FISH 507/SOE 592 – Introduction to Structured Decision Making

Homework #4

Due to Sarah via email ([sconver@uw.edu](mailto:sconver@uw.edu)) by 5pm on Monday, 2/27/2023

Begin by reading the papers by Rushing et al. (2020) and Lawson et al. (2022). Then, do the following:

# Identify some broad source of uncertainty that is relevant to your class project or otherwise related to your research. For example, my student Hannah Sipe is working with managers to help them address a decline in the population of Hihi, a New Zealand native bird, at Zealandia Te Māra a Tāne EcoSanctuary in Wellington, New Zealand. She might identify her broad source of uncertainty as “What factors are causing declines in Hihi at Zealandia?”

# Develop a set of hypotheses relevant to this source of uncertainty. For example, Hannah might develop hypotheses like: “(1) Predation by native predatory birds is reducing adult Hihi survival at Zealandia, resulting in stagnant population growth” and “(2) Inbreeding depression is reducing survival and/or breeding success of Hihi at Zealandia, resulting in stagnant population growth” and “(3) Immature forest habitat results in poor nutrition, leading to reduced survival of adult Hihi at Zealandia, resulting in stagnant population growth.” It is probably useful to aim for no more than ~5 hypotheses (and fewer is okay), so if you have more than that, focus this exercise on those you think most likely. If you aren’t familiar with developing hypotheses, read Wolff and Krebs (2008) – this is a good source for everyone.

# Undertake a Qualitative Value of Information analysis based on the protocol described in Table 3 of Rushing et al. (2020) and Table 1 of Lawson et al. (2022). For each hypothesis, you should score it on three scales: uncertainty, relevance, and reducibility. Put your results in a table, with each hypothesis in a row and the scores on each scale in columns. Then, for each hypothesis, include a short narrative (just a few sentences) explaining your rating. In that short narrative, be sure to address all three scales – why did you score uncertainty, relevance, and reducibility as you did? See the example table and narratives at the end of this document for an example.

1. Plot your uncertainty scores against your relevance scores as in Figure 2 of Rushing et al. (2020).
2. What did you learn? What are priority hypotheses for study, if any? What hypotheses are less important?
3. What did you gain from this exercise? What made it difficult? Can you imagine a process like this being useful for your project? Why or why not?

*Your response should be no more than 2 pages of typed text (less is fine if it conveys your message), plus a table and a figure. I will evaluate your assignment based on (1) the quality of the hypotheses – are they clear, specific, and related to the broad source of uncertainty you posed, (2) the quality of your narratives – are they clear and logical, (3) is your plot correct, (4) are your answers to 5 and 6 logical and thoughtful, and (5) is your writing clear and concise.*

Example table and narratives for QVOI results. The scoring and narrative are shown here for only one of the hypotheses, but should be completed for all in your assignment.

|  |  |  |  |
| --- | --- | --- | --- |
| Hypothesis | Uncertainty | Relevance | Reducibility |
| Native predatory birds reduce survival | 3 | 1 | 1 |
| Inbreeding depression reduces survival or reproductive success | … | … | … |
| Immature forest habitat results in poor nutrition, reducing adult survival | … | … | … |

# Hypothesis 1 narrative: I scored hypothesis (1) as a 3 on the uncertainty scale because we know from other systems that predatory birds can reduce passerine survival but there is no empirical evidence here. I rated it as a 1 on the relevance scale because available management actions would result in only a small improvement in survival. I rated it as a 1 on reducibility because it would be very difficult to experimentally reduce native predatory birds to test the hypothesis directly, and it would be somewhat difficult to observe how many birds die from predators to test it indirectly.

# Hypothesis 2 narrative:…

# Hypothesis 3 narrative:…

**Literature Cited**

Lawson AJ, K Kalasz, MC Runge, MC Schwarzer, ML Stantial, M Woodrey, and JE Lyons.

2022. Application of qualitative value of information to prioritize uncertainties about eastern black rail population recovery. Conservation Science and Practice doi:10.1111/csp2.12732.

Rushing CS, M Rubenstein, JE Lyons, and MC Runge. 2020. Using value of information to

prioritize research needs for migratory bird management under climate change: a case study using federal land acquisition in the United States. Biological Reviews 95:1109-1103.

Wolff JO and CJ Krebs. 2008. Hypothesis testing and the scientific method revisited. Acta

Zoologica Sinica 54:383:386.