

**Appendix 1.** Materials used in workshops to elicit Traditional Ecological Knowledge including open-ended questions to facilitate discussion, a Structured Decision Analysis consequence table, and multiple-choice surveys completed by individual participants.

### **Workshop 1 - 27-28 January, 2015**

Open-ended questions (after concepts of SDA had been introduced)

1. What is the reason people live and stay in Wainwright?
2. What factors affect the ability of people to live and stay in Wainwright?
3. What topics would you like to focus on for this decision-making framework, ie what issues or problems relating to the ability to stay in Wainwright are important to you?

### **Workshop 2 - 28 July, 2015**

Open-ended question (after a brief refresher on SDA and topics covered during workshop 1)

1. We are providing a tool for decision-making, and in the previous workshop you identified some broad topics that are important to the community of Wainwright (for example maintaining the subsistence way of life while allowing for development). If possible, we would like the group to identify three specific issues to focus on for this exercise.

### **Follow-up discussion with two participants, 19 November, 2015**

Open-ended questions

1. Please take a look at these influence diagrams (pasted below, as developed by the authors following discussions during Workshop 2) and tell us if they seem accurate to you.

Figure A1.1. Model of the caribou subsistence system in Wainwright, Alaska

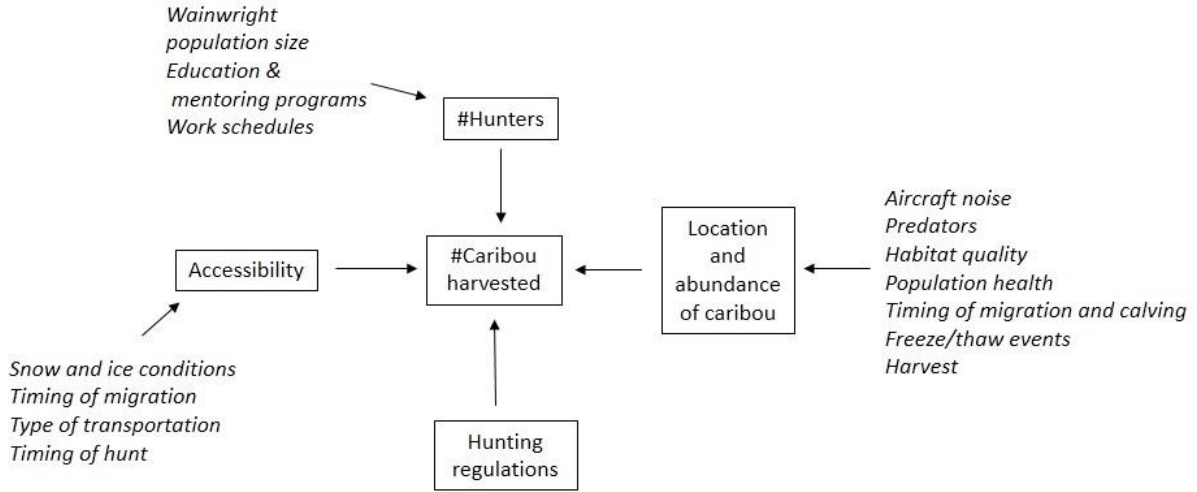


Figure A1.2. Model of bowhead whale subsistence system in Wainwright, Alaska

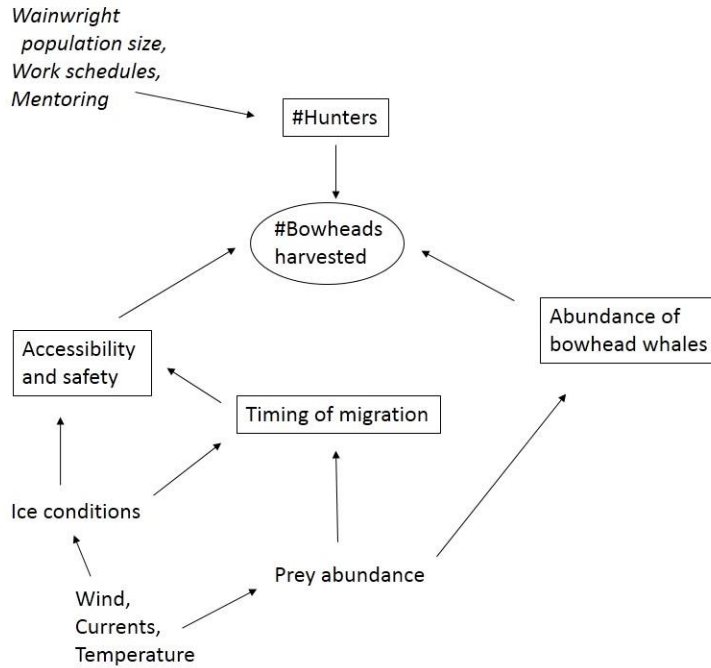


Figure A1.3. Model of walrus subsistence system in Wainwright, Alaska

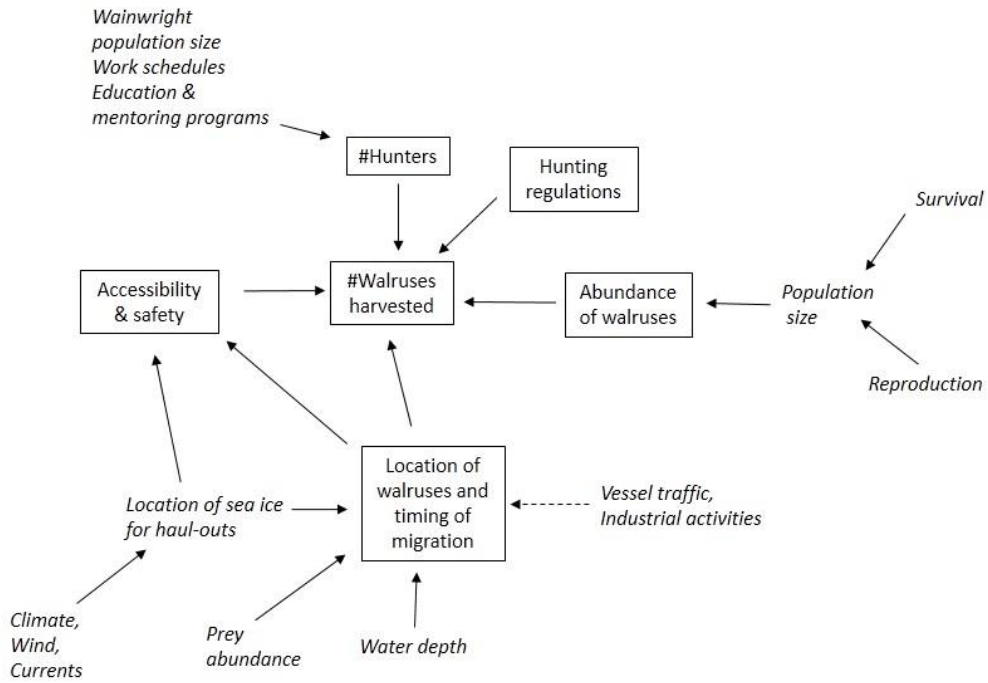
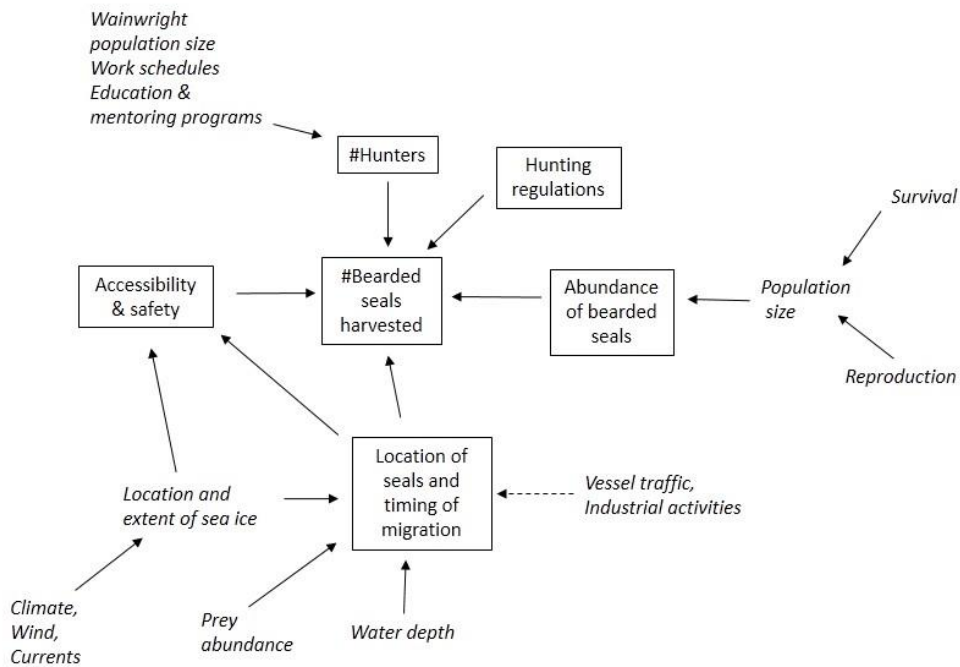


Figure A1.4. Model of bearded seal subsistence system in Wainwright, Alaska



2. How do you anticipate that climate change will affect hunting activities for each of the above species?
3. What would be a good way to survey peoples' attitudes about what limits hunter access to these resources?
4. What strategies could the community put in place to enhance hunter safety in Wainwright? What ranking system would make sense to evaluate these strategies?



Multiple choice surveys on the importance of different factors on wildlife health and abundance.

CARIBOU

1. How important are the following factors in influencing caribou health and abundance?

|   | <b>Very important</b> | <b>Somewhat important</b> | <b>Not important</b>  | <b>Unknown</b>        |
|---|-----------------------|---------------------------|-----------------------|-----------------------|
| Synchrony of calf birth                             | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Predator abundance                                  | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Summer temperature                                  | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Summer forage quality                               | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Insect abundance<br>(mosquitoes, warbles)           | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Lichen<br>abundance/accessibility                   | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Snow depth and compaction                           | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Winter temperature                                  | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Frequency of freezing<br>rain/icing events          | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Timing of spring migration                          | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Timing of fall migration                            | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Disturbance by humans<br>(vehicles, aircraft, etc.) | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Harvest by hunters                                  | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Other (please explain):                             | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |

2. How important are the following factors in influencing caribou hunting success?

|   | <b>Very important</b> | <b>Somewhat important</b> | <b>Not important</b>  | <b>Unknown</b>        |
|---|-----------------------|---------------------------|-----------------------|-----------------------|
| Abundance of caribou                                  | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Timing of spring migration                            | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Timing of fall migration                              | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Caribou distance from town                            | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Disturbance by humans (vehicles, aircraft, etc.)      | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Access to hunting equipment (snow machine, ATV, etc.) | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Hunter expertise                                      | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Other? Please explain:                                | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |

### BOWHEAD WHALE

3. How important are the following factors in influencing bowhead whale health and abundance?

|                            | <b>Very important</b> | <b>Somewhat important</b> | <b>Not important</b>  | <b>Unknown</b>        |
|----------------------------|-----------------------|---------------------------|-----------------------|-----------------------|
| Extent of sea ice retreat  | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Timing of sea ice breakup  | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Zooplankton prey abundance | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Shipping traffic           | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Harvest by hunters         | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Other? Please explain:     | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |

4. How important are the following factors in influencing bowhead whale hunting success?

|   | <b>Very important</b> | <b>Somewhat important</b> | <b>Not important</b>  | <b>Unknown</b>        |
|---|-----------------------|---------------------------|-----------------------|-----------------------|
| Abundance of whales                       | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Timing of migration                       | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Timing of sea ice breakup                 | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Duration of breakup period                | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Shorefast ice thickness                   | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Distance from shore of migrating whales   | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Access to hunting equipment (boats, etc.) | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Hunter expertise                          | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Other? Please explain:                    | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |

#### BEARDED SEAL

5. How important are the following factors in influencing bearded seal health and abundance?

|                                      | <b>Very important</b> | <b>Somewhat important</b> | <b>Not important</b>  | <b>Unknown</b>        |
|--------------------------------------|-----------------------|---------------------------|-----------------------|-----------------------|
| Sea ice thickness                    | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Extent of sea ice retreat            | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Timing of sea ice breakup            | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Benthic prey abundance (clams, etc.) | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Shipping traffic                     | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Harvest by hunters                   | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Other? Please explain:               | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |



6. How important are the following factors in influencing bearded seal hunting success?

|   | <b>Very important</b> | <b>Somewhat important</b> | <b>Not important</b>  | <b>Unknown</b>        |
|---|-----------------------|---------------------------|-----------------------|-----------------------|
| Abundance of bearded seals                | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Timing of spring migration                | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Timing of sea ice breakup                 | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Duration of break-up period               | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Location of seals relative to shoreline   | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Amount of broken ice near the shore       | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Access to hunting equipment (boats, etc.) | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Hunter expertise                          | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Other? Please explain:                    | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |

## WALRUS

7. How important are the following factors in influencing walrus health and abundance?

|                                      | <b>Very important</b> | <b>Somewhat important</b> | <b>Not important</b>  | <b>Unknown</b>        |
|--------------------------------------|-----------------------|---------------------------|-----------------------|-----------------------|
| Sea ice thickness                    | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Extent of sea ice retreat            | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Timing of sea ice breakup            | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Benthic prey abundance (clams, etc.) | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Shipping traffic                     | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Harvest by hunters                   | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Other? Please explain:               | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |

8. How important are the following factors in influencing walrus hunting success?

|   | <b>Very important</b> | <b>Somewhat important</b> | <b>Not important</b>  | <b>Unknown</b>        |
|---|-----------------------|---------------------------|-----------------------|-----------------------|
| Abundance of walruses                     | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Timing of spring migration                | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Timing of sea ice breakup                 | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Duration of break-up period               | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Distance from shore of migrating walruses | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Amount of broken ice near shore           | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Access to hunting equipment (boats, etc.) | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Hunter expertise                          | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |
| Other? Please explain:                    | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/> |

## Workshop 4 – 4-5 January, 2017

Multiple choice surveys on dependence of subsistence activities on sea ice and observed changes in availability.

1. How dependent is each subsistence activity on safe ice conditions?

|                                | <b>High</b>           | <b>Medium</b>         | <b>Low</b>            | <b>Unknown</b>        |
|--------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Bowhead whale (spring harvest) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Bowhead whale (fall harvest)   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Beluga                         | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Bearded seal                   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Walrus                         | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Salmon                         | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Tomcod                         | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Whitefish                      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Grayling                       | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Smelt                          | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Snow goose                     | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| White-fronted goose            | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Brant goose                    | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Sea ducks                      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Caribou                        | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Wild plants, berries           | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

2. How vulnerable is each species to loss of sea ice in the Wainwright area?

|                      | <b>High</b>           | <b>Medium</b>         | <b>Low</b>            | <b>Unknown</b>        |
|----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Bowhead whale        | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Beluga               | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Bearded seal         | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Walrus               | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Salmon               | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Tomcod               | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Whitefish            | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Grayling             | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Smelt                | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Snow goose           | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| White-fronted goose  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Brant goose          | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Sea ducks            | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Caribou              | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Wild plants, berries | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |



## Open-ended questions

1. What kind of products would be useful for the community of Wainwright? Examples of products are a presentation to the Trilateral committee and/or Alak school, a visually appealing report available to all community members (provided examples of such reports).
2. How could Structured Decision Analysis complement traditional decision making in Wainwright?
3. Did you find the SDA process helpful? If so, how?