Triggers and Adaptive Management

Sagebrush Ecosystem Council Meeting

April 5th, 2018

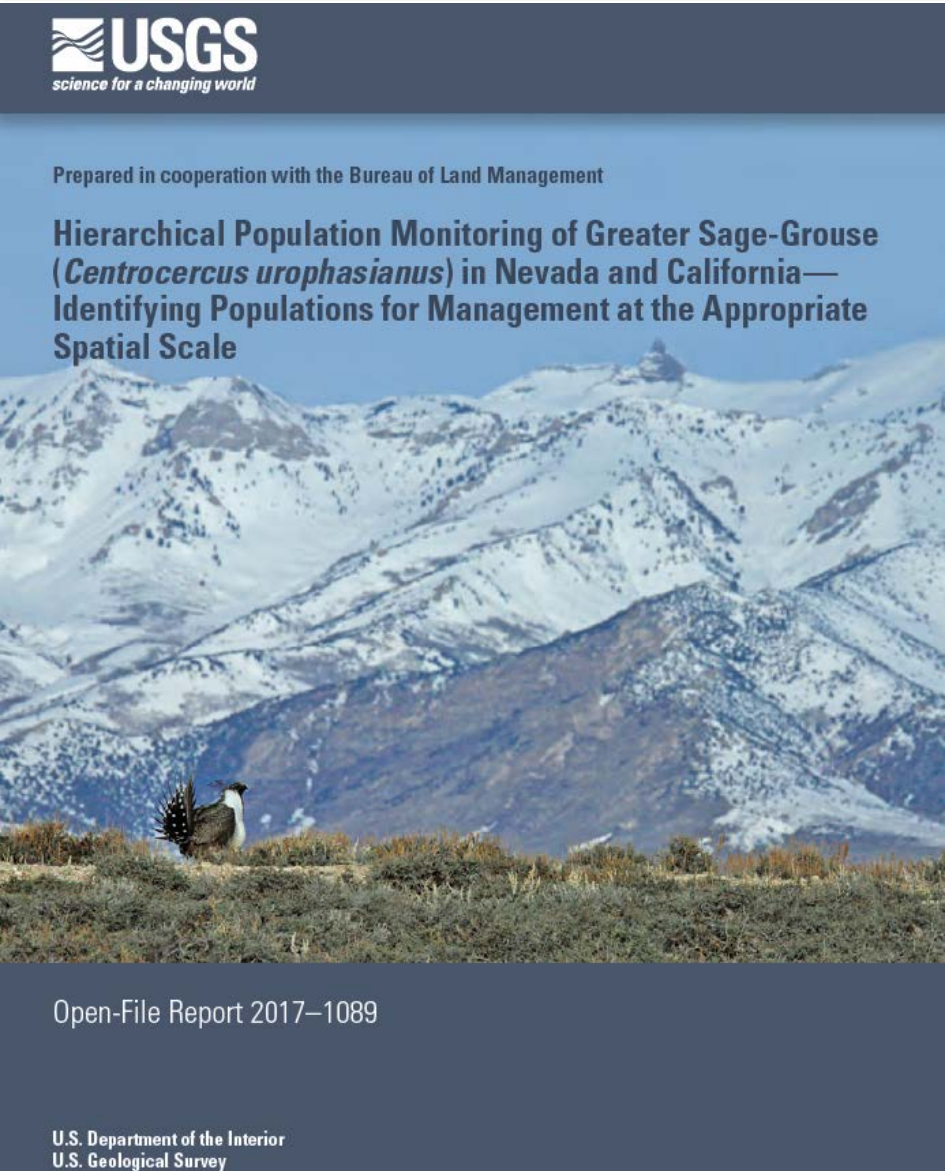
Purpose

Gain a better understanding of the USGS hierarchical population monitoring analysis, triggers, and adaptive management

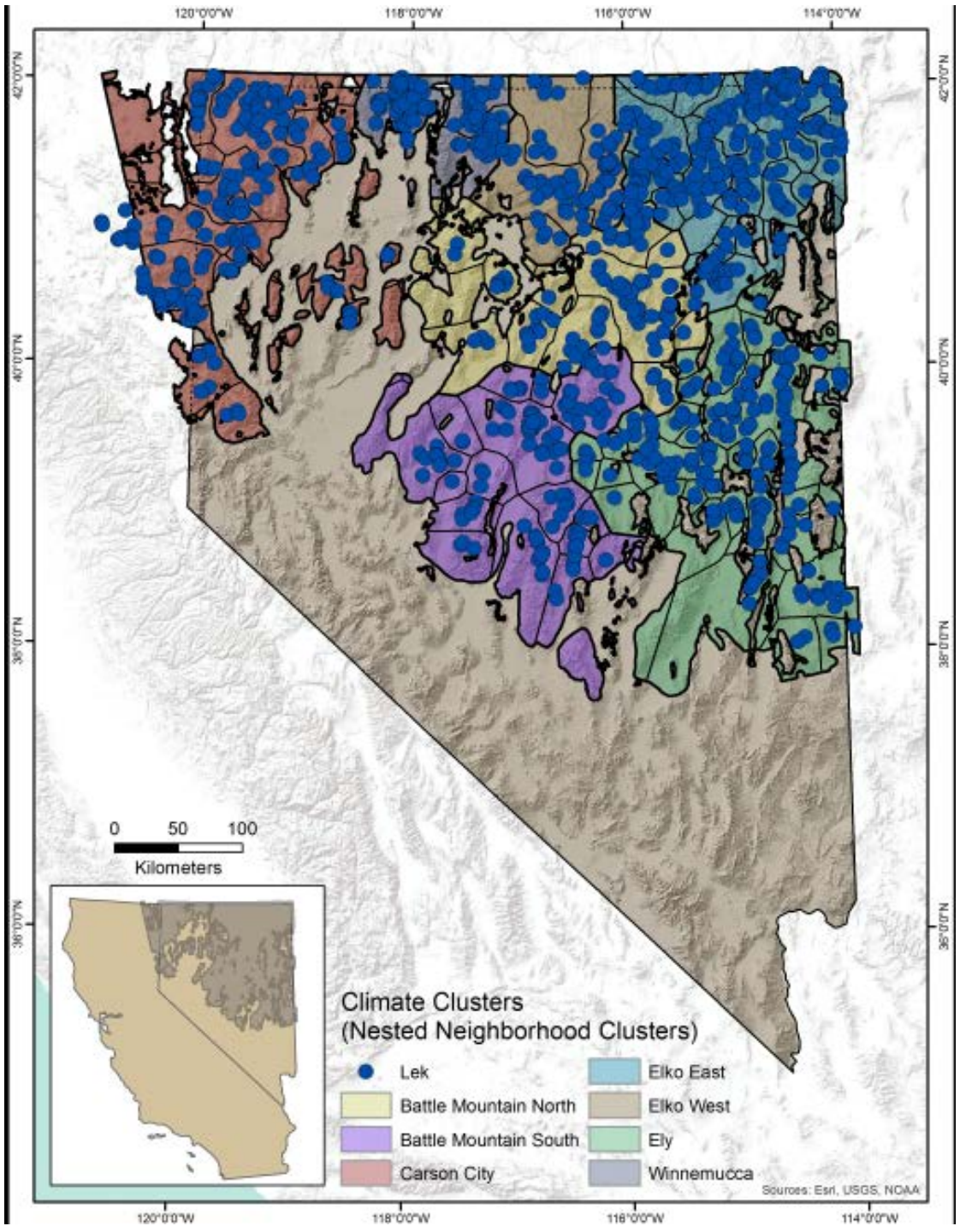
Adaptive Management: State Plan

- Describes the adaptive management process
- Does not discuss Triggers
- Does state a multi-scale approach necessary
- Describes Inventory and Management Action Monitoring

Overview



- 17 Year dataset (2000 – 2016) of lek counts (NV & CA)
- Compare trends across nested spatial scales:
  - Individual lek
  - Lek cluster (neighborhood cluster)
  - Biologically Significant Unit (BSU) (Climate cluster)
- Model identifies leks, lek clusters, or BSU populations in need of management action


120°0'0"W
118°0'0"W
116°0'0"W
114°0'0"W
42°0'0"N
40°0'0"N
38°0'0"N
36°0'0"N
0
50
100
Kilometers
Climate Clusters
(Nested Neighborhood Clusters)
Lek
Battle Mountain North
Battle Mountain South
Carson City
Elko East
Elko West
Ely
Winnemucca
Sources: Esri, USGS, NOAA

Framework

- 1) Partitioning of local compared to regional effects
  - Identifies what scale impacts are occurring
- 2) Incorporates temporal thresholds
  - Multiple years to hit a trigger
- 3) Quantifies duration and magnitude of decline at identified spatial scale
  - Slow vs fast/soft vs hard

Framework

- Framework allows to distinguish whether a decline is due to localized disturbances (more manageable) or connected to larger scale, regional trends (climactic, environmental) that are typically less manageable.

- Temporal thresholds help prevent spurious warnings that occur in a given year that may be due to other factors affecting lek attendance (natural fluctuation, climatic conditions)

Evaluation Process

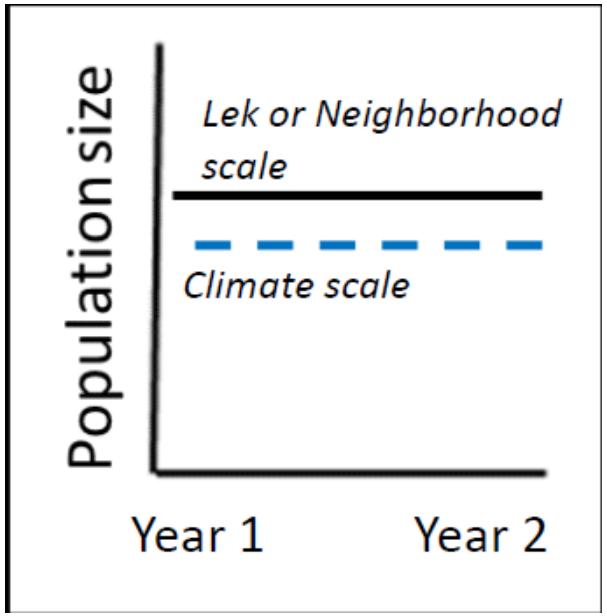
1. Estimate thresholds

    a. Destabilizing – significant rates of population decline
    b. Decoupling – Rate of population decline deviates from average trend of higher spatial scale (lek vs lek cluster)

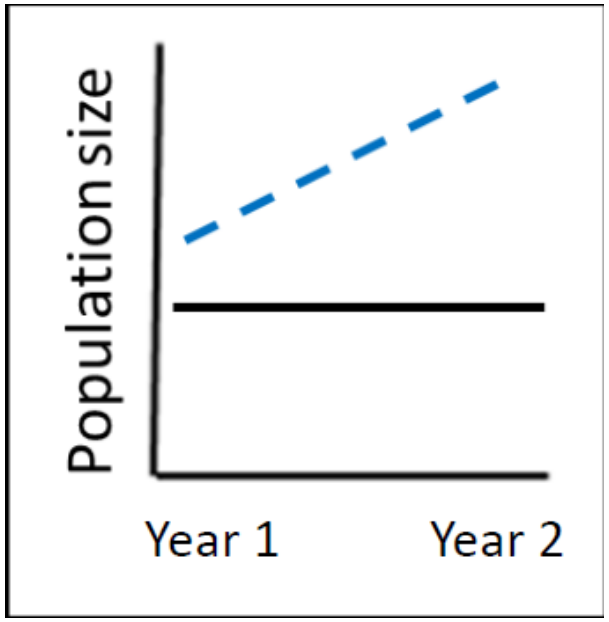
- Differentiate slow and fast rate of decline (Individual Lek)
  - Slow ($\lambda < 0.90$)
  - Fast ($\lambda < 0.55$)

Evaluation Process

2. Warnings
    a. Slow or fast warning activates if both destabilizing and decoupling thresholds are crossed
    b. Example: Lek is declining (slow) AND the rate of decline is not attributed to or similar to changes at larger scales at the Lek cluster = *Slow Warning*



Stable: Yes
Decoupled: No
No Warning



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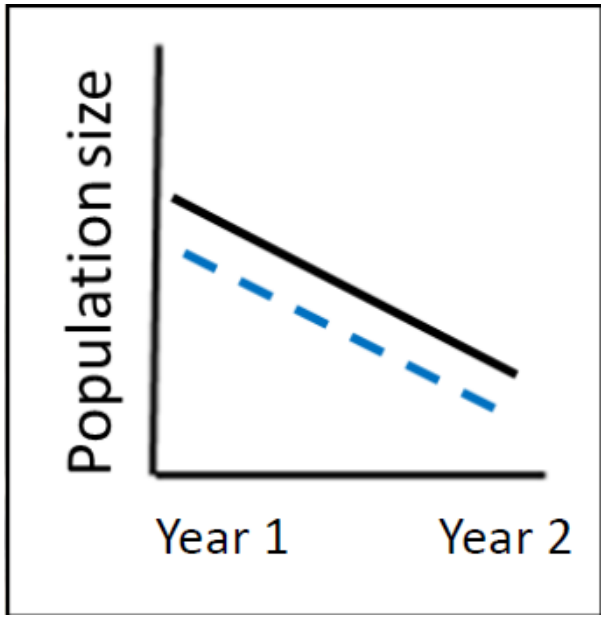

Stable: No
Decoupled: No
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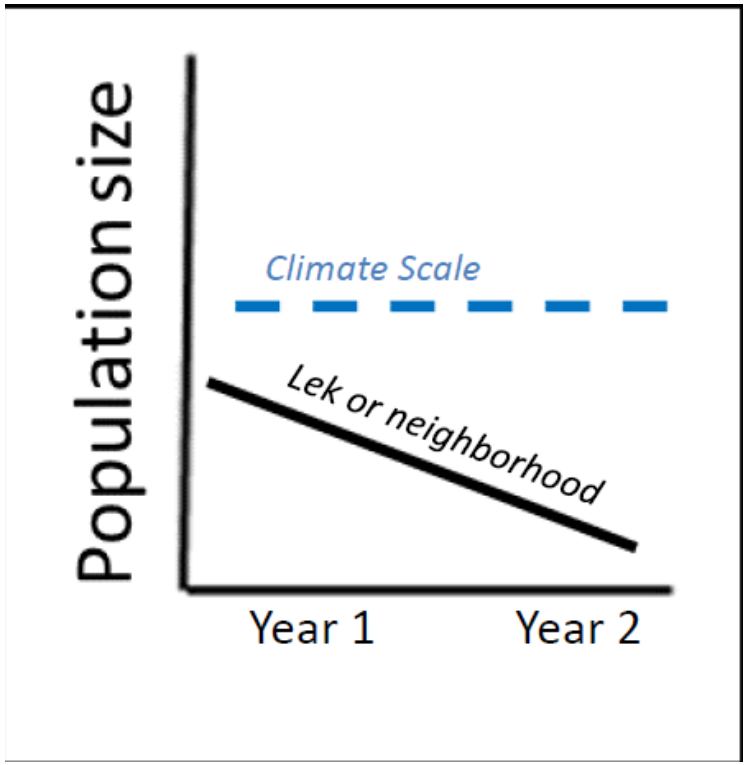


Stable: No

Decoupled: Yes

Warning

Evaluation Process

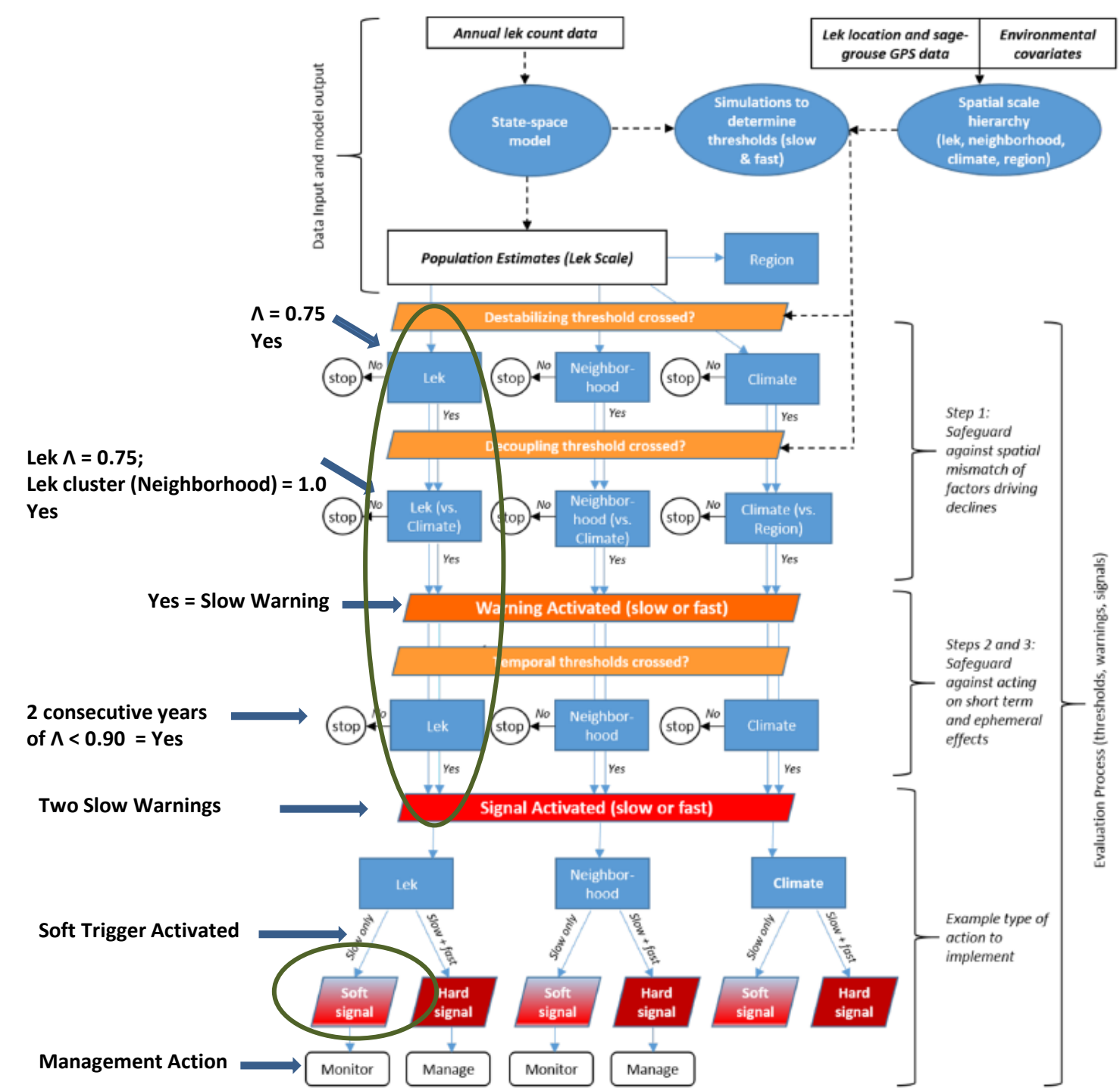
3. Triggers

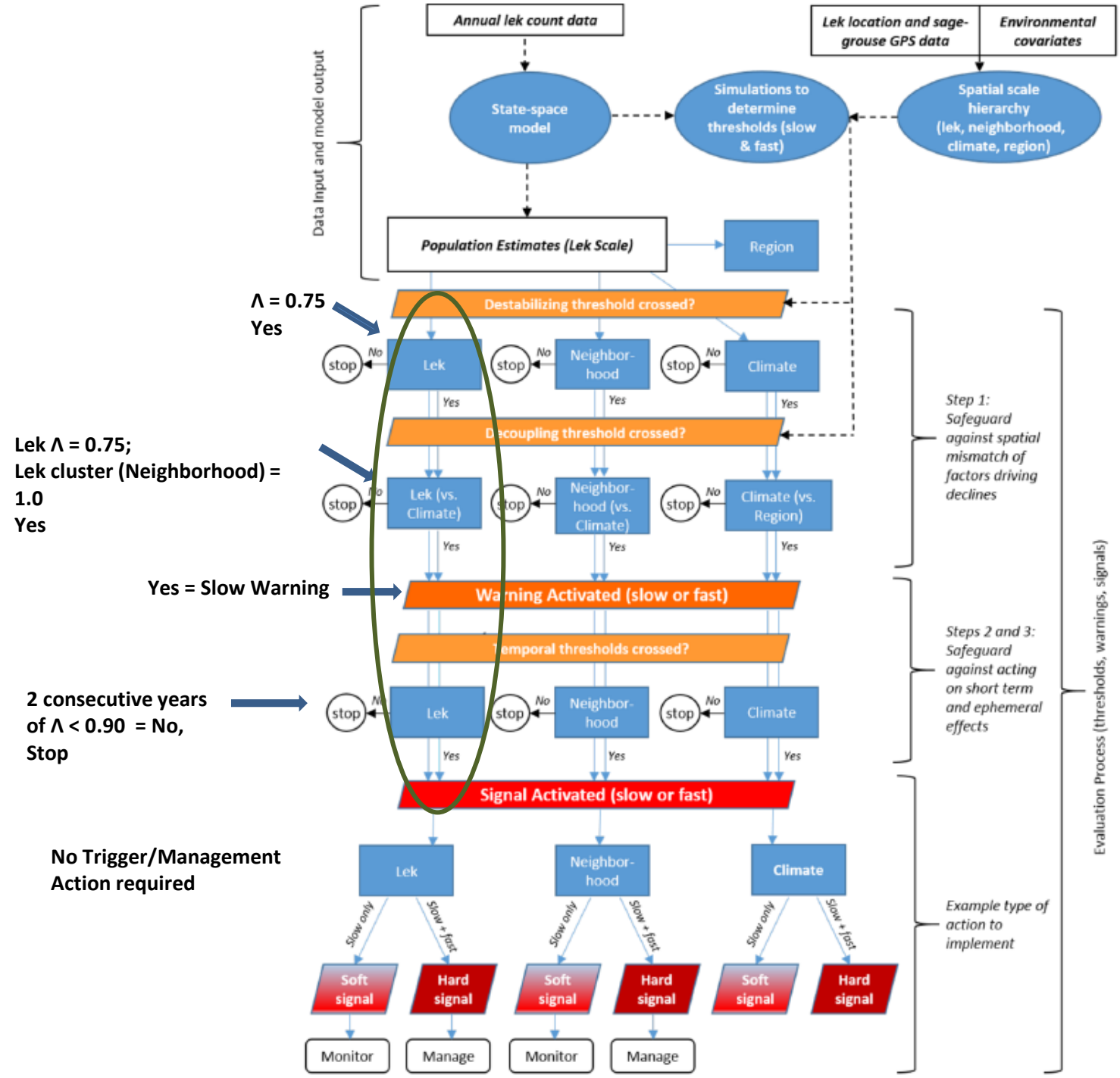
   Crossing of a temporal threshold (multiple annual *Warnings*)

   Soft or Hard Trigger

   a. Soft *Trigger*: Activates if *Slow Warnings* occur over 2 consecutive years

   b. Hard *Trigger*: Activates if *Slow Warnings* occur 3 of 4 consecutive years OR *Fast Warnings* occur 2 of 3 consecutive years


Annual lek count data
Lek location and sage-grouse GPS data
Environmental covariates
Data Input and model output
State-space model
Simulations to determine thresholds (slow & fast)
Spatial scale hierarchy (lek, neighborhood, climate, region)
Population Estimates (Lek Scale)
Region
Λ = 0.75
Yes
Destabilizing threshold crossed?
stop
No
Lek
Neighbor-hood
Climate
Yes
Decoupling threshold crossed?
Lek (vs. Climate)
Neighbor-hood (vs. Climate)
Climate (vs. Region)
Lek Λ = 0.75;
Lek cluster (Neighborhood) = 1.0
Yes
Step 1: Safeguard against spatial mismatch of factors driving declines
Yes = Slow Warning
Warning Activated (slow or fast)
Temporal thresholds crossed?
2 consecutive years of Λ < 0.90 = Yes
Steps 2 and 3: Safeguard against acting on short term and ephemeral effects
Two Slow Warnings
Signal Activated (slow or fast)
Soft Trigger Activated
Slow only
Slow + fast
Soft signal
Hard signal
Example type of action to implement
Management Action
Monitor
Manage
Evaluation Process (thresholds, warnings, signals)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Yes
Destabilizing threshold crossed?
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Lek
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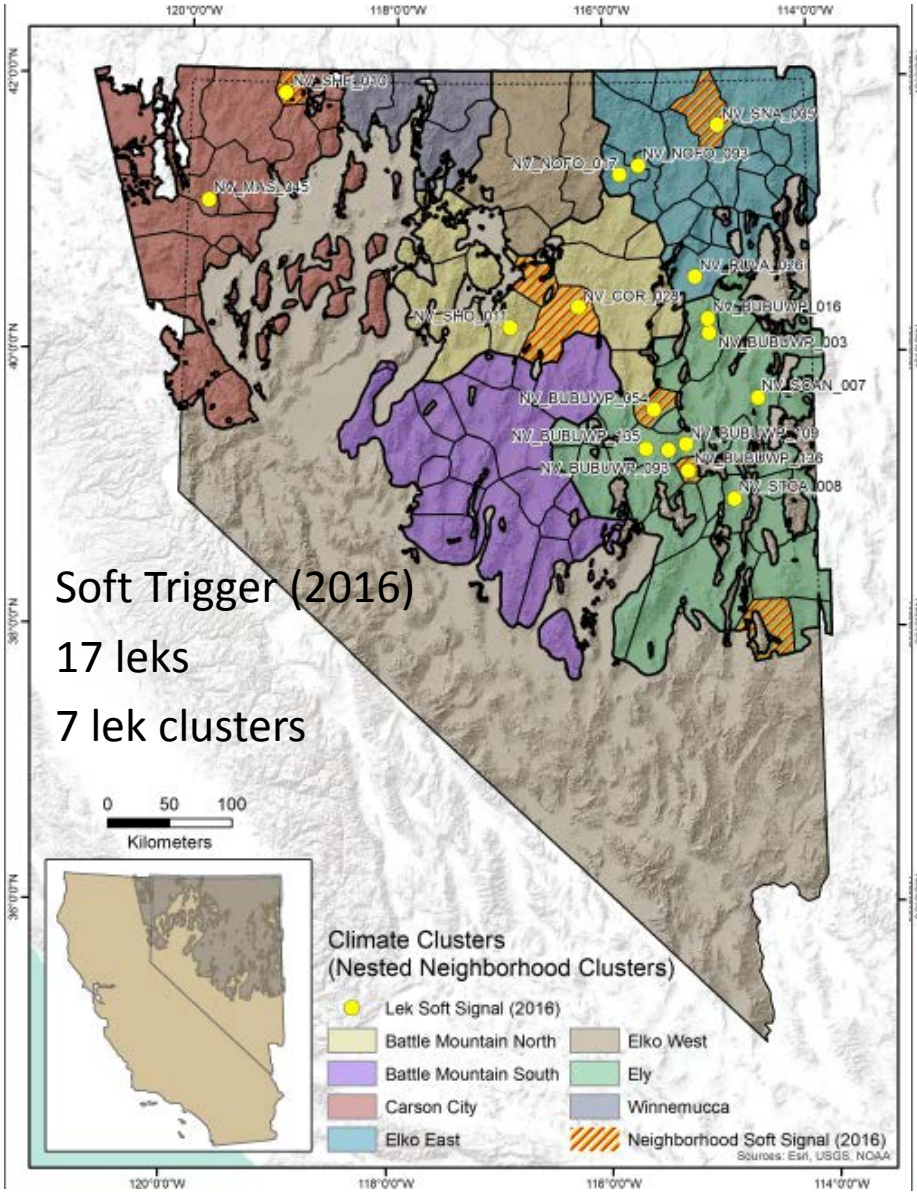
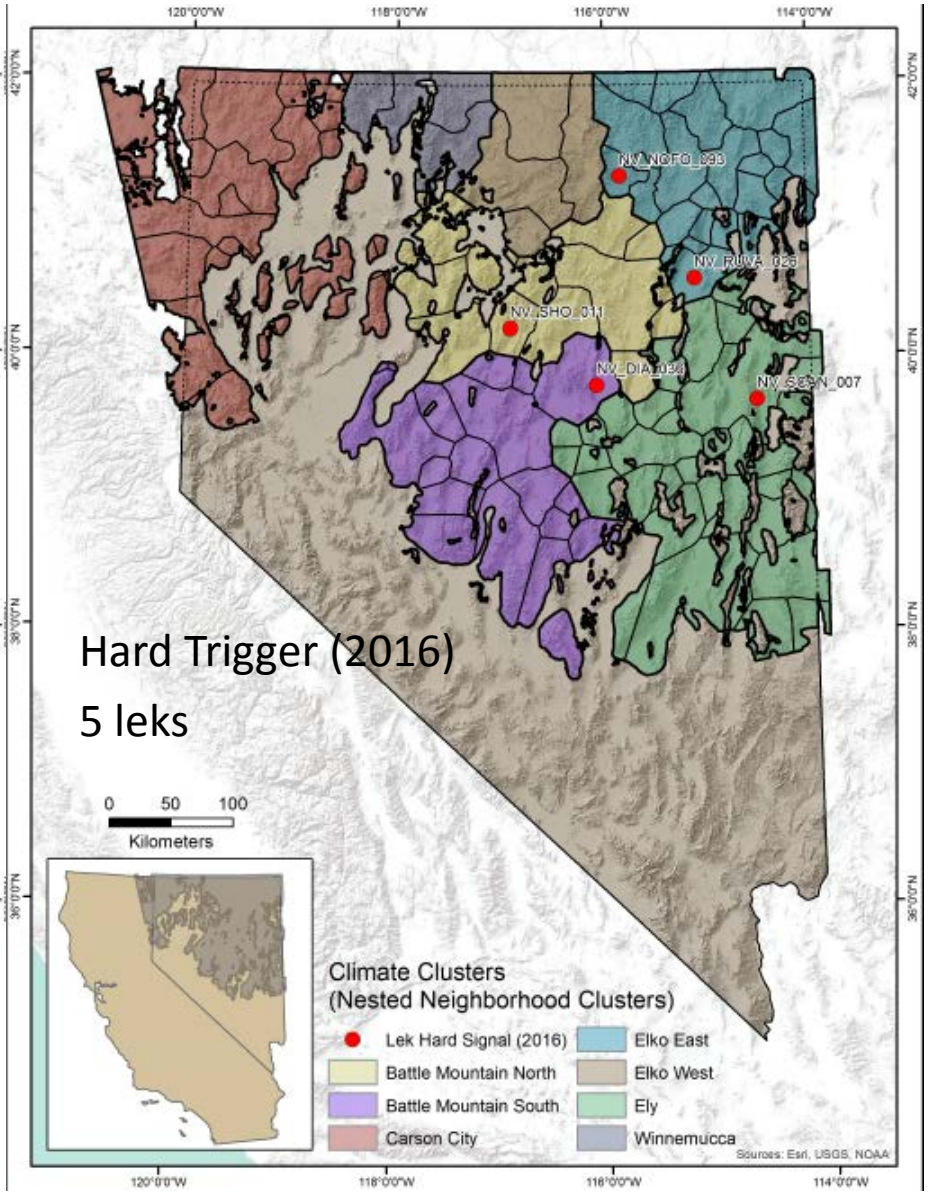
Decoupling threshold crossed?
Lek (vs. Climate)
Neighbor-hood (vs. Climate)
Climate (vs. Region)
Lek Λ = 0.75;
Lek cluster (Neighborhood) = 1.0
Yes
Yes = Slow Warning
Warning Activated (slow or fast)
Temporal thresholds crossed?
2 consecutive years of Λ < 0.90 = No, Stop
Signal Activated (slow or fast)
No Trigger/Management Action required
Slow only
Slow + fast
Soft signal
Hard signal
Monitor
Manage
Step 1: Safeguard against spatial mismatch of factors driving declines
Steps 2 and 3: Safeguard against acting on short term and ephemeral effects
Example type of action to implement
Evaluation Process (thresholds, warnings, signals)

Results





Average 3.86% decline/year over 17 year period

Other State Processes

Colorado

Soft Trigger Threshold	Response	Hard Trigger Threshold	Response
Intermediate Threshold that indicates need to address habitat/population loss	Change management to more conservation or restrictive	Lek counts fall below 25% quartile of high count (1,575 and 640 males) OR 30% habitat loss in PHMA (since ROD signed)	Develop response strategy, initiate assessment to determine causal factor

Idaho/Montana

Soft Trigger Threshold	Response	Hard Trigger Threshold	Response
10% loss of key habitat in PHMA within BSU; OR 10% decline in 3yr avg male counts (both compared to 2011 baseline)	Evaluate causal factors and recommend implementation level activities	Same as soft trigger but using 20% as threshold	Same as response for soft trigger, and PHMA management actions also applied to IHMA

Other State Processes

Oregon

Soft Trigger Threshold	Response	Hard Trigger Threshold	Response
Sagebrush cover drops to between 30-65% of the area capable of supporting sagebrush; OR population drops by > 40%/year or >10%/yr for 3 consecutive years	BLM within 1 month will determine cause and follow a list of adaptive management responses	Sagebrush cover drops to below 30% of the area capable of supporting sagebrush; OR population drops by > 60%/year for 2 yrs	BLM within 1 month will determine cause and will implement a list of restrictive conservation actions

Utah

Soft Trigger Threshold	Response	Hard Trigger Threshold	Response
4yrs consecutive decline > 10% avg male lek counts; 6yrs of declining male lek counts; 40% decline in single yr; 50% decline in 4 yrs; OR 10% habitat loss in PHMA	BLM determine cause and apply measures to mitigate decline	4yrs consecutive decline > 20% avg male lek counts; 75% drop in 10 yr avg; OR 20% habitat loss in PHMA	Requires more restrictive alternative without further action by BLM; BLM to determine causal factors

Other State Processes

Wyoming

Soft Trigger Threshold	Response	Hard Trigger Threshold	Response
Deviation from normal trends in habitat or population in any given year (e.g. lek counts, wing counts, surveys, habitat monitoring)	BLM will apply more conservative or restrictive measures to mitigate for causal factor	2 of 3 yr metric e>60% of normal variability for area in a single year; OR when any of the 3 metrics (habitat loss, lek loss, population decline) >40% of normal variability for a 3yr time period	Adaptive Management Working Group will convene to develop a response and strategy to determine causal factors