2008 SUMMER INDEX – WI-2

INTRODUCTION

The fish community of Lake Superior has changed dramatically over the last 40 years. A fishery supported by the extensive stocking of native and non-native species has been replaced gradually by one maintained through the natural reproduction of native species. Although native species have been rehabilitated in many areas, a potential future concern for the fish assemblage of Lake Superior is the incidental introduction of exotic species. Changes in fish population characteristics must be analyzed over the long term to better understand the effects of these ecosystem disruptions. The summer index assessment is intended to monitor various population dynamics (e.g. abundance, population structure) of the Lake Superior fisheries and to record potential shifts in the fish community structure.

METHODS

During odd numbered years, nineteen stations were sampled in the western waters (WI-1) and during even numbered years, thirty-nine stations were sampled in the Apostle Islands (WI-2) (Figure 1) with the R/V *Hack Noyes*. Each site was sampled with 3,600 ft of monofiliment graded-mesh gill net. Each gang had twelve 300-ft nets arranged in the following mesh (in) sequence: 5, 2, 4, 1.5, 6, 4.5, 2.5, 7, 3.5, 6.5, 3, and 5.5. Nets were set for one night (24 hr) at each station.

All live fish were measured (total length), checked for sea lamprey marks and fin-clips (lake trout), and then released. Dead piscivorous fish were processed in the same manner except stomach contents were collected, individual weights were taken when lake conditions permitted, scale and otoliths were removed. Aging structures were taken from other species as conditions permitted. Sub samples of the other species were measured (total length) and the remaining fish were counted. Live lake trout were marked with individually numbered t-bar tags.

Geometric mean catch-per-unit-effort (GMCPUE) was calculated using only catch data from the stations that were established in the early 1970s (15 stations in WI-1, 11 stations in WI-2). These stations have the longest data sets and allow for examination of long term trends. For all other calculations and summaries (e.g. length frequency, mean length), data from all stations were used.

RESULTS/DISCUSSION

In 2008, 479 lake trout were captured in WI-2 (91% were wild fish). Mean lengths of wild and hatchery lake trout were 19.7 in (SD = 5.3) and 18.9 in (SD = 4.7), respectively. Although fewer hatchery fish were caught, length distributions of wild and hatchery lake trout were relatively similar (Figure 2). Geometric mean catch-per-unit-effort of pre-recruit wild lake trout (<17 in from 2.0-2.5 in mesh) increased from 2006 to 2008 (Figure 3). Total wild lake trout GMCPUE (all meshes) decreased from 2006 to 2008 (Figure 4).

During 2008, 1,925 lake whitefish were captured in WI-2. Mean length of 1,382 whitefish was 16.1 in (SD = 4.5) (Figure 5). The average age of whitefish was 13 (range 5-29; otolith ages only) (Figure 6). Total whitefish GMCPUE (all meshes) also decreased from 2006 to 2008 (Figure 7).

During sampling, 641 round whitefish were captured. Mean length of 135 round whitefish was 13.3 in (SD = 2.8). Round whitefish GMCPUE (from 2.0-2.5 in mesh) increased from 2006 to 2008 (Figure 8). Until the late 1980s, round whitefish were a commercially important species. Although their abundance has been highly variable and lower than in the 1970s, an increasing trend has been recorded since the early 1990s.

In 2008, 1,785 ciscos were captured. Mean length of 527 ciscos was 11.6 in (SD = 2.2) (Figure 9). Cisco GMCPUE from the one inch mesh (all stations) has provided an indicator of year class strength (time lag of two years) throughout Wisconsin waters since 1970s (Figure 10 and 11). In addition to ciscos, other chubs were captured that included the bloater, shortjaw, kiyi, and various “hybrids”. Catch-per-unit-effort (CPUE) of ciscos and chubs has increased since the 1970s but has been annually variable (Figure 12).

Six smelt were captured in WI-2. Smelt GMCPUE has declined dramatically since the 1970s (Figure 13).

Thirty-two burbot were captured, their mean length was 16.9 in (SD = 5.2). Burbot GMCPUE decreased steadily during the 1980s and early 1990s, however GMCPUE has increased gradually since 1998 (Figure 14).

In 2008, 157 siscowet lake trout were captured, their mean length was 21.7 in (SD = 3.8). Geometric mean catch-per-unit-effort of siscowet lake trout increased from 2006 to 2008 (Figure 15).

Five lake sturgeon were captured in WI-2. Average length of sturgeon captured was 34.3 in (SD = 3.5).

In 2008, 38 walleye were captured, their mean length was 18.6 in (SD = 4.7).

Since the 1970s commercially important native species such as lake trout and whitefish have increased dramatically due to more conservative regulations, refuge areas, and sea lamprey control. The prominent forage species has shifted from the exotic smelt (which primarily inhabits near shore areas) to the native cisco. The success of native species rehabilitation and the subsequent change in the forage base may be negatively affecting the current stocking programs. For example, Chinook salmon and stocked lake trout may have poorer survival due to lower smelt abundance and competition with wild, native species. To increase survival, stocking strategies have shifted to stocking lake trout offshore and getting them away from nearshore predators. A portion of the lake trout stocked in 2003-2005 also was stocked in the fall as opposed to in the spring. Lake trout were given specific fin clips depending on time of year stocked. The effects of these stocking strategies on survival rates will be evaluated through this and other assessments in the future.

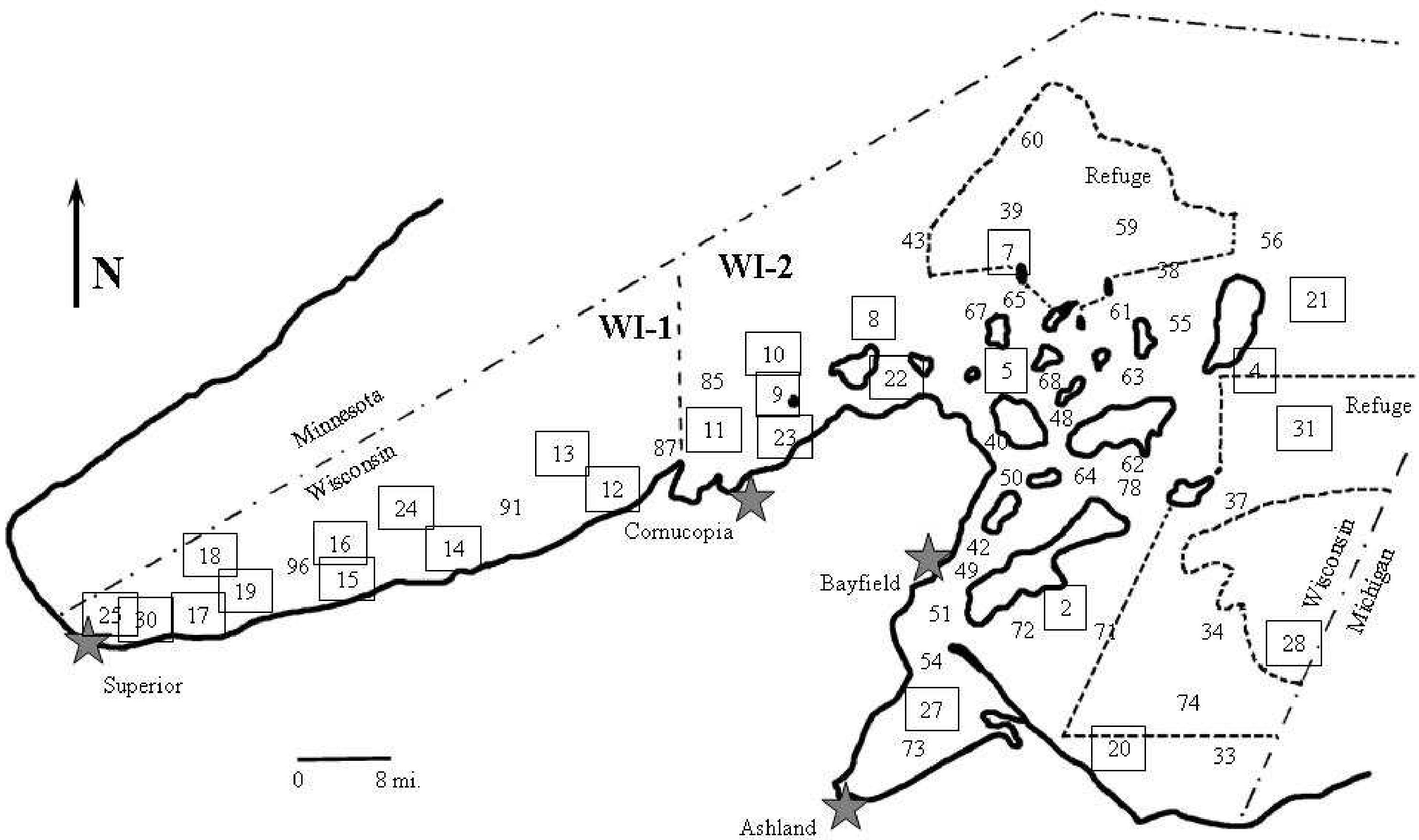

Figure 1. Summer index stations in Wisconsin waters of Lake Superior. Boxed station numbers indicate those used for geometric mean catch-per-unit-effort (GMCPUE).

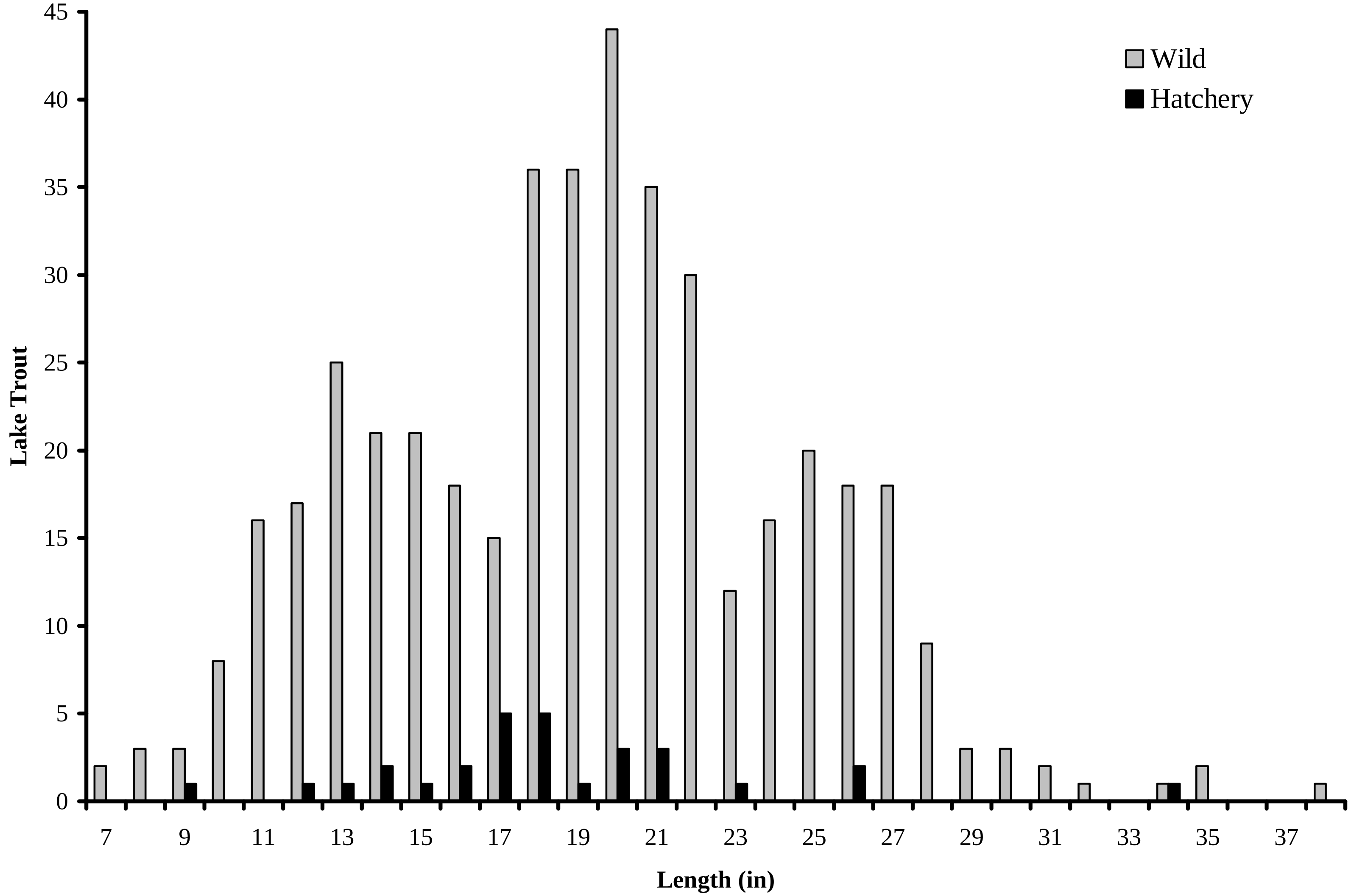

Figure 2. Length distribution of hatchery and wild lake trout captured in Summer Index (all meshes), 2008.

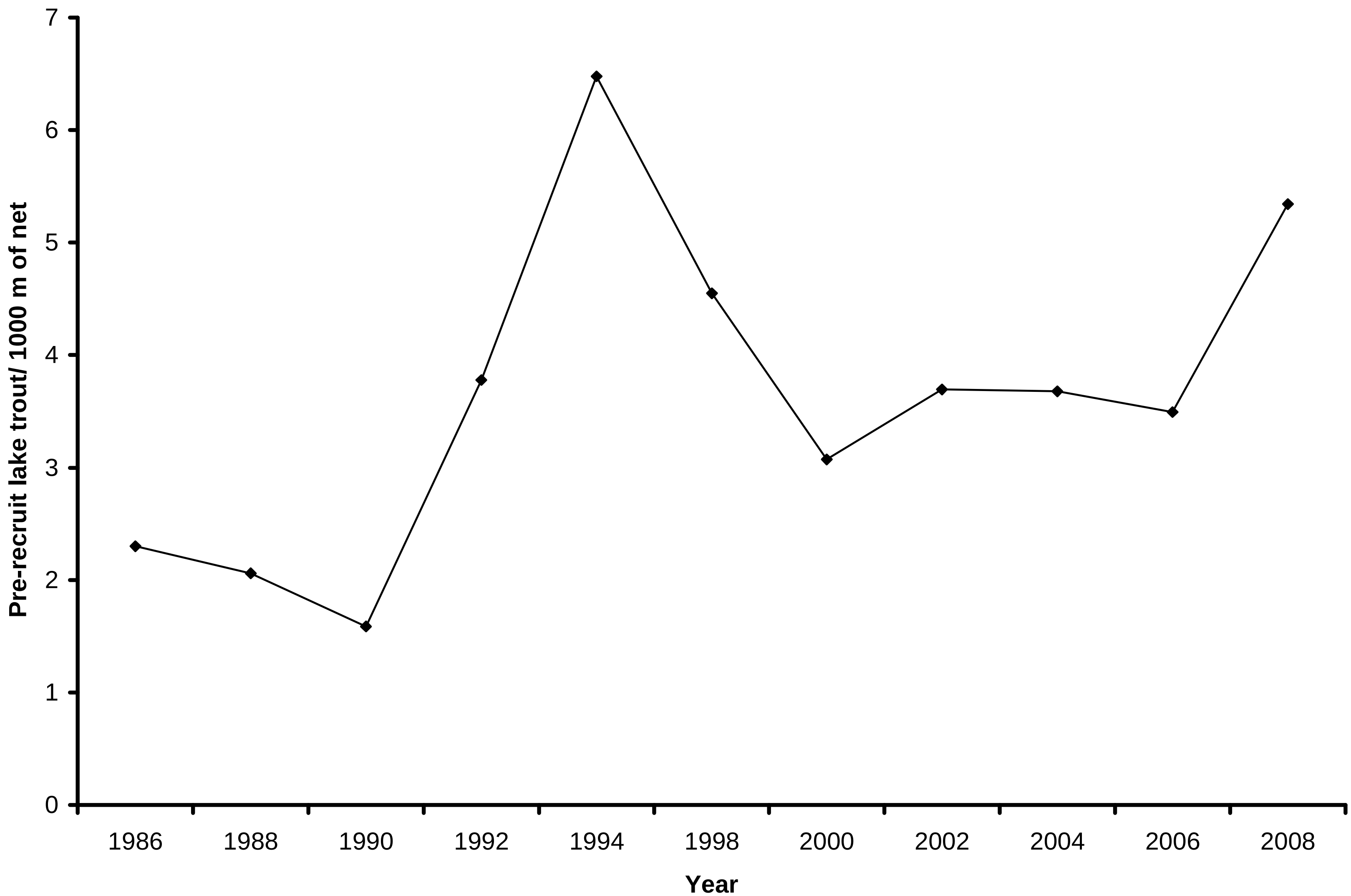

Figure 3. Geometric mean catch-per-unit-effort of pre-recruit lake trout (<17”) from Summer Index (2.0-2.5” mesh) in W-2, 1986-2008.

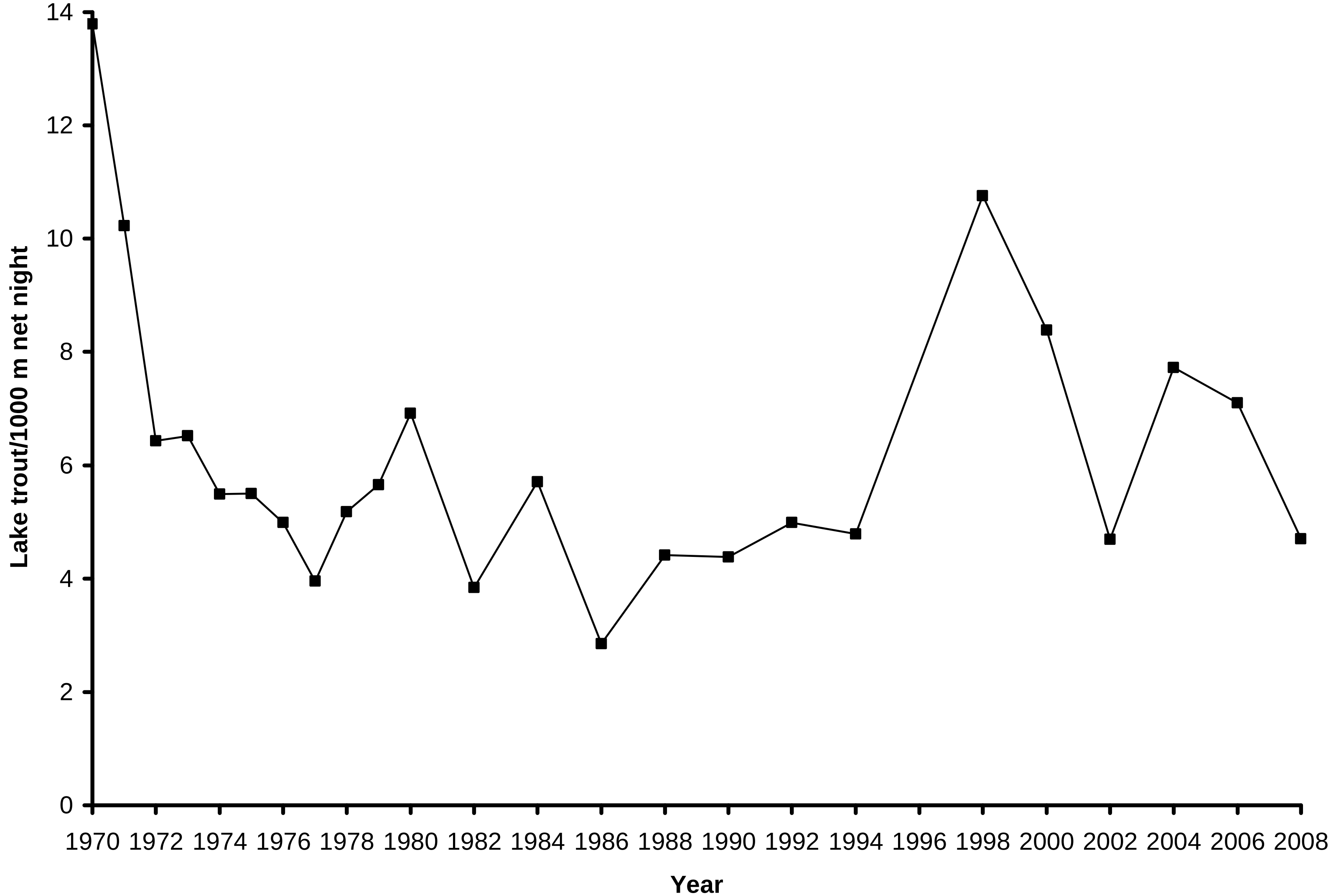

Figure 4. Geometric mean catch-per-unit-effort of lake trout from Summer Index (all meshes) in W-2, 1970-2008.

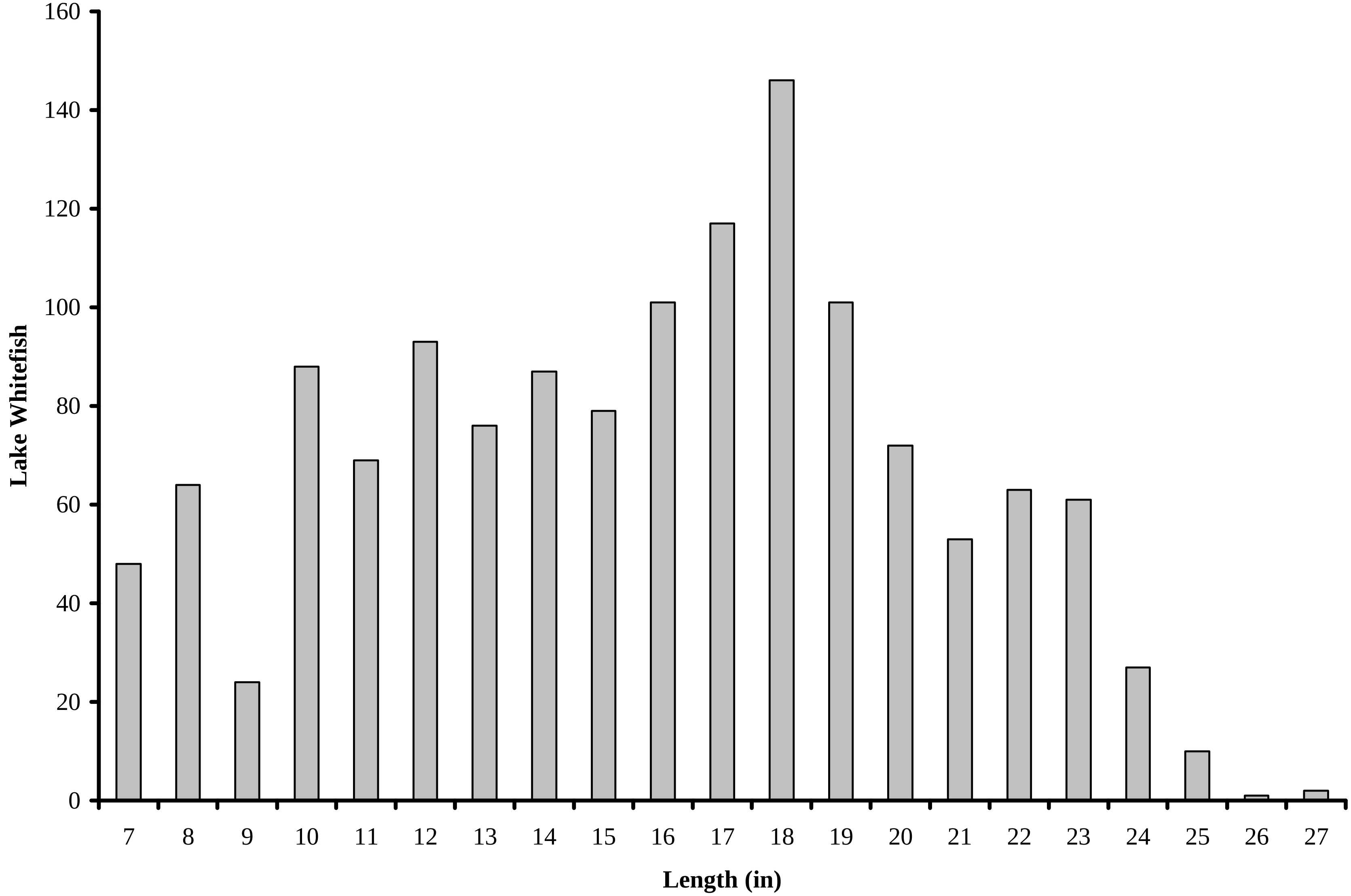

Figure 5. Length distribution of lake whitefish captured in Summer Index (all meshes), 2008.

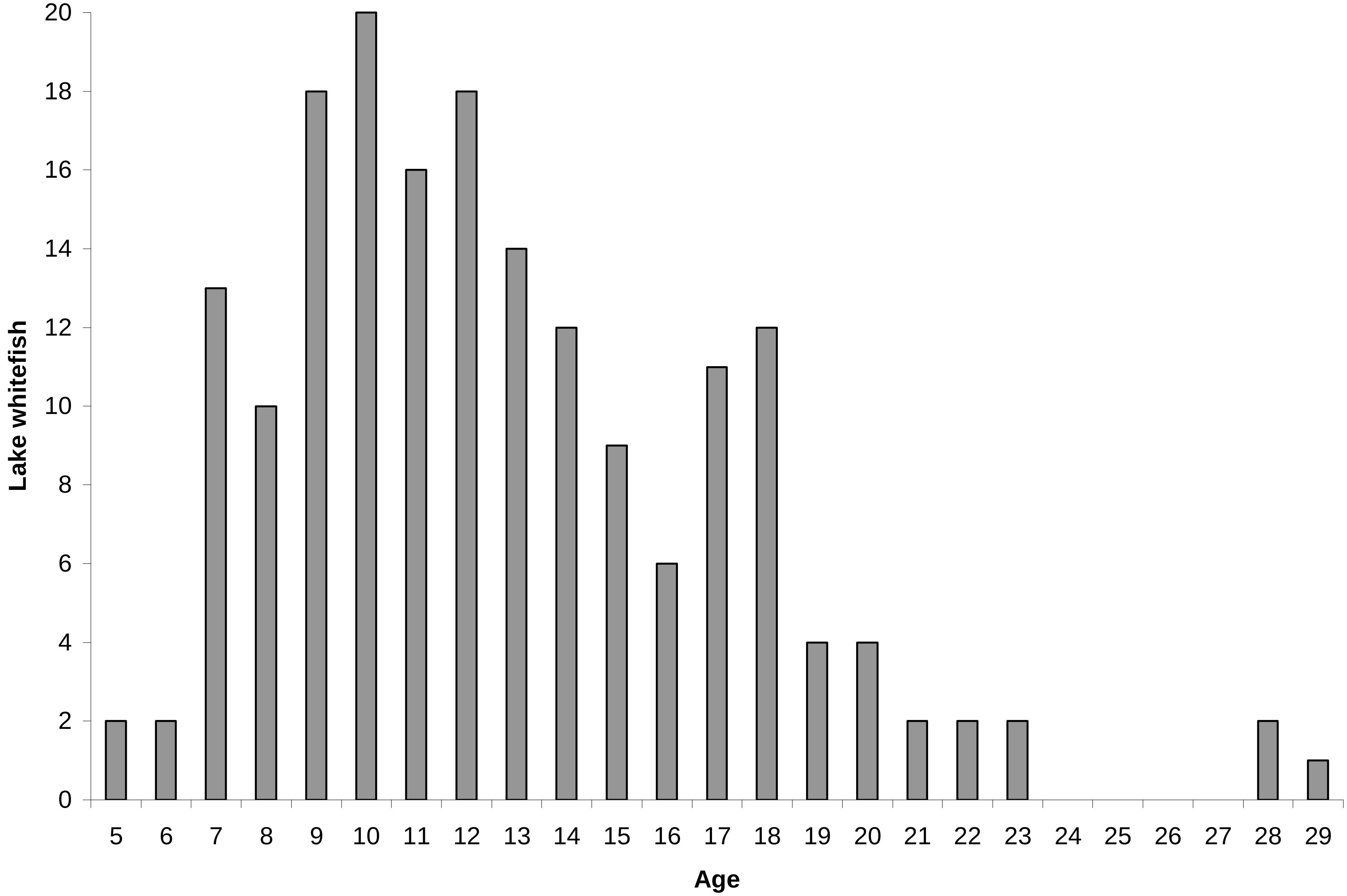

Figure 6. Age distribution of lake whitefish captured in Summer Index (otolith ages), 2008.

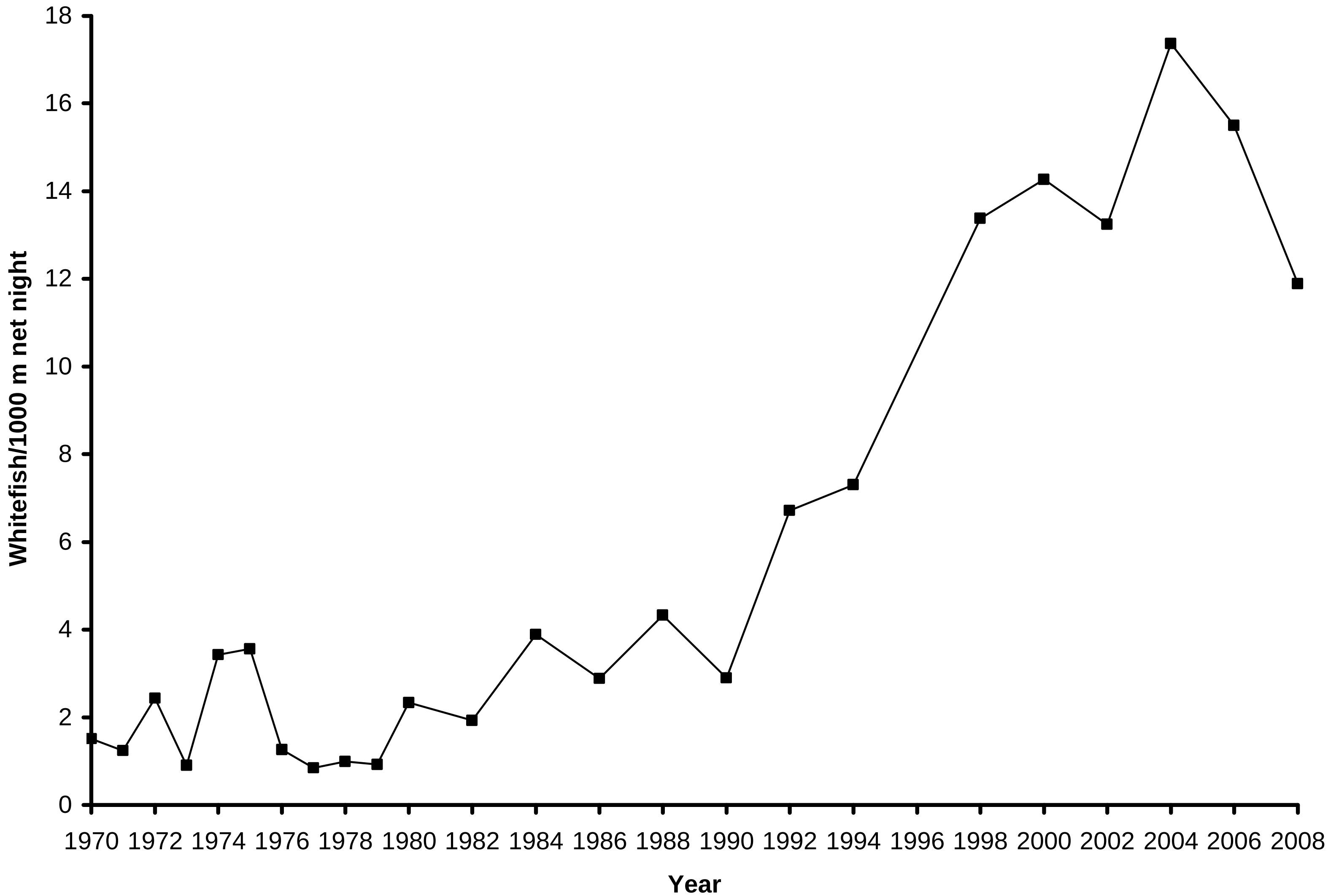

Figure 7. Geometric mean catch-per-unit-effort of whitefish from Summer Index (all meshes) in WI-1 and W-2, 1970-2008.

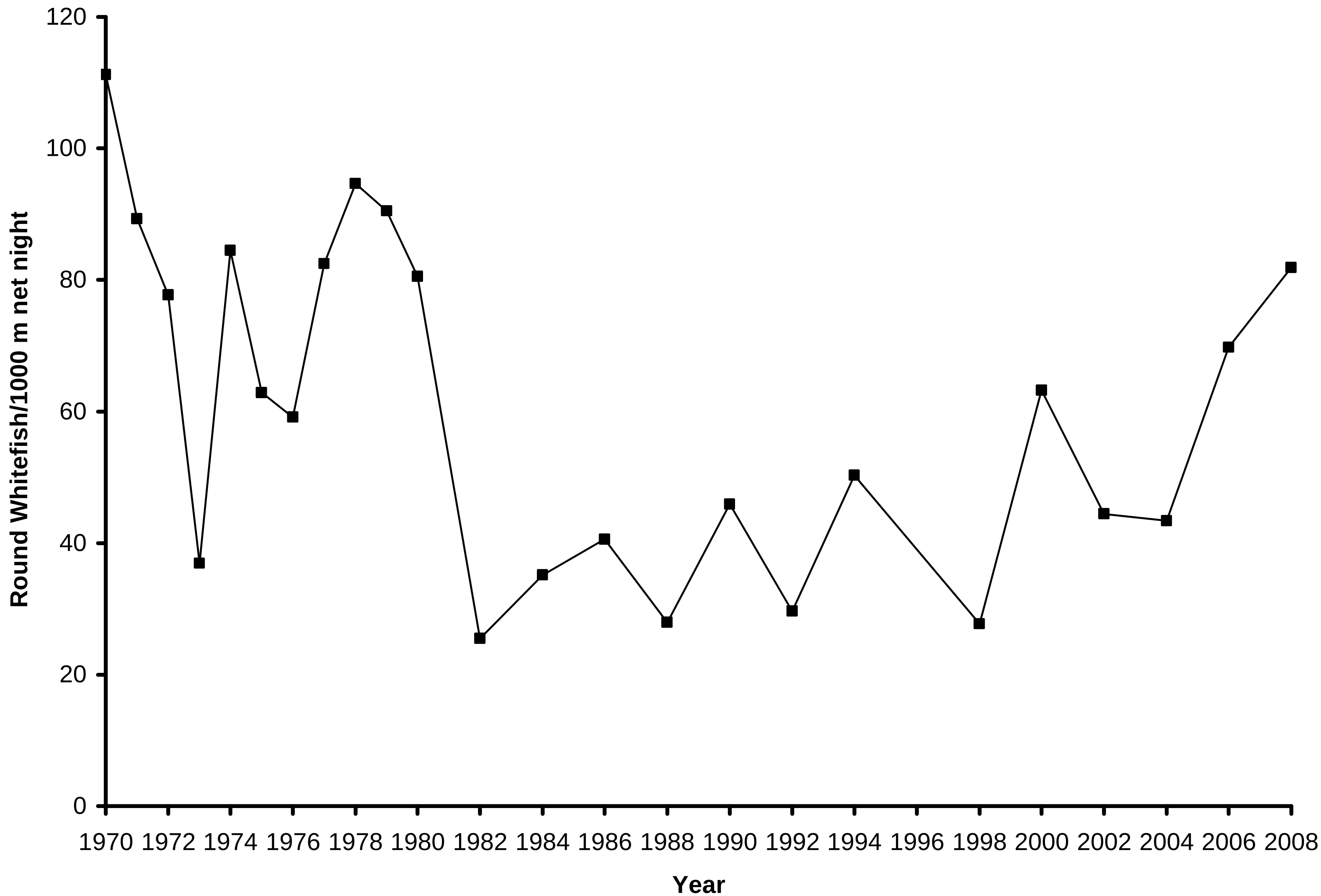

Figure 8. Geometric mean catch-per-unit-effort of round whitefish from Summer Index (from 2.0-2.5" mesh) in W-2, 1970-2008.

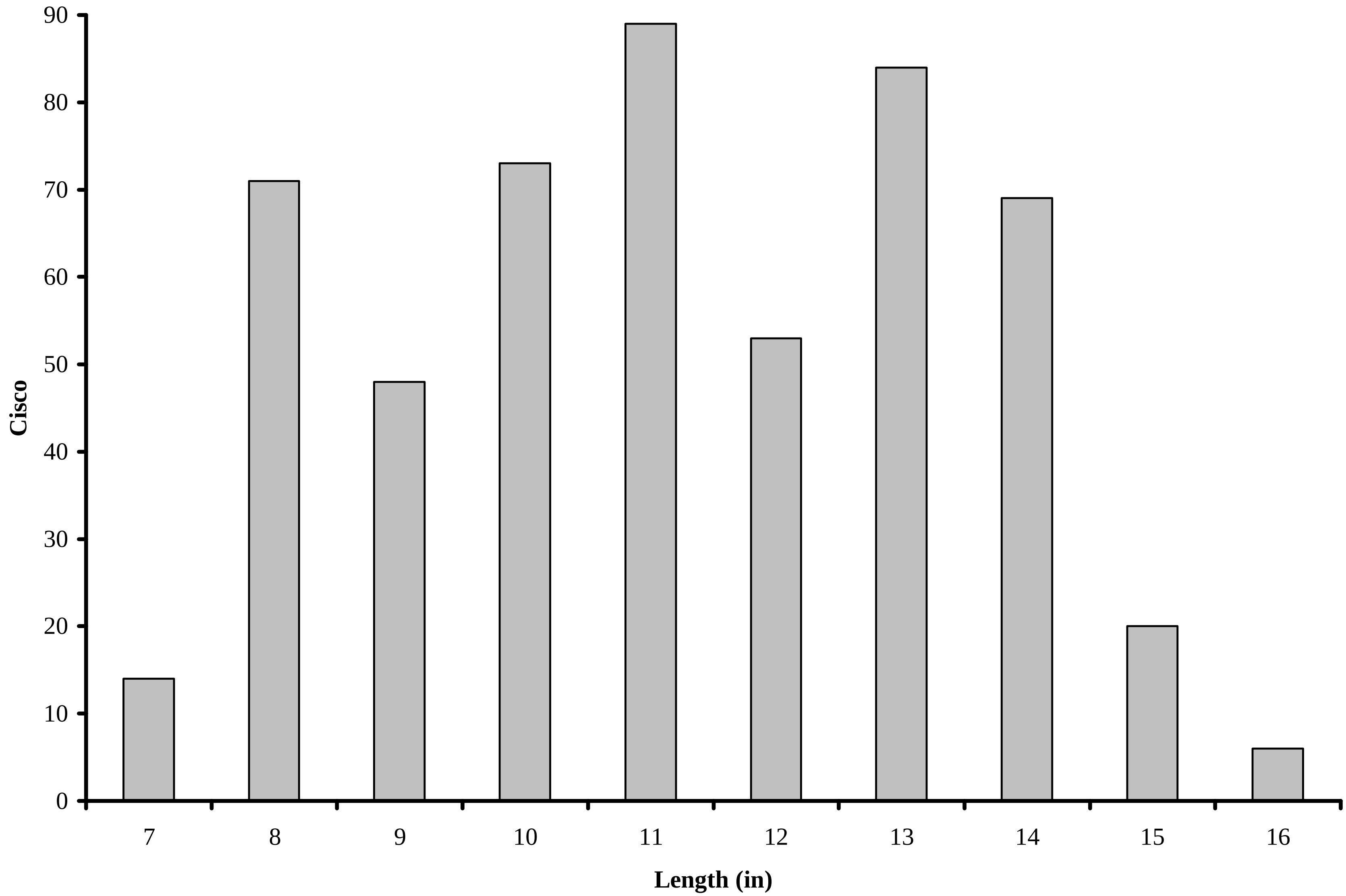

Figure 9. Length distribution of cisco captured in Summer Index (all meshes), 2008.

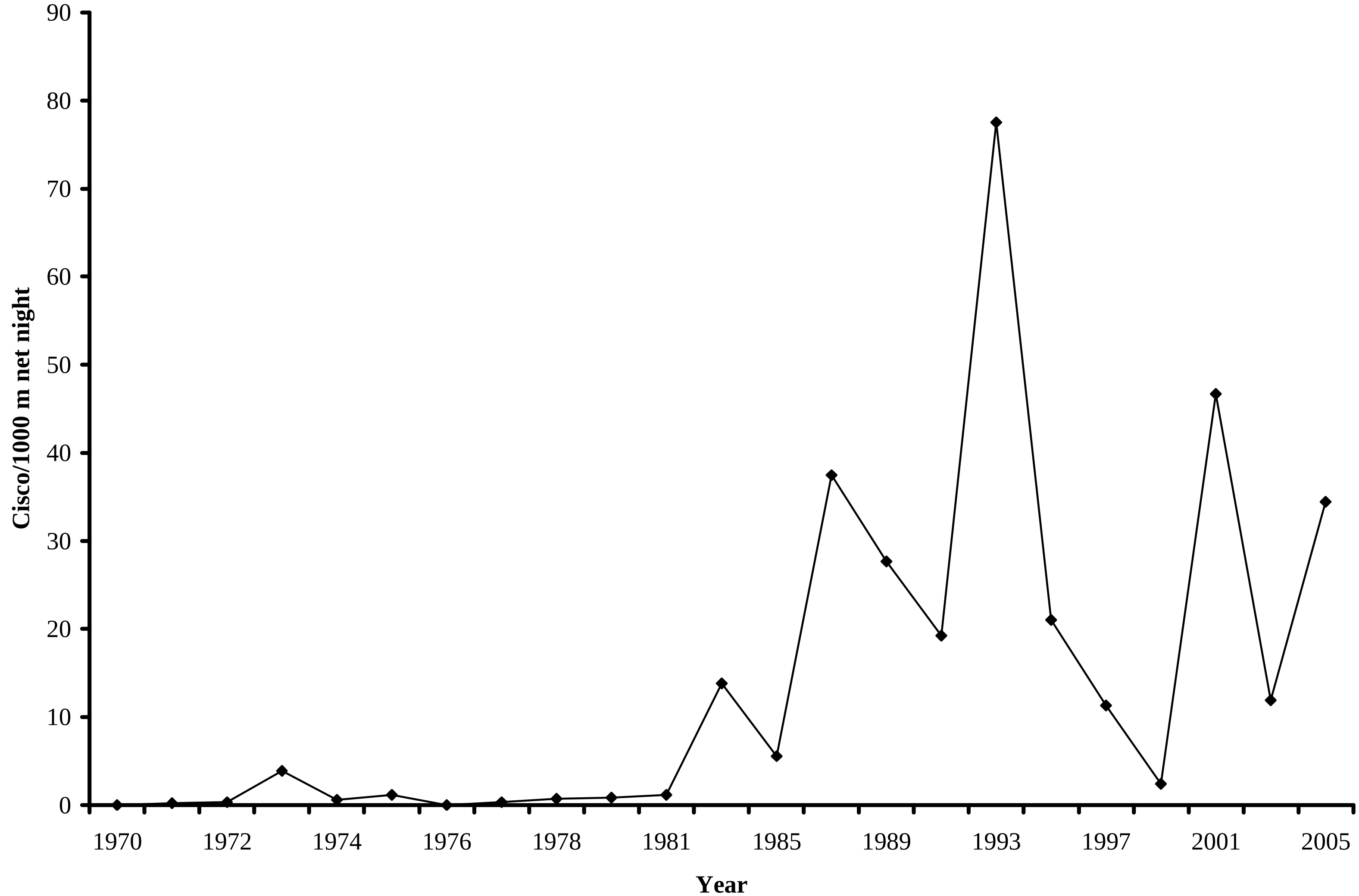

Figure 10. Geometric mean catch-per-unit-effort of cisco from Summer Index (from 1.5” mesh, all stations) in WI-1, 1970-2005.

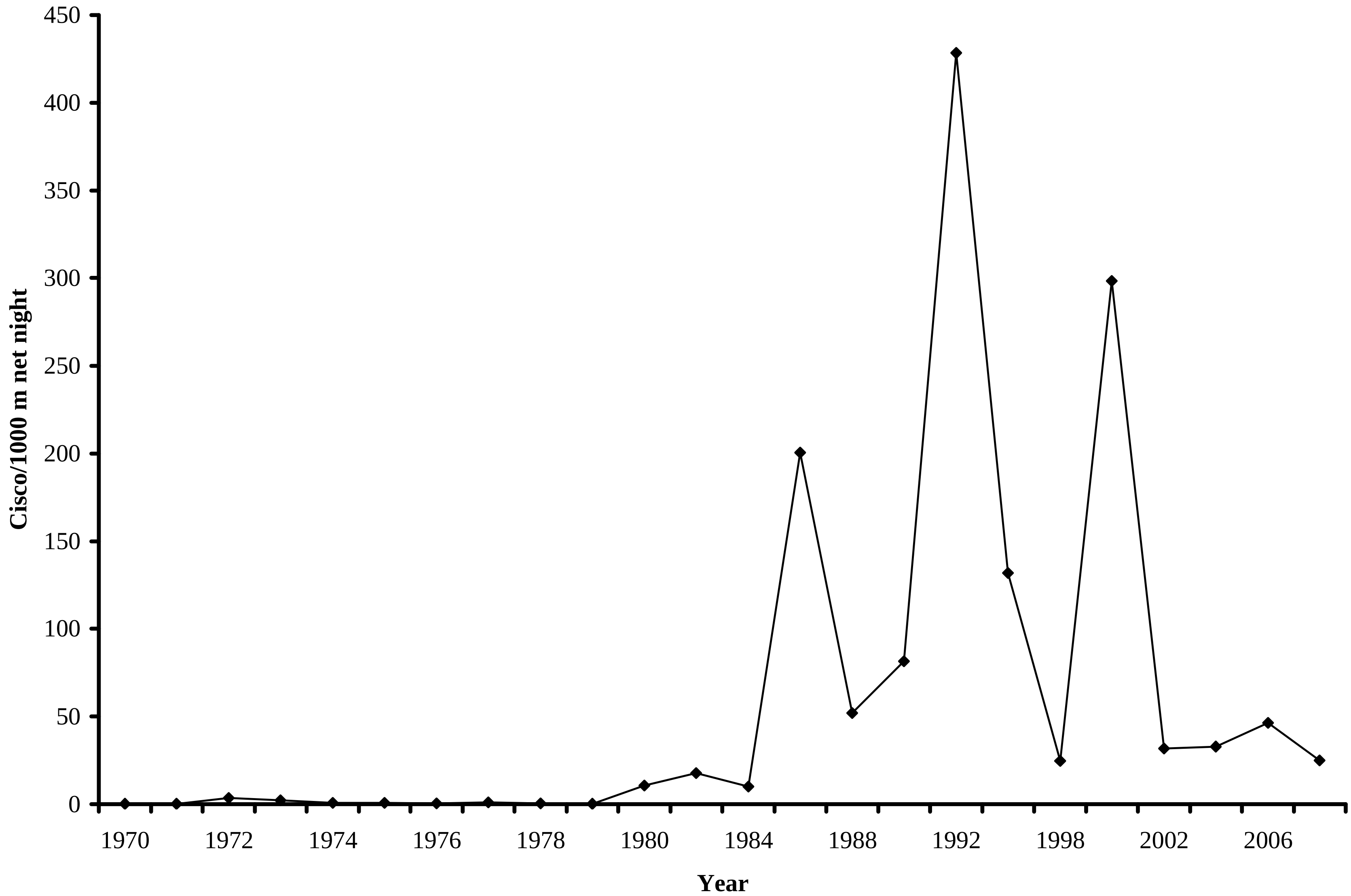

Figure 11. Geometric mean catch-per-unit-effort of cisco from Summer Index (from 1.5” mesh, all stations) in WI-2, 1970-2008.

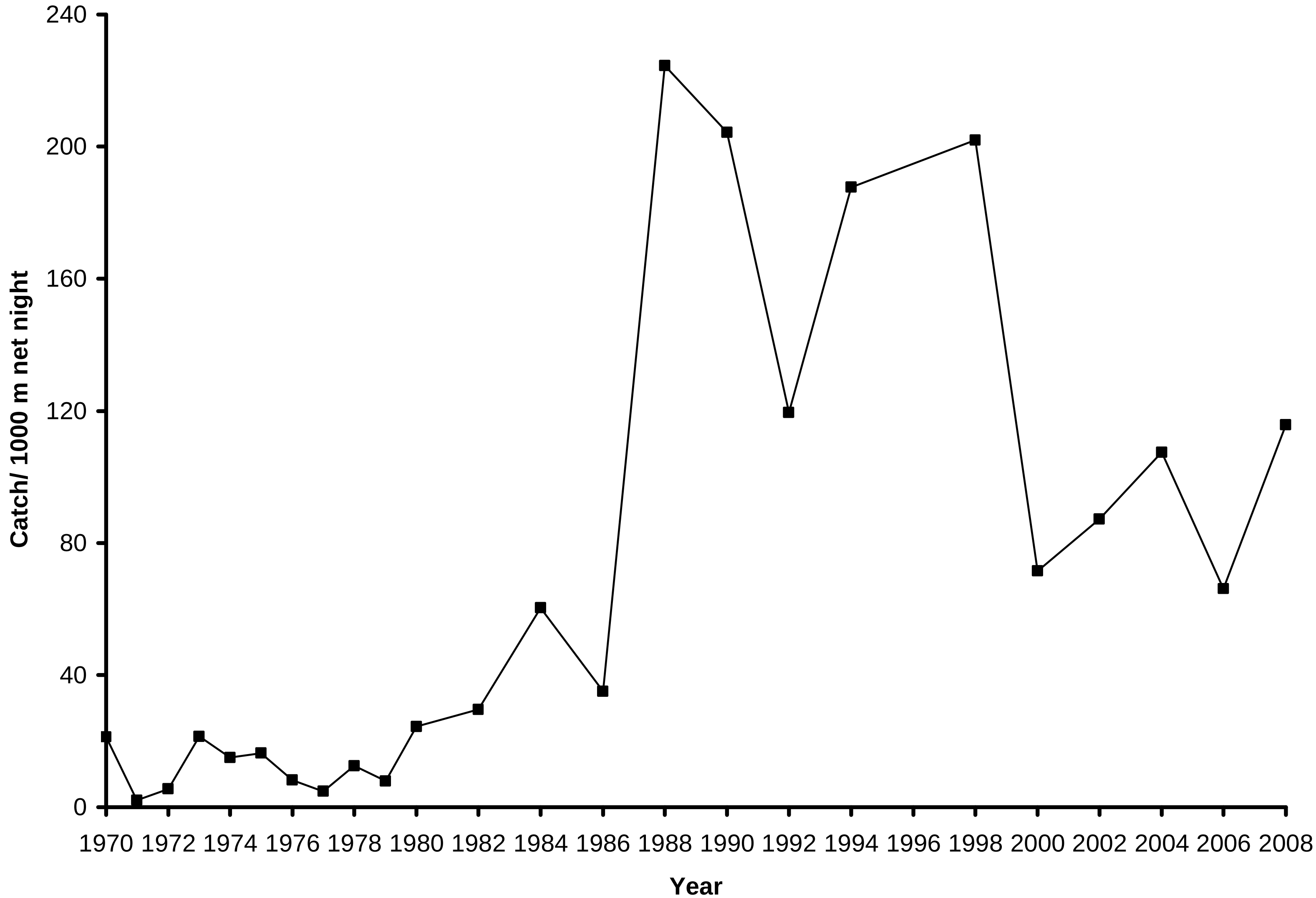

Figure 12. Catch-per-unit-effort of ciscos and deepwater chubs from Summer Index in WI-2, 1970-2008.

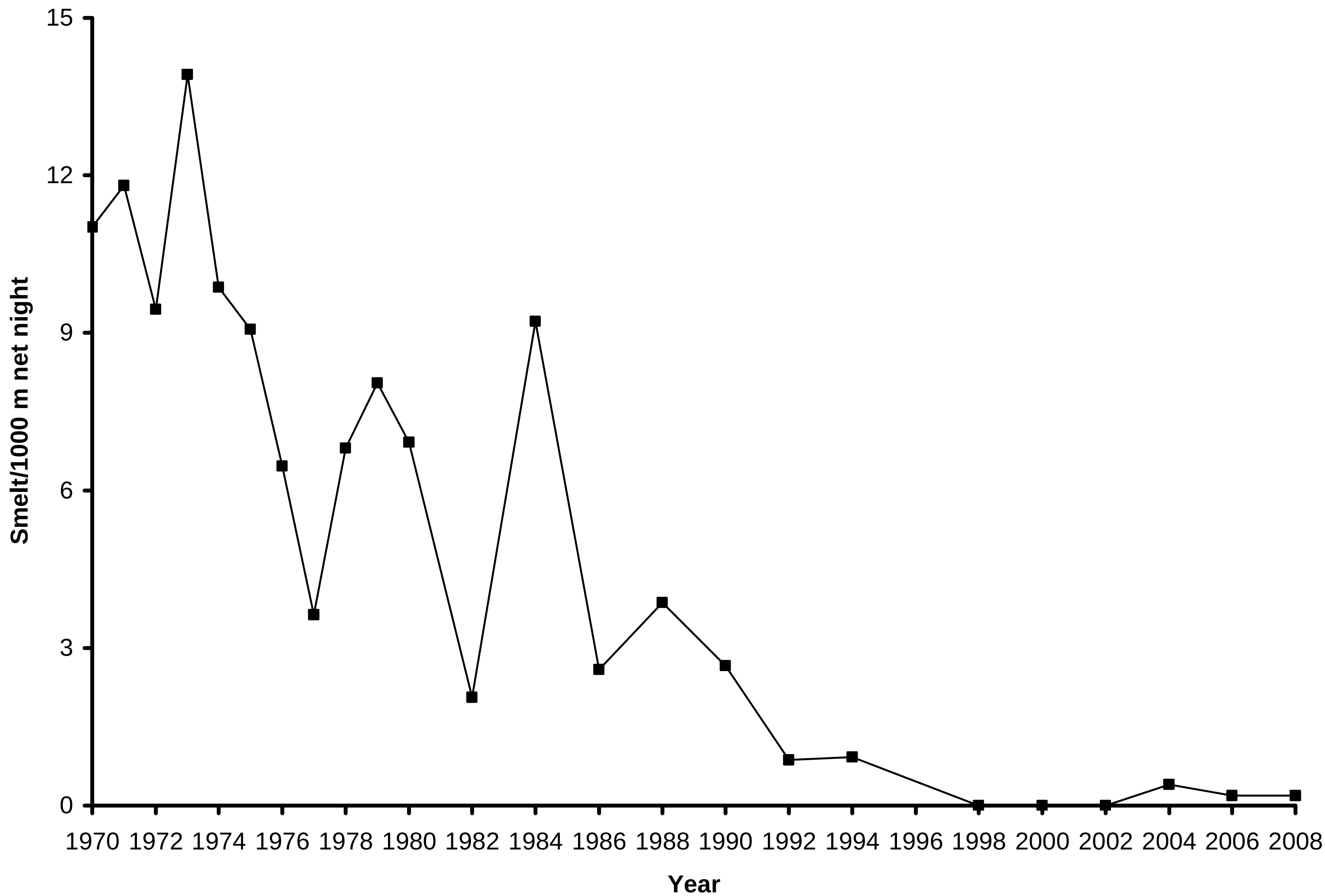

Figure 13. Geometric mean catch-per-unit-effort of smelt from Summer Index (1.5 in mesh) in WI-1 and W-2, 1970-2008.

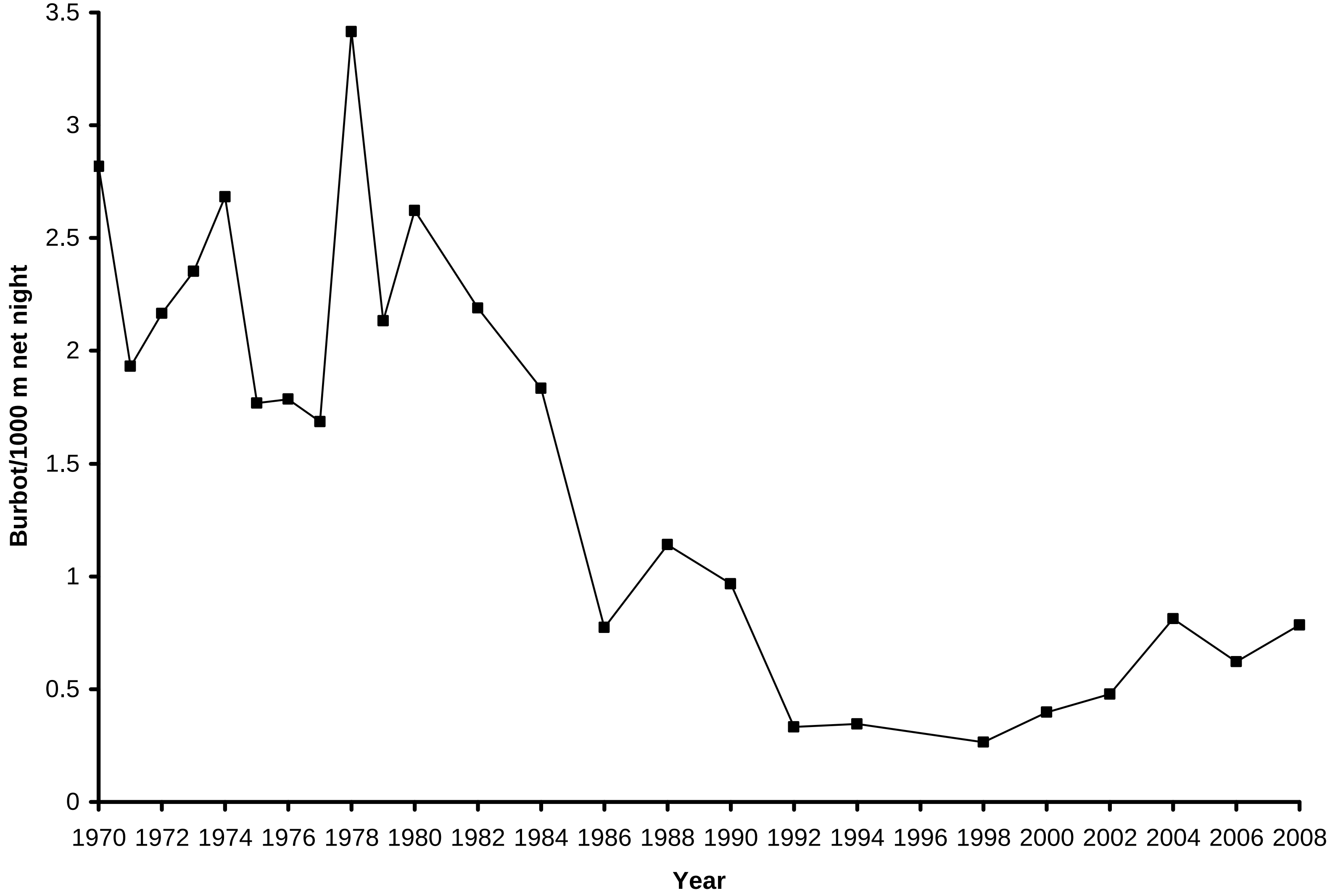

Figure 14. Geometric mean catch-per-unit-effort of burbot from Summer Index (all meshes) in WI-2, 1970-2008.

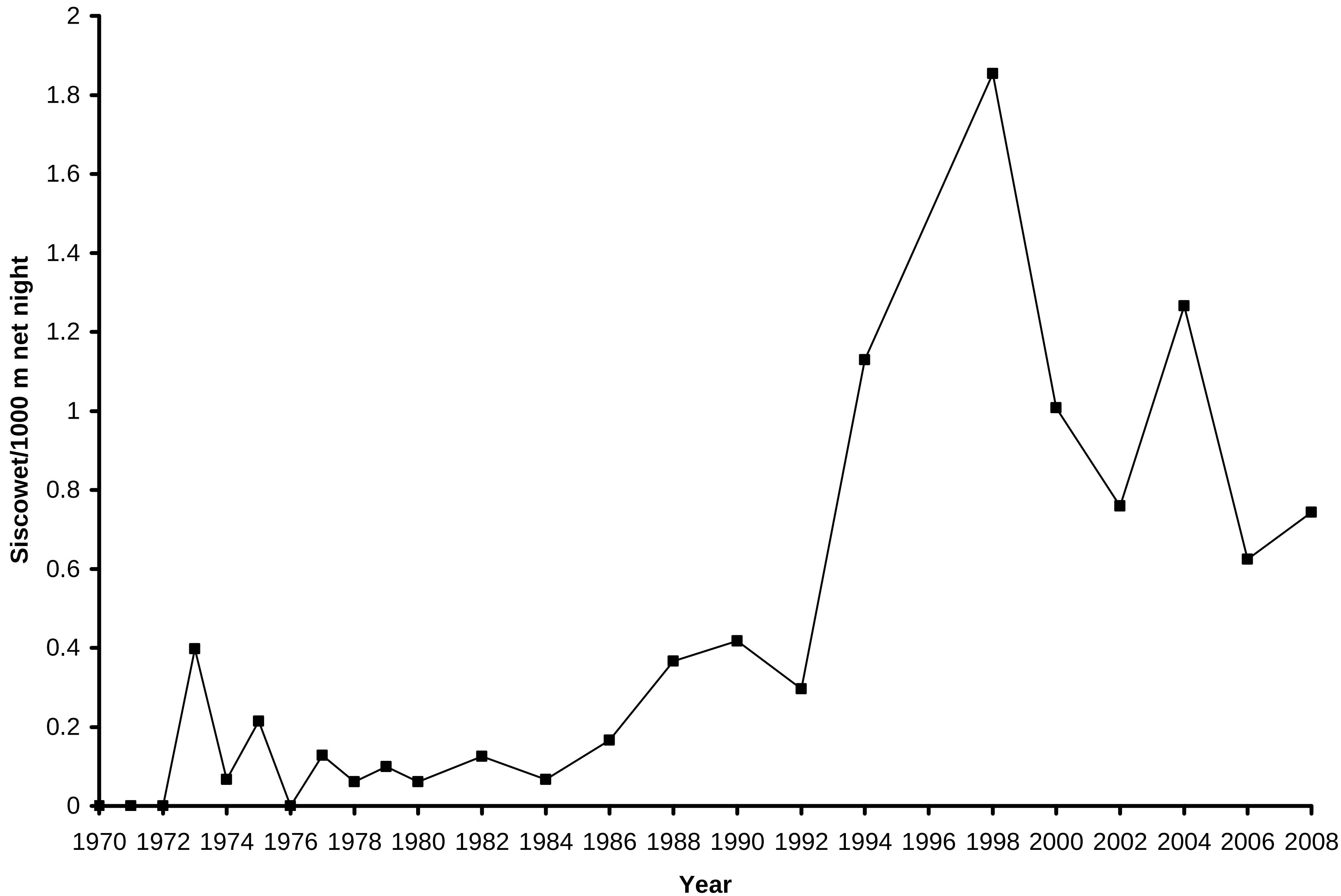

Figure 15. Geometric mean catch-per-unit-effort of siscowet lake trout from Summer Index (all meshes) in W-2, 1970-2008.