

# Using an Experimental Auction Process to Identify Publicly Valued Ecosystem Restoration Projects

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## Goal of the presentation

- Assess public values and priorities for ecosystem restoration projects
- Incorporate public values to prioritize future restoration decisions

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# Background

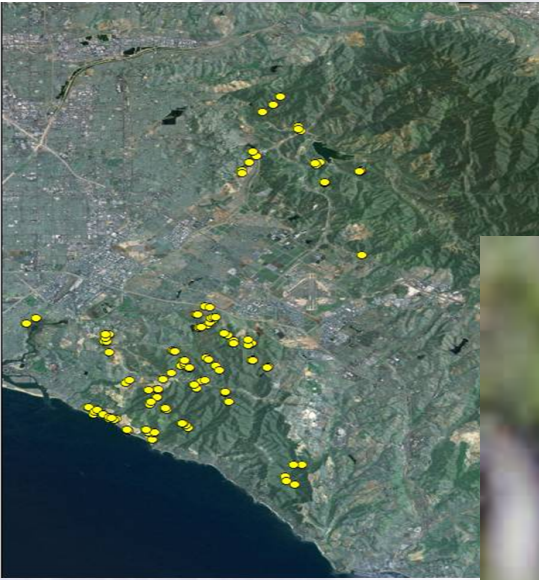
- Orange County Invasive Management (OCIM)
  - Ecosystem Science Component
    - Assess effectiveness of restoration methods
  - Social Science Component
    - Assess public values and priorities
    - Incorporate those values into decision-making

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# Background...

## *Nature Reserve of Orange County (NROC)*





## Method

- Discrete choice experiment approach in environmental economics literature
- People make restoration choices.
- Estimate the values using econometric model

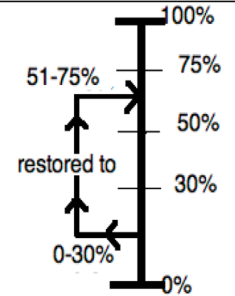
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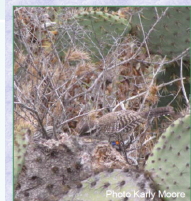
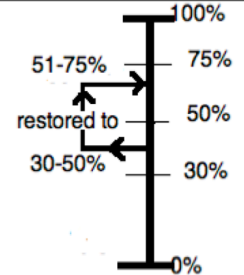
# Method...

Attributes	Description
Restoration Effort	<b>-High</b> (Right Upper Graph) <b>-Low</b> (Right Lower Graph)
Habitat and Bird Species Focus	<b>-Coastal Sage Scrub</b> ( California Gnatcatcher) <b>-Coastal Cactus Scrub</b> (Cactus Wren) <b>-Native Grassland</b> (Other native wildlife)
Size (Acres)	1, 2, 3, 5, 7, and 9
Public Access	<b>-High:</b> Running, hiking, mountain biking , designated area for dogs and horse-back riding <b>-Medium:</b> Running, hiking & mountain biking <b>-Low:</b> Research and guided tours only
Trained Volunteers	<b>-Yes</b> , in addition to <b>restoration professionals</b> <b>-No</b>
Likelihood of Success	<b>-High:</b> easy access maintenance &/or surrounding native landscape <b>-Medium:</b> Moderate access & /or mixed surrounding landscape

Ecosystem Restoration Ladder  
% Native Plants Cover in a Restoration Site



Ecosystem Restoration Ladder  
% Native Plants Cover in a Restoration Site



Coastal populations restricted to cactus scrub in southern California



Inhabits deserts in American southwest

# Method:

## Example Restoration Choice

Project Attributes	Project A	Project B	Project C
Restoration Effort	<p><u>Ecosystem Restoration Ladder</u>  <u>% Native Plants Cover in a Restoration Site</u></p>	<p><u>Ecosystem Restoration Ladder</u>  <u>% Native Plants Cover in a Restoration Site</u></p>	<p>Neither of these projects.  I choose to keep my \$150 for my other priorities rather than paying my cost for either Project A or B.</p>
Habitat and Bird Species Focus	Restoration to <u>Native Grassland</u> , needed to support <u>other native wildlife</u>	Restoration in <u>Cactus Scrub</u> , supports <u>Cactus Wren</u> , and often <u>California Gnatcatcher</u>	
Size of Restoration	3 acres	2 acres	
Public Access	Area allows <u>access</u> for <u>running, hiking and mountain biking</u>	Area allows <u>access</u> for <u>research with permits and guided tours only</u>	
Trained Volunteers	<b>Yes</b> , project <u>involves</u> trained volunteers in addition to restoration professionals	<b>Yes</b> , project <u>involves</u> trained volunteers in addition to restoration professionals	
Likelihood of Success	<b>Medium</b> due to <u>moderate access</u> for maintenance and / or <u>surrounded by mixed native-nonnative landscape</u>	<b>High</b> due to <u>easy access</u> for maintenance and / or <u>surrounded by native landscape</u>	
Cost to You	I will pay \$60, from my \$150.	I will pay \$75, from my \$150.	I keep my \$150.
HOW WOULD YOU VOTE? (CHOOSE ONLY ONE)	<input type="checkbox"/> I vote for PROJECT A	<input type="checkbox"/> I vote for PROJECT B	<input type="checkbox"/> I vote for PROJECT C



# Methods:

## *Decision-Making Workshops and Surveys*

- Implementation rules
  - Field economics experiments (Real-money)
    - Plurality Vote Rule (43)
    - Single Decision-Maker's Choice Rule (38)
  - Complete-at-home surveys (Hypothetical-money)
    - Plurality Vote Rule (45)

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## Results:

### *Estimate Values of Restoration Attributes*

- Marginal values and tradeoffs
- Willingness to pay for a restoration plan
  - Versus status quo
  - Versus another plan
- Rank restoration projects based on percent of respondents' likelihood to vote

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# Results:

## *Hypothesis Tests*

Hypothesis Tests	Results
Plurality Vote Rule Vs. Single Decision-Maker's Choice Rule	Equivalent marginal tradeoffs between restoration attributes under two rules.
Immediately Implementable Vs. Future Projects	Answered the immediately implementable and future restoration choices equivalently.
Combined Real-Money Experiments Vs. Hypothetical-Money Survey	Statistically lower utility value of the status quo option under the hypothetical-money survey

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Latent Class One	Coefficients		Coefficients	Coefficients
Status quo	-2.1827 ***		Cactus Scrub	-0.1990
High Restoration Effort	0.6277 ***		Size	0.2334***
Native Grass	-0.0261*		High Public Access	0.0135
Cactus Scrub	0.0758		Medium Public Access	0.1469
Size	0.2872***		Trained Volunteers	0.5376**
High Public Access	-0.0846*		High Likelihood of Success	0.8276***
Medium Public Access	0.1217**		Price	-0.03121***
Trained Volunteers	0.6295***		Status quo x Hypo	-0.4242**
High Likelihood of Success	0.7280***		<b>Class Probability Model</b>	
Price	-0.0118***		Constant	1.7931***
Status quo x Hypo	-0.4136		Low Income	-2.1506***
<b>Latent Class Two</b>			Public Aspect	1.9291***
Status quo	-0.0330		“Involve Community”	-0.8258
High Restoration Effort	0.4049*		“Habitat Restoration”	1.2719***
Native Grass	0.3401***		“Full Ecosystem”	0.6386**

# Results:

## Marginal tradeoffs

Variables (Tradeoff relative to acres)	Latent Class One Marginal tradeoff	Latent Class Two Marginal tradeoff
Low - High Restoration Effort	2.18	1.74
No - Yes Trained Volunteers	2.19	2.30
Medium-High LOS	2.53	3.55

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# Results:

## *Willingness to Pay (WTP) for Restoration*

Attributes	Project 1	Project 2	Project 3	Project 4	Project 5
Restoration Effort	High	High	High	Low	Low
Habitat and Bird Species	Sage Scrub	Native Grass	Cactus Scrub	Cactus Scrub	Sage Scrub
Size (Acres)	2.5	2.5	2.5	3	3
Public Access	Medium	Medium	Low	High	High
Trained Volunteers	Yes	Yes	Yes	No	No
Likelihood of Success	High	Medium	High	High	High
<b>WTP (Vs. No Plan) Latent Class One</b>	<b>\$ 420.16</b>	\$ 360.47	\$ 413.31	\$ 322.97	\$ 365.53
<b>WTP (Vs. No Plan) Latent Class Two</b>	<b>\$ 76.66</b>	\$ 65.56	\$ 71.17	\$ 37.88	\$ 52.68

# Results:

## *Ranking Projects using voting percentages*

Attributes	Project 1	Project 2	Project 3	Project 4	Project 5
Restoration Effort	High	High	High	Low	Low
Habitat and Bird Species	Sage Scrub	Native Grass	Cactus Scrub	Cactus Scrub	Sage Scrub
Size (Acres)	2.5	2.5	2.5	3	3
Public Access	Medium	Medium	Low	High	High
Trained Volunteers	Yes	Yes	Yes	No	No
Likelihood of Success	High	Medium	High	High	High
<b>Voting percentage (%) Latent Class One</b>	<b>30.68</b>	15.17	28.30	9.75	16.10
<b>Voting percentage (%) Latent Class Two</b>	<b>30.11</b>	21.29	25.38	8.97	14.25



# Conclusions and discussions

- Discrete Choice Experiment Method to elicit values for ecosystem restoration attributes
- Incorporate into Decision-Making
  - Marginal Values and Tradeoffs
  - Willingness to pay
  - Rank Restoration Projects

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## Conclusions and discussions...

- Integrating public values into environmental decision-making
  - Coupled with ecosystem functioning and management criteria, may help achieve maximum ecosystem benefits per dollar invested

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Questions?

Thank you!

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