

Relating Conservation Goals to Ecological Outcomes

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Protecting Biodiversity

Biodiversity is declining

- Habitat destruction
- Invasive species
- Over exploitation
- Climate change



Biodiversity is a valuable resource

- Pollination
- Medicine
- Food Security

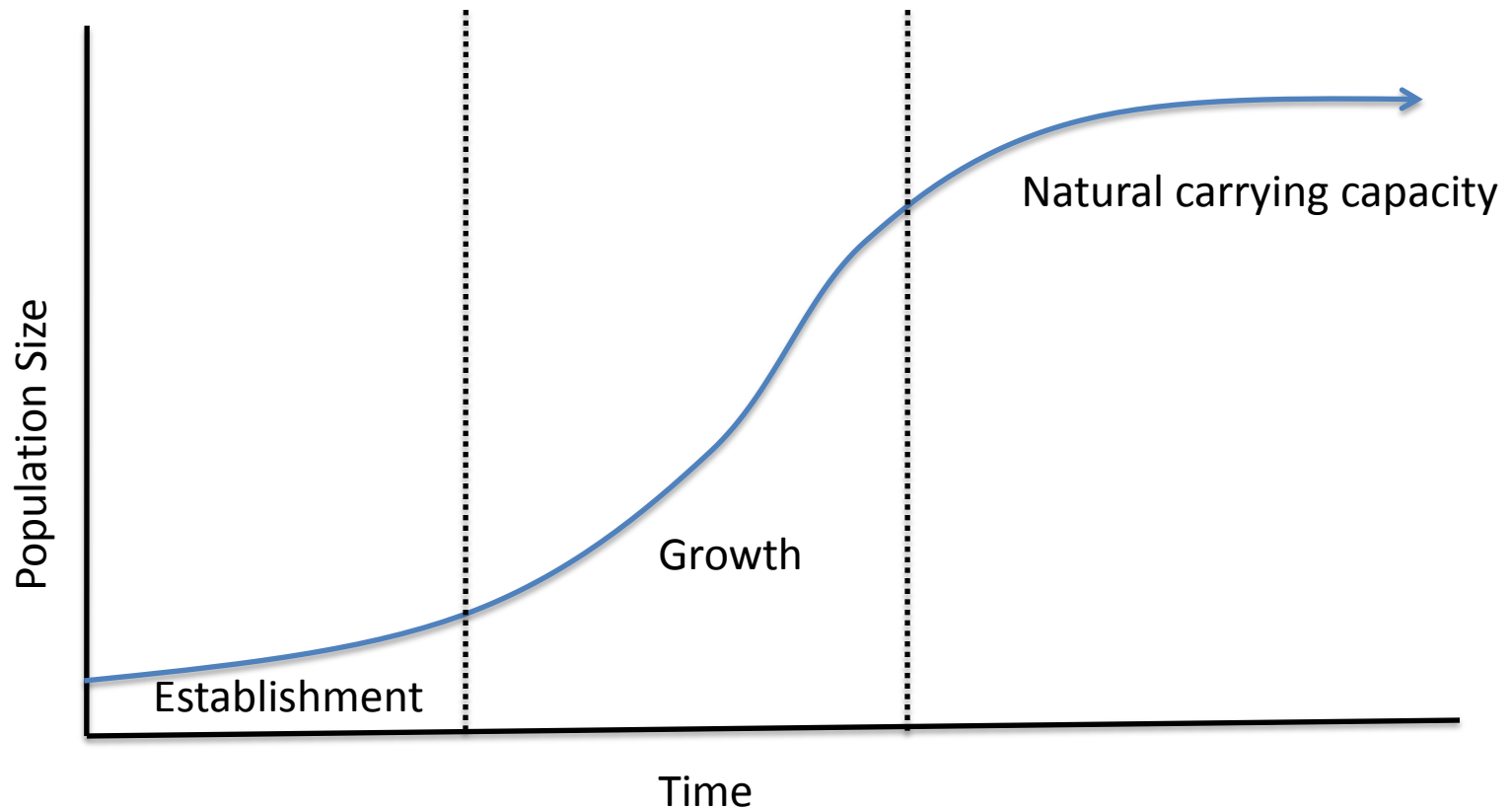


Tools are used to save biodiversity and achieve conservation goals

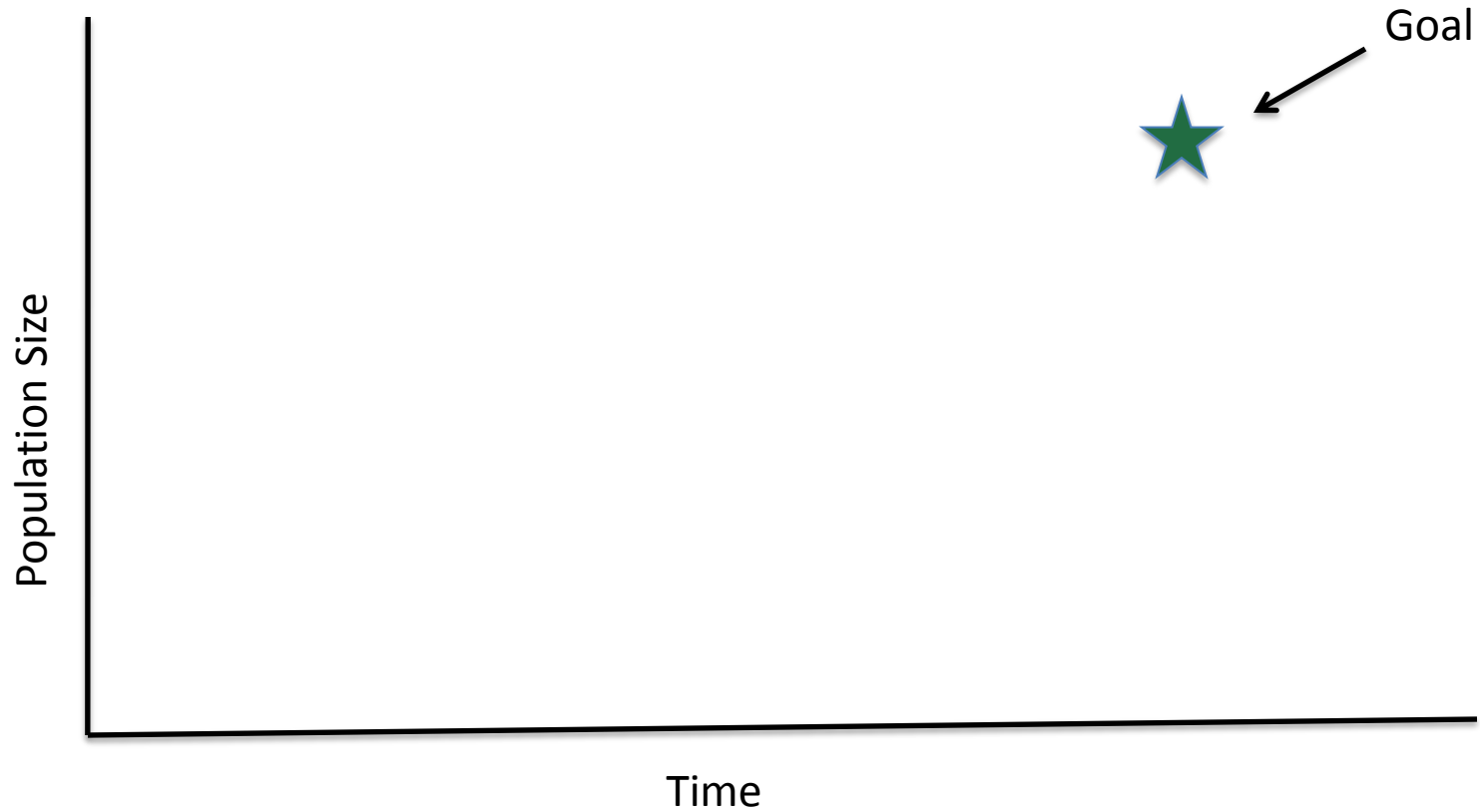
- Endangered Species Act
- Captive Breeding
- Relocations



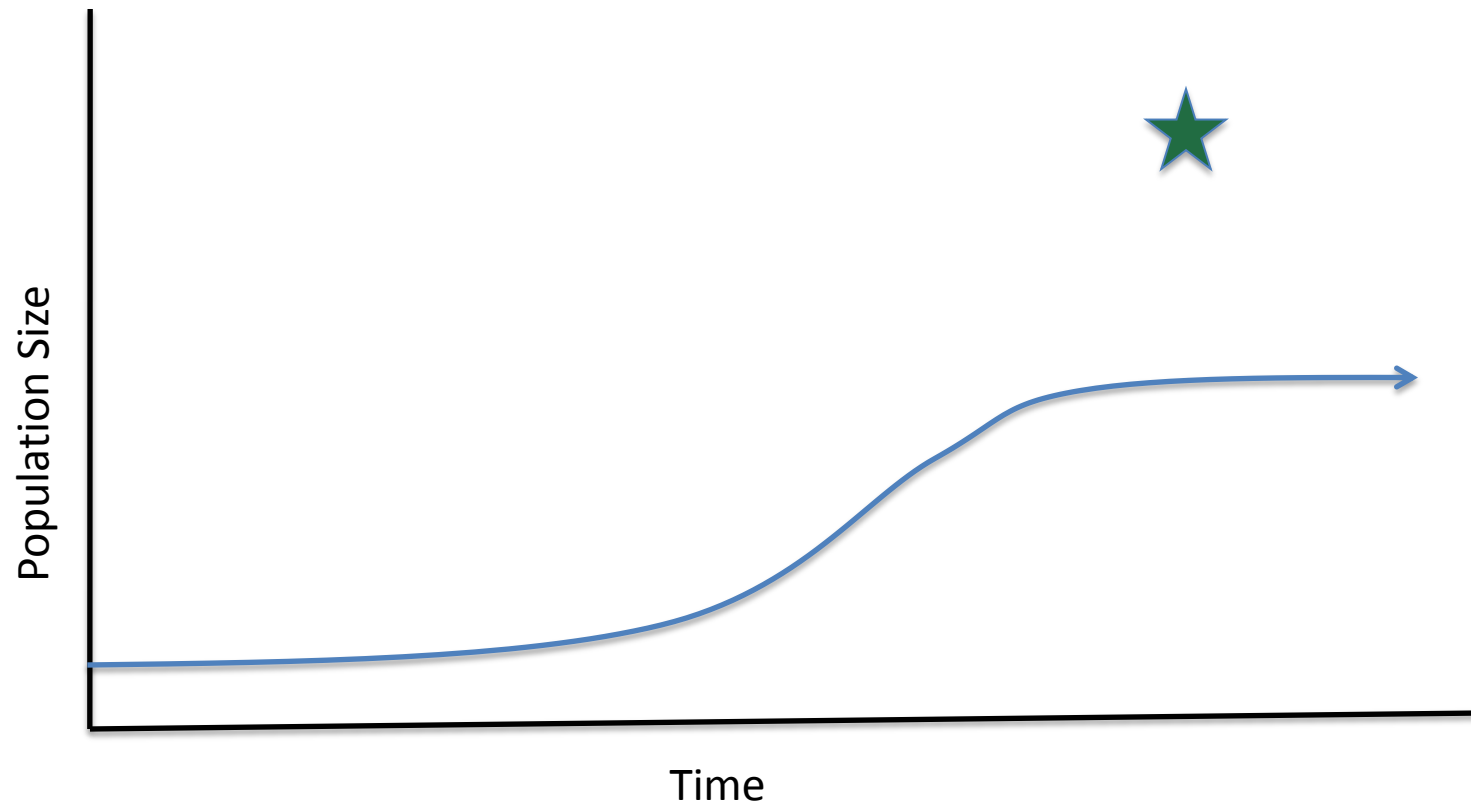
Population Growth



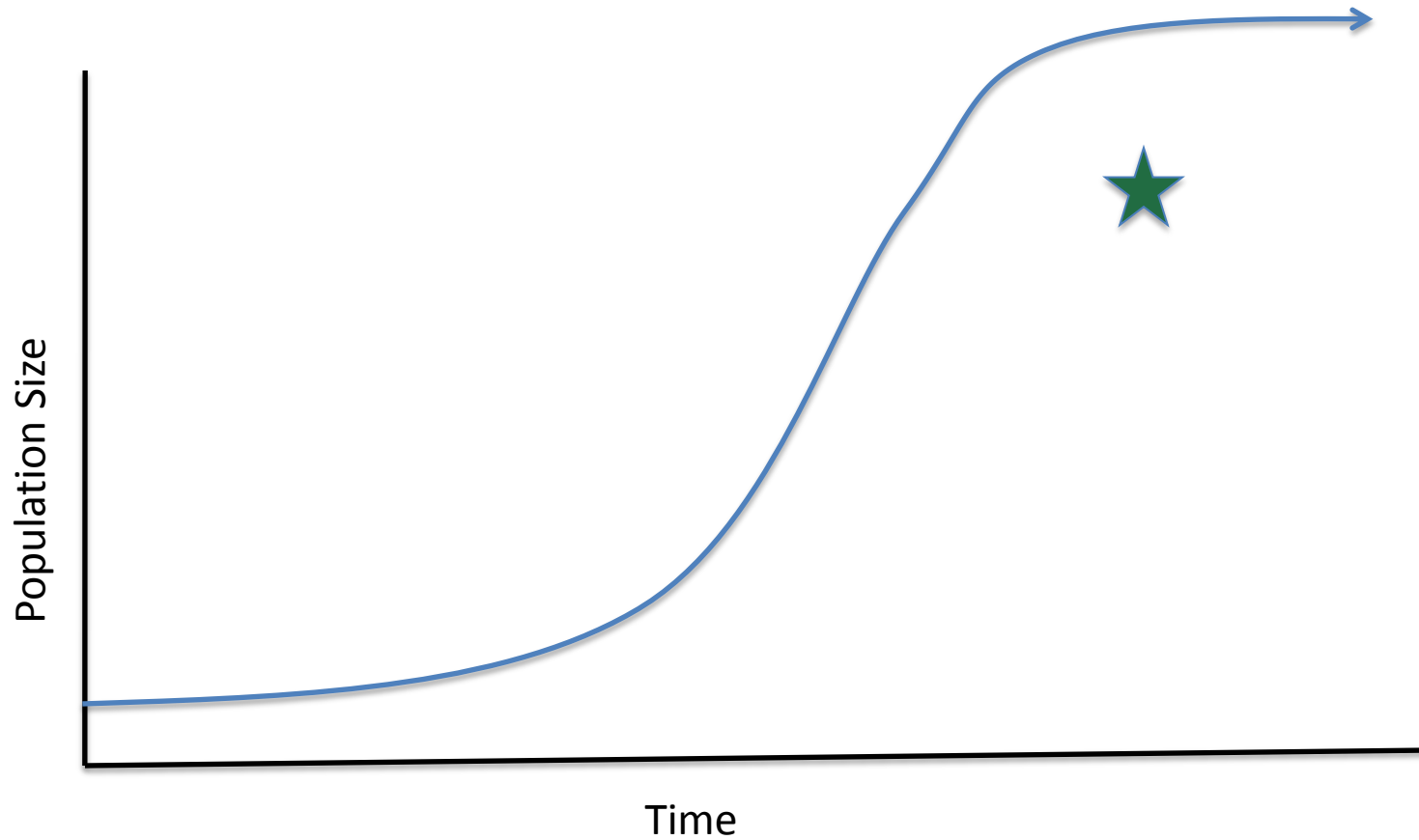
Is Goal Reasonable?



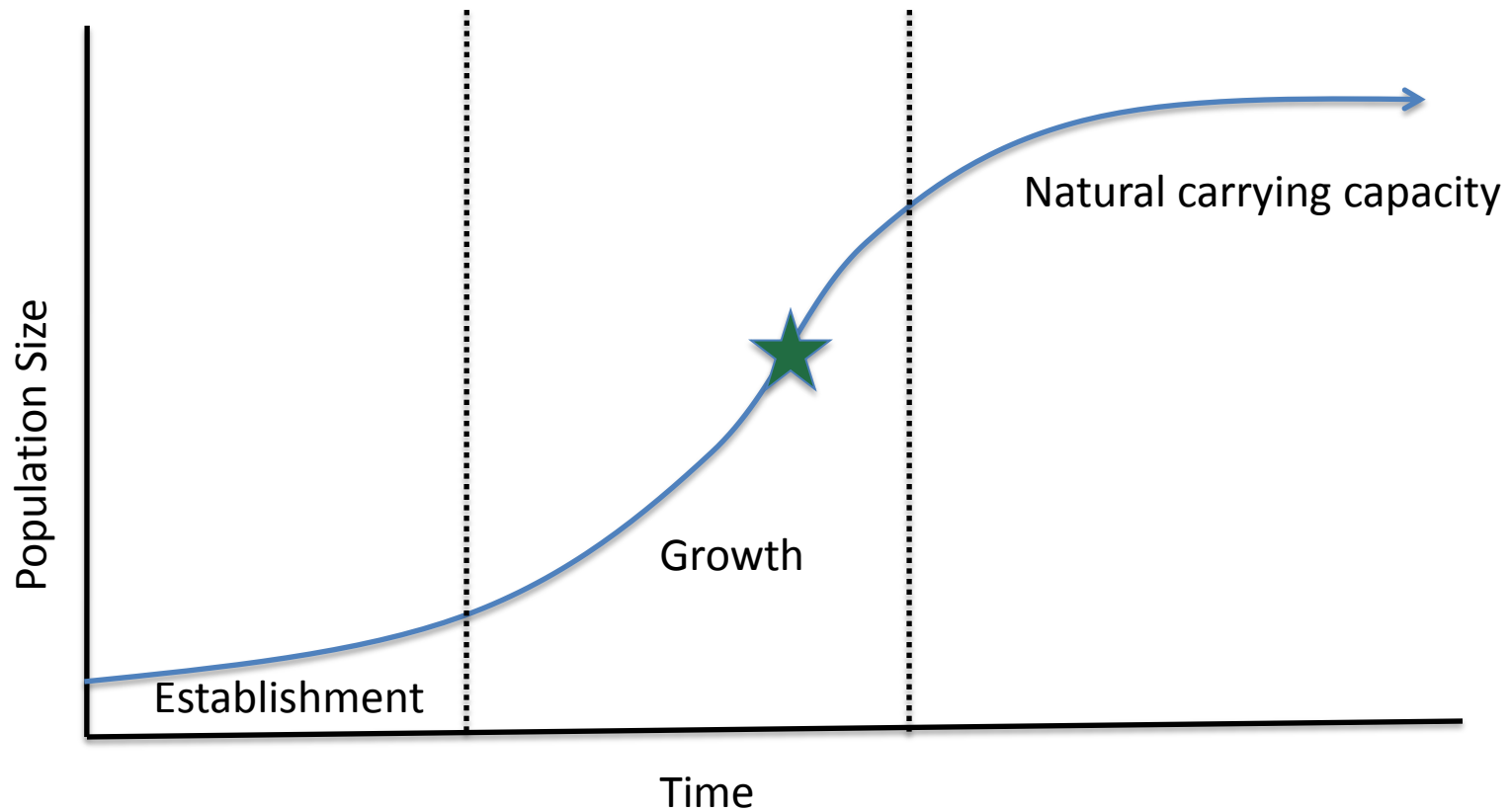
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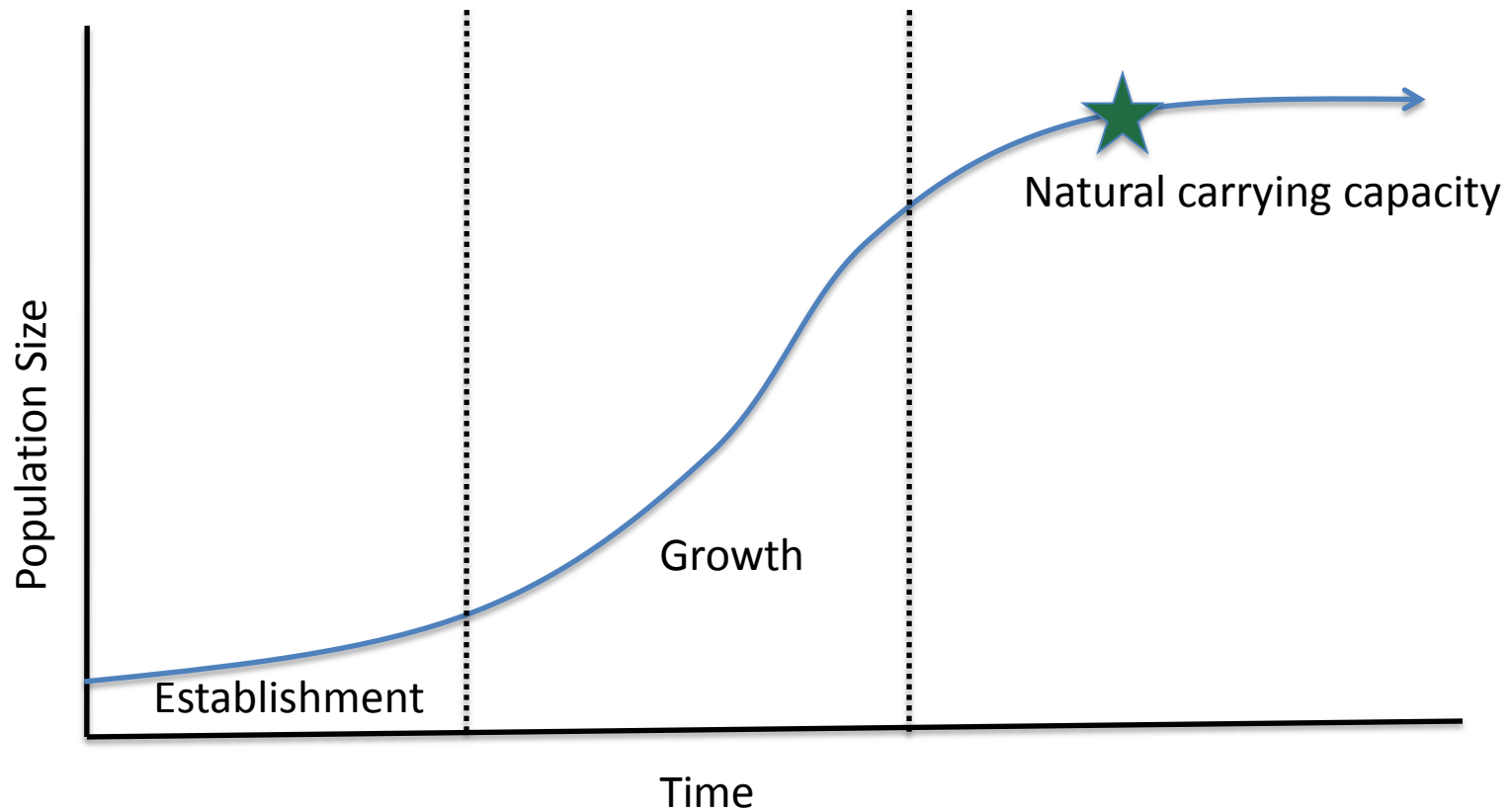
Is Goal Reasonable?



Relating Goals to Outcomes



Relating Goals to Outcomes



Research Methods

20 mammal species



Recorded:

- Population history
- Recovery goal
- Conservation tools

Data from:

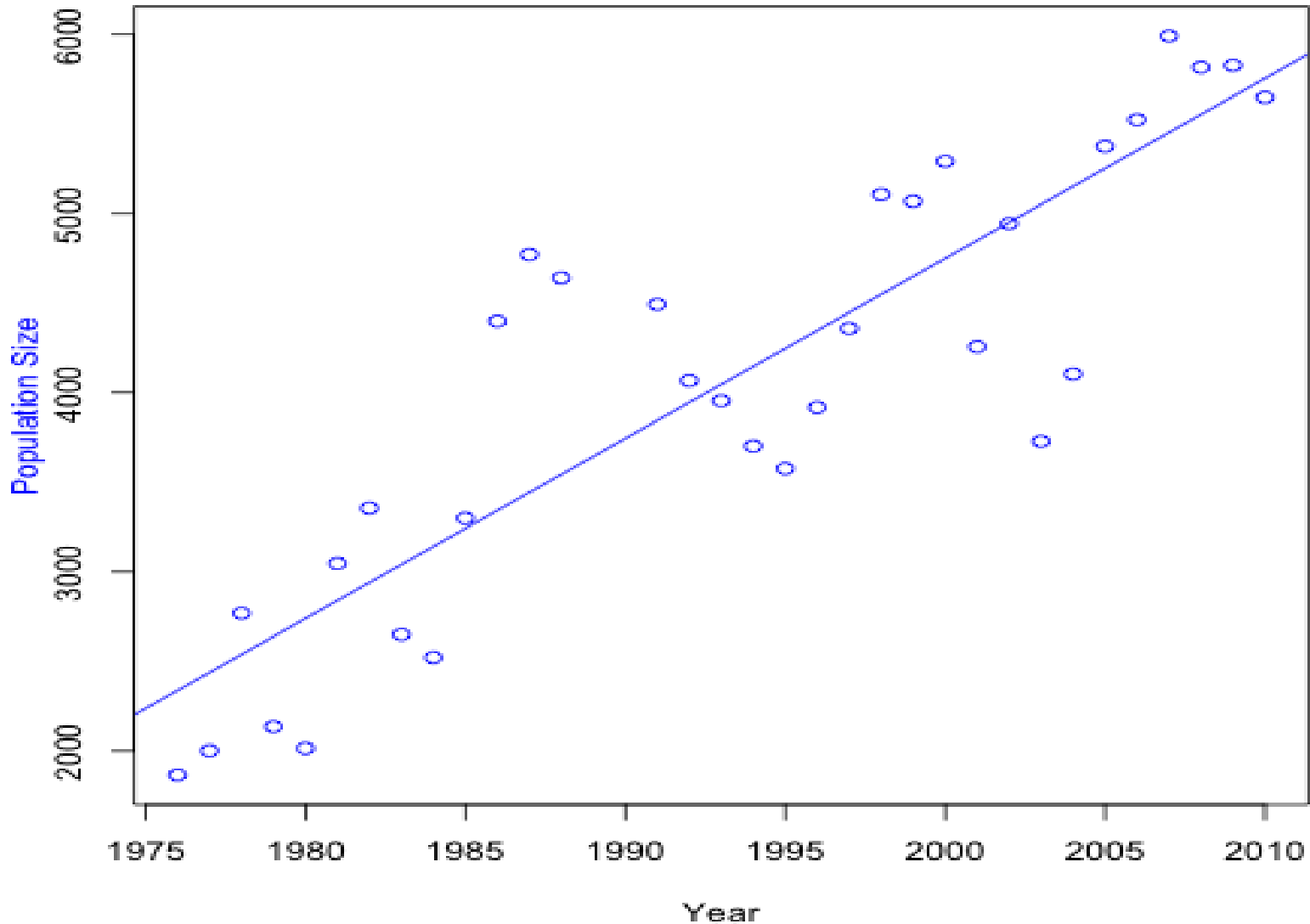


- Recovery plans
- Published papers
- Data files

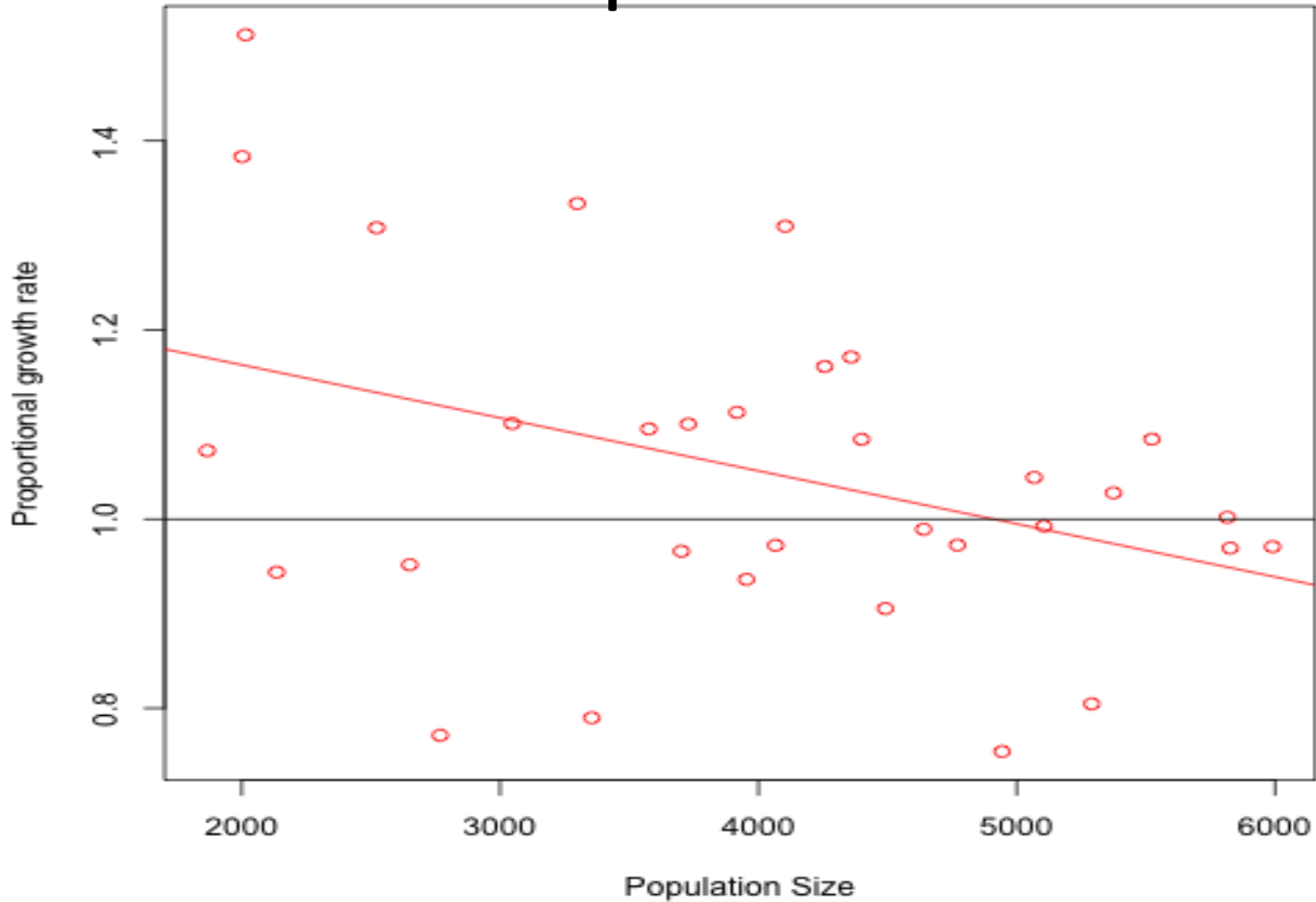
Constructed:

- Growth graphs

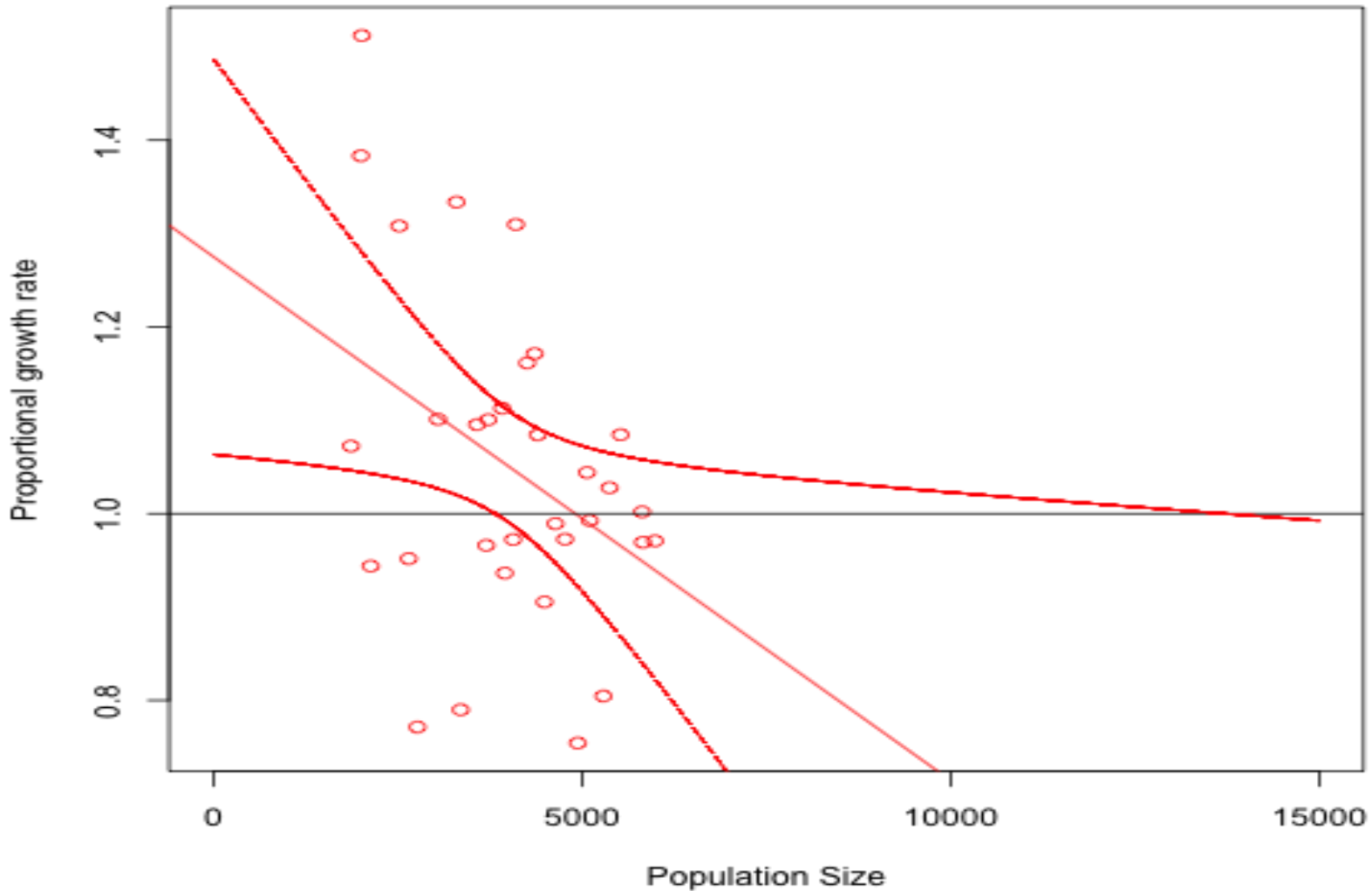
Utah Prairie Dog Population Growth



Utah Prairie Dog Density Dependence



Utah Prairie Dog Carrying Capacity 95% Confidence Interval



Examining Density Dependence

<u>Population</u>	<u>Relationship between Growth rate & Size</u>	<u>Statistical Significance</u>	<u>Estimated Carrying Capacity</u>	<u>Goal</u>	<u>How goal relates to carrying capacity</u>
Bighorn sheep	decrease	0.24	1012	750	below
Black footed ferret	decrease	0.67	1496	1500	equal
Florida panther	decrease	0.91	506	720	above
Gray whale	decrease	0.04	20200	19500	below
Gray wolf	decrease	0.12	1602	60	below
Grizzly bear	decrease	0.03	38	48	above
Guadalupe fur seal	decrease	0.20	5722	30000	above
Red wolf	decrease	0.07	264	550	above
Stellar seal lion	decrease	0.05	18617	45000	above
Southern sea otter	decrease	0.19	2452	3090	above
Utah prairie dog	decrease	0.03	4906	6000	above

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Examining Density Dependence

<u>Population</u>	<u>Estimated Carrying Capacity</u>	<u>Goal</u>	<u>Goal in relation to Carrying Capacity</u>	<u>95% Confidence Interval</u>	<u>Is goal in Confidence Interval</u>
Bighorn sheep	1012	750	below		
Black footed ferret	1496	1500	equal		
Florida panther	506	720	above		
Gray whale	20200	19500	below	15930-77840	inside
Gray wolf	1602	60	below		
Grizzly bear	38	48	above	27-120	inside
Guadalupe fur seal	5722	30000	above		
Red wolf	264	550	above		
Stellar seal lion	18617	45000	above	n/a-23200	outside
Southern sea otter	2452	3090	above		
Utah prairie dog	4906	6000	above	3844-13486	inside

High Goals= Low Extinction Probabilities

<u>Population</u>	<u>Probability of extinction in 50 years from GOAL</u>
Bighorn sheep	0
Black footed ferret	0
Florida panther	0
Gray whale	0
Gray wolf	0
Grizzly bear	5.8%
Guadalupe fur seal	0
Red wolf	0
Stellar sea lion	0
Southern sea otter	0
Utah prairie dog	0

Goals can be lowered

<u>Population</u>	<u>Probability of extinction</u> <u>50 years after GOAL</u>	<u>Probability of extinction</u> <u>50 years from NOW</u>
Bighorn sheep	0	0
Black footed ferret	0	0
Florida panther	0	0
Gray whale	0	0
Gray wolf	0	0
Grizzly bear	5.8%	6.4%
Guadalupe fur seal	0	0
Red wolf	0	0
Stellar sea lion	0	0
Southern sea otter	0	0
Utah prairie dog	0	0

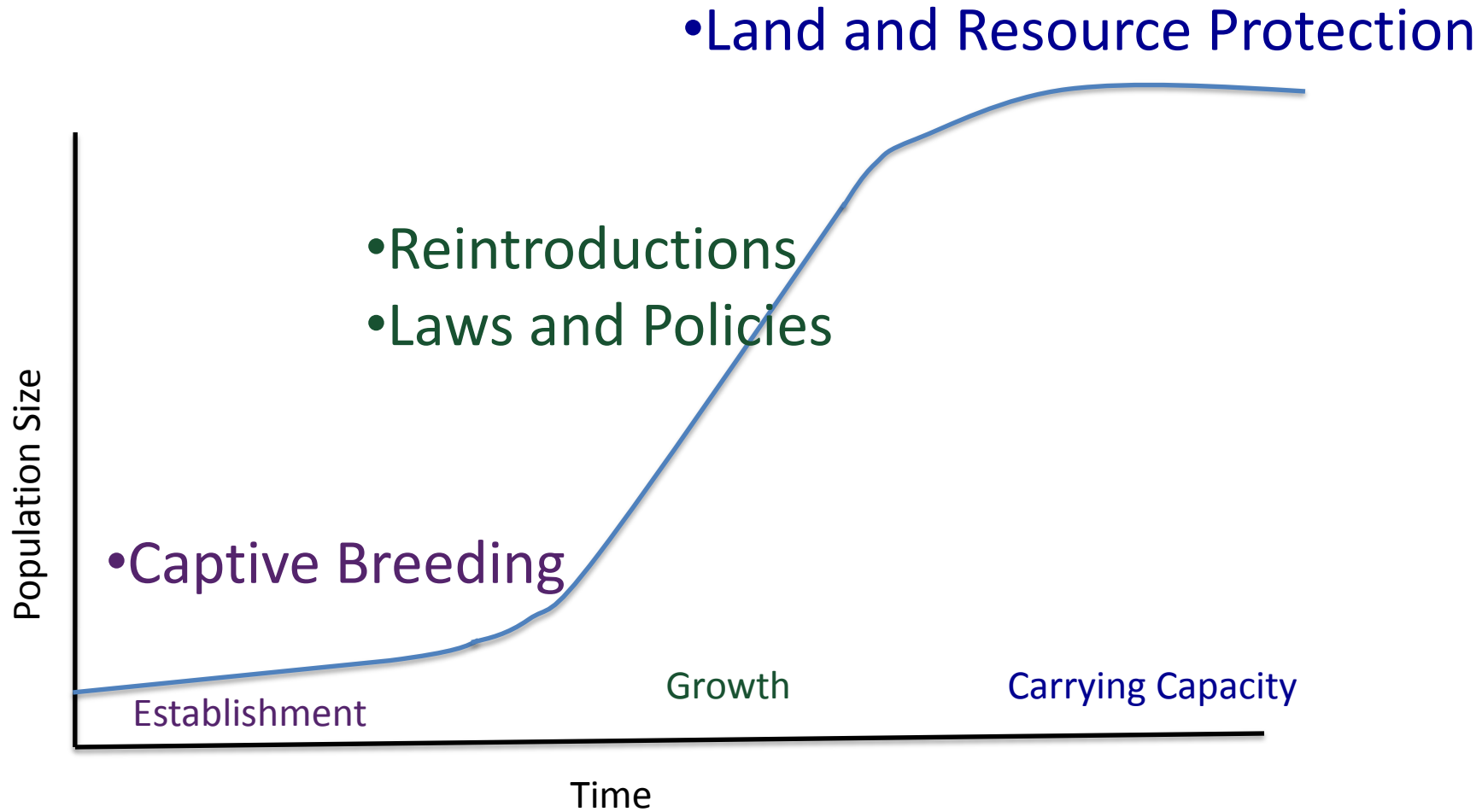
Implications

- Setting goals before conservation actions can be difficult
- Adaptive management strategies may be useful for setting more appropriate goals
- Appropriate goals may lead to better allocation of limited funding and resources

Future Directions

- Increase model complexity
 - Multispecies dynamics
 - Time lags
 - Include information on variation in growth from similar species
- Consider more species

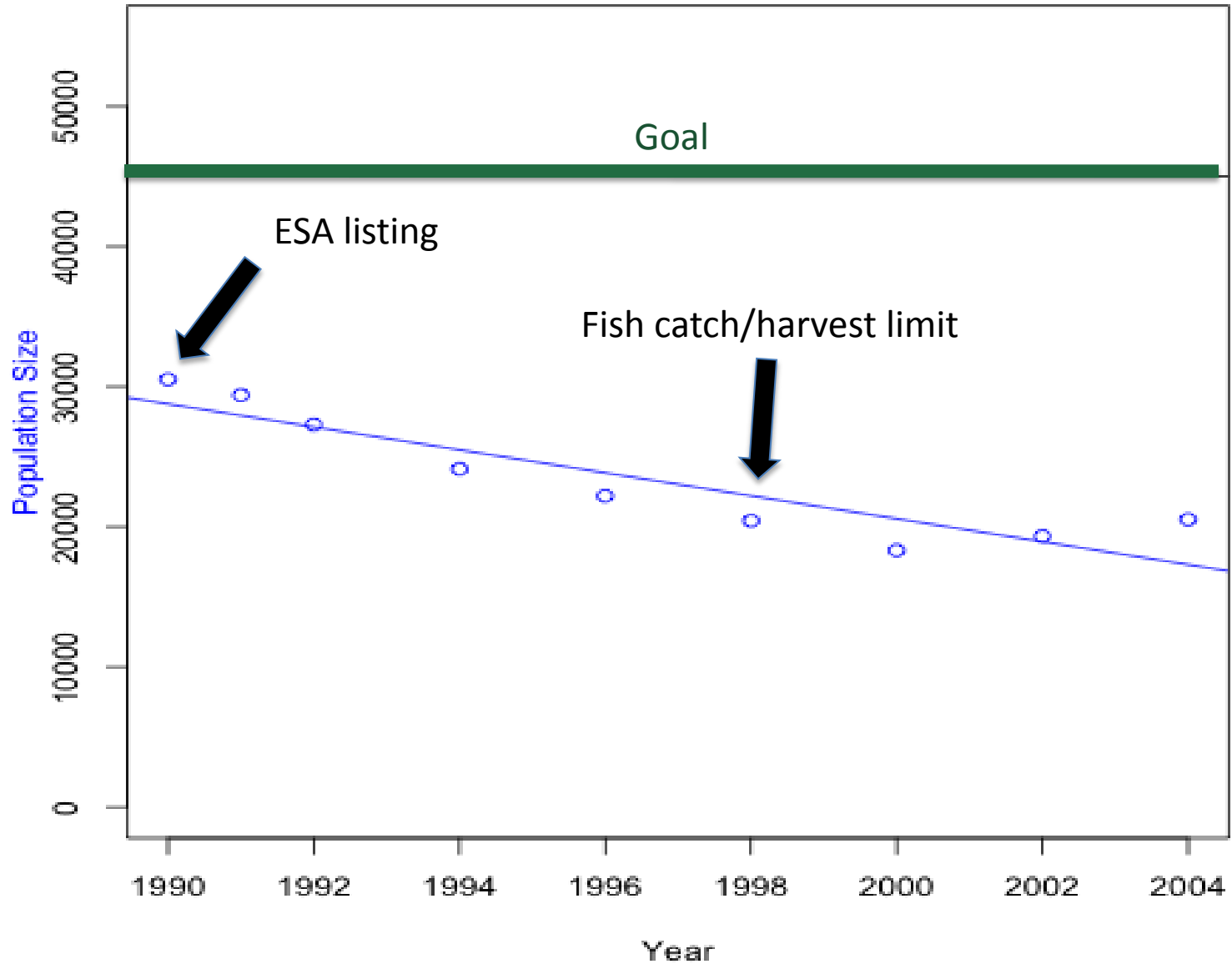
Shaping Growth Parameters



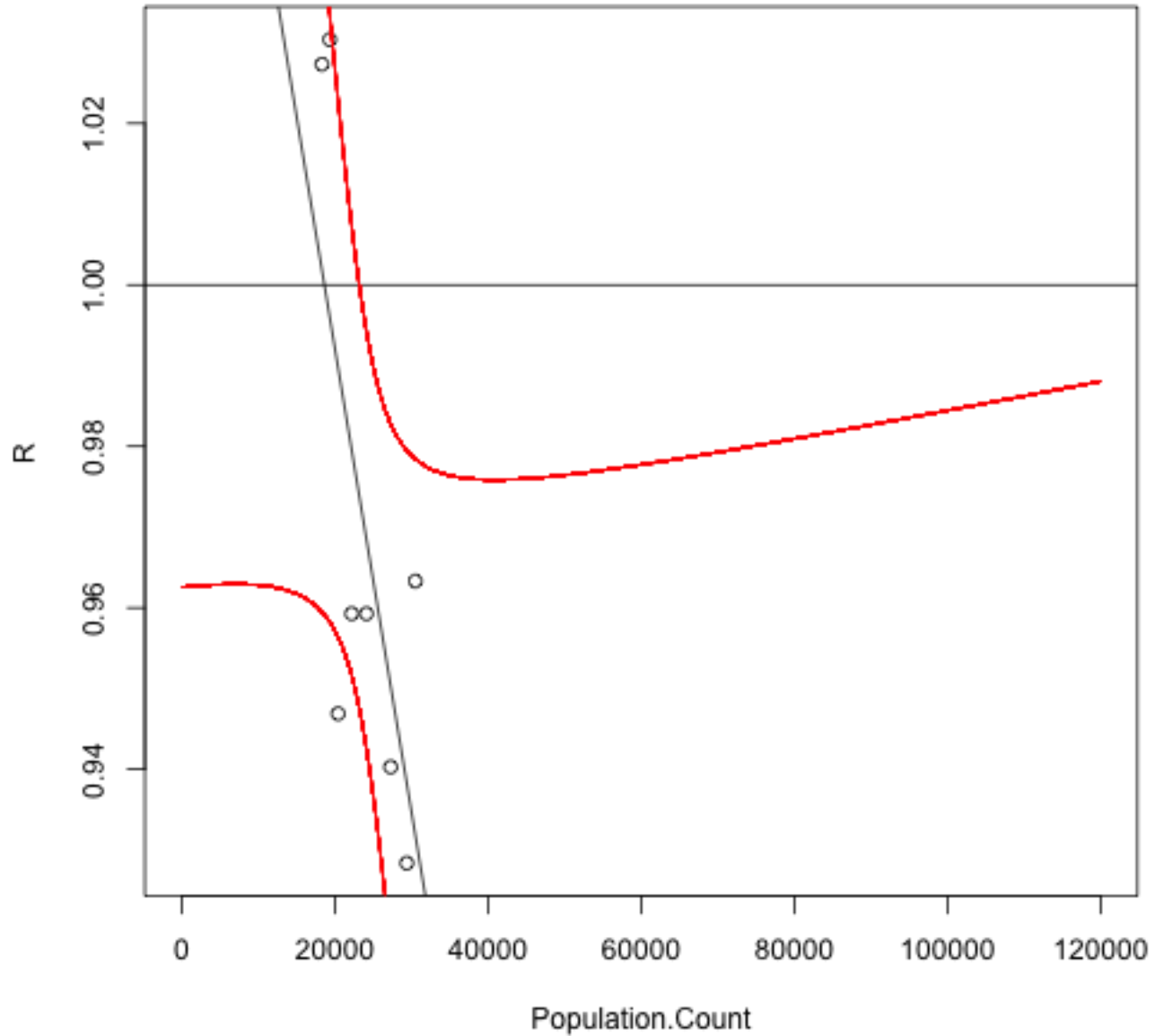
Thank you!

- INSET
- National Science Foundation
- Stephen Gosnell
- Gaines Lab
- Santa Barbara City College

Stellar Sea Lion



Stellar Sea Lion



Logistic Growth

