

Abstract

Previous studies of stream-dwelling brown trout Salmo trutta indicate that smaller fish exhibit limited range of movement that is likely due to a sit-and-wait, drift-feeding strategy, while greater range of movement exhibited by large brown trout may reflect a piscivorous, active-search strategy. The timing and extent of seasonal and daily movements of large brown trout may vary between streams. Radio telemetry was used in the present study to monitor seasonal and daily movements and home site use of large brown trout in the Mainstream Au Sable River, Michigan and to compare results with a similar study in the South Branch.

Thirteen radio-tagged brown trout (442 - 584 mm in length) were tracked up to 904 d between May 1990 and May 1993. Range of movement varied considerably among fish due to differences in distance between home sites, extent of nighttime foraging movements, and seasonal habitat use. Average range of movement was 1,752 m in summer (May - August) and 4,764 m in winter (September - April). Of eight fish tracked in both seasons, four overwintered in their summer range while four moved to separate overwintering habitats. Eighty-eight percent of brown trout captured in an area protected with catch-and-release regulations remained there during the entire tracking period. Brown trout used from one to five home sites in summer and were found in home sites during 86% of daytime locations and 49% of nighttime locations. Eighty-percent of home sites used by large brown trout were classified as artificial cover, 7% as natural cover, and 11% as pools. Most artificial structures were built specifically for trout cover and 82% of fish used at least one of these structures as a home site. Two fish had home sites over 6,900 m apart, otherwise, home sites were 84 m apart on average.

In summer, most large brown trout occupied home sites during daylight hours, moved into midstream at dusk apparently to forage, and returned to the same or nearby home site at dawn. The extent of nighttime foraging movements away from home sites

suggested individual brown trout were using one of two foraging strategies: sit-and-wait or active-search. Individuals using sit-and-wait held stationary positions in midstream < 30 m from home sites. Fish using active-search moved frequently or continuously and were rarely found within 30 m of a home site at night. Distances moved away from home sites at night varied among fish and were negatively correlated with water velocity. Individual fish that used sit-and-wait generally lived in high velocity areas, while fish that used active-search generally lived in low velocity areas. Factors such as type of prey consumed, prey density, or energetic costs associated with sit-and-wait versus active-search in flowing water may influence the foraging strategy chosen by individual fish.

Three individuals were located hourly over 24-hour periods to monitor their diel movements. Average diel range of movement varied among fish from 78 to 424 m and average total distance moved varied from 143 to 967 m. Movements generally occurred at nighttime, with distinct peaks in hourly movements rates near dawn and dusk. Average distance moved per hour varied among fish from 0 to 8 m/h in daytime and from 7 to 77 m/h at nighttime.

In comparison to Mainstream fish, large brown trout in the South Branch used more home sites, moved between home site more often, and exhibited active-search foraging behavior. Fish in the South Branch also ranged farther in summer and winter and most individuals used separate winter habitat.