

**THE OBSERVER NETWORK**  
**PROCEDURES AND MONITORING MANUAL**

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## INTRODUCTION

The Observer Network is a group of woodland owners who participate in a biodiversity monitoring network. The network has three main goals:

1. To help woodland owners become more aware of biodiversity on their land;
2. To help woodland owners maintain and restore native biodiversity by providing a tool to assist in
  - choosing management programs and activities,
  - assessing the success of activities regarding biodiversity targets, and
  - monitoring changes in biodiversity in their woodlands;
3. To provide a means of monitoring native woodland biodiversity across Eastern Ontario.

The Observer Network is based on the principle that indicators can be used to monitor environmental conditions. In this project, wildlife species and habitat parameters have been chosen as indicators of native woodland biodiversity in Eastern Ontario. A variety of species have been identified which by their presence and numbers provide confirmation that certain conditions exist. Habitat indicators, on the other hand, are actual measurements or estimates of the number or amount of features or habitat units present in a woodlot.

Most of the indicators chosen are usable for all forest cover types. However, open oak woodlands, cedar stands, plantations, and swamp forests may score low for some indicators (such as forest interior birds and spring ephemeral wildflowers).

To participate, the landowner carries out the activities specified in the management plan and completes a monitoring record every year. As biodiversity goals are met, the number of positive indicators should increase, and the number of negative indicators decrease.

Detailed information on the Observer Network is contained in the document “Biodiversity Indicators for Woodland Owners” prepared by S. Hamill in 2001. This document and more information on the project are available from:

**Eastern Ontario Model Forest (EOMF)**  
**P.O. Bag 2111,**  
**Kemptville**  
**ON K0G 1J0**  
**Telephone: (613) 258-8241**  
**E-mail: [modelforest@eomf.on.ca](mailto:modelforest@eomf.on.ca)**  
**Web: [www.eomf.on.ca](http://www.eomf.on.ca)**

This “Procedures and Monitoring Manual” was produced as a guide to the project. It is based on

the same principles used in the Managed Forest Tax Incentive Program. For more information and details, consult “A Guide to The Managed Forest Tax Incentive Program (MFTIP)”. Landowners who already participate in MFTIP can easily convert much of the information contained in their MFTIP management plan to a Biodiversity Monitoring Plan for the Observer Network.

## **PARTICIPATION**

Any person who wishes to monitor a woodland property in Eastern Ontario may participate in the Observer Network. The requirements are as follows:

- sign up with the Eastern Ontario Model Forest (see contact information above);
- prepare or have prepared a biodiversity monitoring plan for the woodland;
- monitor the indicators as described in this manual;
- report findings to EOMF.

## **HOW TO PREPARE A BIODIVERSITY MONITORING PLAN**

The sections of the Biodiversity Monitoring Plan correspond to those of a MFTIP management plan. Complete each of the following sections as described in the MFTIP Guide.

**Observer:** name(s), address, telephone, e-mail

**Plan author:** name, address, telephone, e-mail

**Location and identification of property:** county, township, lot, concession, roll number, total area

**General description of property history:** Briefly describe past activities relating to the woodland.

**Importance of property to surrounding landscape:** Describe any features of the woodland that may have an affect on or be affected by surrounding areas.

**Management objectives and priority:** List your objectives for the entire property.

**Explanation of objectives:** Explain the objectives listed above.

**Strategy for plan implementation:** Describe how will the activities of this plan be carried out.

**Monitoring map:** This is a map of the property which corresponds to the Managed Forest Compartment Map in a MFTIP plan. To prepare this map you must divide your property into compartments, based on forest cover type. Each compartment has a different history and composition and may be suited to a different type of management. Give each compartment a number and name, and measure its area. Identify monitoring stations on this map.

**Compartment descriptions:** For each compartment, record the following information:

- compartment number, name, and area.
- forest cover type. The Ministry of Natural Resources has identified seven main forest cover types in Southern Ontario. These are:
  - *Upland tolerant hardwoods*
  - *Upland oaks*
  - *Lowland hardwoods & swamps*
  - *Early successional hardwoods*

- *Pines*
- *Cedar*
- *Hemlock*

More information is available in “A Silvicultural Guide to Managing Southern Ontario Forests”, OMNR, 2000.

- general description. Briefly describe the appearance of the compartment.
- tree inventory, giving species, % composition, diameter at breast height (dbh), and indicate whether it is one of the identified uncommon species.
- average tree height, age, and basal area.
- other vegetation, giving species and whether it is an indicator species.
- wildlife habitat inventory, indicating the presence of snags, cavity trees, stick nests, downed woody debris, mast trees, supercanopy trees, conifer thickets, surface water, and dens or dug holes.
- long term (20 year) compartment management objectives.
- wildlife inventory. List species by compartment or by group of compartments.

## HOW TO MEASURE TREE DBH, HEIGHT, AGE, BASAL AREA, & WOODLOT AREA

### Measuring Diameter at Breast Height (dbh)

Tree diameters are measured at 1.3 metres up from the base of the tree. This is the dbh. The most simple and accurate way to measure dbh is with a diameter tape. Just wrap the tape around the tree and read the diameter. Other methods include:

- < Measure the circumference with an ordinary tape measure and divide by 3.14.
- < Use tree calipers which measure the diameter directly from the tree.

### Measuring Tree Height

Tree height can be approximated by using a height pole or person of known height, and estimating the total height of the tree.

*Advanced method: Use a hypsometer as follows.*

- < *Make sure the observer is at least as far from the tree as it is tall.*
- < *Decide on an appropriate distance scale.*
- < *Measure the horizontal distance to the tree and plant a pole at that point.*
- < *Rest the hypsometer on top of the pole and read the upper and lower sightings. Take the average of two or three readings.*

### Measuring Tree Age

If trees have been cut recently in the woodlot, count the annual rings on several stumps to obtain a relationship between diameter and age. Remember to add three to ten years to account for the years it took the tree to grow to the stump height. Use this relationship to estimate the ages of other trees.

*Advanced method: Use an increment borer to take a core sample of a representative tree's growth rings. Take the core at stump or breast height, and add the number of rings it took the tree*

to grow to the height of the core.

### **Measuring Basal Area**

Advanced methods:

#### *1. Fixed area plot cruise*

Using data from a number of sample plots in the woodlot, generate the number of trees per hectare and the average dbh for the stand. Calculate the average basal area per hectare using the following formula:  $(\text{trees per hectare}) \times (\text{average dbh})^2 \times (0.00007854)$ .

#### *2. Prism cruise details?*

### **Measuring Woodlot Area**

Area can be calculated or estimated from a map or aerial photo if the scale is known.

Advanced method: ?

## **HOW TO RECORD MONITORING DATA**

**Biodiversity Monitoring Record:** This is a record of the indicator species and habitat features found on the property, with space for inserting data each subsequent year. This is the monitoring form which provides a record of changes in the indicators from year to year. For each indicator species noted, record the species name, number of individuals, compartment location, and date.

## **HOW TO SUBMIT MONITORING DATA**

to be determined

## **HOW TO MONITOR SPECIES INDICATORS**

### **1. Amphibians**

#### **Chorus Frog**

Chorus Frogs breed in shallow wetlands where there are few or no fish predators. Such areas are vulnerable to pollution by pesticides, and to drainage and filling operations. Male Chorus Frogs begin calling as soon as the ice melts in the spring (as early as March) and continue through May. They call both night and day, but are most consistently heard in the evening after dark. A monitoring station should be established near a potential wetland for annual monitoring. Listen for calls at the station for 3 minutes on a spring evening and record presence or absence. Several visits would be necessary to confirm absence; only one visit and record is necessary to confirm presence. Record the level of calling, and the number of males calling, by the number or an estimate (Level 1: individuals can be counted, calls not overlapping; Level 2: Calls overlap, individuals can be counted or estimated; Level 3: full chorus, calls continuous and overlapping, individuals not distinguishable).

Example for Level 1 calling: record Level 1 and the number of frogs calling;  
 for Level 2 calling: record Level 2 and the number or an estimate of the frogs calling;  
 for Level 3 calling: record Level 3.

### **Leopard Frog**

Leopard Frogs undertake major annual migrations, which is why they are indicators of good connections. As cold weather approaches they migrate to deep waters where they spend the winter on the bottom. In early spring they move to shallower water for breeding, sometimes moving up to a kilometre from the hibernation site. After breeding they disperse away from water into meadows. Males call from wetlands from April to early May. The same monitoring station could be used for both Chorus Frogs and Leopard Frogs and both species may be heard at the same time. Record the number calling during a 3-minute period as described above. Leopard Frogs should also be noted in any grassy area throughout the summer.

### **Bull Frog**

Bull Frogs live only in permanent waters, as their tadpoles require two or even three summers to develop into adults. Males call both night and day, but most consistently on warm nights in the late evening. Calling begins in late June and extends into July. A monitoring station should be established near a permanent water body for annual monitoring, and calling recorded during a 3-minute period as described above.

### **Salamanders**

Terrestrial salamanders live in woodlands where they take refuge under leaf litter, rotting logs, boards, rocks, and other objects. At least three stations representative of the forest and its various components should be established, each one at least 50 metres from the forest edge. At each of these place a board on the ground in a shady spot. The board should be rough cut, 30 cm by 30 cm, and at least 2.5 cm thick. Place the board flat on the ground on top of a layer of wet leaf litter. As summer is usually too dry for salamander activity, check the boards once in the spring and once in the fall every year. At those times, turn over the board to look for salamanders. Record the species, date, location, and number. Also record if none were found.

## **2. Reptiles**

### **Snakes**

Snake hibernacula are located in dry rocky areas where cracks or holes in the rocks allow access underground for snakes. Such areas should be observed on warm spring days when snakes are emerging and on warm fall days when they are congregating. Record a count or an estimate of the number of snakes seen, the species, the date, and the location.

## **3. Mammals**

### **Flying Squirrels**

Flying squirrels live in holes in trees and are nocturnal. As such, they are rarely seen. They occasionally visit bird feeders and can sometimes be startled into the open by knocking on potential den trees with a stick. Another monitoring method is to watch a den tree at dusk. Record

a count or estimate of the number living in the woodlot.

### **Fisher**

Fisher inhabit wooded areas and are occasionally seen during the day. They have long hunting circuits and large home ranges, making them good indicators of connections. They seem to follow established routes on their travels; if you see one, note the location for future monitoring. The best method to check for Fisher presence is to watch for tracks during the winter. Record an estimate of the number of tracks. Because Fisher are known to prey on porcupines, also note the population level of porcupines in your area each year. This may also provide an indication of Fisher activity.

### **Snowshoe Hare**

Hares live in a variety of wooded habitats with closed canopies. Monitoring can be done either by observations made while walking through woodlands (particularly in late fall if the hares turn white before the snow falls), or by watching for tracks in the winter. As the number of hares varies in a rising and falling cycle, record an estimate of the number of animals each year. Also watch for evidence of Hare feeding; in the spring, observe and record an estimate of the number of young hardwood trees which have had bark chewed off during the winter.

## **4. Birds**

### **Songbirds**

Male songbirds call to defend a territory and to attract a mate. The best way to monitor these species is to listen in the morning (between 05:00 and 10:00) during the “dawn chorus” and identify species by ear. At least three stations should be established at locations representative of the woodland. These should be at least 100 metres from the forest edge and at least 100 metres from each other. Once or twice, between May 24 and July 10 each year, spend ten minutes at each station listening for the indicator species. These stations could be the same as those for salamanders. Refer to the list of indicator species, and record the species, date, location, and an estimate of the number of each species heard calling.

### **Pileated Woodpecker**

Pileated Woodpeckers can be monitored by call the same as songbirds. Their presence can also be recorded by noting large rectangular holes pecked in trees, and piles of large chips on the ground beneath such trees.

### **Barred Owl**

This owl’s distinctive call can be heard at night during the summer in its breeding areas. Listen late at night, possibly even at 01:00 or 02:00 in the morning.

### **Stick Nests**

The stick nests of Red-shouldered Hawks and other raptors should be recorded whenever seen. Activity at such nests can be monitored and recorded during the breeding season by observations at the nest site. Red-shouldered Hawks may not use the same nest every year, but may return in a future year to an existing nest.

## 5. Plants

### Trees

If not already available, a tree inventory of the property should be completed to determine if any rare or uncommon species are present. This inventory should identify the location of significant trees or species and can be added to if and whenever a new species is found. Record an estimate of the number of each uncommon species (<20, 20-100, >100). Check any rare and uncommon species every year to monitor health and change in numbers.

*Advanced method: Canopy trees (those at least 10 cm dbh) are monitored using a minimum of five 20m x 20m quadrats, randomly located with at least one quadrat per compartment. Quadrats should be at least 50 m apart, and at least 3 times the canopy height from the forest edge, avoiding roads and trails. To lay out a 20m x 20m square, randomly choose a centre point in typical vegetation. Measure 14.14 metres diagonally to each corner. Mark the corners with permanent stakes and label the quadrat on one of the stakes.*

*Survey in fall or early spring every five years. Record:*

- < species
- < dbh
- < total height
- < height to the lowest branch
- < condition
- < number of all living and standing trees.

*Condition is recorded as one of the following:*

- < standing alive (AS)
- < broken alive (AB)
- < leaning alive (AL)
- < fallen alive (AF)
- < standing alive dead top (AD)
- < standing dead (DS)
- < broken dead (DB)
- < leaning dead (DL)
- < fallen dead (DF).

*Do not record any fallen dead trees on the initial measurement.*

### Wildflowers

During forest outings and while monitoring other species, watch for spring ephemerals in early spring before and just as the tree leaves are expanding. Refer to the list of indicator species and record species, number, date, and location.

*Advanced method: Ground vegetation is monitored by means of 1m x 1m quadrats. A minimum of 20 quadrats is required, at least 5m apart. These may be stand-alones, or nested within 20m x 20m or 5m x 5m quadrats. If nested, they must not be disturbed during activities related to those plots. If nested, they should be along the sides, not on the corners, to reduce the possibility of*

trampling. Stand-alones can be randomly placed along random parallel lines. Alternatively, randomly select points, random distances out on a compass star centred on a randomly selected base stake.

Use a 1m x 1m frame to delineate the quadrat area and to set corner stakes. Record every 5 years the name and number of each herbaceous species. During the first 2-3 years, visit several times to ensure that all species are identified. Record dates for future use. Visit during late spring, mid-summer, and fall. After 2-3 years, two visits per year every five years would be sufficient.

### **Lichens and Mosses**

During forest outings and while monitoring other species, note whether and where there are any thick mats of mosses, particularly on fallen logs, or large patches of ground lichens. Record the location and an indication of the abundance, size of patch, or diversity of species.

Advanced method: Follow the instructions for 1m x 1m quadrats given under “Wildflowers”.

### **Tree Lichens**

Advanced method: Choose a site with 5 large (>30 cm dbh) maple trees in the interior of the forest, and a second site with 5 large maple trees on the forest edge. Tag each tree, and record species, tree number, and dbh. A suite of 17 lichen species has been chosen for monitoring based on sensitivity to air quality and ease of identification. Monitoring should be done annually in any season, the same time every year, as follows:

- < Tie flagging tape around the tree at 1.0 metre and at 1.3 metres from ground level. Lichens within this 30 cm space will be recorded.
- < Divide the tree vertically into north and south halves by placing nails at the 1 metre mark on the east and west sides of the tree.
- < Identify all lichens on the north side of the tree. Record the percentage of space each species occupies.
- < Repeat for the south side of the tree.
- < Record if no lichens are observed.

### **Invasive Plants**

Invasive species should be noted whenever and wherever found. They should then be marked or targeted for control or eradication programs, or monitored for expansion or contraction. Monitoring of invasives can be used to document occurrence, abundance, expansion, biology, or impact on native plants.

Advanced methods:

#### *1. Quadrat*

The standard method for monitoring invasive plants is by using a quadrat. For invasive trees, the 20m x 20m square quadrat described above under “Trees” is recommended. For invasive herbaceous plants the 1m x 1m quadrat described above under “Wildflowers” would be used. For invasive shrubs such as buckthorn, the standard quadrat is a 5m x 5m square. A minimum of 10 is needed, at least 2 per compartment, separated by at least 15 metres. These may be randomly distributed stand-alones, or randomly selected corners of the 20m x 20m quadrat.

*To lay out a 5m x 5m quadrat, measure 3.54 metres from the centrepoint diagonally to each corner. Permanently mark the corners and label the quadrat. During data collection it helps to outline the quadrat with string strung around the corner stakes. Survey in the fall after leaves have fallen, every five years. A shrub is defined as any woody specimen less than 10 cm dbh which is at least 1 metre tall. Record:*

*for all shrubs  $\geq 4$  cm dbh*

- < species, number, and dbh*
- < condition (same as that given for trees above)*
- < height and height to lowest living branch*

*for all species  $< 4$  cm dbh and  $\geq 1$  metre tall*

- < species and number.*

## **2. Route**

*Establish a route, which could be a trail or the perimeter of the woodlot. The length is at the discretion of the observer. Monitor annually at the height of the growing season, as follows:*

- < Begin the route, looking for invasives within 10 metres of the trail. Do not step away from the trail.*
- < Assign each invasive plant a discrete number (e.g., 02 for the year 2002, 001 for the first plant).*
- < Record the location of each plant with GPS.*
- < Record information on species, habitat, condition, presence of seedlings, and the number of plants within 10 metres of the route at each location.*
- < Continue to the end of the route.*

## **HOW TO MONITOR HABITAT INDICATORS**

### **1. Old Growth**

During the woodlot inventory, note the presence and location of any large ( $>50$  cm dbh) or old ( $>120$  years) trees. These trees indicate old growth. Estimate the area of old growth present to determine whether the 10 hectare or 30% minimum has been met.

*Advanced method: Using data from the 20m x 20m quadrats described under "Trees", identify those sections of the woodlot which would qualify as old growth. Measure the area of each, using the procedure described under "Measuring Woodlot Area". Record the total area of old growth on the "Biodiversity Monitoring Record" form.*

### **2. Forest Interior Size**

Using an aerial photo of the property, estimate or measure (See "Measuring Woodlot Area" above.) the area of the woodlot which is more than 100 metres from any edge of the stand.

### **3. Size or Connections**

Using an aerial photo of the property, estimate or measure (See "Measuring Woodlot Area" above.) the total area of the contiguous wooded area, including that owned by others. From the photo, identify connections (ravines, watercourses, wooded fencerows) to other woodlands. If there are none or not enough, identify areas where connections could be created or improved.

#### **4. Downed Woody Debris**

During the woodlot inventory, note the presence and abundance of large (>40 cm dbh) fallen logs. Using the total area of the woodlot, estimate the number per hectare.

*Advanced method: ?*

#### **5. Closed Canopy**

From at least 10 random points in the woodlot (at least two points representative of each compartment), look straight up at the canopy. Estimate the percentage of sky which is not visible due to the canopy.

*Advanced method: ?*

#### **6. Supercanopy Trees, Conifers (in non-conifer compartments), Snags, Mast Trees, Cavity Trees**

During the woodlot inventory, note the presence and abundance of these trees. Using the total area of the woodlot, estimate the existing number of each of these per hectare.

*Advanced method: Using data from the 20m x 20m quadrats described under "Trees", calculate the number of each of these trees per hectare.*

### **HOW TO DO A HABITAT ASSESSMENT**

On the "Habitat Assessment" page of the "Biodiversity Monitoring Record" record the measurements, calculations, or estimates for each feature. Based on the standards or minimums given, rate each feature as to adequate or inadequate and the year this was completed. Repeat annually, but only record if there is a change and note the year of the change.

### **HOW TO PREPARE BIODIVERSITY GOALS AND OBJECTIVES**

Based on the "inadequate" ratings given in the "Habitat Assessment", investigate and determine the management activities or changes needed to convert each "inadequate" to an "adequate". Write these as goals and objectives and insert them into your management plan and activities.

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