

EP Little River Fish Population Dynamics 1986 to Present

MAK

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The following is a short descriptive data summary covering a range of population dynamics for various fish species sampled from 1986 to 2002 on 3 three long-term monitoring sites located on the East Prong of Little River (EPLR). All sites were sampled in the fall of each year, typically in either September or October.

This data has not been formally edited for quality control and quality assurance errors and has not been published, therefore is not appropriate for disclosure or reproduction at this time. Any questions, comments, or concerns related to these data should be forwarded to Matt Kulp, Great Smoky Mountains NP, (865) 436-1254 or Matt_Kulp@nps.gov.

The three sites sampled on Little River are each unique as they represent different habitat over an elevational gradient along EPLR. Figure 1 describes the general species composition of each site along Little River and relates how much of the biomass of each

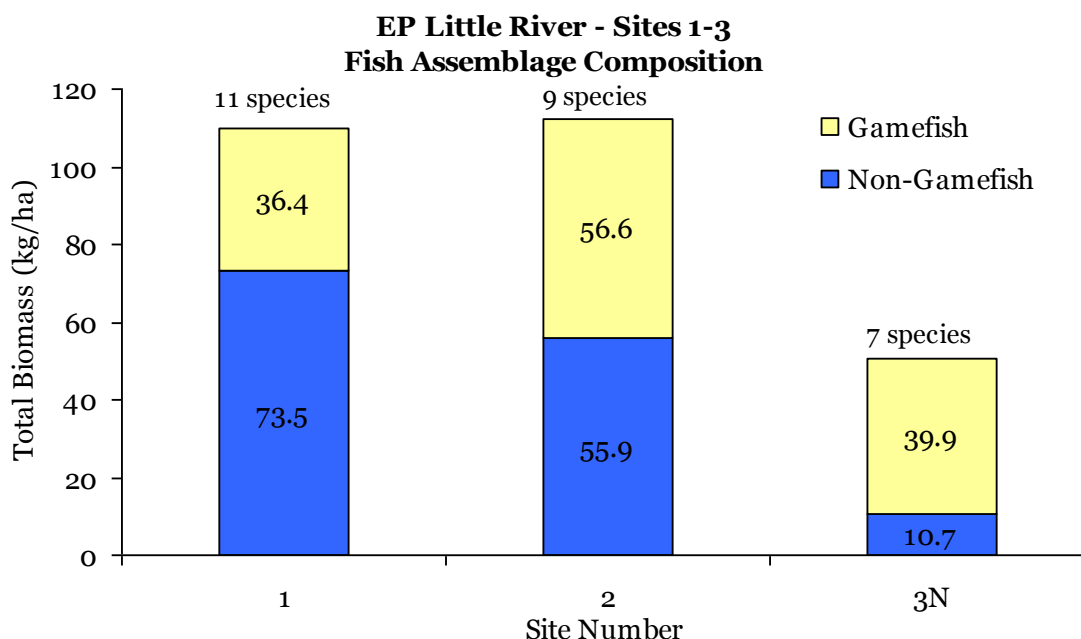


Figure 1.— Total biomass of three different long-term monitoring sites on Little River in relation to game- and non-game species.

site is represented by non-gamefish. Site's 2 and 3N are true coldwater stream reaches where biomass is dominated by salmonids, whereas site 1 represents an area of transition from a coldwater to a coolwater section with biomass dominated by non-gamefish.

In addition to game- and non-gamefish composition, the proportional salmonid biomass changes also among the three sites as habitat transitions from a cool- to a coldwater environment. Although total salmonid biomass increases moving upstream into the

coldwater habitat, a shift also occurs from a split or sympatric salmonid community (site 1) to that of a rainbow trout dominated community (site 3N) (Figure 2).

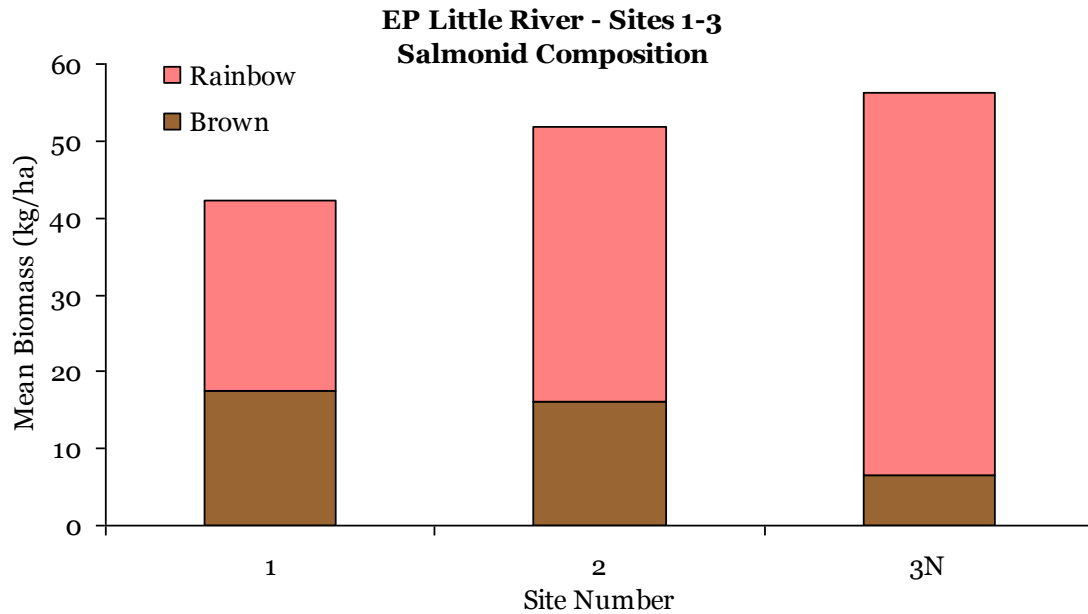
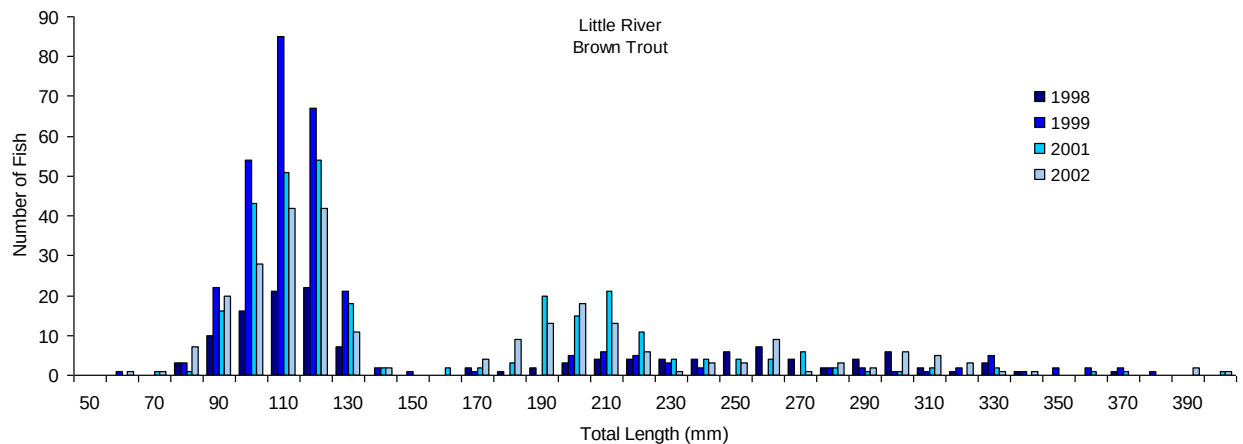


Figure 2.—Total mean salmonid biomass composition among three long term monitoring sites on Little River sampled from 1986 to 2002.

A review of the lengths of brown and rainbow trout collected during the course of the study period (Figure 3) indicates that in any given year, 14-42% of the brown trout and 25-46% of the rainbow trout in EPLR are greater than 178mm (7-inches). Maximum observed total lengths among brown (max TL=410mm or 16.1-inch) and rainbow trout (max TL=330mm or 13-inch) differs significantly. Note there is no evidence of significant cropping in either species at the legal size limit of 178mm.



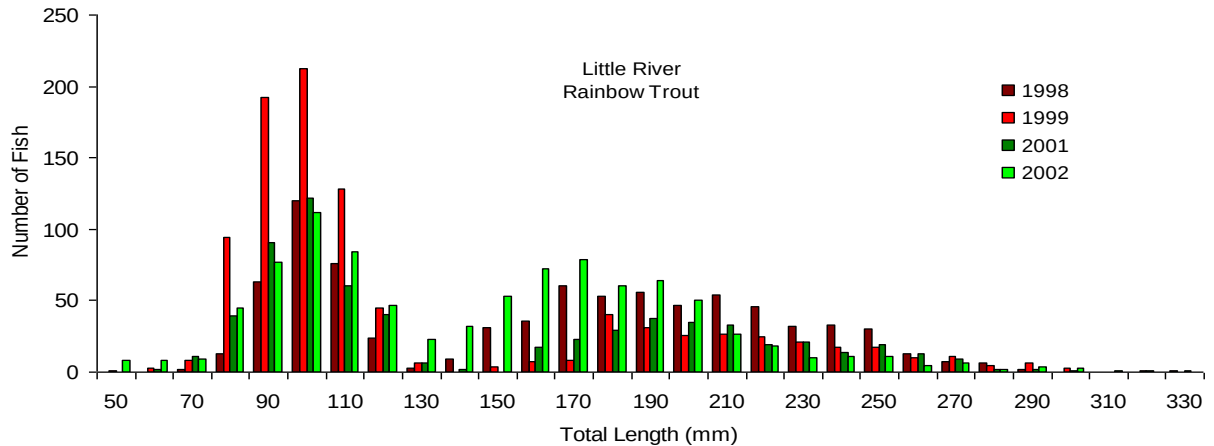


Figure 3.—length frequency distribution of brown and rainbow trout collected from three long term monitoring sites on EPLR from 1986 to 2002. Note 178mm represents 7-inches.

Population dynamics varied considerably over time among rainbow and brown trout, mostly due to major droughts and floods during this period (Figure 4). Standing crops of brown and rainbow trout ranged from 6-20 and 22-60 kg/ha, respectively. Major droughts from 1987-1989 and 1999-2001 reduced total salmonid biomass in all three sites. A major flood in March 1994 greater reduced, and in some cases eliminated, YOY of both brown and rainbow trout in Little River and other Park streams.

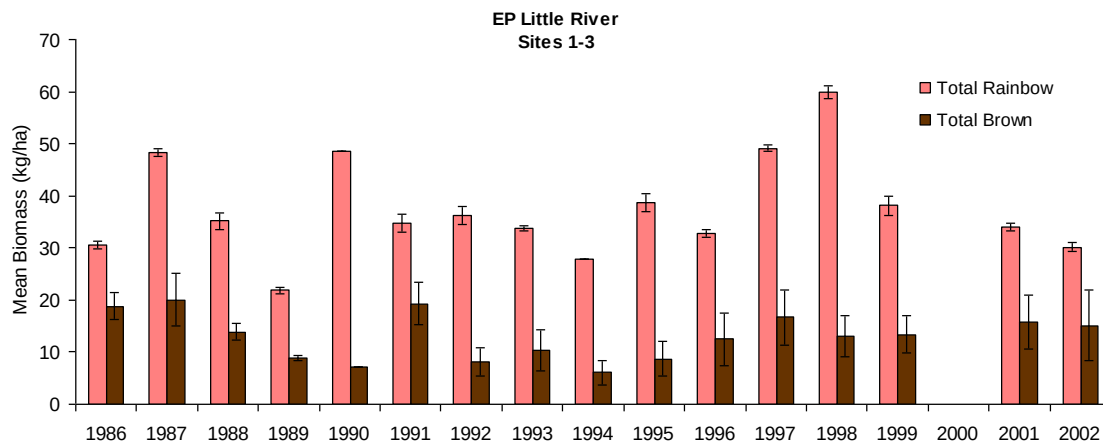


Figure 4.— Mean total biomass of brown and rainbow trout sampled from 1986 to 2002 from three large stream sites on EPLR. Bars represent standard error (SE).

Changes in total mean biomass among the three sampling sites varies considerable among species and sites (Figure 5). All three sites show similar declines following the 1987-1989 and 1999-2001 drought periods, however, indicate various biomass dynamics in other time periods. In general, there are no apparent indications of long term declines in any of the three sites or among the population mean for EPLR (Figure 4).

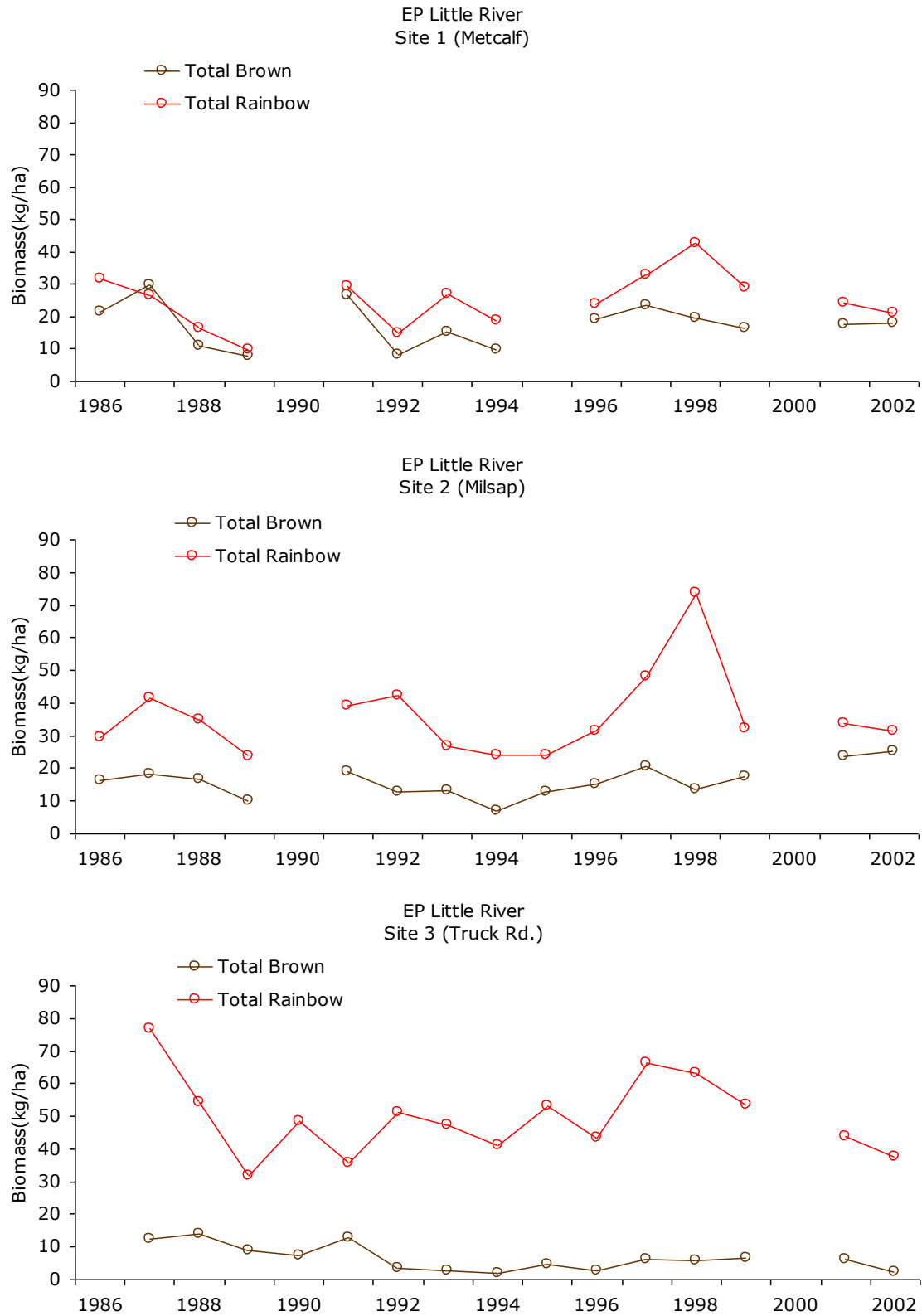


Figure 5.—Total brown and rainbow trout biomass (kg/ha) for each of three long term monitoring sites on EPLR.

Both brown and rainbow trout populations in EPLR and throughout GRSM are extremely resilient and respond quickly to major drought and flood periods, when possible, typically responding the following year with strong year-classes (Figure 6). Note, following the flood of 1994, suitable water levels on Little River in the spring of 1995 afforded both brown and rainbow trout the opportunity to produce substantial year classes (Figure 6). Typically, as long as spring water levels (March-May) remain relatively stable, salmonids in GRSM produce substantial year classes. Also note, despite severe droughts during 1999-2001, YOY production in both brown and rainbow trout was favorable, however recruitment of these fish to older age classes may have been limited by lack of adult stream habitat, limited due to summer droughts.

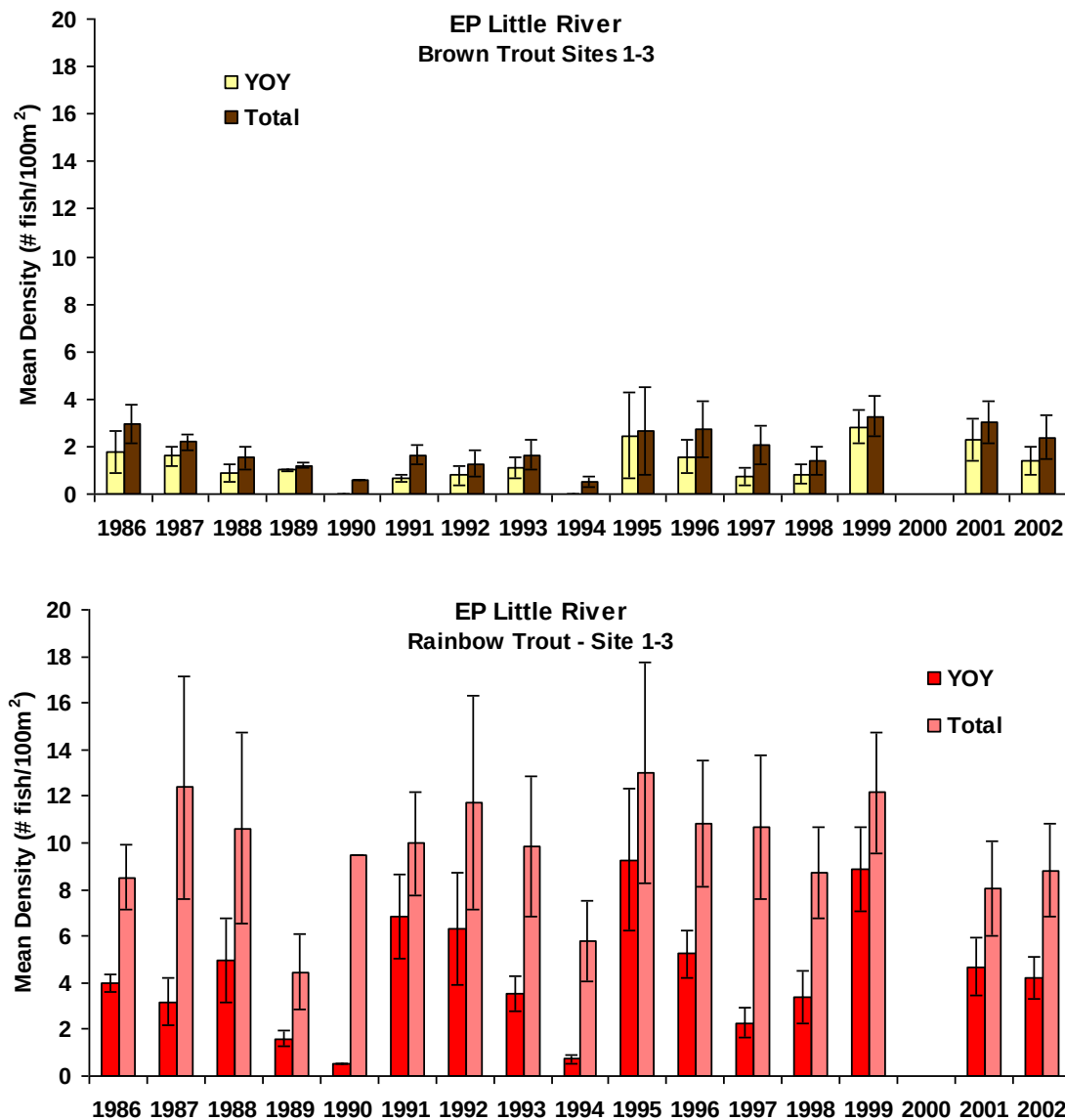


Figure 6.—Mean density (# fish/100m²) of brown and rainbow trout from three long term monitoring sites on EPLR. Bars represent standard error (SE).