OBSERVATIONS ON THE SYSTEMATICS OF JUVENILE WHITE STURGEON AND GREEN STURGEON 1/

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INTRODUCTION

The purpose of this report is to evaluate the dependability of certain taxonomic characters used to identify juvenile white sturgeon (Acipenser transmontanus) and green sturgeon (Acipenser medirostris). This was a necessary prelude to the start of other sturgeon studies, since previous workers experienced difficulty in identifying juvenile white and green sturgeon in the field.

This study is limited in its effectiveness, since only 35 fish were available for examination, and only four of these were green sturgeon.

Deep appreciation is extended to various members of the Department of Fish and Game who collected the fish, and to Harold Chadwick for his helpful supervision.

METHODS

Thirty-one of the fish were collected at the Tracy fish screens on Old River, eight miles northwest of Tracy, San Joaquin County, during August, September, and October of 1956 and 1958. Of the other four, two were caught in gill nets in the Sacramento River near Collingsville, Solano County, and two were collected in the Eel River near Fernbridge and Alton, Humboldt County.

All of the fish were aged by using cross sections of pectoral rays (Pycha, 1955).

The characters previously used in keys (Clemens and Wilby, 1949; Jordan and Evermann, 1896; Schultz, 1936) were selected for examination. These characters are the ratio between the distance from the snout to the barbels and the distance from the barbels to the mouth, the number of dorsal rays, the number of anal rays, the number of lateral scutes, and the number of gill rakers.

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The keys did not specify how counts and measurements should be made, so this had to be determined by trial and error. In this study, these counts and measurements were made in the following manner. (1) For fin rays the closest agreement with the keys was obtained by counting all the fin rays, regardless of size. (2) It was difficult to determine how the barbel-to-mouth distance should be measured, since either the inner edge of the lip or the edge of the ridge around the mouth appeared to be logical reference points. Therefore, both measurements were taken. The barbel-to-snout measurement is the numerator and the mouth-to-barbel measurement the denominator of the ratio. (3) Lateral scutes were counted only to the point at which they first turn upward at the base of the caudal fin. (4) Gill rakers were counted on the first gill arch.

RESULTS

All of the fish examined were age 0. The mean length of the white sturgeon was 8.0 inches, which is 2.4 inches less than the mean length of the age 0 white sturgeon collected by Pycha (1956).

All of the data on taxonomic characters are summarized in Table 1.

When the barbel-to-snout/mouth-to-barbel ratio was measured to the inner edge of the lip, it ranged from 0.63 to 1.21 in the white sturgeon and from 1.10 to 2.11 in the green sturgeon. When this ratio was measured to the ridge around the mouth, it ranged from 0.73 to 1.31 in the white sturgeon and from 1.57 to 2.86 in the green sturgeon. Neither system agreed with the keys, which state that the ratio in white sturgeon is less than one, and that in green sturgeon it is greater than one. Measuring to the edge of the lip agreed best with this. However, when this system was used the two species overlapped, whereas, if the barbel-to-mouth distance was measured to the ridge around the mouth, there was no overlap.

The dorsal rays ranged from 42 to 53 in the white sturgeon and in the green sturgeon from 35 to 40. These ranges compare fairly well with those reported in the keys, which are 44 to 48 for white sturgeon and 33 to 36 for green sturgeon.

Counts of anal rays ranged from 27 to 32 for the white sturgeon and 21 to 27 for the green sturgeon. The keys listed 28 to 31 and 22 to 28 anal rays for white and green sturgeon, respectively.

Lateral scute counts ranged from 36 to 46 for the white sturgeon and from 23 to 30 for the green sturgeon.

Gill raker counts ranged from 23 to 30 for the white sturgeon and 15 to 19 for the green sturgeon. Jordan and Evermann (1896) stated that white sturgeon possess about 26 gill rakers and green sturgeon about 17.

TABLE 1

Morphometric and Meristic Measurements of
Taxonomic Characters of White and Green Sturgeon

	White sturgeon		Green sturgeon	
	Range	Mean	Range	Mean
Snout-to-barbel/ barbel-to-mouth distance (measured to edge of lip)	0.63 - 1.21	0.85	1.10 - 2.11	1.56
Snout-to-barbel/ barbel-to-mouth distance (measured to ridge around mouth)	0.73 - 1.31	1.00	1.57 - 2.86	2.01
Dorsal rays	42 - 53	47	35 - 40	38
Anal rays	27 - 32	30	21 - 31	25
Lateral scutes	36 - 46	42	27 - 31	30
Gill rakers	23 - 30	27	15 - 19	17

DISCUSSION AND CONCLUSIONS

Three of the characters studied were found to be reliable for taxonomic work. One of these was lateral scute counts, which showed no overlap between the two species. This is a good character to use in the field, since optical equipment is usually unnecessary for counting scutes.

Another reliable character is the number of gill rakers. Gill raker counts also showed no overlap between species. However, these counts are difficult to make in the field, since some type of magnifying equipment is needed to count them properly.

The number of rays in the dorsal fin may be used when attempting to key out juvenile sturgeon, since no overlap of fin ray numbers was noted. These, however, are exceedingly tedious to count, so it may be more desirable to use the characters described above. Counts of the rays in the anal fin did overlap and are not a good character to use.

The barbel-to-snout/mouth-to-barbel ratio must be considered a poor character, since both white and green sturgeon show ratios approaching one in juvenile fish. This ratio is quickly and easily determined, however, so, if the ratio is very high or very low, it can be used as a taxonomic character.

SUMMARY

This work was undertaken to determine which of the characters used in identifying green and white sturgeon are reliable for juvenile fish. Thirty-one white sturgeon and four green sturgeon were used in the study.

Most of the fish were aged by examining pectoral ray cross sections and were found to be in their first year. The mean length of the white sturgeon was 8.0 inches.

The characters used in this study were the number of dorsal rays, the number of anal rays, the barbel-to-snout/mouth-to-barbel ratio, the number of lateral scutes, and the number of gill rakers. The number of lateral scutes, the number of gill rakers, and the number of dorsal rays are the most reliable characters. Lateral scute counts are simplest to make, and thus work best in the field. The barbel-to-snout/mouth-to-barbel ratio works only in some cases. The anal ray counts overlapped at 27 rays.

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