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Invertebrate Monitoring in Wetlands

Joel Chirhart

Minnesota Pollution Control Agency

Biological Monitoring Unit

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What effects the quality of the wetlands we are sampling?

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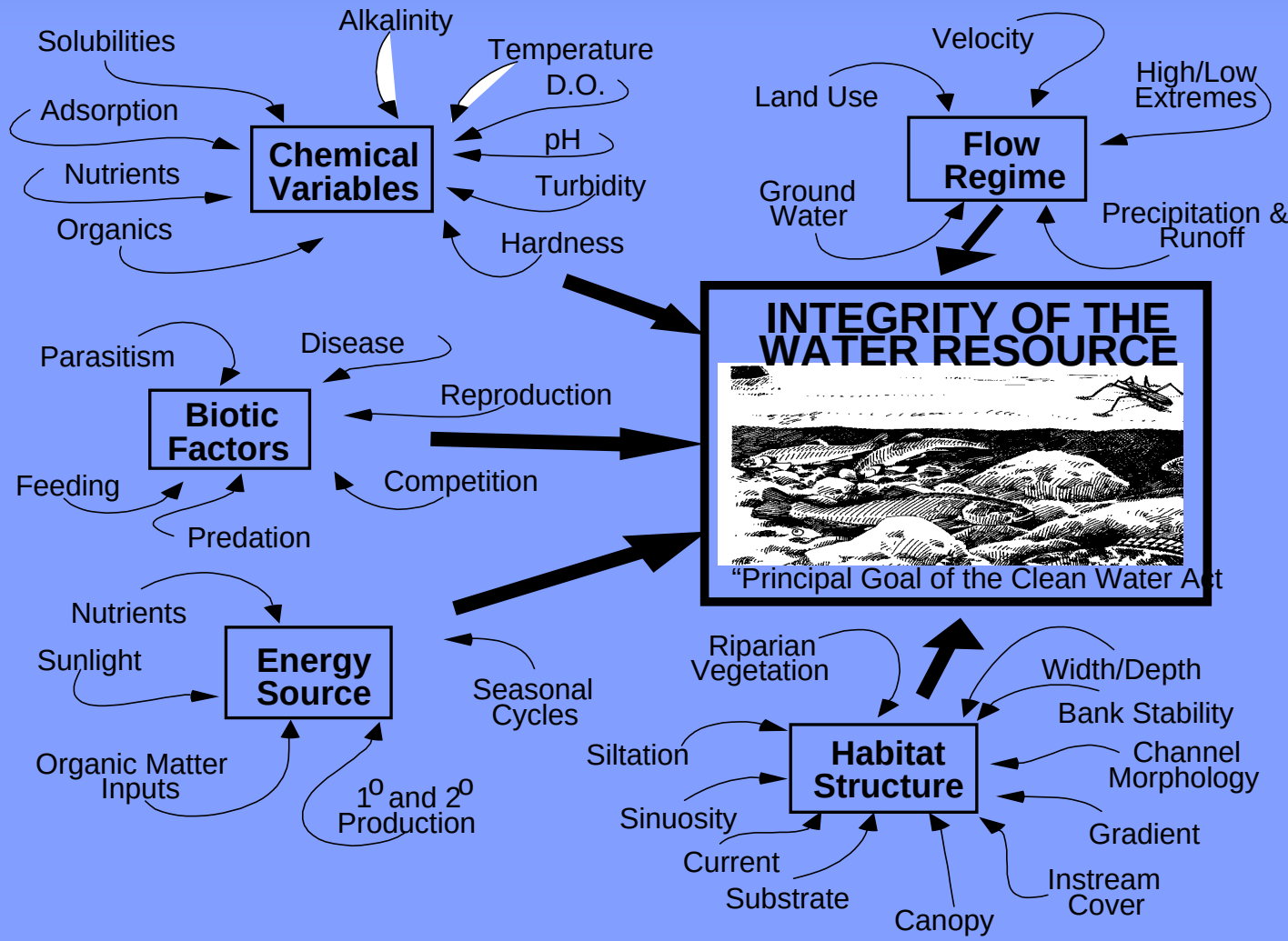
The Five Major Factors Which Determine the Integrity of Wetlands



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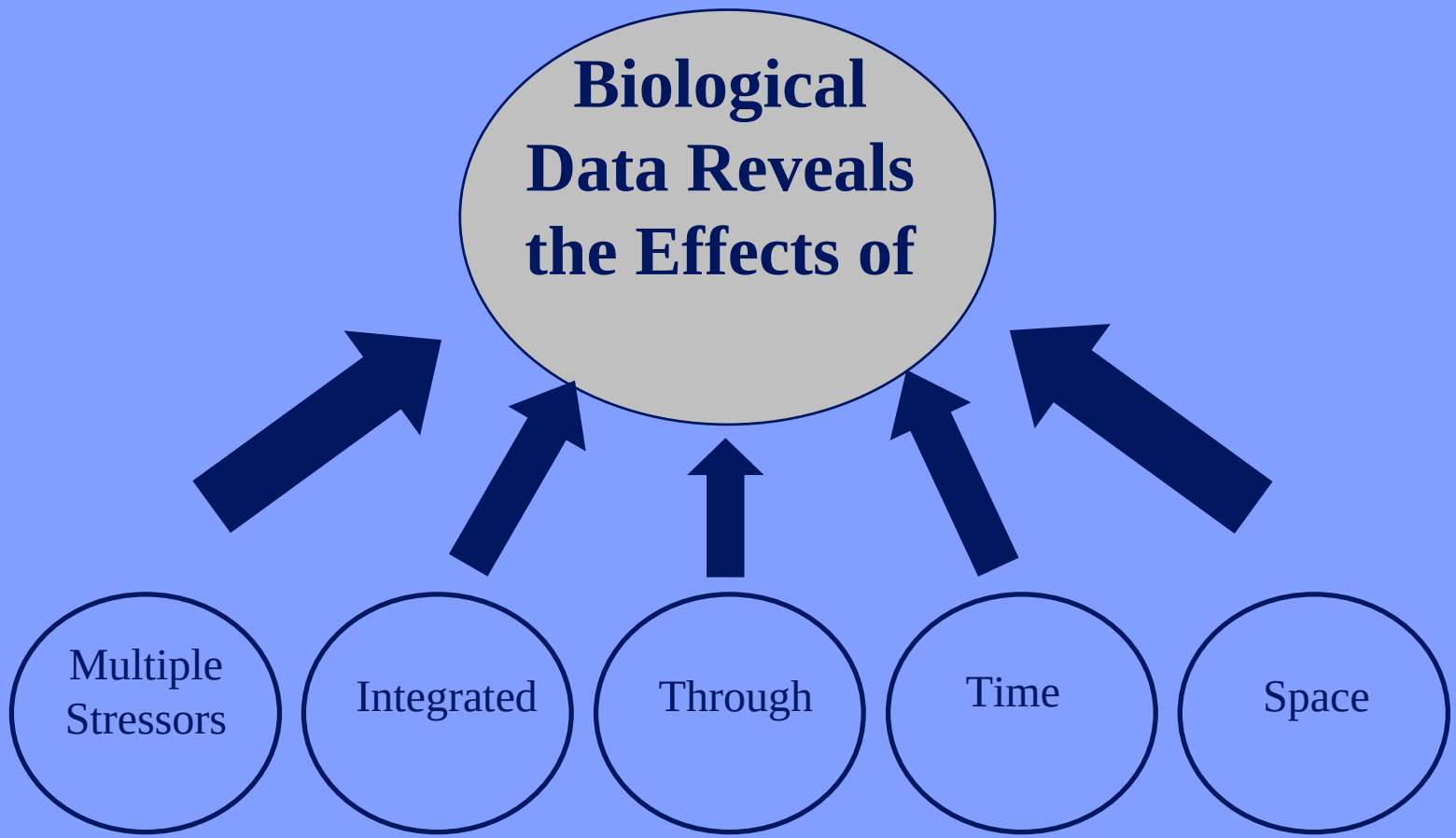
What is so great about biological data?



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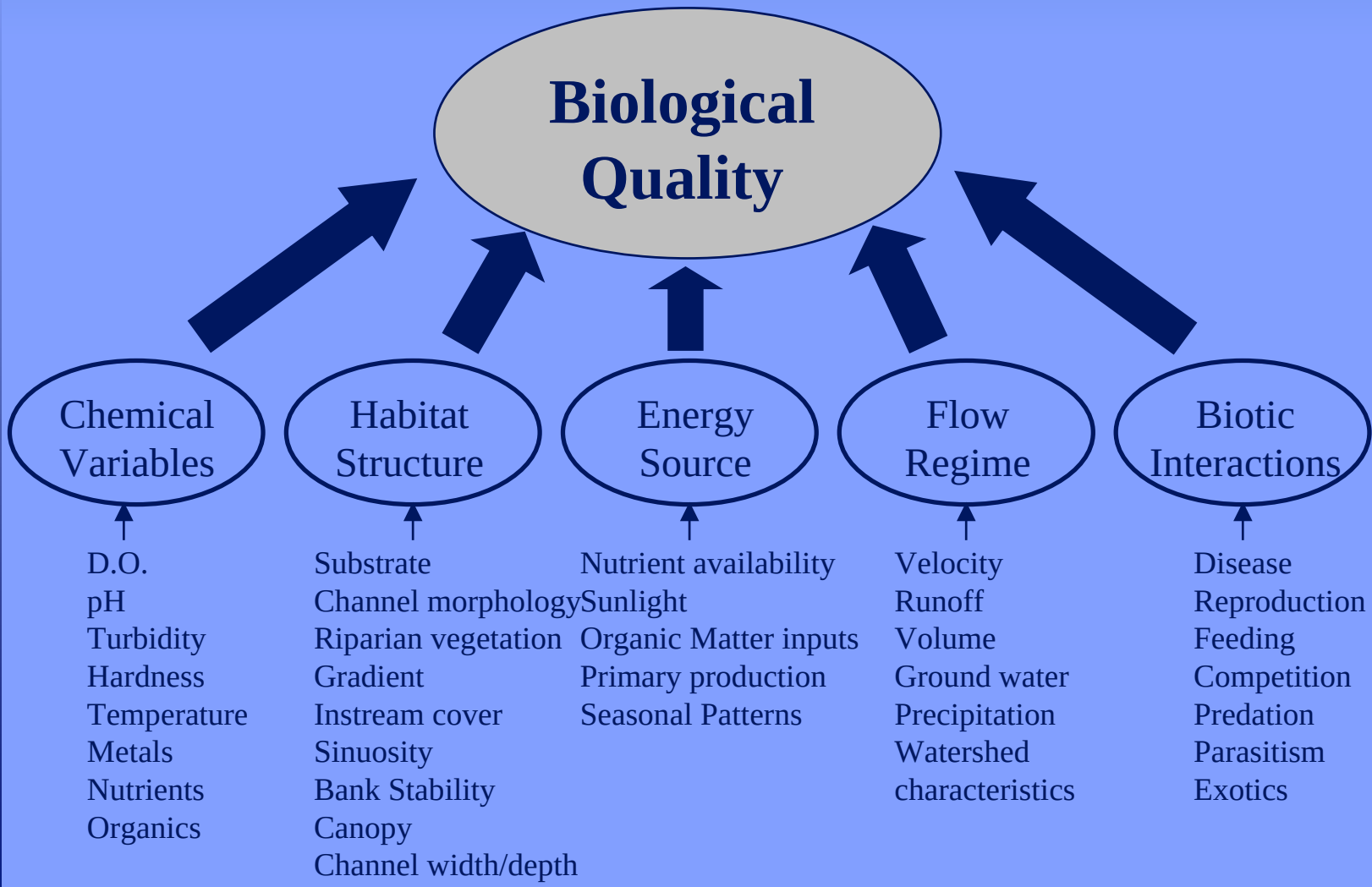
The Big Picture



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Why Macroinvertebrates?

- Invertebrates are commonly and widely distributed in many types of wetlands
- Invertebrates respond with a range of sensitivities to many kinds of pollution
- Many aquatic invertebrates complete their life cycles in wetlands, so they are exposed directly to the physical, chemical, and biological conditions within the wetland
- Aquatic invertebrates are important in wetland food webs for wildlife

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Evaluating the health of a wetland requires a measure that integrates multiple factors

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Economists rely on an integrative tool to assess economic condition

Index of Leading Economic Indicators

- Length of work week, unemployment claims, new manufacturing orders, vendor performance, net business formation, equipment orders, building permits, change in inventories, stock prices, and money supply

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Doctors use multiple measures to assess human health

- Urine chemistry, blood-cell count, blood chemistry, blood pressure, heart-rate, cholesterol levels, body temperature, throat culture, weight, chest x-ray.

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The Index of Biological Integrity (IBI)

- Biologist have developed the IBI as a multiple factor measure to assess the health of streams and wetlands.
- The factors (metrics) that comprise the IBI are measures of different components of the biological community that have been selected based on their ability to reflect human induced changes.

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IBI Metrics

- Taxonomic Diversity (biodiversity)
- Number of Intolerant Groups
- Percentage of Tolerant Groups
- Percentage of Dominant Groups
- Trophic Structure (feeding behavior)
- Individual Health

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Invertebrate IBI Metrics

- **Leech Taxa Metric** – Number of kinds of leeches

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Invertebrate IBI Metrics

- **Corixidae Proportion Metric** – Ratio of water boatman, to other hemipterans and beetles in the bottle trap sample

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Invertebrate IBI Metrics

- **Dragonfly-Damselfly Metric** – Number of kinds of dragonflies and damselflies (odonata)

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Invertebrate IBI Metrics

- **ETSD Metric** – Number of kinds of Mayflies and Caddisflies, and the presence of odonata and fingernail clams
- **Snail Taxa Metric** – Number of kinds of snails

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Invertebrate IBI Metrics

- **Total Taxa Metric** – Number of kinds of invertebrates

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When to sample?

- Invertebrates are sampled in the month of June or early July
  - Samples are taken during this “index period” in order to ensure that the macroinvertebrates are at size that makes them easy to identify
  - This index period also ensures that the majority of the invertebrates collected spent their lives maturing in the wetland being sampled and did not fly in from another nearby wetland.

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Where to sample?

- Invertebrate samples are collected in the shallow, near-shore area not deeper than 3 feet.
- Bottle-traps samples and dip-net samples are collected in the same general area of the wetland

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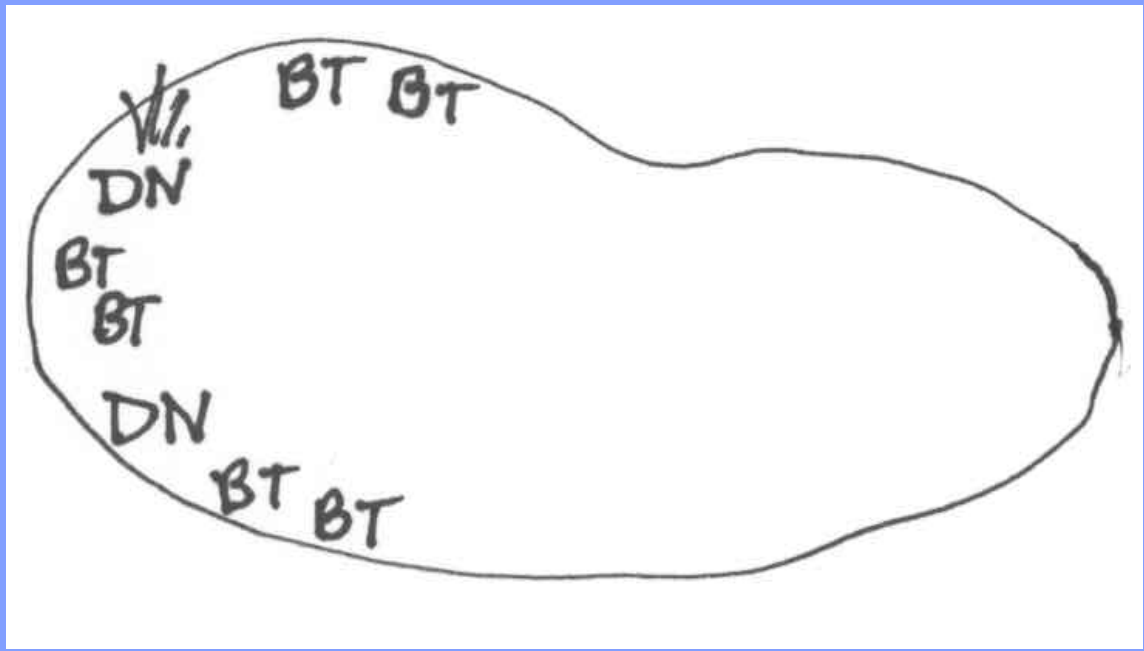
Where to sample?

- If very little vegetation is present, sample close to shore and any vegetation that might present



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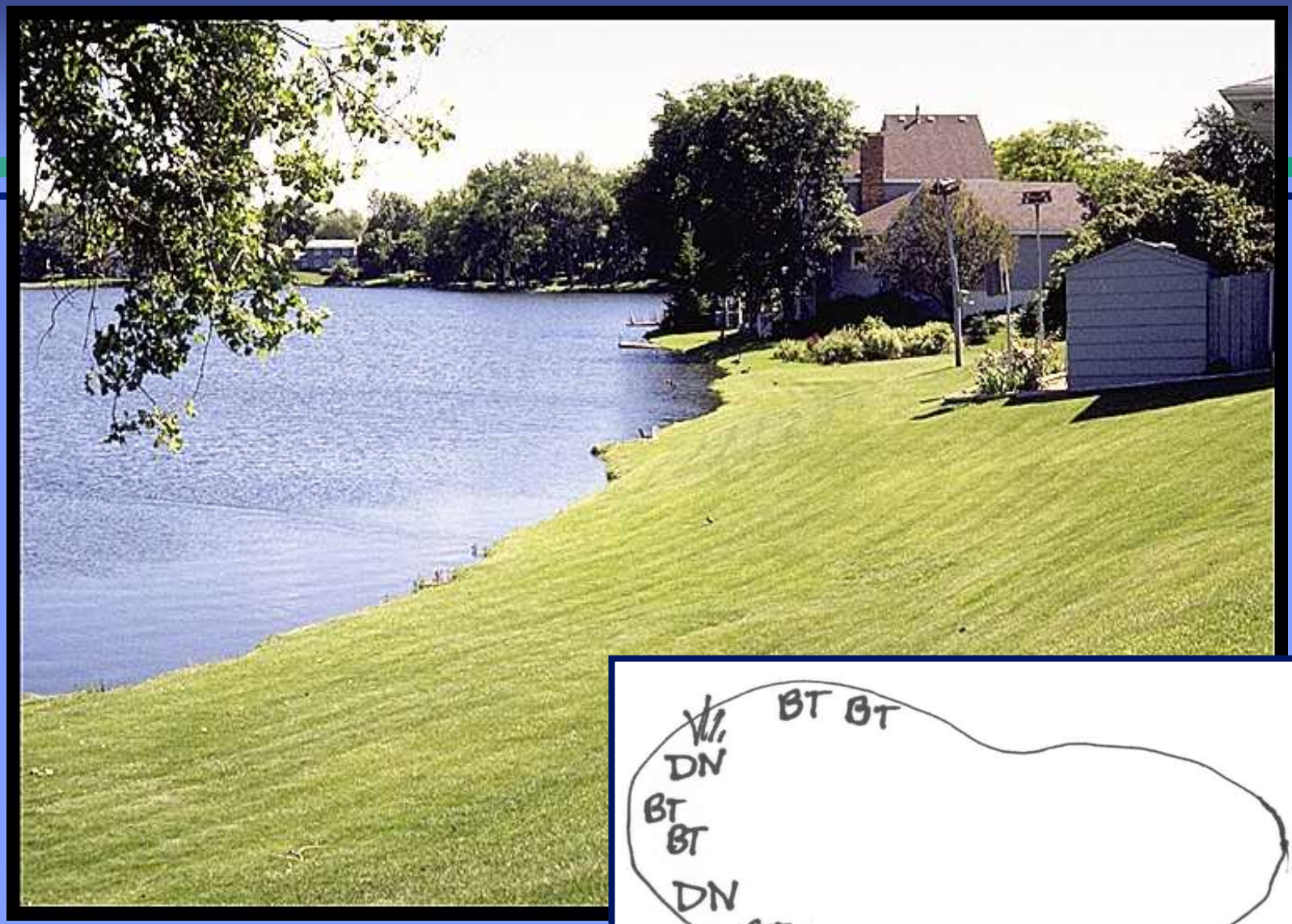

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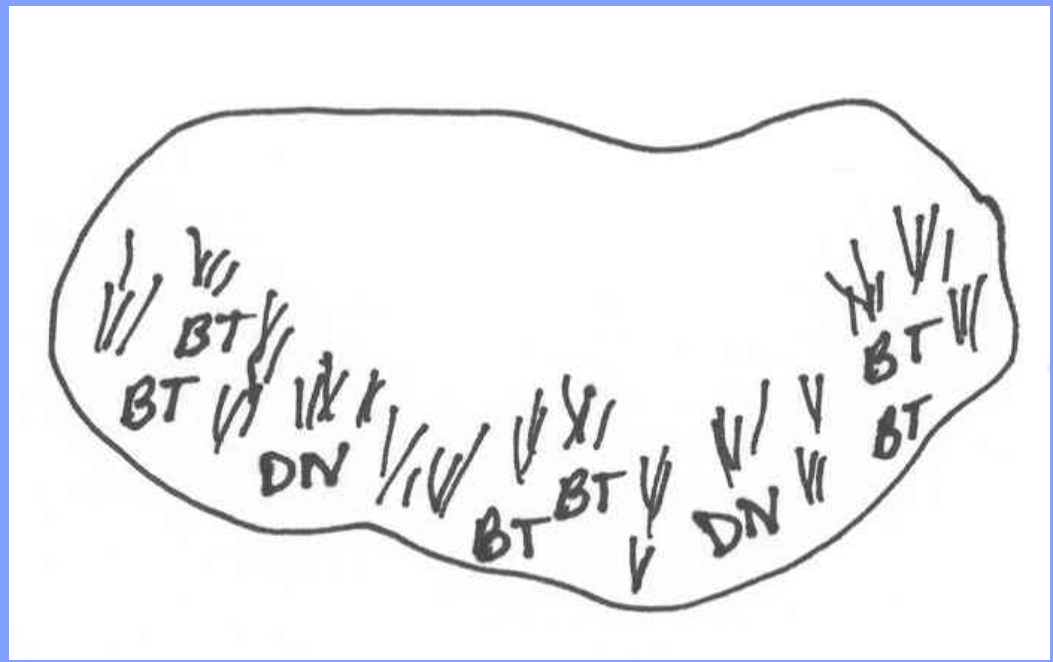
Where to sample?

- If there is a vegetated border around the wetland, sample throughout the vegetated zone, from near shore up to 1 meter deep



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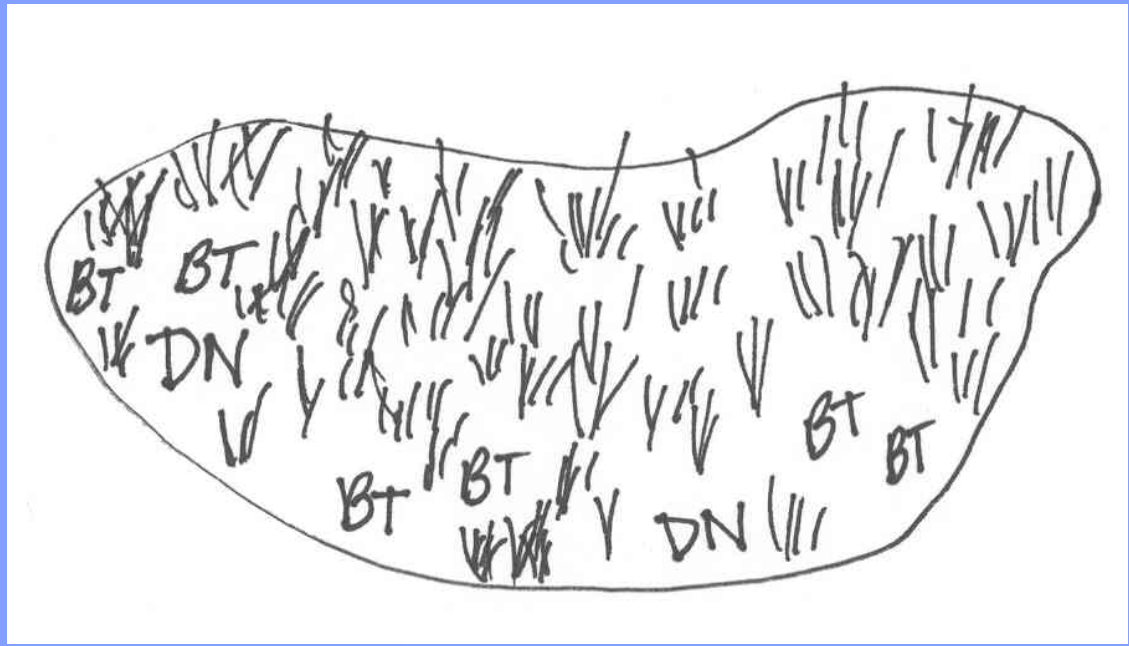
Where to sample?

- If the wetland has dense vegetation throughout, try to find open pockets in which to sample in the near shore area.



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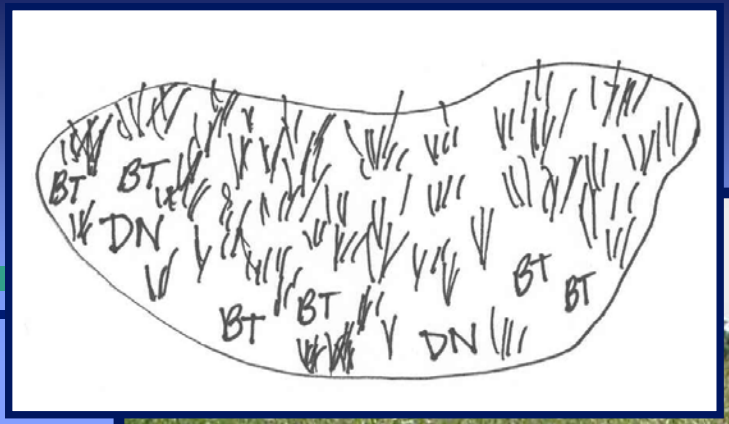

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How to sample?

- **Bottle Traps**

- **Dip-netting**

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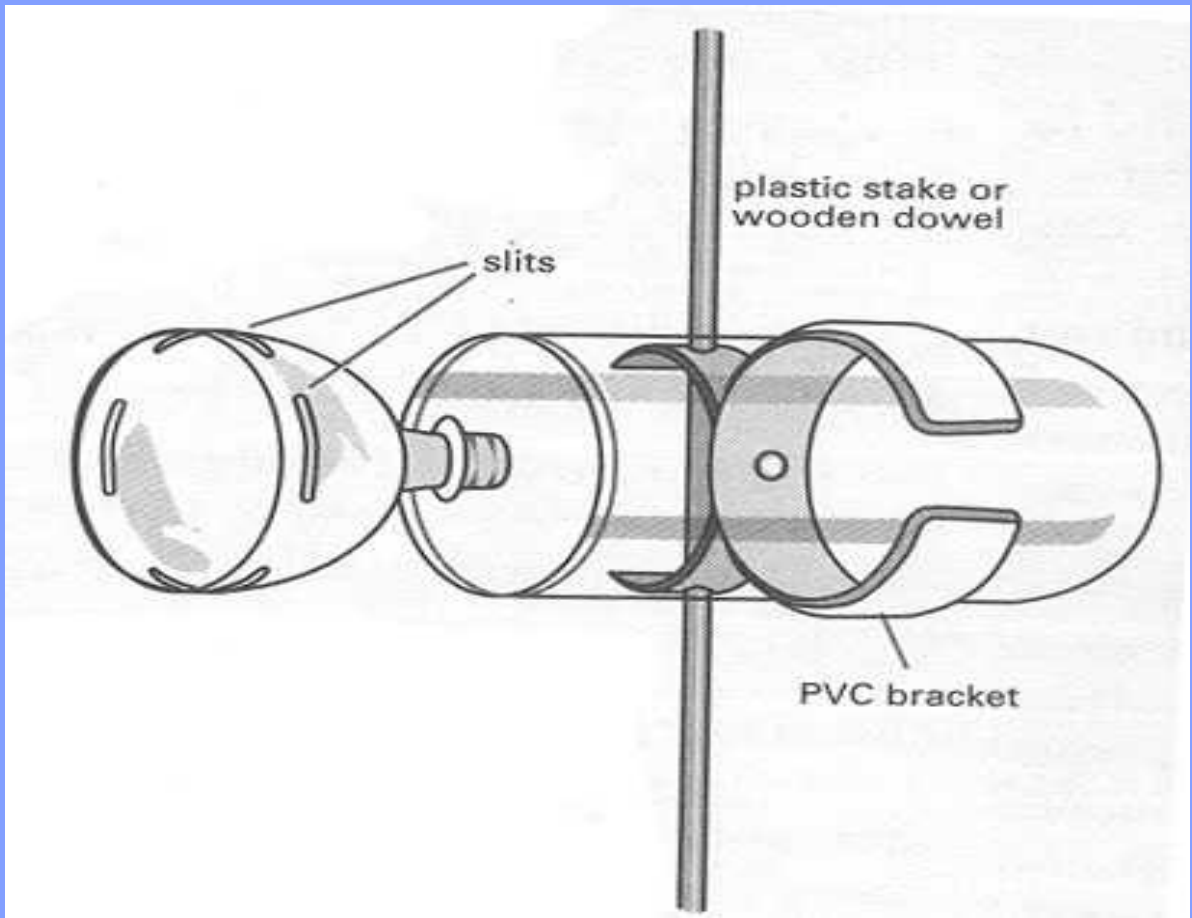
Bottle Trap



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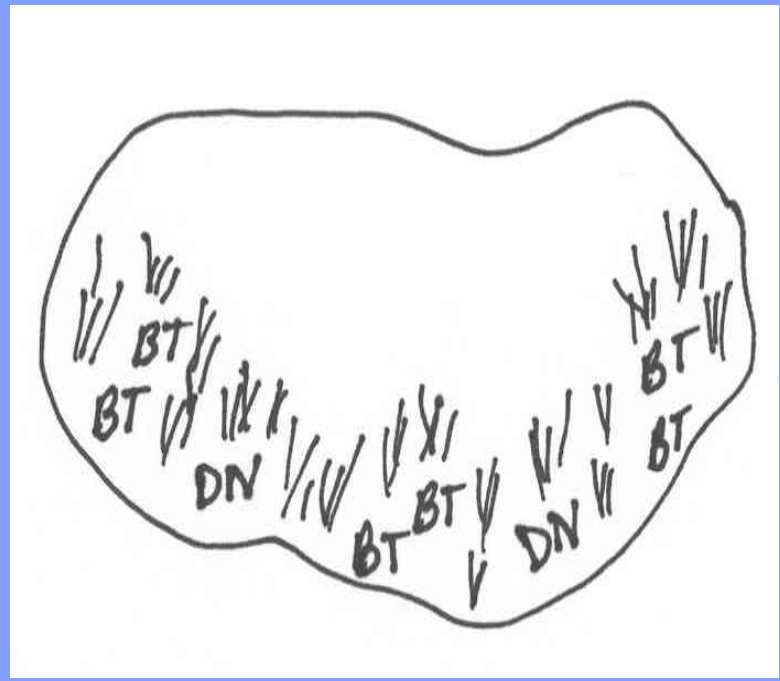
Bottle Trap Sample - Placement

- Place 6 bottle traps in 3 pairs along shoreline.
- The members of each pair should be 3-6 feet apart.
- Pairs should be spaced 20 ft apart.
- At least one pair should be in very shallow water (1 foot or less), the others should be in water 2-3 feet deep



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Bottle Trap Sample - Placement

- Bottle traps are set out for 2 nights
- Bottle traps should be place in water horizontally with no air bubbles inside.
- Funnel should be snapped in securely, clamp should be tightned.
- The top of the bottle trap should be 3-5 inches below the water surface.

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Bottle Trap Sample - Retrieval

- Collect each pair of bottle traps into one jar (3 jars total for 3 pairs of bottle traps)
- Turn the bottle trap in the water the opening is facing upwards
- Raise the trap up dowel, remove the funnel, and pour the contents of the trap through a sieve.

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Bottle Trap Sample - Retrieval

- Dislodge any critters stuck on the **inside** of the trap.
- Collect the second trap and pour into sieve.
- Flush the sieve a sample jar with 95% alcohol.
- If the sample takes up more than a third of the sample jar it should be split between two jars.
- Label the outside and the inside of the jar, using a media that resists alcohol (india ink or pencil)

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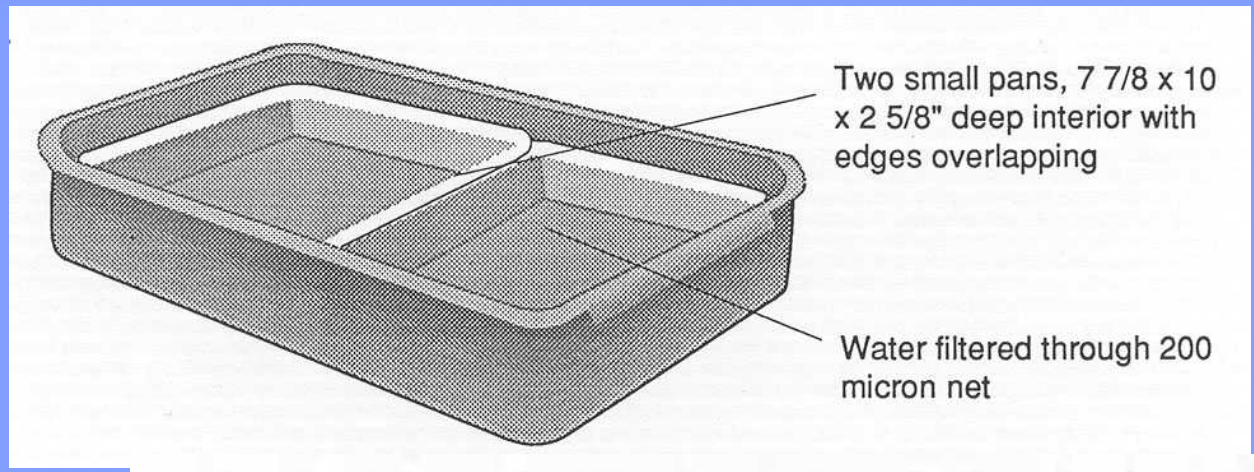
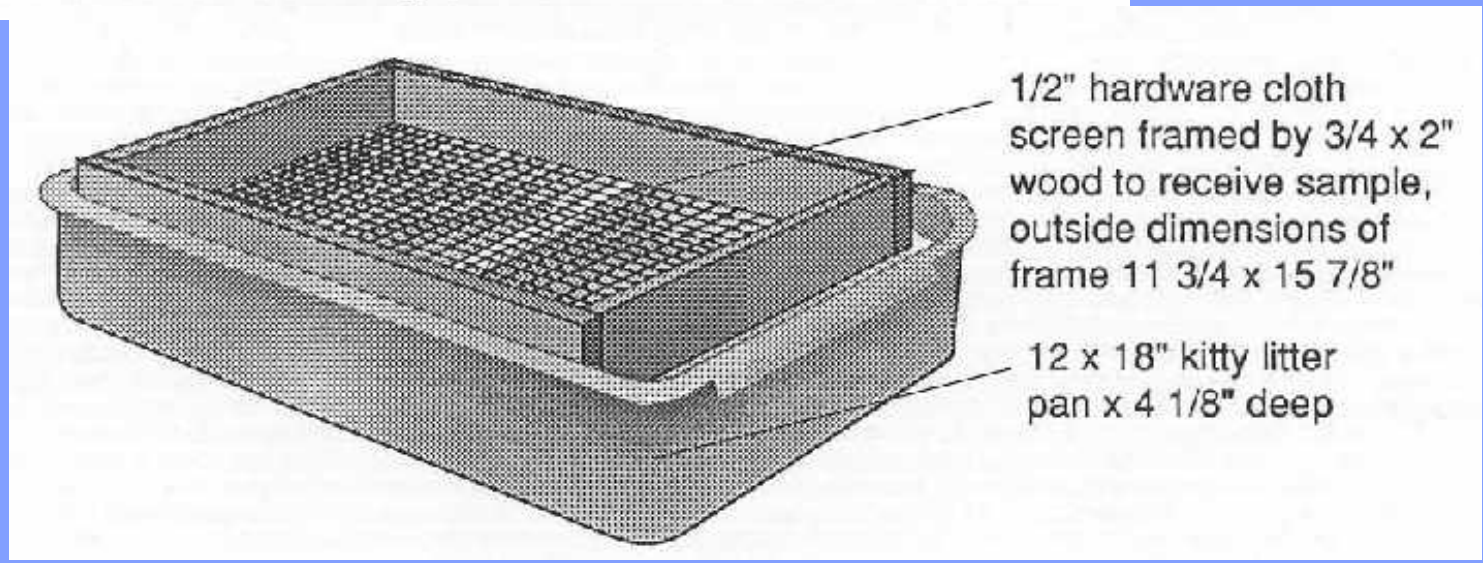
Dip netting Tray





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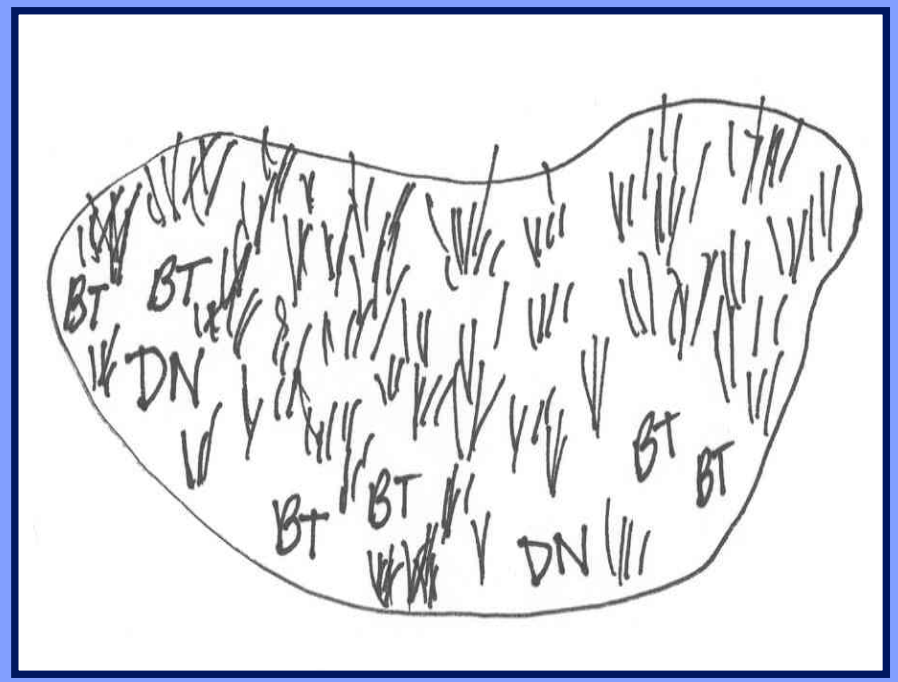
Dipnet Sample - Collection

- Each dipnet sample consist of two dipnetting efforts
- Dipnet in the near shore area in water up to one meter.
- Sample close to the edge and into vegetation.
- Using strong strokes, sweep the dipnet through the vegetation towards your body 3-5 times or until the net is full of vegetation



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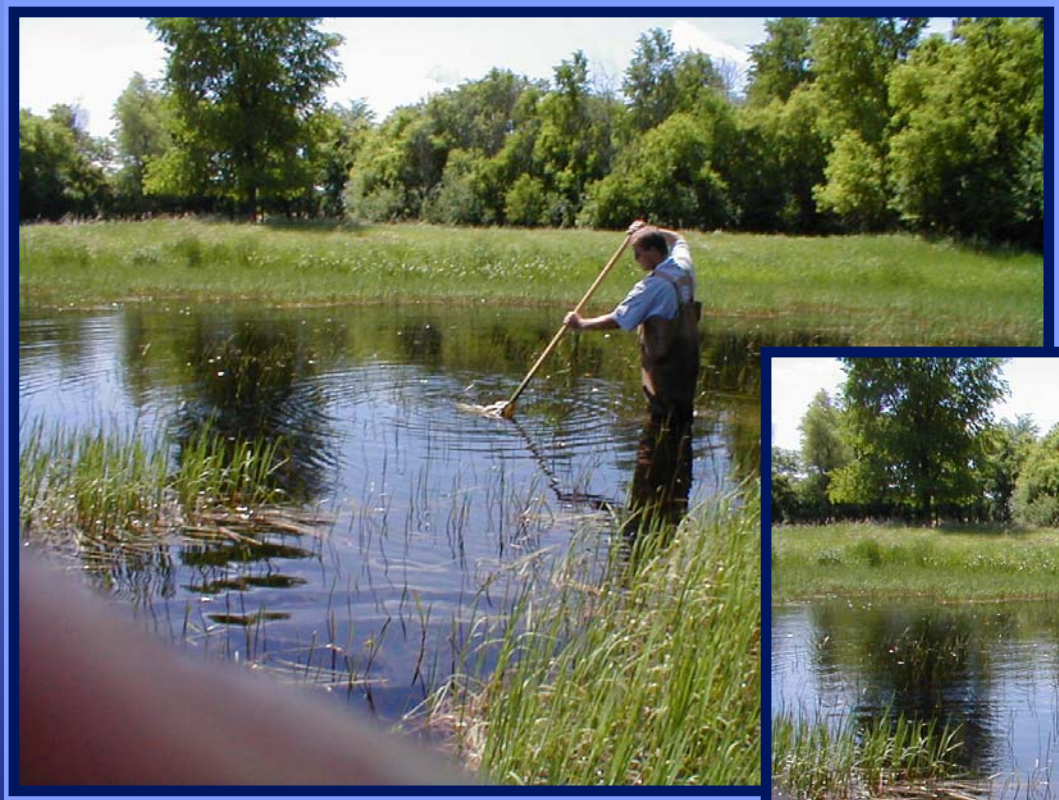

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Dipnet Sample - Collection

- Empty the contents of the net on the hardware cloth screen.
- Spread the vegetation out, and pour some filtered site water over it.
- Spread the vegetation and repeatedely loosen it and tease through it for 10 minutes. Remove the vegetation and repeat.

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Dipnet Sample - Preservation

- After the second dipnetting process, empty the contents of the trays into a sieve.
- Backflush the sieve into a sample jar with 95% alcohol.
- If the sample takes up more than a third of the sample jar it should be split between two jars.
- Label the outside and the inside of the jar, using a media that resists alcohol (india ink or pencil)

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Urban Wetlands:

Not always impaired

72 (Support)	**Invert IBI**	30 Non-Support)
50 (Support)	**Plant IBI**	18 (Non-Support)

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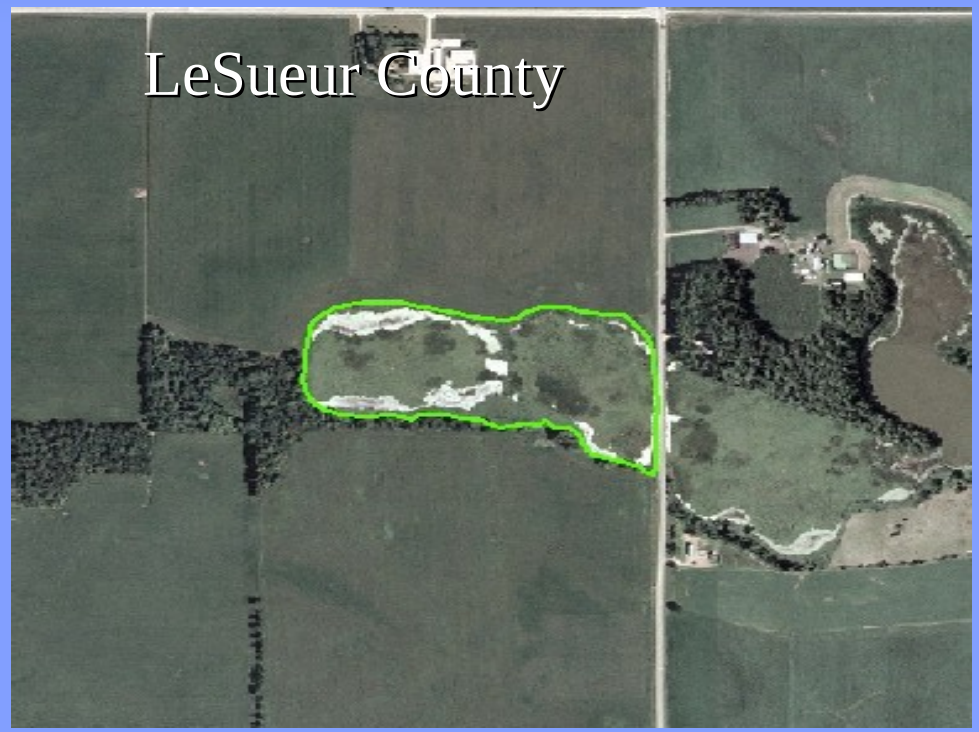
Agricultural wetlands:

Not always impaired



70 (Support)	**Invert IBI**	30 (Non-Support)
51 (Support)	**Plant IBI**	18 (Non-Support)