

# Before-After-Dose-Response

## An environmental monitoring design for the oil sands region

The variety of life on a landscape has important ecological, economic, cultural and ethical benefits, and ultimately makes ecosystems resilient to change. Across Alberta's oil sands region, a dense network of oil sands disturbances has developed over time, putting pressure on the region and its biodiversity. Our goal is to monitor and understand the effects of these disturbances on a range of terrestrial species.

Ecosystems are interconnected, and it is important to design a flexible monitoring program that captures integrated data to address high priority questions for partners and end-users.

**Before-After-Dose-Response (BADR)** is a monitoring design with two components:

### Before-After

Monitoring in the **same location** before and after oil sands industrial development **over time**.

Before Disturbance

After Disturbance

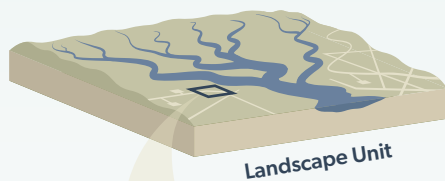
### Dose-Response

Monitoring in **different locations** along a gradient of different intensities and types of oil sands industrial development **at the same time**.

Wildlife is a key component of our monitoring. Understanding wildlife responses across multiple scales helps us connect local behaviours to regional population trends.

**We measure Dose-Response at two spatial scales:**

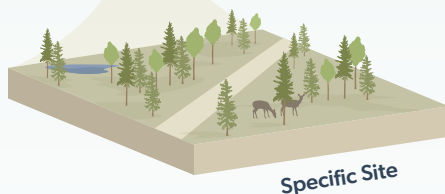
### Landscape-scale (regional)



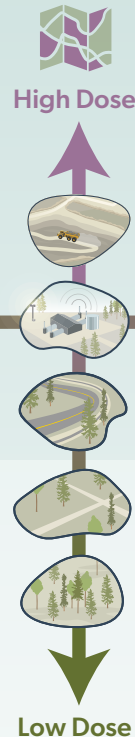
We divide **landscape units** by **individual watersheds**.

We then summarize all the oil sands disturbances within each unit and rank the landscape units from low to high 'dose'.

### Site-scale (local)



We characterize the 'dose' of oil sands disturbance at **specific sites** based on the type of individual disturbances found at that site.



### Joint Monitoring Sites

Each site uses various monitoring approaches. For example, wildlife cameras and autonomous recording units (ARUs) can be used together to monitor **multiple wildlife species at the same time** in the same place, helping us connect different pieces of the biodiversity puzzle.

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