

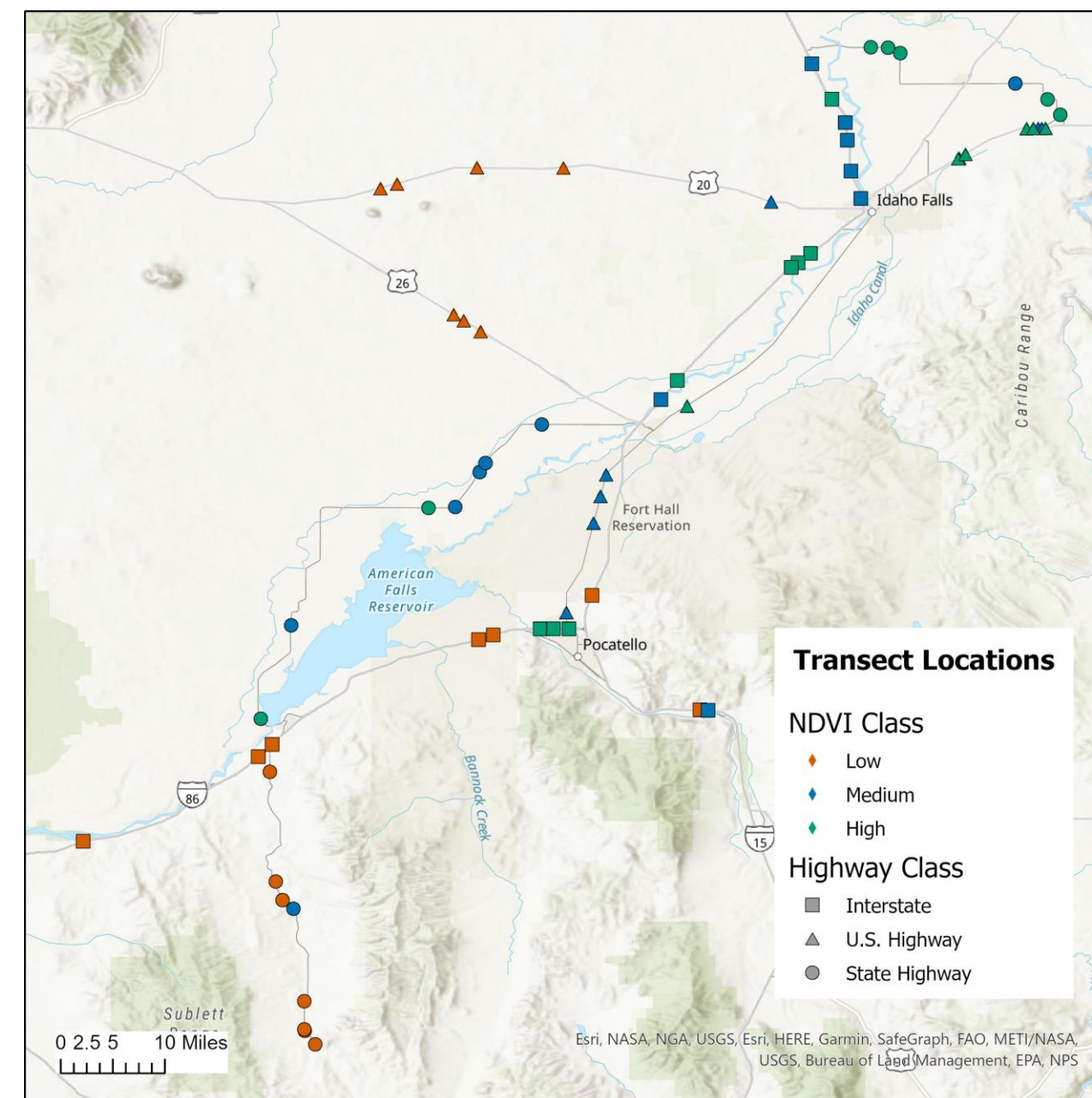
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with support from the Idaho Transportation Department

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Study Overview

We surveyed **butterflies, bees, and flowering plants** at 63 randomized roadside transects in **southeastern Idaho**, stratified across three highway classes (interstate, U.S., and state highways) and three categories of NDVI, a remotely sensed measure of greenness, as shown at right. Higher NDVI categories represented greener, more densely vegetated sites.



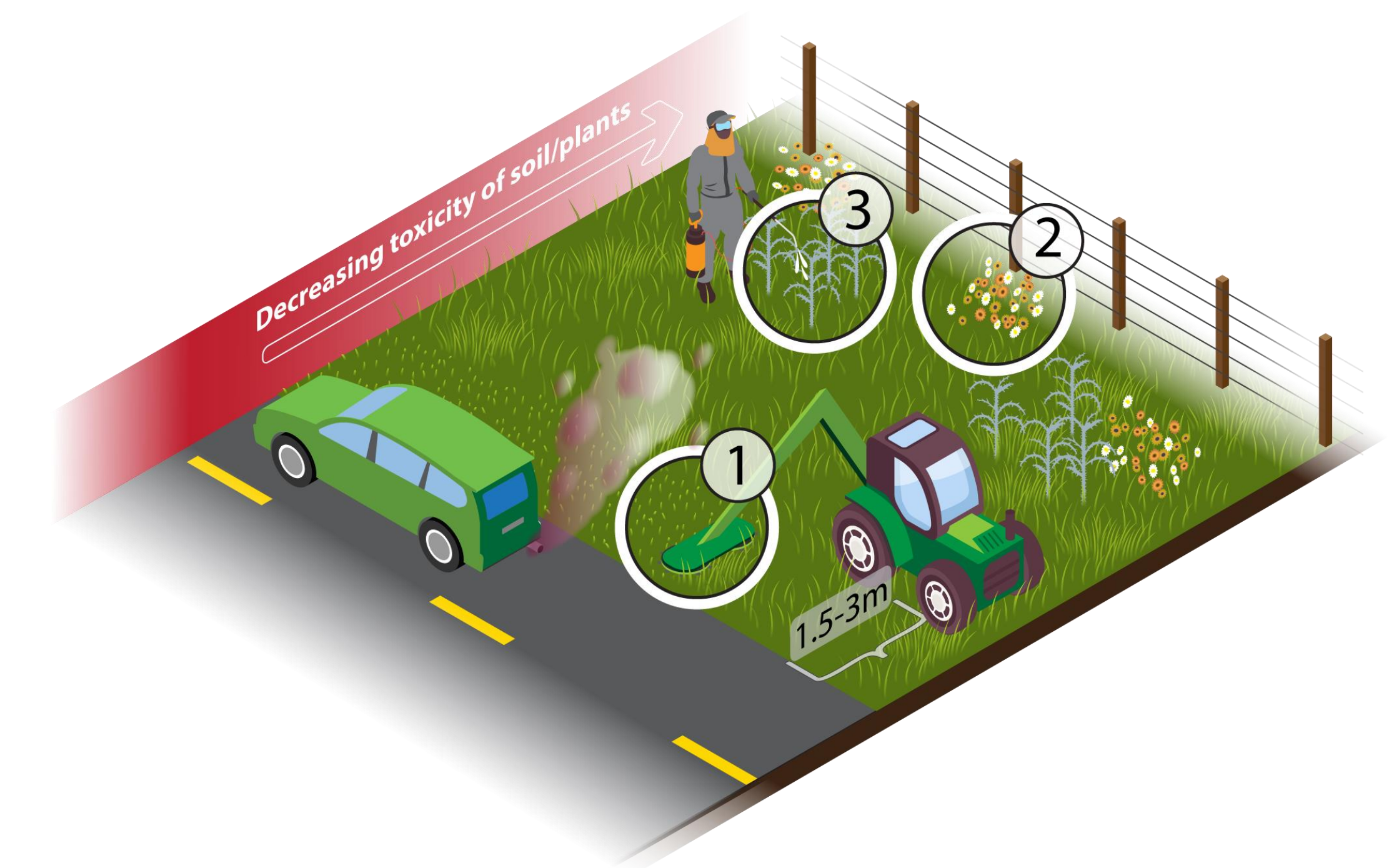
Surveys were conducted in June & July 2021 and 2022, with each site surveyed twice per year. Butterflies/plants were identified in field surveys, and bees were sampled using pan traps.

Separately, in a rapid assessment, **milkweed and monarchs** were surveyed in rights-of-way (ROWs) along both sides of 1,465 km (910 miles) of highways across southern Idaho.

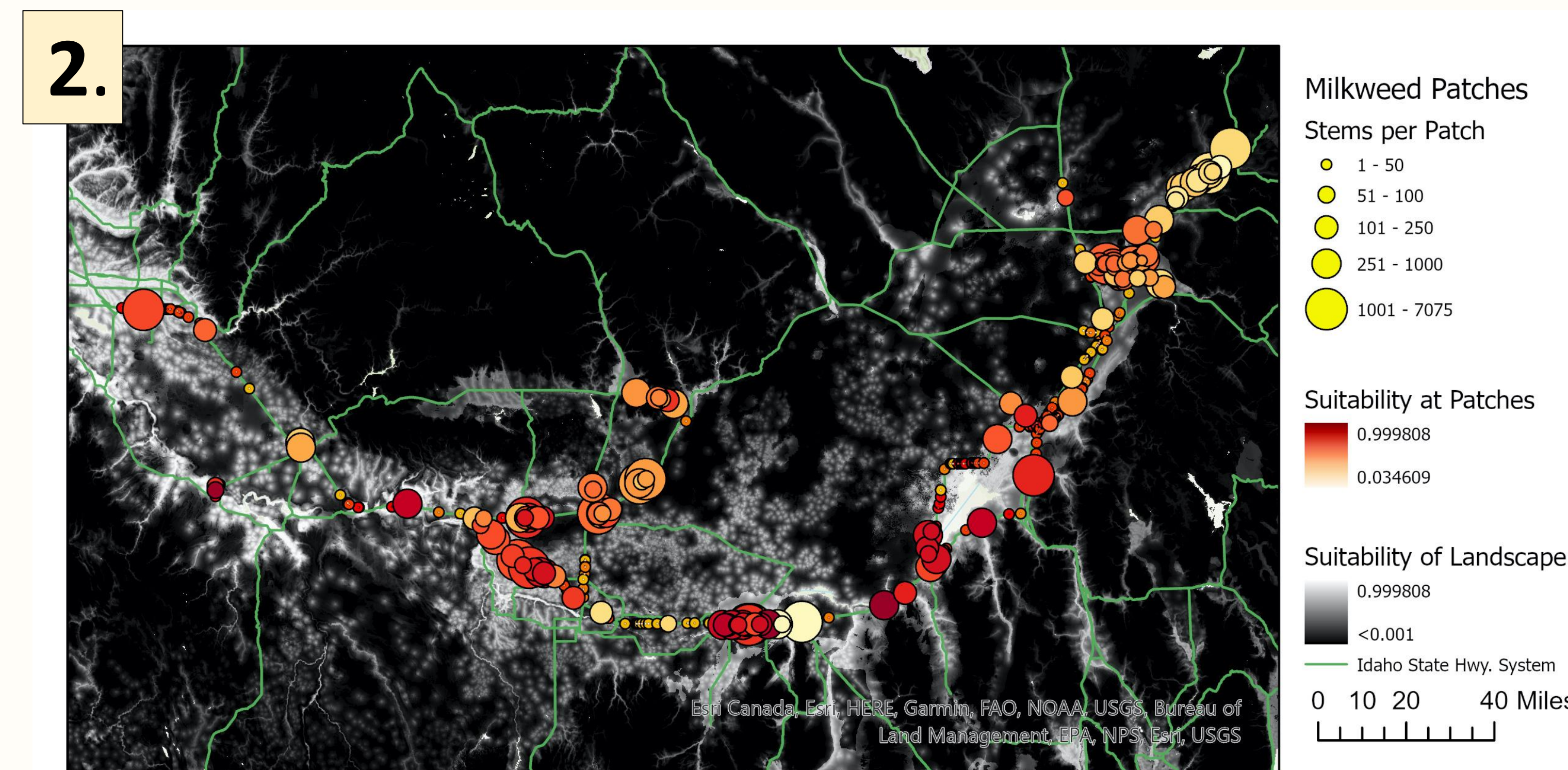
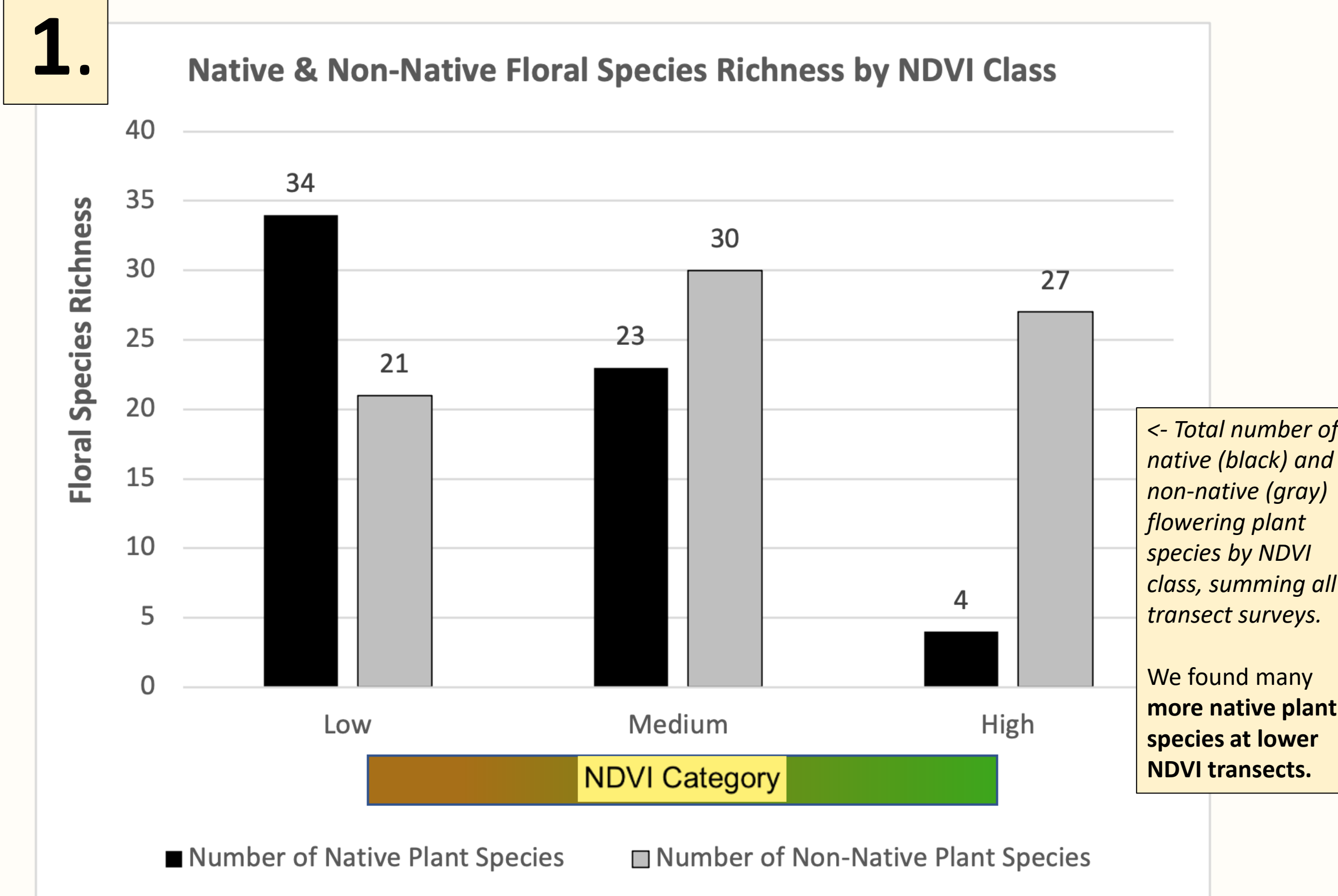
Research Findings:

1. **NDVI can help target rights-of-way for vegetation management: non-native plants dominated areas with high maximum NDVI*** *a metric of greenness measured through satellite imagery
2. **Milkweed (monarch habitat) in roadsides was widespread in southern Idaho, correlated with proximity to water sources and irrigated agriculture**
3. **Bee communities were more abundant and diverse along smaller highways, in lower NDVI (less green/densely vegetated) areas, and with more species of flowers**
4. **Butterfly communities were more diverse with more abundant flowers**

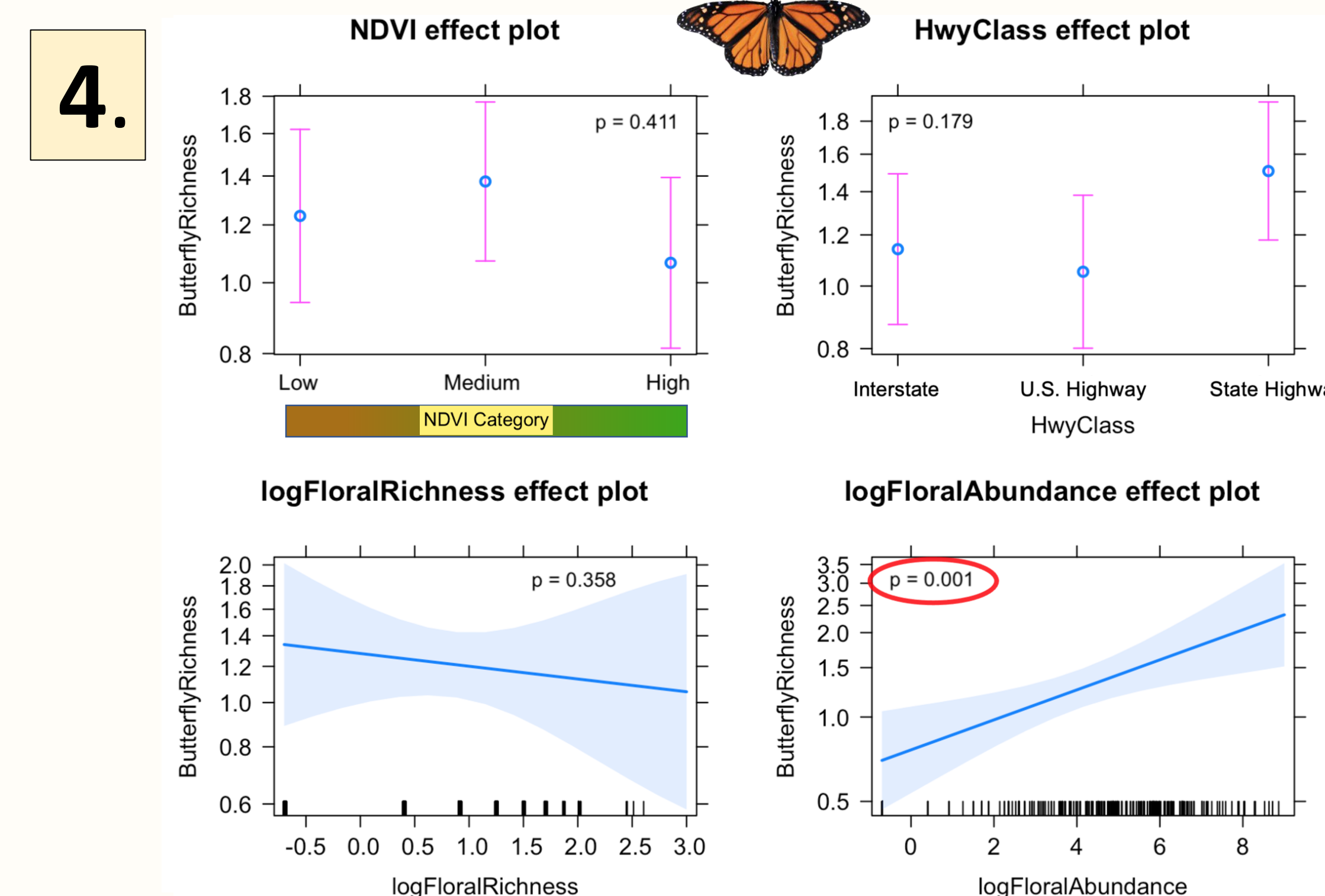
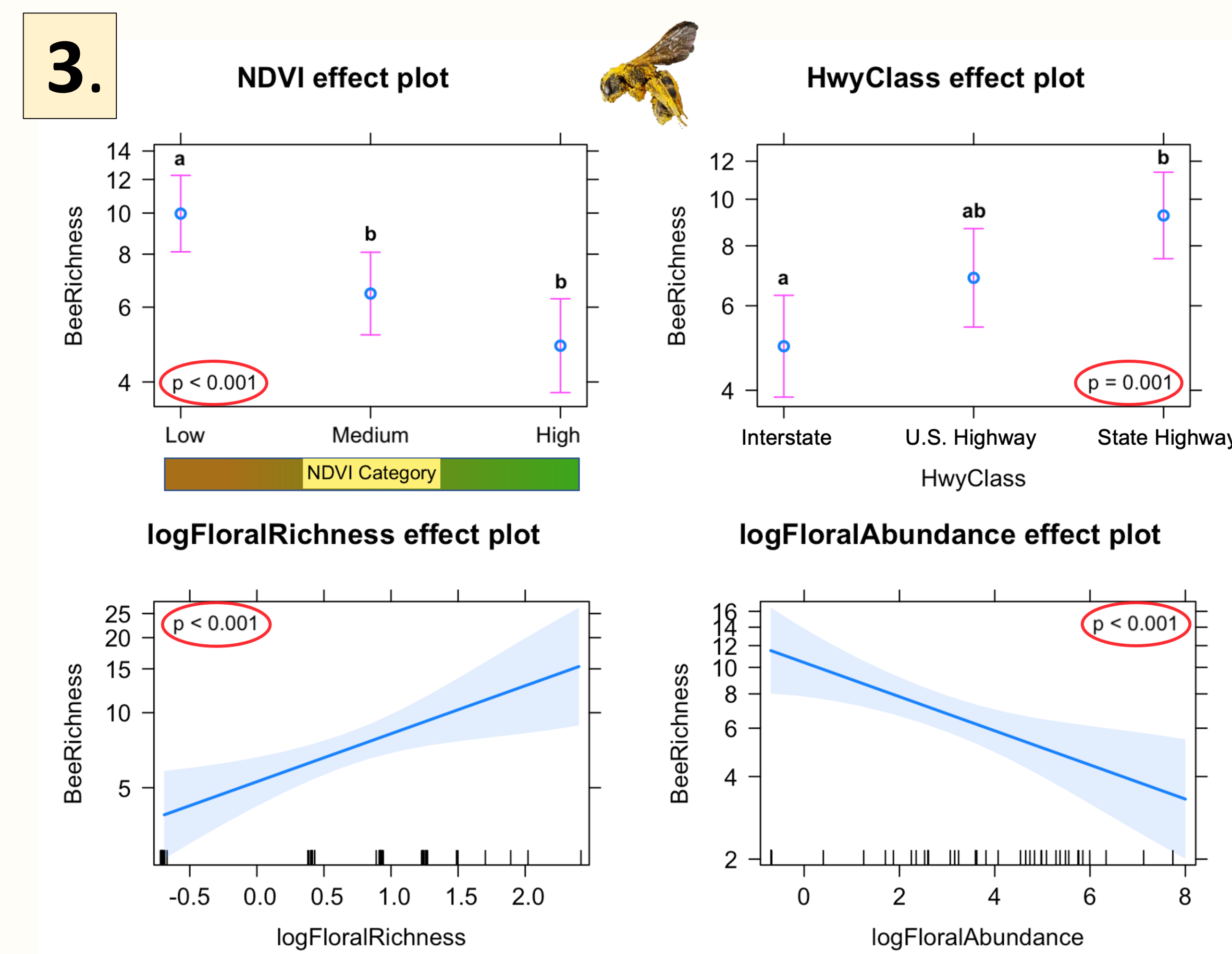
Recommendations for Managing Roadsides for Pollinators



- Above: Three roadside management best practices to support pollinators
- 1) For roads with considerable traffic, maintain a **close-cropped mow zone of 1.5 to 3 m** bordering the pavement (narrower on lower traffic roads), reducing pollinator exposure to roadway toxins.
 - 2) Plant **diverse, native wildflowers** in areas **farthest from the road**, away from the zone of toxicity. These areas should **not typically be mown** in the growing season.
 - 3) Noxious **weeds** should be **spot-treated with herbicides** rather than blanket-treating ROWs. Treatment should **not occur** while weeds are in flower.

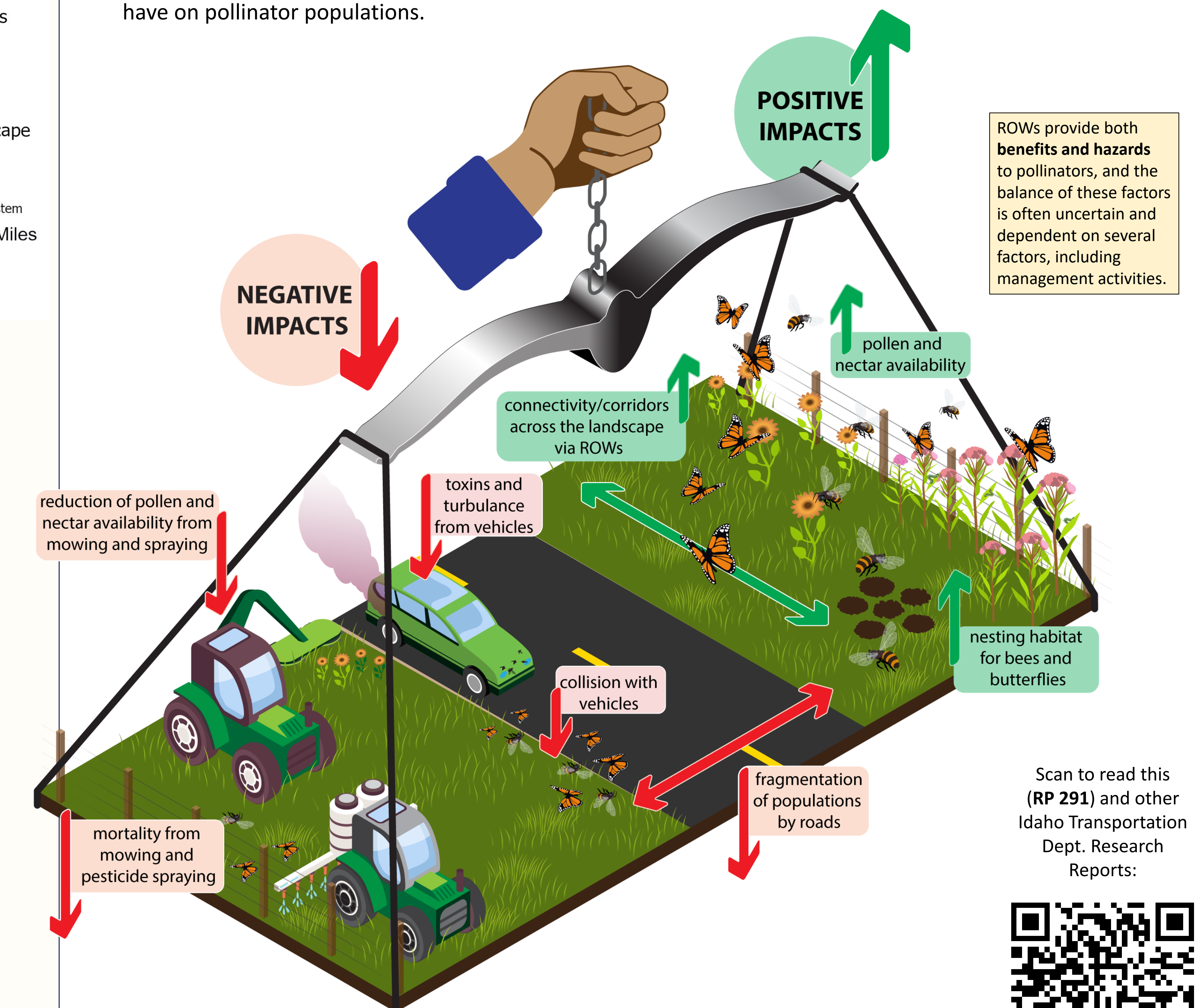


Above: Our survey located 1,363 patches of showy milkweed (*Asclepias speciosa*) in roadside rights-of-way. Existing statewide milkweed models were a **poor predictor** of roadside-specific milkweed locations (mean suitability value of roadside patches = 0.53). Circle color indicates suitability value of patch location from low (white) to high (dark red); suitability derived from statewide showy milkweed suitability model (Svancara, Abatzoglou, and Waterbury 2019, *Frontiers in Ecology and Evolution*)



Above: **Butterfly species richness was significantly higher with higher floral abundance but did not differ with NDVI, highway class, or floral richness.** Butterfly abundance did not vary significantly with any of these variables.

Below: Right-of-way (ROW) management practices by Departments of Transportation can **shift the balance** of positive (green arrows) and negative (red arrows) impacts that roads and roadside lands have on pollinator populations.



Above: **Bee species richness was significantly higher at lower NDVI sites and along smaller highways, as well as at sites with higher floral species richness and lower floral abundance** (the latter likely an artefact of pan-trap sampling). *Similar results for bee abundance.*

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