My Observations
from charts (figs. 3-16)

I’ve been studying temperature and depth profiles of lake trout (lakers) quite a bit over the last few years and would like to share my observations from this Great Lakes Fish and Wildlife Commission Study and my own fishing experience. Following are some charts that show actual depth and temperatures that tagged lake trout have lived in for a period of time. There is a lot to be learned about lake trout from this study when you look closely at the data. Knowing these traits of lake trout will help you find and catch more fish.

During the winter months, they’re not as active as they are in the summer as shown by the depths of water that they inhabit. Their depth range in the winter is small in comparison to the summer depth range when they are seeking out bait fish that are feeding in the warmer waters.

You will rarely find a lake trout in water warmer than 55° and when they are there, it’s only for a short time. Even though the average temperature inhabited (in the study) was 40.4°, they seem to prefer 45° to 50° water in the summer, actively feeding on smaller fish. During the active summer months, they spend almost NO time at 40°, and MOST of their time in 45° to 50° even though deep water will still be 40°. I think the average (of 40.4°) is lower than the ideal temperature because the lake happens to be so cold in the winter. If there was 45° water to be found in the winter, they’d be there.

Many of the graphs show that the fish were in shallow water in the fall, which is when they spawn (in the rocks) at 10’ to 20’ depths.

Most of these fish spent some time in shallower waters in the spring, as the lake warmed up, probably following bait fish, such as spawning smelt. Smelt run in the spring when the stream waters reach 42° to 44° and the lake trout will follow the schools to feed on them. Smelt prefer colder waters just like lakers do, so they make a perfect bait fish for lakers.

You can see the cooling trend of the lake on every tagged fish from fall through the winter months as expected. Most, but not all of them, stayed at a relatively constant depth during the winter.

The average depth of these lakers was just 93’ and most of them inhabited depths less than 120’. The last two in the study, tags 701 and 729, and which were of native origin, averaged 170’ to 180’. This doesn’t mean you won’t find and catch lakers deeper than that.

Understand that ALL of the fish in this study (15 total) were caught by sport fishermen, commercial fishermen and an assessment agency, who typically harvest in waters from 10’ deep to 200’. Don’t limit yourself to these depths. Remember there are MANY fish to be caught in depths greater than 200’ with the right methods.

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**Explanation of Fish Charts:**

There were three release dates: Oct. 2001, Nov. 2001 and Oct. 2002. The left end of the plotted blue and green lines indicates the release date of each tagged fish, and the right end of the plotted lines indicates the capture date by a sport or commercial fisherman, or an assessment agency. Each chart covers 2 years and has data on one tagged fish.

Note the drop in water temperature from the start of the winter months (A) and the relatively small depth range of this fish from December to April (1). The water temperature reaches its coldest during winter season (B), begins to warm, and then forms layers (becomes stratified) in July, Aug. and Sept. (C) The lake trout becomes more active, indicated by a more varied depth range (2) as he follows and feeds on the bait fish in these thermoclines. As the water cools in Oct. and Nov. (D) the fish goes to the shallow spawning grounds (3). After the spawn he goes deep (4) to repeat the cycle.
ABSTRACT
This project collected information on the depth and temperatures used by lake trout in Lake Superior through the use of archival tags. Fifteen (15) of 124 lake trout implanted with depth and temperature archival tags were recaptured. Information was recovered from 14 tags. For these 14 lake trout, the number of days between date of release and recapture ranged from 40 to 706 days and averaged 372 days, temperature recordings ranged from 31.6°F to 63.0°F and averaged 40.4°F, while depth recordings ranged from the water’s surface to 548' and averaged 93'.

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RESULTS

Lake Trout Collection and Tagging

A total of 124 lake trout captured were implanted with depth/temperature archival tags. These fish were released in 2001 (100 fish) and 2002 (24 fish).

Tagged lake trout averaged 26.9 inches and 6.3 pounds. Of the fish tagged 68% (77 fish) were of native origin and 32% (47 fish) of hatchery origin. Seventy-eight percent (78%) (97 fish) were male, 12% (15 fish) female, and 10% (12 fish) unknown sex. Lamprey marking rates for the 124 lake trout released were 2 wounds and 54 scars/100 fish.

Recapture Information

Fifteen (15) lake trout implanted with depth/temperature archival tags were recaptured and information was recovered from 14 tags. Length obtained from 12 recaptured lake trout averaged 26.7 inches and weight from 11 recaptured lake trout averaged 5.8 pounds. Of the 15 recaptured fish seven (47%) were of native origin and eight (53%) were of hatchery origin. There were twelve male, one female, and two unknown sex lake trout recaptured (Table 5). Recaptured lake trout grew an average of 0.1 inch and lost an average of 0.3 pounds. Lamprey marking rates were not recorded for the 15 recaptured lake trout. For the 14 tags from which information was recovered, days at large averaged 372 (range: 40 to 706 days), temperature averaged 40.4°F (range: 31.6°F to 63.0°F), and depth averaged 93.1' (range: water’s surface to 548.1').

Archival Tag Data

Average daily temperature and depth data for individual lake trout are presented in Figures 316, which summarize the continuous data records of time, temperature, and depth (atmospheric pressure). From these data the percentage of time spent at various depths and temperatures during different seasons was determined for each fish. On average fish spent between 72% and 83% of the time in waters between 0 and 120' by season and between 17% and 28% of the time in waters between 120 and 240' by season. One percent or less of the time in any season was spent in waters greater than 240'. Overall, at least one fish spent some time in all depth categories during each season except 480+ feet in the summer season.

Lake trout temperature followed the seasonal pattern of water temperature changes within the lake. At times of the year when the lake was not thermally stratified lake trout temperature varied little. When the lake was thermally stratified and more water temperatures were available, lake trout temperature was more variable.

Results of the components of variance model for each season showed statistically significant differences between hatchery and native fish in winter, spring, and summer at the a = 0.05 level, with native fish inhabiting greater depths than hatchery fish. The difference in depths for the fall season was not statistically significant. Most hatchery fish spent between 75%-100% of the time in water 0 to 120' (Figures 3-8). The exception was hatchery fish number 275 (Figure 9) which spent only 47%-73% of the time by season in water 0 to 120', with 27% to 53% of its time spent in water 120 to 240'. Very little time, 1% or less, was spent in water greater than 240' in any season by hatchery fish. For native fish, five spent 50%-100% of the time in water 0 to 120' (Figures 10-14), while two native fish, numbers 701 and 729, spent 32% to 98% of the time in water 120 to 240' (Figures 15 and 16). With the exception of fish number 729 which spent between 2% and 17% of its time by season in water 240 to 360', 2% or less time was spent in water greater than 240' in any season by native fish.
Discussion

The archival tag data collected during this study indicated that lake trout live inshore and spend the majority of their time in waters less than 240' deep. The extent to which depth distribution overlaps with siscowet is unknown in the absence of similar continuous depth distribution data on siscowet. However, these data do indicate that on average very little time (1%) is spent in waters greater than 240', which is considered siscowet habitat.

There were significant differences in the depth distribution of native and hatchery fish in all seasons except fall. These significant differences coupled with the fact that the majority of fishing is in waters less than 120' may explain why catchability of hatchery lake trout is higher than native lake trout (Bence and Weeks 1995, WSTTC 1995). The difference in catchability for hatchery and native lake trout is one factor which has led to the use of different stock assessment models for each. The similarity in the fall depth distribution patterns between hatchery and native fish is associated with the movement of fish onto relatively shallow reefs (50') to spawn.

Finally, the average seasonal temperature at which recaptured lake trout in this study occurred was 40.4° F. This is similar to the average annual temperature of 41°F assumed in calibrating the Pauly equation used to set the initial natural mortality rate for stock assessment models in Michigan management units of Lake Superior.
Figure 3. Depth (plotted blue line) and temperature (plotted green line) for lake trout tag #037.

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Figure 4. **Depth (plotted blue line) and temperature (plotted green line)** for lake trout tag #242.
Figure 5. Depth (plotted blue line) and temperature (plotted green line) for lake trout tag #248.
Figure 6. Depth (plotted blue line) and temperature (plotted green line) for lake trout tag #321.

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Figure 7. Depth (plotted blue line) and temperature (plotted green line) for lake trout tag #532.
Figure 8. Depth (plotted blue line) and temperature (plotted green line) for lake trout tag #731.

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Figure 9. Depth (plotted blue line) and temperature (plotted green line) for lake trout tag #275

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Figure 10. Depth (plotted blue line) and temperature (plotted green line) for lake trout tag #249.
Figure 11. Depth (plotted blue line) and temperature (plotted green line) for lake trout tag #508.

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Figure 12. Depth (plotted blue line) and temperature (plotted green line) for lake trout tag #767

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Figure 13. Depth (plotted blue line) and temperature (plotted green line) for lake trout tag #777.

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Figure 14. Depth (plotted blue line) and temperature (plotted green line) for lake trout tag #790.
Figure 15. **Depth (plotted blue line)** and **temperature (plotted green line)** for lake trout tag #701.

**Depth (feet)**

**Temperature (Fahrenheit)**


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Figure 16. **Depth (plotted blue line)** and **temperature (plotted green line)** for lake trout tag #729.

**Depth (feet)**

**Temperature (Farenheit)**

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