MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS

FISHERIES DIVISION
JOB PROGRESS REPORT

STATE: Montana

PROJECT TITLE: Lake Fisheries Inventory

PROJECT NO.: F-33-R-21

JOB NO.: I-a

JOB TITLE: Seasonal area and depth distribution of cutthroat, bull trout (Dolly Varden) and lake trout in Flathead Lake

PERIOD COVERED: July 1, 1986 to June 30, 1987

ABSTRACT

Annual age and growth data was collected during the report period from the target fish species. The analysis of these data will be presented in the next progress report and will include a summary of the present status of food utilization of these fish. These surveys were accomplished in cooperation with the BPA contract fisheries study on the lake.

A volunteer angler tagging program which was directed to mark the target species was implemented. Eleven anglers tagged 945 trout which included 391 cutthroat trout, 391 lake trout, 137 bull trout and 26 rainbow trout. Fish were marked in both the lake and river environments. Recapture information was received on 89 fish for a return percentage of 14.8 percent for cutthroat trout, 4.4 percent for lake trout, 8.8 percent for bull trout and 7.7 percent for rainbow trout. Returns from bull and cutthroat trout continue to demonstrate the strong dependant relationship between this lake and river system. Although lake trout recapture percent was lowest of all species, returns do suggest minimal damage results after being caught by angling with recapture time spans ranging from 30 to 470 days.

Average size of 1986-87 angler caught lake trout was 31 inches long and weighing 13 pounds. The largest fish reported and tagged this season was a "35 pounder". Approximately one-third of the angler catch was represented by small lake trout (less than 28 inches). Comparison of past lengths of angler caught lake trout showed a slight increase, from 27.7 to 30.6 inches, since the 1960's.

Average length of angler caught bull trout was 20.5 inches, with a range from 9 to 32 inches. River caught cutthroat trout averaged 15.5 inches with seasonal variation ranging from 12.7 to 17.9 inches.

BACKGROUND

Flathead Lake in northwestern Montana is the largest natural lake in the western United States and is noted for its high quality water and angling opportunities (Graham and Fredenberg 1982). In 1966, the Flathead Lake fisheries study was initiated to gather baseline information on the fishes of the lake (Hanzel 1970 and 1972). After this initial work the study program was split into two segments; one to address trend in the kokanee population and the other to study other game fish species in the lake.

Information on the game fish populations, other than kokanee, has included initial age and growth summaries and detailed food habits of cutthroat and bull trout along with other associated species (Leathe and Graham 1982). Other related Department projects on the lake have been detailed by Graham et al. (1980).

Angling pressure on the lake ranks second in all state waters and provides an economic stimulus to the Flathead Valley (Graham and Fredenberg 1982).

OBJECTIVES

It shall be the primary objective of this job to determine growth rates of lake trout and to assess annual and seasonal comparisons of growth.

PROCEDURES

It was the intent of this job to continue to accumulate growth and seasonal distribution data on lake trout (Salvelinus namaycush) , westslope cutthroat trout (Salmo clarki lewisi) and bull trout (Salvelinus confluentus) during the summer, fall, and winter periods. Fish growth data were collected during creel checks made during the summer, fall and winter periods. Additional data were collected from target fish species taken during the coordinated BPA kokanee (Oncorhynchus nerka) sampling efforts with gill nets. Stomach samples of the target fish species were collected to document the utilization of Mysis, kokanee, and other food items.

Age and growth information will be made by reading plastic impressions of scales and verifying age by comparison of otolith bones. All scale and otolith data will be stored and analyzed with the Regional PC computer (Hanzel, 1984).

A cooperative tagging program was organized with eleven volunteer anglers who release many of the fish they catch in the Flathead Lake and River System. Three of the individuals selected concentrated their tagging efforts in the

river system above the lake, marking bull, cutthroat and some rainbow trout (Salmo gairdneri). The lake anglers represented deep-troller fishermen who utilize down riggers or steel-line fishing outfits to catch bull and lake trout. The anglers were selected by the principle area and season they fish. Co-op taggers have been tagging since January, 1985 and continue to the present.

Co-op anglers were issued tagging kits which included a "Floy" tagging gun, a group of numbered Floy tags, scale sample envelopes, measuring tape, hanging spring-scale, and recording sheet. Anglers were schooled on the proper procedures for tagging and recording data.

Information on cutthroat trout caught and tagged in the Flathead River above the lake was included in this report since both river and lake environments are essential to the life history of this species. Data from river caught fish can reflect information from the fish while residing in the lake.

FINDINGS

Age, Growth, and Food Habits

Scales, otoliths, and length and weight data from the target species were collected through the report period. Age and growth analysis of the target fish species will be made in conjunction with the BPA Contract study and be presented in the next progress report. The food utilization of the target species will be presented in the final report of the BPA study "Impacts of Kerr Dam on the kokanee in Flathead Lake".

Cooperative Angler Tagging Program

Eleven anglers volunteered to tag and release trout while fishing on Flathead Lake or in the river system above. Three taggers concentrated their fishing effort on the main Flathead River between Kalispell and Columbia Falls, 22 and 44 river miles above the lake. Two of these river anglers only fished during the spring bull trout migration season, mid-May through mid-July; while the other tagger fished the year around for cutthroat trout marking fish larger than 10 inches. Lake taggers were selected from a group of deep-trollers to represent angling from four popular fishing areas. These areas include: 1) winter trolling along the southeast shoreline in Yellow, Blue and Skidoo bays, primarily for lake trout with some bull trout; 2) ice fishing when possible in the northern mid area of the lake from Angel Point on the west to Yenney Point on the east and in Somers Bay on the extreme northwest portion, primarily for lake and bull trout; 3) spring trolling, primarily for bull trout; 4) summer-fall angling on mid-lake deposition bar and an area south of Wildhorse Island known as "Mac Alley", primarily for lake trout.

To date co-op taggers have marked a total of 945 fish of which 391 were cutthroat trout, 391 lake trout, 137 bull trout and 26 rainbow trout. Seventy-two (52.5 percent of total) of the bull trout were tagged in the lake. All lake trout were tagged in the lake whereas all rainbow and nearly all cutthroat were tagged in the river (one was tagged in the lake).

Tag Recaptures

Tag return information was received on 89 fish caught by anglers in the Flathead River and Lake system. A total of 58 returns (14.8 percent return of total cutthroat tagged) were from cutthroat trout, 17 (4.4 percent return) from lake trout, 12 (8.8 percent return) from bull trout and 2 (7.7 percent return) from rainbow trout.

Most cutthroat returns represented little traveling; however movements of over 30 miles were reported from 10 fish. These longer distances represented movements up- and downstream from point of tagging as well as data from 5 cutthroat recaptured in the lake. The maximum upstream movement was reported on a cutthroat caught in the North Fork of the Flathead River above the Canadian Border, a distance of over 70 miles. Catches of cutthroat trout in the lake were reported along both shorelines; with the maximum southern movement of 20 miles from the mouth of the Flathead River to an area called "The Narrows". Although time span between recaptures ranged from 0 to 448 days, movements over 30 miles were generally longer than 100 days after tagging. Cutthroat trout have been known to be quite "gullible" in terms of catchability by anglers. One return further demonstrated this trait: this 17-inch cutthroat was first recaptured in mid-May 113 days and 30 miles upstream from the tagging point. At the mouth of this small tributary, the angler returned the fish to the water, after recording the tag number, and continued on fishing. He caught this same fish 3 more times in 20 minutes. After the fourth release, he decided to move on to another hole.

Recaptures from rainbow trout were all from the river showing little movement during a time span from 43 to 79 days.

Half of the bull trout returns (a total of 12) were from fish tagged in the lake. All but one of these lake marked fish were again caught in the lake, the exception was taken upstream in the Flathead River 3 miles above the lake. The time span to recapture in the lake ranged from 13 to 210 days and all fish were caught in the northern half of the lake. River marked fish were caught in the river system after a time span of 41 to 291 days, with maximum distance recorded of 20 miles upstream in 10 days. One river tagged fish was recaptured in the lake after 291 days near a west shore prominence known as "Angel Point" 47 miles downstream.

Lake trout returns were all tagged in the southern mid-lake area with most recaptures being made in the same major area after a time span that ranged from 35 to 470 days. An exception was one return which was recaptured on the same day and area it was tagged. Another recapture, tagged by our netting crew in the fall of 1980 was re-caught, 1,864 days and 18 miles (direct line) southeast of the tagging point. One dead tagged lake trout was recaptured 9 days after tagging; the fish was snagged by a fellow tagger in

the same area tagged. The tagger described this fish as being stressed more than usual during tagging and that its post-tagging recovery had been slower.

Fish Lengths

Lake Trout. - The average size and weight of the angler caught lake trout tagged during 1986 (total of 155) and 1987 (total of 235) was 31.3 inches-13.8 pounds and 30.6 inches - 12.5 pounds, respectively. The size range of these fish varied from 14 to 42.5 inches with the heaviest fish weighing 35 pounds. Approximately one-third (27.7 and 30.6 percent from 1986 and 1987) of each year's catch were small lake trout less than 28 inches. A 28-inch limit, representing fish weighing less than 10 pounds, was imposed during the 1986-88 fishing seasons. This regulation was changed to restrict the daily catch to one large trophy size trout and to liberalize the possession limit of the smaller trout. The limit allows:

> -only 1 lake trout larger than 28 inches can be included in the aggregate bag limit of 5 trout. Species included in the aggregate are cutthroat, bull, brook, rainbow and lake trout.

The possession limit, from May, 1982 through April, 1986, was one fish per day. Prior to May, 1982 the lake trout limit was part of an aggregate trout limit of 10 pounds and one fish; not to exceed 10 fish. This limit was clarified to allow at least two fish regardless of the weight limit.

A comparison of 573 angler caught lake trout in the past from three major angler harvest programs on the lake (Robbins, 1963, Graham and Fredenberg, 1982 and Hanzel, 1986) and the present angler coop program shows some size fluctuation (Figure 1); however, the average size and weight of lake trout from 1960 to the present has not decreased as was generally perceived by most anglers (Table 1). To the contrary, fewer smaller fish (less than 28 inches) have been represented in the catch during the past two fishing seasons. It was anticipated that with a liberalization of the of the lake trout limit more smaller fish would be harvested; however it failed to materialize.

Table 1. The number, average length, average weight, and percent of fish less than 28 inches of angler caught lake trout from Flathead Lake, 1960-1987.

Year	No.	Avg. Lgth. -inches-	Avg.Wt. pounds-	Percent Less than 28"
1960's	65	27.7	10.21	49.2
1970's	9	29.4	9.33	44.4
1981	51	31.4	13.72	23.5
1985	58	27.4	10.43	63.8
1986	155	31.3	13.80	27.7
1987	235	30.6	12.50	30.6

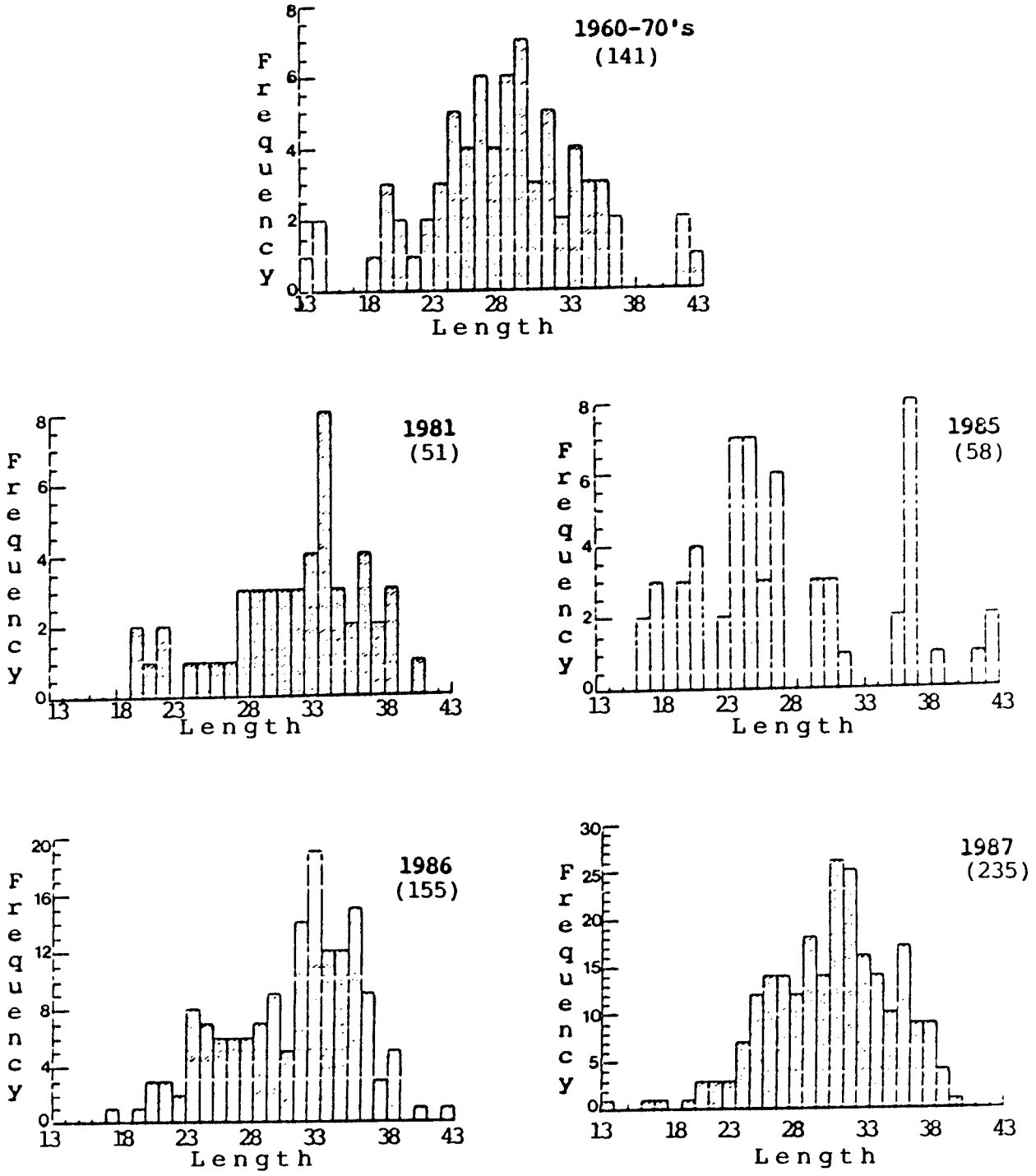

Figure 1. Length frequency histograms, 1 inch length interval of angler caught lake trout from Flathead Lake, 1960-1987. Number in parenthesis is sample size.

A regression analysis, following the multiplicative model ($Y = aX^b$), of length and weight was made for the group data from 104 measurements from 1960-70 and 325 measurements from 1986-87. Strong relationships were represented in both groups with correlation coefficients of 0.9889 and 0.9303, respectively. A comparison of the formula is as follows:

1960-70	Weight =	-9.251 x Length ^3.4808
1986-87	Weight =	-8.197 x Length ^3.1027

A predicted weight from a 28.0 inch trout from each of the above formula would yield comparable weights of 8.51 and 8.57 pounds. Standard errors of the estimates are 0.1505 and 0.1826, respectively.

Bull Trout. - The average size of the angler caught bull trout tagged during 1986 (total of 77) and 1987 (total of 58) was 20.7 and 19.9 inches, respectively. The size ranged from 9.0 to 32.0 inches. River tagged bulls (ave. length 20.6") were 0.7 inches larger than lake tagged fish and represented more large adult fish (fish moving up-river on their spawning migration) than those that were tagged in the lake (Figure 2). Weights were taken on a portion of the fish tagged; however, the numbers were disproportionate to the size structure within each area so an average would be meaningless. A regression analysis of 54 measurements of length and weight (Multiplicative model) was made yielding a correlation coefficient of 0.9393. A predictive formula of weight from length is as follows:

Weight = -8.7013 X Length ^3.248

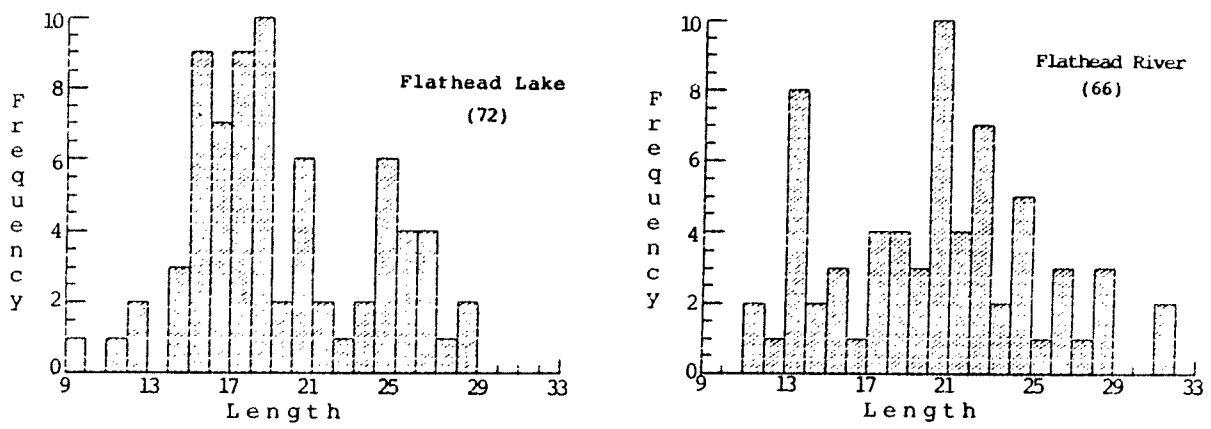

Figure 2. Length frequency histograms, 1 inch length interval, of angler caught bull trout from Flathead Lake and Flathead River, 1986-1987. Number in parenthesis is sample size.

Cutthroat Trout. - The average size of 390 angler tagged cutthroat trout (18 in 1985, 191 in 1986, 181 in 1987) in the Flathead River was 15.5 inches (Figure 3). The average size by year was 15.8, 15.8 and 15.2 inches, respectively. The general size of the fish caught in the winter periods appears to be larger (increases of approximately 2.0 inches) than those caught during the summer (Figure 4). The decrease size of summer fish reflects the presence of more of the smaller emigrating cutthroat smolt in this river section on their way to the lake. The 3-month average lengths of river cutthroat trout ranged from 12.4 to 17.9 inches.

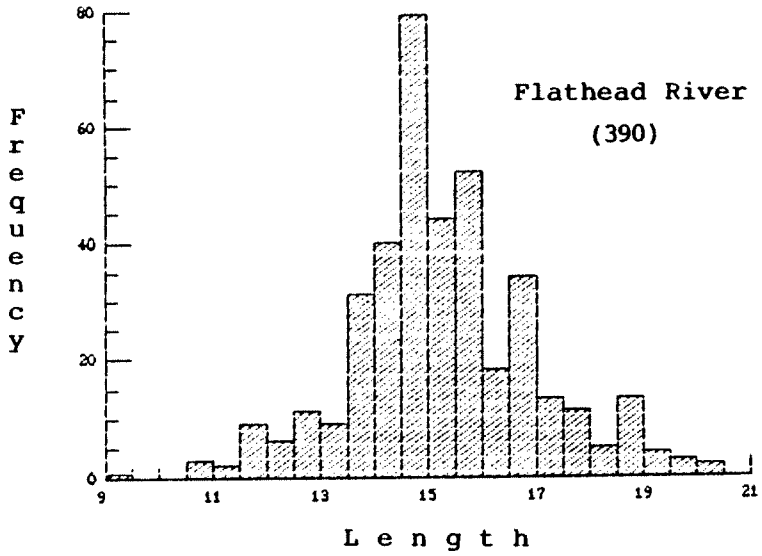

Figure 3. Length frequency histogram, 1/2 inch length intervals, of angler caught cutthroat trout from the Flathead River, 1985-1987. Number in parenthesis is sample size.

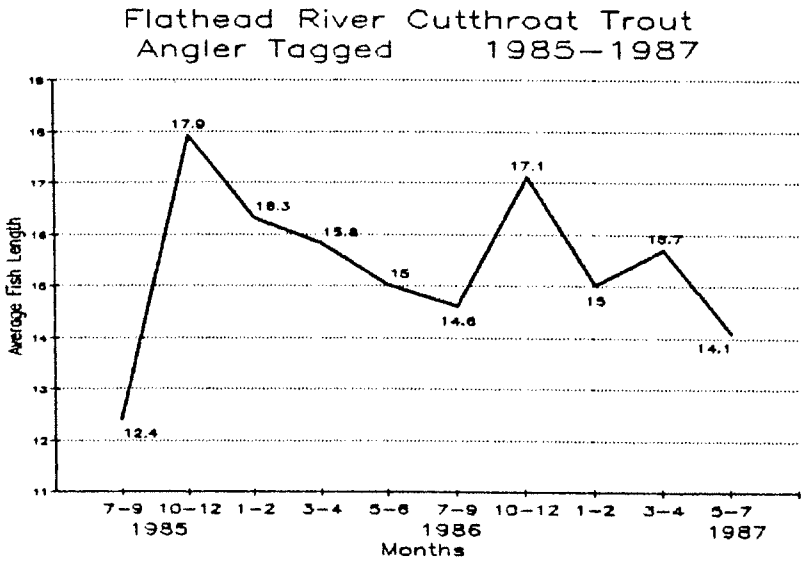

Figure 4. Average lengths of angler caught cutthroat trout from the Flathead River by periodic seasons, 1985-1987.

RECOMMENDATIONS

The age and length of angler creel composition and growth analysis collectively provide an index of evaluation for the target species in Flathead Lake. These parameters have been monitored in the past and now can be used to establish a baseline from which changes can be evaluated. Each parameter describes specific conditions about these species and assists in interpreting population changes.

Present trends in the target species populations seem to be fluctuating as they possibly respond to changes in river flows resulting from more stabilized flow releases from Hungry Horse Dam into the Flathead River recommended for improved kokanee reproduction. A continuation of the monitoring of these parameters in the lake and/or river would aid in interpreting and evaluating the status during the next four years. Continued monitoring would also aid in evaluating target species numbers and/or growth responses to impacts resulting from fluctuating lake levels or possibly to the rapidly increasing numbers of Mysis shrimp in the lake.

It is recommended to continue to monitor the following target species population parameters:

1. Size and age composition of lake and river fish by species, gathered from angler interviews, electrofishing, and gillnetting.
2. Annual growth and food habit preferences by species.
3. Annual angler catch and success by area.

It is recommended to continue monitoring of indices until the salmon population stabilizes to evaluate the degree of inter-specific competition and to preserve the trophy sized fishery for bull and lake trout in the system.

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Date: September 8, 1987

Waters referred to: Flathead Lake 07-6400-01
Flathead River 07-1560-01

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