Timing and methodology of Golden Eagle occupancy surveys: implications for NEPA review

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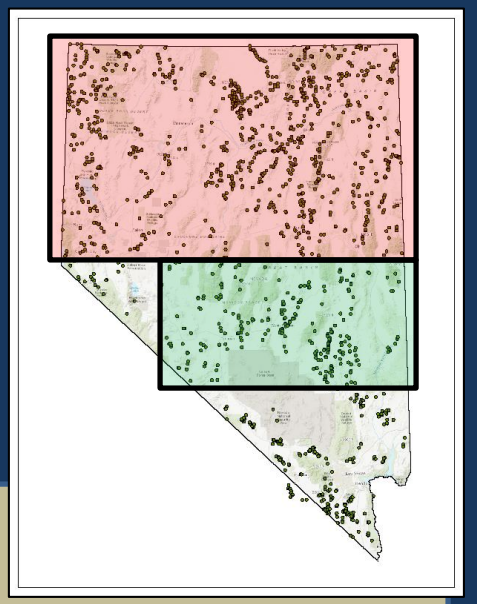
February 20, 2019

Nesting Phenology: 2015–2018

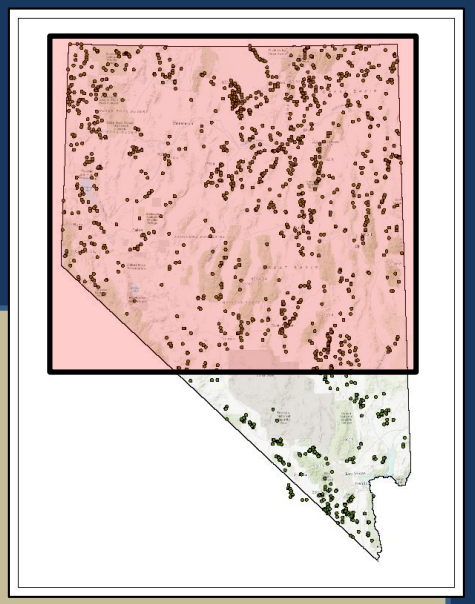


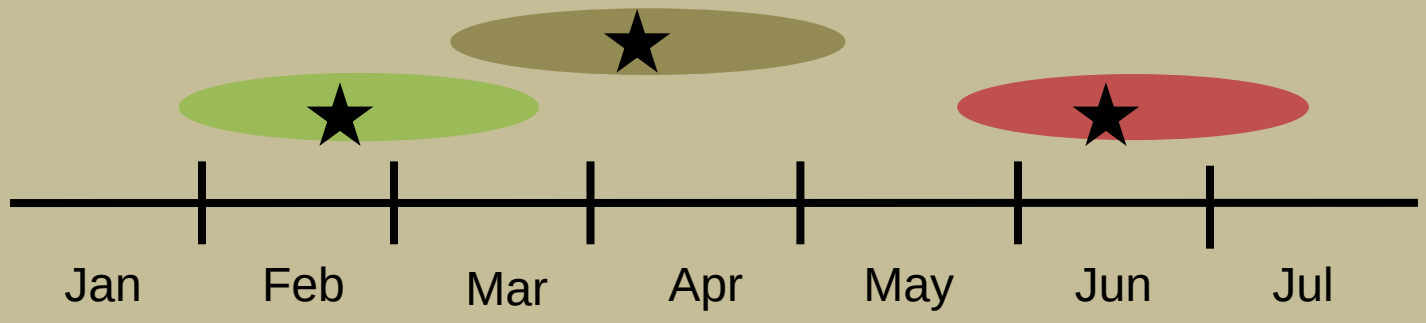
	Southern Great Basin (n = 40)		Northern Great Basin* (n = 45)	
	mean	range	mean	range
Incubation	18 Feb	27 Jan – 12 Mar	21 Feb	5 Feb – 23 Mar
Hatching	3 Apr	12 Mar – 25 Apr	6 Apr	21 Mar – 6 May
Fledging	10 Jun	20 May – 3 Jul	14 Jun	21 May – 14 Jul

* With assistance from Wildlife Resource Consultants LLC: 2016–18

Dates estimated backdating from nestlings (Driscoll 2010), and using 45 days for incubation and 70 days until fledging.

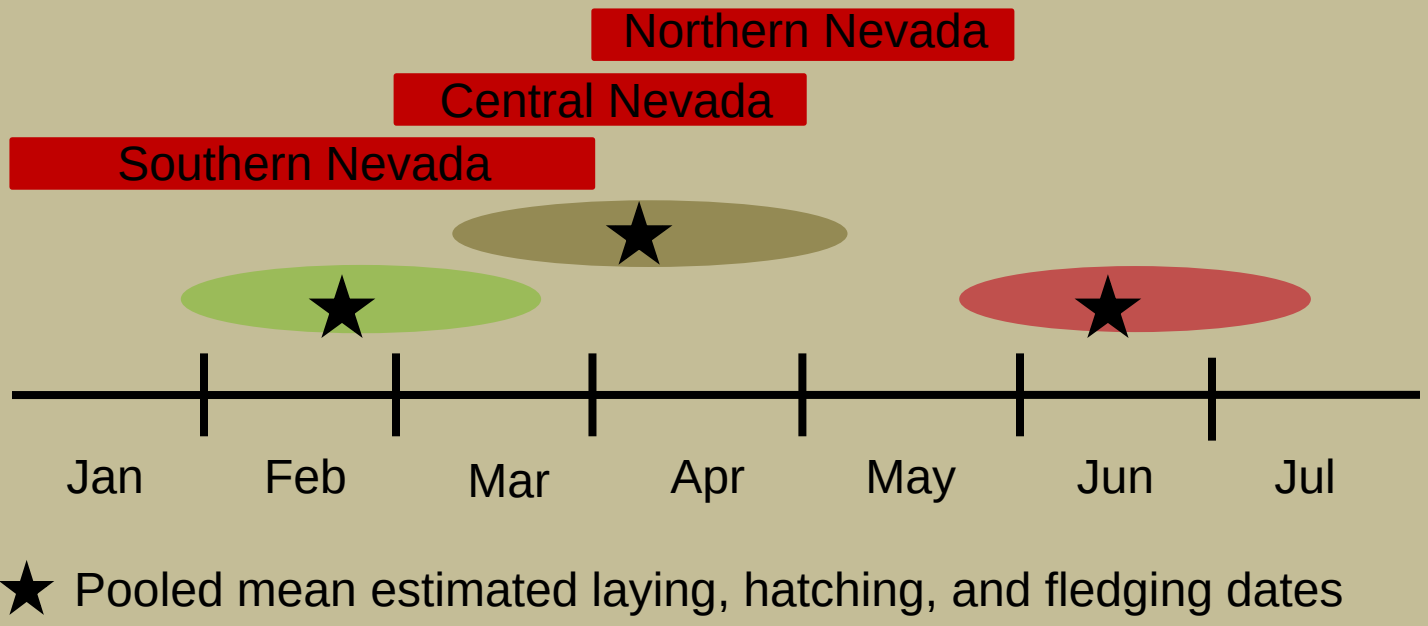
Nesting Phenology





★ Pooled mean estimated laying, hatching, and fledging dates

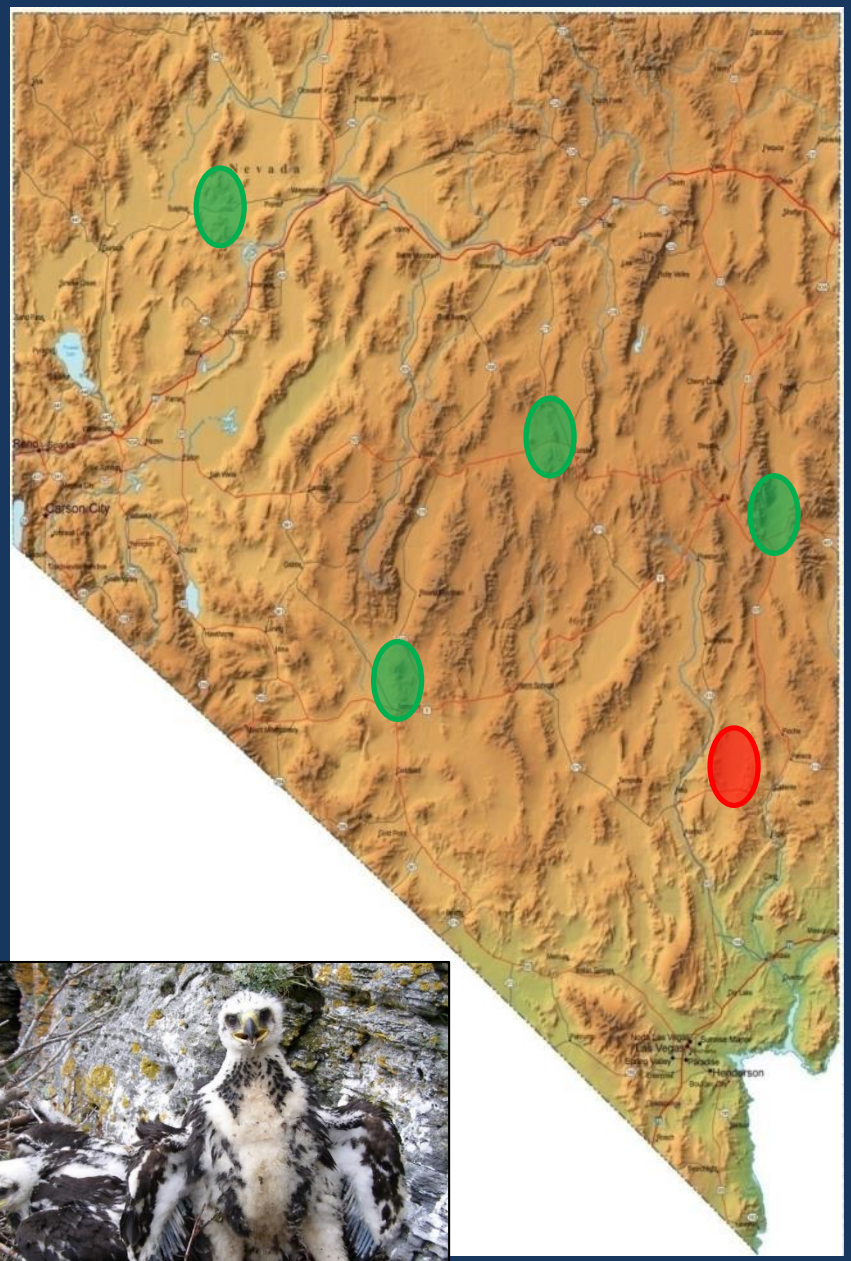
Nesting Phenology and Bighorn Sheep Lambs



Sensitive lambing seasons based primarily on NDOW Game Biologist expert opinion

Occupancy Study Areas

- Initiated study in primary study area in 2014 (15 territories)
- Secondary study areas investigated in 2015 and 2018 (28 territories)
- Ground surveys conducted during courtship breeding stage (December – January)
- Surveys assessed territory occupancy:
  - Adults at nest/nest cliff
  - Courtship/territorial defense
  - Nest building/maintenance



Study Sites

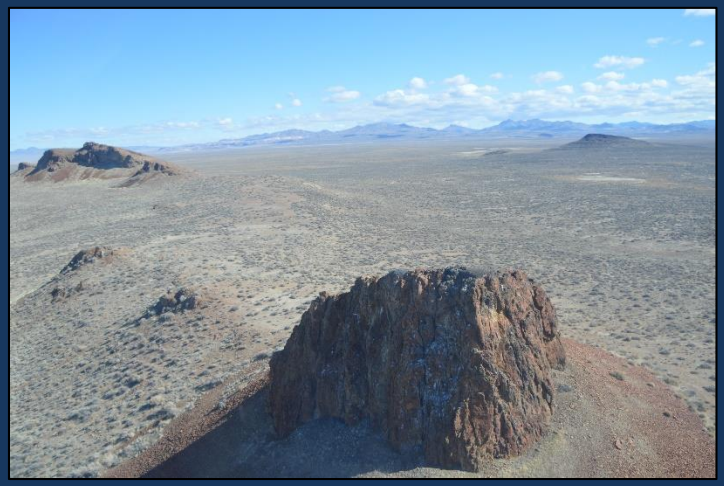
Occupancy Surveys

Primary Study Area

	2015	2016	2017	2018	2019	Total
Checked territories	11	14	15	15	14	69
Occupied territories	11	14	15	15	12	67
Territories assessed for breeding	7	7	9	10		33
Breeding attempts	7	7	9	8		31
Successful attempts	6	5	7	3		21

- Secondary study area occupancy: 28 of 28 territories
- 2018 was a very low lagomorph year (2019?)

Ground vs. Aerial Surveys

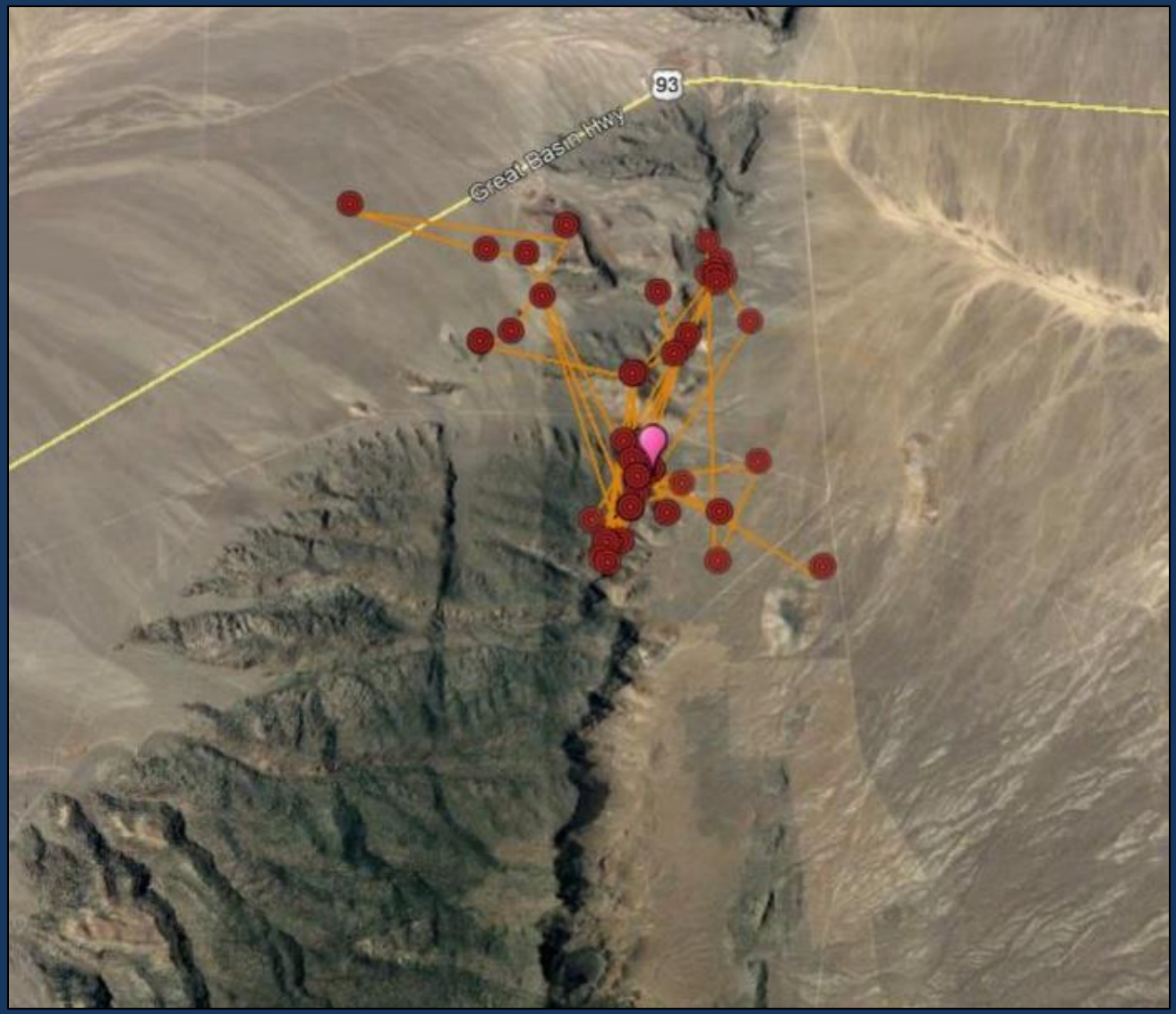


- Ground Survey: 7-9 January 2018
  - 18 of 18 territories occupied
  - Mean 16 min/survey (range 4–67 min per survey)
- Aerial Survey: 21 February
  - 13 of 23 (57%) territories occupied
  - 11 of 18 (61%) ground surveyed territories occupied
  - 14 of 18 (78%) territories occupied after 2nd aerial survey on 29 May
- Pairs initiated incubation 12 Feb – 23 Mar (mean = 2 Mar)

Surveys conducted by JGB & Wildlife Resource Consultants LLC

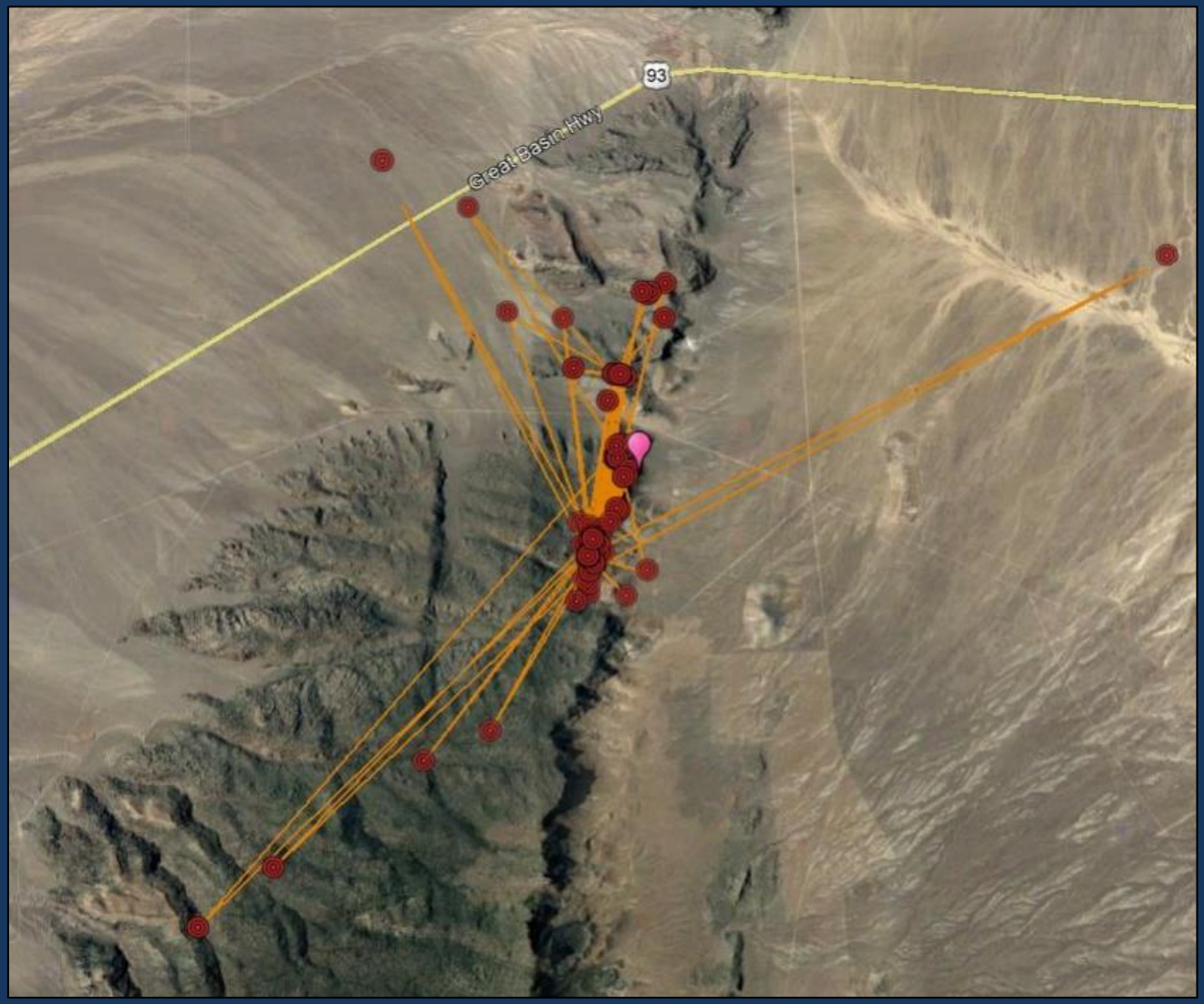
Movement Data (PTT): successful adult female

January



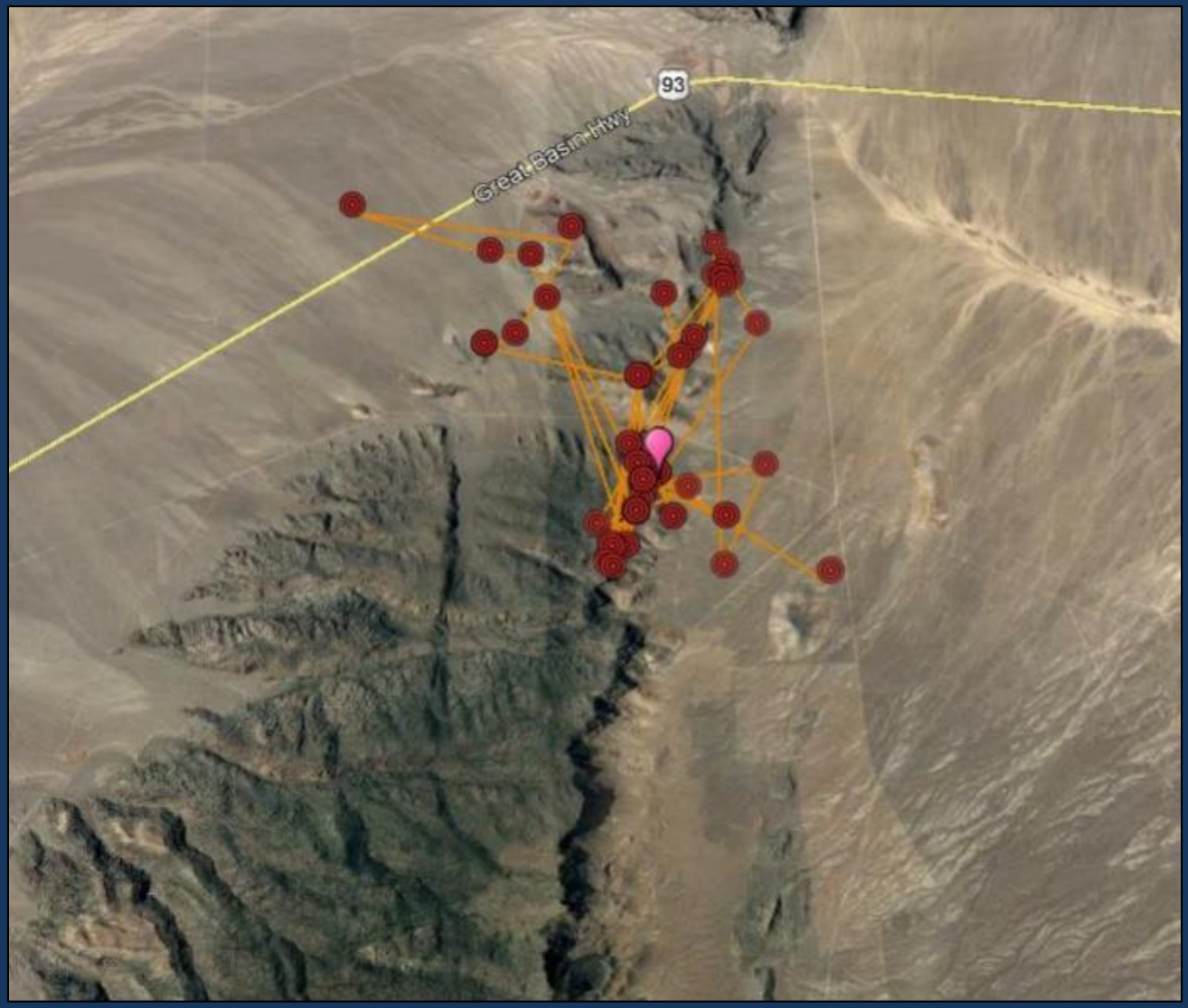
Movement Data (PTT): successful adult female

March



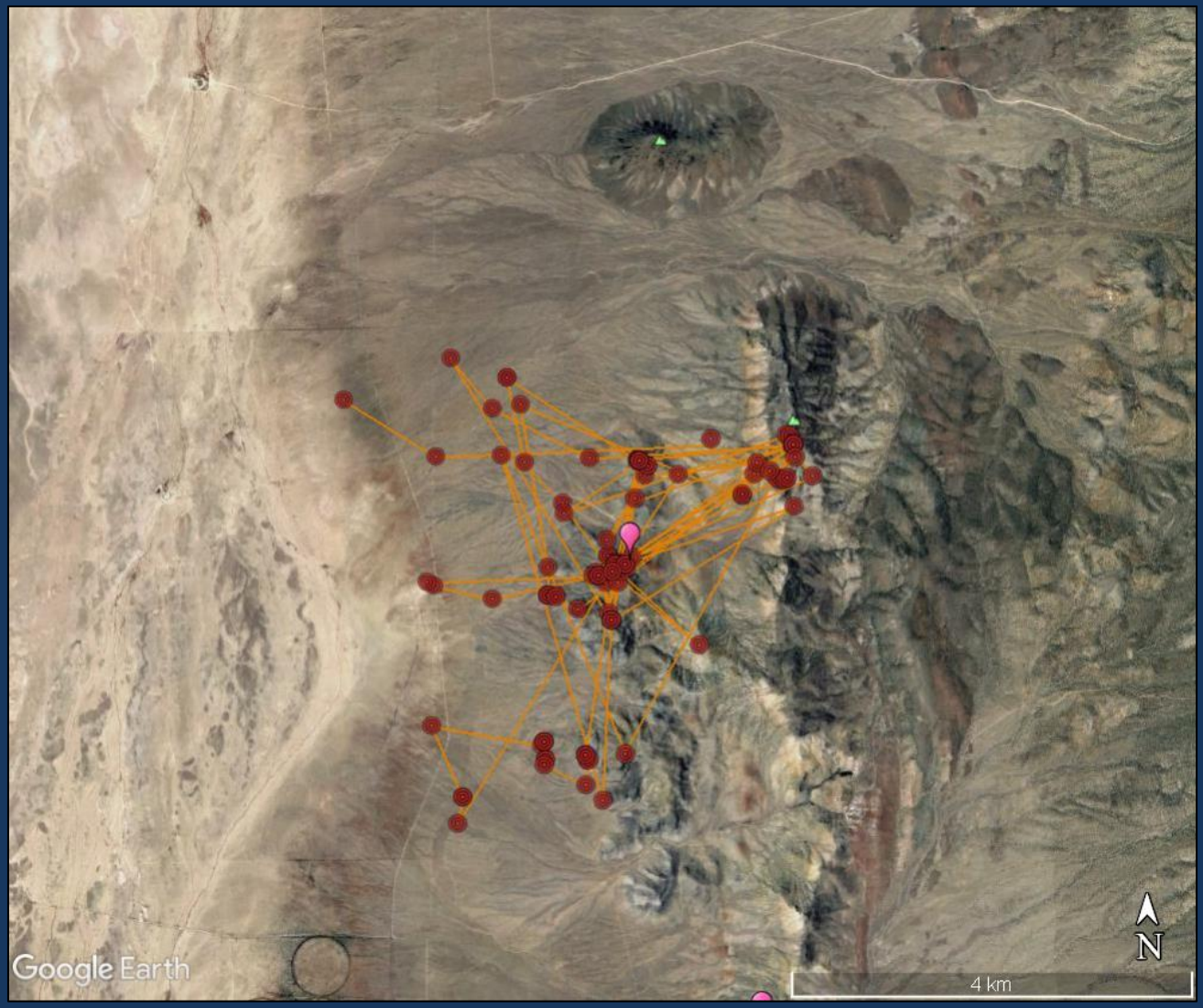
Movement Data (PTT): successful adult female

May



Movement Data (PTT): unsuccessful adult female

January



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March

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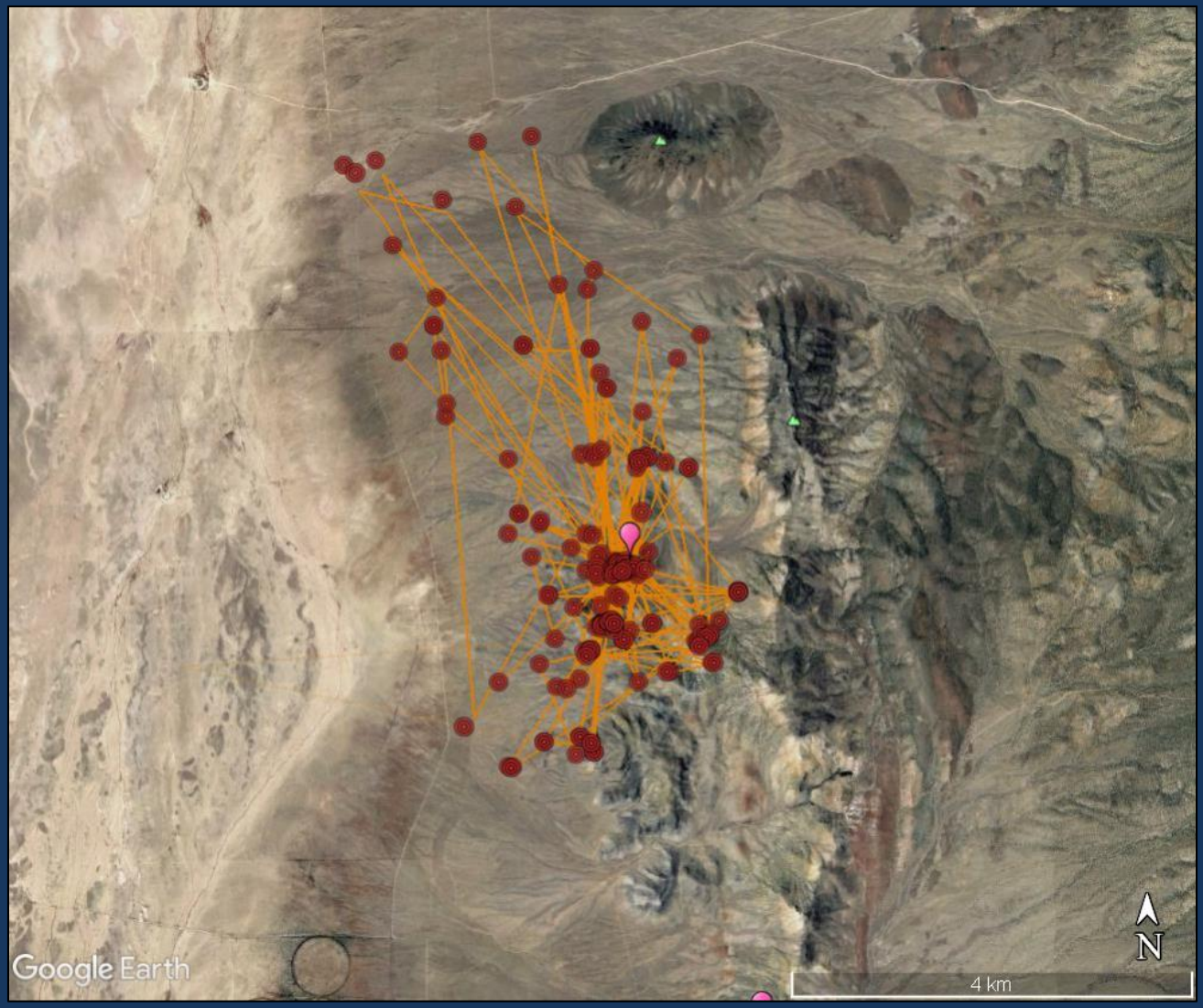
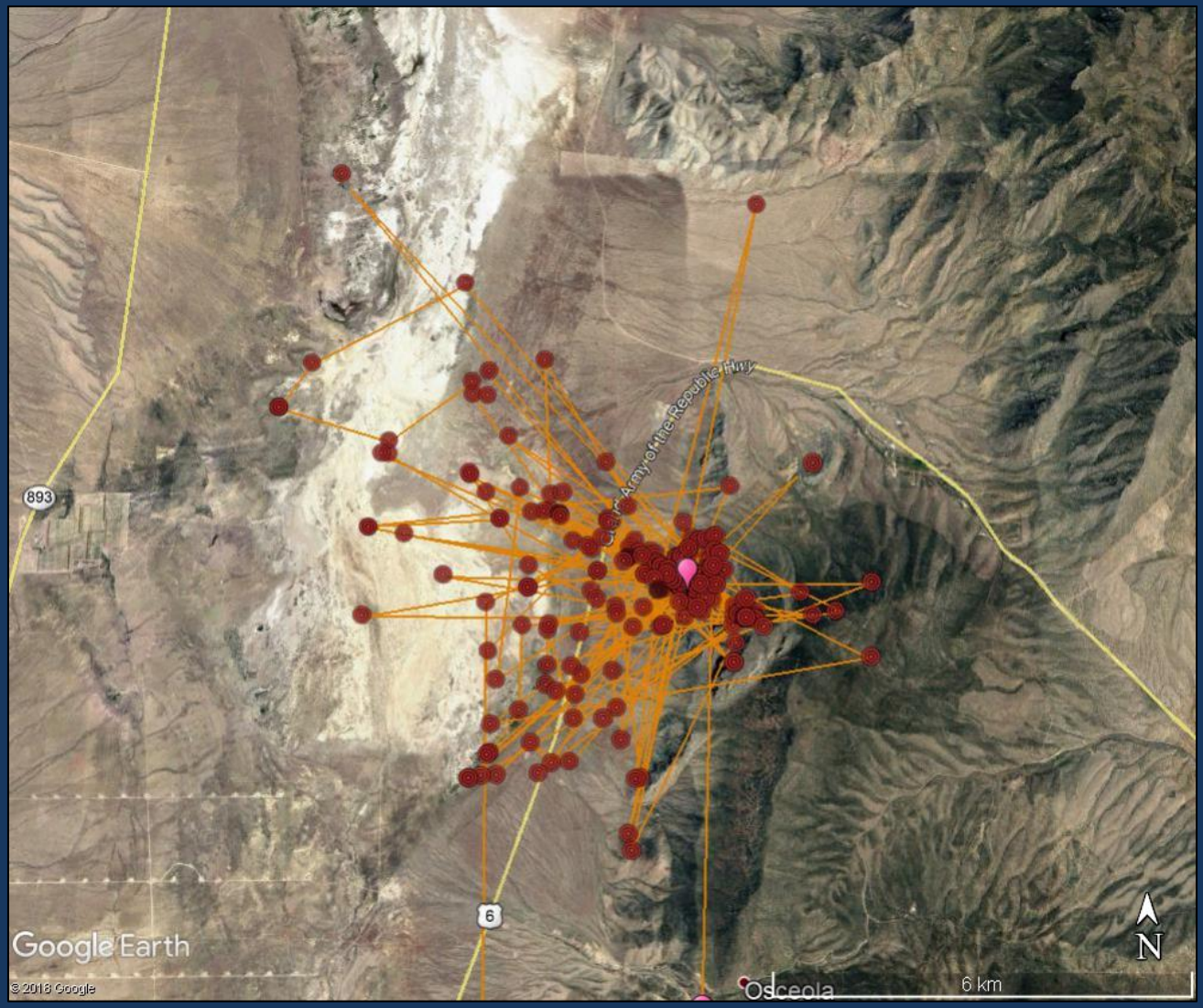
May



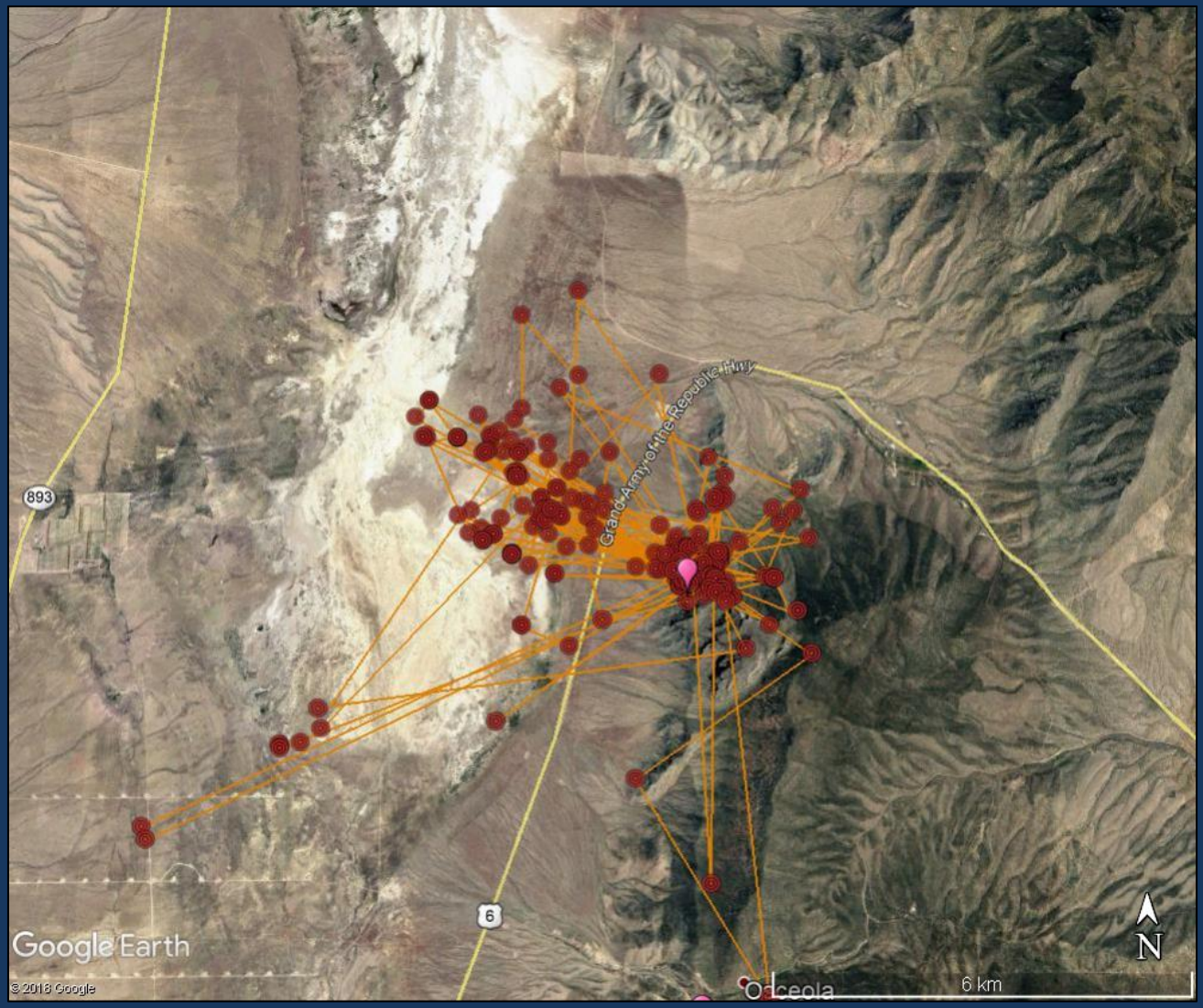
Movement Data (PTT): nonbreeding adult male

March



Movement Data (PTT): nonbreeding adult male

May



Summary

- Generally high year-round territory occupancy across the Great Basin in Nevada
- Aerial surveys, particularly those later in the breeding season, tend to underestimate population size
- Aerial surveys are good at locating nests, but assessing occupancy is biased toward breeding pairs, and successful breeding attempts
- Early ground surveys are very good detecting territory occupancy, but can be limited when assessing nests
- Rugged terrain can make some areas nearly impossible to thoroughly ground survey

Recommendations

- Recommend using a mix of ground and aerial surveys to accurately determine the potentially impacted population size and to track occupancy and productivity
- Initial ground surveys should occur during courtship whenever possible
- Initial aerial surveys are potentially more effective once pairs have begun incubating, but remain biased in assessing occupancy
- Study detection rates (ground and aerial methodology) for successfully locating and assessing occupancy status of Golden Eagle territories and nests

Special Thanks

- Nevada Department of Wildlife
  - Jennifer Newmark
  - Cris Tomlinson
  - Laura Richards
- Bureau of Land Management
  - Todd Trapp & Alicia Styles
  - Sandra Brewer
- American Eagle Research Institute
  - Daniel Driscoll, Gregg Doney, Nick Todd, Dave Haines, Diego Johnson
- Hycroft Mining Corporation
  - Tracey Thom
- Wildlife Resource Consultants LLC
  - Sue Fox and Matt Kiesse
- Spring Valley Wind TAC
- Multiple field assistants