CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: April 9, 2011 FILE REF: 3600

TO: Peter Stevens

FROM: Michael Seider

SUBJECT: 2010 Summer Index Report

CC: Bill Horns – FH/3 – Madison
Steve Avelallemant – Rhinelander
Steve Hewett – FH/3 - Madison

2010 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 2010, 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 monofilament 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 2010, 461 lake trout were captured in WI-2 (96% were wild fish). Mean length of wild and hatchery lake trout was 20.1 in (SD = 5.5) and 19.7 in (SD = 4.7), respectively. The modal age of lake trout captured was seven (Figure 2). Geometric mean catch-per-unit-effort of pre-recruit wild lake trout (<17 in from 2.0-2.5 in mesh) increased slightly from 2008 to 2010 (Figure 3). Total wild lake trout GMCPUE (all meshes) increased from 2008 to 2010 (Figure 4).

During 2010, 1,815 lake whitefish were captured in WI-2. Mean length of 1,364 lake whitefish was 15.9 in (SD = 4.4). The modal age of lake whitefish captured was 12 (Figure 5). Total lake

whitefish GMCPUE (all meshes) also increased from 2008 to 2010 (Figure 6).

During sampling, 1,284 round whitefish were captured. Mean length of 257 round whitefish was 13.8 in (SD = 2.6). Round whitefish GMCPUE (from 2.0-2.5 in mesh) increased from 2008 to 2010 (Figure 7). Until the late 1980s, round whitefish were a commercially important species. Round whitefish abundance remained relatively low during the 1980s and 1990s, but GMCPUE has increased dramatically since about 2004 (Figure 7).

In 2010, 1,515 ciscos were captured. Mean length of 538 ciscos sampled was 11.0 in (SD = 2.7) (Figure 8). The fastest growing individuals from the 2009 year class were 7-8 in and just becoming vulnerable to the 1.5 inch mesh. Cisco GMCPUE from the 1.5 in mesh generally provides an indicator of year class strength with a two year lag time (Figure 9 and 10).

Twenty-eight smelt were captured in WI-2. Smelt GMCPUE has declined dramatically since the 1970s (Figure 11).

Twenty-four burbot were captured. Burbot GMCPUE decreased steadily during the 1980s and early 1990s, but has been increasing gradually since 1998 (Figure 12).

In 2010, 224 siscowet lake trout were captured, their mean length was 20.4 in (SD = 4.1) (Figure 13). Geometric mean catch-per-unit-effort of siscowet lake trout increased from 2008 to 2010 (Figure 14).

Four lake sturgeon were captured in WI-2. Average length of sturgeon captured was 32.8 in (SD = 3.3).

In 2010, 40 walleye were captured, their mean length was 16.1 in (SD = 4.4).

Since the 1970s 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. Stocking strategies have shifted to scatter planting trout offshore to improve survival and return to the sport creel. The effects of these stocking strategies on survival rates will be evaluated through this and other assessments in the future.

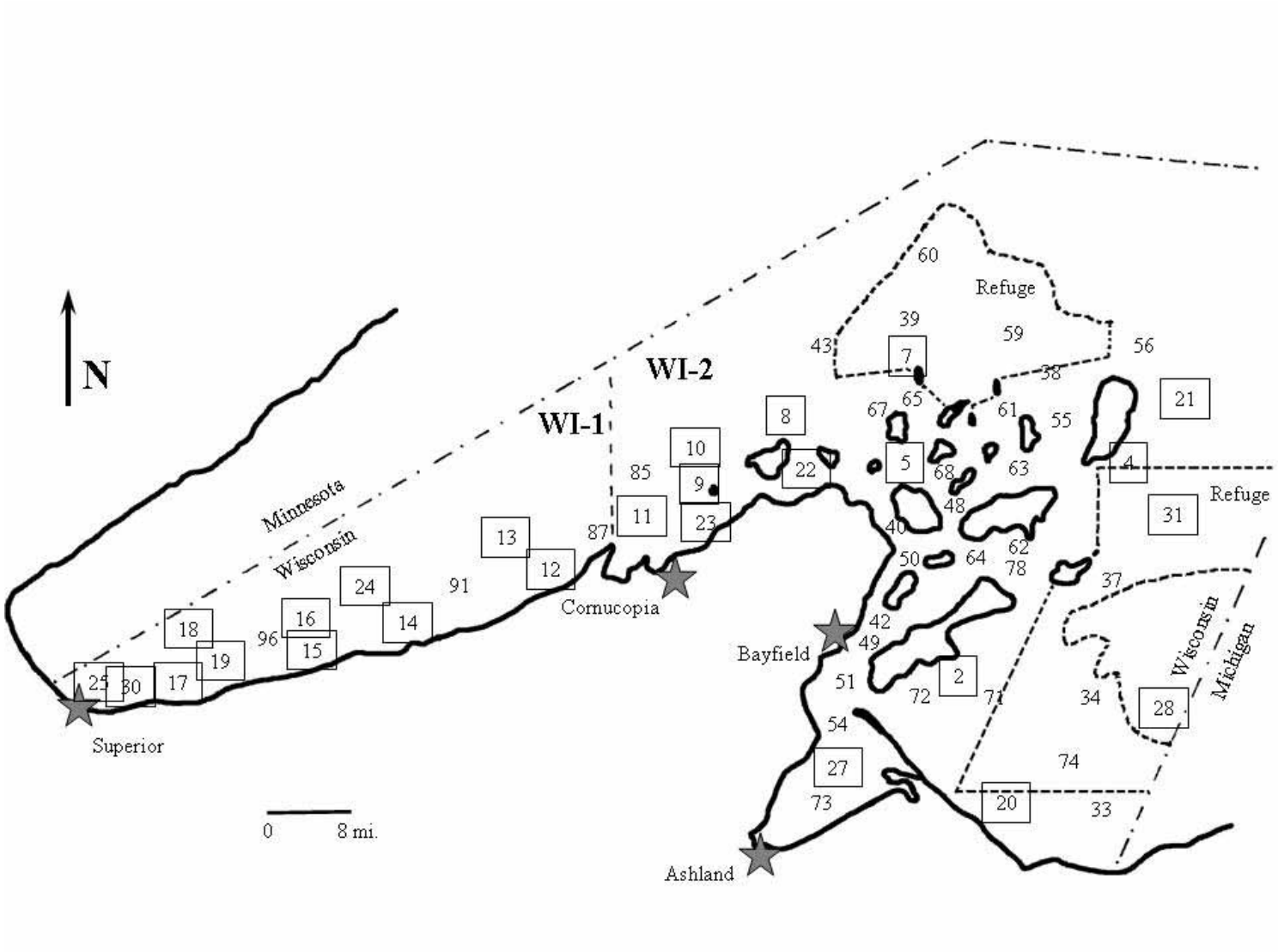

Figure 1. Summer index stations in Wisconsin waters of Lake Superior. Boxed station numbers indicate those used for geometric mean catch-per-unit-effort (GMCPUE).

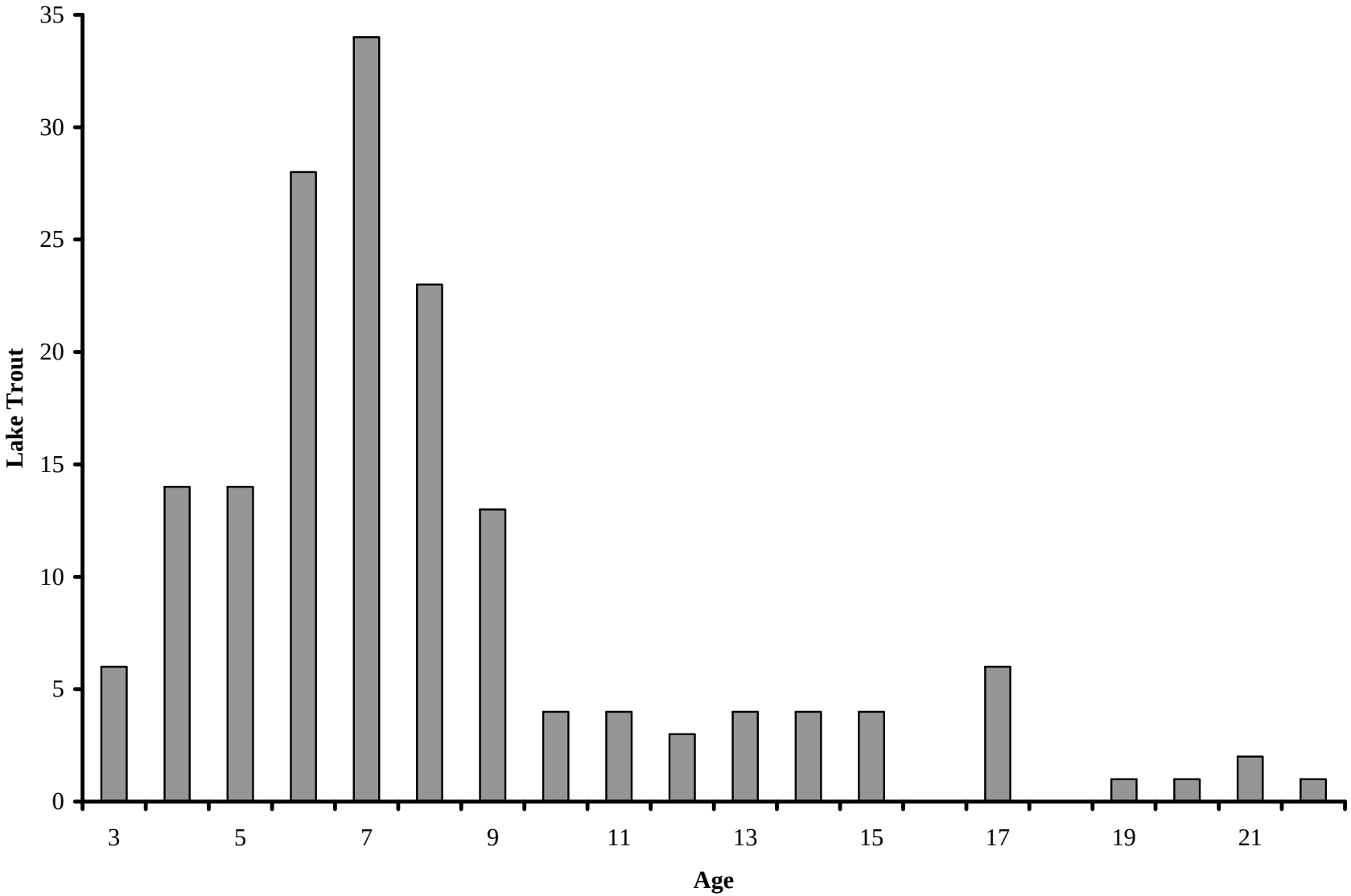

Figure 2. Age distribution of lake trout captured in Summer Index (all meshes), 2010.

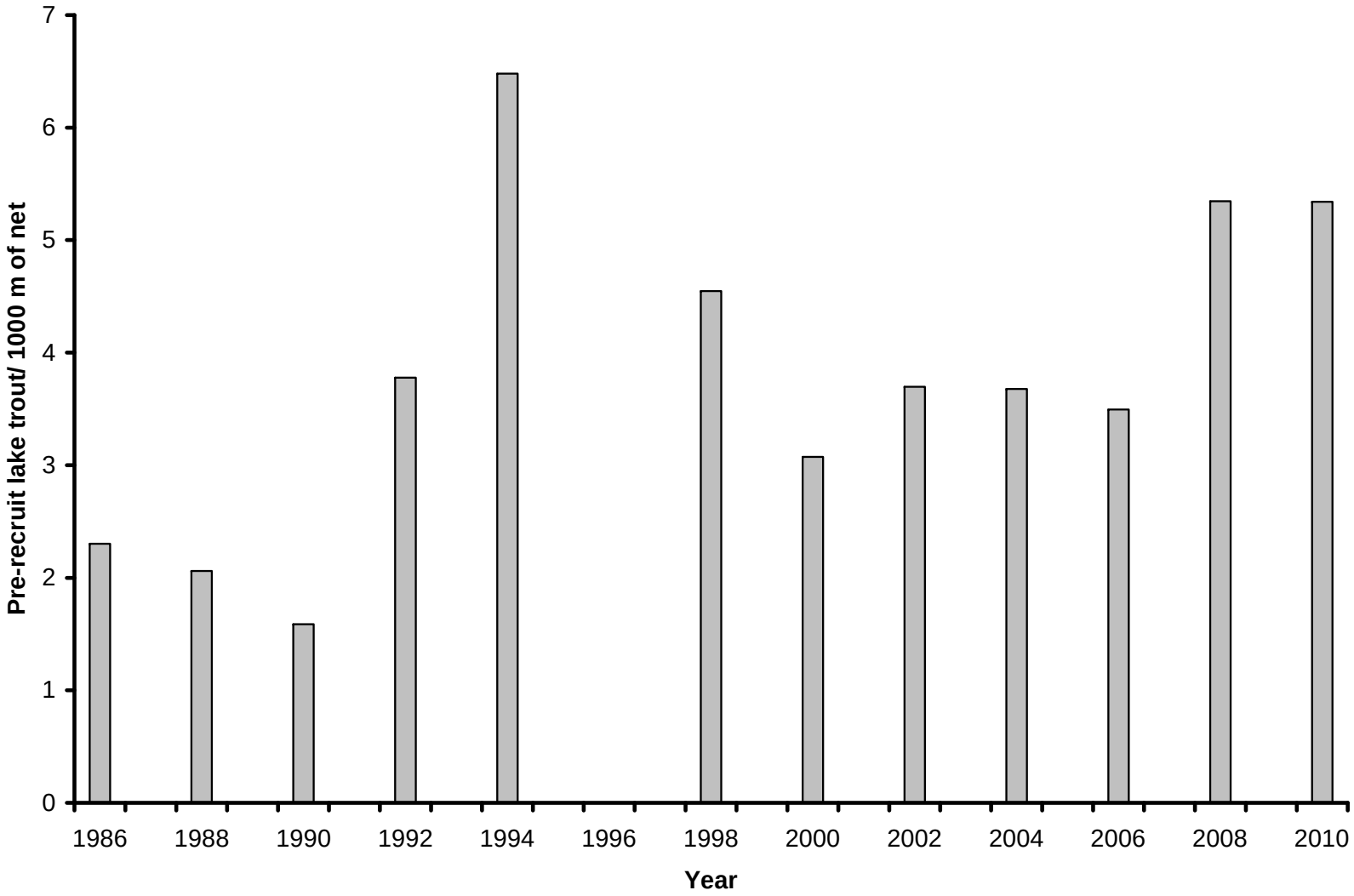

Figure 3. Geometric mean catch-per-unit-effort of pre-recruit lake trout (<17”) from Summer Index (2.0-2.5” mesh) in WI-2, 1986-2010.

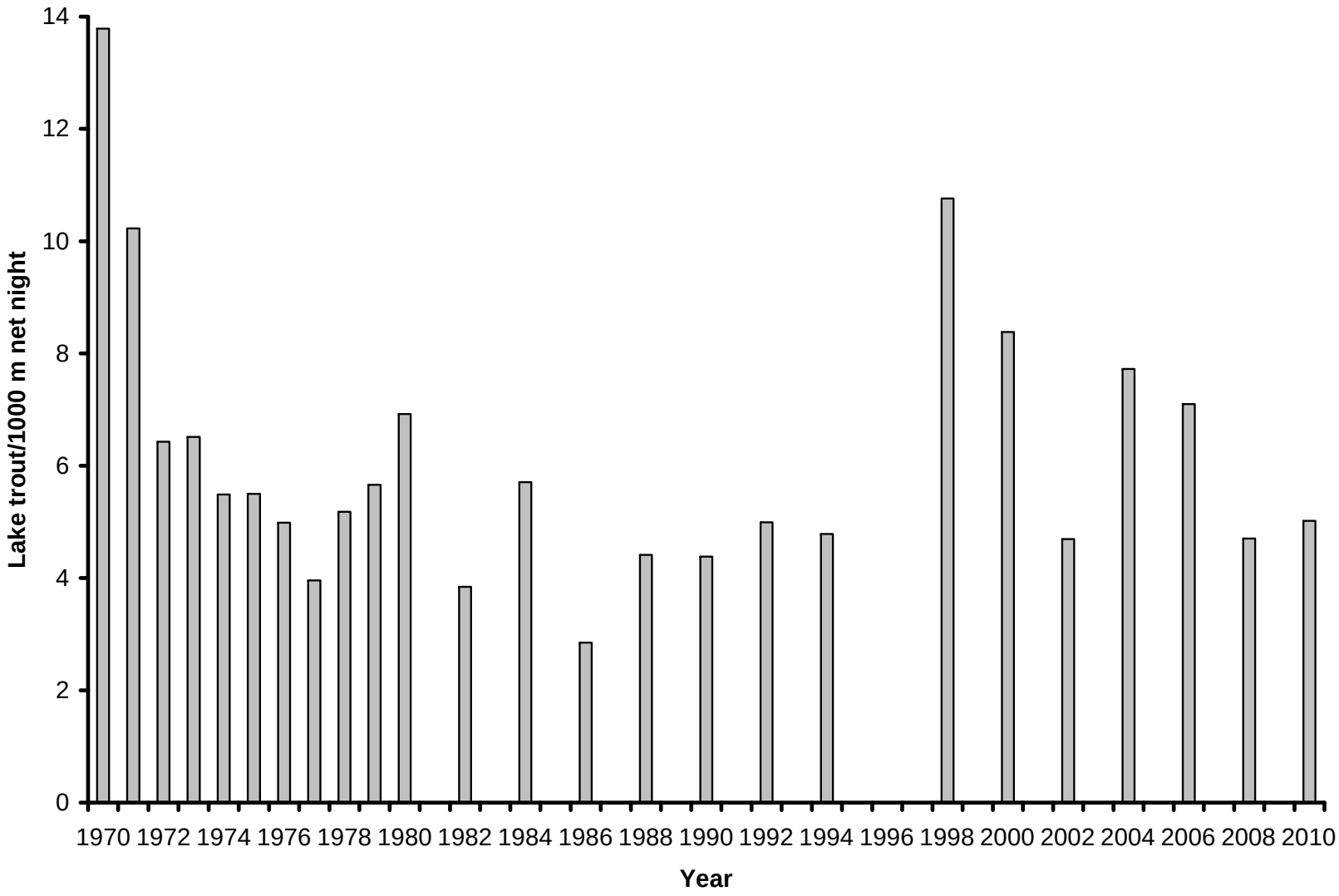

Figure 4. Geometric mean catch-per-unit-effort of lake trout from Summer Index (all meshes) in WI-2, 1970-2010.

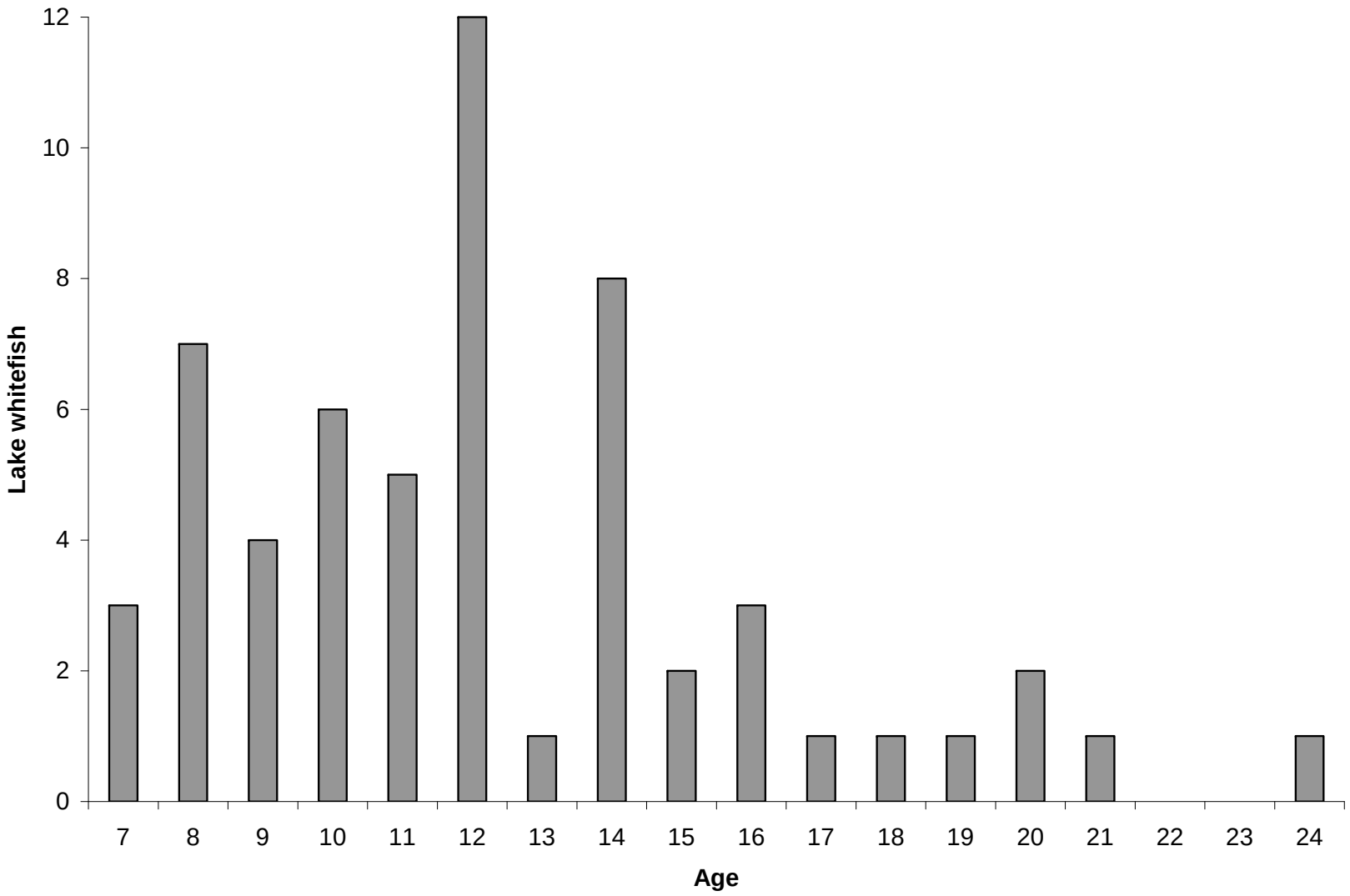

Figure 5. Age distribution of lake whitefish captured in Summer Index, 2010.

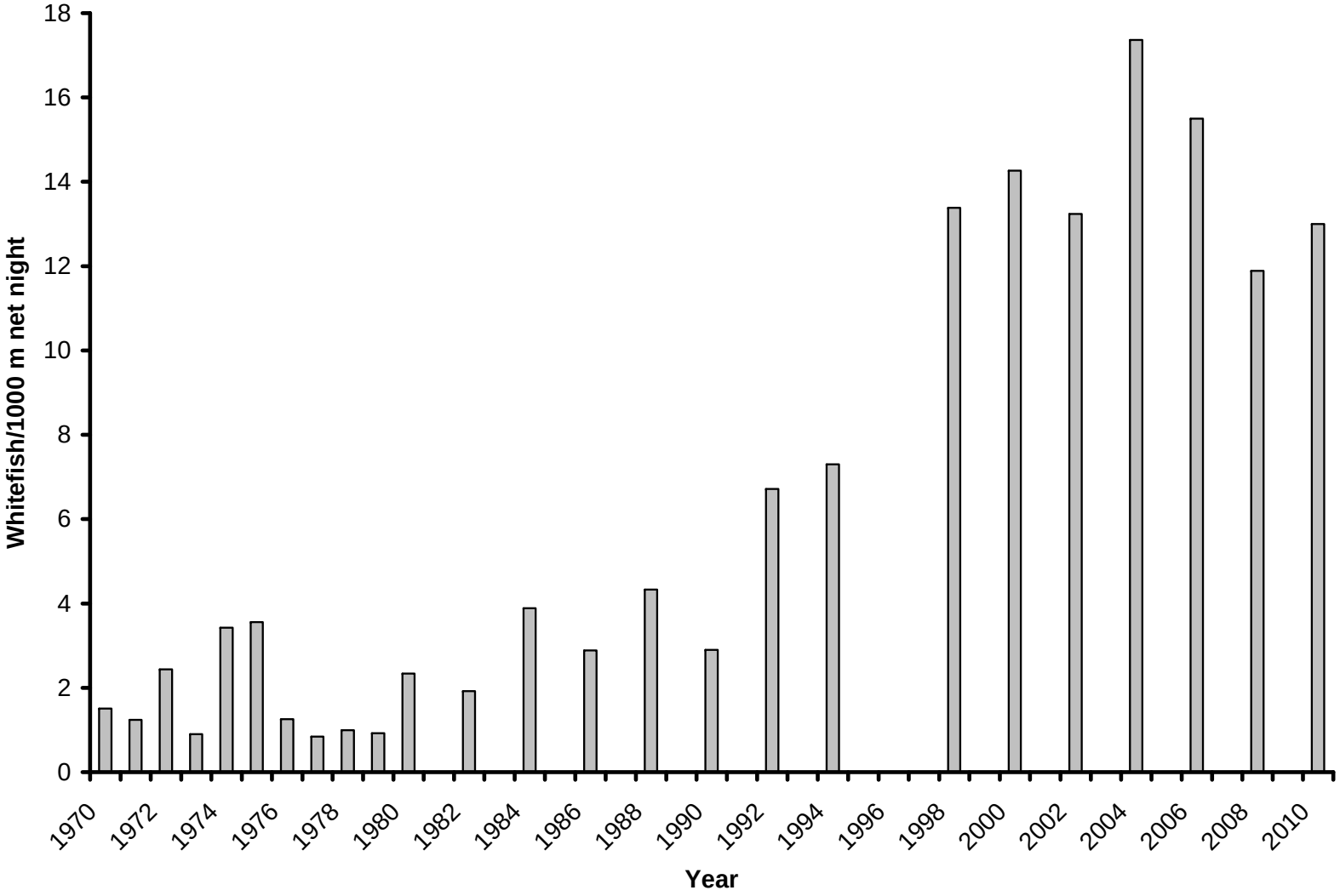

Figure 6. Geometric mean catch-per-unit-effort of lake whitefish from Summer Index (all meshes) in WI-2, 1970-2010.

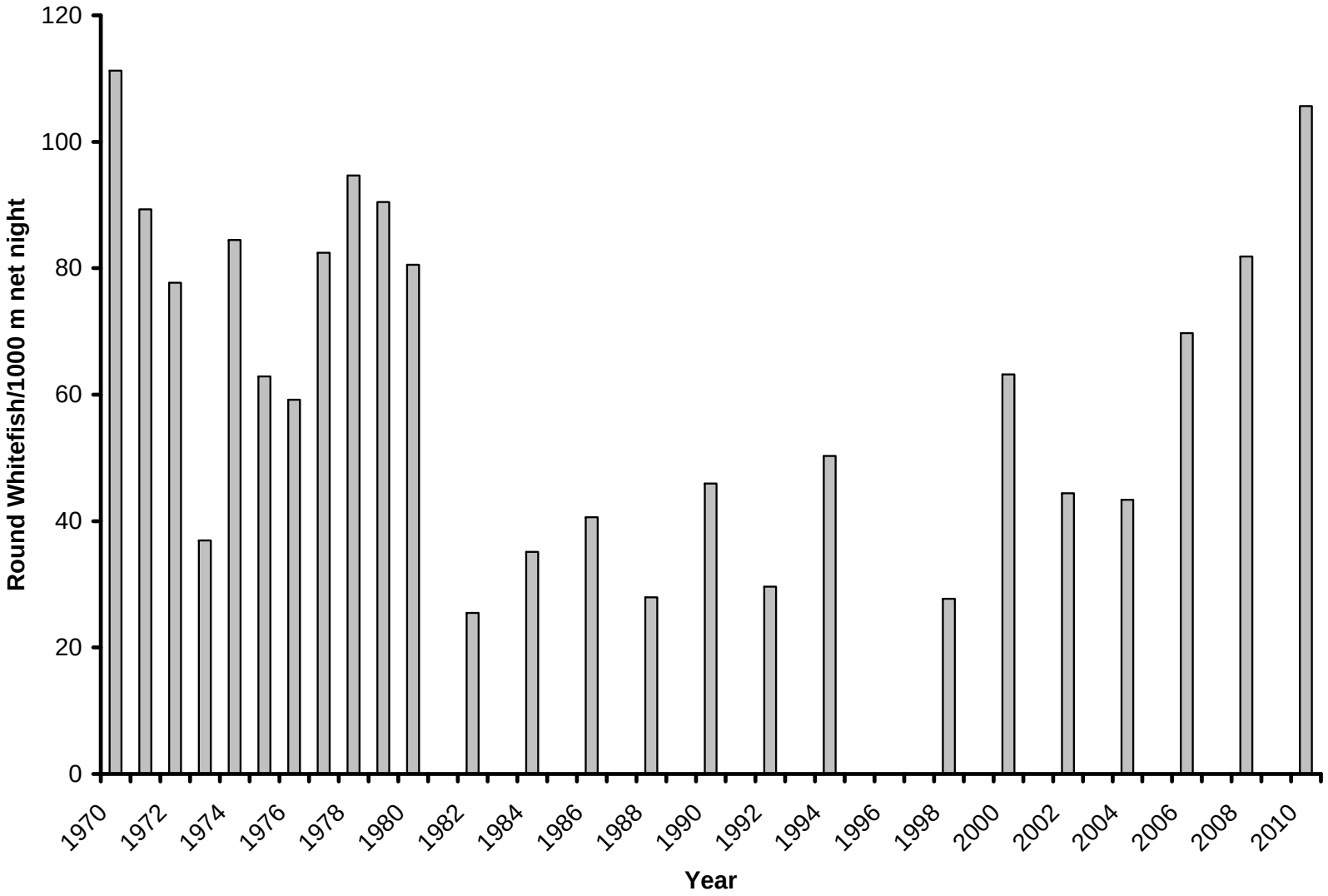

Figure 7. Geometric mean catch-per-unit-effort of round whitefish from Summer Index (from 2.0-2.5” mesh) in WI-2, 1970-2010.

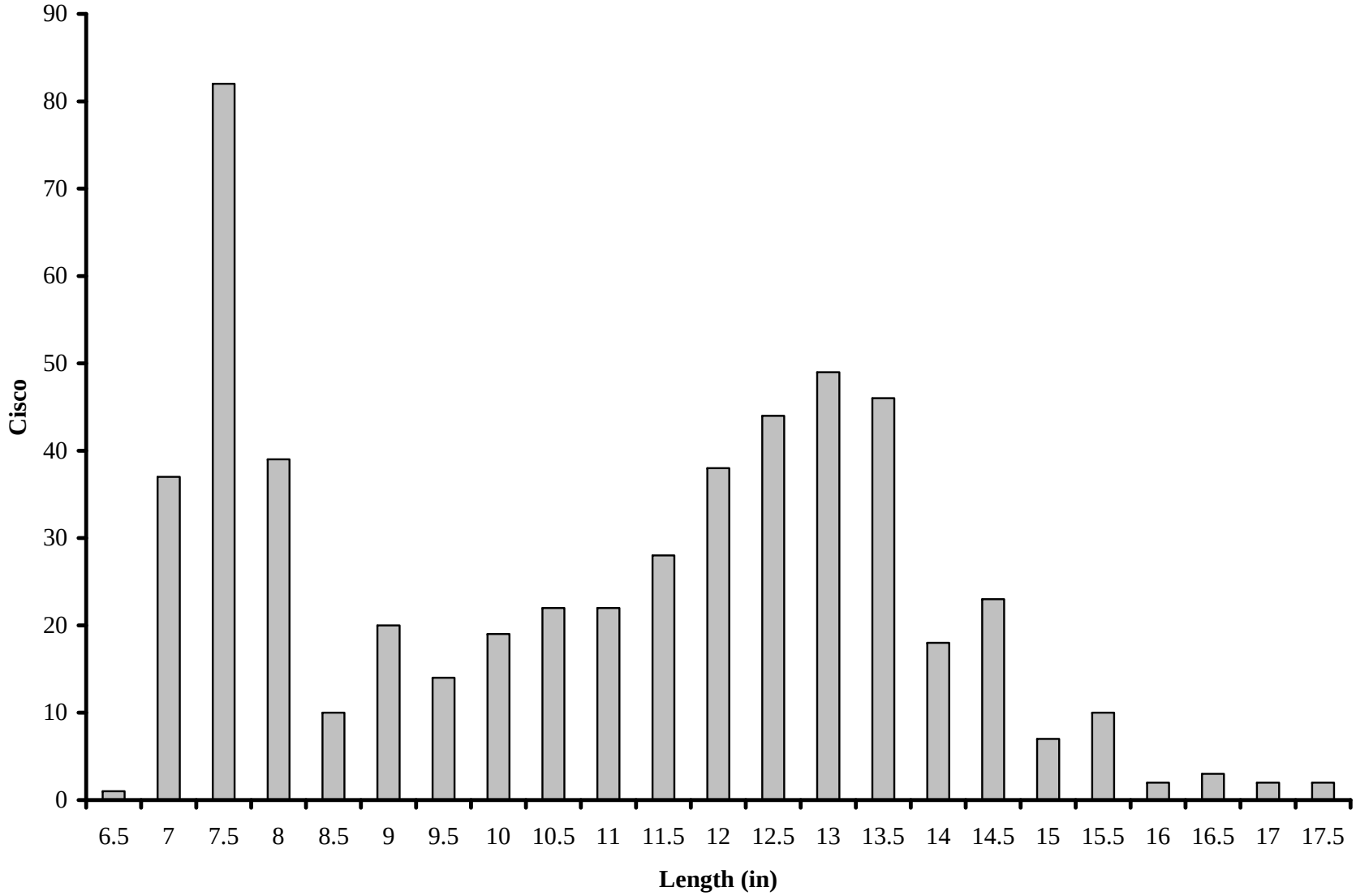

Figure 8. Length distribution of cisco captured in Summer Index (all meshes), 2010.

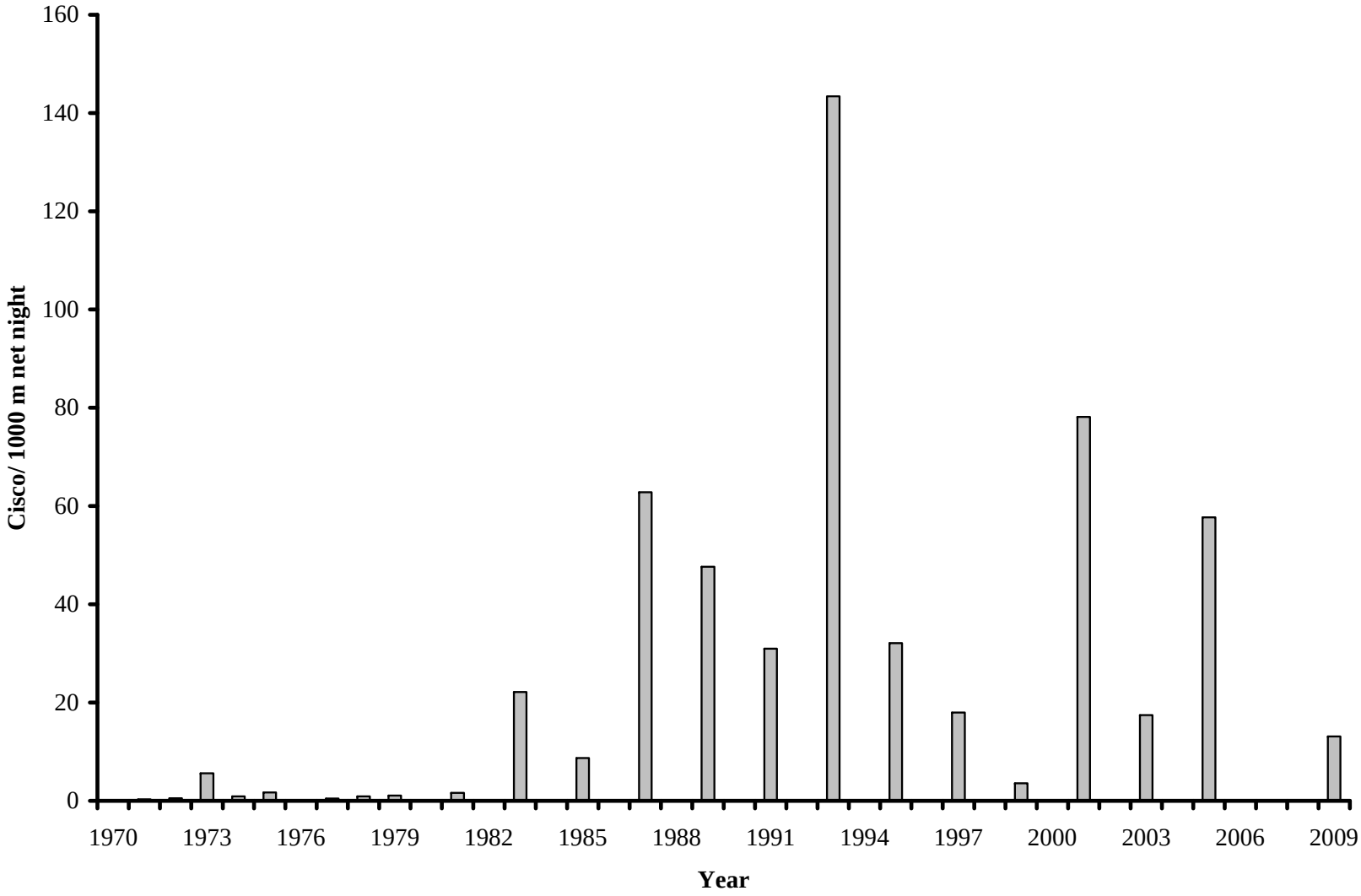

Figure 9. Geometric mean catch-per-unit-effort of cisco from Summer Index (from 1.5” mesh, all stations) in WI-1, 1970-2009.

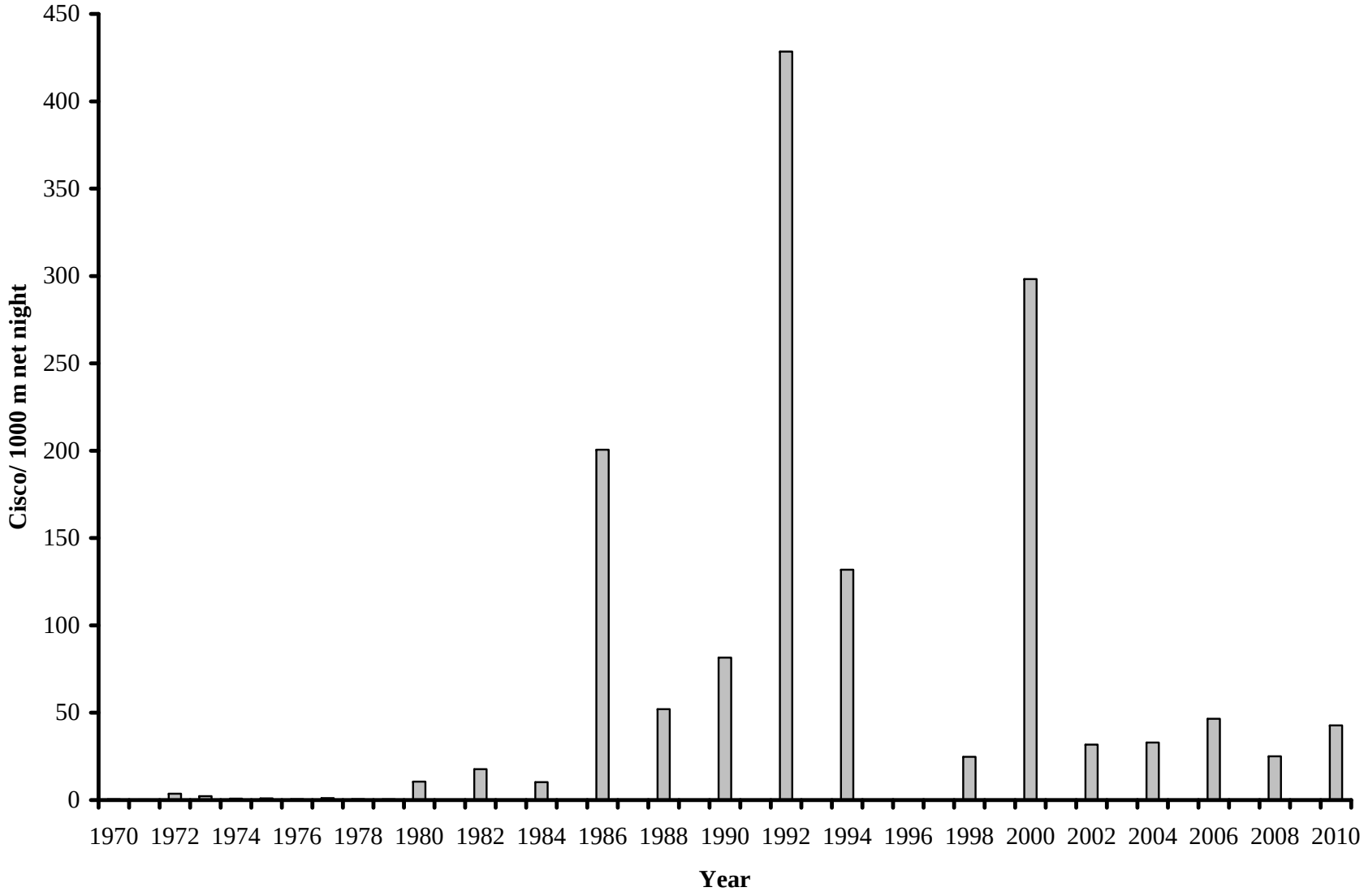

Figure 10. Geometric mean catch-per-unit-effort of cisco from Summer Index (from 1.5” mesh, all stations) in WI-2, 1970-2010.

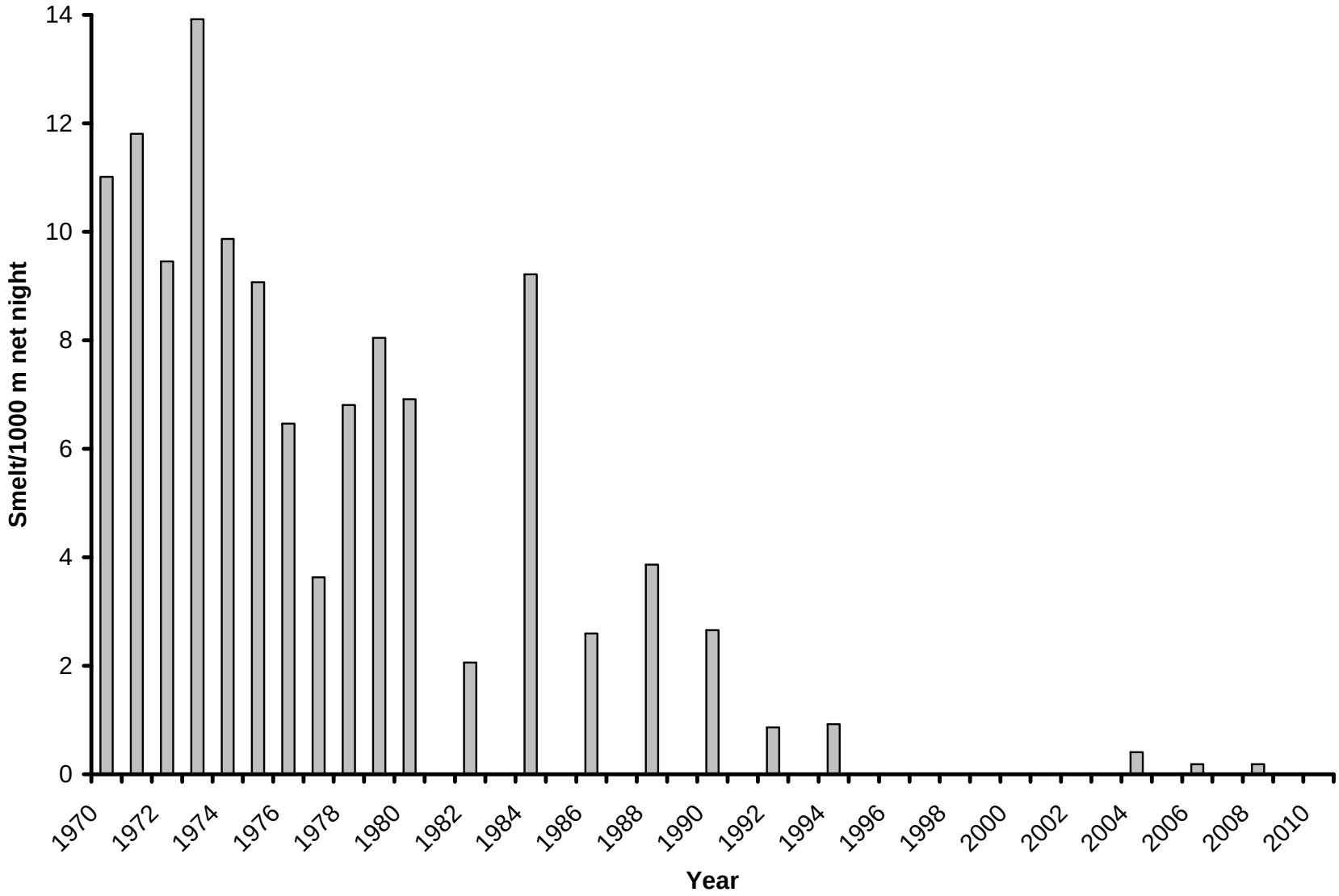

Figure 11. Geometric mean catch-per-unit-effort of smelt from Summer Index (1.5 in mesh) in WI-2, 1970-2010.

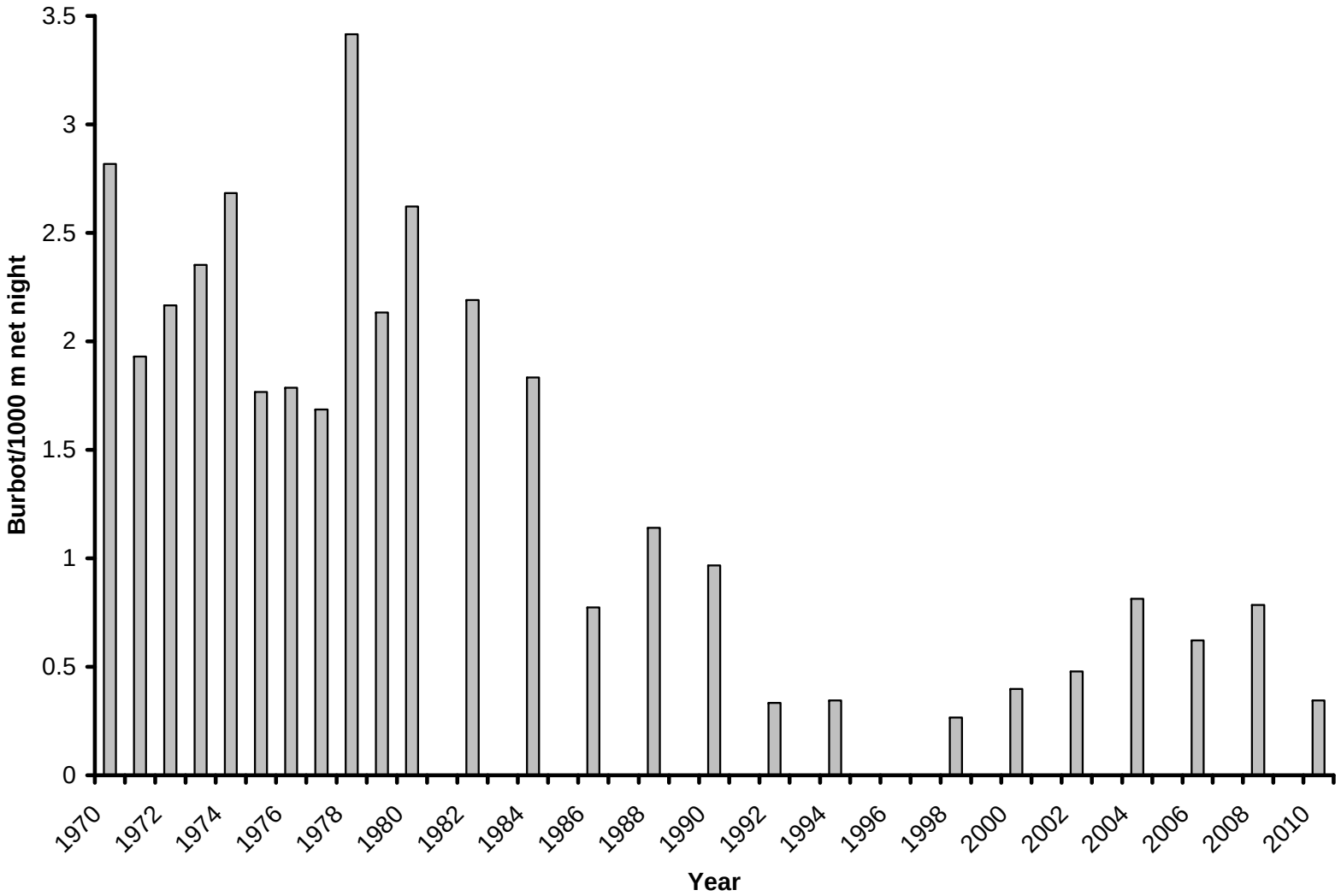

Figure 12. Geometric mean catch-per-unit-effort of burbot from Summer Index (all meshes) in WI-2, 1970-2010.

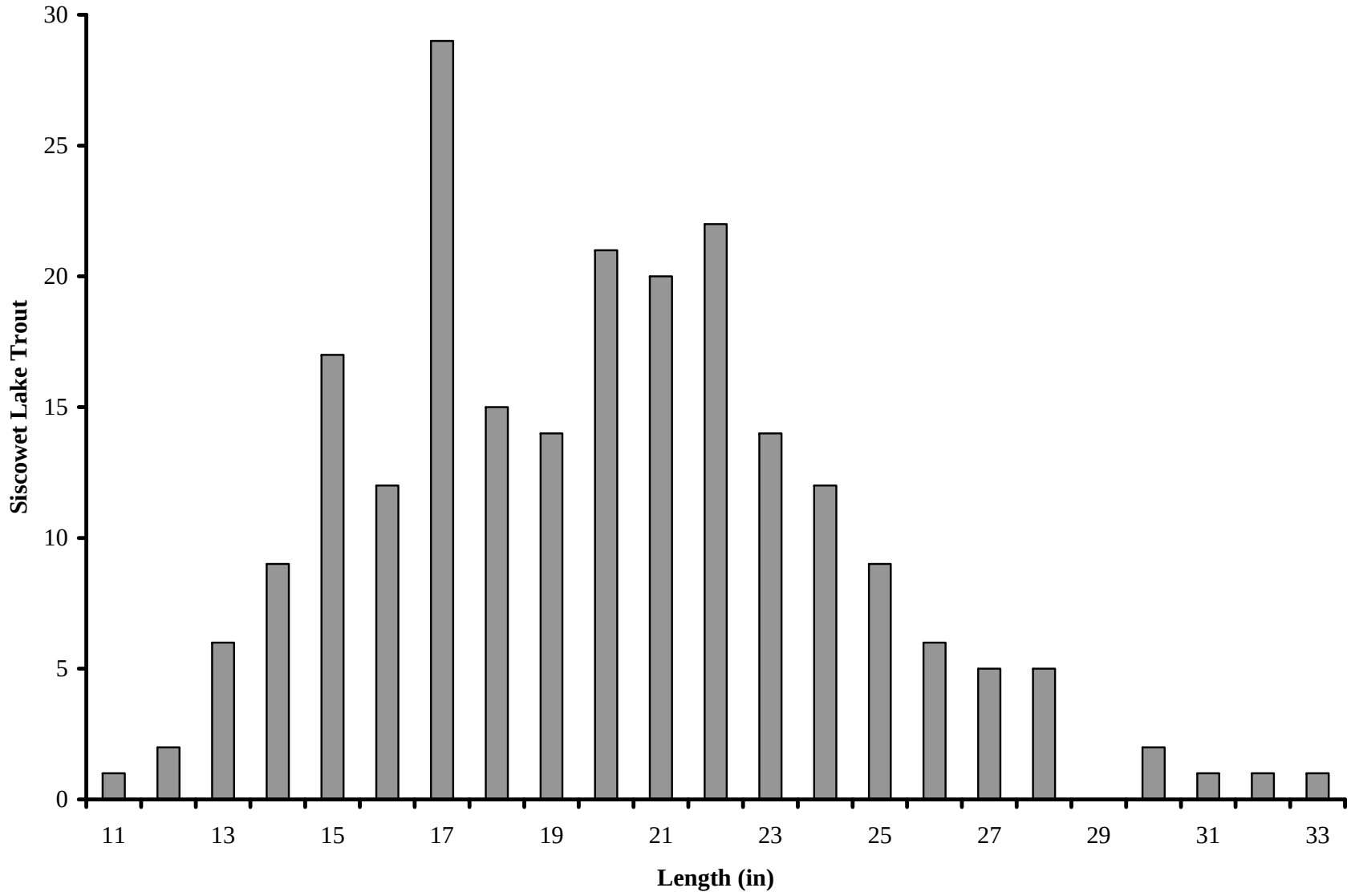

Figure 13. Length distribution of siscowet lake trout captured in Summer Index (all meshes), 2010.

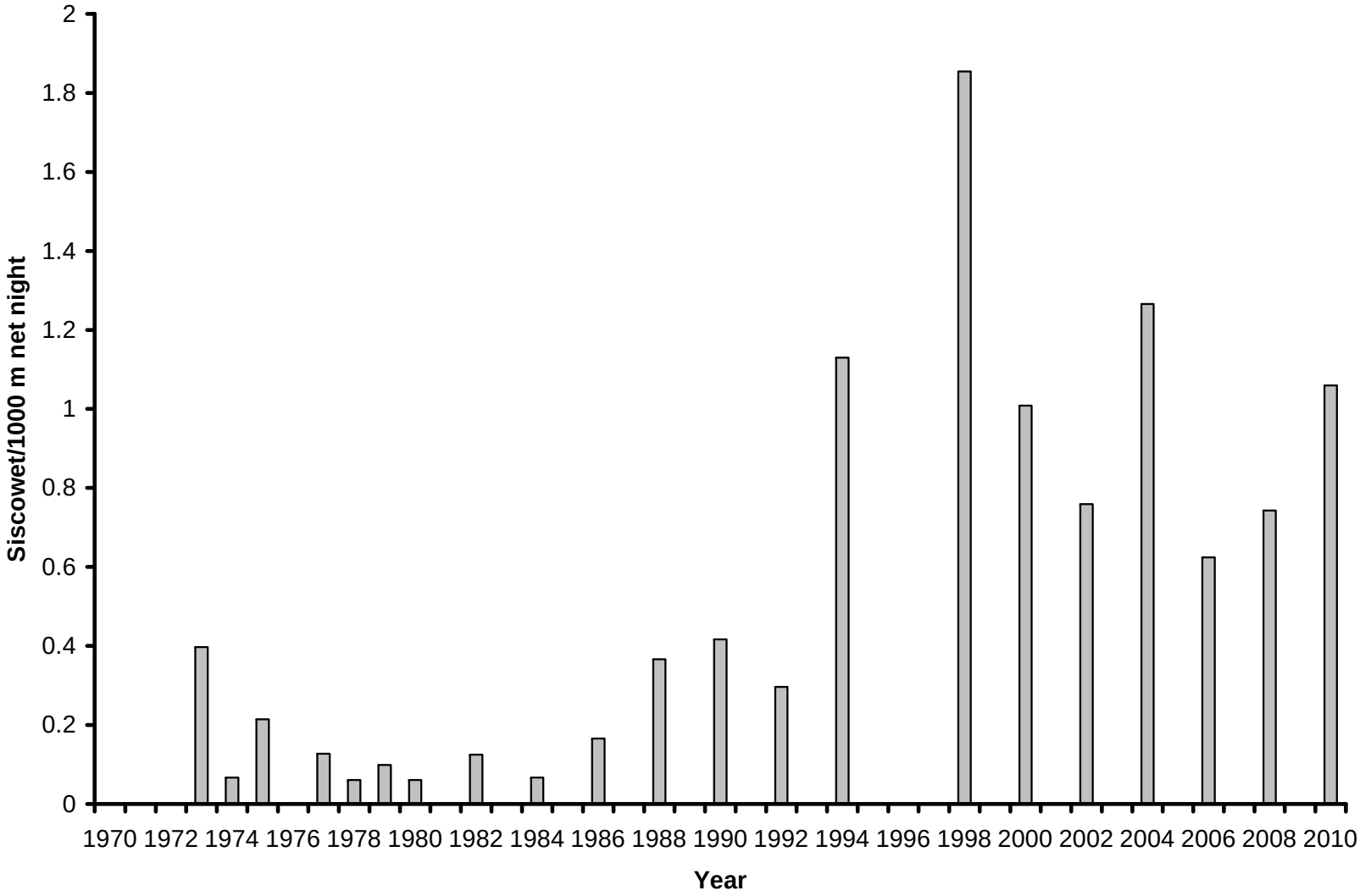

Figure 14. Geometric mean catch-per-unit-effort of siscowet lake trout from Summer Index (all meshes) in WI-2, 1970-2010.