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EFFECTS OF "TROPHY" AND "FISH-FOR-FUN" REGULATIONS
ON FISH POPULATIONS IN LAKES OF SYLVANIA¹ ✓

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ABSTRACT

The 21,000-acre Sylvania Recreation Area, part of the Ottawa National Forest, in Gogebic County, Michigan, was opened to the public as a semi-wilderness in 1967. Fishing was permitted under "trophy" and "fish-for-fun" regulations. Prior to the opening, the tract had been a private estate and fishing in the lakes had been light. Under the "fish-for-fun" regulation, all fish taken had to be returned to the water. Under the "trophy" regulation, bass could not be kept unless they were a minimum size of 18 inches, lake trout--30 inches, walleye--20 inches, and northern pike--30 inches, while for all other fish there was no size limit. The creel limit for the first group, under the "trophy" regulation, was two singly or in combination, while for the second group it was 10 fish daily. Only artificial lures could be used.

The fish populations have been monitored with experimental gill nets in October of most years. In 1966, before the tract was opened to the public, an attempt was made to sample the fish populations in most of the lakes. In succeeding years, eight lakes have been sampled again from one to four times. Of these eight lakes, four were under the "trophy" regulation, two were under the "fish-for-fun" regulation, and two had the regular statewide regulations. Judging from the catch per effort of the smallmouth bass in the gill-net collections, bass 18 inches or larger, as well as those in the category 15.0 to 17.9 inches, have decreased substantially in numbers under the "trophy" regulation. Because of poor samples no judgment can be made on the change in abundance of bass under "fish-for-fun" and statewide regulations. There were no obvious changes in numbers of lake trout, walleyes and northern pike. With the decrease in large, old bass there was no increase in numbers of yellow perch or white sucker, with the exception of the latter species in one lake. As a result of the decreases in numbers of large bass the fishing regulations for 1975 were changed; under the new regulations no bass may be kept regardless of size. Minimum sizes for lake trout, walleyes and northern pike remain the same. For these three, only one fish may be kept each day. For the other species, the daily limit is 10 singly or in combination and there is no size limit. Only artificial lures may be used.

The low harvest potentials of 1.4 to 4.5 pounds of fish per acre for the Sylvania lakes suggest that fishing for fun is the only way to provide a satisfactory angling experience for more than a few people. Apparently "trophy" fishing for smallmouth bass leads to harvests greater than the minimum size limits allow, and "fishing-for-fun" is the best alternative.

¹✓ Contribution from Dingell-Johnson Project F-35-R, Michigan.

Introduction

The 21,000-acre Sylvania Recreation Area containing 36 named lakes, part of the Ottawa National Forest, is located in Gogebic County, 6 miles southwest of the town of Watersmeet in the Upper Peninsula of Michigan. In 1967 it was opened to the public and since then has been managed as a semi-wilderness with restrictions on access, motorized travel and other public use. Fishing was permitted under "trophy" and "fish-for-fun" regulations. The intent of these regulations was to maintain the populations of large, old game fish which existed in many of the lakes before the Sylvania tract was opened to the public. Prior to the opening, the tract had been a private estate and fishing on the lakes had been light. Under the "fish-for-fun" regulation all fish taken had to be returned to the water. Under the "trophy" regulation bass could not be kept unless they were a minimum size of 18 inches, lake trout--30 inches, walleye--20 inches, and northern pike--30 inches, while for all other fish there was no size limit. The creel limit for the first group, under the "trophy" fishing regulation, was two singly or in combination, while for the second group it was ten fish daily. Only artificial lures could be used.

It appeared from some of the test netting that the populations of game fishes, particularly bass, were declining under the "trophy" fishing regulations, even with the very high minimum sizes in force. The possible depletion of smallmouth bass was considered for four of the lakes in Sylvania by Clady, Campbell and Cooper (1975). In general, the lakes in the tract are unproductive, growth of the fishes is slow and recruitment is variable (Clady, 1970).

The objective of this report is to determine the effects of "trophy" and "fish-for-fun" regulations on populations of smallmouth bass, walleye, lake trout, northern pike and associated fishes in the lakes of the Sylvania tract by analysis of catch per effort and age structure of fish populations caught in gill-net collections made in October during 1966 to 1974.

Methods

In 1966, before the tract was opened to the public, an attempt was made to sample with nets the fish populations in most of the lakes. In the succeeding years through 1974 (except 1968) some of the lakes have been sampled again. To date eight lakes have been sampled more than once. Of the eight--Loon, Clark, Whitefish and High lakes have been under the "trophy" regulation; Deer Island and Mountain have had a "fish-for-fun" regulation, and Big Bateau and Long lakes have had regular statewide regulations. The latter two lakes are located on the edges of the tract and have always been open to public fishing.

Samples of the fish were taken in monofilament nylon gill nets of the experimental type. The nets, 125 feet long and 6 feet deep, consisted of five 25-foot panels of 1 1/2-, 2-, 2 1/2-, 3-, and 4-inch stretched mesh. The nets were set at random within each general habitat zone of a lake (shallow shoreline, gravel bars, etc.) usually in three gangs of four nets apiece. The average set was 20 hours overnight. Most fish captured were measured to the nearest 0.1 inch; a scale sample was taken from some. Impressions of the scales were made on cellulose acetate slides and age was determined from the scale image magnified with a microprojector.

An attempt was made to release all fish unharmed. Clady et al. (1975), commenting upon bass captures, stated, "The only large fish that appeared distressed upon release were several with bloated air bladders which were netted from very deep water and had not adjusted to changes in atmospheric pressure. Trophy-sized fish were usually only lightly entangled in the nets by the snout and forward part of the head. A few smaller bass, which became more completely enmeshed in the nets, may have died after release."

Catch per effort was calculated by dividing number of fish caught by total hours of fishing by each net. It was used to measure relative abundance of different fishes and abundance of different sizes of smallmouth bass.

Results

Catch per effort for all sizes of smallmouth bass captured in the experimental gill nets, for those bass 15.0 to 17.9 inches long, and those 18 inches or larger in the eight study lakes is given in Table 1. For the four lakes under the "trophy" fishing regulation--Loon, Clark, Whitefish and High--there was no indication in the catch per effort of a decline in bass of all sizes except in Loon Lake in 1972. However the number of bass in Loon appeared to decline so drastically between 1970 and 1972 that the question of 1972 sample being aberrant arises. The catch per effort for those bass 15.0-17.9 inches long in Loon and Clark lakes appears to have declined about one-half or more in 3 to 4 years. In Whitefish and High lakes there was no change. For those bass 18.0 inches or larger the catch per effort has decreased about 10-fold in 3 to 6 years in Loon and Clark. In Whitefish and High lakes there were few or no bass of this size in the original sample and none in the second sample.

Unfortunately for the remaining lakes--Deer Island and Mountain under the "fish-for-fun" regulation, and Big Bateau and Long under the normal statewide regulations--either the 1966 or the second sample was insufficient. In Deer Island Lake, there appeared to be a substantial increase in all categories of catch per effort. Under complete protection from harvest some increase in population might be expected but not to the degree and within the time span (1966-1971) involved. In Mountain Lake, there appeared to be an increase in population size in 1971 compared with 1966 but the 1966 sample was very inadequate.

For Big Bateau Lake, under the normal statewide regulations of a 10-inch minimum size and creel limit of 5 fish, the catch per effort increased from 1966 to 1973; on Long Lake it appeared to decrease substantially from 1966 to 1973. In the first case the first sample undoubtedly is inadequate, and in the second case the second sample is inadequate also.

The catch per effort for the common species of fish, other than smallmouth bass, found in the eight lakes is given in Table 2. With the

decline of the larger, older bass there was some concern among fisheries managers that there would be a corresponding increase in such species as yellow perch and white sucker. In none of the lakes has there been an increase in yellow perch indicated by the catch per effort except Big Bateau which has been under the statewide regulations and probably has not had an accumulation of larger bass in recent years.

In 1973 yellow perch were taken in Clark Lake. Although they had been reported in the lake in 1966 by Mr. Carlie Giese--the caretaker of the Sylvania Tract before it became Forest Service property--they had not been caught in the 1966 and 1969 netting. Perhaps this can be interpreted as an increase in the perch population but further samples are needed to document substantial population growth.

The white suckers have increased only in Loon Lake. In all of the other lakes there has been either a decrease in the catch per effort or no change for this species.

The numbers of lake trout in Clark and High lakes, under the 30-inch minimum size limit, have not changed. Likewise the walleye and northern pike in Whitefish Lake have not decreased in numbers under the respective minimum sizes of 20 and 30 inches.

The average total length in inches and number of smallmouth bass for each age group, for two or more years of collection, in the eight study lakes are given in Table 3. The growth of bass in these lakes is considerably below the average for the state of Michigan, as Clady et al. (1975) illustrate for four of the lakes. The decrease in numbers of older, larger bass is also apparent from the age-group distributions for Loon and Clark lakes.

Clady (1975) demonstrated for the Sylvania lakes the relationship between strength of a year class of smallmouth bass and June-October air temperature during the first year of life of the bass. Abundant year classes occurred in years of warm air temperatures. This same relationship can be seen in the numbers of fish in each age group in Table 3. For example, 1966 was a relatively warm year at Sylvania (Clady, 1975) and so the number of bass in age-group VI in 1972 from Loon Lake is relatively

larger than numbers in other age groups in that collection; likewise for age-group VII in 1973 for Clark Lake; age-group V in 1971 from High Lake and so forth. All of these age groups originated in 1966.

The average total length in inches, with number of fish in parentheses, for each age group of the common species of fish found in the Sylvania lakes that were sampled twice is given in Table 4. Growth of the species of fish adequately sampled is less than average growth in Michigan (Laarman, 1963) with the exception of the lake trout. Growth of the lake trout appears to be better than most observed growth for the species country-wide (Carlander, 1969). In Clark Lake no young lake trout (age-groups II and III) were taken in the first sample in 1966. In the second sample taken in 1973, the young were well represented but there were few older, larger trout as were evident in 1966. In High Lake the opposite was true for the lake trout. The 1971 sample in comparison with the 1966 sample was better represented by the older, larger trout than the younger ones. None of the species of fish had obvious correlations between year class abundance and air temperatures as did the smallmouth bass.

Discussion

The fishing does not appear to have had any influence on the abundance of the fishes of Sylvania except the smallmouth bass. It was to be expected that the numbers of bass 18 inches and larger would decline drastically under the minimum size limit of 18 inches. It was not expected that there would be a decrease in numbers of bass 15.0 to 17.9 inches, particularly when only artificial lures could be used to fish, which should reduce hooking losses to a minimum. Clady et al. (1975) speculated on reasons for the large losses of bass of this size but illegal removal is probably the most likely. Presumably "trophy" fishermen could not resist keeping large fish even if the fish were less than 18 inches long.

As a result of the decreases in the numbers of large bass the fishing regulations were changed for 1975. Under the new regulations

no bass may be kept regardless of size. Only artificial lures may be used. The minimum size for lake trout remains 30 inches, for walleye--20 inches, and northern pike--30 inches. Of the latter three species not more than one fish may be kept each day. For all other species the daily limit is 10 singly or in any combination. There is no size limit on other species.

Clady (1970) calculated the average ratio of age-specific production to standing crop for smallmouth bass of age IV+ in Katherine Lake in the Sylvania Tract to be 0.27 and for largemouth bass in Cub Lake, 0.13. The respective standing crop estimates were 9.7 pounds per acre of smallmouth bass and 28.8 pounds per acre of largemouth. If anglers harvested the available bass production for these two lakes, Katherine Lake would have a harvest of 2.6 pounds per acre of smallmouth bass and Cub Lake would have a harvest of 3.7 pounds per acre of largemouth bass. The standing crop of 9.8 pounds per acre of yellow perch in Cub Lake would probably increase the total harvest for that lake by 1 or 2 pounds. In Schneider's (1975) classification of lakes, harvest can be estimated from indices of climate, panfish abundance, vegetation and Secchi disc readings. For the Sylvania lakes considered in this report, vegetation is sparse, Secchi disc reading is about 20 feet (Crumrine and Beeton, 1975), and the fraction of panfish to total sport fish (by weight) presumably ranges from 0.0 to 0.5. With these parameters the harvest is estimated with the Schneider equation to be between 1.4 and 4.5 pounds per acre, which is in good agreement with Clady's data.

The low harvest potentials suggest that fishing for fun is probably the only way to provide a satisfactory angling experience for more than a few people. Information to date suggests that trophy fishing for smallmouth bass leads to harvests greater than the minimum size limit allows and fishing for fun is the best alternative.

The populations should be monitored by netting as they have been in the past. Samples taken every 2 or 3 years from the lakes considered in this report, as well as others in the tract, should provide an evaluation of the fishing regulations and the changes in the fish populations.

Table 1. --Catch per effort (net-hour) for all sizes of smallmouth bass captured in gill nets, for those bass 15.0 to 17.9 inches long, and for those 18 inches or longer, in eight lakes of the Sylvania tract

Lake	Year	Total net-hours	Total fish	Catch per effort		
				All sizes	15.0-17.9 inches	≥ 18.0 inches
Loon	1966	400	113	0.28	0.12	0.0350
	1967	200	114	0.57	0.22	0.0350
	1969	334	209	0.63	0.15	0.0240
	1970	564	210	0.37	0.06	0.0089
	1972	415	23	0.06	0.01	0.0024
Clark	1966	322	50	0.16	0.08	0.0217
	1969	792	67	0.08	0.04	0.0025
	1973	732	80	0.11	0.01	0.0027
White-fish	1966	272	11	0.04	0.02	0.0037
	1970	314	30	0.10	0.02	0.0000
High	1966	130	44	0.34	0.04	0.0000
	1971	232	89	0.38	0.03	0.0000
Deer Island	1966	102	8	0.08	0.00	0.0000
	1971	440	268	0.61	0.12	0.0250
Mountain	1966	66	3	0.05	0.03	0.0000
	1971	219	25	0.11	0.01	0.0000
Big Bateau	1966	102	5	0.05	0.01	0.0000
	1973	288	119	0.41	0.03	0.0000
Long	1966	124	44	0.35	0.17	0.0300
	1973	267	8	0.03	0.01	0.0000

Table 2. --Catch per effort (net-hour) for the common species of fish other than smallmouth bass, captured in gill nets in eight lakes of the Sylvania tract
(Number of fish in parentheses)

Lake and year	Total net hours	Species							
		Yellow perch	Cisco	White sucker	Lake trout	Rock bass	Wall-eye	Northern pike	Blue-gill
<u>LOON</u>									
1966	400	0.14 (57)	0.20 (79) ^a	0.20 (78)	....	....	....	....	....
1967	200	0.14 (27)	0.30 (59)	0.34 (68)	....	....	....	....	....
1969	334	0.22 (72)	0.14 (48)	0.44 (147)	....	....	....	....	....
1970	564	0.20 (111)	0.06 (36)	0.40 (225)	....	....	....	....	....
1972	415	0.14 (58)	0.89 (371)	0.77 (318)	....	....	....	....	....
<u>CLARK</u>									
1966	322	....	0.47 (151)	0.12 (39)	0.08 (26)	0.24 (76)	....	....	....
1969	792	....	0.46 (364)	0.12 (93)	0.04 (30)	0.11 (85)	....	....	....
1973	732	0.03 (24)	0.41 (298)	0.03 (21)	0.08 (60)	0.44 (320)	....	....	....
<u>WHITEFISH</u>									
1966	272	0.11 (31)	....	0.03 (8)	....	0.01 (2)	0.17 (45)	0.02 (6)	....
1970	314	0.11 (36)	....	0.01 (4)	....	0.04 (12)	0.13 (40)	0.04 (11)	....
<u>HIGH</u>									
1966	130	0.06 (8)	....	....	0.05 (6)	....	....	....	....
1971	232	0.05 (11)	0.05 (12)
<u>DEER ISLAND</u>									
1966	102	0.44 (45)	0.51 (52)
1971	440	0.38 (167)	0.23 (103)

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Table 2. --concluded

Lake and year	Total net hours	Species							
		Yellow perch	Cisco	White sucker	Lake trout	Rock bass	Wall-eye	Northern pike	Blue-gill
<u>MOUNTAIN</u>									
1966	66	....	....	0.33 (22)	....	....	....	....	....
1971	219	....	....	0.31 (68)	....	0.03 (7)	....	....	....
<u>BIG BATEAU</u>									
1966	102	0.32 (33)	....	0.37 (38)	....	....	....	....	0.02 (2)
1973	288	1.30 (375)	....	0.09 (25)	....	....	....	....	0.04 (11)
<u>LONG</u>									
1966	124	....	....	0.08 (10)	....	....	0.08 (10)	....	0.18 (22)
1973	267	....	....	0.10 (27)	....	....	0.05 (14) ^b	0.03 (9) ^b	0.09 (23)

^a Partial count; many ciscoes not recorded.

^b Walleye and northern pike stocked in 1966 and 1973, respectively.

Table 3. --Average total length (TL) in inches and number (N) of smallmouth bass for each age group, for two or more years of collection, in seven lakes of the Sylvania tract

Age group	Loon Lake							
	1966		1969		1970		1972	
	TL	N	TL	N	TL	N	TL	N
I	5.8	4	....	..	....	..	....	..
II	7.4	3	6.2	1	6.1	1	....	..
III	10.2	9	7.8	11	9.7	2	....	..
IV	11.6	11	10.9	4	10.3	17	....	..
V	12.6	17	12.4	13	12.0	4	....	..
VI	14.5	9	14.4	3	13.7	11	13.1	11
VII	15.5	14	15.0	7	....	..	14.5	1
VIII	16.2	6	15.9	9	16.3	4	17.0	1
IX	16.4	11	17.2	5	....	..	....	..
X	17.0	7	17.4	6	....	..	18.1	2
XI	17.7	13	18.0	3	....	..	16.6	2
XII	18.2	7	18.9	2	....	..	....	..
XIV	18.2	1	19.2	1	18.0	1	....	..
Total	....	112	....	65	....	40	....	17

Age group	Clark Lake						Deer Island Lake			
	1966		1969		1973		1966		1971	
	TL	N	TL	N	TL	N	TL	N	TL	N
I	....	..	....	..	....	..	6.0	1	6.0	2
II	....	..	....	..	6.4	10	9.2	1	9.0	39
III	7.2	2	8.2	1	8.5	21	12.0	4	11.8	7
IV	....	..	9.6	3	10.2	14	....	..	14.0	5
V	11.3	3	12.1	16	11.8	4	....	..	15.0	3
VI	13.5	4	14.1	11	12.6	3	....	..	....	..
VII	15.4	8	15.2	6	14.2	23	....	..	16.3	5
VIII	15.6	6	16.2	10	14.1	2	....	..	....	..
IX	17.3	11	16.4	10	....	..	....	..	....	..
X	17.9	7	17.0	2	17.4	1	19.1	1
XI	18.4	5	19.3	1	18.8	2
XII	18.8	1	18.2	1
XIII	19.5	2
XIV	19.0	1
Total	50	61	80	6	62

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Table 3. (concluded) Average total length (TL) in inches and number (N) of smallmouth bass for each age group, for two or more years of collection, in seven lakes of the Sylvania tract

Age group	High Lake				Mountain Lake			
	1966		1971		1966		1971	
	TL	N	TL	N	TL	N	TL	N
I	5.8	1	6.2	4	....	..	....	..
II	7.7	3	8.2	13	....	..	....	..
III	9.8	15	10.0	9	....	..	9.3	3
IV	12.2	7	....	..	12.3	1	12.1	1
V	13.5	8	13.1	12	....	..	11.8	10
VI	13.9	3	14.5	3	16.0	1	12.8	3
VII	15.1	3	15.7	1	....	..	13.8	3
VIII	15.5	2	16.6	1	16.7	1	15.1	1
IX	15.8	1	....	..	....	..	....	..
X	....	..	....	..	....	..	15.5	1
Total	....	43	....	43	....	3	....	22

Age group	Big Bateau Lake				Long Lake			
	1966		1973		1966		1973	
	TL	N	TL	N	TL	N	TL	N
I	5.6	1	....	..	....	..	....	..
II	8.3	2	7.5	14	....	..	9.4	1
III	....	..	9.0	57	11.1	5	....	..
IV	....	..	11.3	32	13.2	4	13.2	3
V	13.9	1	14.4	8	14.4	5	....	..
VI	15.5	1	16.0	2	15.2	5	15.4	2
VII	....	..	16.5	5	15.9	4	16.2	2
VIII	....	..	....	..	16.9	6	....	..
IX	....	..	....	..	....	..	....	..
X	....	..	17.6	1	17.3	1	....	..
XI	....	..	....	..	18.0	1	....	..
Total	....	5	....	119	....	31	....	8

Table 4. --Average total length (TL) in inches and number (N) of fish for each age group of the common species of fish found in Sylvania lakes, 1966-1973

Age group	Clark Lake											
	Lake trout				Rock bass				Cisco			
	1966		1973		1966		1973		1966		1973	
	TL	N	TL	N	TL	N	TL	N	TL	N	TL	N
I	....	..	....	..	...	..	...	..	...	..	7.6	2
II	....	..	10.0	5	4.2	2	4.2	2	8.3	5	7.8	24
III	....	..	13.4	17	5.1	9	5.4	57	9.0	15	8.4	10
IV	18.2	8	18.3	24	6.0	4	6.3	102	9.0	1	9.2	11
V	21.1	5	24.9	9	7.5	2	7.1	38	...	..	11.9	4
VI	25.2	6	25.9	3	7.9	9	7.7	19	...	..	13.4	1
VII	28.1	3	28.4	1	8.2	6	8.0	29	...	..	...	..
VIII	31.5	2	....	..	8.8	1	8.5	5	...	..	...	..
IX	35.3	2	....	..	8.8	2	9.6	2	...	..	...	..

Age group	Clark Lake					
	White sucker				Yellow perch	
	1966		1973		1973	
	TL	N	TL	N	TL	N
II	....	..	18.3	3	6.6	5
III	16.9	10	18.8	18	6.9	7
IV	20.6	6	....	..	8.1	1
V	....	..	....	..	9.2	2
VI	....	..	....	..	11.5	1

Age group	High Lake							
	Lake trout				Yellow perch			
	1966		1971		1966		1971	
	TL	N	TL	N	TL	N	TL	N
II	15.3	1
III	19.7	4	8.0	1
IV	21.5	1	18.2	2	6.5	6	8.8	2
V	24.3	5	9.7	1
VI	24.8	3	10.0	1
VII
VIII	27.9	1

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Table 4. (concluded) Average total length (TL) in inches and number (N) of fish for each age group of the common species of fish found in Sylvania lakes, 1966-1973

Big Bateau Lake												
Age group	Yellow perch				Bluegill				White sucker			
	1966		1973		1966		1973		1966		1973	
	TL	N	TL	N	TL	N	TL	N	TL	N	TL	N
I	.....	..	.....	..	...	..	...	..	9.0	2	.....	..
II	7.6	2	.....	..	6.4	1	...	..	.....	..	17.8	1
III	9.0	5	7.2	15	...	..	7.8	3	17.0	1	18.0	24
IV	9.6	3	7.6	50	...	..	9.0	1	19.7	1	.....	..
V	10.3	8	9.5	18	...	..	...	..	20.1	5	.....	..
VI	11.5	12	10.4	24	10.3	1	9.6	1	21.2	3	.....	..
VII	12.5	4	12.2	8	...	..	9.4	6	.....	..	.....	..
VIII	.....	..	12.7	4	...	..	...	..	.....	..	.....	..
IX	.....	..	12.6	5	...	..	...	..	.....	..	.....	..
X	.....	..	13.6	1	...	..	...	..	.....	..	.....	..

Long Lake						
Age group	Walleye				White sucker	
	1966		1973		1973	
	TL	N	TL	N	TL	N
II	.....	..	15.6	10	10.6	3
III	.....	..	.....	..	14.9	7
IV	.....	..	.....	..	16.0	14
V	19.4	2	19.5	1	14.2	1
VI	19.8	1	21.0	2	21.0	1
VII	.....	..	.....	..	.....	..
VIII	.....	..	.....	..	18.4	1
IX	19.4	1	.....	..	.....	..
X	20.4	3	22.8	1	.....	..
XI	20.6	4	.....	..	.....	..

Long Lake								
Age group	Bluegill				Cisco		Northern pike	
	1966		1973		1973		1973	
	TL	N	TL	N	TL	N	TL	N
II	18.6	8
III	5.4	4	4.2	1	23.4	1
IV	6.5	2	4.7	19
V	6.7	1	5.3	1
VI	5.9	1	12.2	1
VII	6.0	1

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