

Scale of Study



**WHY SCALE INFLUENCES
APPROPRIATE MONITORING**

Study Scale



- Determined based on:
 1. Study Objectives
 2. Available Resources
 3. Study Duration
 4. Type of Water Resource
 5. The complexity of the project to monitor

The Four Scale Categories



1. Point
2. Plot (**limnocorrals**)
3. Field (**bays or region**)
4. Watershed (**lakes**) *

***Lake Systems**

Point Scale Studies



- Smallest scale in water quality monitoring
- Sample as “point in space” / single observation
- Examples
 - Precipitation gages
 - Soil samples
 - Snow samples
 - Many lake samples
- Not groundwater or stream
 - Why?
 - *These are considered watershed scale samples*

Point Scale Sampling Cont.



- **Appropriate For:**
 - Trend Monitoring
 - Research and Fate and Transport Monitoring
 - Model Evaluation
- Point Sampling can be cheap
- Frequency of visits and duration can vary greatly depending on your study objectives

Plot Scale Studies



- Appropriate for replication of several treatments as part of fate and transport study or effectiveness of BMP's.
 - Overland flow
 - Not good for groundwater, streamflow or lakes (these are larger than plot boundaries)
- Good for short duration studies (<5 years) but may require a greater investment of time and funds than other studies.
- Treatments on each plot must remain separate from one another
- Insufficient replication of plots makes the results invalid (See last paragraph of page 5-2)

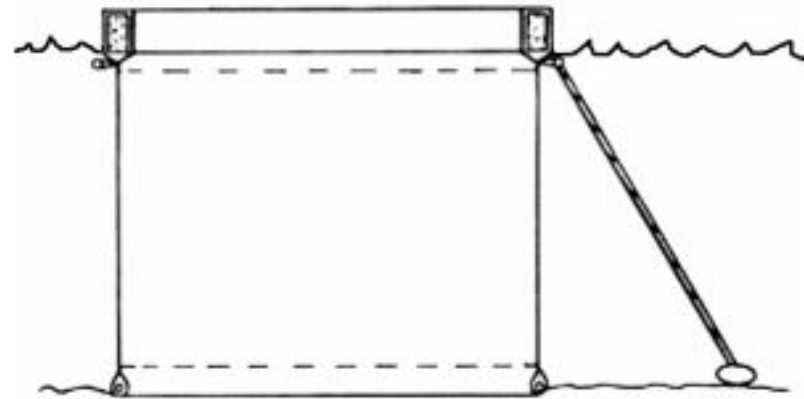
Plots – Limnocorrals example



Used for testing of pollution in freshwater lakes
-Do not allow for mixing with lake water.



Basic Limnocorral Design



Plots continued



- Plot studies can give detailed information on the effectiveness of:
 - Tillage
 - Contouring
 - Planting
 - Waste Management
 - Pesticide Management
 - Etc.

Field Scale Studies



- Monitoring at this scale implies a larger area than a plot, although the entire plot design could cover an entire field.
 - Sizes differ based on practices in local regions
 - Identical to the plot scale if objectives include:
 - ✦ Fate and Transport of a substance
 - ✦ BMP effectiveness
 - ✦ Models
 - Also appropriate for ground water and overland flow studies
 - Cost is not as much as either plot or watershed scale projects
 - Short duration (<5 years) but could last longer

Field Scale Studies, Cont,d



- Field scale studies most suitable for evaluating individual practices on a field.
 - Field Nutrient Management
 - ✦ Animal waste management
 - Erosion Control
 - Conservation Cropping
- It is important that the field scale be matched with an appropriate design. I.e. before and after would not be acceptable for a single field.

Watershed Scale Studies



- Larger than field and plot level
 - Used to determine long term trends
 - Identify critical areas or WQ problem
 - Make load allocations
 - Verify watershed scale models
 - BMP monitoring

Watershed Scale Studies Cont'd



- Should be used for monitoring:
 - Groundwater
 - Streams
 - Lakes or estuaries

Watershed Scale Studies Cont'd



- **Costs**
 - Range from medium to high, depending on size of system
 - Should be studied for longer durations than plot or field studies
- **The size of the watershed selected influences the response to implementation of conservation practices.**

Watershed Scale Studies Cont'd



- Small watersheds have small, sometimes intermittent streams
- Moderate sized watersheds have permanent 3 to 5 order streams
- Large watersheds, > 50,000 acres are typically difficult to sample due to differences of land uses, etc..
- Selecting the appropriate watershed size is the most critical aspect

Exercise



- Page 64
- Waterbody Choices
 - Lake
 - Stream
 - Overland flow
 - Ground water
 - Soil solution
- Scale of Study Choices
 - Point
 - Plot
 - Field
 - Watershed