Togiak Seabird Monitoring

Questions for Kara

* What is the management objective?
* What is the survey objective?

See the attached 2018 workplan for insight into this project.

Bottom line is this is a trend monitoring project. Here are the objectives from the 2018 Workplan:

**Objectives:**

1. Monitor trends in the nesting population of black-legged kittiwakes, common murres, and pelagic cormorants at Cape Peirce.
2. Monitor trends in the nesting productivity of black-legged kittiwakes, common murres, and pelagic cormorants at Cape Peirce.

These data go to Don Dragoo for incorporation into the Statewide Seabird report, however, Pat would like to see us do more with the Cape Peirce data. This included getting a solid trend analysis (both pop and prod) published in the scientific literature. The nuances of this data and the validity of long term trend analyses done in the past are my main concern.

See 2013 Seabird report attached.

Is report and older reports in ServCat? I could not find them.

* + **Nope, I’m working on making that happen**
* Nests:
  + Blanks are no counts or zeros?
    - Blanks are NO counts, often due to birds flushing from cliffs during the count
* To address variable survey effort, how about standardizing counts by survey area to get density of birds or nests?
  + Plots are not the same square area. The same plot boundaries, however, have been used for all years (with some exceptions). The… … view the observer has of the plot determines its area – so a plot photo may be a good representation of the observable area. However, plot photos have not been taken every year. Some changes occur as ledges sluff off and become unusable, but other ledges are created too.
* There were no COMU nests in the dataset that you sent. See my plots. That appears to differ from the report (?).
  + COMU don’t make nests – they form tight groups on cliffs and lay their egg on the bare cliff and hold it there with their feet– its impossible to track an individual bird as the group jostles and changes brooding adults. The data is captured in the ‘productivity monitoring’ and ends up being the number of birds observed in incubation posture on a particular ledge. It’s quite subjective relative to nest counting
  + This will be the next step after we are happy with the population assessment.

Sources of bias

General thoughts:

* Quantify relationship between birds/nest counts and year/plot/other variables
  + Poisson mixed effects model
    - Random intercept for each plot, fixed effect (slope) for each year:
      * Birds ~ Year + (Year|Plot)
    - Random intercept for each plot and random slope for year
      * Birds ~ 1 + (Year|Plot)
  + Zero inflated Poisson model
* GIS to estimate plot area using viewshed

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1. Trend in abundances across reps within a plot
   1. Is there a consistent trend among plots?
   2. Relationship with productivity
2. Separate models by species first, then add covariates and see if we can combine to a global model
3. Stratify plots by failure/success years and estimate detection separately.
4. Detection rates
   1. Time varying
   2. Observer
5. Metadata
6. Match with the seabird database
   1. Talk with Michael Swaim about differences between the seabird db and the Togiak dataset
   2. Access and compare the seabird db
      1. **McCrea will try it**
7. Mendenhall 1993