Miyawaki Forest Biodiversity Surveys
Spring 2024 – Winter 2025

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Miyawaki Forest Biodiversity Surveys

Monitoring biodiversity provides essential information about the effectiveness of the habitat restoration technique in achieving its goals, such as the Miyawaki method. Monitoring allows us to assess restoration success by determining if the restored forest is achieving the desired levels of biodiversity, approaching the complexity and resilience of a natural forest ecosystem. We can also track progress over time by observing how biodiversity changes and develops as the forest matures, identifying trends and potential challenges, and allow an adaptive management approach. Overall, monitoring contributes to our understanding of forest ecosystem dynamics, resilience, and the factors influencing biodiversity recovery.

A comprehensive monitoring program should encompass a range of metrics to capture different facets of biodiversity. Two fundamental and achievable measures of biodiversity are Community Composition and Species Richness. Community Composition is the types of species present and their relative abundances, while Species Richness provides the relative abundance of different species, in which a balanced community has high evenness, indicating that no single species dominates.

Establishing a baseline of biodiversity data is crucial for evaluating the success of a habitat restoration project. Once this baseline is established, long-term biodiversity monitoring should be conducted to capture the full trajectory of ecosystem recovery. Monitoring should be completed using a standardized protocol that ensures data comparability over time. Appropriate statistical methods should be used to analyze monitoring data and draw meaningful conclusions.

Biodiversity monitoring is an indispensable component of habitat restoration projects. By carefully monitoring changes in biodiversity, we can assess the effectiveness of the restoration approach, track progress over time, adapt management strategies, and ultimately contribute to the conservation and restoration of forest ecosystems. A well-designed and implemented monitoring program is essential for maximizing the ecological benefits of Miyawaki forests and ensuring their long-term sustainability.

Biodiversity Monitoring

Various methods can be employed to monitor biodiversity, including conducting bird surveys and deploying wildlife cameras.

Bird Surveys

A standard and appropriate method to monitor avian diversity is to conduct point counts, where an observer stands at a designated point, called a point count station, and records all the birds seen or heard within a fixed radius during a set time-period. Point counts are generally conducted for a number of reasons: 1) to estimate the population size and density of different bird species; 2) to determine bird community composition and diversity; 3) to detect presence of threatened, endangered or rare bird species; 4) to identify changes in bird populations and communities over time; 5) to assess the impacts of habitat management practices, and; 6) to compare bird populations across different habitats or treatments. By repeating point counts over multiple years, researchers can monitor long-term trends in bird abundance and diversity.

Point counts are a standardized method that allows data to be compared across sites, regions and periods. For the present study, we wanted to compare the biodiversity at the Miyawaki forest with an adjacent control plot, where the forest had been replanted using a standard urban forestry method.

While most point counts are conducted over 5 minutes, we felt that the initial period after the Miyawaki forest has been established would only contain a few birds. We chose to conduct the point counts for a sufficient period in which we could detect an adequate number of individual birds from which to draw meaningful conclusions. We therefore chose to conduct the point counts over 30 minutes. We also chose conduct the point counts at the two locations consecutively; one at the location of the Miyawaki forest (49°10'25.7"N 123°11'49.9"W), and another at an adjacent plot approximately 35m to the West (49°10'25.7"N 123°11'51.7"W; Figure 1). We randomized the order of the consecutive point counts at the start of each survey by flipping a coin at the site when we arrived.

When conducting the point counts, each bird we detected was categorized based on whether the bird was “In Plot”, (either on the ground or perched on vegetation within the plot), “Near Plot” (if the bird was using habitat adjacent (within 15m) to the plot), or “Fly Over” (if the bird flew over the plot but did not land).

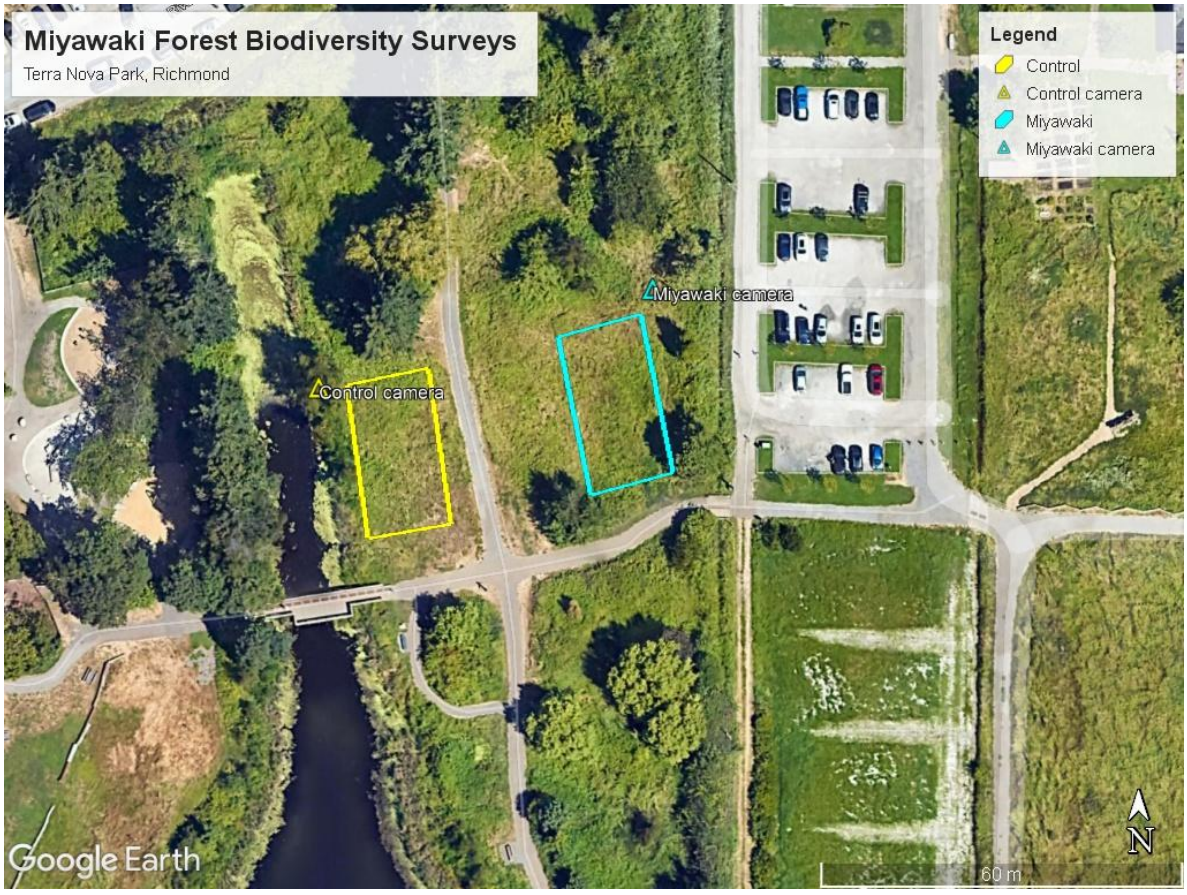

Figure 1. Terra Nova Park showing Miyawaki Forest (blue polygon) and control Plot (Yellow polygon), with locations of wildlife cameras (triangles)

Other Wildlife Surveys

When point counts are conducted during daylight hours, many wildlife species other than birds are not surveyed adequately. For example, mammal species that have an increased level of activity during twilight or nocturnal periods. Therefore, to capture these occurrences within the Miyawaki forests and adjacent control plots, it is necessary to use a different survey methodology to point counts.

One increasingly effective way to accomplish the capture of data during periods of low light is to use wildlife cameras that are activated by the animal blocking the beam of an infrared light that is emitted from the camera. This activation triggers the camera to capture a series of three photos and a 10-second video file, which can be downloaded after a pre-defined deployment period and reviewed by the observer.

In the present study at Terra Nova Park in Richmond, we set up two cameras; one facing the Miyawaki Forest (Figure 2), and another facing the control plot. We mounted each camera to a tree or a telephone pole at least 3m above the ground, to dissuade tampering by the public. The cameras we used were Reconyx HyperFire 2, which emit an infrared flash to

illuminate the subject while avoiding emitting light in the visual frequency range of most mammals and thereby alerting them to the camera. We fit each camera with a 128 GB memory card and long-life AA batteries to ensure continuous function for the deployment period. In the present study, we returned to the site after 7 days to retrieve the cameras, and then downloaded the images and video files for review in the office.

Figure 2. Wildlife camera affixed to a disused telephone pole near to the Miyawaki plot, Terra Nova Park, Richmond.

Monitoring Results

We monitored biodiversity over four, 7-day periods to capture representations of the Spring, Summer, Fall, and Winter periods. We conducted point counts and deployed the cameras on 23 May 2024, 28 August 2024, 27 November 2024, and 17 January 2025 (Table 1).

Bird Surveys

We conducted surveys at each of the two plots for a total of120 minutes over the 4 time periods. We detected 164 birds (73 Miyawaki, 91 control), of which 11 birds were detected *In plot* (4 Miyawaki, 7 control), 102 were *Near plot* (37 Miyawaki, 65 control), and 53 were *Fly over* (73 Miyawaki, 91 control). See Table 1 for summary and Appendix 1 for details.

Other Wildlife Surveys

In total, the wildlife cameras captured 6,646 photos (1,532 Miyawaki, 5,114 control) and 767 video files (278 Miyawaki, 489 control), which revealed a number of wildlife detections over the four time periods. To simply the results, we present below a summary of notable detections and images in this report, separated by the two plot types.

Control plot

- Coyote (29 Aug 2024, 29 Nov 2024); Figure 3
- Spotted Towhee (29 Aug 2024); Figure 4
- Great Blue Heron (29 Aug 2024, 29 Nov 2024, 17 Jan 2025); Figure 5
- Domestic cat (29 Nov 2024); Figure 6

Miyawaki forest

- Coyote (30 Nov 2024)
- Domestic rabbit (27 Nov 2024); Figure 7

Table 1. Point count survey results showing bird detections in a Miyawaki Forest and adjacent control plot over 4 seasons at Terra Nova Park, Richmond

Date	Season	Plot type	In plot		Near plot		Fly over plot	
			Number	Richness	Number	Richness	Number	Richness
23-May-2024	Spring	Miyawaki	1	1	5	5	1	1
		Control	2	2	2	2	1	1
28-Aug-2024	Summer	Miyawaki	0	0	4	4	5	5
		Control	2	2	17	17	4	4
27-Nov-2024	Fall	Miyawaki	0	0	5	5	2	2
		Control	1	1	4	4	3	3
17-Jan-2025	Winter	Miyawaki	3	3	8	8	3	4
		Control	1	1	6	6	0	0

Figure 3. Coyote capture during biodiversity surveys at Terra Nova Park, Richmond

Figure 4. Spotted Towhee captured during biodiversity surveys at Terra Nova Park, Richmond

Figure 5. Great Blue Heron captured during biodiversity surveys at Terra Nova Park, Richmond

Figure 6. Domestic cat captured during biodiversity surveys at Terra Nova Park, Richmond

Figure 7. Domestic rabbit captured during biodiversity surveys at Terra Nova Park, Richmond

Conclusions

Bird Surveys

The point count surveys at Terra Nova Park successfully documented the birds utilizing the Miyawaki and control plots across four seasons in 2024–2025. While overall bird diversity and abundance at both plots were generally low, we observed no significant differences between the two plot types during any time period for either metric.

This finding is particularly interesting, as we would expect that in future years—once habitat structure and plant diversity further differentiate between the two plots—a greater diversity and abundance of birds will be found in the Miyawaki plot compared to the control plot. This anticipated pattern should be closely monitored as future studies replicate this research.

Additionally, we noted that adjacent habitats contained a greater number and diversity of birds compared to the plots themselves. We believe this is due to the presence of mature treed habitat, where birds could forage or perch while scanning for other birds or predators. Notably, this pattern was independent of the plot type (Miyawaki or control).

Other Wildlife Surveys

In addition to avian studies, we collected anecdotal evidence on mammalian presence within the Miyawaki and control plots. Similar to our bird diversity findings, mammal diversity and abundance were generally low, which we attribute to the young age of the forests. We anticipate that these metrics will increase as the forest matures over time.

Notably, our cameras recorded multiple instances of coyotes traversing the plots. Given that mammals often maintain specific hunting territories, these sightings may involve the same individual, likely in search of prey. This coyote might have been following scent trails left by other non-native, domestic mammals observed in the plots. Specifically, we documented a domestic cat and a rabbit on separate occasions. These occurrences likely reflect the urban setting of the park; the cat may originate from a nearby residence approximately 100 meters from the plots. The rabbit sighting is particularly noteworthy, as releasing pet rabbits into parks is an unfortunately common practice in southern British Columbia. For instance, Vancouver has experienced issues with invasive European rabbits, notably at Jericho Beach Park, where these animals, descended from abandoned pets, have established populations.

The presence of domestic animals in urban parks poses challenges to local ecosystems, including potential predation on native species and the spread of diseases. Addressing these issues requires public education on responsible pet ownership and adherence to local wildlife regulations.

Future recommendations

We feel that future biodiversity surveys in the form of point counts and wildlife camera deployments should be conducted periodically as the forests mature. While this is best done on an annual basis, financial and logistical constraints mean that this is done every 3 years. We recommend that these surveys also use eBird to document bird sightings for the same duration as we conducted in the present study (i.e. 30 minutes) with the choice of count location determined with a coin toss. Individual eBird checklists should be shared with the eBird account *BSC_BC* to ensure data is collected in the same account, which will make comparisons between years and among seasons more straightforward. In a similar vein, wildlife cameras should be placed at the same locations as used in 2024-2025 for periods of 1-week subsequent to the point count days. In documenting biodiversity this way, the success of the Miyawaki reforestation method in Richmond can be demonstrated.