

FINAL REPORT

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FEDERAL AID IN FISHERIES RESTORATION ACT

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Federal Aid Project F-4-R-21

Region 2-A Fisheries Studies

Objective 8: Evaluation of the Tailrace Fishery of Possum Kingdom Dam
Project Leader: Allen Forshage

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November 14, 1974

Abstract

A two-year creel survey was conducted on the Brazos River below Possum Kingdom Reservoir. The survey was designed to measure the recreational and economical outputs provided by the fishery before and after stocking catchable rainbow trout. Substantial increases in fishing pressure and fishermen harvest were recorded after the introduction of the trout. Economic information collected indicated that benefits derived by the trout fishery are substantially higher than the cost to maintain it.

Federal Aid Project F-4-R-11

Region 1-A Fisheries Studies

Objective: Evaluation of the Native Fishery of Possum Kingdom Dam
Project Leader: Allen Forshaw

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November 14, 1974

FINAL REPORT

State: Texas Report Number: F-4-R-21

Project Title: Region 2-A Fisheries Studies

Study Title: Evaluation of the Tailrace Fishery of Possum Kingdom Dam

Period Covered: January 1, 1972 through December 31, 1974

Objective Number: 8 Job Number: 8

Objective:

To determine the desirability of maintaining a "put and take" fishery of catchable rainbow trout, Salmo gairdneri, in the tailrace waters of the Brazos River below Possum Kingdom Dam, Palo Pinto County, Texas.

Background:

In 1971 a 20 mile section of the Brazos River below Possum Kingdom Reservoir was investigated for the possibility of a trout fishery. The investigation indicated that suitable trout habitat did exist in the first four miles of river below the dam (Forshage, 1972). To further categorize this section of the river with respect to fishing pressure and harvest, a creel survey was made during 1972. A second year of creel survey was made during 1973 after the introduction of catchable rainbow trout. Creel surveys during the two years were designed to determine if stocking catchable rainbow trout is an economically and recreationally sound fishery management practice.

Description of Study Area:

This study was accomplished on a section of the Brazos River 18 miles northwest of Mineral Wells in Palo Pinto County, Texas at latitude 32° 55" and longitude 98° 30". The study area began at the stilling basin below the Dam of Possum Kingdom Reservoir and extended 2.6 miles downstream (Figure 1). The physical features and limnological characteristics of this section of the river have been described by Forshage, 1972.

Procedures:

Measurements of the recreational and economical outputs provided by the fishery of the Brazos River were made by a creel survey. The survey was conducted monthly during 1972 and 1973. Two consecutive weekdays and two consecutive weekend days, randomly chosen, were surveyed each month. During periods of low use, a complete check of all anglers could be made by checking the river every two hours from dawn until dusk. During periods of high use two survey stations were established at the only two access points. Each station was manned by a survey clerk during daylight hours. Daily

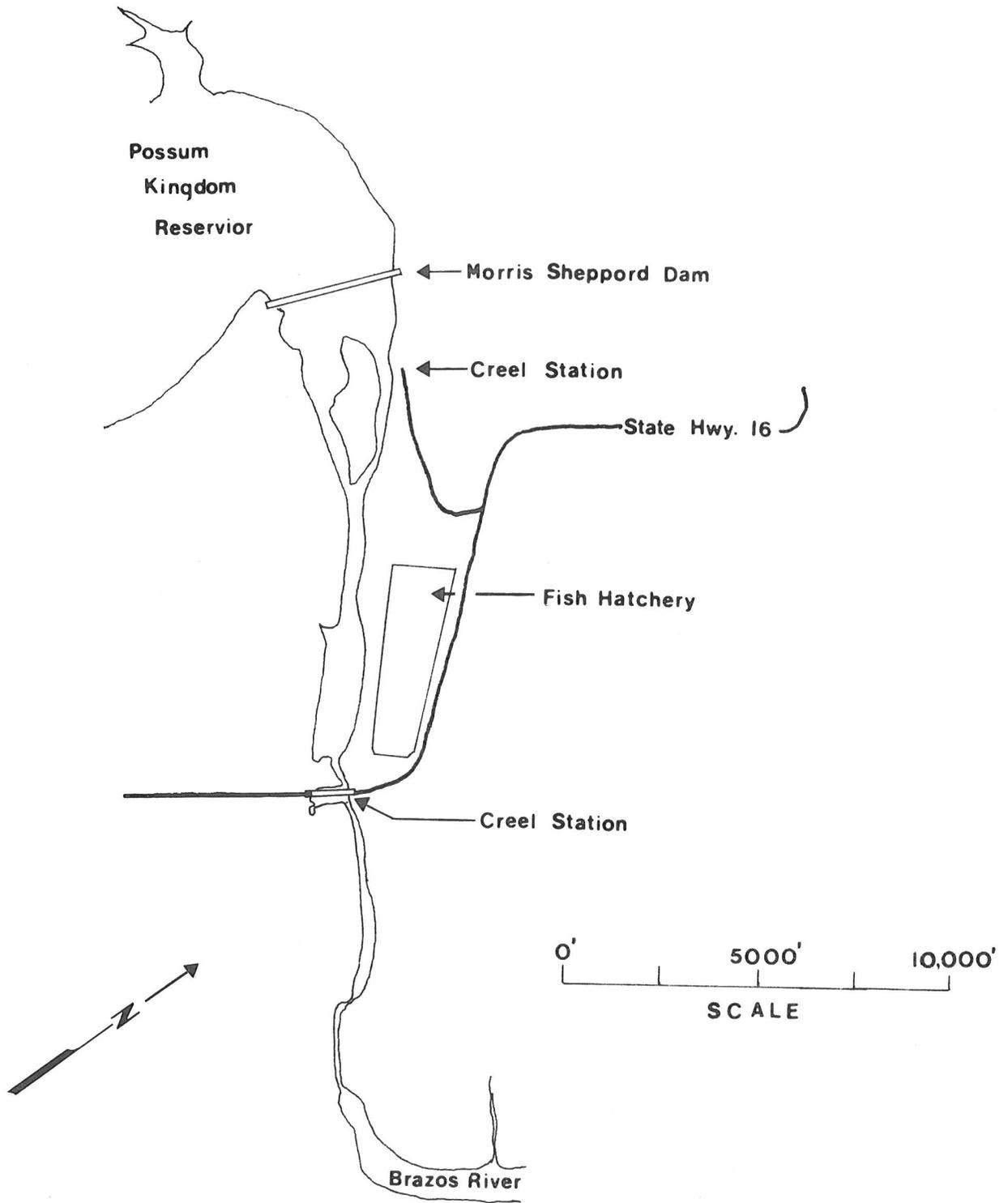


Figure 1. The Brazos River, Palo Pinto County, Texas showing the extent of the study area and creel stations.

surveys varied in duration depending on the number of daylight hours and density of fishing pressure. The minimal period covered was 8 A.M. to 5 P.M., but the survey often enclosed a broader time span during the summer months.

Creel survey data and economic information collected during fisherman interviews were recorded on a survey form. Creel information reflected the duration of each fishing trip, the number of anglers in party, total hours fished by all members of the party, angling methods, and the number and species of all fish in the creel. Economic information recorded indicated the amount of money spent in the immediate area for lodging, bait, tackle, food, ice, and refreshments. In addition, the county of residence and miles traveled were recorded.

Estimates for the number of fishermen, man-hours fished, fisherman harvest by species, and total expenditures were calculated for each survey stratum (week-end and weekdays) for each month. Averages for survey parameters were obtained from observed values for days surveyed and expanded by the number of days in each survey stratum for each month. These values for each month were then totaled to obtain yearly estimates.

Results:

Characteristics of the Fishery

During 1972 an estimated 4,744 anglers fished the Brazos River tailrace. The total fishing pressure during the year was estimated to be 11,300 man-hours. The total fisherman harvest was calculated to be 8,431 fish which was dominated by sunfish species. Other species caught and their estimated number and catch rate is shown in Table 1.

In 1973, after the introduction of trout, the estimated number of anglers who fished the tailrace increased by 203%. The total fishing pressure increased by 28,999 man-hours. Fisherman harvest increased 144% and the catch composition changed considerably (Table 1).

Composition of the Catch

Twenty species of fish were caught by anglers during the study. Sunfish species (redbreast, green warmouth, bluegill, longear, and redear sunfish) were generally the most abundant species in the catch during 1972 and second most abundant during 1973. Largemouth and spotted bass were the most sought after species during 1972. These species declined in importance, with respect to angler preference, after the introduction of trout. Catch rates of bass decreased during 1973, but the total harvest only decreased by 15% from 1972 catches, Table 1.

Table 1. Catch composition and catch rates of fishermen from the Brazos River below Possum Kingdom Reservoir for 1972 and 1973.

Species	1972			1973		
	Number of Fish Caught	Percent of Total	Catch per Man-Hour	Number of Fish Caught	Percent of Total	Catch per Man-Hour
Gar	96	1.14	0.01	11	0.05	0.01
Trout				7854	38.18	0.21
Carp	1011	11.99	0.09	1945	9.46	0.05
Suckers*	15	0.18	0.01	17	0.08	0.01
Buffalo	154	1.85	0.01	75	0.36	0.01
Catfish	733	8.69	0.07	1748	8.50	0.06
White Bass	573	6.80	0.05	341	1.66	0.01
Sunfish	3963	47.00	0.34	4929	23.96	0.10
Bass*	1180	14.00	0.11	1009	4.91	0.03
Crappie	104	1.23	0.01	416	2.02	0.01
Drum	602	7.12	0.05	2225	10.82	0.06
Total	8431	100.00	0.75	20,570	100.00	0.56

* Suckers - This group consisted of river carpsucker and gray redhorse sucker.

** Bass - This group consisted of the largemouth bass and spotted bass.

Catfish angling was characterized by a peak in angler harvest during July through October. Channel catfish comprised 98% of all catfish species caught. The remaining 2% were composed of flathead catfish and black bullhead catfish. Harvest of catfish in 1973 increased by 138% over the 1972 harvest. This increase can be explained by the change in fishing methods. Trout fishermen using corn and cheese as bait were effective in catching channel catfish.

Few fishermen actually fished for crappie, white bass, gar, carp, drum, buffalo and river carpsuckers. These species were usually caught incidentally while fishing for other species.

In 1973, approximately 16,000 catchable rainbow trout, divided into five stockings through the year, were introduced into the Brazos River. The average catch rate during the year was calculated to be 0.21 trout per man-hour. The catch rate ranged from 0.56 to 0.01 trout per man-hour. An estimated 49% of all trout stocked in the river were harvested during 1973.

The estimated catch rate of all fishes during 1972 was calculated to be 0.75 fish per man-hour. After the introduction of trout the catch rate decreased to 0.53 fish per man-hour. This decrease was attributed mainly to the large number of inexperienced fishermen who were attracted to the area by the publicity of the trout stocking.

Seasonal Trends in Fishing Pressure and Harvest

The estimated fishing pressure by month was used as a criterion for determining seasonal trends in angler effort for 1972 and 1973, Figure 2. Before the stocking of trout, angler effort was low in winter, high during spring and summer, and intermediate in the fall. After the introduction of trout, fishing pressure was highest during the winter and spring with a gradual decline through the summer and fall. As indicated by Figure 2 the fishing pressure was substantially higher during 1973.

Fisherman harvest showed a similar relationship to seasonal trends, Figure 3. In 1972 fisherman harvest reached a peak during late spring and early summer and declined in the fall and winter. During 1973 fisherman harvest was highest in the winter and lowest in the summer. Fisherman harvest during the summer months for both years was similar.

Increases in fishing pressure and fisherman harvest during 1973 were a direct result of the trout stocking. The introduction created an interest and utilization of the tailrace fishery during normally low use and harvest periods.

Fisherman Dollar Yield and Benefit

During 1972, an estimated 2,190 fishing parties, expending an average of 3.3 hours per trip, fished the Brazos River. Fishermen parties spent an average of \$4.80 per trip and harvest on average of 3.9 fish. Expenditures

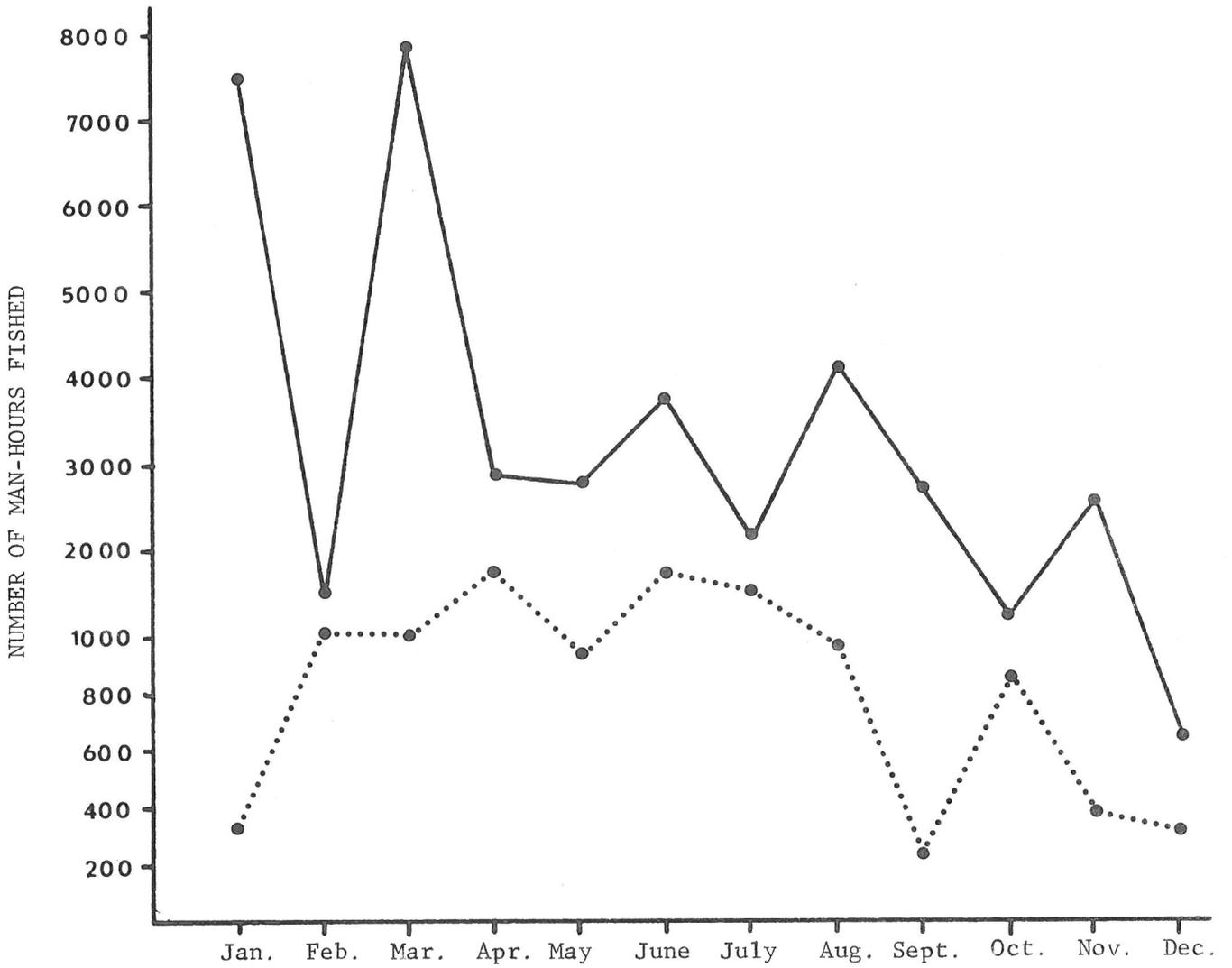


Figure 2. Seasonal trends in fishing pressure on the Brazos River during 1972 (.....) and 1973 (—).

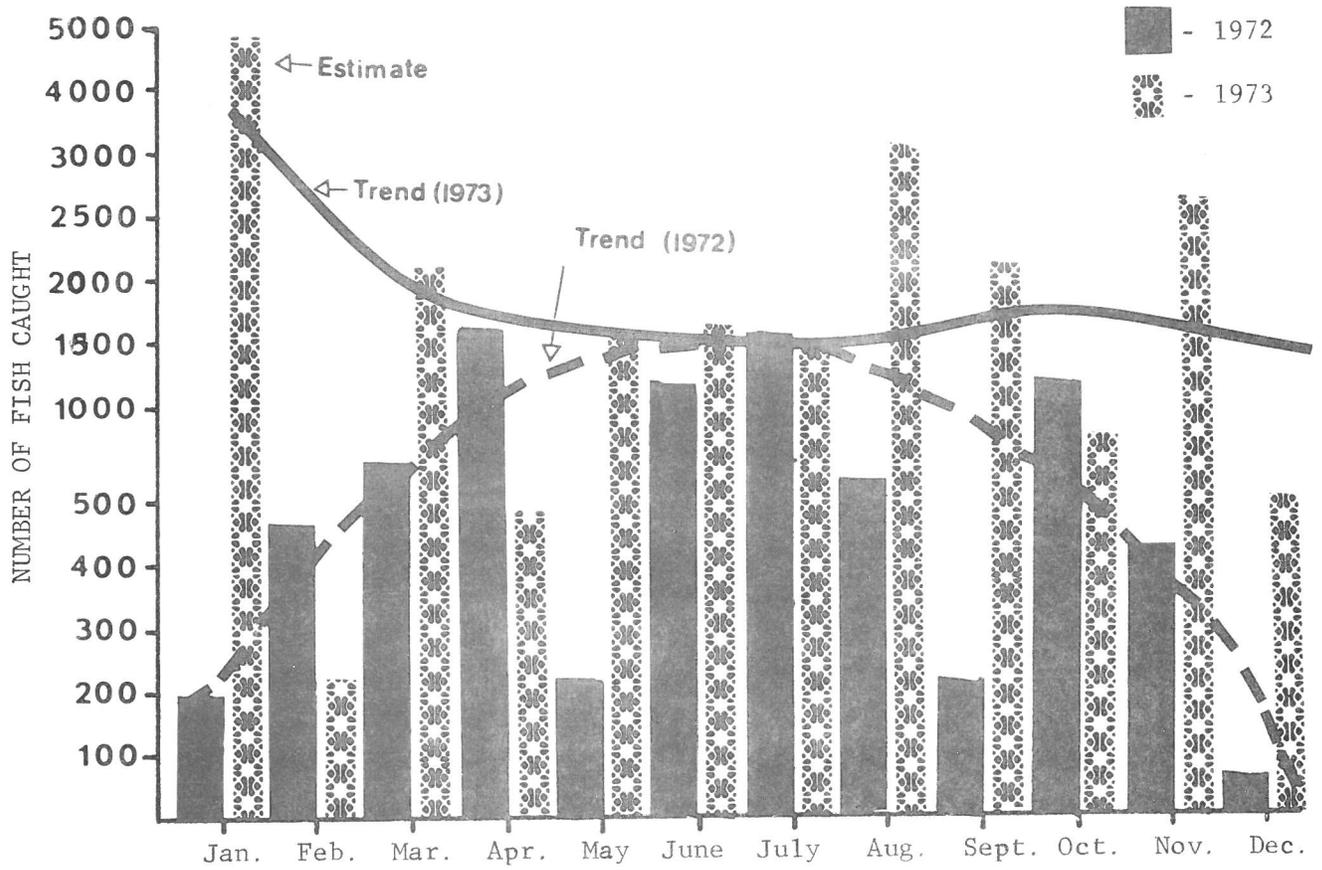


Figure 3. Seasonal trends in fisherman harvest from the Brazos River during 1972 and 1973.

represent only what the anglers spent in the immediate area for bait, tackle, food, ice and refreshments. During 1973, an estimated 6,576 fishing parties fished the tailrace. Anglers fished an average of 2.7 hours per trip and harvested 3.1 fish at an average cost of \$4.00 per trip. This represents a \$15,833.00 increase in money spent by anglers on the fishery of the Brazos River tailrace.

There are two measurable benefits generated by a sport fishery: number or pounds of fish creel and hours of recreation provided. Measurements of both parameters were made before and after the stocking of trout. Based on data collected, the number of fish harvested in 1973 increased by 12,837 fish and fishing pressure increased by 28,999 man-hours. These increases were a direct result of the trout stocking.

The cost of stocking the 16,000 trout was estimated to be \$2,500.00. This is based on hatchery rearing and stocking cost provided by the New Mexico trout hatcheries production records.

Conclusions:

Creel surveys during 1972 indicated little fishing was done on the Brazos River tailrace below Possum Kingdom Reservoir. Most of the fishing pressure on the river was directed towards largemouth bass, sunfish species, and channel catfish.

The introduction of trout during 1973 created an interest in the fishery. This resulted in increased utilization, especially during the winter months. It also resulted in an increase in the harvest of warm-water fishes. During 1973, an estimated 12,716 warm-water fishes were added to the creel. This represents an increase of 51% over the 1972 harvest.

The creel survey also indicated that a good trout fishery was provided. The number of trout harvested by fishermen indicated a sufficient rate of return to justify continuation of the stocking program.

Economic information collected indicated that benefits derived by the trout fishery are substantially higher than the cost to maintain it.

Literature Cited

Forshage, A. 1972. Investigation of a portion of the Brazos River. Job progress report. (Job No. B-42), Fed. Aid. in Fish Restoration Project F-4-R-18, Texas Parks and Wildlife Department. 13 p.

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Date: November 14, 1974

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