



WILD SHEEP SOCIETY
OF BRITISH COLUMBIA

Assessing the responses of Stone's Sheep (*Ovis dallei stonei*) to human disturbance using physiological bioindicators and local knowledge

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TĀLTĀN
TAHLTAN CENTRAL
GOVERNMENT



Stone's Sheep Disturbance Project – Westin Creyke - wcreyke@unbc.ca

To replicate this **multi-disciplinary ecological study**, you must simultaneously deploy non-invasive physiological monitoring and qualitative resource mapping informed by Indigenous community knowledge.

Phase 1: Study Design & Site Selection

- Identify a **disturbed study population** near a resource road.
- Choose an **undisturbed control population** with similar geography.
- Map regional baseline vegetation greenness using **Mean NDVI**.
- Track seasonal variations across summer and winter ranges and during anthropogenic disturbance events.

Phase 2: Physiological Stress Monitoring (Objective 1)

1. Field Collection & Storage

- Track wild herds to locate and collect fresh **fecal pellet samples** non-invasively without handling sheep.
- Place pellet samples into sealed plastic bags and keep cool (**ideally freeze samples immediately**, but this is not always possible in the field) to prevent bacterial steroid degradation or production. An insulated dry bag with snow changed out every 8 hours and buried in snow at night can keep samples around or just below 0°C. Samples kept this way can provide reliable fecal glucocorticoid measures for up to 72 hours. If sampling entirely via helicopter, sampling sessions should not last longer than a day, as aerial traffic can influence next-day fecal glucocorticoid concentrations in pellet groups.

2. Laboratory Extraction & Assay

- Thaw and manually homogenize each wet fecal sample.
- Freeze-dry homogenized samples
- Extract metabolites using a **high-percentage alcohol solvent** (e.g., 80% ethanol).
- Centrifuge the mixture to isolate the liquid supernatant.
- Quantify **Fecal Cortisol Metabolites** via enzyme-linked immunosorbent assays (ELISA).
- Quantify metabolic **Triiodothyronine (T3)** via parallel ELISA.
- **Log-transform concentration values** ($\ln(\text{ng/g})$ feces) for uniform statistical scaling.

3. Traffic Monitoring & Modeling

- Log daily **vehicle traffic volume** on the resource road.
- Deploy **motion-activated trail cameras** along wildlife migration paths.
- Construct **Generalized Linear Mixed Models (GLMM)** to merge data.
- Evaluate how traffic fluctuations predict changes in fecal glucocorticoids.

Phase 3: Local Knowledge Integration (Objective 2)

1. Community Engagement

- Partner formally with **local Indigenous governments or community boards**.

- Ensure community interest in your research questions.
- Obtain explicit ethical consent before launching community interviews.

2. Semi-Structured Interviews

- Request the community to identify knowledge holders as potential participants, then identify more participants using the snowball method.
- Offer culturally appropriate incentives for participation (often a gift in the form of food rather than money).
- Conduct open-ended, semi-structured interviews with local knowledge holders.
- Record historical oral accounts of **long-term population trends**.
- Document observed changes in **seasonal animal movements**.
- Note community reports regarding expanding predator or human ranges.
- Log physical observations of long-term landscape alterations.

3. Qualitative Coding

- Transcribe all community interviews completely.
- Conduct a systematic **thematic analysis** on the text using a qualitative analysis software (e.g. Nvivo).
- Keep an open mind; look for themes that aren't necessarily 'related' to your questions or preconceptions.
- Group matching observations into distinct socio-ecological categories.

Phase 4: Data Validation & Reporting

- **Present preliminary findings** directly to interview participants first.
- Finalize anonymous participant acknowledgments based on individual consent.
- **Return the finished raw data** to the partner communities.
- Publish collaborative informational materials to support tribal wildlife policies.
- Communicate the science to the communities in a digestible and enjoyable form.

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