

Suisun Marsh Waterfowl and Managed Wetland Research Program



SUISUN MARSH PROGRAM



California
DEPARTMENT OF WATER RESOURCES

Waterfowl Populations

Since the 1974 Suisun Marsh Preservation Act 7 species have shown a significant decline on the Midwinter Waterfowl Survey

Pintail 83%

Cinnamon Teal 82%

Mallard 68%

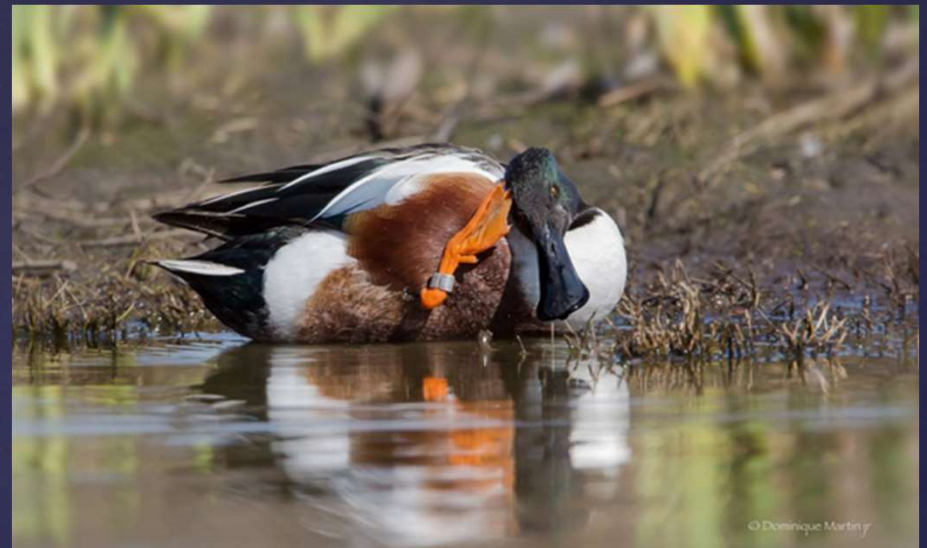
Redhead 45%

Scaup 24%

White-fronted Geese 58%

Snow Geese 50%

Total Dabbling Ducks 60%

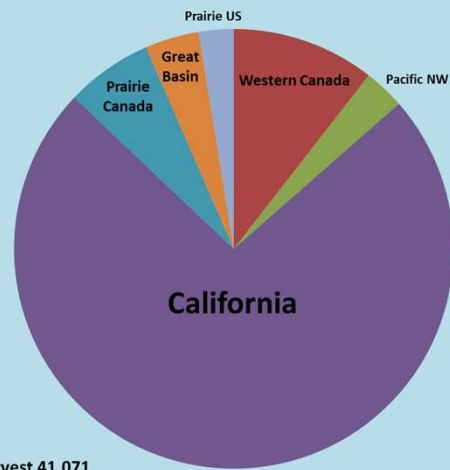


Program Goals 10-year Program

- Understand habitat use and foraging needs of wintering waterfowl
- Evaluate importance of California's breeding waterfowl- develop management practices
- Identify other key potential impacts (geese!)
- Develop and implement management actions based on research findings

Breeding Habitats!

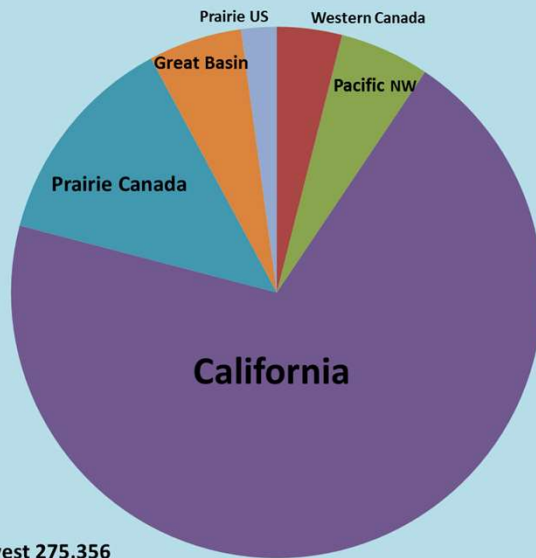
Cinnamon and Blue-winged Teal



Average Annual Harvest 41,071

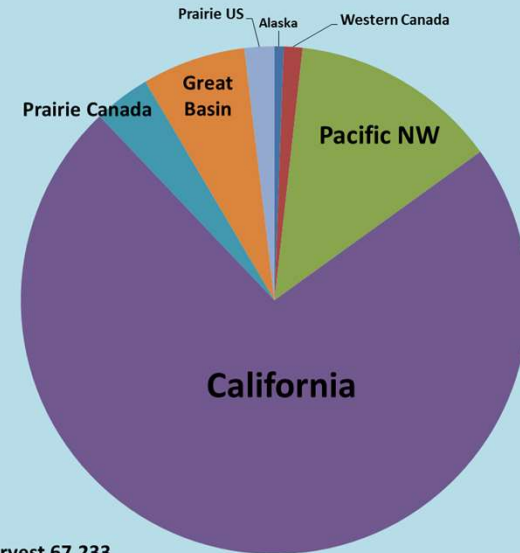


Mallard



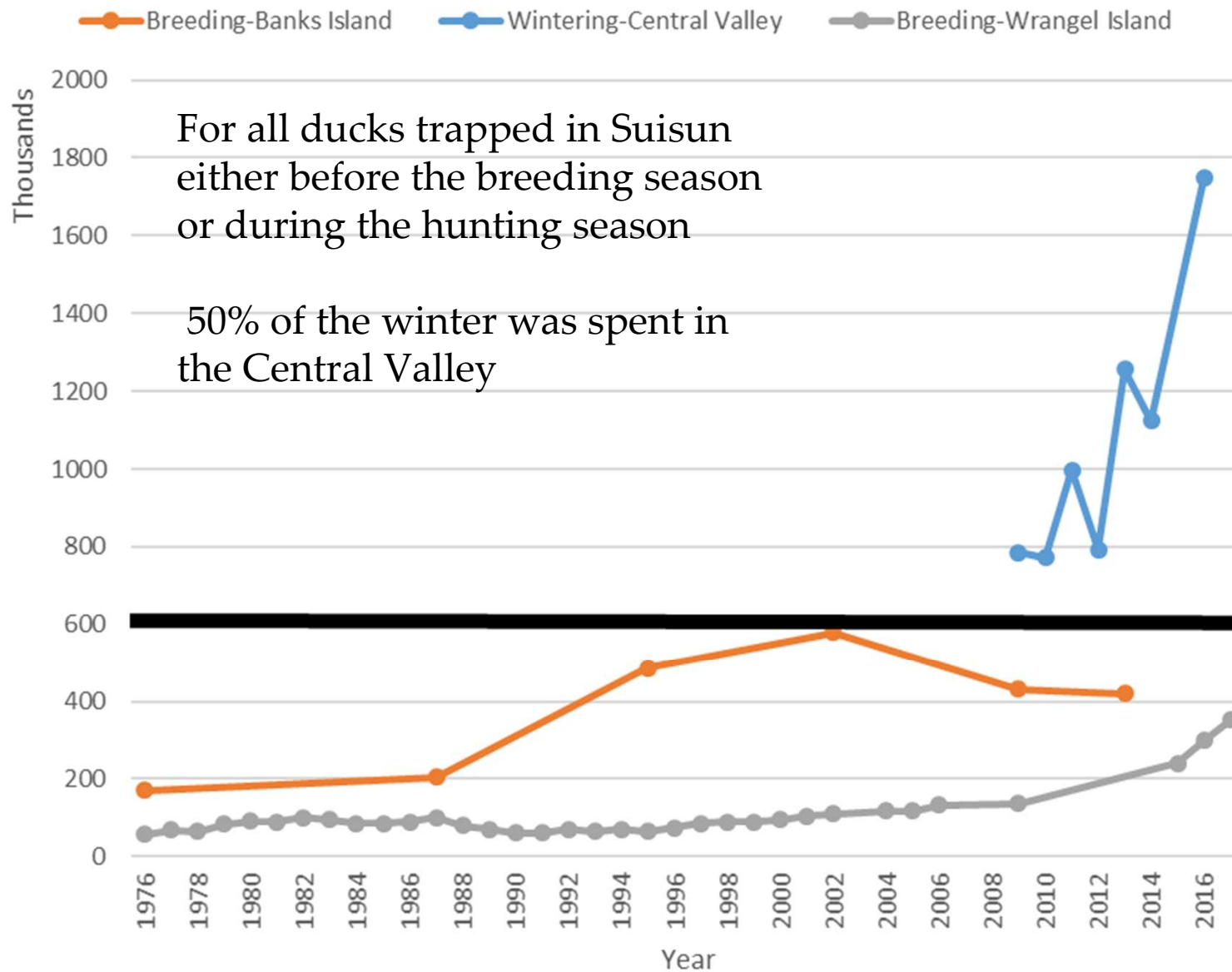
Average Annual Harvest 275,356

Gadwall

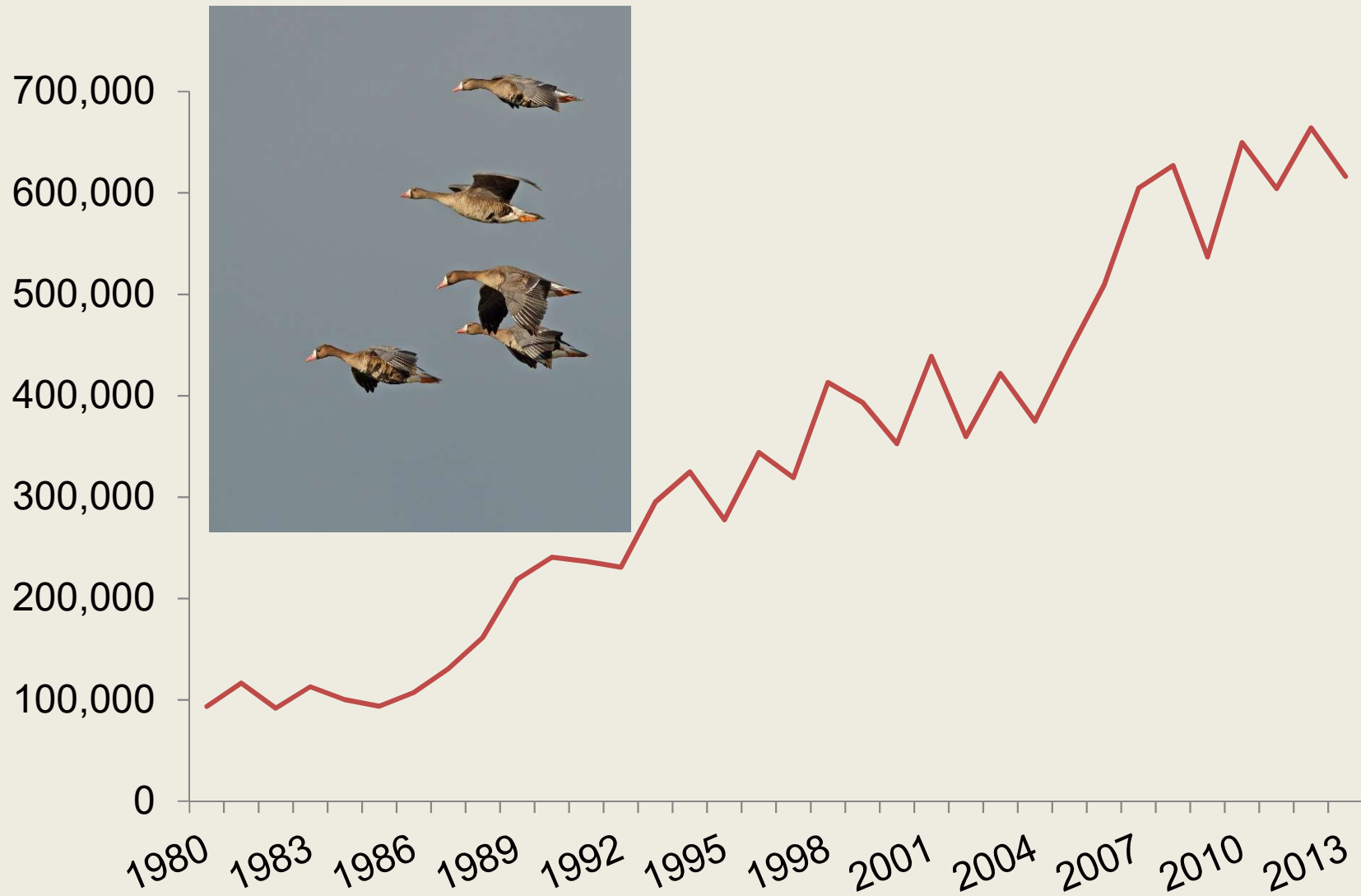


Average Annual Harvest 67,233

Lesser Snow and Ross's Goose Population Estimates Breeding and Wintering in the Central Valley – Impacts on Wintering Duck foods?



White-Fronted Goose Counts – October



For up to 13 species of waterfowl
examine habitat use and movements
using telemetry

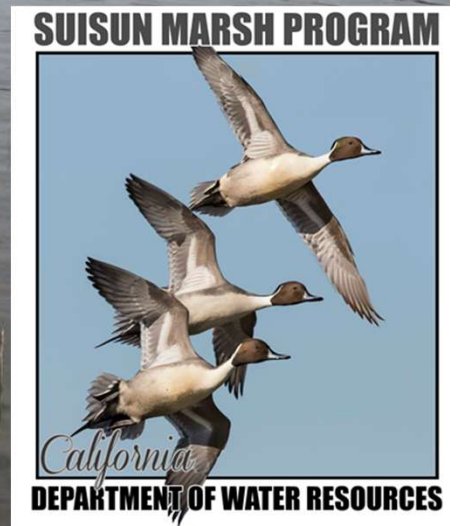


Examine nesting ecology of Mallards,
Gadwall, & Cinnamon Teal

Thank You!



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Suisun Marsh Branch
CA Department of Water Resources
916-376-9693 Office
Cliff.Feldheim@water.ca.gov



Breeding and Wintering Waterfowl in California



Research Objectives

- Life cycle of different species
 - Nesting
 - Brooding
 - Molting
 - Migration
- Species differences
- Space use and movements
 - Roosting/Foraging areas (daily and seasonal)
 - Variables effecting movements (i.e. hunting, weather)
- Habitat use regionally



MALLARD



PINTAIL



WIGEON



SHOVELER



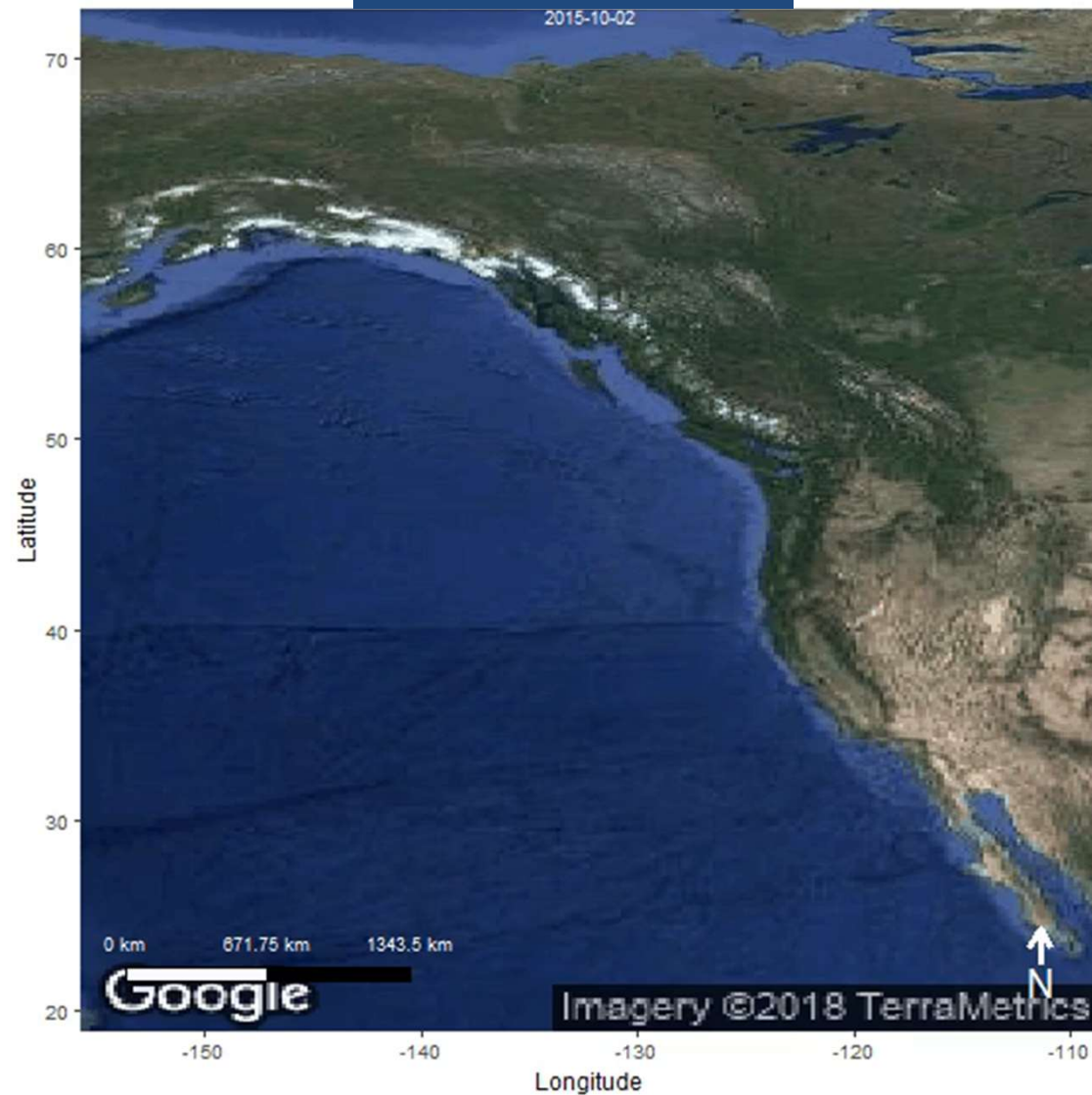
GADWALL

Waterfowl Movements in Suisun (And Beyond)

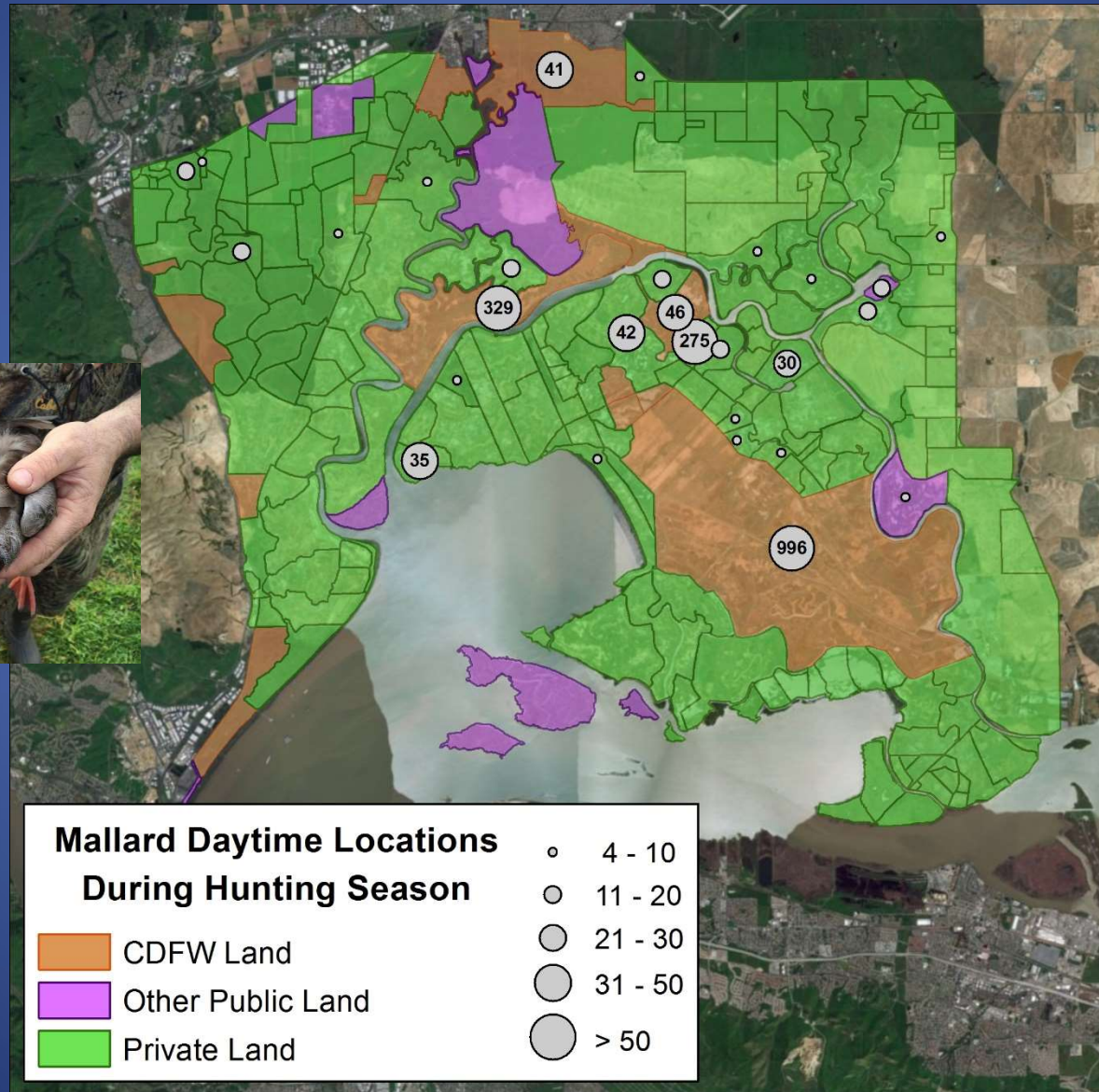


Waterfowl Movements in Suisun (And Beyond)

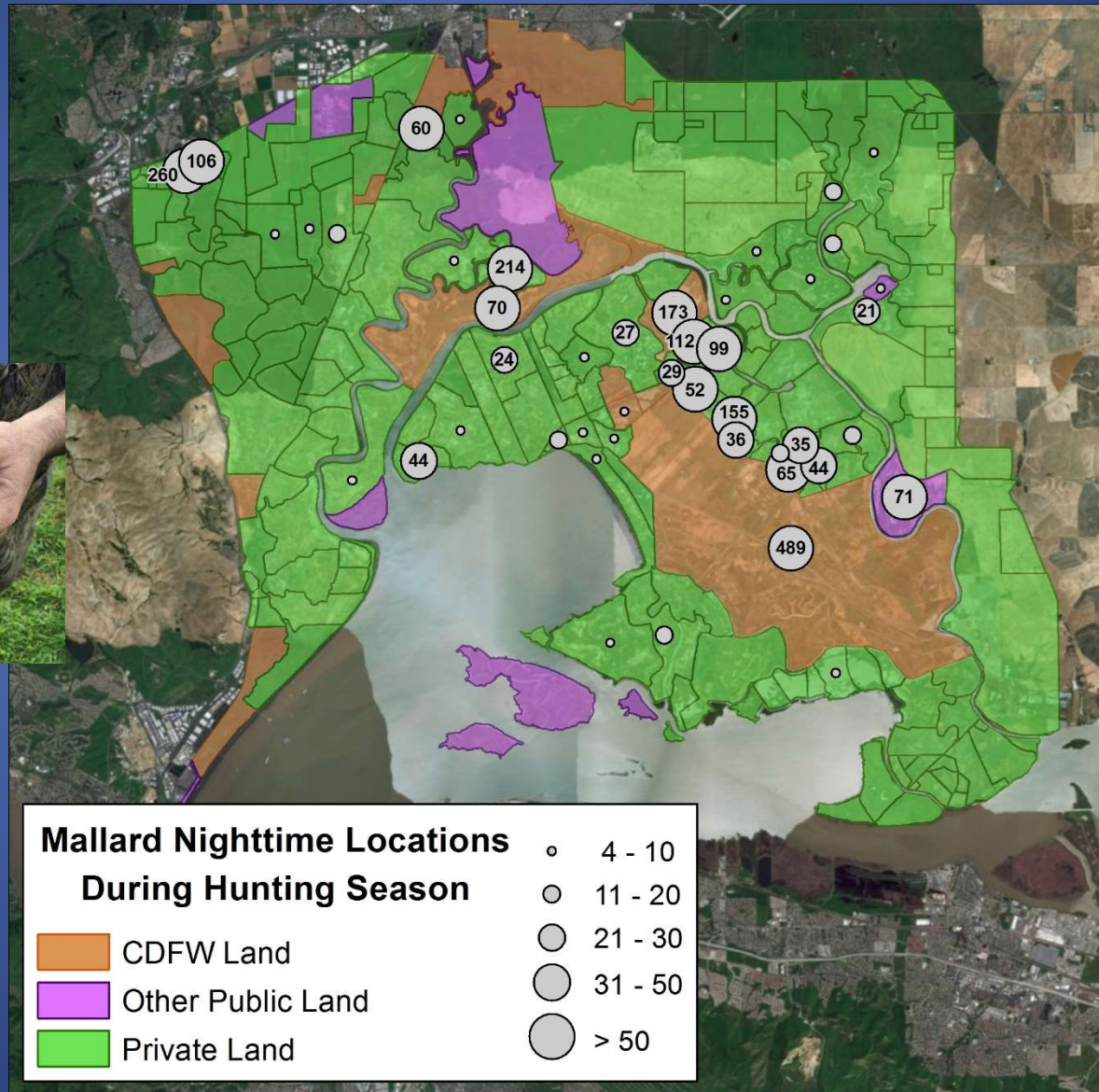
Drake Pintail Wate66



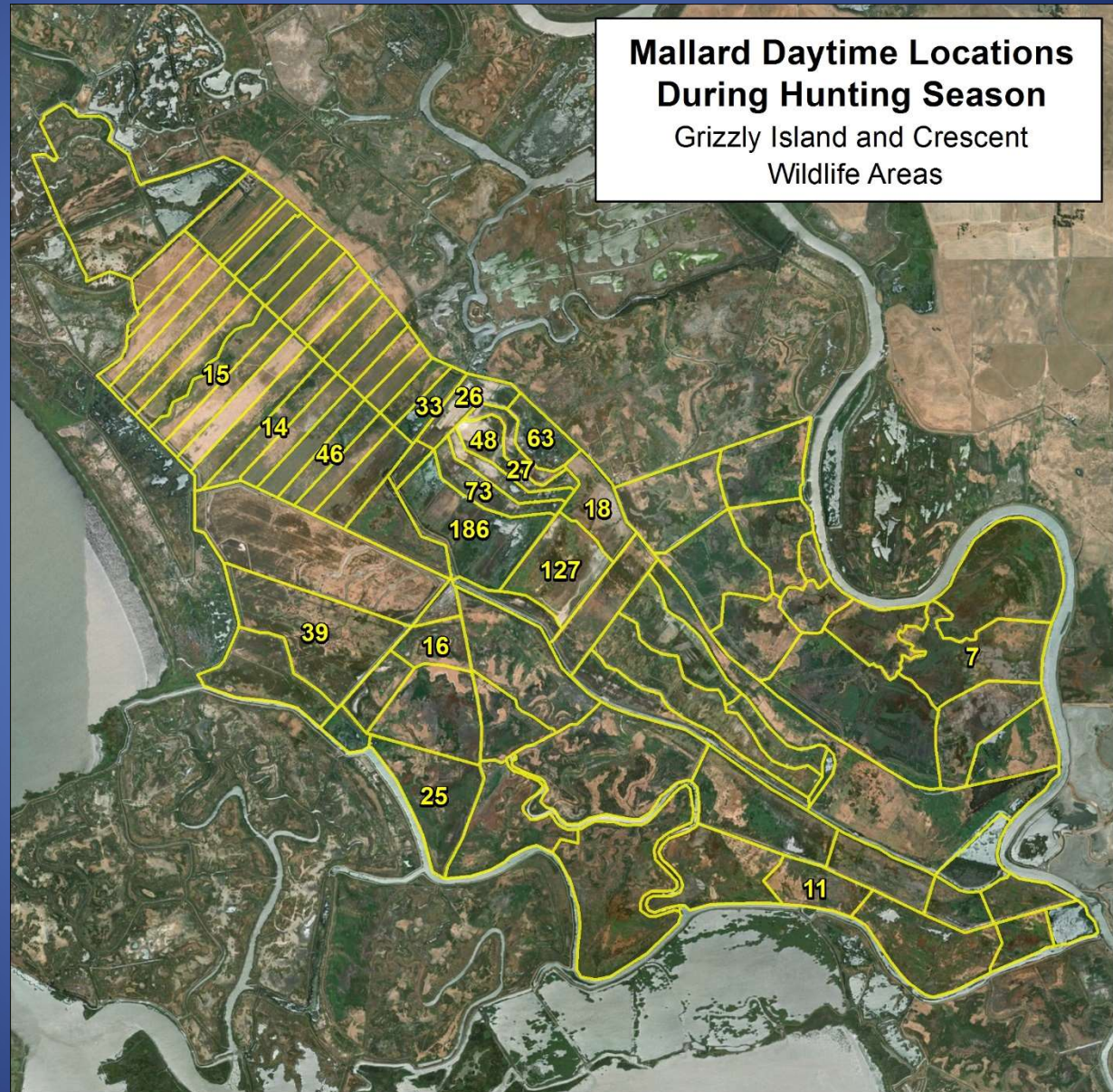
Mallard Hunting Season Points: 2015-18



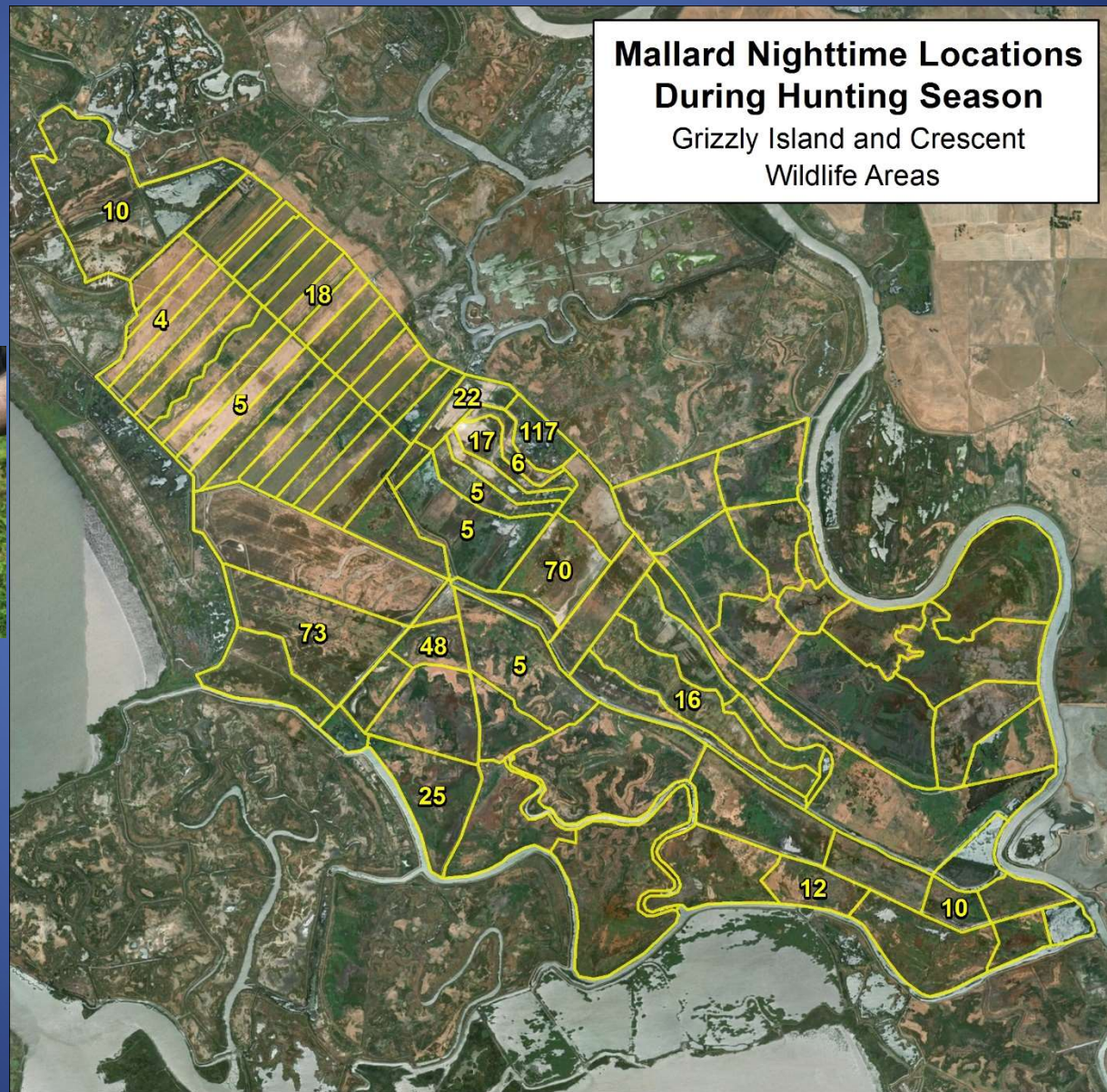
Mallard Hunting Season Points: 2015-18



Mallard Hunting Season Points: 2015-18



Mallard Hunting Season Points: 2015-18

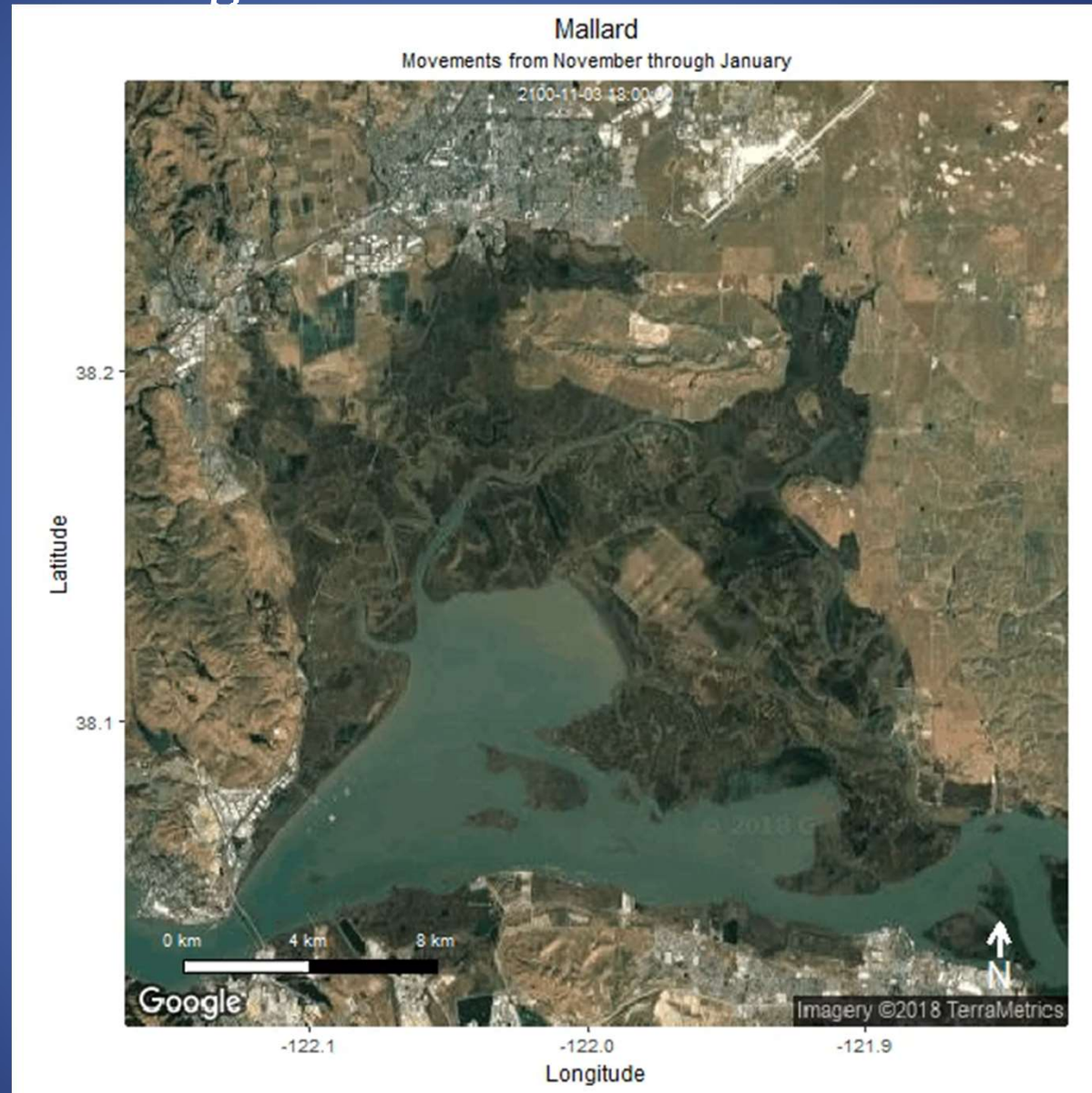


Mallard Hunting Season Points: 2015-18

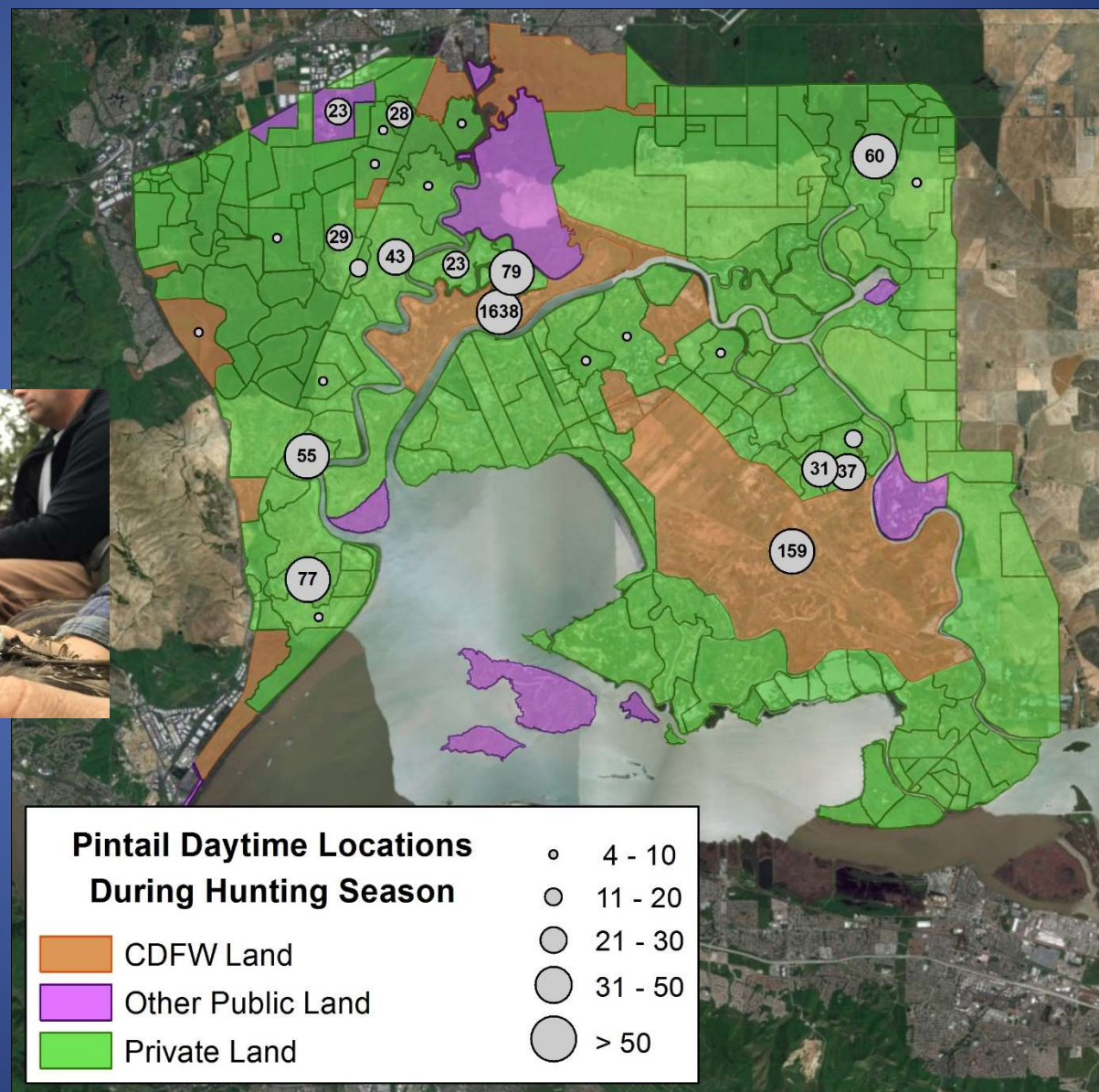
PRIVATE: DAYTIME				GRIZZLY AND CRESCENT WILDLIFE AREAS: DAYTIME			
Property	Location_Count	Individuals	Days	Unit	Location_Count	Individuals	Days
Sweetwater Gun Club	20	1	14	12F-1	63	3	45
Westwind Duck Club	30	2	19	12B	73	11	56
Tip End Gun Club	35	1	18	12G	127	4	75
Grizzly Ranch	42	4	33	12A	186	16	132
Balboa Farms	275	5	165	12C	197	15	129
PRIVATE: NIGHTTIME				GRIZZLY AND CRESCENT WILDLIFE AREAS: NIGHTTIME			
Property	Location_Count	Individuals	Days	Unit	Location_Count	Individuals	Days
Ornbaun Kennels	106	1	53	17E	25	2	14
Balboa Farms	112	4	77	17C	48	1	31
Gang Bang Duck Club	155	1	68	12G	70	1	37
Joice Island Mallard Farms	214	3	119	16B	73	1	42
Sweetwater Gun Club	260	1	120	12F-1	117	2	62



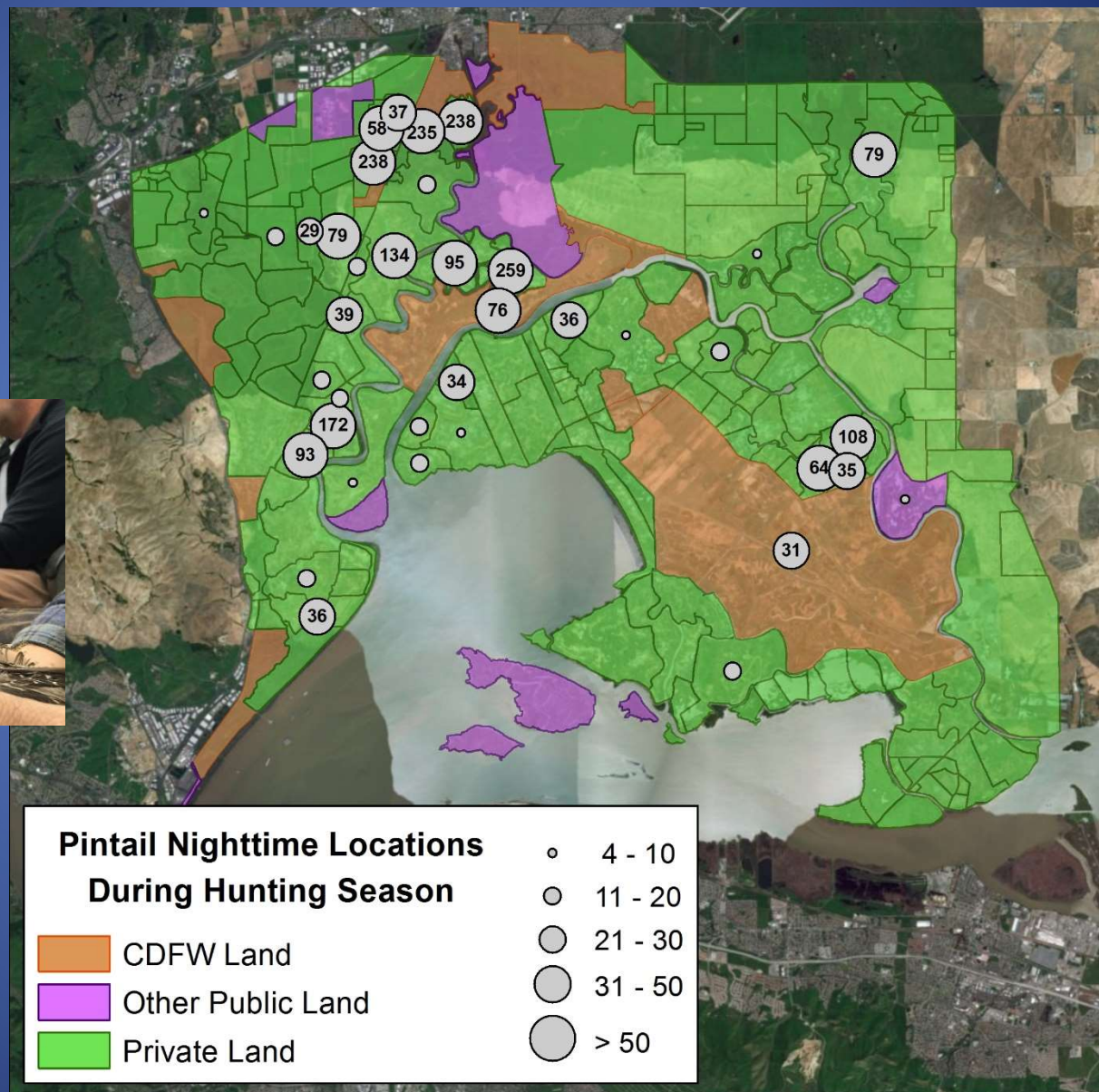
Mallard Hunting Season Movements: 2015-18



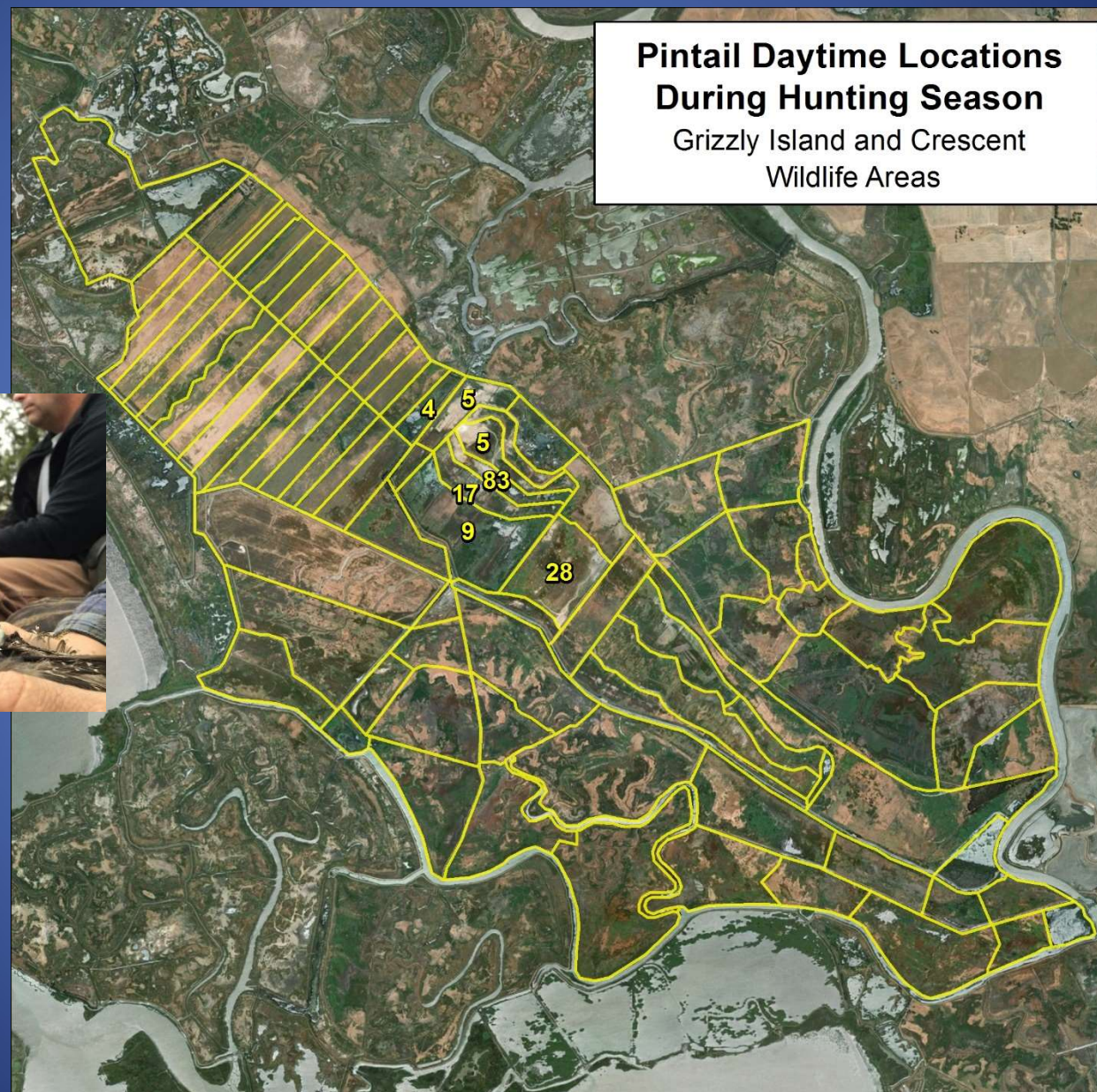
Pintail Hunting Season Points: 2015-18



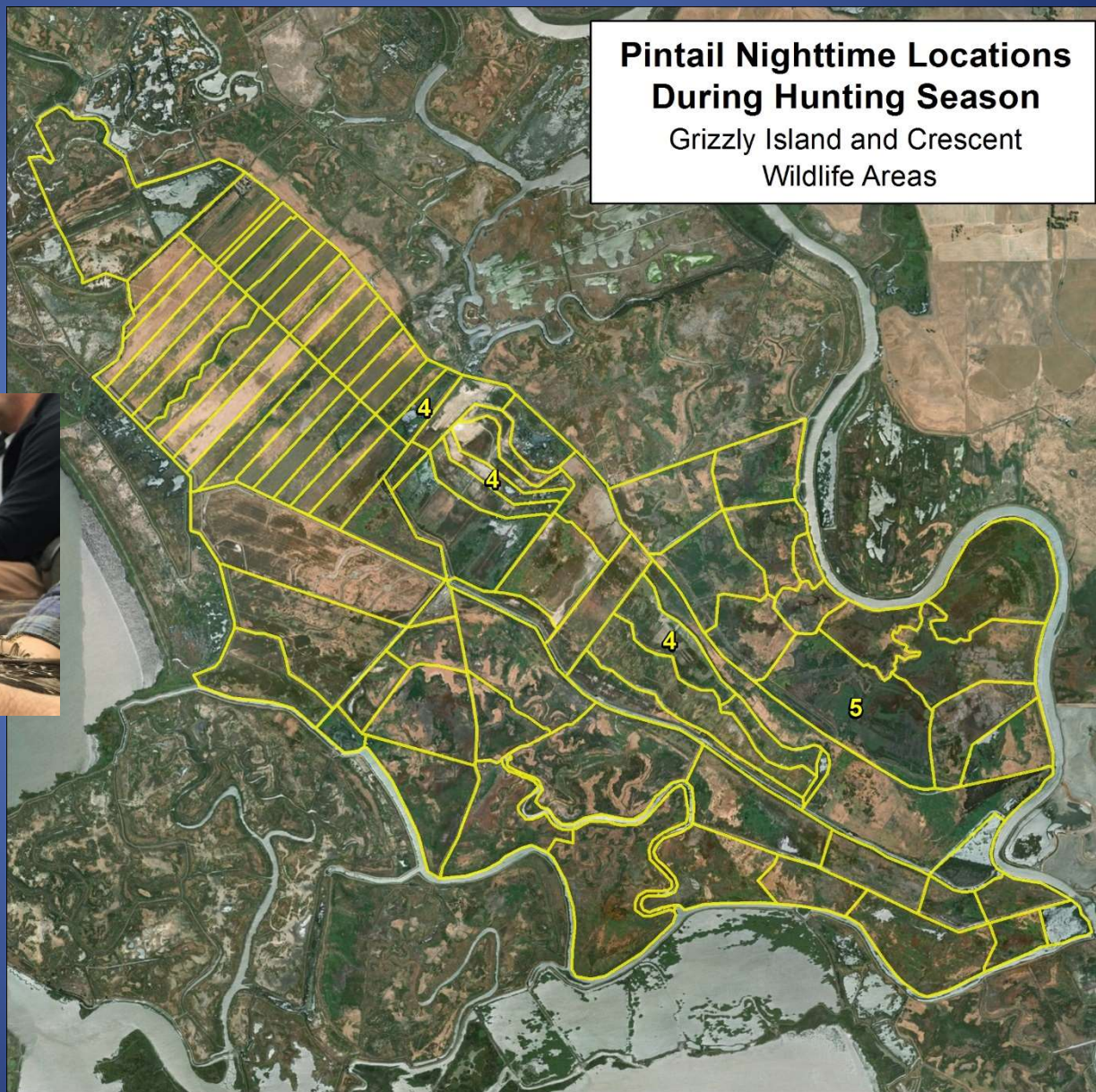
Pintail Hunting Season Points: 2015-18



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Pintail Hunting Season Points: 2015-18

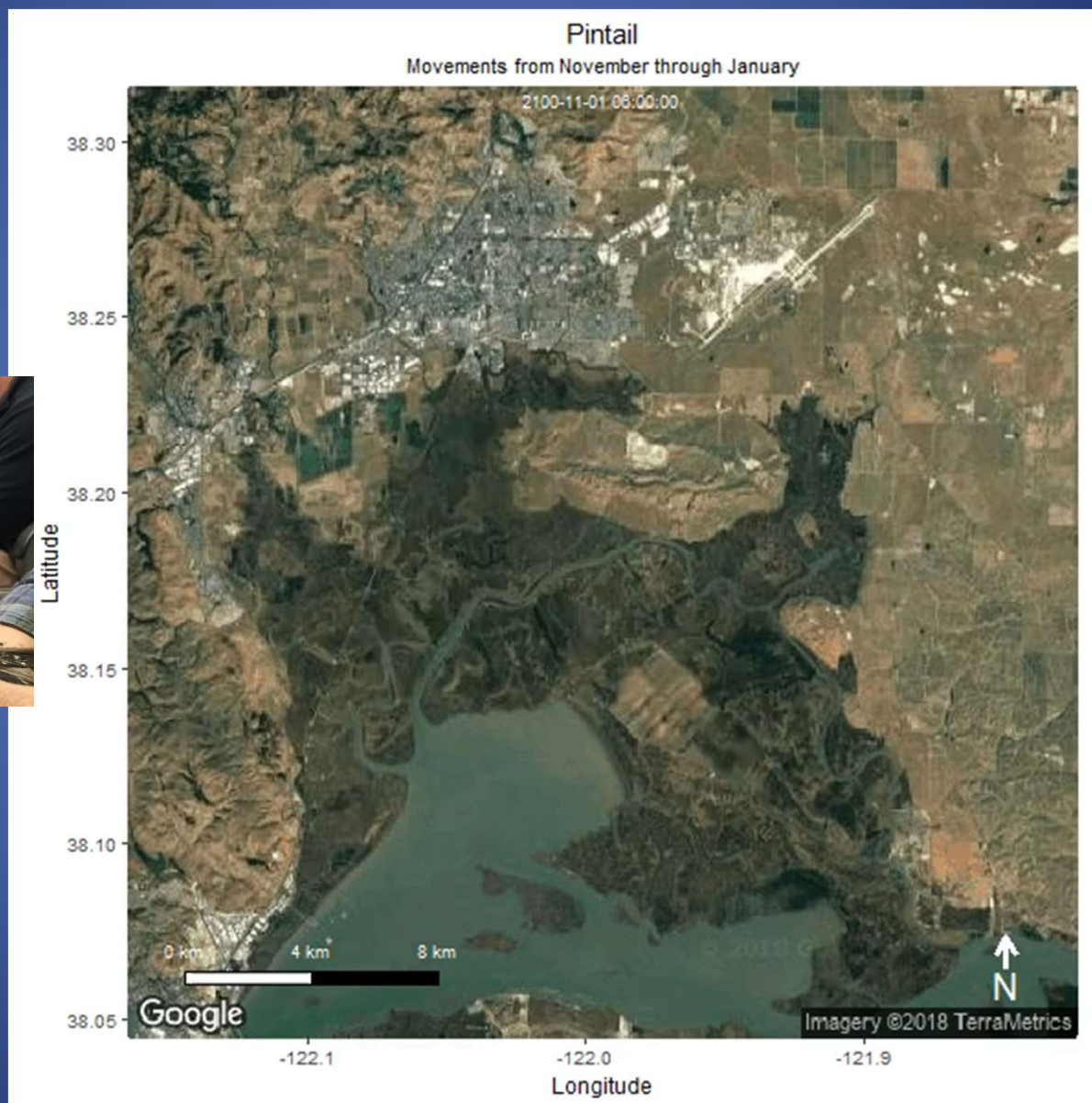


Pintail Hunting Season Points: 2015-18

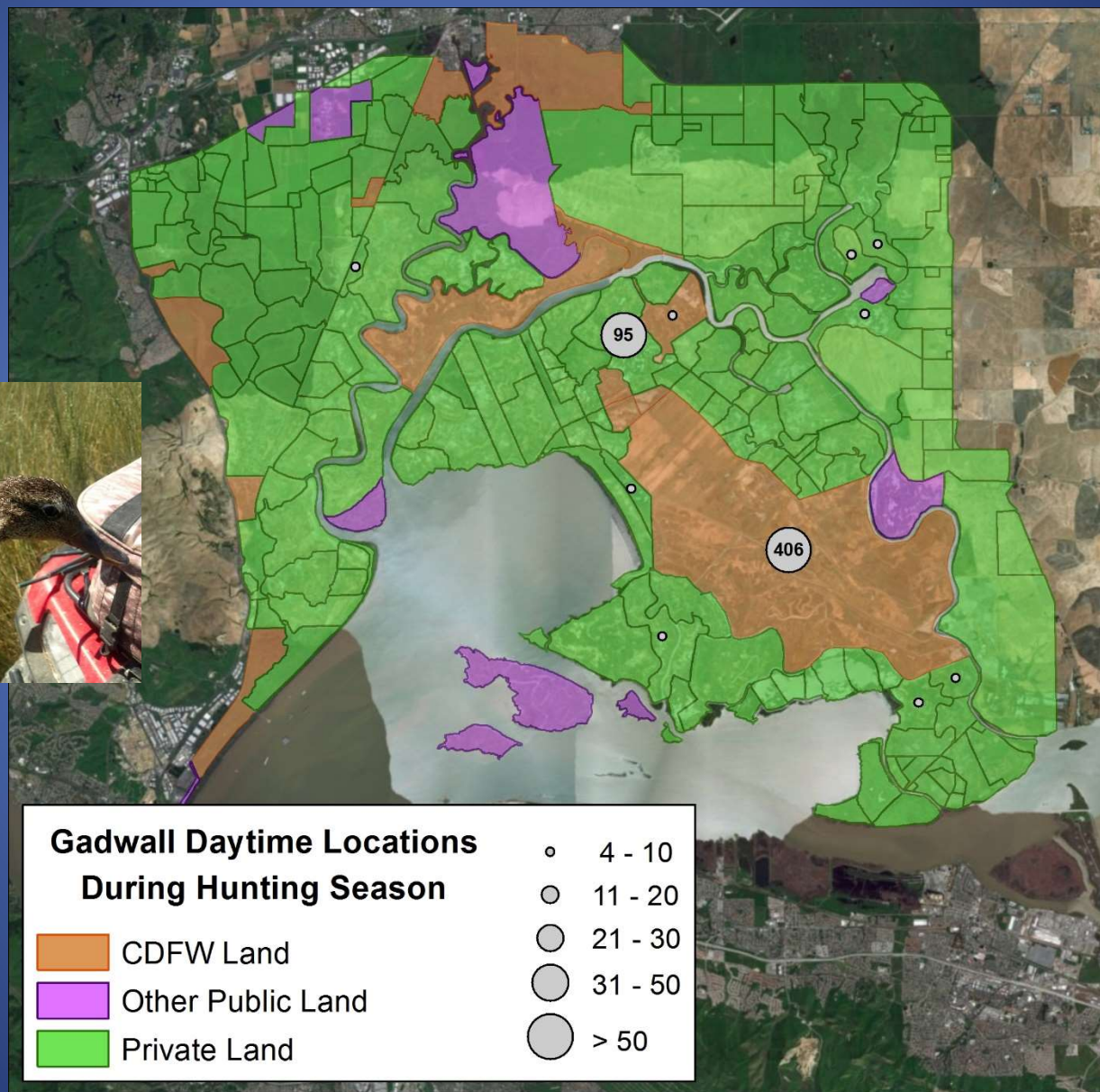
PRIVATE: DAYTIME					GRIZZLY AND CRESCENT WILDLIFE AREAS: DAYTIME				
Property	Location_Count	Individuals	Days		Unit	Location_Count	Individuals	Days	
Shelldrake Duck Club	43	5	32		12F-2	5	1	4	
Miramonte Gun Club	55	4	34		12A	9	2	6	
Denverton Land Company (304 and 306)	60	3	34		12B	17	2	13	
Mulberry Land Company	77	8	51		12G	28	3	10	
Joice Island Mallard Farms	79	4	43		12C	83	7	39	
PRIVATE: NIGHTTIME					GRIZZLY AND CRESCENT WILDLIFE AREAS: NIGHTTIME				
Property	Location_Count	Individuals	Days		Unit	Location_Count	Individuals	Days	
Antioch Golden Eye	172	4	55		11B	4	1	1	
Walnut Creek Gun Club	235	12	116		12C	4	1	2	
Wings Landing	238	17	130		13P	4	1	1	
Gray Goose	238	9	119		4A	5	1	2	
Joice Island Mallard Farms	259	8	104						



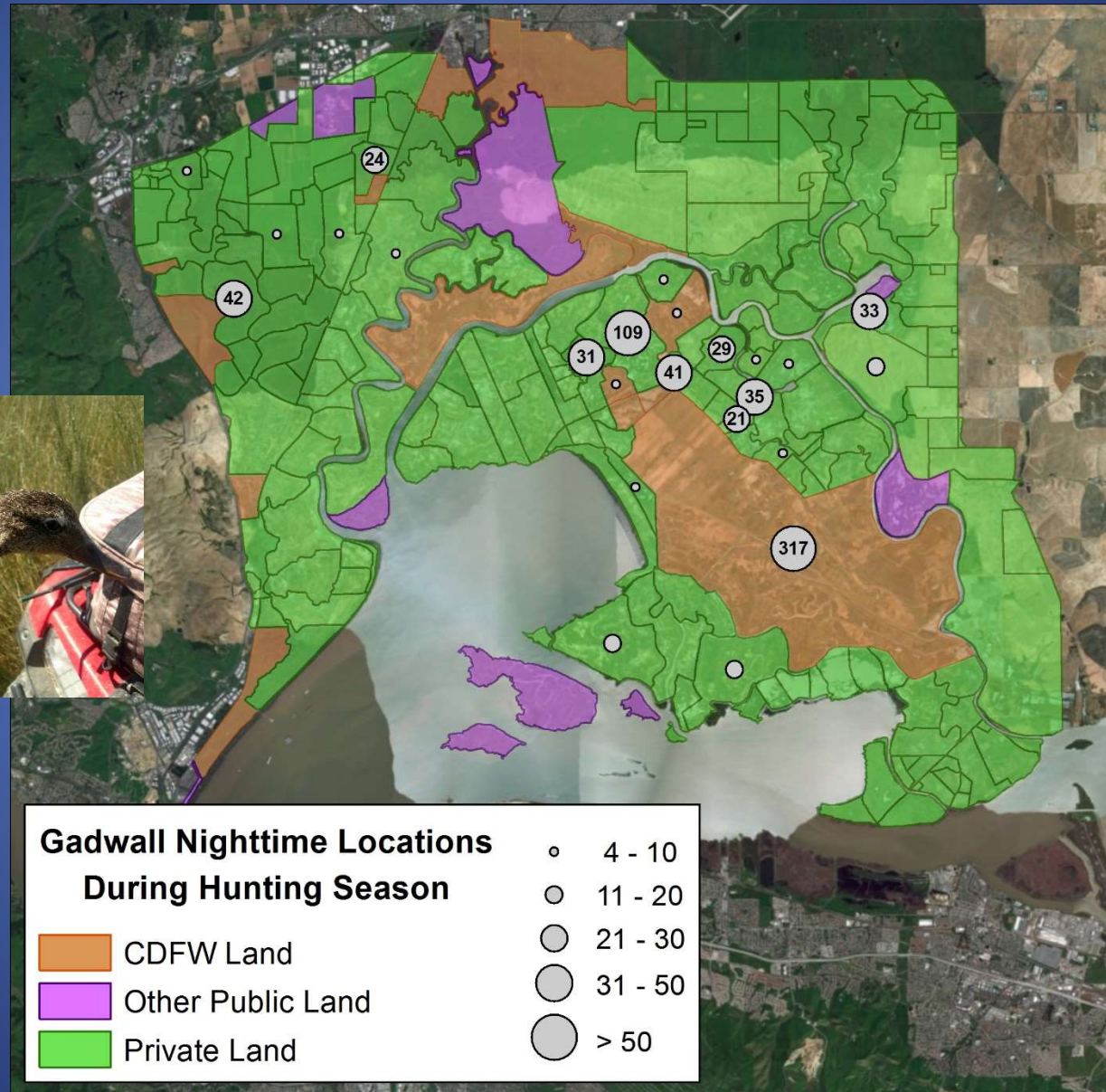
Pintail Hunting Season Points: 2015-18



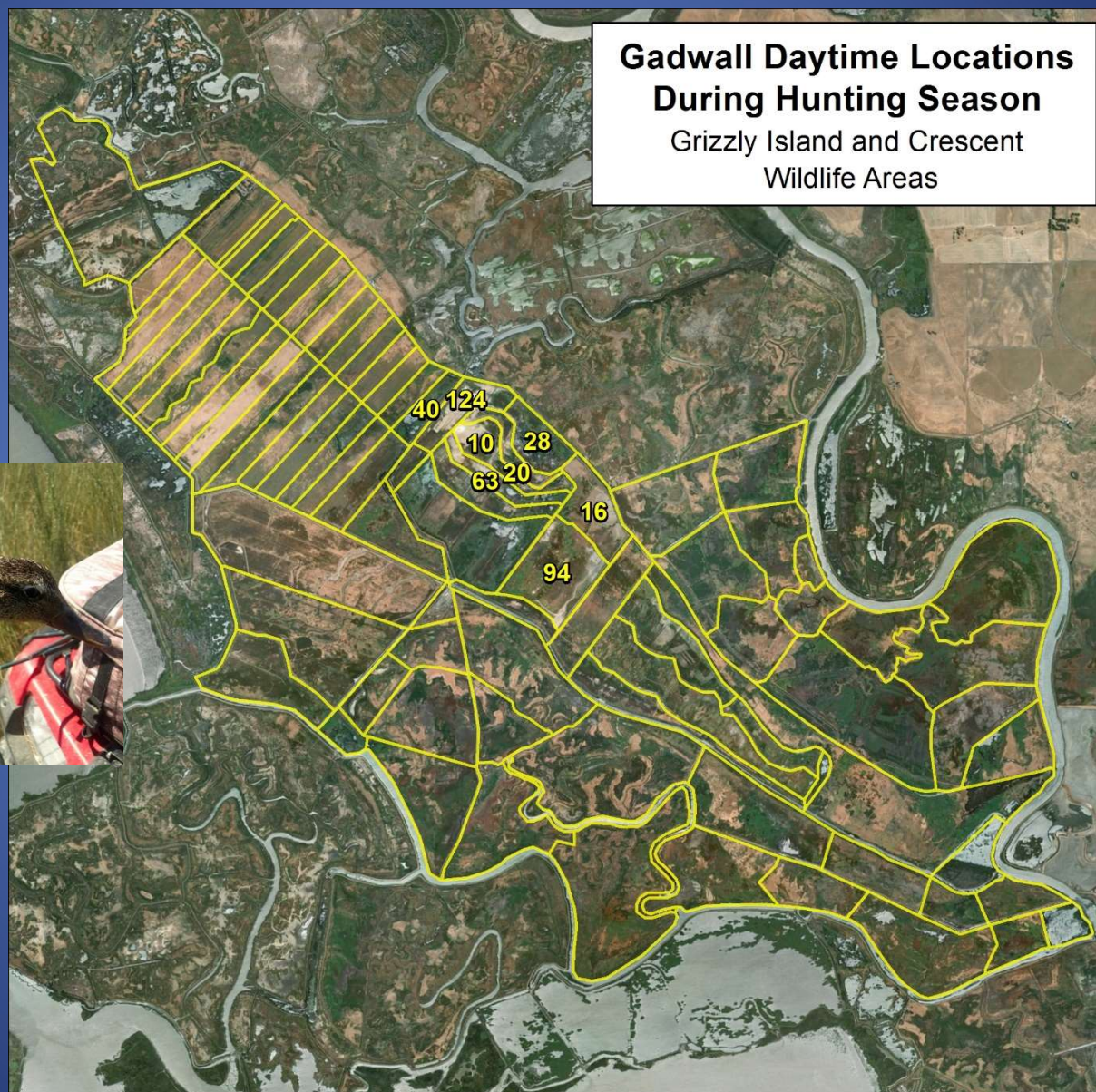
Gadwall Hunting Season Points: 2015-18



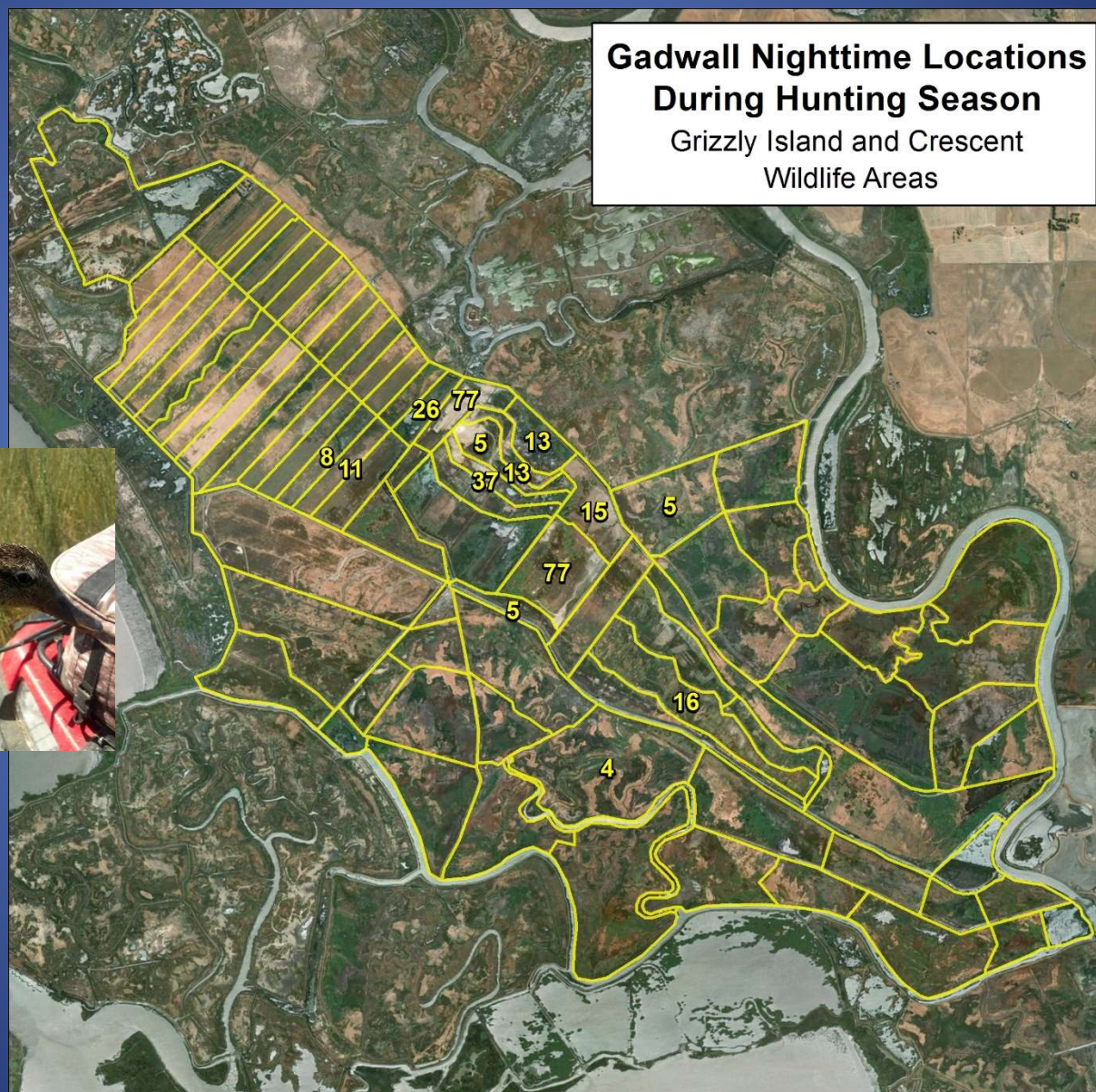
Gadwall Hunting Season Points: 2015-18



Gadwall Hunting Season Points: 2015-18



Gadwall Hunting Season Points: 2015-18



Gadwall Hunting Season Points: 2015-18

PRIVATE: DAYTIME					GRIZZLY AND CRESCENT WILDLIFE AREAS: DAYTIME				
Property	Location_Count	Individuals	Days		Unit	Location_Count	Individuals	Days	
Grizzly King Gun Club	4	1	3		12F-1	28	1	21	
The Duck Club	5	1	5		13P	40	4	29	
Grizzly Ranch	95	4	47		12C	63	5	47	
					12G	94	3	55	
					12F-2	124	4	80	
PRIVATE: NIGHTTIME					GRIZZLY AND CRESCENT WILDLIFE AREAS: NIGHTTIME				
Property	Location_Count	Individuals	Days		Unit	Location_Count	Individuals	Days	
The Duck Club	33	2	22		11A	16	2	9	
The Sleeping Pintail	35	1	20		13P	26	2	13	
Marsh Club	41	1	18		12C	37	3	22	
Cordelia Gun Clug	42	2	23		12G	77	3	43	
Grizzly Ranch	109	4	54		12F-2	77	4	37	

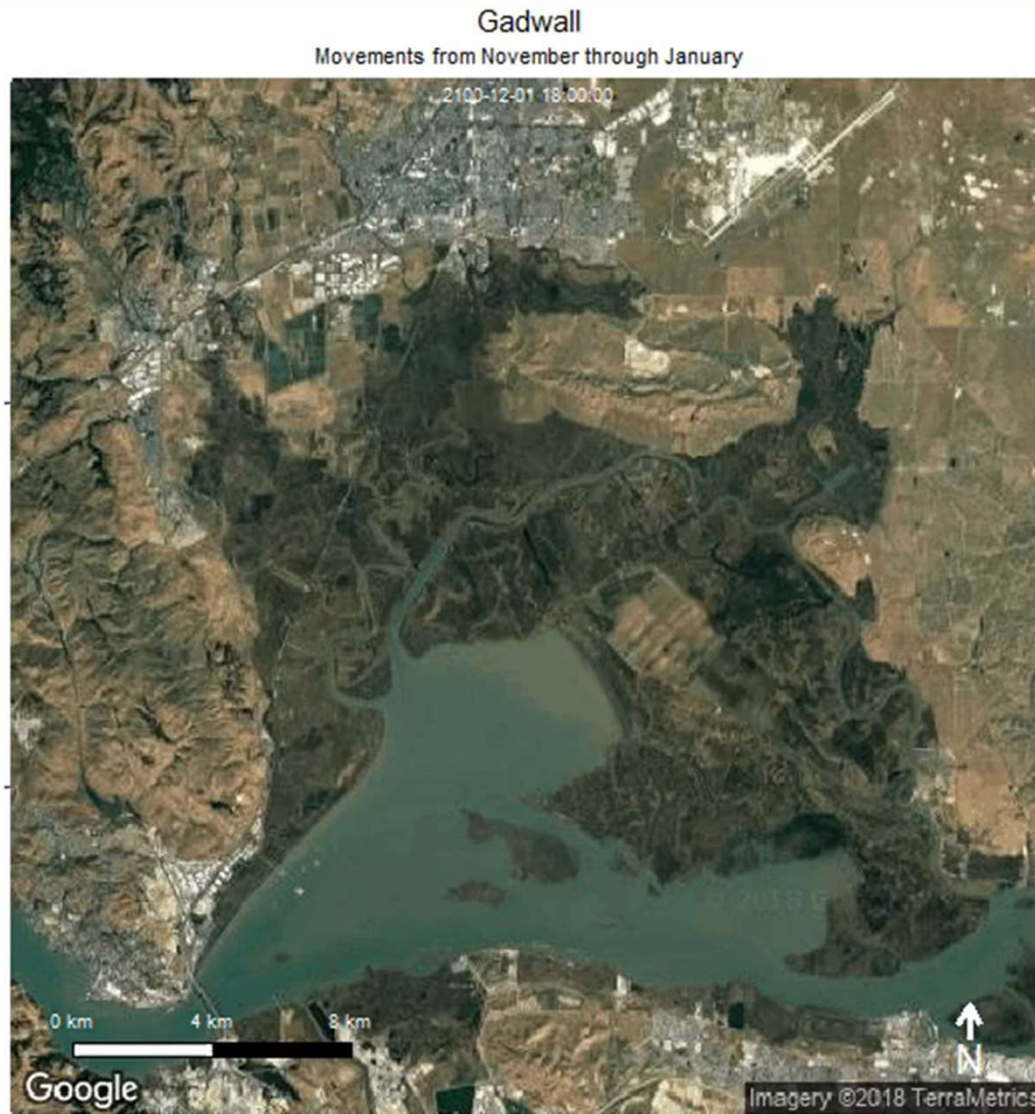


Gadwall Hunting Season Movements: 2015-18



38.2

38.1



-122.1

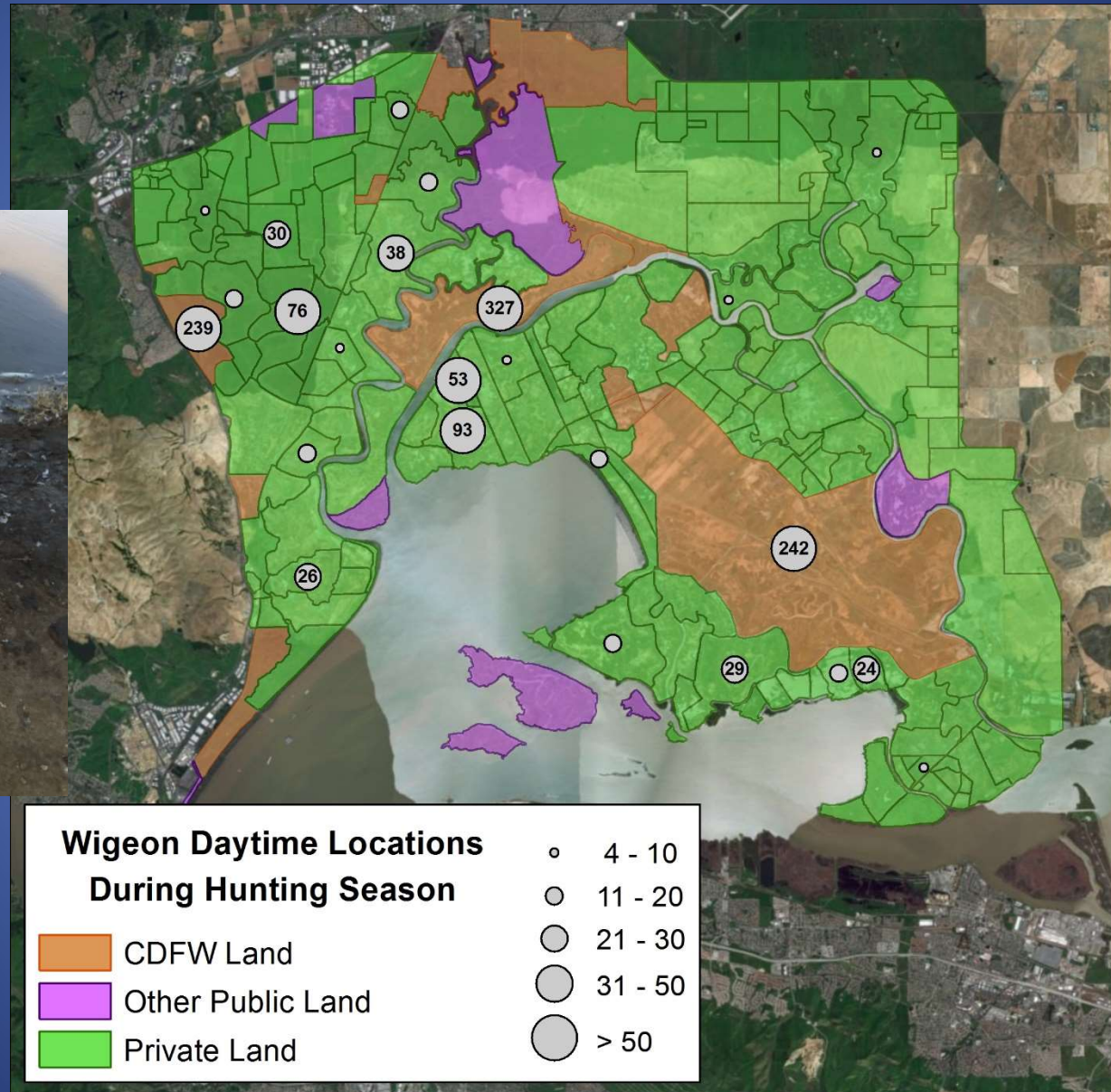
Longitude

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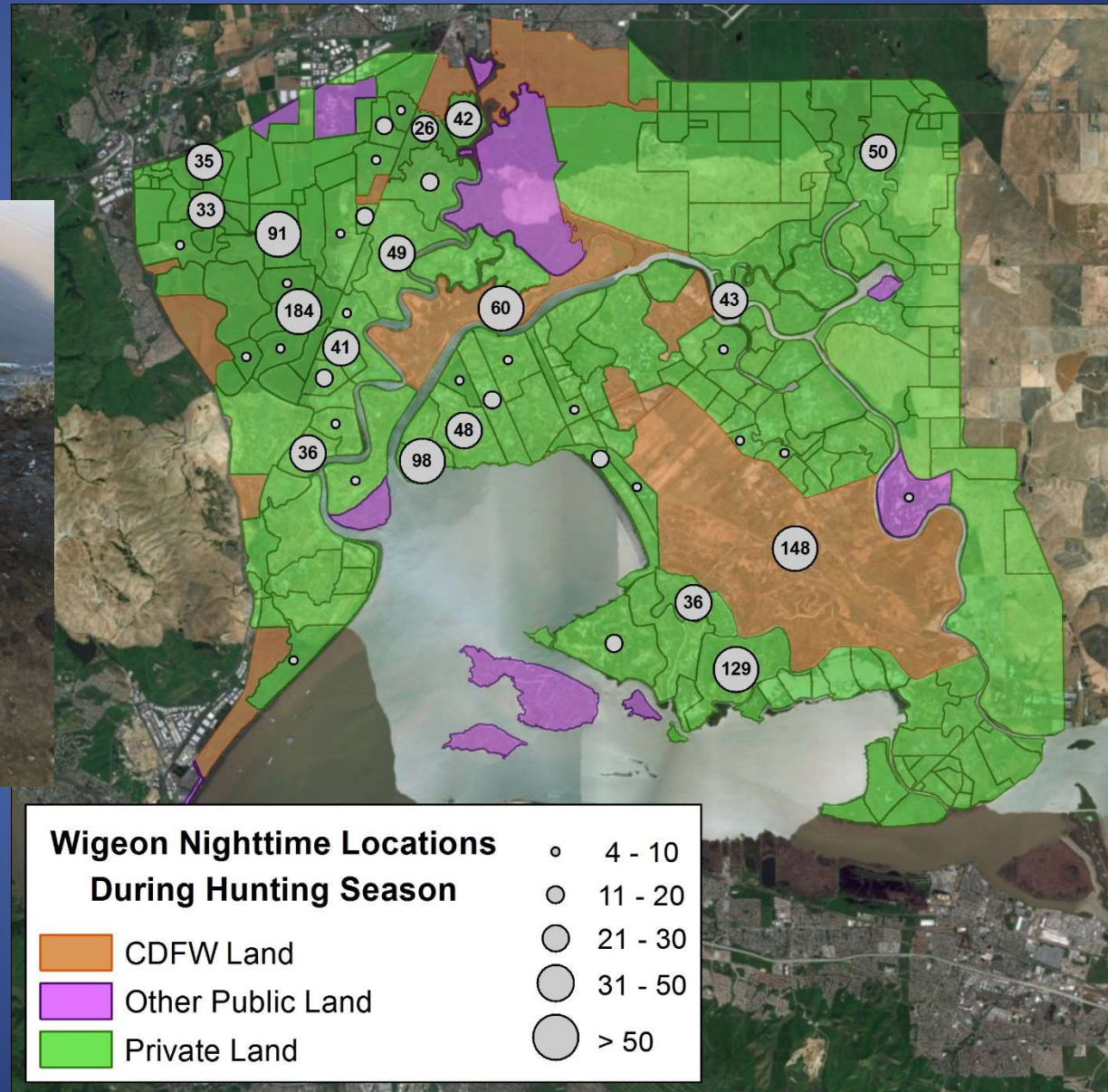
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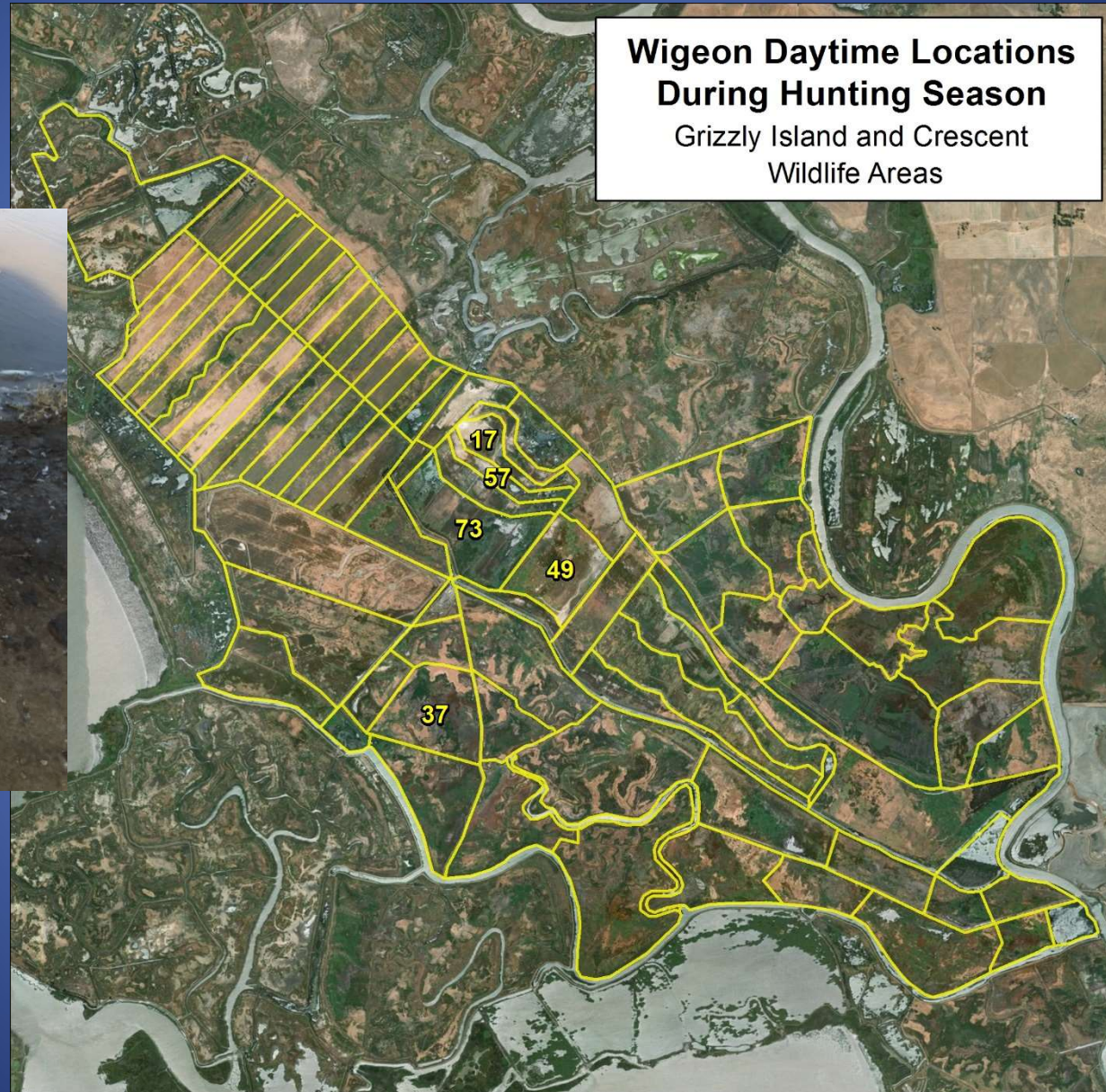
Wigeon Hunting Season Points: 2015-18



Wigeon Hunting Season Points: 2016-18



Wigeon Hunting Season Points: 2016-18



Wigeon Hunting Season Points: 2016-18

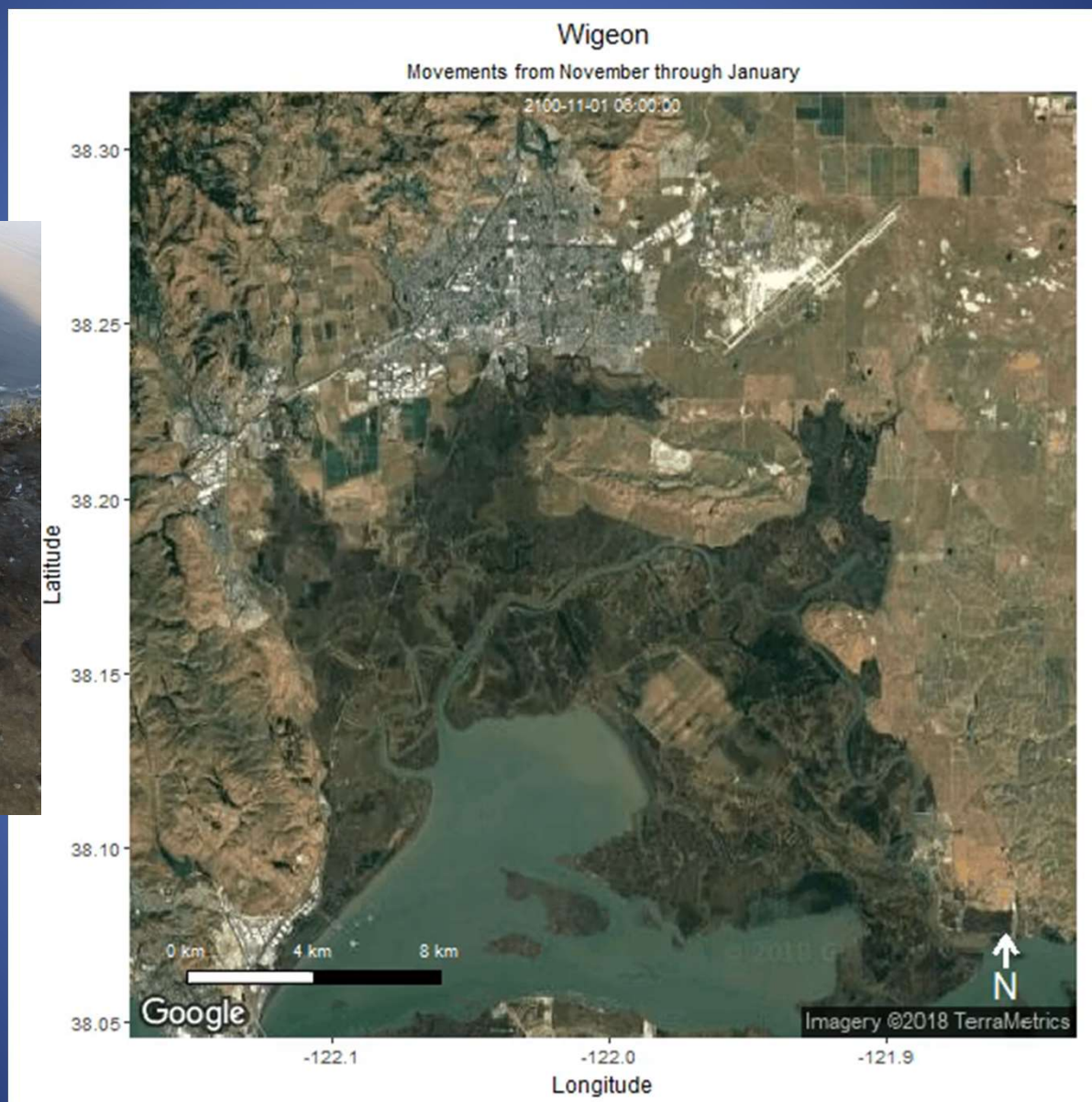


Wigeon Hunting Season Points: 2016-18

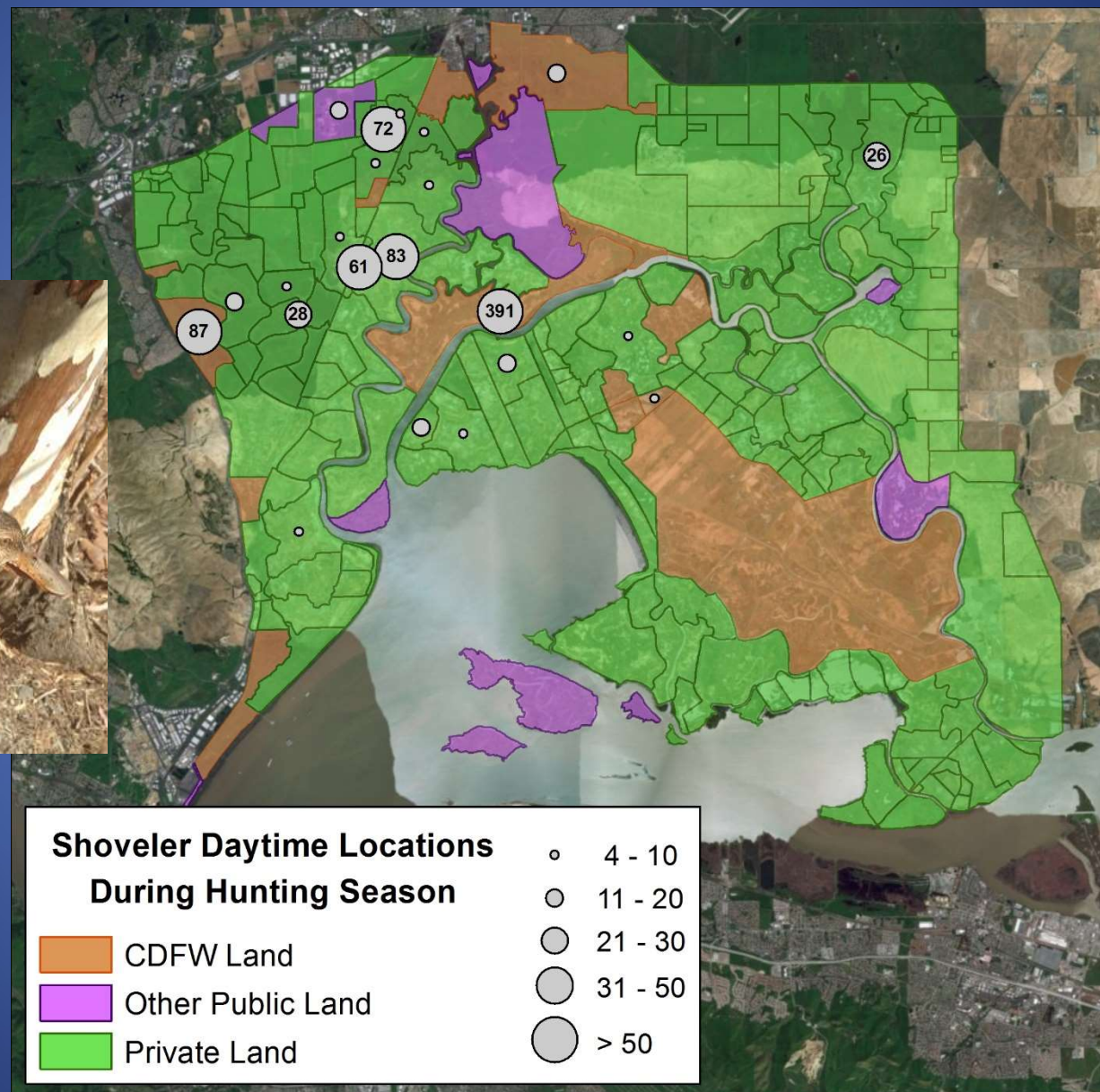
PRIVATE: DAYTIME				GRIZZLY AND CRESCENT WILDLIFE AREAS: DAYTIME			
Property	Location_Count	Individuals	Days	Unit	Location_Count	Individuals	Days
Suisun Marsh Hunting Preserve	30	2	19	12D	17	2	12
Shelldrake Duck Club	38	3	27	17D	37	2	19
Grizzly Duck Club	53	1	32	12G	49	1	26
Teal Duck Club	76	3	54	12C	57	4	40
The Island Club	93	6	55	12A	73	4	45
PRIVATE: NIGHTTIME				GRIZZLY AND CRESCENT WILDLIFE AREAS: NIGHTTIME			
Property	Location_Count	Individuals	Days	Unit	Location_Count	Individuals	Days
Denverton Land Company (304 and 306)	50	2	27	21	6	1	3
Suisun Marsh Hunting Preserve	91	3	51	17B	6	2	4
Tip End Gun Club	98	5	44	17D	28	2	15
Wheeler Island	129	13	66	11B	35	1	22
Teal Duck Club	184	4	99	12G	56	1	30



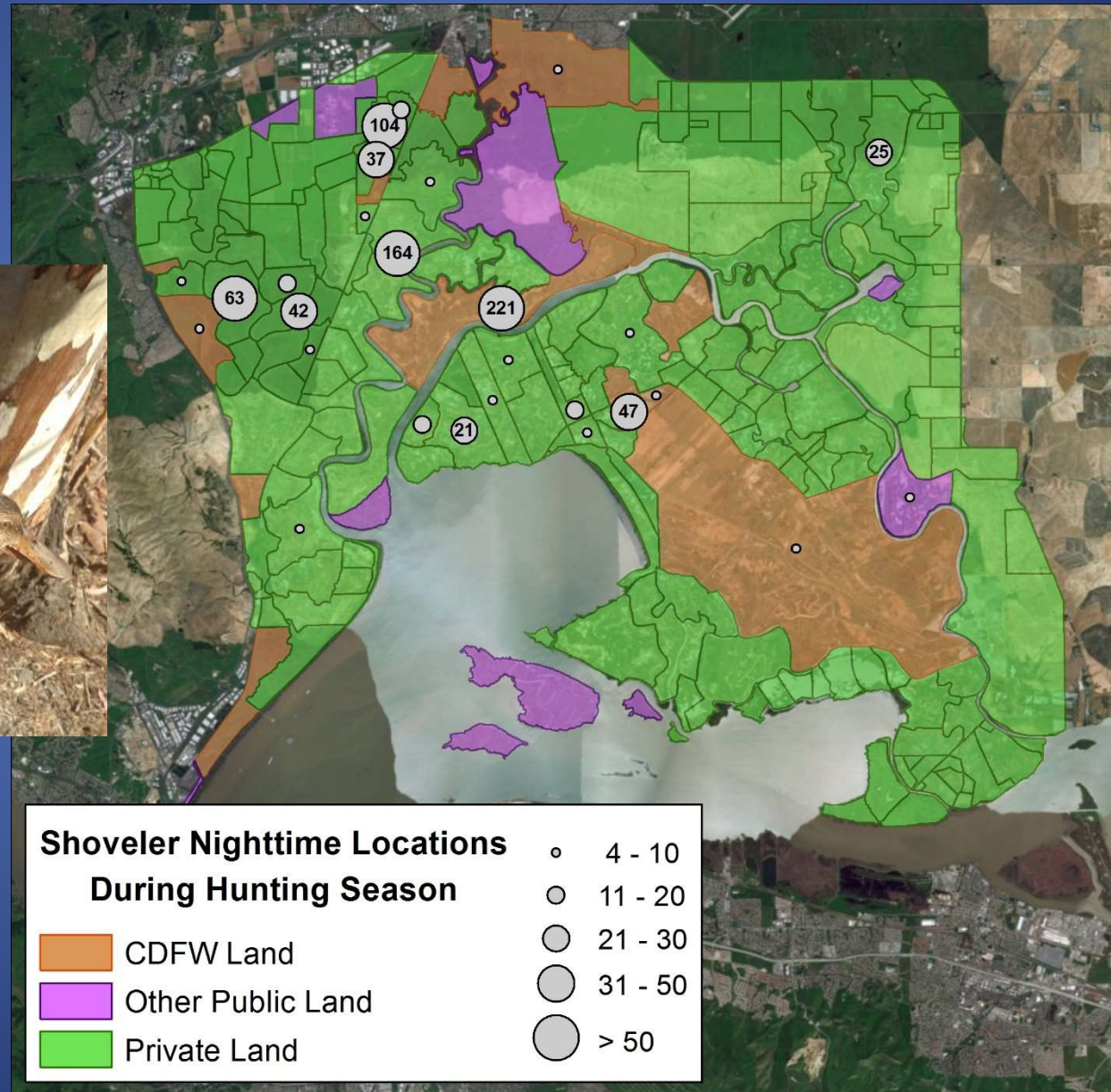
Wigeon Hunting Season Movements: 2016-18



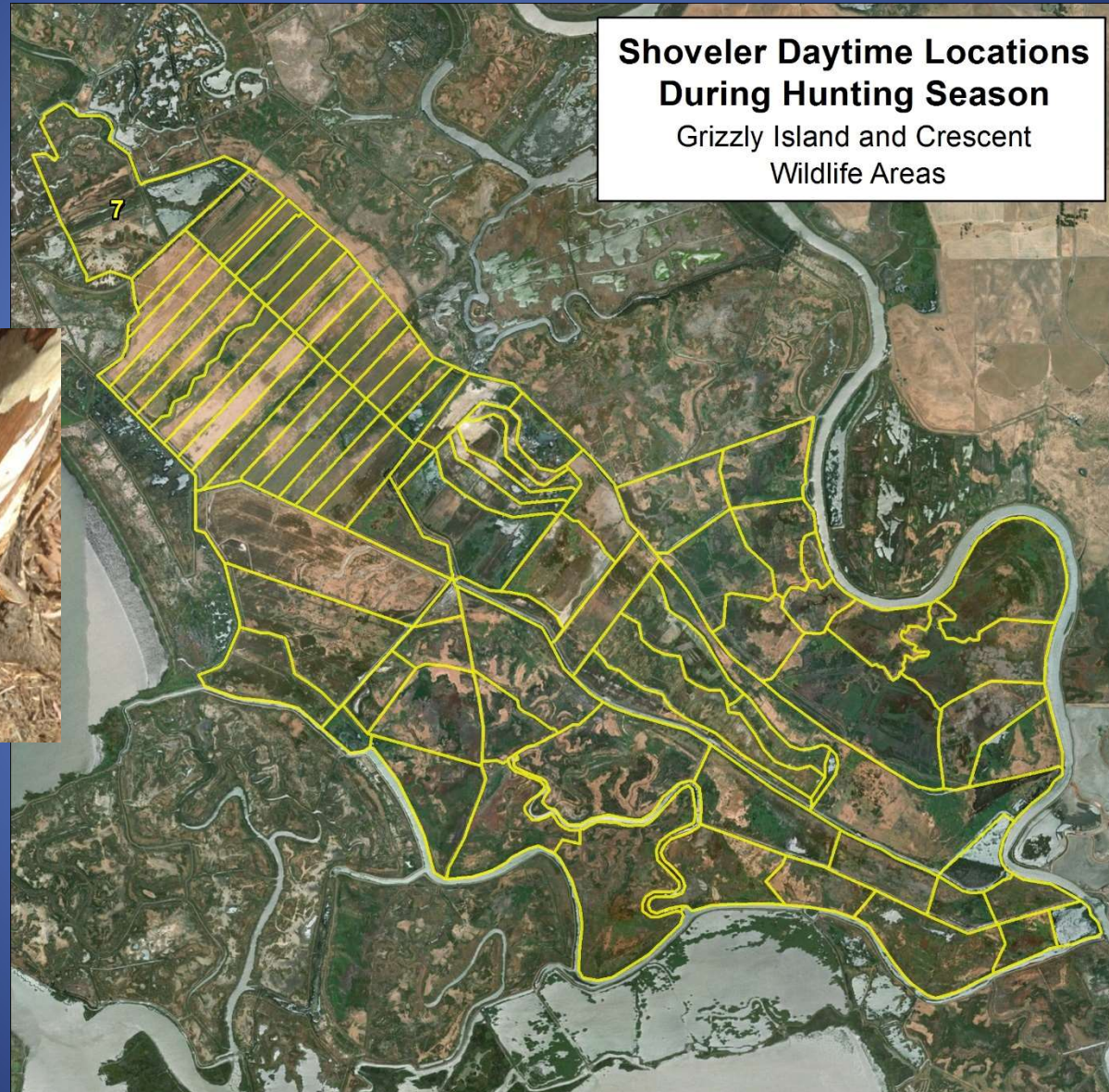
Northern Shoveler Hunting Season Points: 2015-18



Northern Shoveler Hunting Season Points: 2015-18



Northern Shoveler Hunting Season Points: 2015-18



Northern Shoveler Hunting Season Points: 2015-18



Northern Shoveler Hunting Season Points: 2015-18

PRIVATE: DAYTIME

Property	Location_Count	Individuals	Days
Denverton Land Company (304 and 306)	26	1	15
Teal Duck Club	28	1	19
Hollywood Duck Club	61	2	45
Suisun Farms	72	5	51
Shelldrake Duck Club	83	3	57

PRIVATE: NIGHTTIME

Property	Location_Count	Individuals	Days
Gray Goose	37	5	20
Teal Duck Club	42	3	22
Cordelia Gun Clug	63	2	34
Suisun Farms	104	5	57
Shelldrake Duck Club	164	5	85

GRIZZLY AND CRESCENT WILDLIFE AREAS: DAYTIME

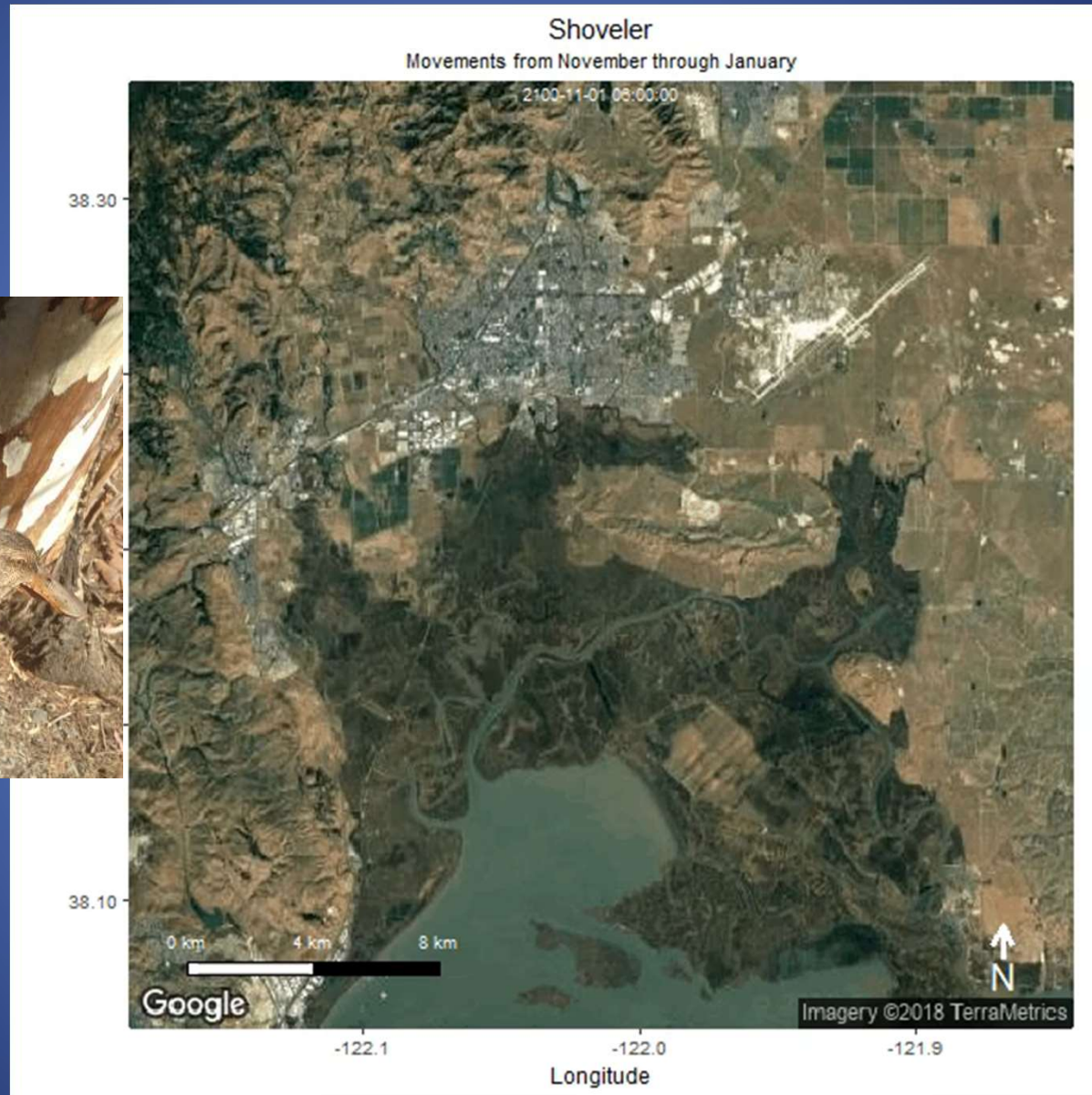
Unit	Location_Count	Individuals	Days
Crescent	7	2	6

GRIZZLY AND CRESCENT WILDLIFE AREAS: NIGHTTIME

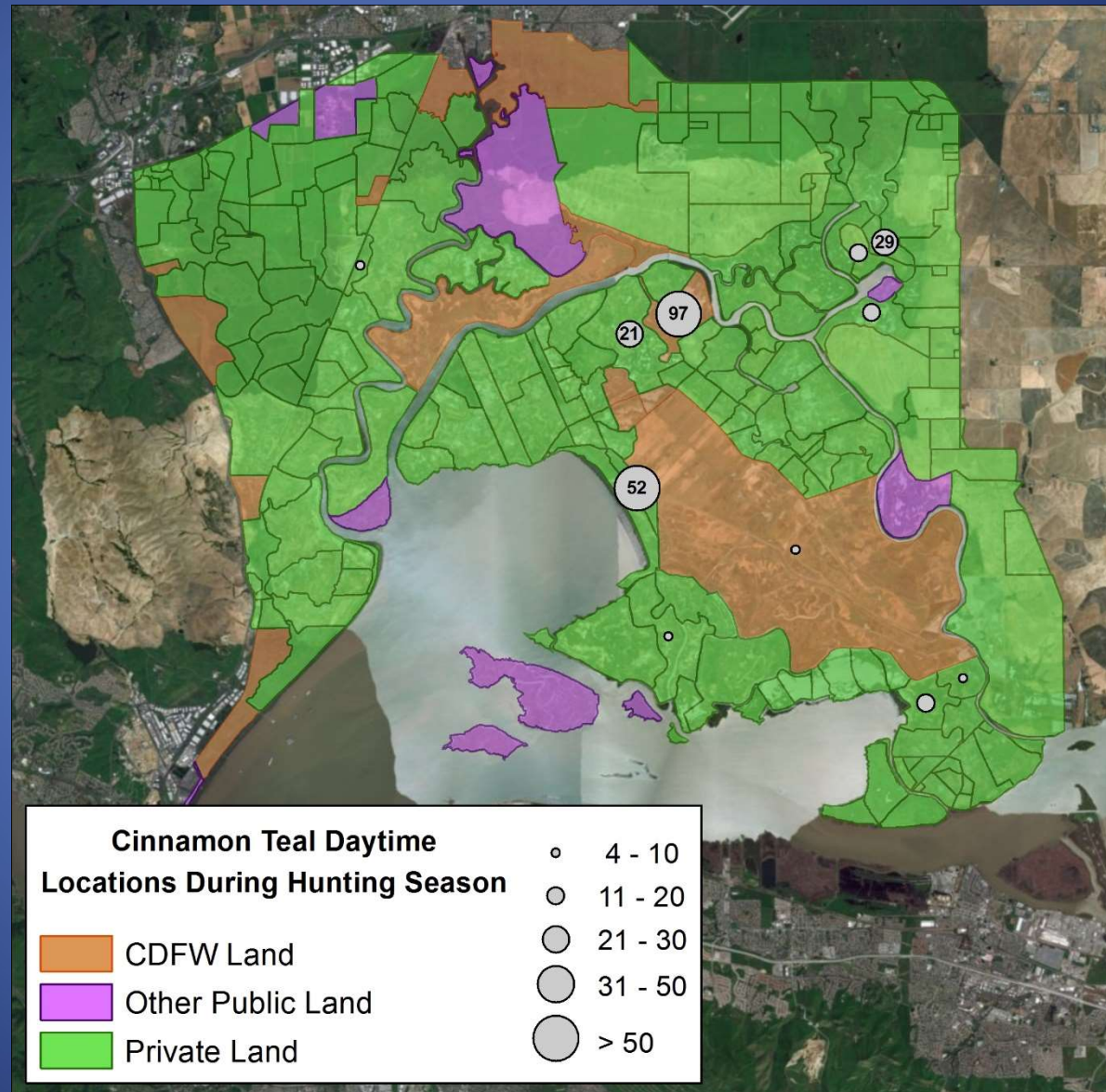
Unit	Location_Count	Individuals	Days
19	4	2	2
Crescent	58	3	32



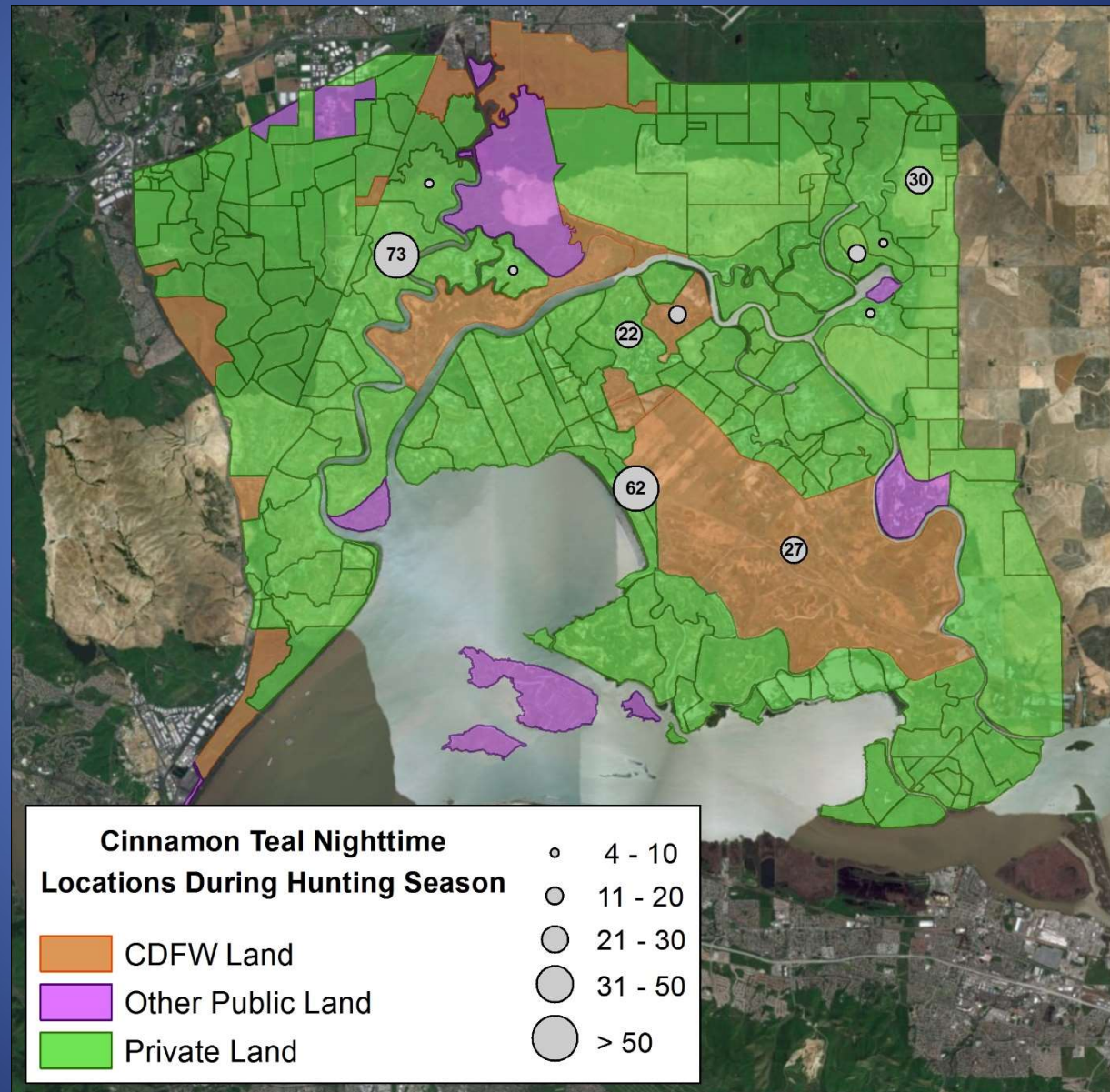
Northern Shoveler Hunting Season Movements: 2015-18



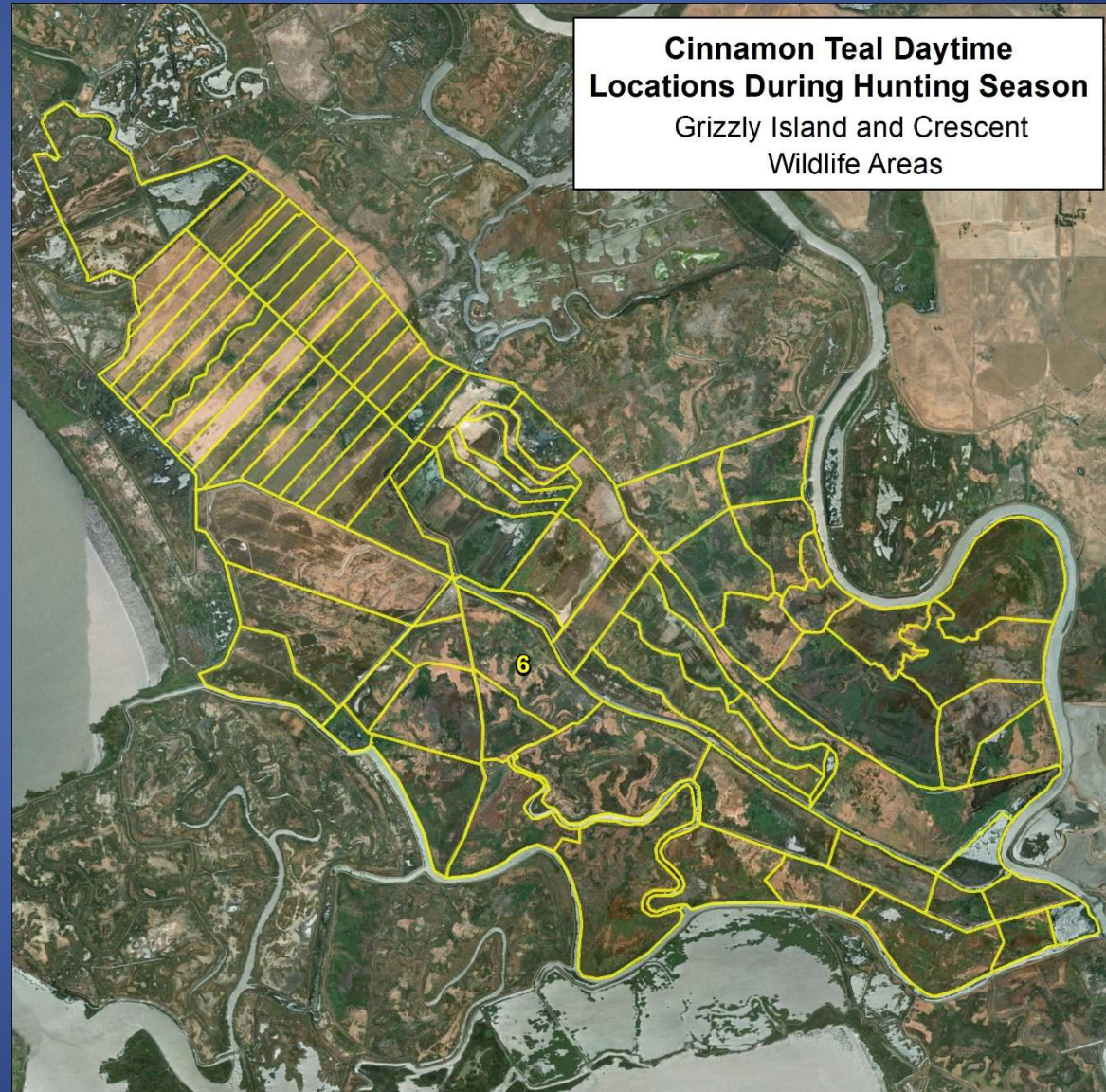
Cinnamon Teal Hunting Season Points: 2017-18



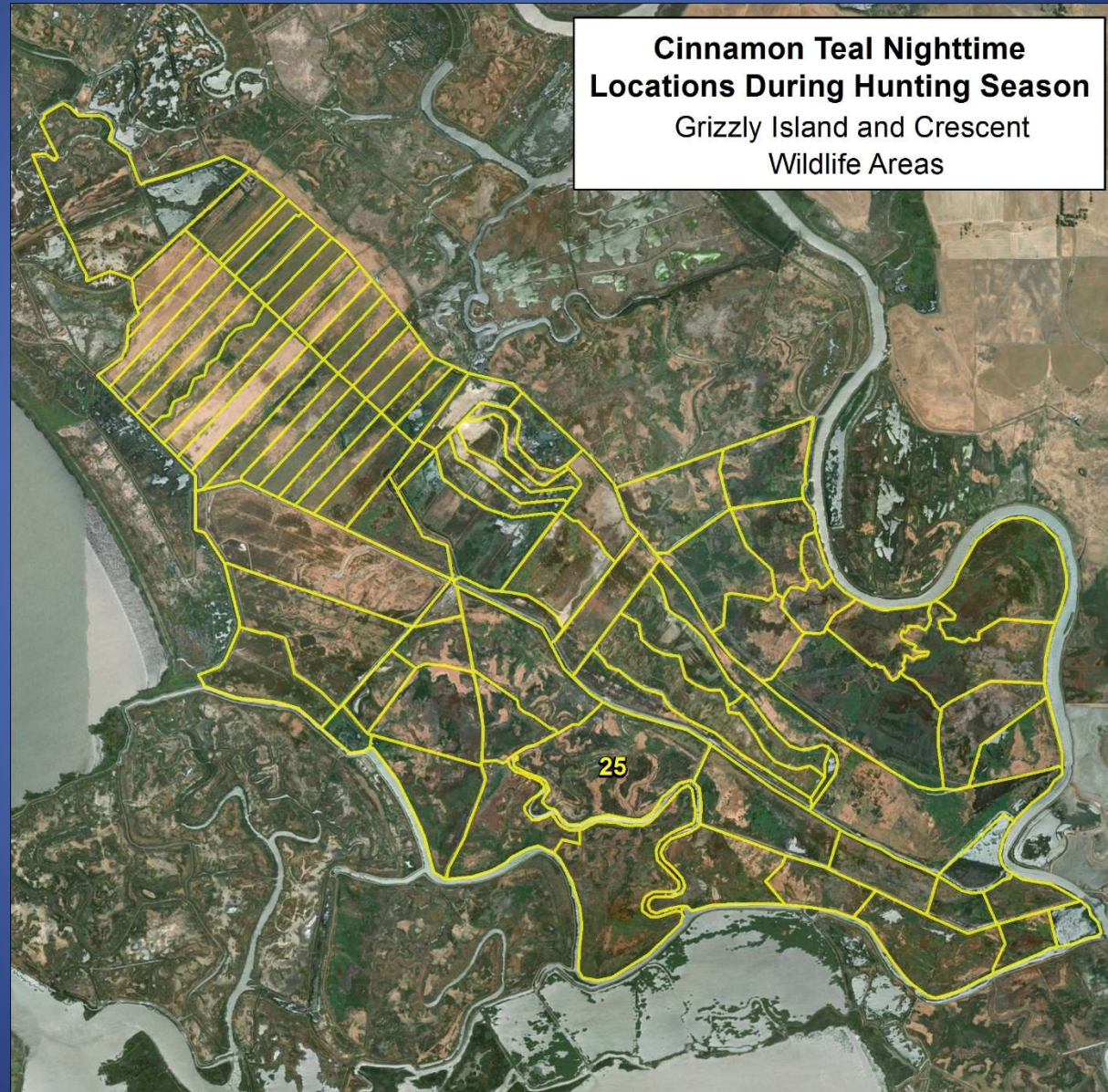
Cinnamon Teal Hunting Season Points: 2017-18



Cinnamon Teal Hunting Season Points: 2017-18



Cinnamon Teal Hunting Season Points: 2017-18

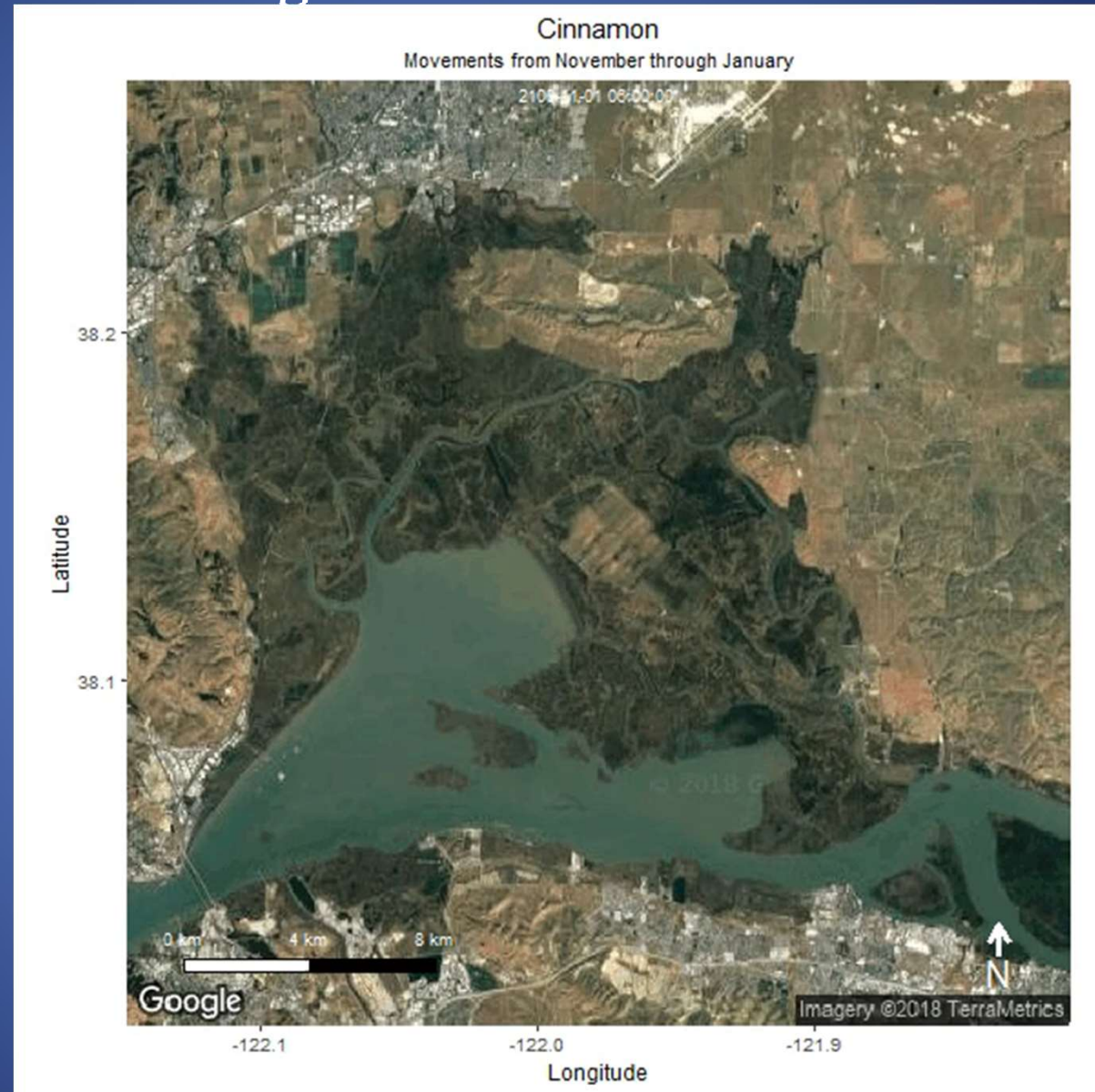


Cinnamon Teal Hunting Season Points: 2017-18

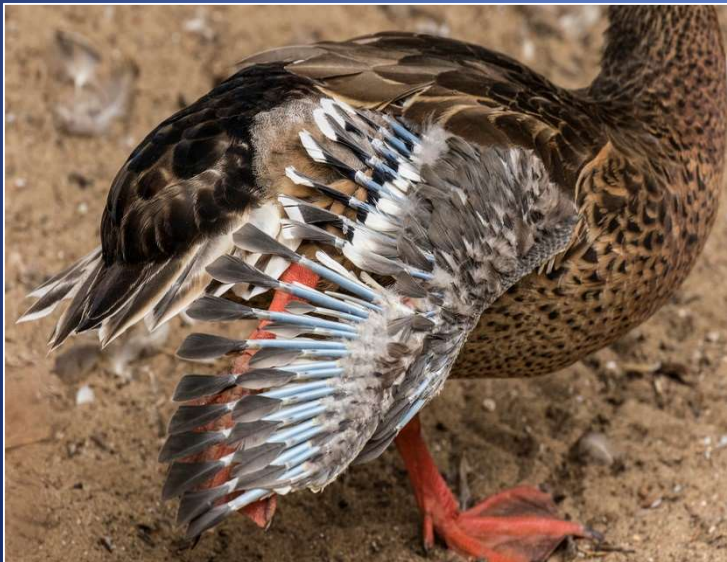
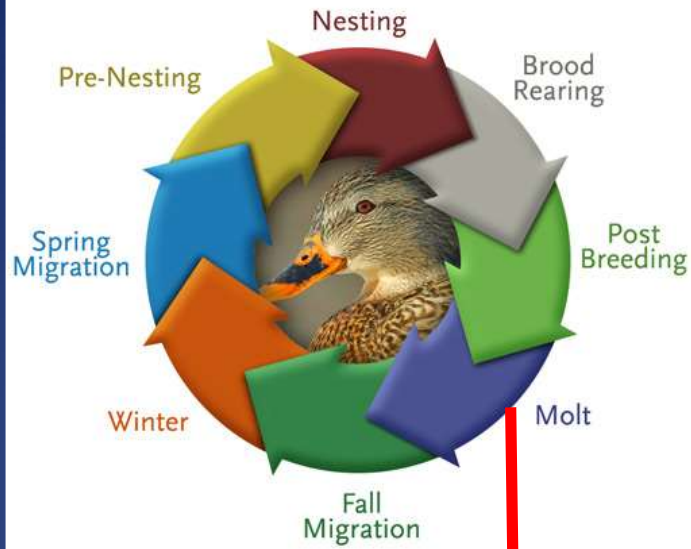
PRIVATE: DAYTIME				GRIZZLY AND CRESCENT WILDLIFE AREAS: DAYTIME			
Property	Location_Count	Individuals	Days	Unit	Location_Count	Individuals	Days
Flying D	12	1	8	18B	6	1	4
The Duck Club	15	1	9				
Grizzly Ranch	21	1	18				
Overlook Club	29	1	19				
Grizzly King Gun Club	52	1	32				
PRIVATE: NIGHTTIME				GRIZZLY AND CRESCENT WILDLIFE AREAS: NIGHTTIME			
Property	Location_Count	Individuals	Days	Unit	Location_Count	Individuals	Days
Flying D	20	1	11	20	25	1	13
Grizzly Ranch	22	1	8				
Duck & R	30	1	14				
Grizzly King Gun Club	62	1	31				
Shell Drake Duck Club	73	1	40				



Cinnamon Teal Hunting Season Movements: 2017-18



Life Cycle of a Mallard



SPECIES AND SEX	MONTH	JUNE	JULY	AUG.	SEP.
AMERICAN BLACK DUCK	MALE				
	FEMALE				
AMERICAN WIGEON	MALE				
	FEMALE				
CANVASBACK	MALE				
	FEMALE				
GADWALL	MALE				
	FEMALE				
GOLDENEYE SPP.	MALE				
	FEMALE				
LESSER SCAUP	MALE				
	FEMALE				
MALLARD	MALE				
	FEMALE				
NORTHERN PINTAIL	MALE				
	FEMALE				
NORTHERN SHOVELER	MALE				
	FEMALE				
REDHEAD	MALE				
	FEMALE				
TEAL SPP.	MALE				
	FEMALE				
WOOD DUCK	MALE				
	FEMALE				

- Waterfowl are flightless 2-3 weeks
- Critical part of life cycle where waterfowl are susceptible to predation and botulism when flightless, so adequate habitat is necessary for survival
- Water availability and distribution has become a major issue, especially in late summer when waterfowl are molting
- Need to identify important molting areas to help guide management decisions
- Improving survival of post-breeding waterfowl improves waterfowl breeding populations

Molting

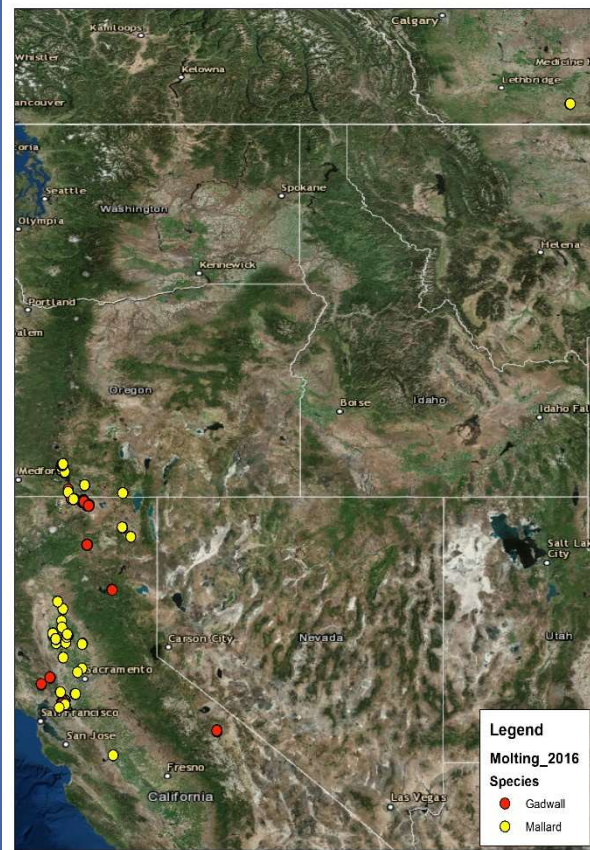
2015

Mallards – 18
Gadwall - 10



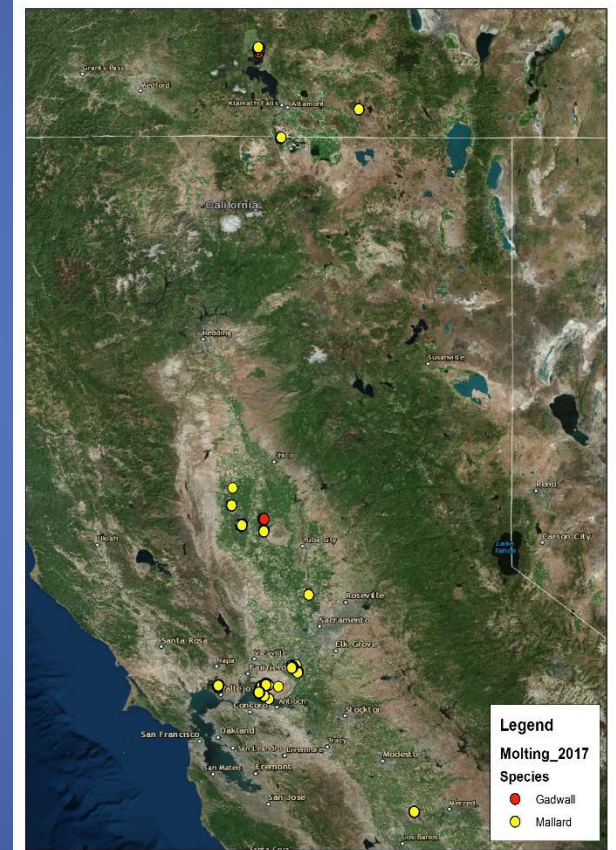
2016

Mallards – 51
Gadwall - 24



2017

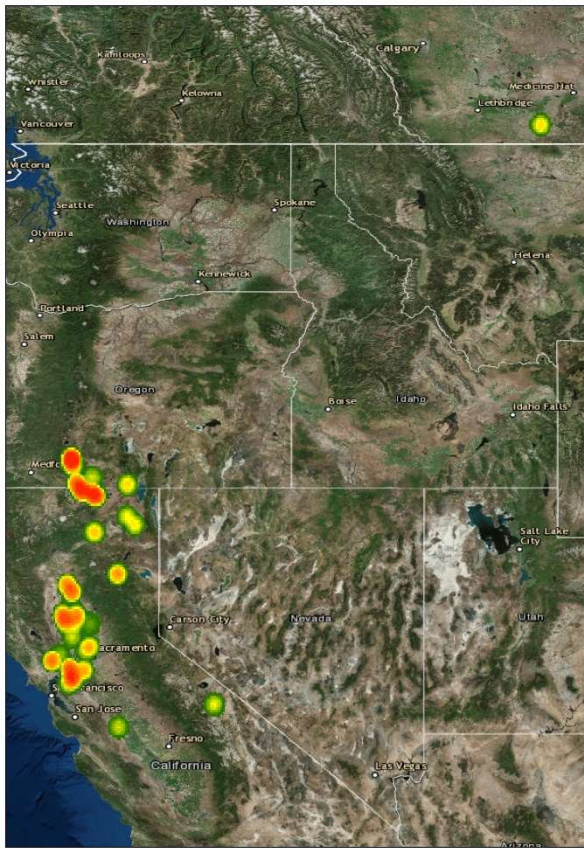
Mallards – 27
Gadwall - 2



Molting

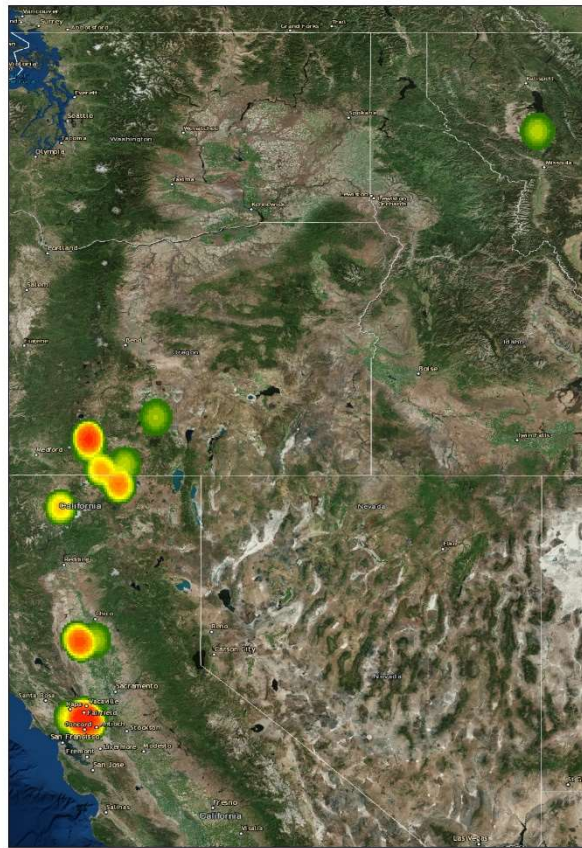
2015

Mallards – 18
Gadwall - 10



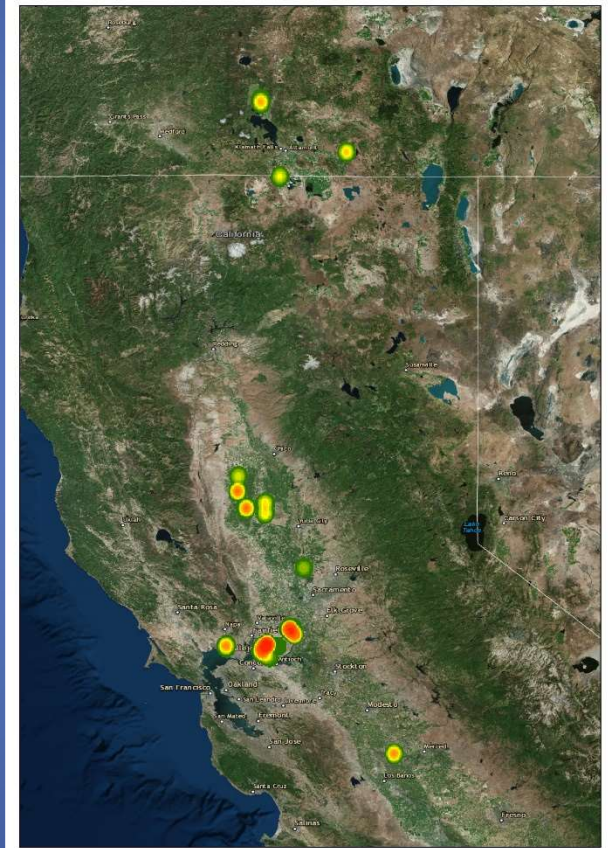
2016

Mallards – 51
Gadwall - 24

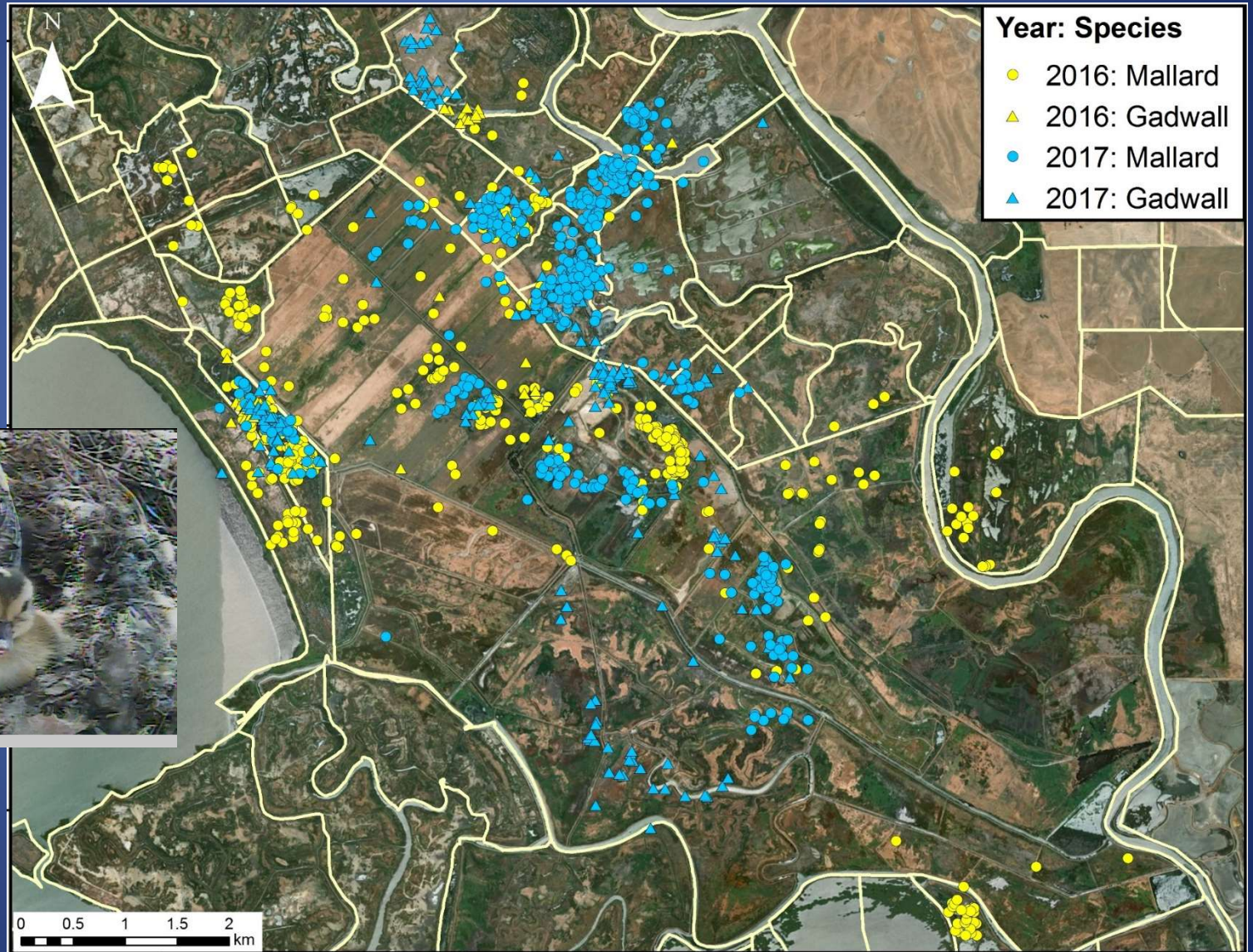


2017

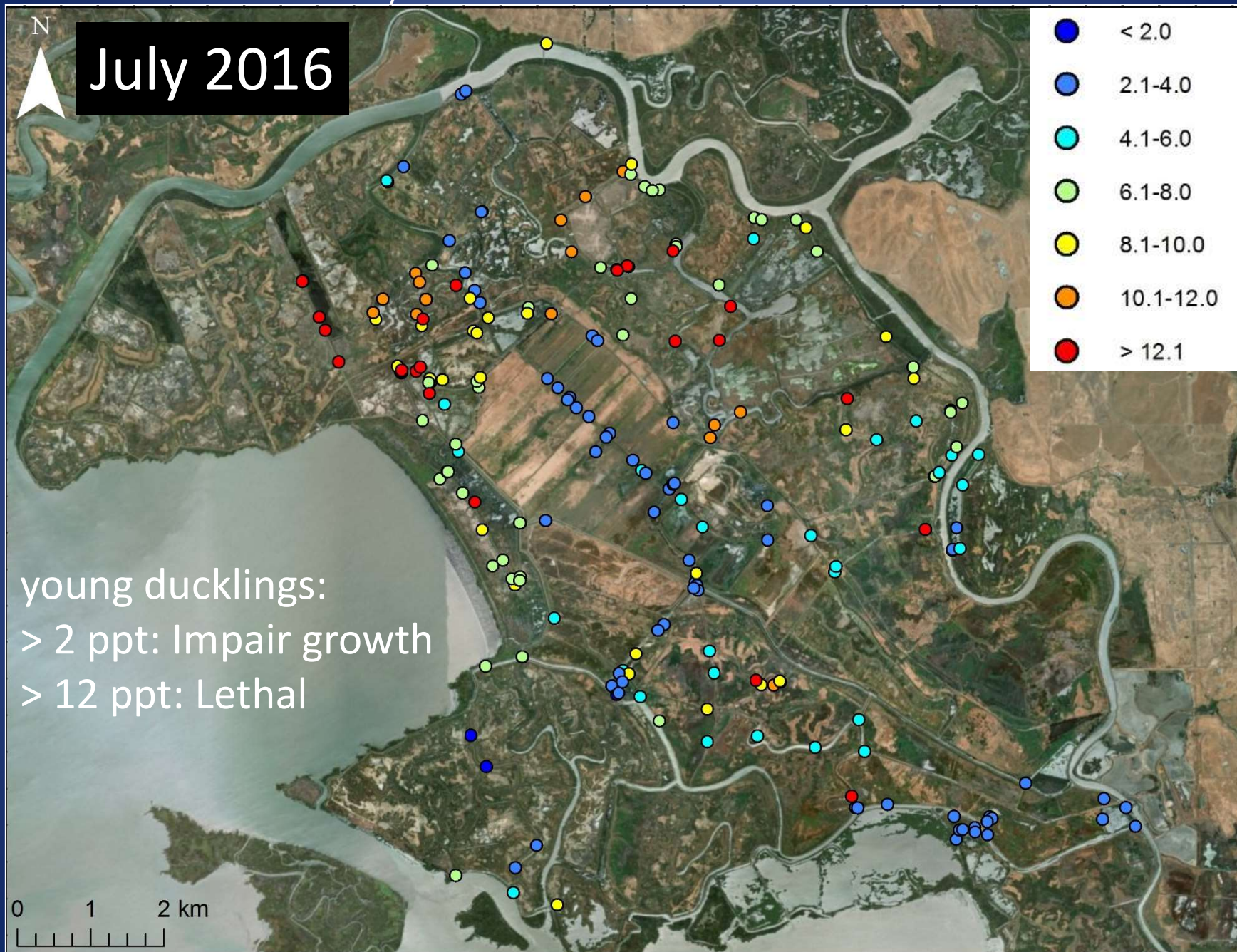
Mallards – 27
Gadwall - 2



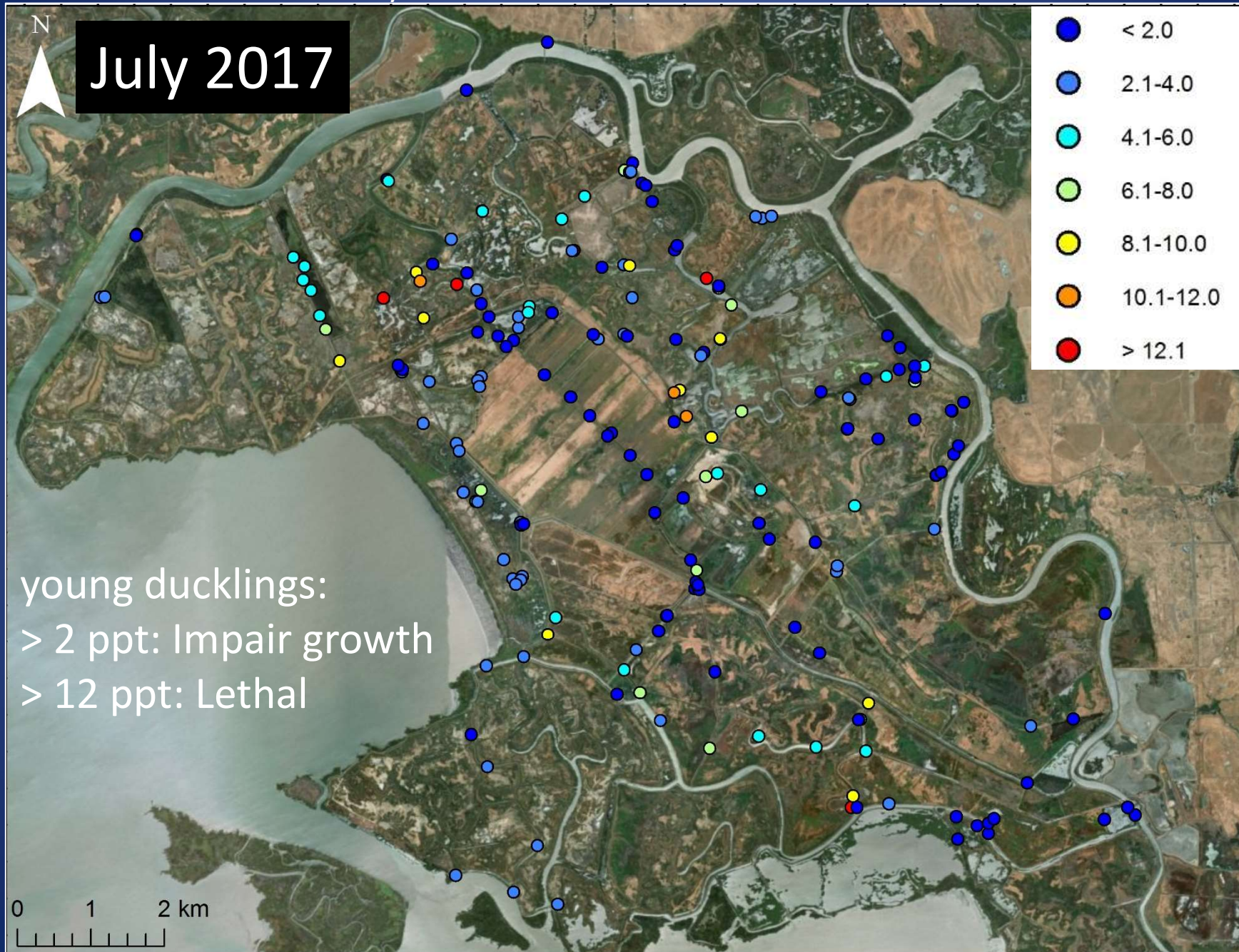
Brood Locations



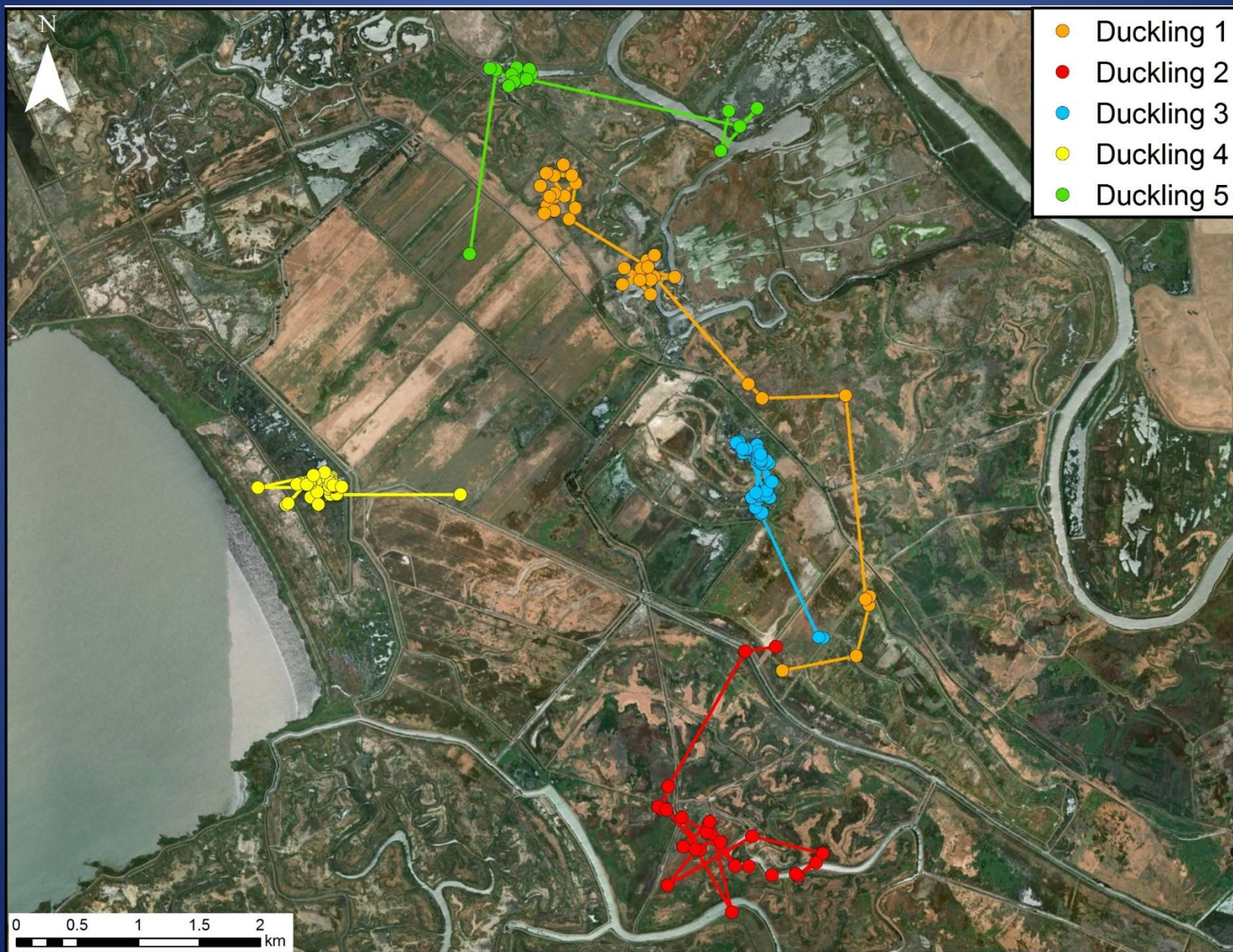
Brood Water Salinity



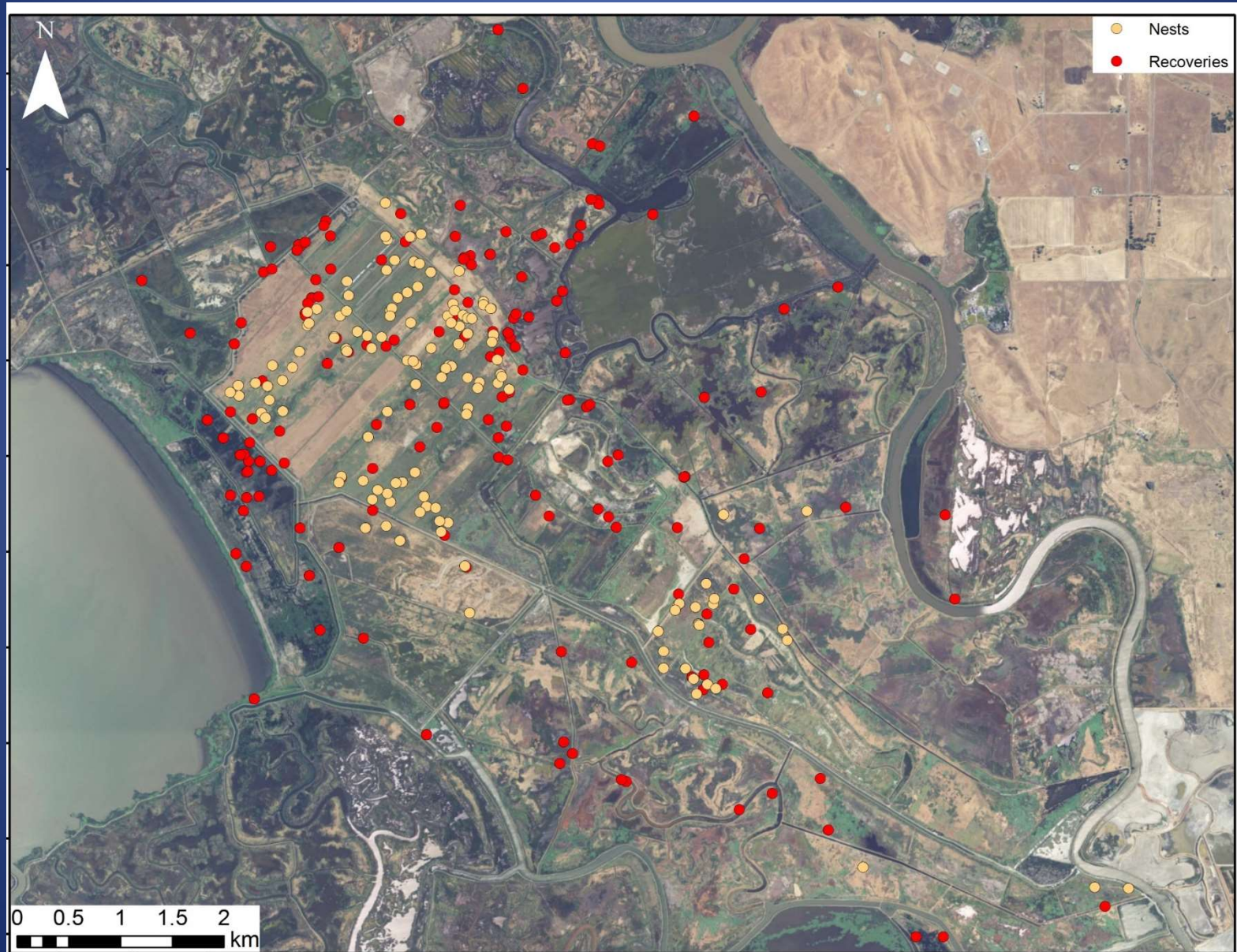
Brood Water Salinity



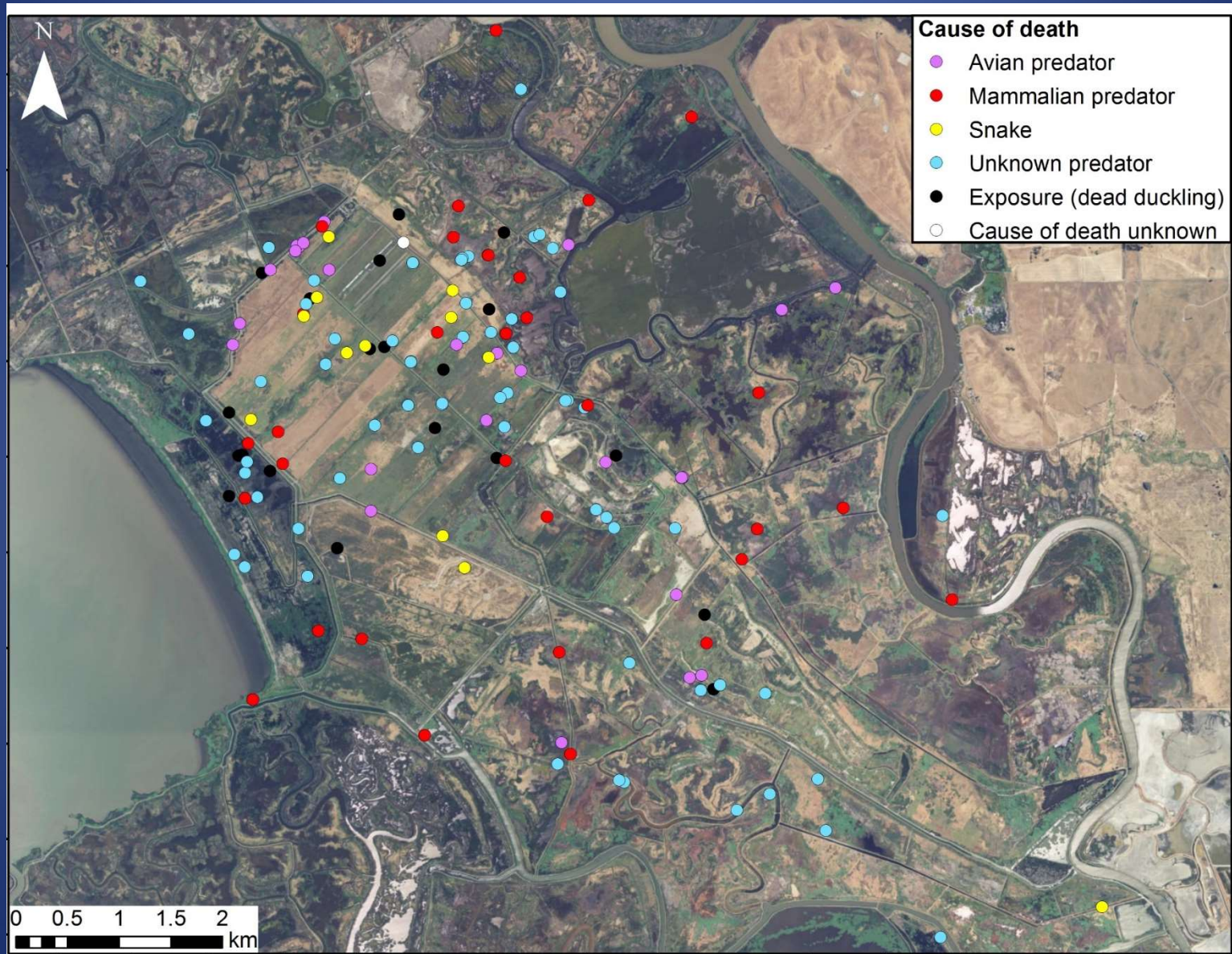
Radio-marked Duckling Movements



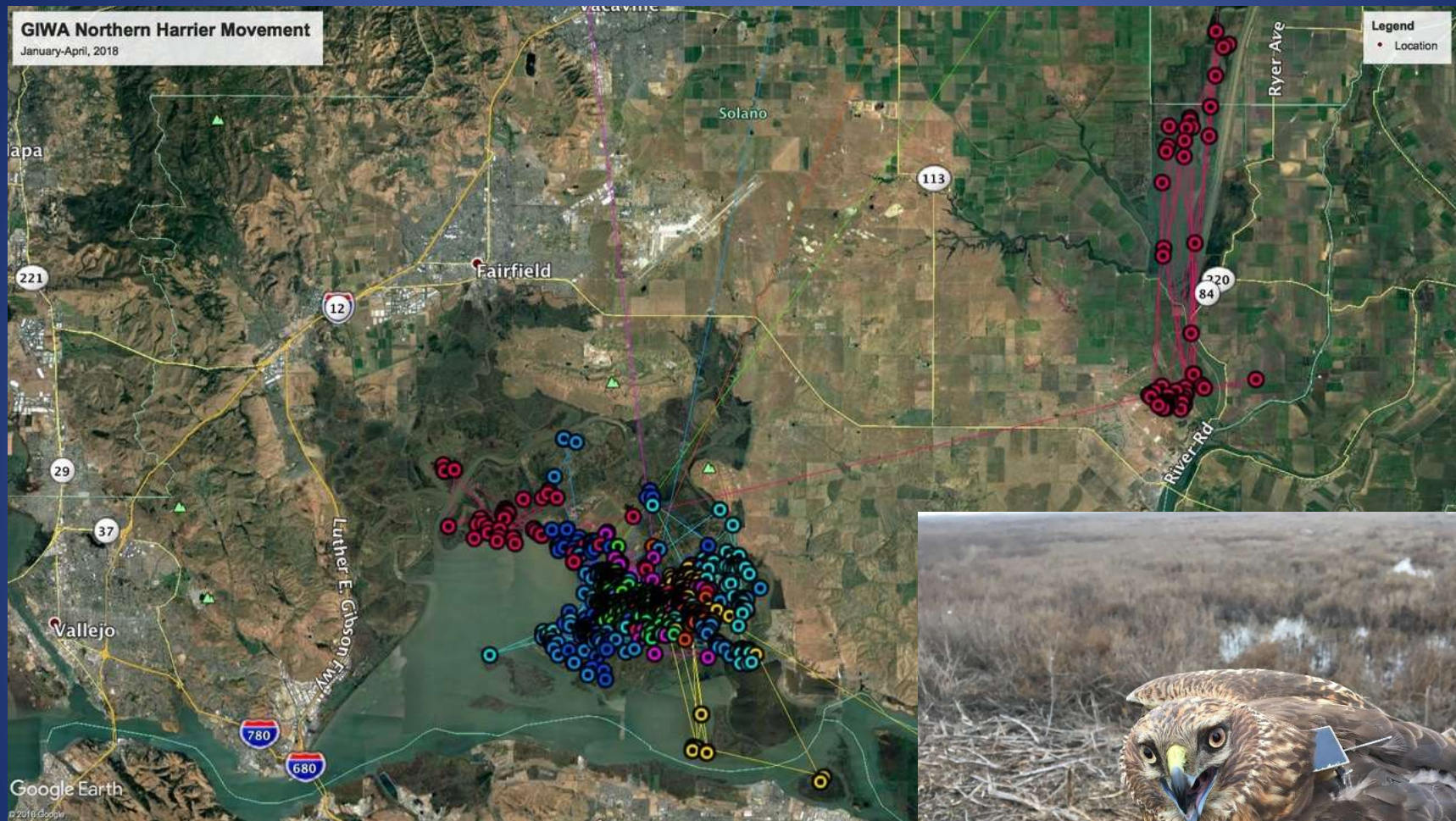
Nest Locations and Duckling Recovery Locations



Cause of Duckling Mortality



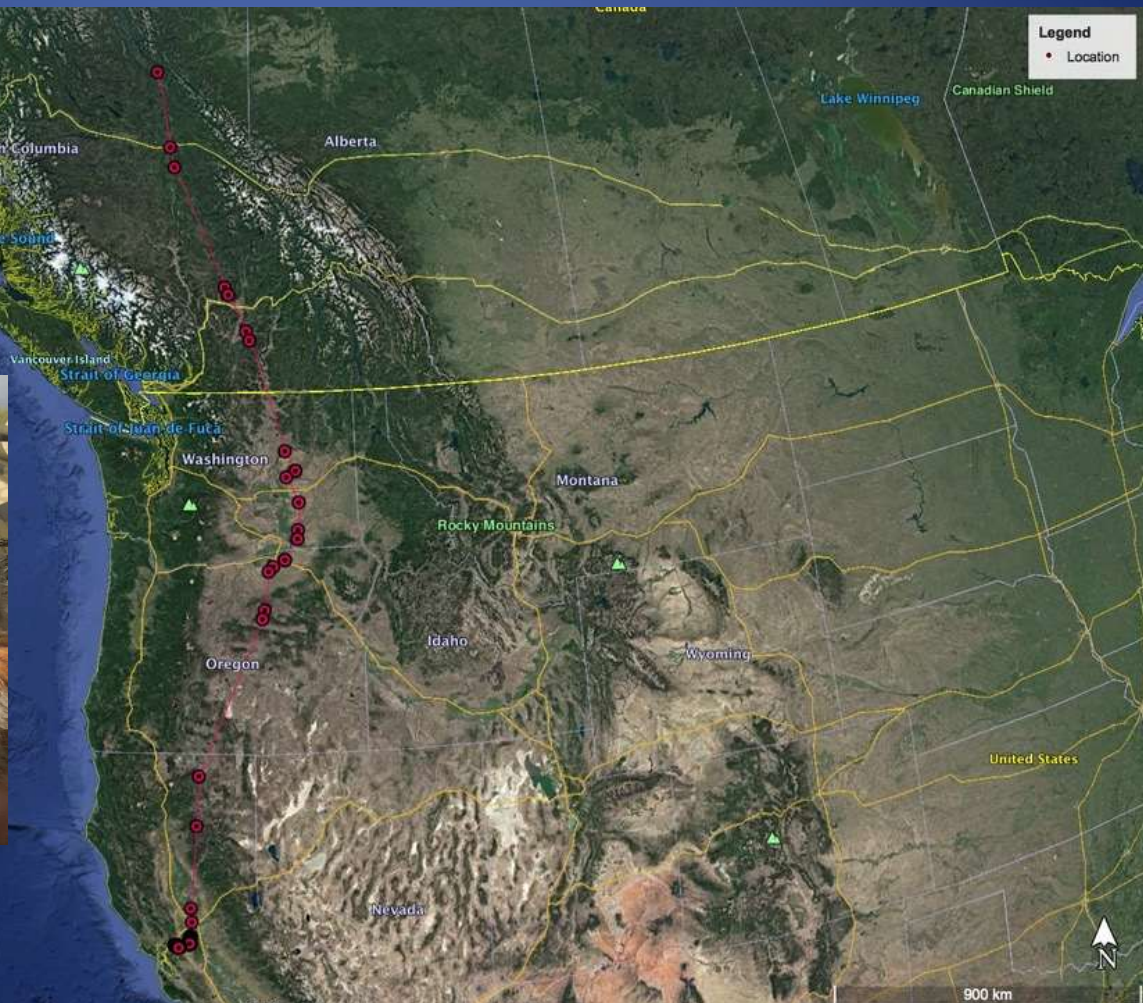
Avian Predator Movements



Avian Predator Movements

GIWA Northern Harrier (FOWL 37)

January-April, 2018



Google Earth

Image Landsat / Copernicus
© 2018 Google
© 2018 INEGI
Data SIO, NOAA, U.S. Navy, NGA, GEBCO



Avian Predator Movements

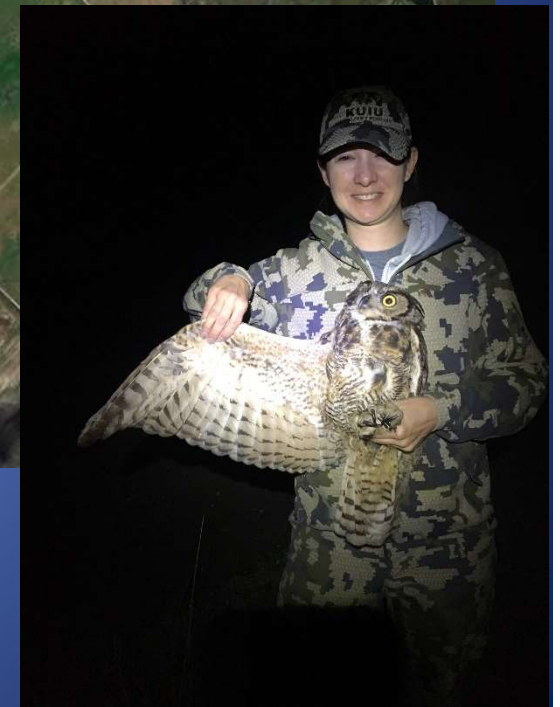
GIWA Great Horned Owl Movement

March-April, 2018



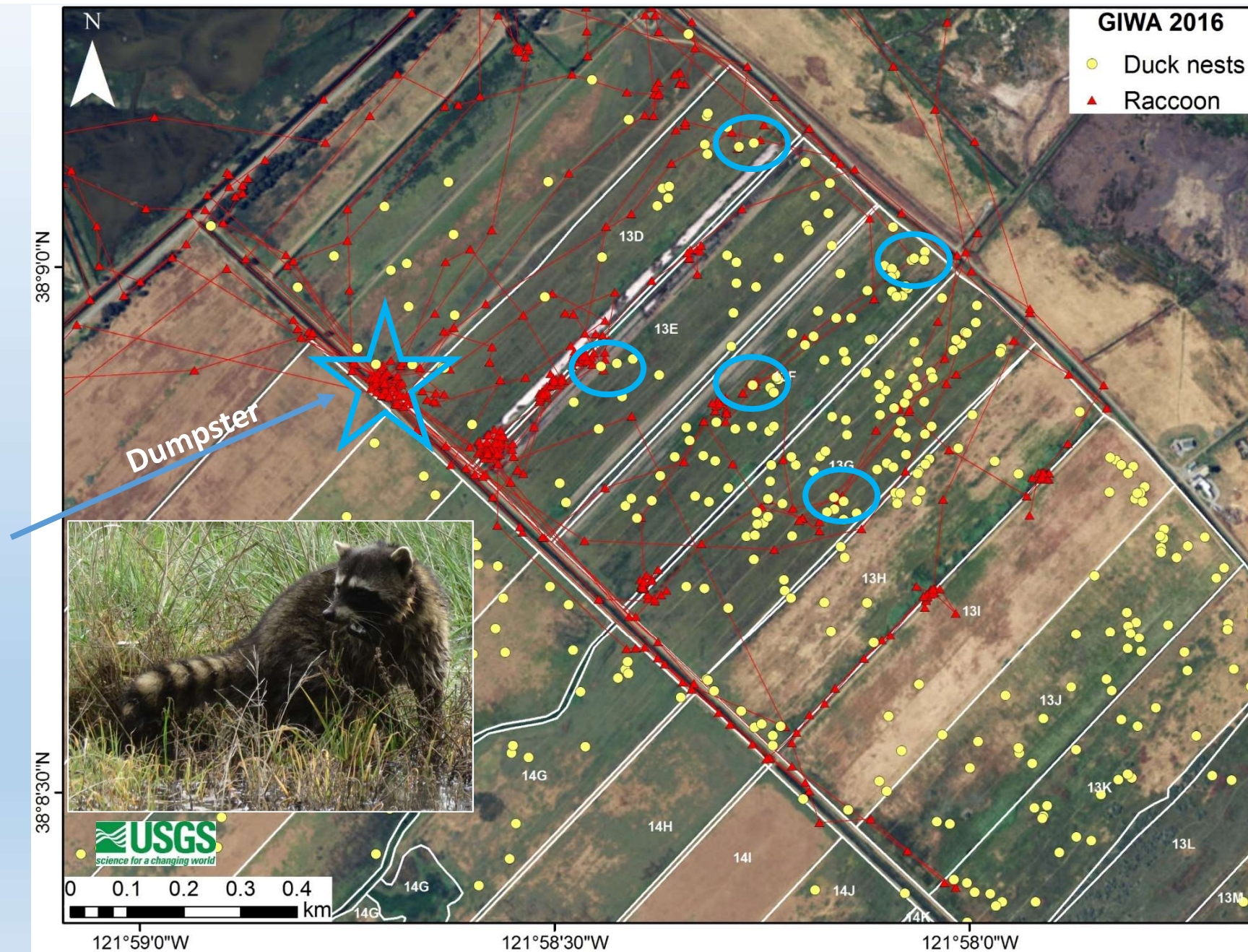
Google Earth

© 2010 Google

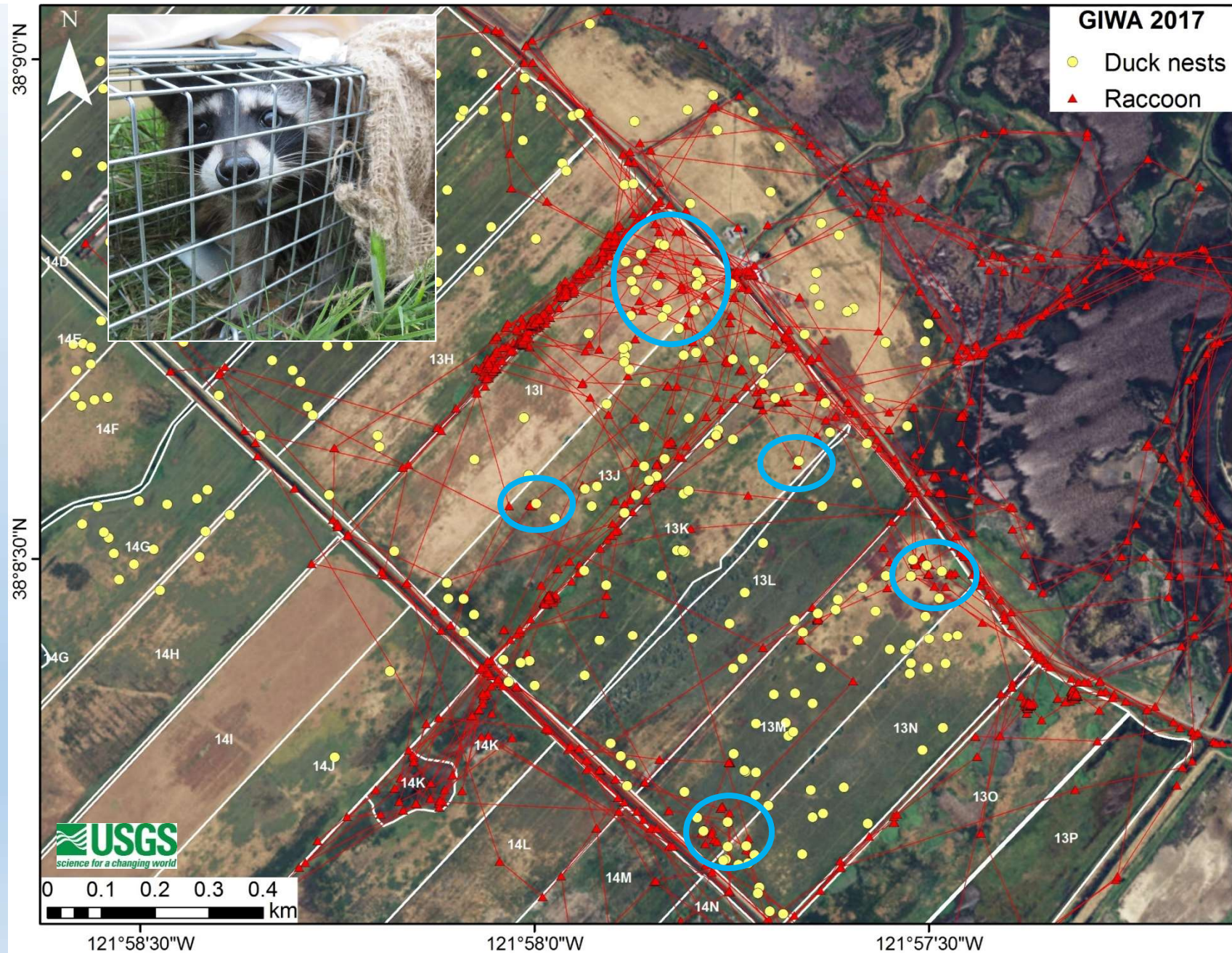




Nests in Relation to Raccoon Movements 2016



Nests in Relation to Raccoon Movements 2017



Suisun Diving Duck Project 2017 - 2018

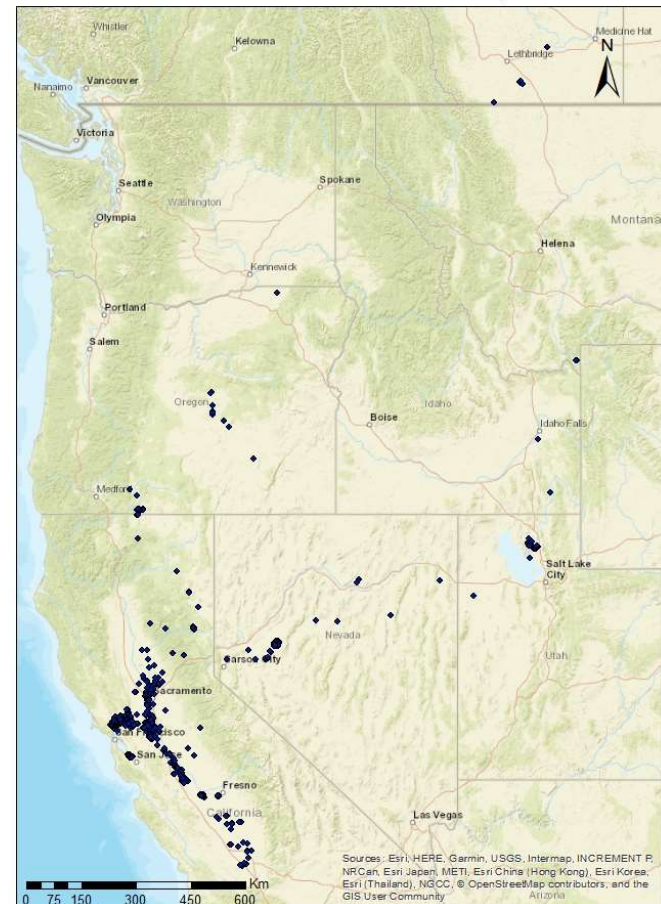
- Banded 221 Canvasback
- Marked 29 CANV using GPS-GSM implants
- ~27,000 deployed locations from CANV
- 6 are known to have left the region (southern Alberta, southwestern Montana, central Nevada, Great Salt Lake, and southern Oregon)
- 4 are last known to have been in the Central Valley
- 2 are actively reporting from Napa-Sonoma
- 4 were shot by hunters



Suisun Diving Duck Project 2017 - 2018

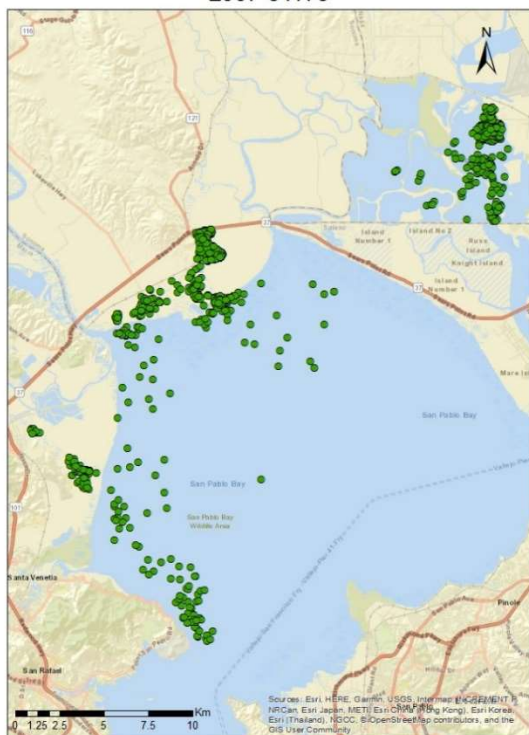
- Banded 221 Canvasback
- Marked 29 CANV using GPS-GSM implants
- ~27,000 deployed locations from CANV
- 6 are known to have left the region (southern Alberta, southwestern Montana, central Nevada, Great Salt Lake, and southern Oregon)
- 4 are last known to have been in the Central Valley
- 2 are actively reporting from Napa-Sonoma
- 4 were shot by hunters

Marked Birds December 2017 - April 2018

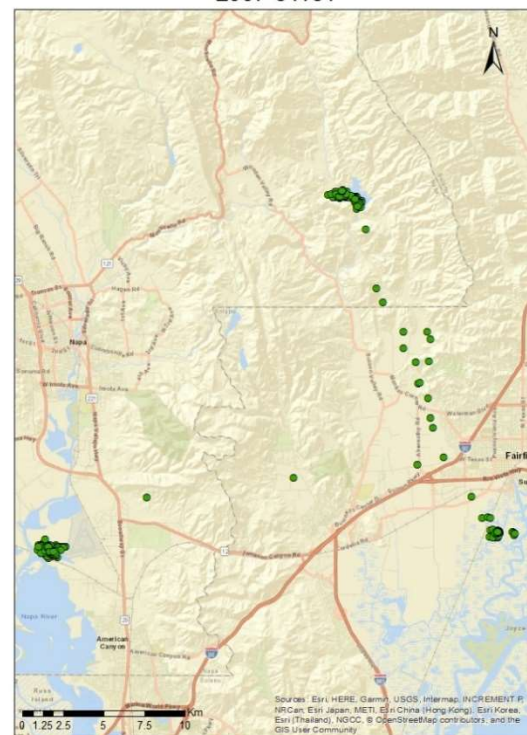


Local Movements

Adult, Male Canvasback
2007-61176

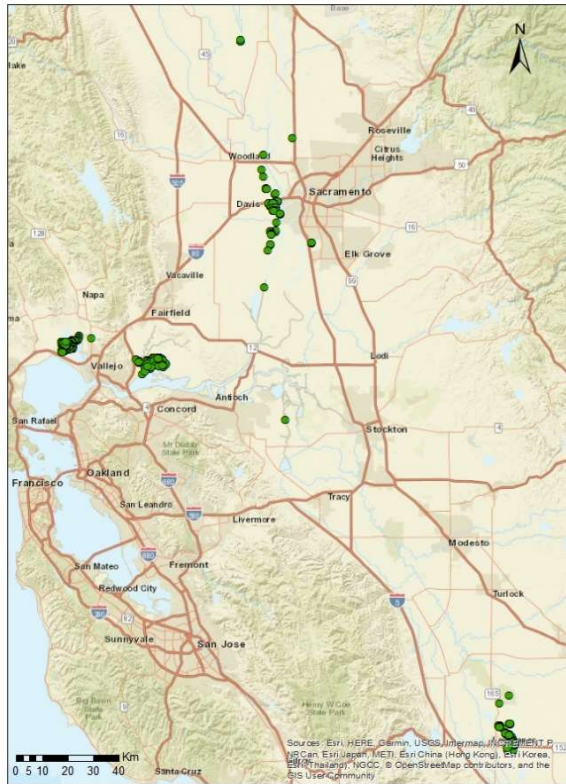


Adult, Female Canvasback
2007-61131

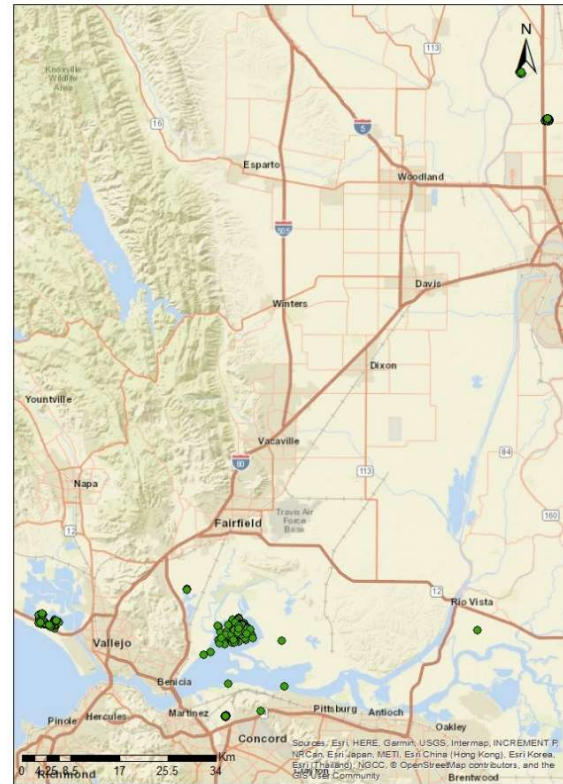


Local Movements

Adult, Female Canvasback
2007-61193



Adult, Female Canvasback
2007-61228

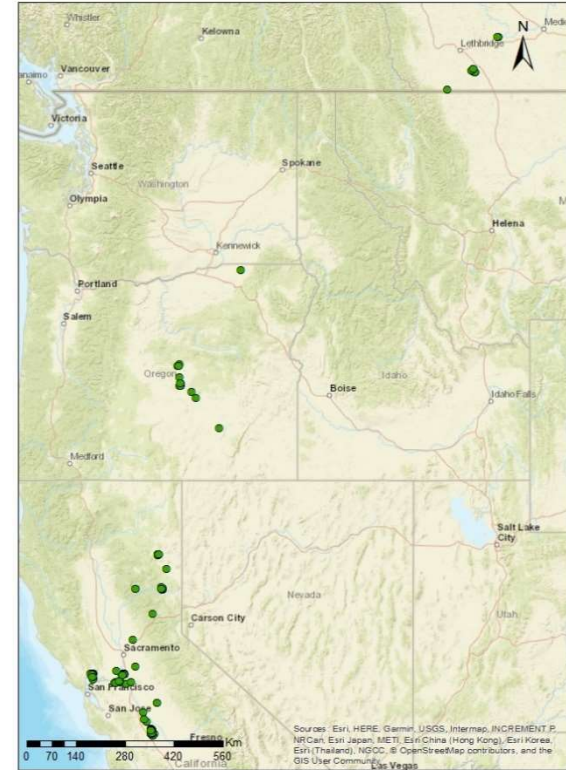


Migrants

Adult, Female Canvasback
2007-61162

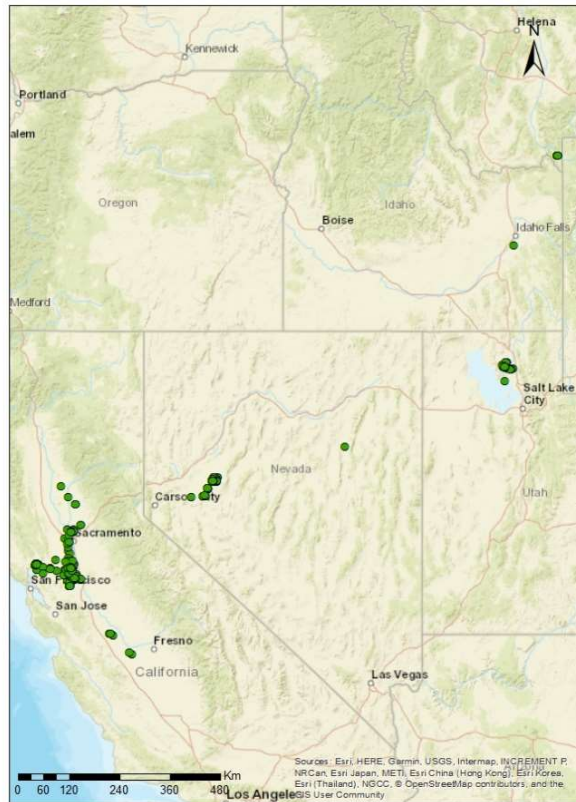


Adult, Male Canvasback
2007-61122

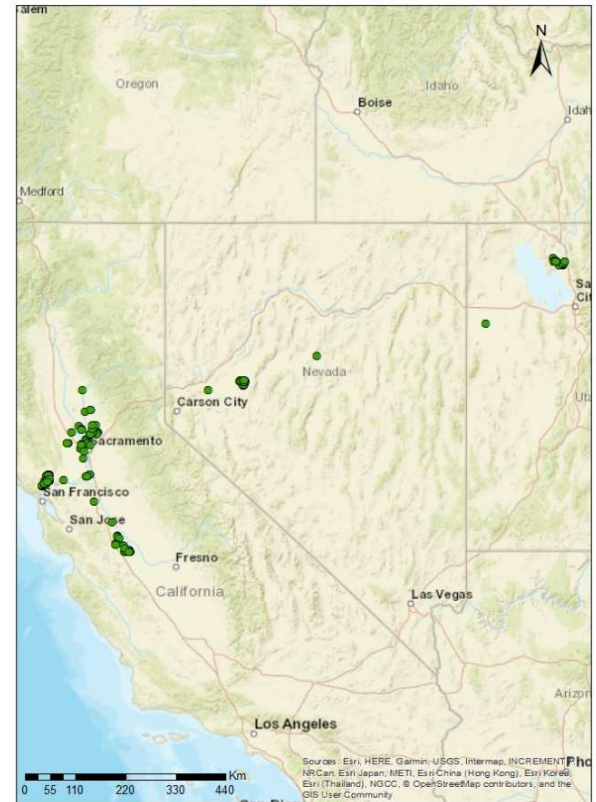


Migrants

Adult, Female Canvasback
2007-61115



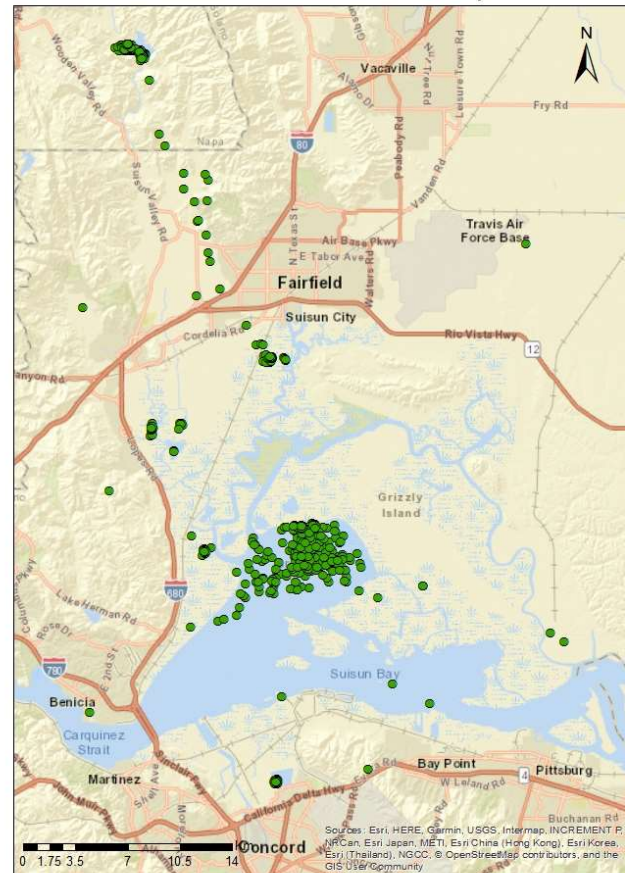
Adult, Female Canvasback
2007-61203



Special Thanks To

- Cordelia Gun Club
- Teal Club
- Goodyear Duck Club
- Mulberry Land Company
- Morrow Island Land Company

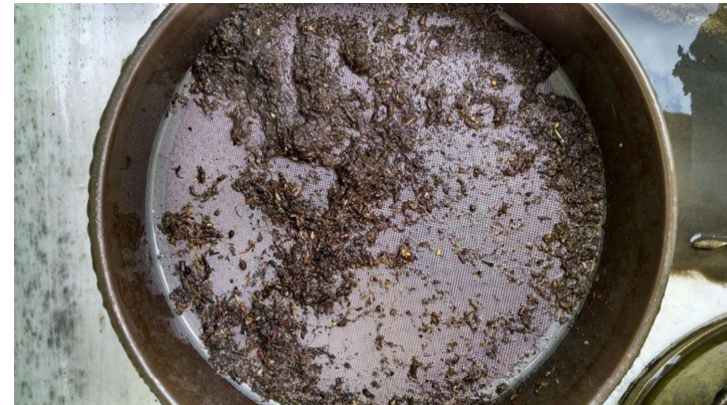
Marked Birds December 2017 - April 2018



Suisun Marsh Seed Sampling

Goals

- Estimate seed abundance in Suisun Marsh
- Assess how Tidal and Managed wetlands
- Estimate Suisun Marsh's wintering waterfowl carrying capacity



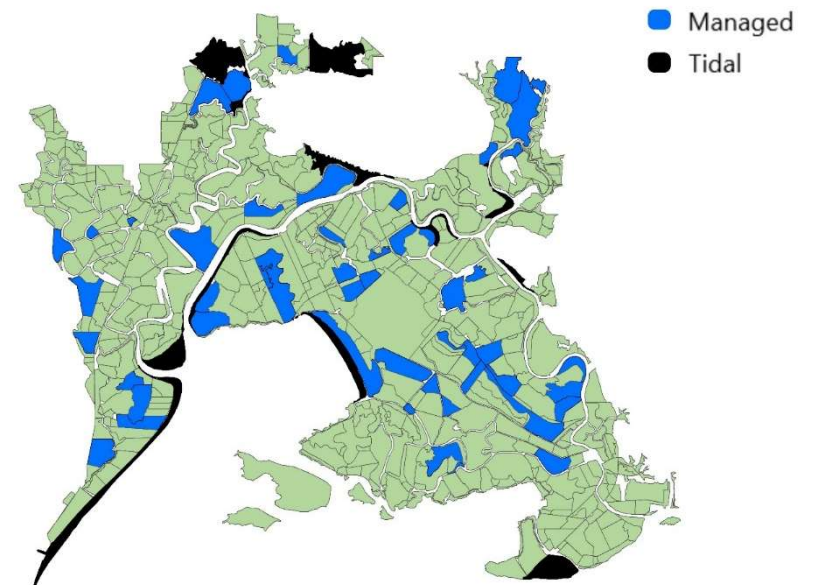
Suisun Marsh Seed Sampling

Wetland units were sampled in Fall and resampled in Winter

- 50 managed wetlands
- 13 tidal wetlands

1,000 Managed Wetland Samples

260 Tidal Wetland Samples



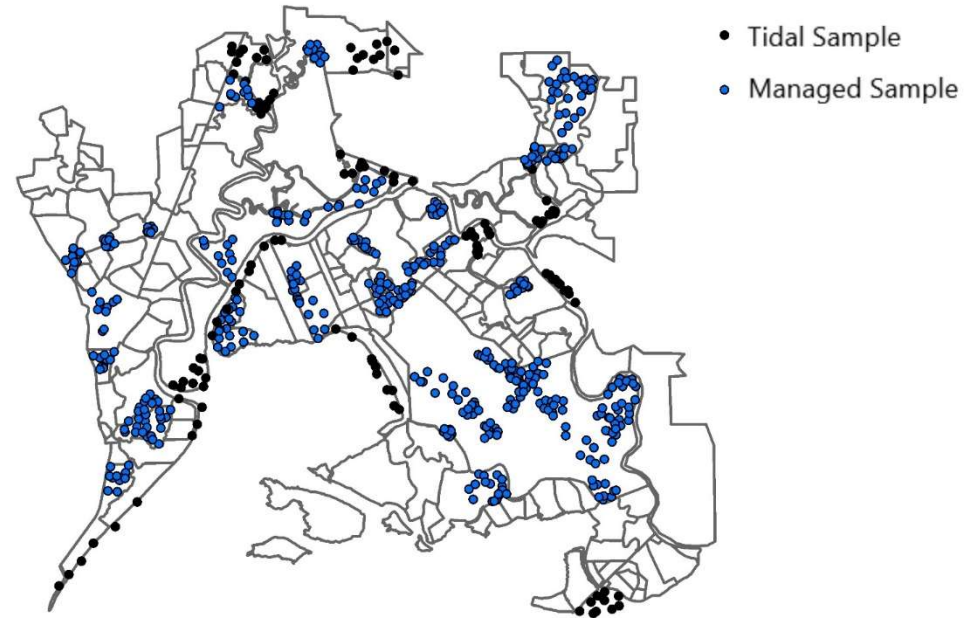
Suisun Marsh Seed Sampling

Wetland units were sampled in
Fall and resampled in Winter

- 50 managed wetlands
- 13 tidal wetlands

1,000 Managed Wetland
Samples

260 Tidal Wetland Samples



Thanks to all the participating Duck Clubs!!!

Feeding ecology of dabbling ducks wintering in the Suisun Marsh

Jacqueline Satter

Dr. John Eadie

- What does their diet consist of?
- How does diet composition compare to previous data?
- How does it compare to seed composition/abundance data?
- How does it change throughout the season?
- across seasons?
- among species?
- between sexes?



Goals

- Update Burns 2003
- Gain better understanding of Suisun Marsh wintering duck ecology
- Steps toward better marsh management and persistence of a healthy duck population for generations to come
- Thanks to all our cooperating duck clubs!!!!



Thank You!!

