- Phil Miller, CBSG of IUCN
- Margaret Slater, ASPCA
- Julia Levy, Univ. of Florida
- Felicia Nutter, Tufts University
- Dennis Lawler, ACC&D
- John Boone, Great Basin Bird Observatory

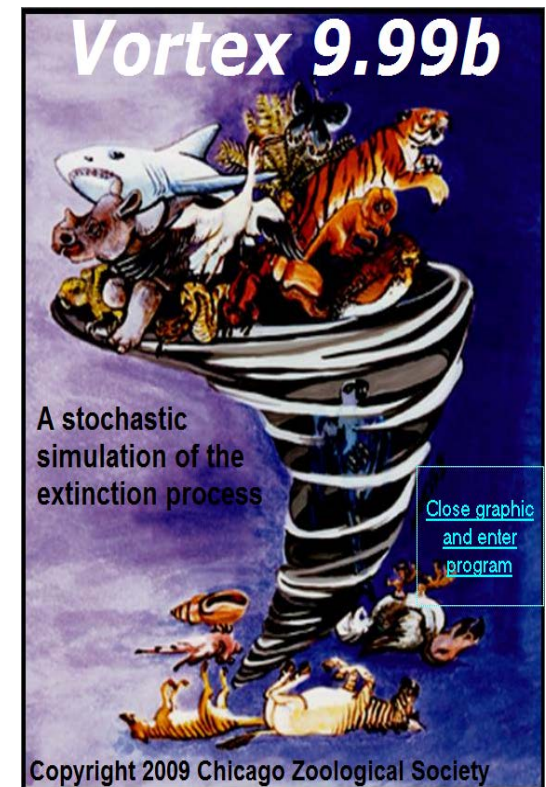
# Adaptive Management

Empirically driven, “adjustable” management



# Adaptive Management Step 1: Free-ranging Cat Simulation Models

- **Baseline population simulation model**
  - Vortex software (Phil Miller, CBSG of IUCN)
  - Four habitat / landscape archetypes
- **Systematic scenario exploration**
  - Treatment intensity, interval, duration
  - Treatment type \*
  - Demographic targeting
  - Density-dependent feedback
  - Spatial patterning
  - Evaluate in a cost-benefit framework



Vortex - Stochastic Simulation of the Extinction Process - [Northern Jaguar PVA\_New - C:\Phil's CBSG Data\Mode

File Vortex Window Help

Project Settings Simulation Input Text Output Graphs and Tables Project Report

Add Scenario Delete Scenario < Sonora Baseline\_000 > Reorder Sonora Baseline\_000 Sonora

**Scenario Settings**

Scenario Name

Number of Iterations

Number of Years  Duration of each "year" in days

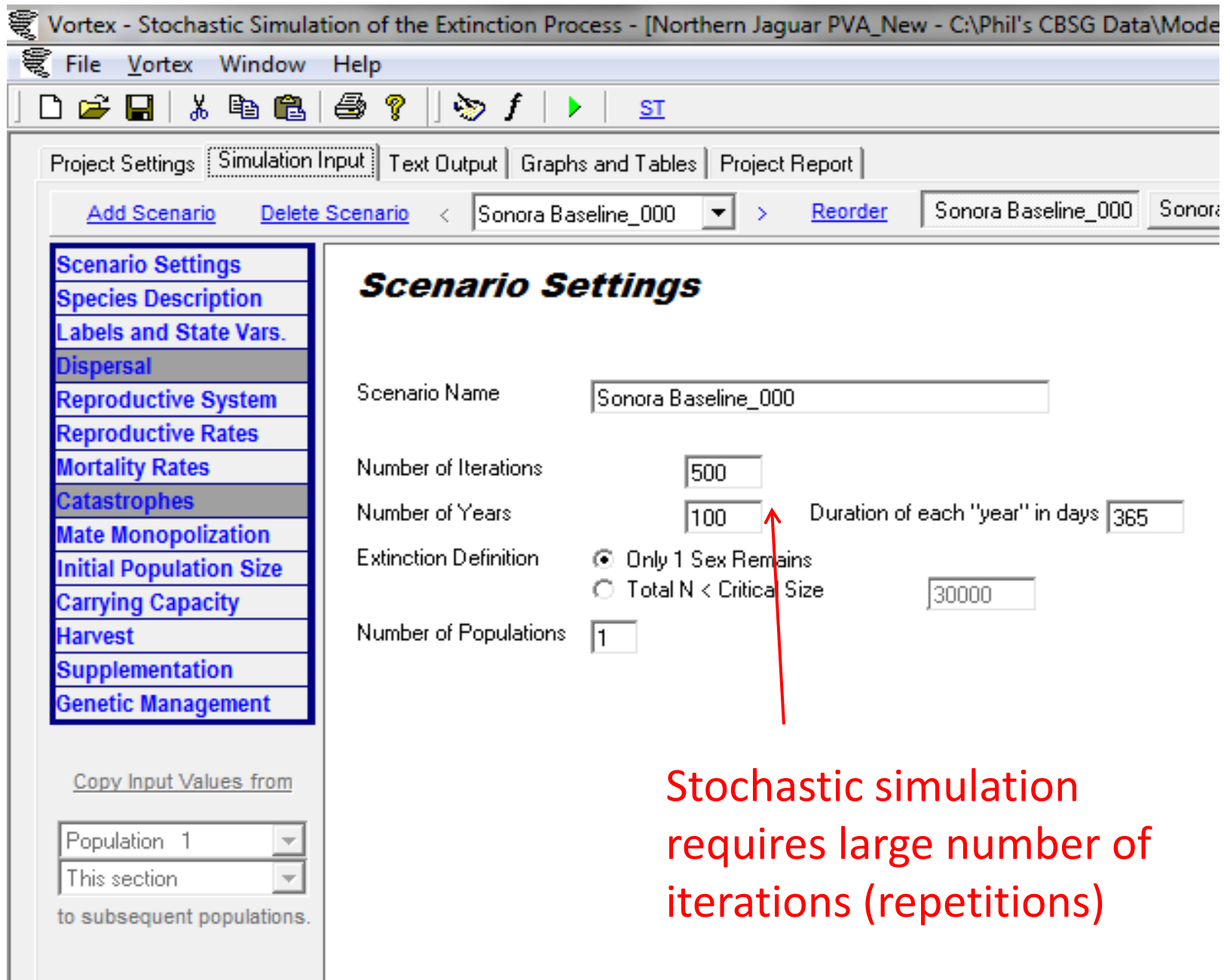
Extinction Definition  Only 1 Sex Remains  Total N < Critical Size

Number of Populations

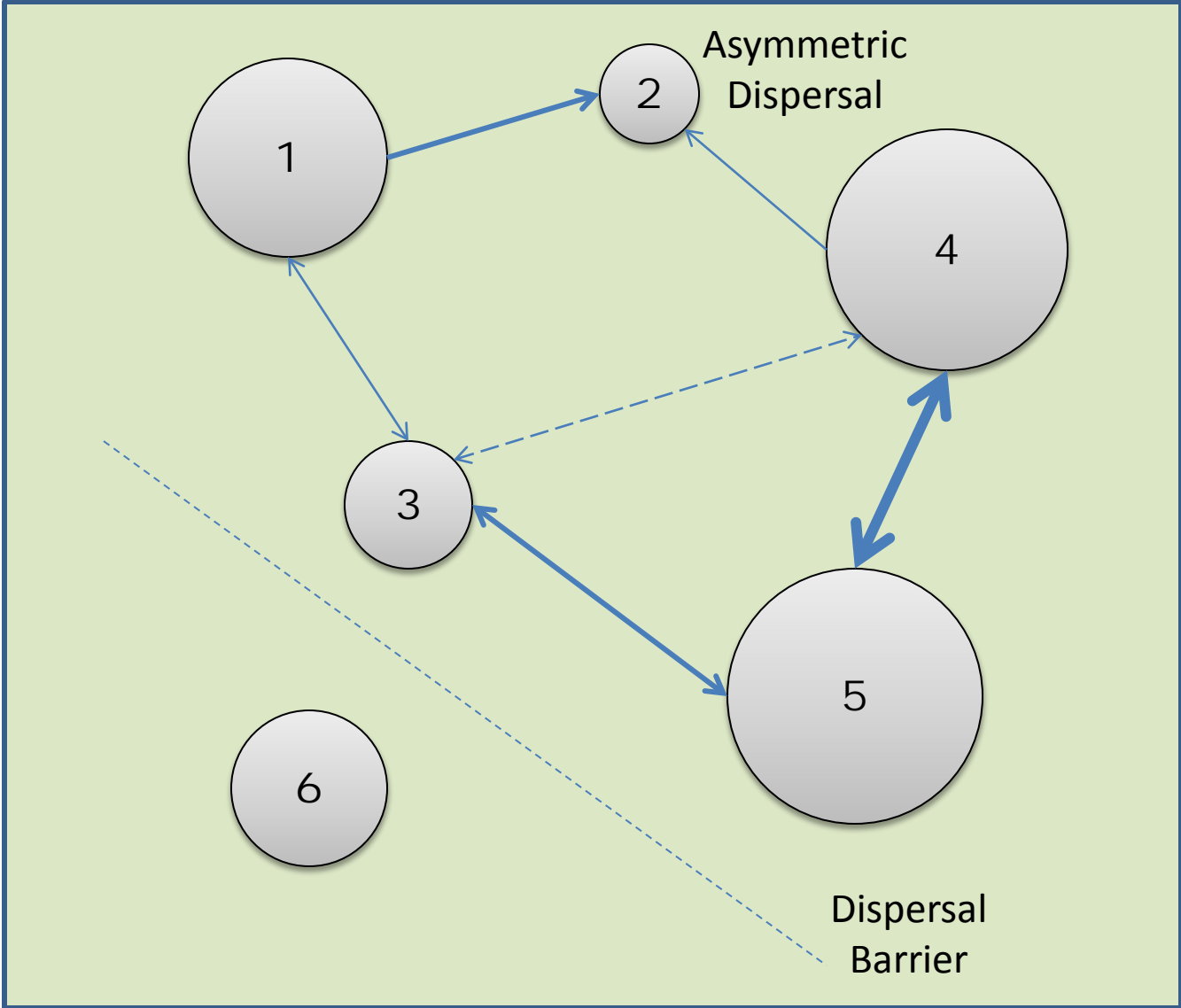
Scenario Settings  
Species Description  
Labels and State Vars.  
Dispersal  
Reproductive System  
Reproductive Rates  
Mortality Rates  
Catastrophes  
Mate Monopolization  
Initial Population Size  
Carrying Capacity  
Harvest  
Supplementation  
Genetic Management

Copy Input Values from

to subsequent populations.



Stochastic simulation  
requires large number of  
iterations (repetitions)



# Scenarios

Vortex - Stochastic Simulation of the Extinction Process - [Northern Jaguar PVA\_New - C:\Phil's CBSG Data\Models\]

File Vortex Window Help

Project Settings Simulation Input Text Output Graphs and Tables Project Report

Add Scenario Delete Scenario < NJPAU Metapopulation\_ > Reorder Sonora Baseline\_005 Sonora B

- Scenario Settings
- Species Description
- Labels and State Vars.
- Dispersal
- Reproductive System
- Reproductive Rates
- Mortality Rates
- Catastrophes
- Mate Monopolization
- Initial Population Size
- Carrying Capacity
- Harvest
- Supplementation
- Genetic Management

## Dispersal Among Populations

### Dispersing classes

Age Range: Youngest

2

Oldest 3

Dispersing Sex(es)

Males

Females

% Survival of Dispersers

100

Dispersal Modifier Function (optional)

=D\*(1+(8\*(S='M')))

### Dispersal Rates

[Import Rate Matrix](#)

[Apply Multiplier of](#)

1

[Export Rate Matrix](#)

[Fill Matrix with](#)

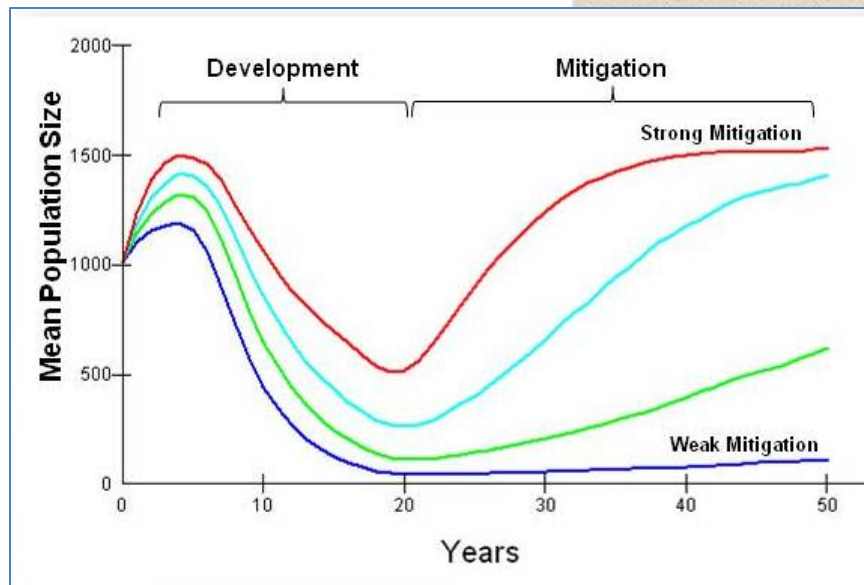
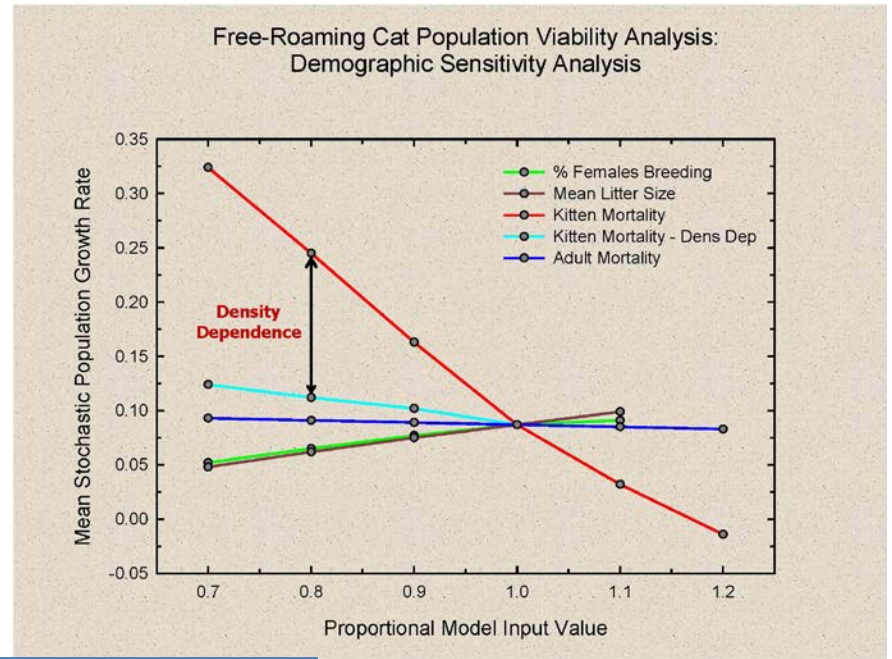
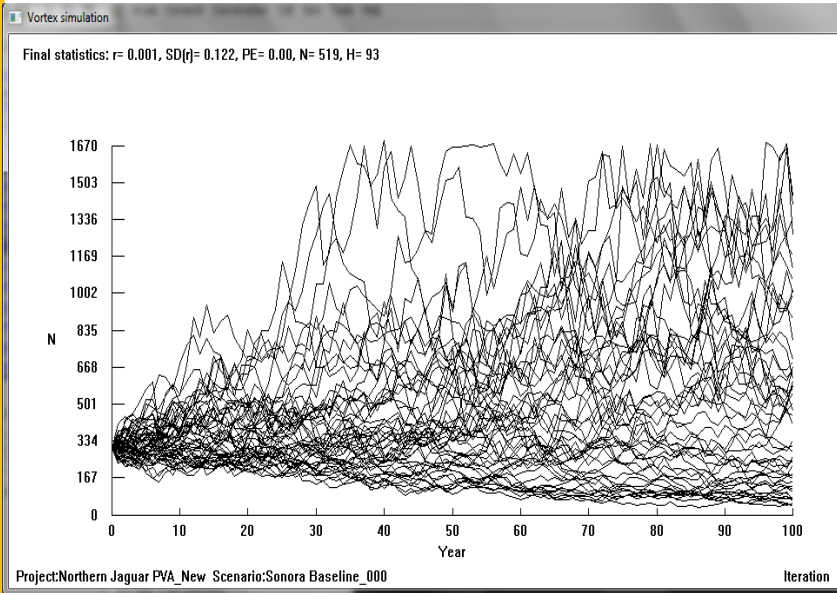
1.0

Annual probabilities (as percents) of dispersal from source populations (rows) to recipient populations (columns)

	Sinaloa	N Sinaloa	Sonora	N Sonora	US South I-10
Sinaloa	99.75	0.25	0.00	0.00	0.00
N Sinaloa	0.25	99.5	0.25	0.00	0.00
Sonora	0.00	0.25	99.475	0.25	0.00
N Sonora	0.00	0.00	0.25	99.55	0.00
US South I-10	0.00	0.00	0.025	0.20	99.775
US North I-10	0.00	0.00	0.00	0.00	100.00

Flexible specification of dispersal characteristics

Dispersal matrix among subpopulations within a metapopulation



Guidance



# **Adaptive Management Step 2: Guidance**

- **Actively distributed**
- **Achievable**
- **Understandable**
- **Streamlined and bottom-lined**
- **Not wishy-washy**

# Adaptive Management Step 3: Implementation of Guidance

- **Pilot sites and partnerships**



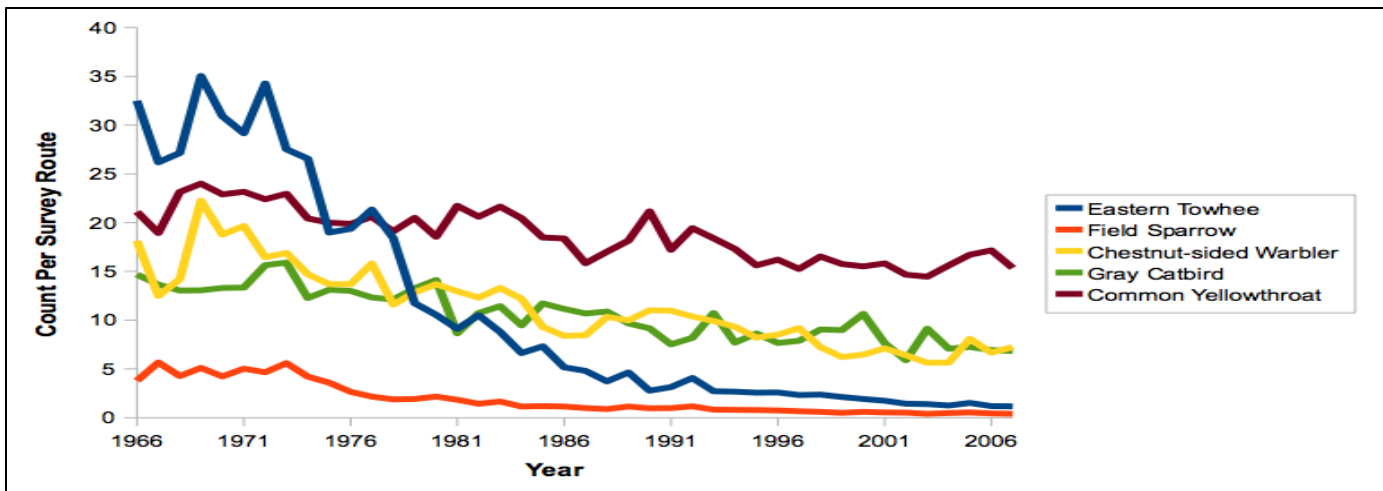
# Adaptive Management Step 4: Collecting Field Data

- **Different, but complementary, approaches:**
  - Long-term monitoring (observational)
  - Pre- and post-intervention (experimental)
  - Targeted research
- **Coordinated better than stand-alone**

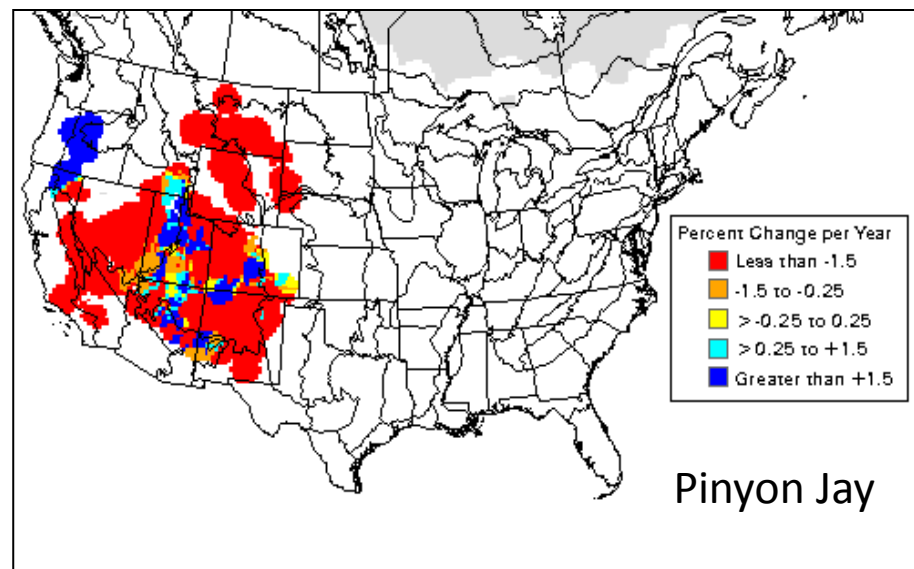
# Coordinated Long-Term Monitoring

- **What is it?**
  - Ongoing measurement of key population attributes
  - Consistent methods
  - Adequate replication and representation of environmental diversity
- **Benefits**
  - Baseline data
  - Trends
  - Exploratory data analysis

# Monitoring Examples: Breeding Bird Survey



- Administered by USGS
- Data collected by volunteers
- 1966 – present
- Seriously inadequate but profoundly useful



# Monitoring Examples: ebird.org

The screenshot shows the eBird website interface. At the top, there's a navigation bar with links for Home, About, Submit Observations, Explore Data, and My eBird. Below this, there are links for Sign In and Register, and a language selection menu. The main content area is titled "Bird Observations" and shows a search filter for "Oregon" and a date range of "1/1 - 12/31, 1900-2012 Combine Years". A list of species is displayed, including Greater White-fronted Goose, Emperor Goose, Snow Goose, and Ross's Goose, each with a corresponding observation frequency chart. A detailed view of the Greater White-fronted Goose is shown in the bottom left, featuring a line graph of frequency over time and a key for data quality.

**Bird Observations**

Date Range:  1/1 - 12/31, 1900-2012 Combine Years

For  [ Oregon ] Last updated ~22 hrs ago.

478 species (+113 other taxa)

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Greater White-fronted Goose	█	█	█	█	█	█	█	█	█	█	█	█
Emperor Goose	█	█	█	█	█	█	█	█	█	█	█	█
Snow Goose	█	█	█	█	█	█	█	█	█	█	█	█
Ross's Goose	█	█	█	█	█	█	█	█	█	█	█	█
Snow/Ross's Goose	█	█	█	█	█	█	█	█	█	█	█	█

**Bird Observations**

Species:  Date Range:  1/1 - 12/31, 1900-2012 Combine Years

1 species (+0 other taxa)

Frequency

Abundance Birds Per Hour Average Count High Count Totals Map

KEY: █ = insufficient data █ = rare to widespread

Download Histogram Data

# Experiments

- **Every s/n intervention is an experiment, and can be measured as such**
- **..... but they rarely are**
  - Inadequate pre-treatment / control data
  - Inadequate post-treatment timeline
- **Ongoing monitoring programs can provide baseline**

# Costs and Benefits of Coordinated Field Studies

## Cost

- Can be relatively cheap, especially if volunteers are utilized
- “Perfect” design is not required

## Benefits

- DATA with broad applicability
- Optimization of management
- Basis for constructive engagement



## Step 5: Field Data → Models

- Refine existing parameters
- Supply missing parameters
- Validate (or not) model predictions
- Define new testing scenarios of interest

**Improved Guidance**

# Adaptive Management: Current Status

- Initial model development: complete
- Scenario testing: getting underway
- Guidance: by May 2013
- Implementation partners: being solicited
- Field studies and monitoring: detailed monitoring plan drafted

# Setting Management Goals

- **Characterization of “bad cat” and “benign cat” archetypes, and associated goals**
- **Practical conservation is the norm**
- **Mutual commitment to the most humane methods for each scenario that are practicable and effective**
- **Cat advocates should be explicit about their goals**
- **MOU or collaborative policy statements**

