Improving streams and rivers for aquatic life

Riffles and pools, and streamside plants

Basic morphology of a stream and schematic diagram of the relationship between riffles and pools

Meandering streams are apt to form typical habitats, such as riffles, runs, glides and pools.

(The photographs on the right show the "Habitat Research Zone" of ARRC.)

Runs

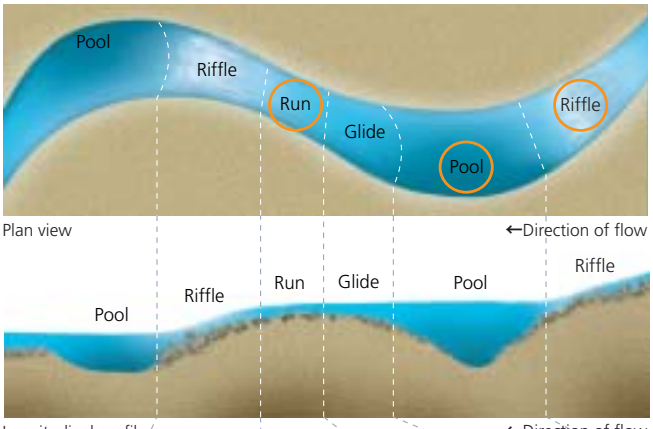
Runs are downstream of pools where the bed slope is rather gentle.
Bed materials tend to be embedded.

Pools

The substrate varies depending on the stream. The bottom of the experimental stream is mostly sand and mud.

Riffles

Riffles are chutes into pools, and the bed slope is the steepest among habitats.
Generally, bed materials are not embedded.



Zone	Riffle	Run	Glide	Pool
Water depth	Shallow	Shallow	Rather deep	Deep
Water surface	Whitecaps	Wrinkles	Calm	Calm
Current velocity	Very fast	Fast	Slow	Very Slow
River bed	Lying loosely on the top	Embedded	Sand and gravel	Sand and mud

Even in such a small stream, riffles and pools are important habitats for fish.

1.Overview of the experiment

Surveys were conducted in the three experimental streams. The streams consist of various zones including sections with riffles and runs, long glides and sections with concrete banks to prevent plant growth.

In the experiment, a homogeneous section regarding in-stream habitat was selected as a survey reach. A fish survey was conducted in each survey reach, and the relationship between fish community and in-stream habitats was analyzed. The experiment was conducted from November 24, 1998, to January 6, 2000. The flow of 0.05 to 0.1 m^3/s was supplied as base flow.

2.Fish survey

Fish surveys were conducted six times in 1999, in March, May, July, August, October, and December. This analysis was based on the surveys of July, August and October. In the fish surveys, the streams were classified into segments that have a homogenous in-stream habitat, and representative survey reaches were selected from among the segments.

Firstly, the upstream and downstream ends of the survey reaches were closed with blocking nets, and electrical fishing was conducted. Fish were collected from the lower to upper direction of each survey reach. The specimens were identified, and body length and wet weight were measured at the site, then the fish were returned to the corresponding survey reach. A survey reach was 15 m-long on average, and a survey in a standard survey reach took 1 minute and was repeated three times.

3.Classification of habitats and survey

Habitats should be classified first to investigate the relationship between habitats and inhabiting states. In this experiment, habitats were classified based on past classification studies.

The streams were first divided from the cross sectional viewpoint into two parts, lotic zones and streamside zones. A lotic zone denotes a place where water flows without being affected by streamside plants. The lotic zones were then classified into riffles, runs, glides and pools based on the aspects of water surface, water depth, and current velocity.

Streamside zones were classified by streamside plants. The area of water surface shaded by streamside plants was determined by looking from directly above, and the area was divided by total water area to calculate the coverage by streamside plants (Figure 1). Since detail numbers are not significant (because plants change in shape), survey reaches were grouped into vegetation coverage of "less than 10%", "10% to 20%", and "over 20%".