Update – Integration of Traditional Knowledge and western science using a Bayesian approach for fully informed models

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Project Goals & Objectives

Our overall goal is to combine Traditional Knowledge (TK) with satellite telemetry data of seal movement to get a better understanding of seal habitat use and behavior. To do this we are using three species as a case study: ringed, bearded, and spotted seals. Our specific objectives are to:
1. Document TK on the habitat use and behavior of ringed, bearded, and spotted seals.
2. Convert the TK into a form that can be use in species habitat and movement models.
3. Include both TK and satellite telemetry data on ringed, bearded, and spotted seals into models using a Bayesian framework.

Methods

1. TK interviews – We will conduct interviews with knowledge holders using a semi-directed approach, which allows for the interviews to be more like a conversation. We will focus on topics around seal habitat use (e.g., if they are associated with specific ice concentrations) and behavior (e.g., if seals are feeding in specific areas).
2. Conversion of TK – We will convert the TK into a form that can be included in our seal habitat and behavior models.
3. Combination of TK and telemetry data – We will combine the converted TK with satellite telemetry data from the North Slope Borough Department of Wildlife. We will use Bayesian modeling because this approach lets us combine different type of data and information into the same model.
4. Comparison – We will compare models that include TK with those that do not.

Throughout this project we will go back to the hunters we have interviewed to confirm our interpretation of the TK and get feedback on our approach and results.

Progress

- TK Interviews
    - Utqiaġvik, AK – We interviewed 9 hunters in November 2018 and conducted follow up interviews to review our interpretation of the TK in September 2019. Billy Adams and Andy Vonduyke identified hunters to be interviewed.
    - Kotzebue, AK – We interviewed 10 hunters in November 2019, with the assistance of Alex Whiting. We have not been able to return and do follow up interviews to review the TK due to COVID-19 travel restrictions.
    - Point Hope, AK – We interviewed 7 hunters in November 2019, with the assistance of Michael Tuzroyluck. We have not been able to return and do follow up interviews to review the TK due to COVID-19 travel restrictions.

- Documentation of TK
    - We have submitted a manuscript summarizing the TK of ringed, bearded, and spotted seals in Utqiaġvik, AK to the journal Arctic Science.

        Gryba R, Huntington HP, Von Duyke AL, Adams B, Frantz B, Gatten J, Harcharek Q, Olemaun H, Sarren R, Skin J, Henry G, Auger-Méthé M (*in revision*) Indigenous knowledge of bearded seal (*Erignathus barbatus*), ringed seal (*Pusa hispida*), and spotted seal (*Phoca largha*) behaviour and habitat use near Utqiaġvik, Alaska. Arctic Science.

- Seal habitat and behavior modeling
    - We are currently working on models using only the satellite telemetry data to identify seal habitat use. We are focusing on the area around Utqiaġvik for the first set of models.
    - We are continuing to collect satellite telemetry data in seal movement and behavior.

Future Activities

- Return to Point Hope and Kotzebue to review our interpretation of the TK with the hunters. We hope to do this in winter 2021/2022.
- Finalize habitat and behavior models without TK.
- Add TK into the habitat and behavior models for the waters near Utqiaġvik.
- Begin modeling for the areas around Point Hope and Kotzebue.
- Return to all 3 communities to present our initial models and get feedback.

Conclusion

Our goal is to develop a method for TK to be included in habitat and behavior models. Our approach should improve models of, and the identification of, important habitat because it can include all of the information that is contained within TK, not just 'western' science data. Although we are currently focused on ringed, bearded, and spotted seals, our method can be applied to other species in the future.