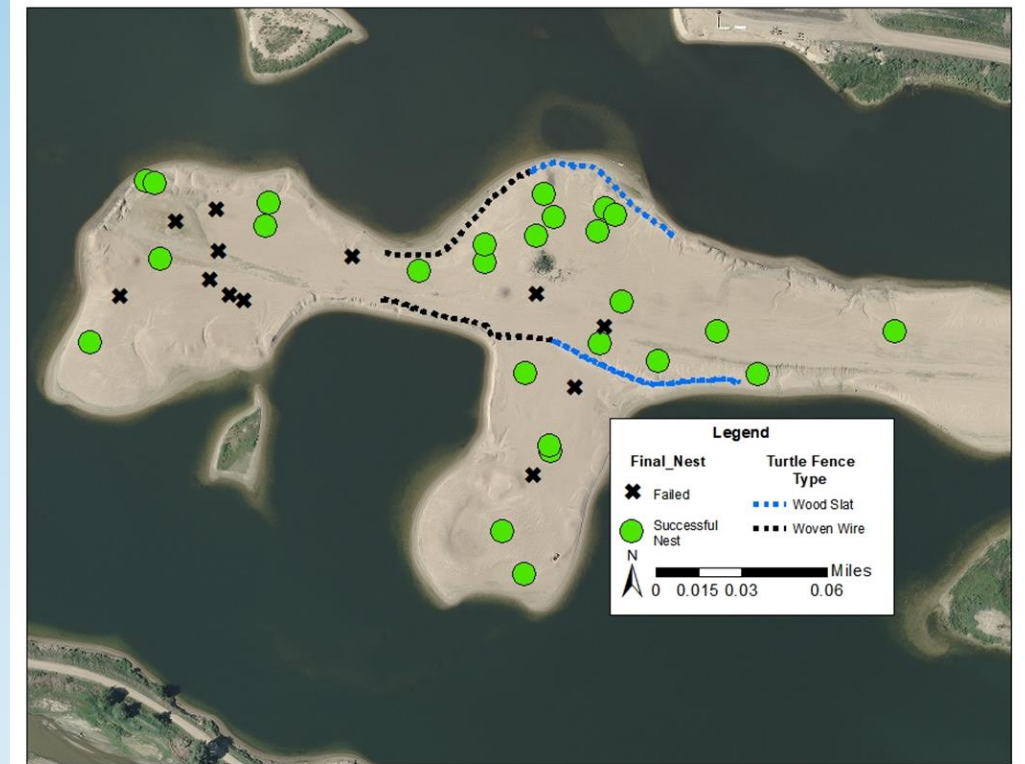


# Tern and Plover

## Predator Management and Monitoring Plan 2021



Malinda Henry  
PRRIP EDO  
Science Lead



## Piping Plover CEM

**Q: What are the impacts of predation on productivity?**

High Control - High Uncertainty →

Low Control - High Uncertainty →

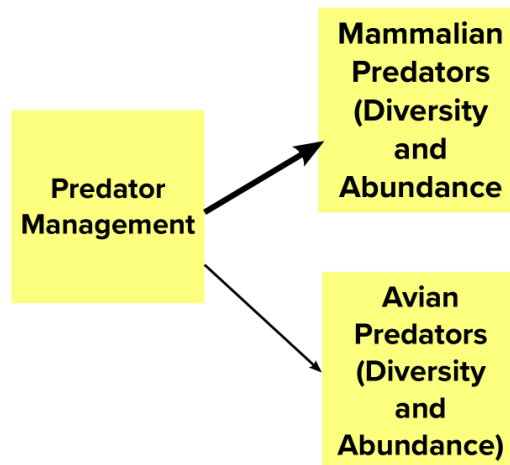
High Control - Low Uncertainty →

Low Control - Low Uncertainty →

### Indirect Productivity Factors

PRRIP  
Actions

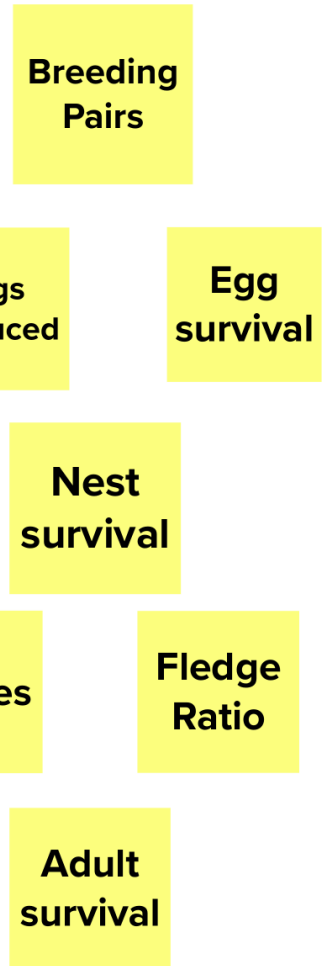
Habitat



### Direct Productivity Factors

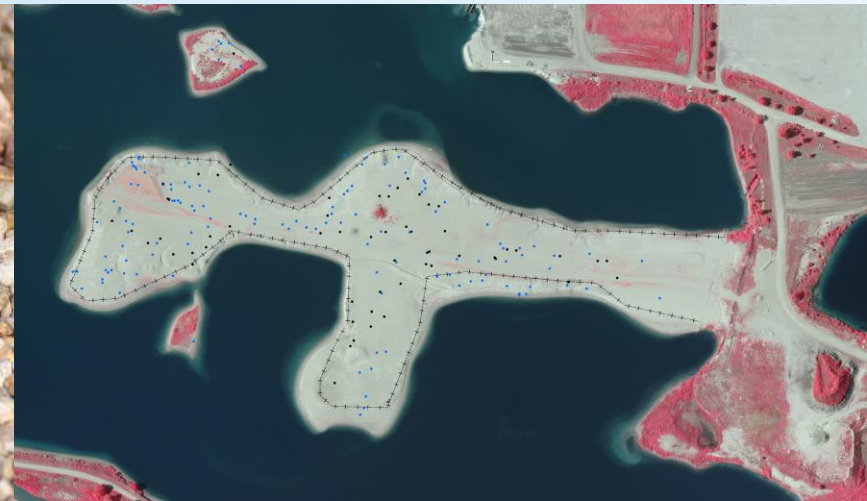


### Performance Indicators



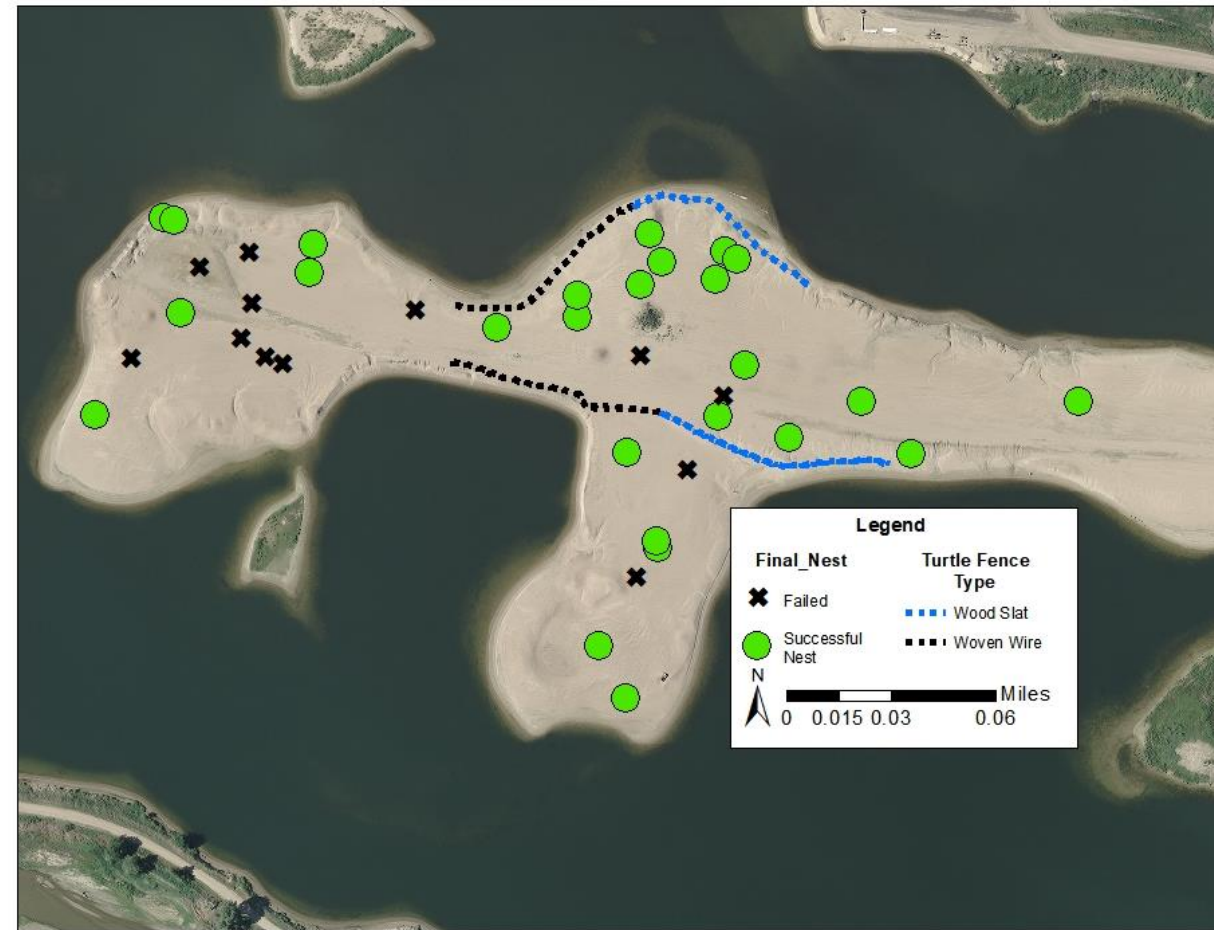
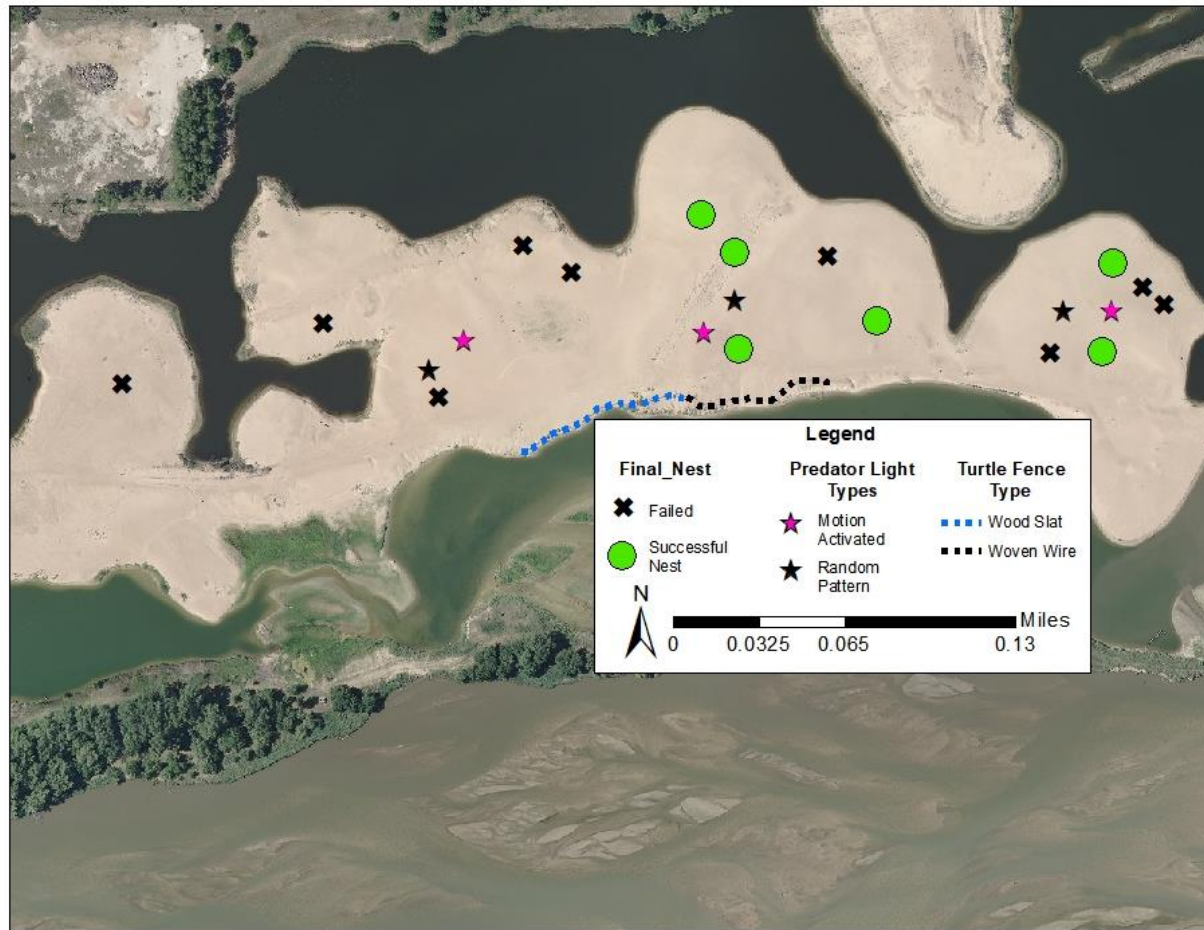
# LT/PP Predator Management and Monitoring Plan for 2021

- ❑ Predator management actions
- ❑ Predator and LT/PP response
- ❑ Coordination
  - ❑ outside monitoring, inside remote cameras (site and nest level), track surveys, animal trapping etc.
- ❑ Fating dendrogram decision rules
- ❑ River survey design



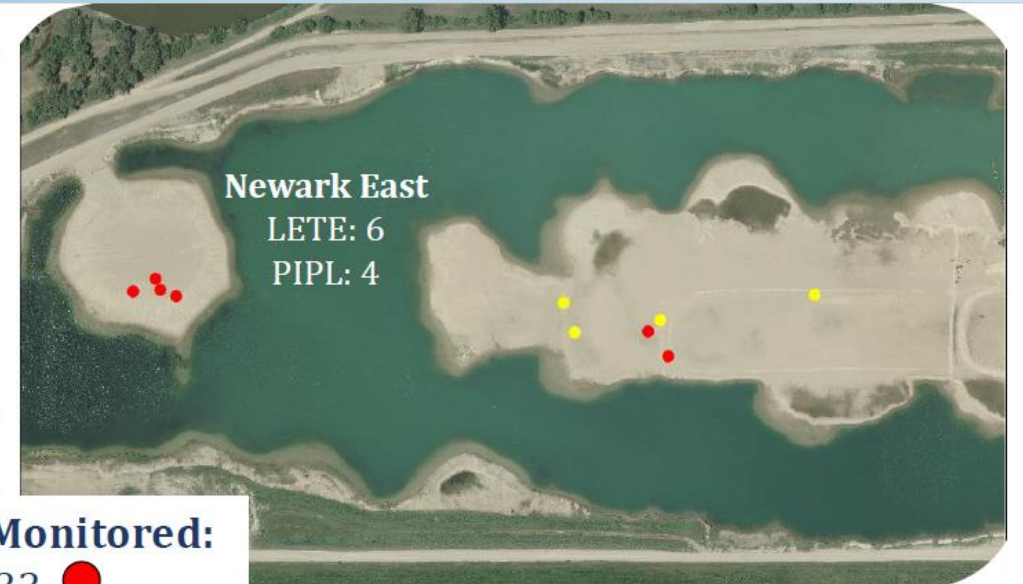
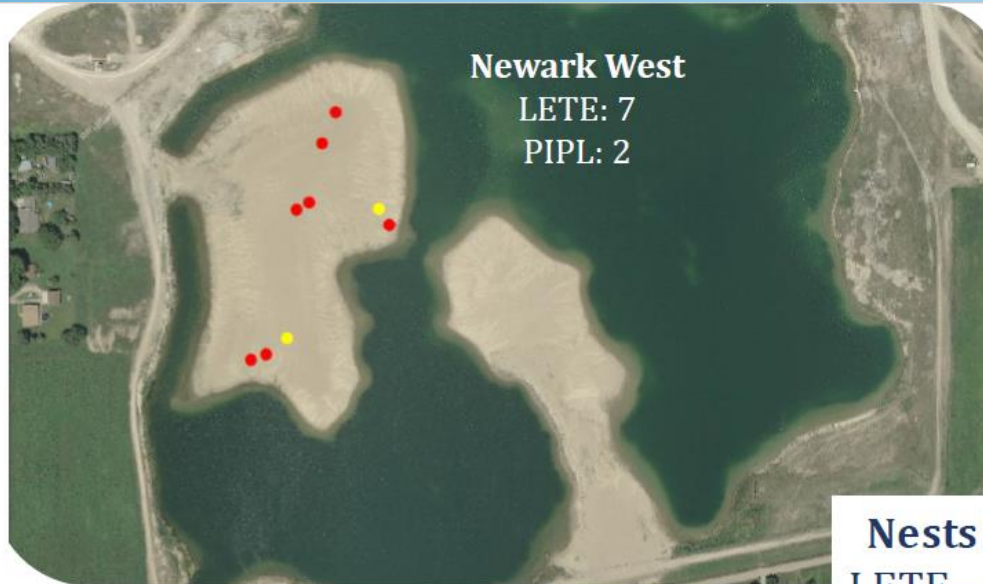
# 2020 Additional Predator Control Pilot Study

## Fencing and Lighting





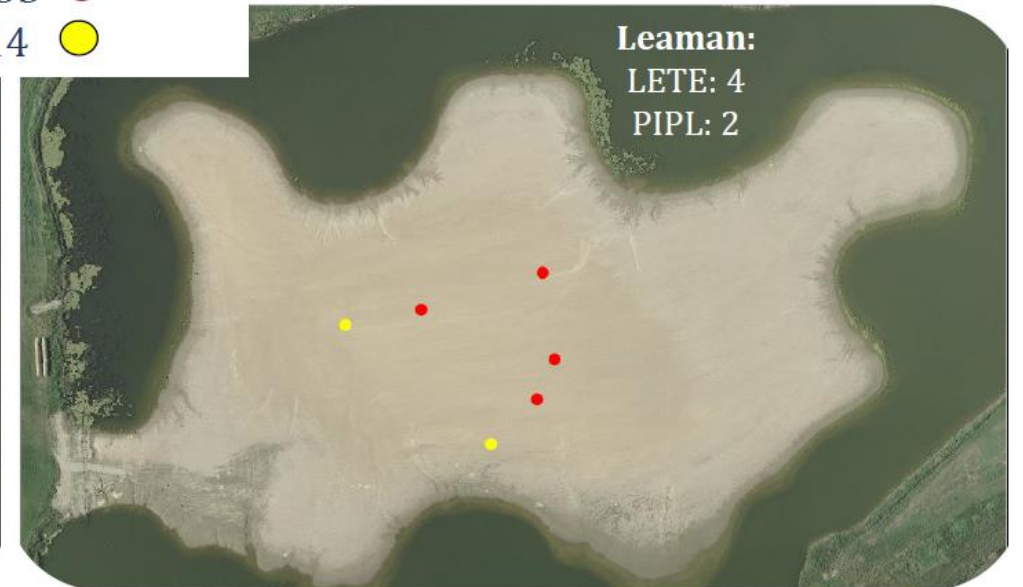
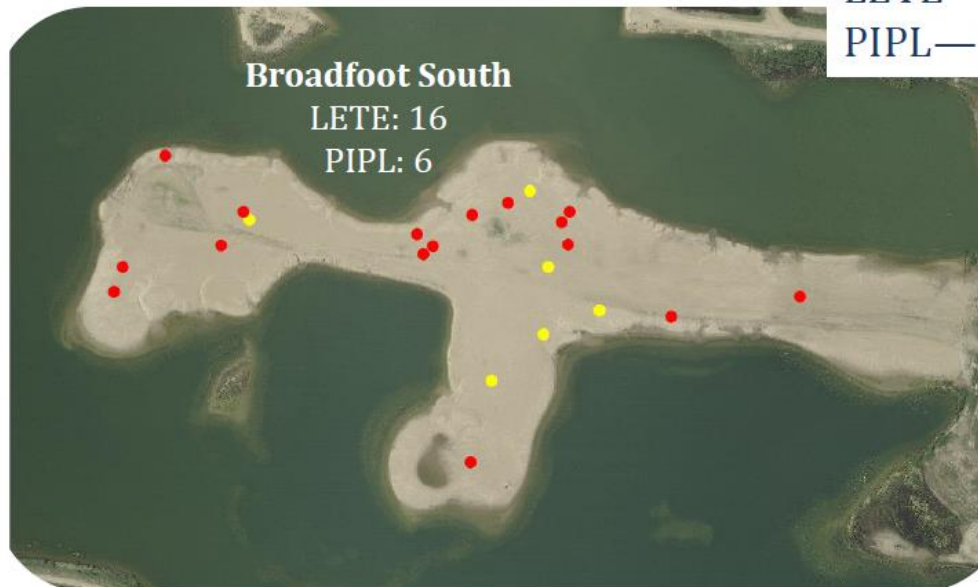
# 2020 Nest Camera Monitoring



## Nests Monitored:

LETE—33 ●

PIPL—14 ●

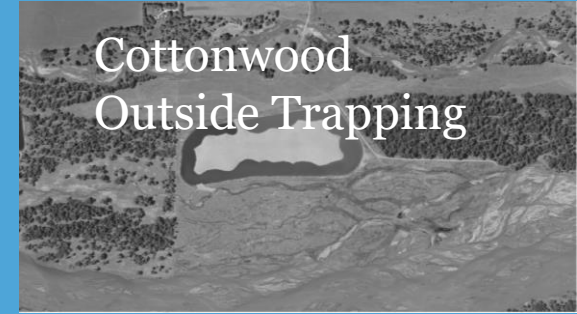




Lexington  
Outside trapping



Dyer  
Outside trapping



Cottonwood  
Outside Trapping



Blue Hole  
Outside trapping



Broadfoot Kearney South  
**Interior Fence + Lights**  
Outside trapping

**2021**  
**5 Status Quo**  
**3 Additional**  
**Predator**  
**Management**



Newark West  
**Exterior Fence + Lighting**  
Outside trapping

Newark East  
Outside trapping



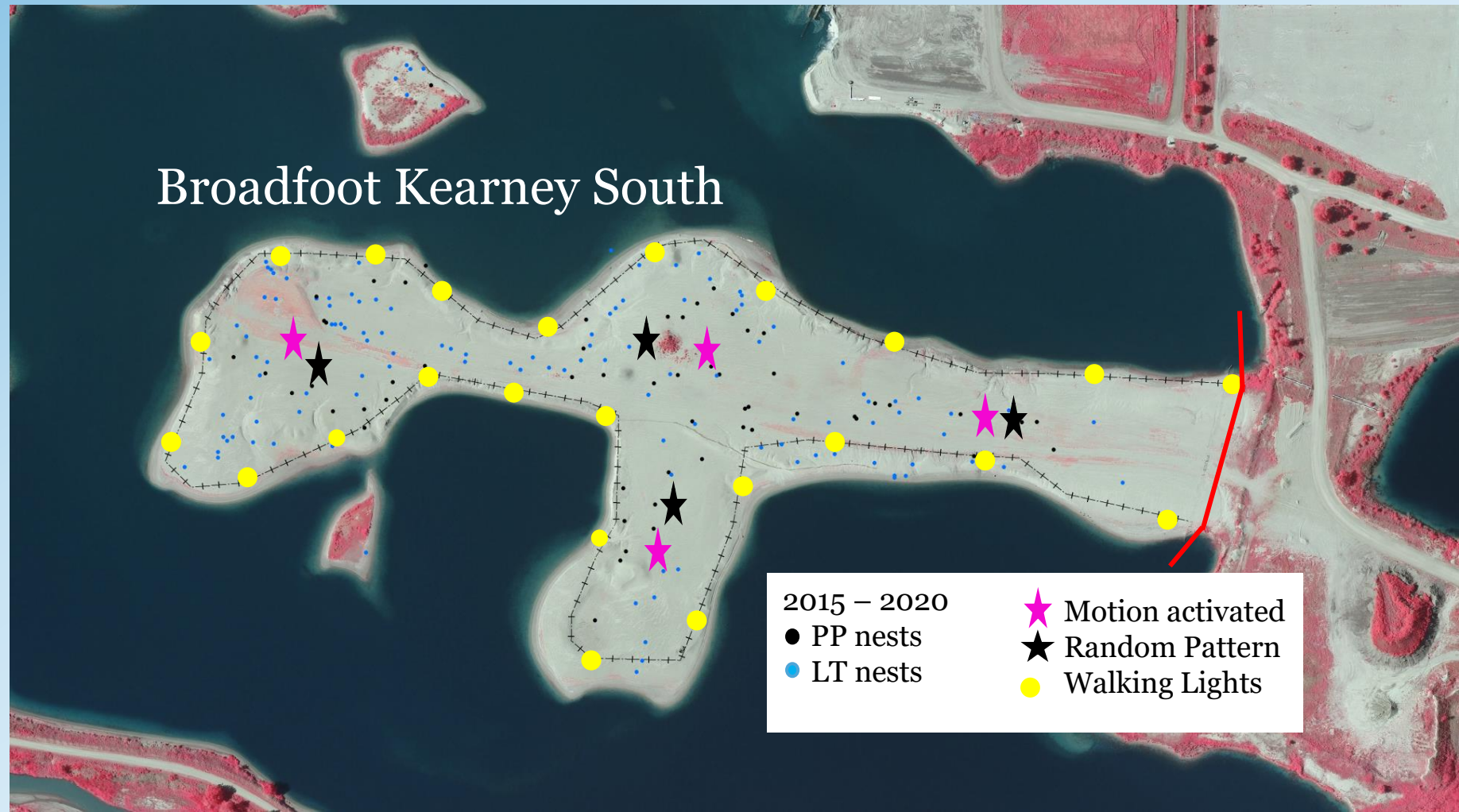
Leaman  
**Lights + Power Pole Avian Spikes**  
Outside trapping

# 2021 Additional Predator Management

- Predator/turtle fencing
- Predator deterrent lighting

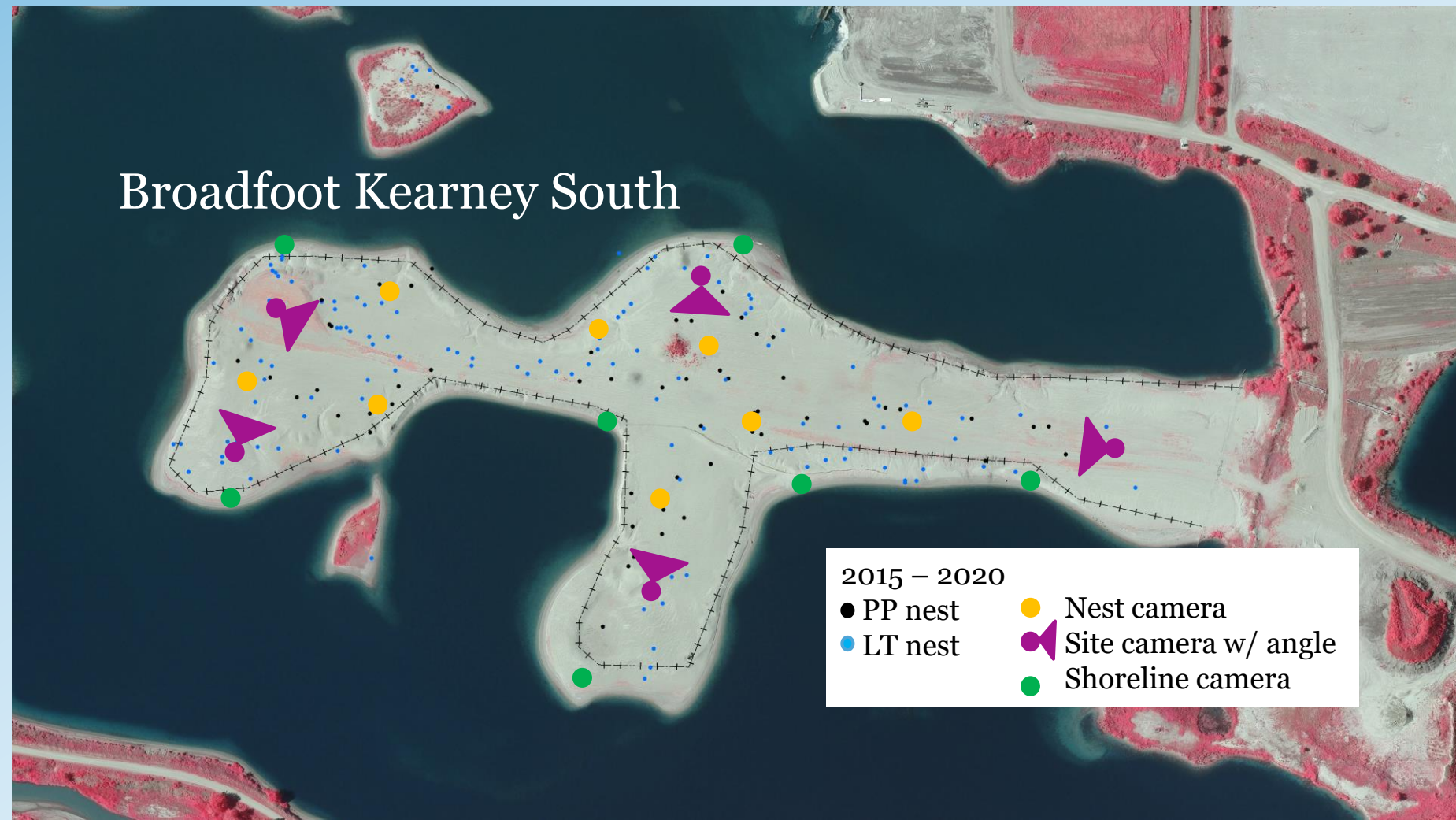
## Status quo

- Predator fence at terrestrial entrance
- Mammal trapping



# 2021 Monitoring effectiveness

- Outside monitoring
- Remote camera monitoring
- Track surveys
- Mammal trapping



Newark West  
Exterior Fence

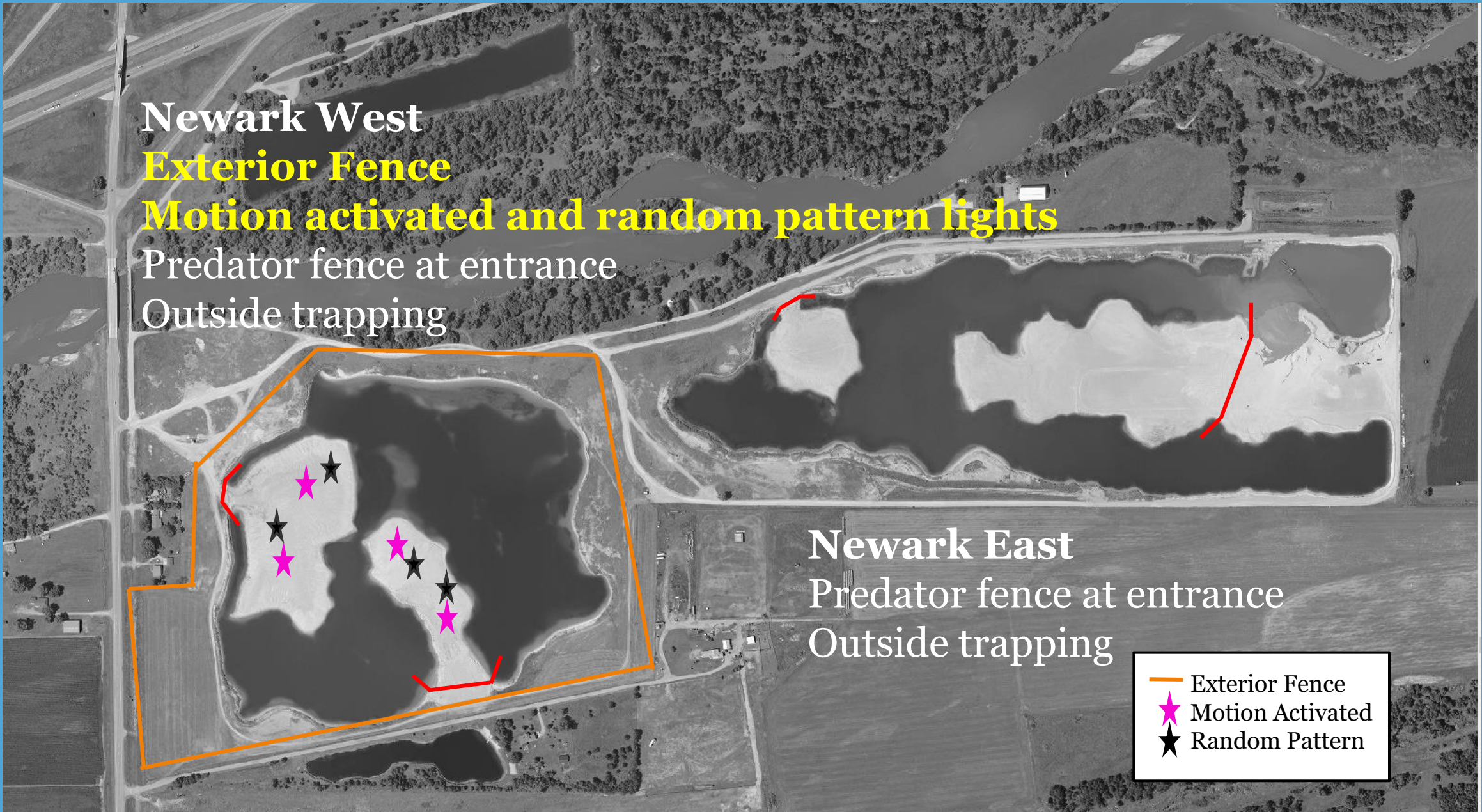
Motion activated and random pattern lights

Predator fence at entrance  
Outside trapping

Newark East

Predator fence at entrance  
Outside trapping

- Exterior Fence
- ★ Motion Activated
- ★ Random Pattern



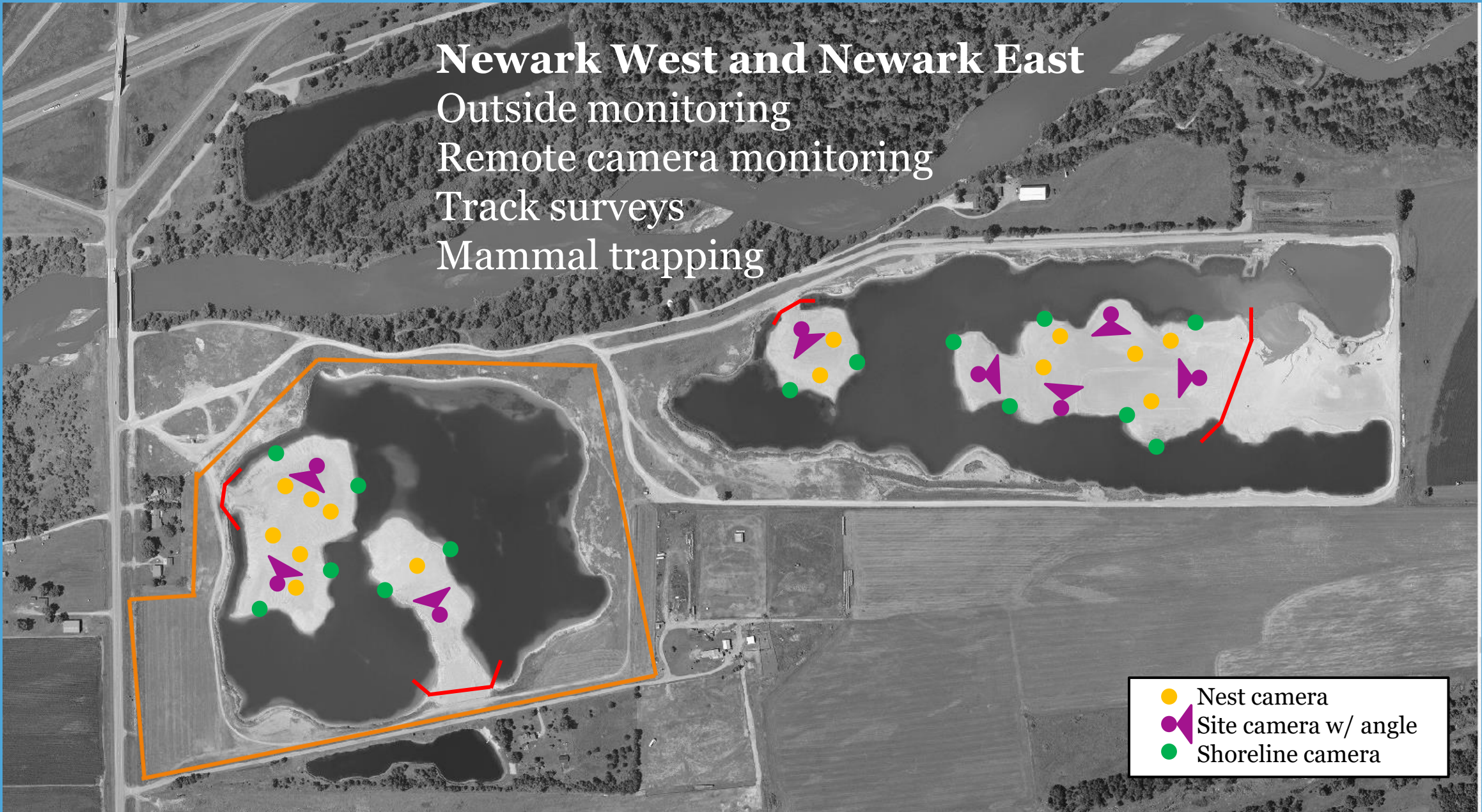
# Newark West and Newark East

Outside monitoring

Remote camera monitoring

Track surveys

Mammal trapping



Leaman

**Power Post Avian Spikes**

**Motion activated and random pattern lights**

Predator fence at entrance

Outside trapping



★ Motion activated  
★ Random Pattern

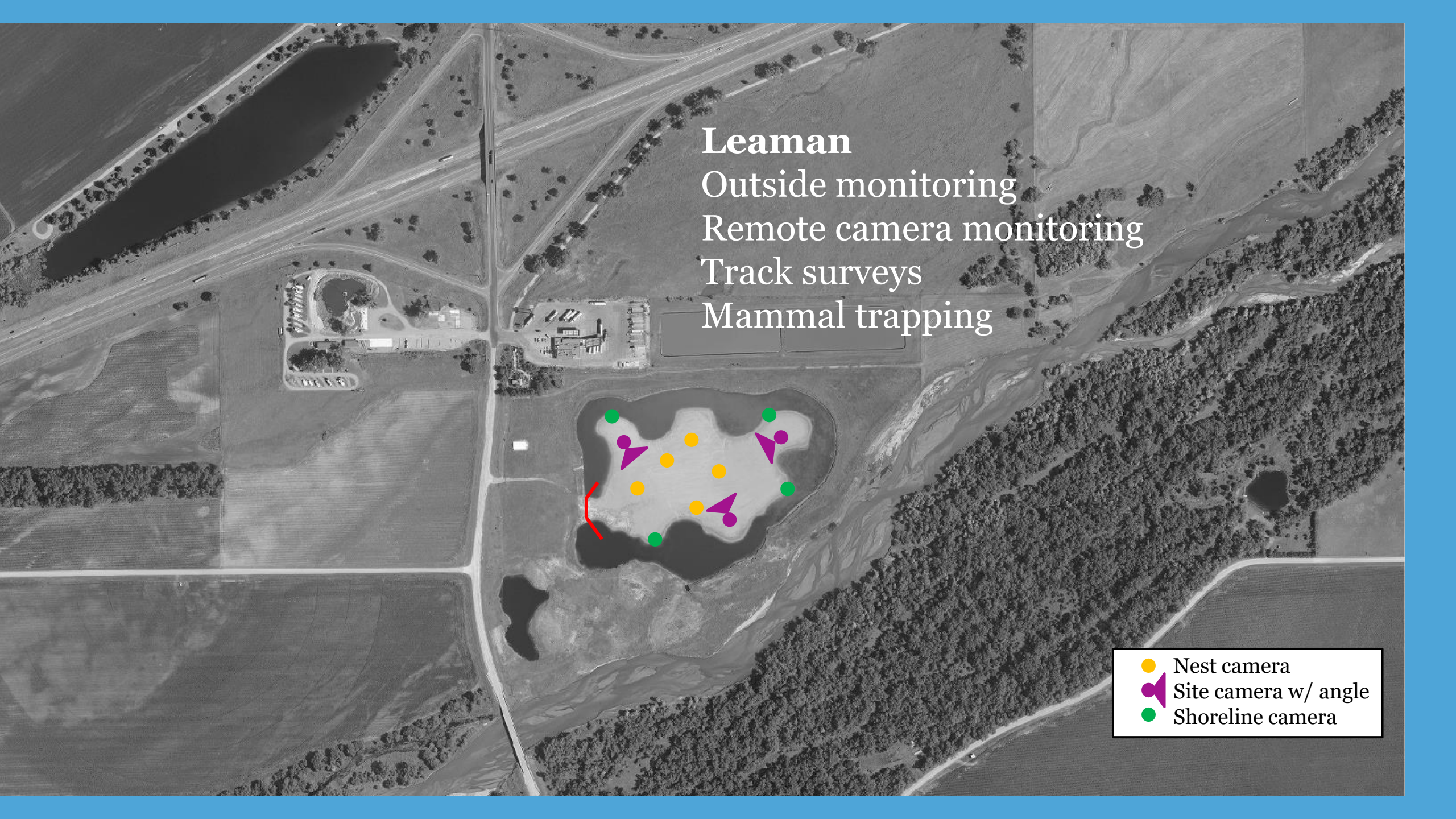
## Leaman

Outside monitoring

Remote camera monitoring

Track surveys

Mammal trapping

- 
- An aerial photograph of a wetland area with a central pond. The pond is marked with several colored symbols: yellow circles, purple triangles, and green circles. A red line is drawn along the western shoreline of the pond. The surrounding landscape includes fields, a road, and a forested area to the southeast.
- Nest camera
  - ▲ Site camera w/ angle
  - Shoreline camera



# LT/PP Productivity and Predator Response

- nests
- eggs produced and hatched
- daily nest/brood survival
- fledges
- failed-predated nests and broods
- number of predators registered/effort
- number of predators trapped/effort
- breeding pairs
- nest success
- chicks produced
- fledge ratio
- failed-unknown nests and broods
- number of predation events registered/effort
- identification of predators responsible for losses



# Coordination

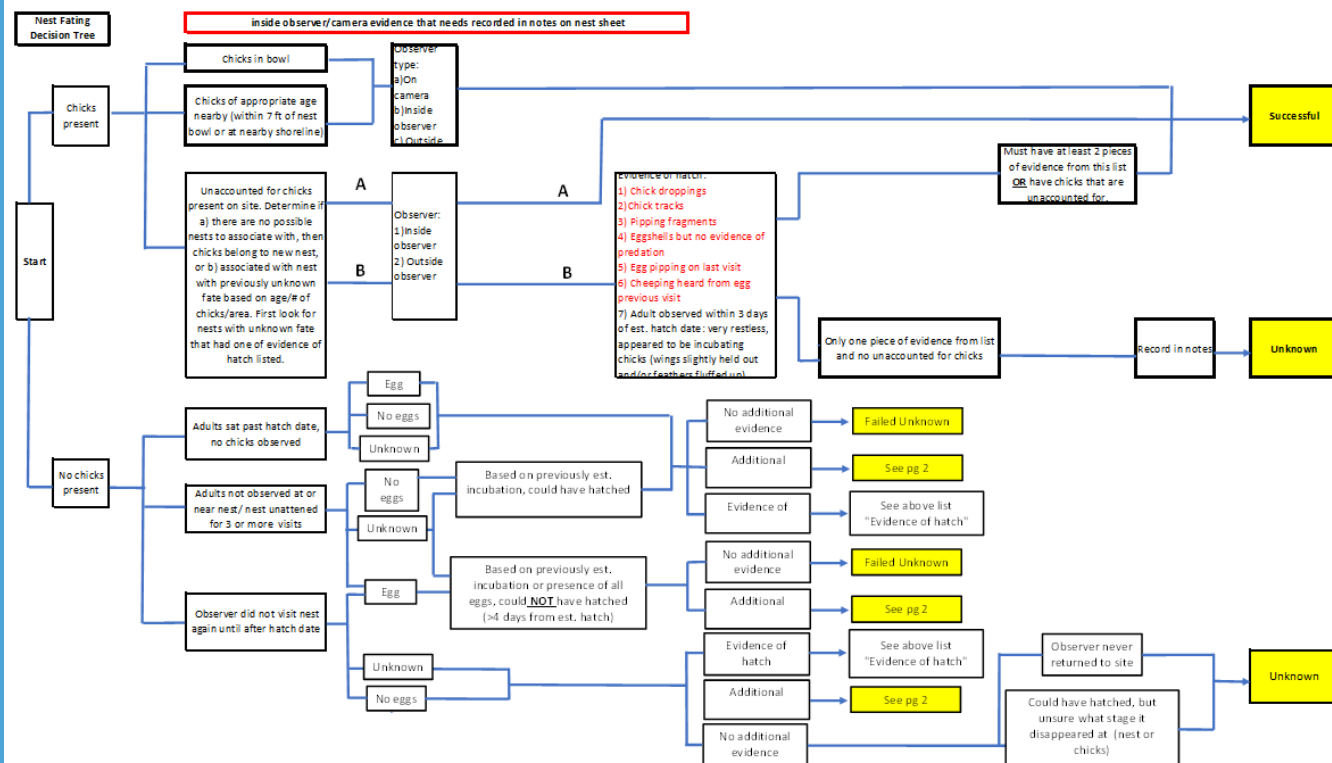
- Outside monitoring
- Inside observations
- Nest remote cameras
- Site and shoreline remote cameras
- Track surveys – turtles and predators, fence approaches vs. breaches
- Mammal trapping – captures per unit effort



# Fating Dendrograms

- Subjective, consistent
- Integration of information
- Improve estimates of FAILED  
PREDATED nests and broods
- Reduce UNKNOWN fates

See fating evidence list on NM sheets for evidence associated with each nest.

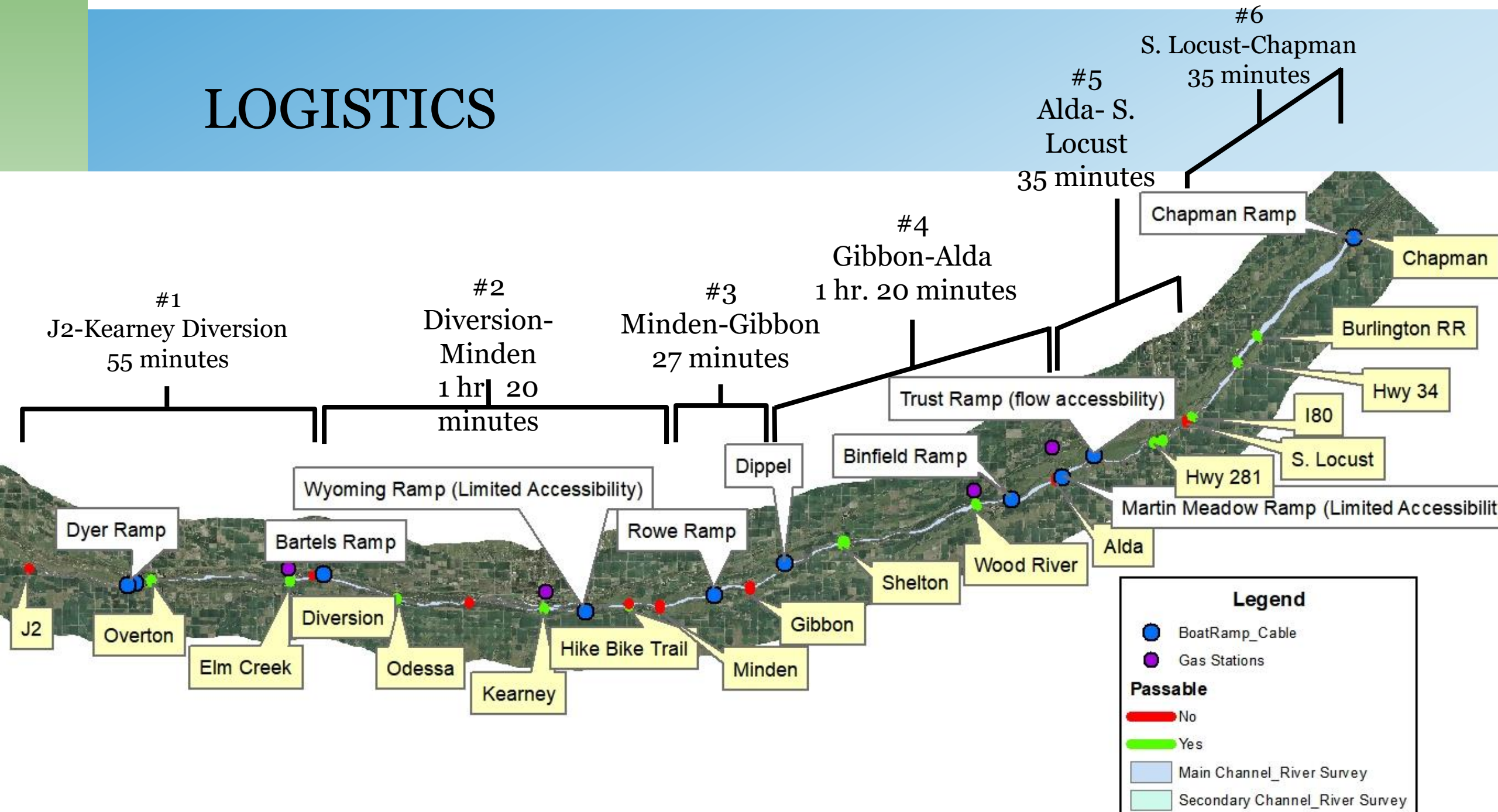




# River Survey Design

- Balance between logistic constraints and survey design
- Improve distribution of survey effort over time of day

# LOGISTICS



			Day 1									Day 2							
Year	Survey		J2- Diversion			Diversion-Minden			Gibbon-Alda			Minden-Gibbon			Alda-S.Locust			S.Locust- Chapman	
			Start	End		Start	End		Start	End		Start	End		Start	End		Start	End
2021	1-May	1	8:30	9:35	2	10:45	12:05	4	14:35	15:55	1	9:35	9:55	1	8:00	8:45	4	13:20	14:20
2021	15-May	3	12:35	13:40	1	8:00	9:20	2	10:05	11:25	3	13:25	13:45	2	10:30	11:05	1	8:30	9:30
2021	1-Jun	2	11:10	12:15	3	13:25	14:45	1	8:30	9:50	2	10:00	10:20	2	11:10	11:45	3	12:45	13:45
2021	15-Jun	2	10:30	11:35	1	8:00	9:20	3	12:45	14:05	4	15:25	15:45	4	14:00	14:35	2	11:00	12:00
2021	1-Jul	1	8:30	9:35	2	10:45	12:05	4	14:35	15:55	1	8:00	8:20	1	9:10	9:45	2	10:45	11:45
2021	15-Jul	4	14:00	15:05	2	11:00	12:20	1	8:30	9:50	2	10:55	11:15	3	12:05	12:40	1	8:30	9:30
2021	1-Aug	3	11:25	13:40	1	8:00	9:20	2	10:05	11:25	4	14:25	14:45	3	13:00	13:35	2	11:00	12:00
2022	1-May	1	8:30	9:35	2	10:45	12:05	4	14:35	15:55	1	9:35	9:55	1	8:00	8:45	4	13:20	14:20
2022	15-May	3	12:35	13:40	1	8:00	9:20	2	10:05	11:25	3	13:25	13:45	2	10:30	11:05	1	8:30	9:30
2022	1-Jun	2	11:10	12:15	3	13:25	14:45	1	8:30	9:50	2	10:00	10:20	2	11:10	11:45	3	12:45	13:45
2022	15-Jun	2	10:30	11:35	1	8:00	9:20	3	12:45	14:05	4	15:25	15:45	4	14:00	14:35	2	11:00	12:00
2022	1-Jul	1	8:30	9:35	2	10:45	12:05	4	14:35	15:55	1	8:00	8:20	1	9:10	9:45	2	10:45	11:45
2022	1-May	4	14:00	15:05	2	11:00	12:20	1	8:30	9:50	2	10:55	11:15	3	12:05	12:40	1	8:30	9:30
2022	15-May	3	11:25	13:40	1	8:00	9:20	2	10:05	11:25	4	14:25	14:45	3	13:00	13:35	2	11:00	12:00
2023	1-May	1	8:30	9:35	2	10:45	12:05	4	14:35	15:55	1	9:35	9:55	1	8:00	8:45	4	13:20	14:20
2023	15-May	3	12:35	13:40	1	8:00	9:20	2	10:05	11:25	3	13:25	13:45	2	10:30	11:05	1	8:30	9:30
2023	1-Jun	2	11:10	12:15	3	13:25	14:45	1	8:30	9:50	2	10:00	10:20	2	11:10	11:45	3	12:45	13:45
2023	15-Jun	2	10:30	11:35	1	8:00	9:20	3	12:45	14:05	4	15:25	15:45	4	14:00	14:35	2	11:00	12:00
2023	1-Jul	1	8:30	9:35	2	10:45	12:05	4	14:35	15:55	1	8:00	8:20	1	9:10	9:45	2	10:45	11:45
2023	15-Jul	4	14:00	15:05	2	11:00	12:20	1	8:30	9:50	2	10:55	11:15	3	12:05	12:40	1	8:30	9:30
2023	1-Aug	3	11:25	13:40	1	8:00	9:20	2	10:05	11:25	4	14:25	14:45	3	13:00	13:35	2	11:00	12:00
2023	1-May	1	8:30	9:35	2	10:45	12:05	4	14:35	15:55	1	9:35	9:55	1	8:00	8:45	4	13:20	14:20
2024	15-May	3	12:35	13:40	1	8:00	9:20	2	10:05	11:25	3	13:25	13:45	2	10:30	11:05	1	8:30	9:30
2024	1-Jun	2	11:10	12:15	3	13:25	14:45	1	8:30	9:50	2	10:00	10:20	2	11:10	11:45	3	12:45	13:45
2024	15-Jun	2	10:30	11:35	1	8:00	9:20	3	12:45	14:05	4	15:25	15:45	4	14:00	14:35	2	11:00	12:00
2024	1-Jul	1	8:30	9:35	2	10:45	12:05	4	14:35	15:55	1	8:00	8:20	1	9:10	9:45	2	10:45	11:45
2024	15-Jul	4	14:00	15:05	2	11:00	12:20	1	8:30	9:50	2	10:55	11:15	3	12:05	12:40	1	8:30	9:30
2024	1-Aug	3	11:25	13:40	1	8:00	9:20	2	10:05	11:25	4	14:25	14:45	3	13:00	13:35	2	11:00	12:00
2025	1-May	1	8:30	9:35	2	10:45	12:05	4	14:35	15:55	1	9:35	9:55	1	8:00	8:45	4	13:20	14:20
2025	15-May	3	12:35	13:40	1	8:00	9:20	2	10:05	11:25	3	13:25	13:45	2	10:30	11:05	1	8:30	9:30
2025	1-Jun	2	11:10	12:15	3	13:25	14:45	1	8:30	9:50	2	10:00	10:20	2	11:10	11:45	3	12:45	13:45
2025	15-Jun	2	10:30	11:35	1	8:00	9:20	3	12:45	14:05	4	15:25	15:45	4	14:00	14:35	2	11:00	12:00
2025	1-Jul	1	8:30	9:35	2	10:45	12:05	4	14:35	15:55	1	8:00	8:20	1	9:10	9:45	2	10:45	11:45
2025	15-Jul	4	14:00	15:05	2	11:00	12:20	1	8:30	9:50	2	10:55	11:15	3	12:05	12:40	1	8:30	9:30
2025	1-Aug	3	11:25	13:40	1	8:00	9:20	2	10:05	11:25	4	14:25	14:45	3	13:00	13:35	2	11:00	12:00
			Number of Surveys			Number of Surveys			Number of Surveys			Number of Surveys			Number of Surveys			Number of Surveys	
Morning		1	10		1	15		1	10		1	10		1	10		1	10	
Mid day		2	10		2	15		2	10		2	10		2	10		2	15	
Early Afternoon		3	10		3	5		3	5		3	5		3	10		3	5	
Late Afternoon		4	5		4	0		4	10		4	10		4	5		4	5	



# River Survey Design

- Balance between logistic constraints and survey design
- Improve distribution of survey effort over time of day
- Post-season evaluation

# QUESTIONS?

- ✓ Predator management actions
- ✓ Predator and LT/PP response
- ✓ Coordination
  - ✓ outside monitoring, inside remote cameras (site and nest level), track surveys, animal trapping
- ✓ Fating dendrogram decision rules
- ✓ River survey design

