Progress Report October 15, 2001: An Operational Methodology for Measuring and Analyzing Bio-indicators to Support Sustainable Forest Management (07-004 re-sub)

Summary of Progress on the First Year (The project is on schedule as of October 1, 2001)

Funding for project began on March 26, 2001.

1. We have established a web site for the project which currently contains an overview of the project and a PDF file of the proposal. All reports and summaries will be placed on the web site. Web Address
http://www.glfc.cfs.nrcan.gc.ca/index-en/research-e/irm-e/bioindicators-e.html

2. We have compiled the spatial digital data available for use in site selection and landscape vegetation analysis (see below for list of digital data).

3. We have completed our first field season of data collection (detailed below) with the establishment of 120 sites, the collection of bird, mammal and pitfall data, and the installation of salamander boards (Table 1).

4. The first stage of the monitoring report is in progress.

5. The review papers for carabids and for spiders are in progress.

Overview of Project Activities By Date

April 2001 : We conducted the project establishment which involved hiring of staff, buying of equipment (see budget summary), planning field camp establishment, planning details of study design, finalizing criteria for overall site selection, compiling geographic coverages of study area, finalizing collaboration details with OMNR, Domtar and Pukaskwa National Park.

May 2001 : Field Camp Set Up (Towing Trailers, Electrical/Generator set up, Digging Pit Toilet and Gray Water disposal pits, Lab Trailer Set up, Construction of Fuel Boxes, Tent Platforms) Site selection, choosing sites, flagging sites for bird, mammal, pitfall and salamander sampling, pitfall traps installation, some salamander board installation. Dean Phoenix from OMNR worked for 1 week on site selection, 6 additional crew provided by OMNR for 1 week of site selection and site set up.

June 2001: Set pitfall traps, collected pitfall traps approximately bi-weekly, conducted bird surveys (point counts and playbacks). Two additional students working through June provided by the OMNR

July 2001: Pitfall trapping ongoing, bird surveys conducted until July 10, small mammal live trapping began on July 16. Training provided by Brian Hutchinson from Parks Canada.

August 2001: Pitfall trapping stopped during August. Small mammal live trapping continued through August.

September 2001: Small mammal live trapping, salamander board installation, camp disassembly. Equipment clean up and organization. Pitfall trap sample sorting.

Overview of Study and Plot Design

Question A: Comparison of forest fauna communities within a disturbed versus undisturbed landscape.

We have 17 sites established in mature forest within Pukaskwa Park. These are our forested plots within an undisturbed landscape treatment. These are predominantly jackpine dominated mixedwood forests.

We have 19 sites established in large mature forest patches within the DOMTAR SFL. These are our forested plots within a disturbed landscape. These are predominantly mixedwood forest, although not always jackpine dominated as most of this forest type has been removed through logging. We had difficulty finding forest patches of a sufficient size to allow our plots to be established.

Question B: How does the fauna community change as regenerating forest matures? How quickly does it provide habitat for mature forest specialists?

We have

10 plots established in 0-5 years post logging stands
10 plots established in 5-10 years post logging stands
10 plots in 10-15 years post logging stands
9 plots in 15-20 years post logging stands
8 plots in 20-25 years post logging stands

The majority of these regenerating stands have been replanted with jackpine, and been treated at approx 5 years to reduce deciduous plant competition. Some sites were selected to provide a comparison with natural regeneration, although very few stands were available to choose from for this comparison.

Staff structure for the project

Dr. Jennie Pearce is the Project Coordinator.
Jamie Broad and Daniel Schuurman are full time Forestry Officers being paid from the project budget for the entire fiscal year.
Gillian Eccles is the GIS specialist for the project for 6 months of the year.
The Landscape Analysis and Applications Section provided part time services of Dr. Lisa Venier, Dr. Dan McKenney, Kathy Campbell, Kristi Maguire, Eavan O=Connor as in kind support.

Field Camp Set Up

Road repair, trailer towing, trailer set up, pit toilet digging and gray water disposal set up, generator and electrical system set up, steps and platform building, fuel box building. The field camp is located at UTM Zone 16 Easting 589601 Northing 5375585. See the budget summary for an itemized list and cost of camp components.

Site Selection

Site selection was conducted from April through to the end of May. Various GIS coverages (see below) were used to preselect potential areas that met our criteria for vegetation type, age, and location. On the ground, site selection involved investigating areas preselected from the maps. A complete list of sites, their associated treatments, the taxa that were sampled there and their locations are found in Table 1. Figure 1 shows their locations.

Geographic Data Compilation to Inform Site Selection

Ecosite coverage: developed by Pukaskwa National Park
Fire history coverage: developed by Pukaskwa National Park
Landsat coverage:
FRI mapsheets: all mapsheets covering study area and Pukaskwa park provided by Domtar
Other coverages/shapefiles:

- Domtar logging roads (proads2001, troads2001, sroads2001) and edited to study area (theme1.shp, troads_edit.shp, proads_edit.shp)
- Survey Sites
- GPS location of bird count sites (birdsites.shp)
- All other site locations (projsites.shp, sites1.shp)
- Study area

Merged mapsheets covering study area outside the park, dissolved on MNR coding (Outsidepark_diss)
Merged and dissolved mapsheets of Pukaskwa, based on MNR code (Pukcomp_diss.shp)
Merged park and study area mapsheets (sitearea.shp)
Water bodies in the study area (sitearea_lakes.shp)
Rivers within the study area (Rivers.shp)
Wetlands within the study area (Muskeg.shp)

Site Set up and Flagging

Sites were flagged at roadside and trail side with pink, blue and orange flagging. An azimuth was selected based on the shape and size of the plot. Orange flagging was used to flag in along the azimuth for at least 100 m and sometimes longer depending on the nature of the plot. A bird census point was installed at the beginning of the plot (flagged with blue and double orange). From there, a pitfall line was established (flagged pink and blue using both plot pins and flagging above to mark each trap location), a mammal line was established (flagged pink with plot pins and flagging above) and a salamander line was established (flagged blue with pins and above). Pitfall traps were at least 20m from each other and any other sampling lines, mammal trap locations were 10 m apart and at least 10 m from any other sampling lines, salamander trap locations were 10 m apart and at least 10 m from any other sampling lines.

Bird Data Collection Protocols

We conducted point count sampling (Welsh 1995) using 10 minute counts with 2 visits, one in early to mid June and one in mid June to early July between dawn and 9:30 am Eastern Daylight Savings Time (Welsh 1995, Howe et al. 1997). We divided the 10 minute count into two consecutive 5 minute periods to examine the additional data gathered from the second 5 minutes and also to make our data compatible with the Forest Bird Monitoring Program (Canadian Wildlife Service), Ontario Ministry of Natural Resources Wildlife Assessment Program protocol and the new Breeding Bird Atlas of Ontario protocol. Point counts were not conducted under windy conditions or during precipitation. All birds seen or heard were recorded. The distance of observations was estimated as within 50 m, from 50 m to 100 m , and outside of 100 m. Figure 1 is a map of the sites sampled for birds. See Table 1 for the geographic location, treatment types, and dates and times of all sites sampled for birds. A selection of these sites were also sampled using a playback of the Cape May Warbler. Immediately after a point count a one minute tape of Cape May song was played. All responses to the song were recorded for 2 minutes after the playback including responses from species other than the Cape May Warbler. We sampled a total of (103 sites) all of which were at least 500 m apart and usually much further.

Small Mammal Live Trapping

Small mammals were captured using Sherman live traps, with dimensions of 7.5 x 7.5 x 30 cm. The trap operates by capturing mammals that enter the trap, triggering the treadle and causing the door to shut. A 0.032 gauge aluminum trap cover was placed over exposed traps to limit temperature increases on warm days, and shelter traps from precipitation. Small mammals were surveyed along a 90-m trapline. The traplines started and remained at least 100m distant from the road, trail or other treatment type. Traplines consisted of 10 stations located 10 m apart and each station consisted of two live traps (i.e. 20 traps/line in total). Each trap was placed upon the ground adjacent to suitable cover (e.g. stump or fallen log). Traps were baited with approximately 1 teaspoon of peanut butter, rolled oats and sunflower seeds. A 1 cm^3 slice of potato was provided as a source of water. A fist-sized wad of cotton quilt batting was added to each trap to allow animals to build a nest in the metal traps.

Small mammals were identified to species. Sex and possibly age were determined where possible by inspection of animals. After inspection, all captured small mammals were released. The date, time, site, trap number, species, released alive or found dead and comments were recorded at each site for each day of the trapping session. All traps were cleaned periodically with 10% bleach. Small mammals were also trapped using pitfall traps. See next section for pitfall methods. Small mammal trapping took place during July through September. Trapping generally consisted of two sessions (i.e. each site surveyed twice). Each session was repeated for three consecutive nights. Traps were set on the first day and checked early on the following day before noon. Table 1 contains a complete summary of which sites were trapped, and the total catches for each site. Our mammal trapping protocol is based generally on the sampling protocol for small mammal populations in Ontario by Alissa Sugar et al. Wildlife Assessment Program.

Pit Fall Trapping Protocols

The number of trap nights for the pitfall sample is in Table 1. All samples have been washed with ethanol and stored in ethanol. Sorting and identification of trap contents will begin in October 2001.
Ground active invertebrates were captured using pitfall traps. These traps consist of a 1 litre plastic cup (diameter 10.5cm) inserted inside of a 20cm section of PVC pipe. These traps were dug into the ground so that the top of the trap was flush with the soil surface. Each trap was covered by a 20cm diameter plastic dinner plate, suspended approximately 1cm above the trap, to prevent rainwater entry. At each site, a transect was established containing 9 traps, each trap 20m apart. This transect was 20m from either the salamander or small mammal lines. Traps were filled to a depth of 1 inch with propylene glycol diluted by 50% with water to act as a preservative and to prevent invertebrate escape from the traps. Traps were emptied every two weeks from early June to late August. The invertebrate sample was

washed and stored in 95% ethanol. Carabid beetles and ground spiders will be separated from this sample and identified to species. The number of trap nights for the pitfall sample is in Table 1.

Vegetation Sampling

Vegetation sampling will be conducted in the 2002 and 2003 field seasons. Detailed protocols for the vegetation sampling will be developed over the winter of 2001/2002. Vegetation will be sampled at microscales (individual boards, traps or bird census points), at meso scales (plots) and landscape scale (stands and groups of stands).

Salamander Trapping Protocols

We are using modified cover boards to sample salamanders. These boards consist of a plain board (8" x 30") with two half-sized boards (4" x 30") suspended by spacers, creating an interstitial space. Board placement to date is detailed in Table 1. Board transects were at least 20 m away from pitfall traps and 10 m away from mammal traps. Sampling of salamanders will start in the spring of 2002. Detailed descriptions of salamander sampling will be included in the field protocol in the first annual report.

Personnel Schedule for Field Work

See Table 2 for a complete summary of personnel and time spent in the field.

Budget Summary

This year was the first year of the project, and therefore required considerable resources to be directed towards establishing an accommodation and work area at the centre of the study locale, and the purchase of field equipment. The Canadian Forest Service provided a laboratory trailer and accommodation trailer to the project for this year, and purchased an ATV and ATV/generator trailer for the project. We also required an additional 2 accommodation trailers to house field staff and another ATV which the Landscape Analysis and Application Section (CFS) purchased in exchange for the project co-ordinators salary for 12 months being paid for by the OLL project. This resulted in a considerable financial saving to the Section which could in turn be directed toward in kind support for the OLL project. These activities resulted in some minor changes to the budget. See Table 3 for details.

As will be outlined in the end-of-year report, next year considerably more resources will be required to be directed toward the employment of field staff and a spider taxonomist. Fewer supplies and material expenses are expected.

List of Tables and Figures

Table 1 : Summary of sites, locations, treatments, sampling conducted

	Location							
Site Name	UTM Easting	UTM Northing	Treatment Type	Birds Point Count	Birds PlayBack	Salamandar Boards	Mammal Trapping	Pitfall Trapping
APUK01	587524	5368604	Park	1	1	20	6	68
APUK02	587021	5368359	Park	1	1	20	6	68
APUK03	586769	5367513	Park	2	1	20	6	68
APUK04	586091	5367354	Park	2	1	20	6	68
APUK05	585950	5366680	Park	2	1	20	6	68
APUK06	585928	5365965	Park	2	1	20	6	68
APUK07	585736	5365405	Park	2	1	20	6	66
APUK08	585267	5364544	Park	2	1	20	6	66
APUK09	585371	5363806	Park	2	1	20	6	66
APUK10	585031	5363044	Park	2	1	20	6	66
APUK11	585042	5362300	Park	2	2	20	6	66
APUK12	584653	5361605	Park	2	1	20	6	66
APUK13	584660	5361182	Park	2	2	20	6	66
APUK14	585406	5361191	Park	2	1	20	6	66
APUK15	586382	5360665	Park	2	1	20	6	66
APUK16	586987	5360084	Park	1	1	20	6	66
APUK17	587738	5360106	Park	1	1	20	6	66
FOR001	586224	5377299	Forest	2	1	50	6	67
FOR002	586301	5376772	Forest	2	1	50	6	67
FOR003	588269	5376102	Forest	2	1	50	6	68
FOR004	615738	5382134	Forest	1	1	50	6	78*
FOR005	586021	5375408	Forest	2	1	50	6	69
FOR006	594621	5381264	Forest	2	1	50	6	71
FOR007	596213	5378356	Forest	2	1	50	6	66
FOR008	593822	5374147	Forest	2	1	50	6	66
FOR009	623140	5377012	Forest	2	1	50	6	79
FOR010	613638	5373587	Forest	2	1	50	3	62
FOR011	594616	5383571	Forest	2	1	50	6	67
FOR013	586154	5374784	Forest	2	1	50	6	69
FOR014	603828	5386611	Forest	2	1	50	6	80*
FOR015	592169	5387267	Forest	2	1	50	6	66

FOR016	603642	5382241	Forest	2	1	50	6	79
FOR017	603597	5376169	Forest	2	1	50	6	70
FOR018	601974	5377558	Forest	2	1	50	6	70
FOR019	617454	5384926	Forest	2	1	50	6	81*
FOR020	618278	5384037	Forest	2	1	50	6	78
R0A01	597605	5376990	0 year	2	1	20	6	66
R0A02	602691	5383429	0 year	2	1	20	6	78
R0A03	593320	5384690	0 year	2	1	20	6	65
R0A04	593372	5385652	0 year	2	1	20	6	65
R0A05	585463	5384094	0 year	2	1	20	6	65
R10A01	597240	5376385	10 year	2	1	20	6	67
R10A02	598353	5376781	10 year	1	1	20	6	67
R10A03	600099	5377526	10 year	1	1	20	6	70
R10A04	627327	5387029	10 year	2	1	20	3	64
R10A05	606257	5375430	10 year	3	1	20	6	79
R10A06	606251	5372177	10 year	2	1	20	3	61
R10A07	605066	5378224	10 year	2	1	20	6	77
R10A08	620047	5367986	10 year	2	1	20	6	82*
R10A09	616416	5384407	10 year	2	1	20	6	81*
R10A10	615052	5383116	10 year	1	2	20	6	81*
R15A01	606592	5372815	15 year	2	1	20	6	79
R15A02	607420	5371998	15 year	2	1	20	3	60
R15A03	608665	5372408	15 year	2	1	20	6	81*
R15A04	614812*	5373818*	15 year	2	1	20	3	62
R15A05	617164	5376447	15 year	2	1	20	6	78
R15A06	614751	5373914	15 year	2	0	20	3	64
R15A07	615673	5371407	15 year	2	1	20	3	67*
R15A08	616245	5374559	15 year	2	1	20	3	64
R15A10	614423	5375527	15 year	2	1	20	3	61
R1A01	593319	5379238	1 year	2	1	20	6	74
R1A02	593724	5379145	1 year	1	1	20	6	66
R1A03	605180	5375846	1 year	3	1	20	6	81*
R1A04	596802	5383880	1 year	1	1	20	6	78*
R1A05	614845	5370635	1 year	2	1	20	3	66
R20A01	623783	5374935	20 year	2	1	20	3	61
R20A03	620834*	5372193*	20 year	2	1	20	6	82*

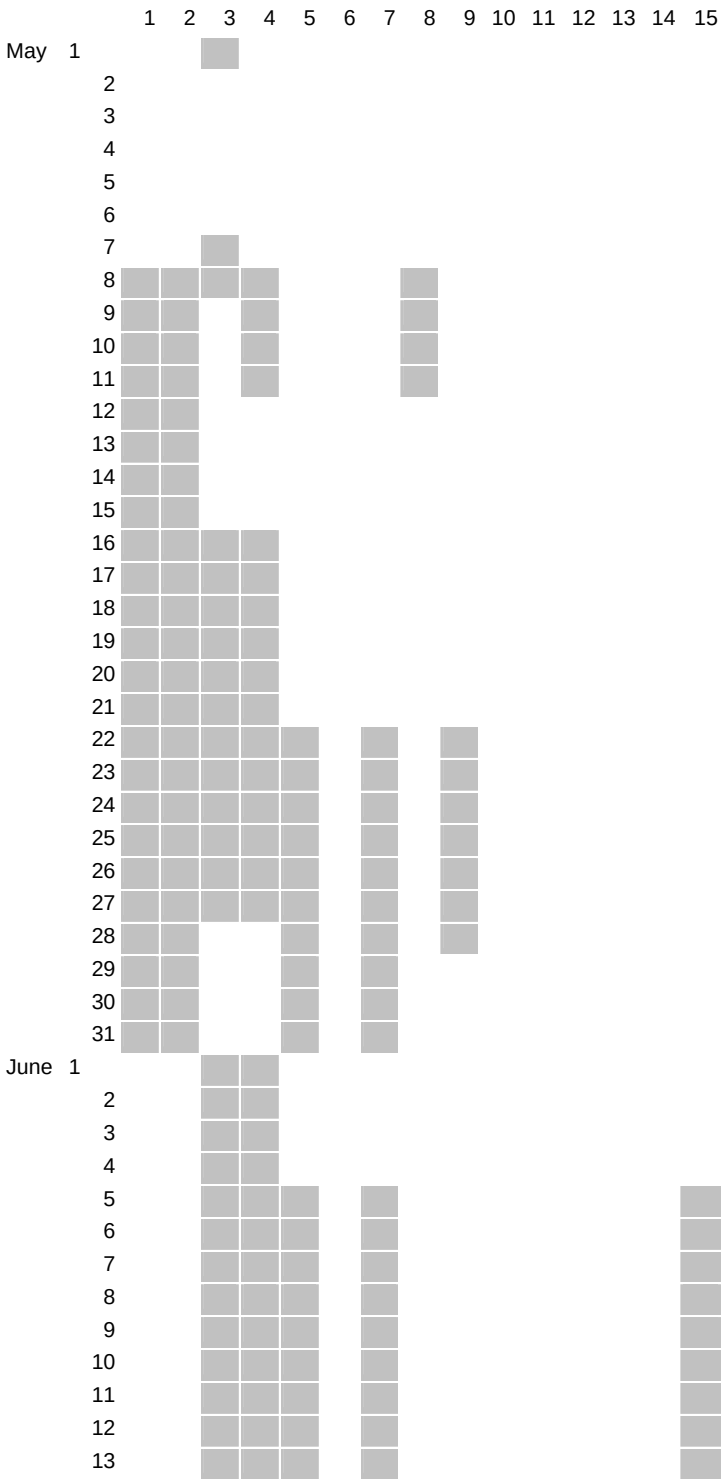
R20A04	628150	5389896	20 year	2	1	20	3	64
R20A05	631756	5369196	20 year	2	1	20	3	66
R20A06	632755	5368242	20 year	2	1	20	3	66
R20A07	635060	5369497	20 year	2	1	20	3	66
R20A08	632555	5380837	20 year	2	1	20	3	65
R20A09	617272	5383579	20 year	1	1	20	6	81*
R5A01	590923	5376084	5 year	2	1	20	6	67
R5A02	594343	5378068	5 year	2	1	20	6	68
R5A03	590788	5374900	5 year	2	1	20	6	66
R5A04	592811	5378618	5 year	2	1	20	6	74
R5A05	594162	5379990	5 year	1	1	20	6	66
R5A06	600975	5382854	5 year	2	1	20	6	78
R5A07	595060	5382460	5 year	2	1	20	6	66
R5A08	590710	5386246	5 year	2	1	20	6	65
R5A09	585630	5376523	5 year	2	1	20	6	68
R5A10	586939	5376775	5 year	2	1	20	6	67
BRD001	589371	5376012	Forest	2	1	_	_	_
BRD002	589782	5376161	Forest	2	1	_	_	_
BRD003	587180	5376683	Forest	2	1	_	_	_
BRD004	590559	5376031	Forest	2	2	_	_	_
BRD005	601774	5378312	Forest	2	1	_	_	_
BRD006	602712	5385641	Forest	2	1	_	_	_
BRD007	602676	5384939	Forest	2	1	_	_	_
BRD008	602527	5384534	Forest	2	1	_	_	_
BRD009	598898	5383756	Forest	1	1	_	_	_
BRD010	604618	5378806	Forest	2	1	_	_	_
BRD011	603955	5379123	Forest	2	0	_	_	_
BRD012	599348	5377288	Forest	2	1	_	_	_
BRD013	607346	5381157	Forest	2	1	_	_	_
BRD014	606728	5379757	Forest	2	1	_	_	_
BRD015	606669	5379266	Forest	2	1	_	_	_
BRD016	605762	5373716	Forest	2	1	_	_	_
BRD017	606644	5374810	Forest	2	1	_	_	_
BRD018	601113	5377630	Forest	1	1	_	_	_

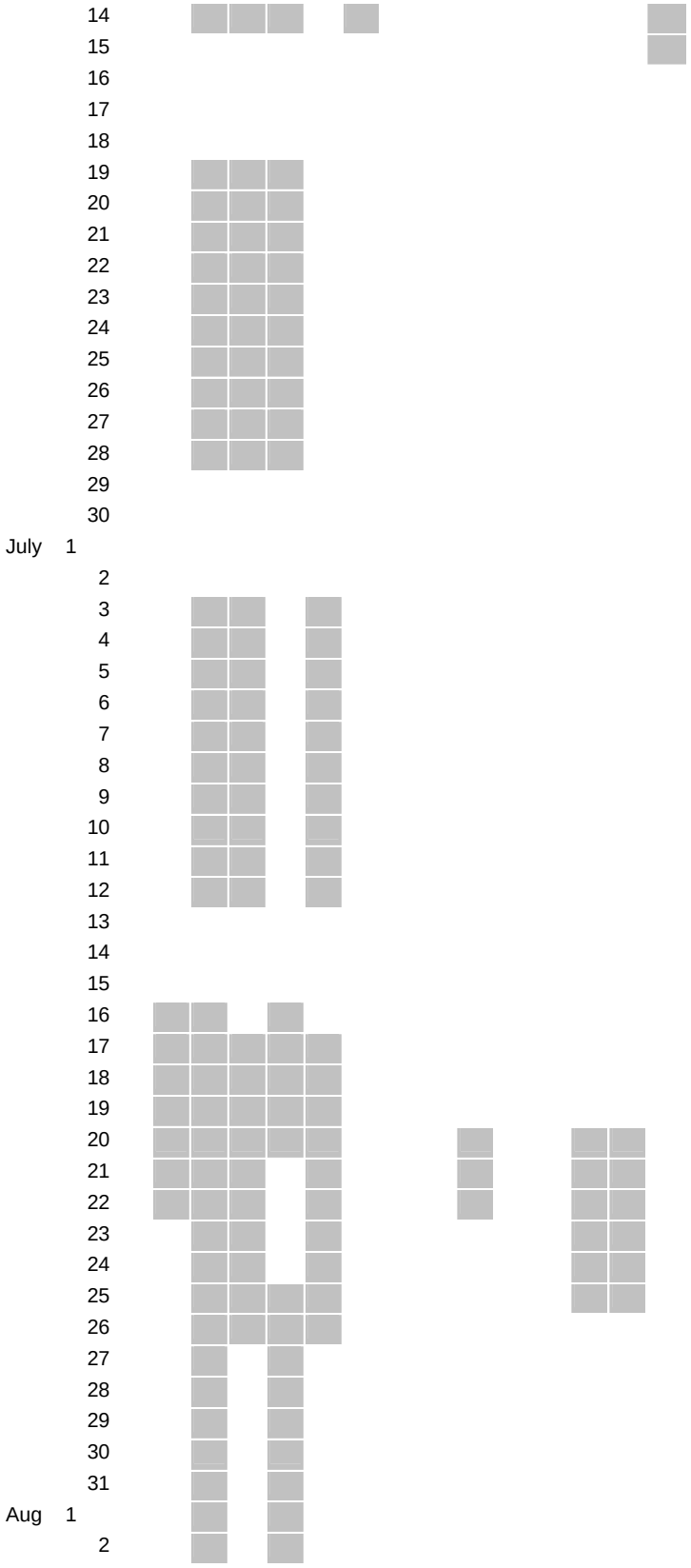
BRD019	598108	5381305	Forest	1	1			
BRD020	592172	5382987	Forest	2	1			

Field Descriptions

Location	UTM zone 17 NAD83 coordinates of bird count station (asterix denotes that road-side site entry coordinates are listed)	
Treatment Type	Park	Sites located within Pukaskwa National Park
	Forest	No logging has ever occurred
	0 year	0-5 year regeneration
	1 year	0-5 year regeneration
	5 year	5-10 year regeneration
	10 year	10-15 year regeneration
	15 year	15-20 year regeneration
	20 year	20-25 year regeneration
Bird Point Count	Number of 10 minute point counts conducted during field season	
Bird PlayBack	Number of 10 minute playback counts conducted during field season	
Salamander Boards	Number of salamander boards installed	
Mammal Trapping	Number of trap nights during field season (asterix denotes that an estimated value is listed)	
Pitfall Trapping	Number of days site was trapped (does not take into account non-functioning traps i.e. No sample taken because destroyed by an animal)	

Table 2: Work Summary for 2001 Field Season
1=Lisa Venier; 2=Jennie Pearce; 3=Jamie Broad; 4=Dan Schuurman; 5=Darryl Edwards; 6=Gillian Eccles; 7=Christine Kormos; 8=Dean Phoenix; 9= Four ONMR Crew; 10=Volunteers; 11=Four Unskilled Workers; 12=Two Sault College Students;13=Kristi Maguire

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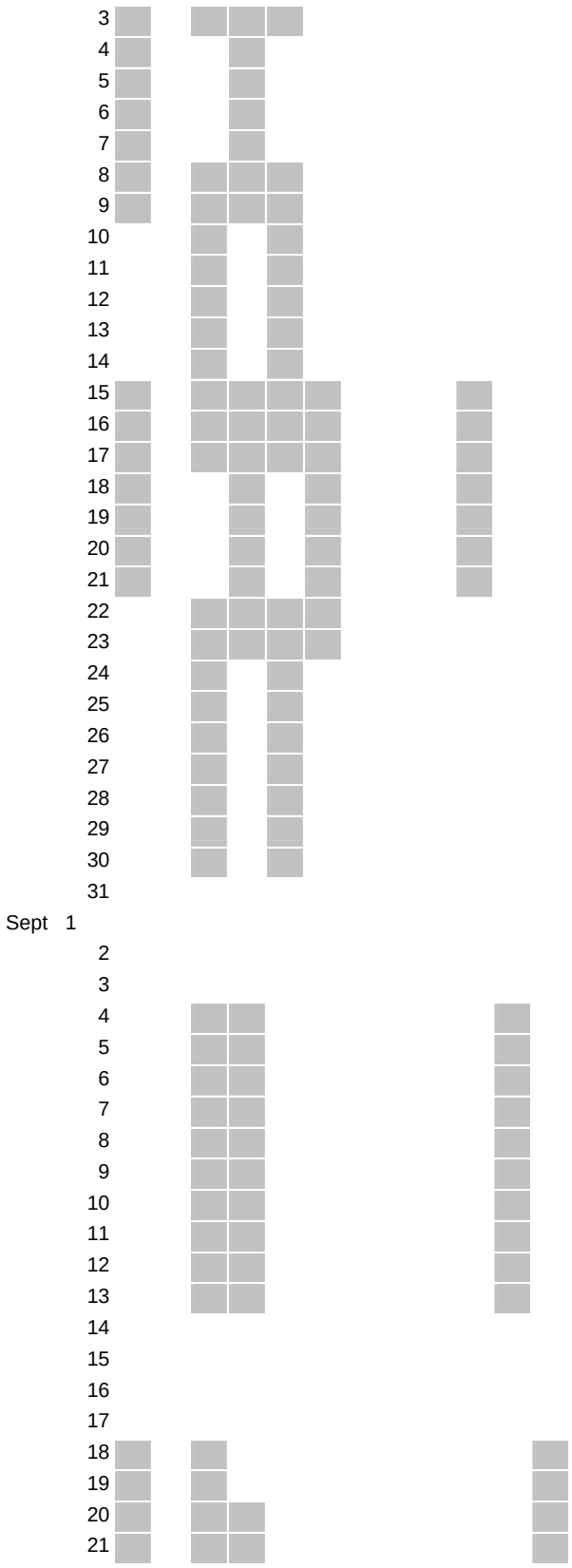
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