11.1 PROTOCOL FOR SAMPLING MACROPHYTES IN LAKES

Overview

These methods represent an amalgam of elements from various approaches. Aquatic macrophytes are sampled to: inventory species (presence/absence), identify invasive species, for biodiversity studies and aquatic health assessments, for primary productivity assessments, and bio-monitoring to determine the effects of environmental change or anthropogenic stressors. Field studies may be qualitative or quantitative in nature and appropriate survey methodology is typically selected on the basis of project-specific objectives. Generally, the whole plant should be collected for taxonomy. Some species groups can only be identified by mature fruits or flowers. Small plants like the duckweeds do not make acceptable pressed and dried specimens. Therefore, small screw cap vials make good collecting and preservation containers.

The sampling protocols are applicable to wetlands, ponds, lakes, reservoirs, and large river surveys. Consideration must also be given to the type of water body (i.e., lotic versus lentic, size of water body or study area, littoral extent, and depth) and the nature of the aquatic plant communities to be sampled (see Table 5).

OBJECTIVE	METHODS	DESCRIPTION
Reconnaissance	Surface Inventory	Qualitative
Species Inventory/Biodiversity	Surface Inventory	Qualitative
	Point Intercept	Qualitative/ Semi Quantitative
	Line Intercept	Qualitative/ Semi Quantitative
Biomass/Productivity/ Bio-Monitoring	Transect with Quadrat	Quantitative

Table 5. Summary of macrophyte methods in relation to study objectives

Field staff should be familiar with regional aquatic macrophyte species and the use of plant identification keys. Plants fall into three generalized categories:

- *submergent* - entire plants submerged (Photo 22);
- *floating-leaved* - plants with submerged parts and leaves that

float at the surface (Photo 23); and

• *emergent* – plants with erect parts (stems and leaves) that rise above the water surface (Photo 24).

Within all three categories, all rooted vascular plants should be considered. Macro-algae (i.e., *Chara* sp. and *Nitella* sp.) are similar to vascular aquatic macrophytes in size, form and function, and should be treated the same. Filamentous algae, aquatic mosses, and free-floating vascular plants (e.g., *Lemna* sp.) should be recorded when present, but quantification is subject to specific study design. Identify plants in the field whenever possible, but also be knowledgeable in the preparation and preservation of aquatic macrophytes for office identification, or if need be submission to a qualified plant taxonomist. Specific study designs may also require retention of reference collections. Be aware of invasive/exotic, rare and endangered species. It is also important to be able to identify invasive, rare or endangered species.

When possible conduct surveys during the peak growing season (i.e., mid-summer to early fall). There is the likelihood that surface inventories or other reconnaissance surveys may be conducted outside of the peak growing season (if plant growth has progressed enough to permit determination of bed extent and species identification). Many aquatic macrophytes are difficult to identify prior to the development of inflorescences or seed stages.

Sources

British Columbia MWLAP (2003), Alberta Environment (2006 a), Développement durable, Environnement et Parcs, Gouvernement du Québec (2007)

Photo 20. Example of submergent macrophytes (Source: Richard Carignan, University of Montreal)

Photo 21: Example of floating-leaved macrophytes (Source: Développement durable, Environnement et Parcs, Gouvernement du Québec (2007)).

Photo 22. Example of emergent macrophytes (Source: Développement durable, Environnement et Parcs, Gouvernement du Québec (2007))