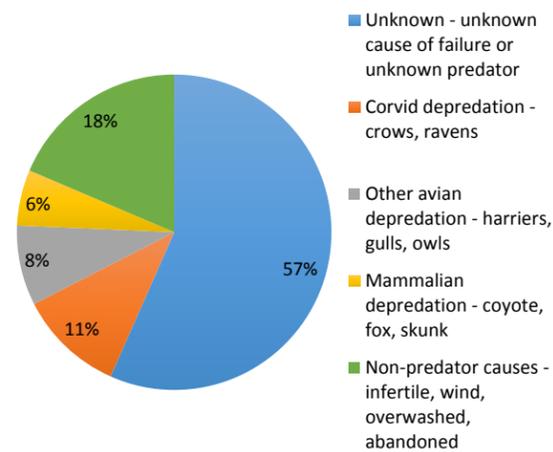


## Background

Understanding causes of nest failure is important when managing sensitive populations. The Snowy Plover, a ground nesting shorebird, is listed as Threatened along the Oregon coast by USFWS and ODFW.

Plover management in Oregon is intensive, and depends on accurate information on productivity and causes of reproductive failure. As part of INR's breeding season monitoring, we attempt to document all causes of nest failure. However, monitors have difficulty correctly identifying the cause of many nest failures, largely because evidence is obscured by wind or rain in the ephemeral coastal environment. Thus, the largest category of nest failures is 'unknown'. The lack of information on a large proportion of nests makes adaptive management difficult.

### Cause of nest failure as recorded by monitors, 2011 - 2016 (n = 1500)



We used trail cameras (Reconyx PC900 HyperFire, Bushnell Trophy Cams, and a custom made video camera), placed approximately 3m from



plover nests to reduce the number of nest failures recorded as unknown. We placed cameras at 130 nests between 2011 and 2016.

## Aims

1. Determine if the presence of cameras affected nest success
2. Identify primary causes of Snowy Plover nest failure
3. At nests with cameras, compare the cause of nest failure documented by cameras with information documented by monitors in the field.

This:



Not this:



## Results

Although nests with cameras hatched at a slightly higher rate, we found no significant difference in the percentage of nests that hatched at least one egg (apparent nest success) between nests with and without cameras ( $\chi^2 = 2.22, 1 \text{ df}, p = 0.14$ ).

Of the 130 nests with cameras, 70 failed. Cameras revealed that most nest failures were due to predation (74%).

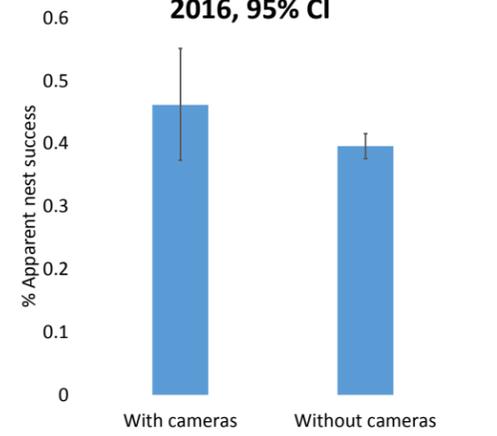
The most common predators documented by cameras included Northern Harriers, Common Ravens, coyotes, and red fox.

We had a fairly high rate of equipment failure (13 nests out of 130). We were able to clearly identify cause of failure in 82% of the nests that failed.

Even with equipment failure taken into consideration, cameras were significantly better at correctly identifying cause of nest failure than monitors ( $\chi^2 = 25.54, 1 \text{ df}, p < 0.001$ ). Monitors were able to identify the cause of failure at 29 of the failed nests while cameras documented cause of failure at 58.

When monitors were able to identify cause of failure based on evidence in the field, they were correct in all but one case.

### Snowy Plover nest success with and without cameras, 2011 - 2016, 95% CI



21 failures to Northern Harriers



14 failures to Common raven

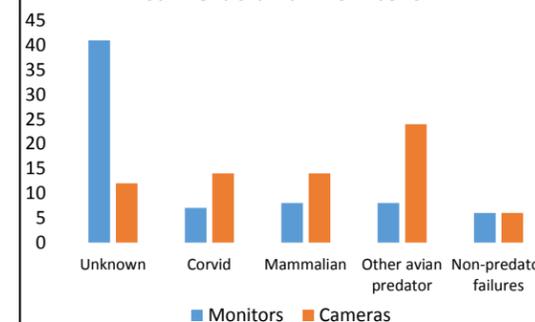


9 failures to coyote



4 failures to red fox

### Cause of nest failure at nests with cameras, as recorded by cameras and monitors



## Conclusions

- Because nests with and without cameras had similar success rates, we believe predators did not use cameras to locate nests. Likewise, cameras do not appear to deter predators.
- As expected, corvids, coyote, and fox were important nest predators. We were surprised however to find that Northern Harriers were the most common nest predator in this study. Eggs are not typically part of the harrier diet (Smith et al. 2011). Cameras were vital to documenting this unusual predator, because they typically fly to and from nests, leaving few tracks and little evidence.
- When monitors were able to discern the cause of nest failure, they were usually correct. But cameras were indispensable for accurately identifying causes behind unknown failures.
- Camera use increased over the years of this study, and we anticipate continuing their use, increasing sample size and allowing more rigorous analyses.



Not all nests failed! How many plovers can you find at this hatched nest?

### Literature Cited:

Smith, K.G., Wittenberg, S.R., Macwhirter, R.B. and Bildstein, K.L., 2011. Northern harrier (*Circus cyaneus*). *The Birds of North America Online* (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology.

Thank you to our partners

