**Working title:** Why we need to include faunal community metrics when managing for ecological integrity

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# Abstract (150 words max):

[Fill in later]

# In a nutshell (100 words max):

[Fill in later]

Baby: managing for ecological integrity as a goal that encompasses more than single-dimensional aspects of ecosystems.

* Outline some examples in structure, composition, function, and connectivity.

Werewolf: Ecological integrity for management has been well-developed for abiotic and plant metrics, but not for wildlife/fauna. Measures of fauna so far include primarily reducing faunal communities to one dimension through focal species monitoring, or measures such as species richness that don’t capture how those fauna are integral to ecological structure, composition, function, or connectivity. Ecosystems include the faunal communities they house, so any measure of a landscape’s ecological integrity would be incomplete without equally robust ways of measuring faunal integrity when managing for integrity. Put some of the “why” in this paragraph as well:

* Why: if they’re so integral? Why have they been left out? Is it because they’re hard to measure? Hard to measure a bunch of animals doing a bunch of different things at a large scale? Is it because they’re not primary drivers? This could help us frame our argument.
* is it computational? Methods? Data or monitoring limitations? methods and money
* management assumptions and historic bias toward habitat. Because wildlife are harder to measure, just run with the assumptions.
* it’s easier to measure stationary plants than to monitor wildlife. They’re not static – more dynamic.
* is there something more challenging about choosing the “animals” that represent an ecosystem than the plants that represent the community? We can come up with “habitat status” for a vegetation community, but we haven’t really done that with animals. And could you?

Silver Bullet: Given that fauna are part of an ecosystem, in this paper we argue that managing for ecological integrity needs explicit integrity metrics that capture faunal community responses. Specifically, we first highlight how wildlife perform key functional roles that feedback to shape ecosystem states and how monitoring faunal integrity could serve as an early warning indicator of ecosystem state changes. Then, we highlight how current management strategies, including habitat-only ecological integrity metrics and single-species monitoring, fall short when managing for ecological integrity. Finally, we provide guidance on specific methods for incorporating faunal community responses into ecological integrity metrics, including linking fauna to the integrity aspects of structure, composition, function, and connectivity, while considering the management context and prioritizing strategies that weigh cost of data collection versus information gained (Sanderlin et al. 2019).

# 1. Why faunal communities need to be part of managing for ecological integrity

## 1.1 The unique role of faunal communities in shaping ecosystems

### 1.1.1 Habitat and wildlife feedbacks that maintain aspects of ecosystem integrity

Fauna as integral players in shaping ecosystem structure, composition, function, and connectivity

Fauna are part of ecosystems – if you remove fauna, the ecosystem will not function as it did with those fauna there. So if you’re managing for that ecosystem, how could you remove fauna from the equation?

animals provide very specific or unique characteristics beyond habitat. functional roles having in impact on the shape of the future ecosystem and what it looks like.

Fauna are disproportionately likely to go extinct due to abundance/trophic level, and serve distinct functional roles in ecosystems (Duffy 2002)

Animal diversity increases animal biomass in food webs (Schneider et al. 2016)

Animal functional roles and some functional traits predict ecosystem functioning more than species-specific indices (Gagic et al. 2015)Diagram

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### 1.1.2 Faunal communities as early warning indicators

Fauna can provide evidence of change before habitat changes (‘canary in the coal mine’)

“Early warning indicators” literature may be very helpful here, at least in aquatic systems, these tend to be faunal community/species measures (Gsell et al. 2016)

## 1.2. How current approaches fail to capture faunal community integrity

### 1.2.1: Habitat-only integrity: the faulty assumption of “if you build it, they will come”

## 

Habitat-only perspective: do wildlife always occupy “ideal” habitat that has been restored?

Not always the case that “if we have the structure, the species will come”.

making a lot of assumptions about wildlife in managing if we just focus on habitat, but those are just assumptions.

Species distribution models, which use habitat features to estimate coverage of suitable habitat for species, are poor predictors of population demographics, and are even less predictive when trying to estimate community responses versus single-species responses (Lee-Yaw et al. 2022)

### 1.2.2 Why single-species wildlife monitoring isn’t enough

Paper is about “communities” not single species – can talk here about the shortcomings of where we’ve come so far in the single-species mindset (also that it is reductionist in a way that habitat metrics aren’t)

would like it to be more about more than one species, thinking about communities, species part of communities – can we pull them out

This paper is about communities, not single species (but can highlight how you can pull out single species that are still doing things for the community too).

use this to pull out specific relationships or interactions that weren’t visible before, or wouldn’t have seen if we had focused on single species a priori.

Animal functional roles and some functional traits predict ecosystem functioning more than species-specific indices (Gagic et al. 2015)

# The path forward

Outline some methods for different aspects of ecological integrity already in the previous outline, but in a more succinct way

Could also include some of the management considerations already outlined in previous outline draft, but distilled down into a few sentences to motivate why we’re advocating the metrics we propose

# Box Ideas:

Examples of specific management agencies and how they use ecological integrity

Examples of case-studies highlighting aspects of “why” fauna above

Examples of methods to explicitly include faunal communities in measures of ecological integrity

# Figure Ideas:

Conceptual figures of the different aspects of “why”

Conceptual figures of methods to incorporate fauna