MARSH MONITORING PROGRAM:
2003 VOLUNTEER HABITAT WORKSHOP SUMMARY

Prepared for

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by

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EXECUTIVE SUMMARY

In August 2003, Marsh Monitoring Program (MMP) staff organized and held a one-day workshop at Bird Studies Canada's (BSC) headquarters, with the main objective of evaluating MMP participants' ability to characterize and estimate proportional area coverage of dominant marsh habitat types within standard MMP survey stations under normal field conditions. Efforts were made to involve participants who collectively represented a broad range of habitat survey experience, though this was not fully achieved, due to both a lack of response from initial invitations, and because a large-scale electrical black-out that occurred just prior to the workshop prevented a number of participants from traveling long distances. Nineteen participants did attend the workshop, and represented a modest distribution across the habitat survey experience strata.

Participants completed field habitat description surveys at five separate MMP test stations at various locations within Long Point area marshes. Results from these examinations indicate that participants are generally accurate in their ability to identify and estimate proportion of dominant marsh habitat coverage at field survey stations, although certain conditions resulted in over- or under-estimation of certain habitat types at some test stations. Results suggested that some improvements could be made to MMP training (staff- and self-based) in order to improve participant identification abilities of specific vegetation types. Suggestions for future directions to fulfill these needs are presented.

INTRODUCTION

Since 1995, more than 650 Marsh Monitoring Program (MMP) volunteers have surveyed over 550 routes within Great Lakes basin marshes for occurrence and abundance of anurans (frogs and toads) and birds. Data gathered in this manner have demonstrated great utility in understanding annual status and trends in relative population estimates of many anuran and bird species (Weeber and Vallianatos 2000, Timmermans and Craigie 2002), and in demonstrating that many species' population changes are closely associated with changes in Great Lake water levels (Craigie et al. 2003, Timmermans 2001, Timmermans et al. unpublished data).

In addition to collecting species population information, many MMP volunteers also collect information about general proportions of marsh habitat types within each of their survey stations. These data are used to estimate species-specific habitat associations of marsh birds and anurans. Standardized MMP training kits provide detailed instructions that guide volunteers in their efforts to record marsh habitat descriptions in their survey areas. However, recent concerns have arisen regarding the quality and utility of these volunteer-based habitat assessments. These concerns stem from the belief that current habitat estimation protocols lack the precision and accuracy required for such species-habitat association analyses, and that among-observer variability may be too high to yield representative results.

To investigate how accurately and precisely MMP volunteers estimate proportional habitat coverage in survey stations, MMP staff, with financial support from Environment Canada (EC) ECB-OR, conducted a one-day workshop, during which volunteers were asked to complete standard MMP habitat evaluation forms for pre-selected sites. Volunteer estimated coverage of each habitat type was compared to actual proportional coverage of each habitat type, which was measured more precisely by MMP staff on a separate occasion. The deviation of volunteer estimates from actual habitat coverages gave us an estimate of volunteer accuracy and precision. Results of these activities are presented and discussed herein.

METHODS

Volunteer Selection Protocol

Candidate participants were selected from the existing MMP volunteer database using a stratified sampling regime. A stratified, rather than a random, sampling regime was used in an attempt to gain a balanced cross-section of volunteer skills, experience and geographic location of MMP surveyors. This was accomplished by querying the existing MMP database using the following discriminating elements: 1) habitat description forms were filled out completely and correctly for all survey stations at which a habitat description was made; 2) approximately equal representation from the various survey regions within the Great Lakes basin; and 3) MMP survey experience, which was

divided into four categories (Table 1). A list of volunteers within each skill category was thereby generated, and invitations to attend the workshop were sent to approximately 120 volunteers, with the intent of yielding 10 participants per experience category, or a total of 40 participants.

Marketing Campaign

Volunteers were engaged to participate in this one-day MMP Focus Group and Workshop through a marketing campaign prepared by MMP staff. This campaign was targeted at individuals who were selected by the selection protocol described above. The marketing campaign involved sending letters of invitation to the selected volunteers, which outlined the importance of volunteer participation to the MMP, a short agenda for the day, and a list of incentives for participation. Those incentives included a door-prize draw for a wooden carving of a kingfisher, a lunch and barbeque, a $100 travel subsidy, the opportunity to meet MMP and EC staff and other volunteers, and the opportunity to visit Bird Studies Canada's headquarters in Port Rowan, Ontario. Those volunteers who accepted the invitation were subsequently sent a letter of appreciation, which included an itinerary for the day, a list of local accommodations, and maps of the Long Point region.

Volunteer Habitat Assessment

To test volunteer habitat description capabilities during the workshop, five survey stations within the Long Point area were selected by MMP staff that represented a range of different habitat types and complexities. These stations were Crown Marsh, Long Point Provincial Park (LPPP) Marsh, Bird Studies Canada (BSC) Marsh, Big Creek Marsh, and Hastings Marsh. Participating volunteers were divided into two groups, each with an approximately equal representation of all experience categories. This kept the evaluation 'fair' and 'balanced' by reducing the possibility of any one group consisting entirely of participants who had not previously completed a habitat evaluation. However, participants in the lowest skill level, who either had not performed an MMP survey, or had surveyed for birds and/or amphibians but had not completed a habitat evaluation form, were given prior notification to read through the MMP protocol booklet to ensure that they gained some familiarity about how to complete the survey. We assumed that all other participants were familiar with the protocols and/or had recently reviewed the material, as would have been expected at this time of year (August).

Each group visited each of the five survey stations in succession, for a period of 10-20 minutes at each station. During station surveys, each individual independently estimated and recorded habitat characteristics of the 100 m radius semi-circular survey station onto an MMP Habitat Description Form (Appendix A) following MMP protocols (Anonymous 2001).

Quantitative Habitat Assessment

In order to determine how successful volunteers were at correctly classifying broad habitat features, a more intensive, quantitative habitat assessment was completed at each of the five survey stations by MMP staff. This was accomplished by dividing each semi-circular station into 20 m × 20 m sub-plots, and visually estimating the proportion of each sub-plot that was occupied by each habitat type listed on the MMP Habitat Description Form (Appendix A). These values were converted into total area occupied by each habitat type by determining the area encompassed by each sub-plot or partial sub-plot (along the curvature of semi-circle), and summing the areas for each habitat type across the 20 m x 20 m sub-plots. The area occupied by each habitat type was then divided by the total station area to yield its overall percent coverage. These values were treated as the 'known' data set against which to compare volunteer habitat estimates.

Scoring and Analysis of Volunteer Habitat Assessment

In order to analyze the ability of volunteers to correctly classify habitat features, data from all individuals and experience categories were pooled, and the mean estimated percent coverage (± std. dev.) for each habitat type was calculated for 1) each survey station and 2) all stations combined. These data were compared to our 'known' data set using regression analysis. If volunteers described habitat well, the slope of the regression line should not have differed significantly from a value of 1.

RESULTS

Volunteer Participation

Despite efforts to obtain 10 volunteers in each of the four skills categories, those numbers were not achieved for several reasons. Most notably, the workshop coincided with the major electrical blackout that affected most of northeastern North America, and several participants were therefore unable to attend. As a result, MMP staff attempted to increase the number of workshop participants, regardless of habitat classification skill level. This resulted in an over-representation of both highly experienced surveyors (group one and two) and surveyors from southern Ontario (Table 2). In total, 19 volunteers participated in the habitat assessment experiment, of which ten were classified as group one, and three were categorized into each of groups two, three and four based on the number of times that habitat evaluations had been performed by those individuals (Table 2).

Volunteer Field Habitat Assessment

Over all five survey sites, the mean volunteer-derived estimate of habitat cover did not differ significantly from the measured habitat values ($R^2 = 0.9822$, $p < 0.0001$; Figure 1). Thus, on average, volunteers tended to correctly identify and estimate proportional coverage of all habitat types.

Participants also did well in estimating proportions of marsh habitat when stations were considered separately (BSC Marsh: $R^2 = 0.8429$, $p = 0.0278$; Crown Marsh: $R^2 = 0.9998$, $p = <0.0001$; Big Creek Marsh: $R^2 = 0.9970$, $p = <0.0001$; Hastings Marsh: $R^2 = 0.9564$, $p = 0.0039$; LPPP Marsh: $R^2 = 0.9937$, $p = 0.0002$; Figure 2).

However, variation in participant estimates from actual measurements did occur. For example, proportion of open water tended to be overestimated at LPPP and BSC marshes, but underestimated at Hastings and Big Creek marshes. At LPPP marsh, volunteer estimates of grass, reed and emergent cover tended to be greater than measured cover, while the estimated proportion of cattail and 'other' vegetation was lower than measured cover. Alternatively, at BSC marsh, coverage of grasses and exposed substrate were underestimated, but reed coverage was overestimated. At Big Creek marsh, water willow and open water cover tended to be underestimated, and cover of reeds was overestimated. Finally, at Crown marsh, volunteers under-estimated cover of cattail and 'other' vegetation, and over-estimated cover of rushes, grasses and emergents.

DISCUSSION

The use of volunteer habitat assessments in analysis of species-habitat associations has been questioned regarding its accuracy and precision. The main purpose of this study was to evaluate the degree of association of volunteer habitat estimates to known habitat types and proportional habitat coverage. When data from all survey stations and participants were combined, the results suggested that volunteers estimated proportion of habitat cover well, as there was little overall deviation from measured habitat coverage values. This provides some confidence that volunteer habitat assessments can be used in analyses of species-habitat associations, particularly when very large sample sizes are used.

However, deviations of volunteer estimates from actual values did occur at individual marshes. Apart from normal variation to be expected in estimations, several other factors could have contributed to these deviations. First, estimation of proportional habitat cover tends to be more difficult in highly complex habitats. Both LPPP and BSC marshes, for example, have a relatively high complexity of habitat patches, and volunteer estimates of individual habitat features tended to deviate from actual measurements more often at those stations than at the other survey stations.

In addition, the water level at BSC marsh was manually drawn down between the time that volunteers performed their habitat assessments and when MMP staff quantified habitat coverage. Thus, although results suggest that volunteers over-estimated the proportional cover of open water and underestimated the cover of exposed substrate, this was most likely the result of the change in water level between surveys.

Deviation of habitat estimates from actual values might also have occurred if the volunteer's view of the survey station was obscured by tall, emergent vegetation. At Hasting's Marsh, the vantage point from which vegetation surveys were made was low, and it was therefore difficult to view and estimate the amount of open water. This is reflected in the results for this station, as volunteers overestimated the coverage of emergent vegetation, but underestimated the amount of open water.

Alternatively, identification and/or quantification of some of the less common, lower profile emergent vegetation, such as water willow and smartweed, also presented challenges, and misidentification of those species could have translated into an over/under-estimation of the more common emergent vegetation. At Big Creek marsh, for example, the misidentification of the less familiar water willow for the more common reed, or, alternatively, for another less common species such as smartweed, might have resulted in the underestimation of water willow at that marsh.

Thus, although participants did estimate proportional coverage of habitat types well, there is an indication that additional training and guidance are necessary to help improve participant identification skills for marsh habitats. Such training can be staff-based or self-directed learning. In addition, the results presented here are biased toward highly experienced surveyors, as greater than half of the workshop participants were classified as skill level 1. As a result of this bias, the overall accuracy and precision with which average MMP surveyors estimate habitat coverage is likely not as high as that reported here. This further accentuates the need to improve or expand upon current volunteer training techniques. Results are also biased toward southern Ontario surveyors, and thus should not be considered representative of volunteers throughout the Great Lakes basin.

Future Directions

1. More rigorous, focused and localized volunteer training and outreach activities should be developed, involving in-person training and communication between program personnel and volunteer participants. One potential means to help accomplish this is to develop an ambassadorship element to the MMP, which would entail engaging dedicated and qualified MMP participants to act as ambassadors to help deliver local/regional in-person training, recruitment, and more frequent interaction between program personnel and participants. First time

surveyors could also be encouraged to join a more experienced volunteer for their first survey, before attempting to survey on their own.

2. A series of formal self-testing modules should be incorporated into the MMP kit instructional material or online. For each test component (i.e., visual bird and marsh habitat tests, aural bird and anuran tests), the MMP would establish minimum identification scoring criteria, below which any participant must continue to improve their identification skills until they meet program standards before they are able to conduct formal field surveys.
3. In addition to the training modules, we suggest that MMP staff acquire resources to develop and produce high-quality laminated field identification keys of various marsh habitat components that volunteers may encounter in Great Lakes basin marshes, recognizing that habitat/vegetation types vary latitudinally and longitudinally.

ACKNOWLEDGEMENTS

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TABLES

Table 1. Description of volunteer skill level categories.

Skill Level		Description of Experience
1	Experts	> 5 years experience; professionals in their field
2	Highly experienced volunteers	3-5 years experience
3	Moderately experienced volunteers	1-3 years experience
4	Non-experienced volunteers	< 1 year experience

Table 2. Distribution of workshop participants among geographic locations and skill levels, based on the number years spent conducting MMP surveys and on the number of habitat evaluations performed.

Geographic Location	Skill Level	# Years Conducting MMP Surveys	# Habitat Evaluations Performed
Hamilton, Ontario	1	10	75
Salford, Ontario	1	10	48
Mountsberg, Ontario	1	10	35
Greece, New York	1	9	39
Halton, Ontario	1	9	12
Long Point, Ontario	1	8	30
Guelph, Ontario	1	7	32
Shallow Lake, Ontario	1	7	10
Long Point, Ontario	1	6	32
Brantford, Ontario	1	5	21
Allanburg, Ontario	2	4	7
Long Point, Ontario	2	3	58
Long Point, Ontario	2	3	15
Durham County, Ontario	3	2	21
Severn Sound, Ontario	3	2	12
Grimsby, Ontario	3	2	1
Long Point, Ontario	4	1	3
Long Point, Ontario	4	1	0
Stratford, Ontario	4	0	0

FIGURES

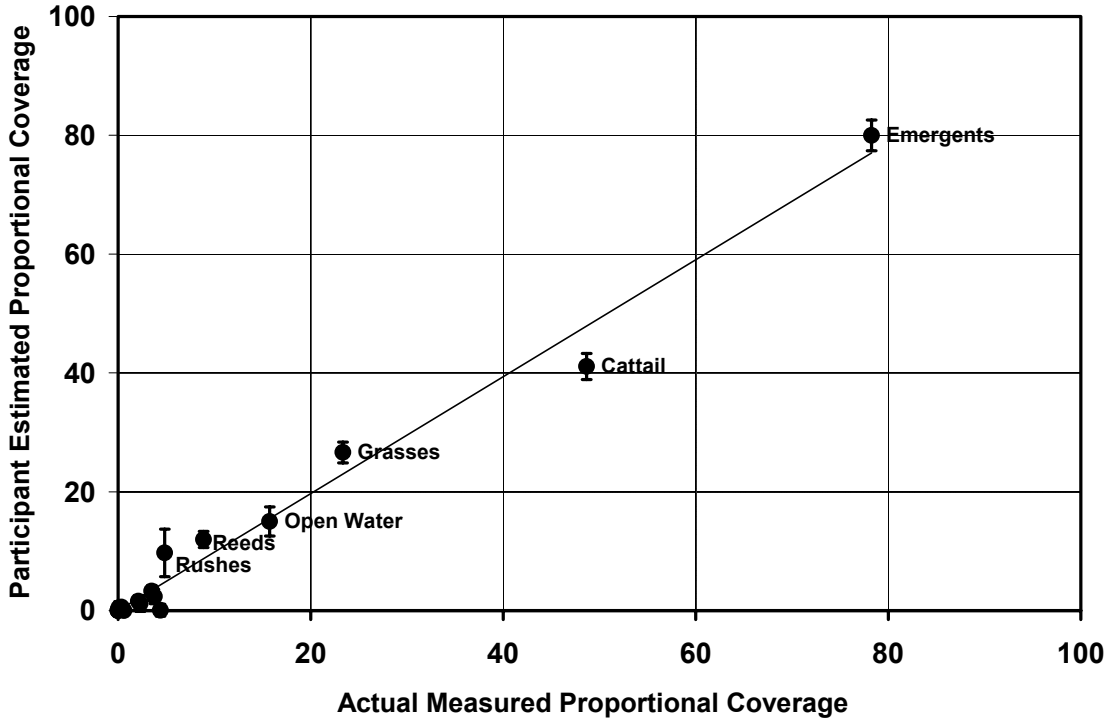


Figure 1. Comparative scatter plot relating mean (± std. dev.) volunteer estimated and actual measured proportional marsh habitat coverage for all five MMP 100 m semi-circular survey stations (combined) at Long Point, Ontario.

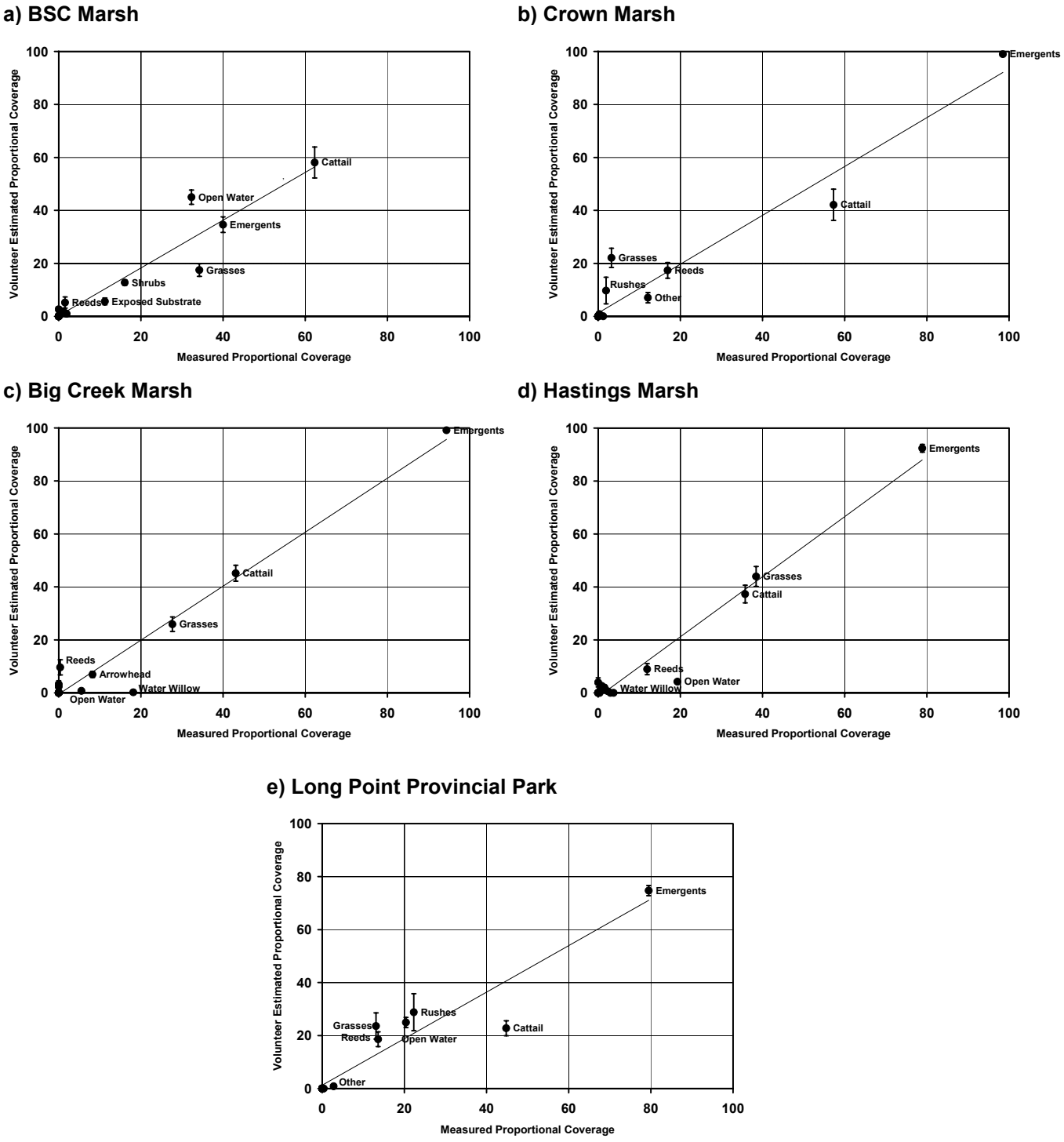


Figure 2. Comparative scatter plots relating mean (± std. dev.) volunteer estimated and actual measured proportional marsh habitat coverage for a) BSC marsh, b) Crown Marsh, c) Big Creek Marsh, d) Hastings Marsh, and e) Long Point Provincial Park.

APPENDIX A.

0578229283 Marsh Monitoring Program-Habitat Description Form

Please print with BLOCK CAPITALS, remain within the boxes and mark each individual choice by filling in the corresponding circle. Please use pen (not felt tip).

MARSH MONITORING PROGRAM

Day Month Year 2,0,0 Route #

Amphibian Survey Y/N: Station Letter: (A - H)

Bird Survey Y/N: Station Letter: (A - H)

Observer # Observer Name

(A) % of major habitats in 100 metre radius station area

herbaceous emergent vegetation cover:
large patches of open water/floating plants:
exposed mud/sand/rock:
trees:
shrubs:
Total:

Note: These should sum up to 100%

(B) Floating plant cover in open water zones (fill in one)

none ○ slight ○ moderate ○ dense ○

unknown ○ not applicable ○

(C) Wetland Permanency (fill in one)

permanent ○ semi-permanent ○ seasonal ○

(D) Overall marsh size (fill in one)

tiny ○ small ○ medium ○ large ○ huge ○

(E) Area within 100 metres behind you is mainly (fill in one)

marsh ○ field ○ forest ○ urban ○ other

(F) Human influences affecting sample area (fill in one or more)

none ○ dykes ○ channels ○ roadside ○ sewage lagoon ○

urban ○ pollution ○ industrial ○ agriculture ○

natural/protected area ○

other

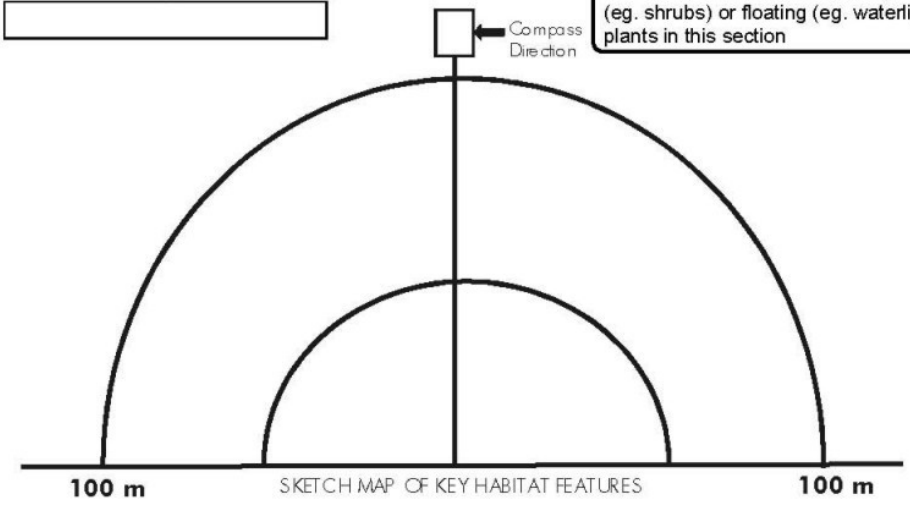
(G) Dominant Emergent Vegetation

Step 1: Identify the herbaceous emergent plants that dominate the station.

Step 2: **Selecting the top 4**, estimate the percent of their contribution (by area) to the total emergent vegetation.

cattail (*Typha*).....
reeds (*Phragmites and Phalaris*)....
grasses and grasslike sedges.....
rushes/bulrushes (*Juncus/Scirpus*)
purple loosestrife (*Lythrum*).....
water willow (*Decodon*).....
pickerel weed (*Pontederia*).....
arrowhead (*Sagittaria*).....
smartweed (*Polygonum*).....
bur-reed (*Sparganium*).....
wild rice (*Zizania*).....
other ....
other ....
other ....

Note:
- Percentages do not need to sum to 100%
-Please DO NOT include woody (eg. shrubs) or floating (eg. waterlily) plants in this section



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Some Useful Reminders

You do not need to access the entire station area to describe the habitat. Merely stand at the focal point and record what you see within the bounds of the 100 m (110 yd) radius station area. See the MMP Training Manual for additional details.

Completing the left-hand side of the form (Sections A through F)

(A) Scan the 100 m (110 yd) radius sample area. Estimate the **percent of the total area** that is covered by emergent vegetation, open water (including floating plants), exposed mud/sand/rock, trees, and shrubs. These values should add up to 100%.

Definition: "open water" includes any and all pools of water that are at least the size of a standard sheet of plywood (4 x 8 ft). It supports little if any **emergent** vegetation. However, it may contain **floating plants**. As a rule of thumb, if you could float a small canoe in it (and maybe even paddle around a little), it is probably "open water."

(B) Look again at the open water zones. Categorize the amount of **floating plant cover**. If there is no open water, fill in the circle for "not applicable."

(C) **Wetland permanency** is categorized according to the following definitions:

permanent - almost never dries up; water is usually quite deep (knee to chest deep)
semi-permanent - can dry up in some years of low precipitation (or if water level is periodically drawn down); water is usually fairly shallow (not much more than knee deep)
seasonal - usually flooded in spring and early summer, but tends to dry up in late summer or in dry years. Even when flooded, the water is shallow (not much more than calf deep)

(D) Estimate the **size of the entire contiguous marsh complex**, excluding large bodies of navigable water like lakes and bays. For your information, one hectare (about 2.5 acres) measures 100 metres x 100 metres (e.g. a "tiny" marsh). 100 hectares is 1000 metres x 1000 metres (e.g. a "huge" marsh).

tiny - between 1.5 and 2.5 hectares (3.5 - 6 acres) **small** - between 2.5 and 5 hectares (6 - 12 acres) **medium** - between 5 and 25 hectares (12 - 60 acres)	**large** - between 25 and 50 hectares (60 - 125 acres) **huge** - greater than 50 hectares (>125 acres)

(E) Classify the **land use** (to 100 m (110 yd)) behind you as you face the station area. Choose only one category.

(F) Identify the obvious **human influences** that may be affecting the station area. Choose as many categories as you think apply.

Completing the right-hand side of the form (Section G)

(G) **The Dominant Emergent Vegetation Box**

The estimates you make in this section are based on the **total area covered by emergent vegetation only** (ignore open water/floating plant and shrub/tree zones). Scan the area and decide which kinds of emergent vegetation dominate the area. Limit yourself to the **top four most common** species. What proportions of the total emergent vegetation cover do each of these dominant plants occupy? (Because other less-common plants may be present, the dominants **do not need to add up to 100%).**

In some marshes, virtually all of the emergent vegetation may be represented by a single dominant species (e.g. cattail = 100%) or by a couple of species (e.g. cattail =75%, grass = 20%). If so, you don't need to list any other species in the Dominant Emergent Vegetation box. As a general rule of thumb, any species that accounts for less than about 10% of the cover really can't be considered as a dominant. If a dominant species is not listed in the box, list it under other (be sure it is herbaceous (non-woody) and emergent (extends above water's surface). If you can't identify it, take your best guess, followed by a question mark (e.g. "Milkweed? = 25%").

The values you provide are **estimates** only and you don't need to spend a lot of time trying to calculate actual percentages. In fact, if you spend any more than a couple of minutes on this task, you're probably overdoing it!

Note: Grasses and grass-like sedges include all those plants with a "grass-like" growth form. Botanically speaking, these belong to the genera *Spartina, Poa, Calamagrostis, Glyceria* and the sedges such as those in the *Carex* genus. Common Reed and Reed Canary (*Phragmites* and *Phalaris*), and the rushes (*Juncus* and *Scirpus*) are considered separate from grasses based on their distinctive form and natural history.