

# FISH MANAGEMENT REPORT 111

## A FIVE-YEAR STUDY OF BROWN TROUT POPULATIONS AND ANGLING SUCCESS IN THE CASTLE ROCK CREEK FISH-FOR-FUN AREA, GRANT COUNTY, WISCONSIN

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### ABSTRACT

In 1977 a 2.2-mile portion of Castle Rock Creek, a 0.2-mile tributary stretch of Castle Rock Spring, and a 1.4-mile tributary stretch of Doc Smith Branch in northeast Grant County were designated as a catch and release (no kill) area. The Castle Rock Creek and Spring portions provide approximately 9.1 acres of high quality trout water and the Doc Smith portion provides 2 acres of marginal quality trout water. The protection afforded by the special rules allowed brown trout (*Salmo trutta*) of hatchery origin to increase substantially until 1980 when moderate to severe declines occurred.

In Castle Rock Creek and Spring the number of trout 13 inches and larger (in the fall) increased from 3/acre in 1976 to 26/acre in 1979, but dropped to 18/acre in 1980. The fall trout biomass increased from 18 lb/acre in 1976 to 91 lb/acre in 1979, but dropped to 63 lb/acre in 1980. The maximum trout biomass was 99 lb/acre in the spring of 1980. The maximum number of trout present was 285/acre in the spring of 1978 and the minimum number present was 99/acre in the fall of 1980.

In Doc Smith Branch the number of trout 13 inches and larger (in the fall) increased from 7/acre in 1976 to 13/acre in 1979, but dropped back to 7/acre in 1980. The fall trout biomass increased from 25 lb/acre in 1976 to 47 lb/acre in 1979, but dropped to 12 lb/acre in 1980. The maximum trout biomass was 90 lb/acre in the spring of 1980. The maximum number of trout present was 435/acre in the spring of 1977, and the minimum number present was 23/acre in the fall of 1980.

Anglers who used the area were mostly male fly fishermen from south central and southeastern Wisconsin and northern Illinois. They were generally highly satisfied with the number, size, appearance, and fighting behavior of the trout they caught. During the 9-month season in 1979, they spent an estimated 3,357 hours fishing the Castle Rock Creek and Spring portions and caught 5,509 trout. Each trout in the Castle Rock Creek and Spring portion was caught an average of 4 times in 1979.

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## INTRODUCTION

Fishing-for-fun, or catch and release fishing with a zero bag limit (no kill), and very low bag limits have become increasingly popular methods of managing trout fisheries in the United States in recent years. Pennsylvania has been a leader in establishing specially regulated areas although their program, "... grew on a situation-by-situation basis without much order or direction." (Graff and Hollender 1977).

In 1972 the National Park Service established a no kill project on the Yellowstone River in Yellowstone National Park (Anderson 1977) in an attempt to improve the native cutthroat trout (*Salmo clarki*) fishery. The project greatly improved the fishery and angling pressure now is greater on the no kill area than on those waters where trout can be harvested. The results of this project were widely publicized and gave impetus to other agencies to initiate similar projects.

In 1977, a no kill project was established in southwest Wisconsin (the first of its kind in the state) on a 2.2-mile portion of Castle Rock Creek, 0.2-mile tributary stretch of an unnamed stream (commonly called Castle Rock Spring), and 1.4-mile tributary, Doc Smith Branch. Castle Rock Creek and Spring were the main streams involved in the project. They were chosen for the following reasons:

- (1) Large brown trout (*Salmo trutta*) over 20 inches were occasionally caught, and habitat to support such large trout was good.
- (2) The water quality was excellent.
- (3) Natural reproduction was very limited, thus trout numbers could be controlled through stocking.
- (4) Fishing pressure and harvest were so intense that growth potential of stocked trout was never fully realized.
- (5) The fishability was excellent due to the open nature of the stream banks.
- (6) Public access to most of the area was assured because of Wisconsin Department of Natural Resources (DNR) easements.
- (7) Fishing pressure could readily be shifted (for those anglers who wanted to harvest trout) to other comparable streams in the area.

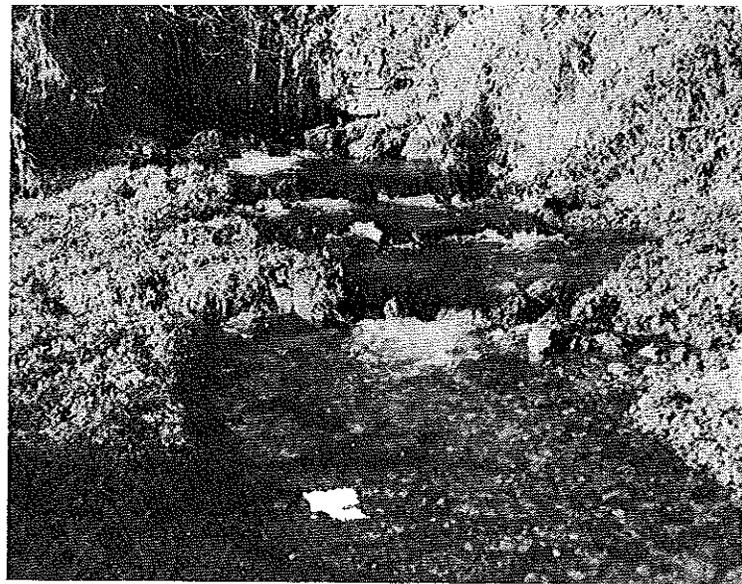
Since Doc Smith Branch joins Castle Rock Creek in the area that was proposed for fish-for-fun rules, it was included in the project. Also, Doc Smith Branch is a marginal trout stream so including it gave an opportunity to evaluate no kill regulations on a poor stream as well as high quality streams.

The Big Green River located 10 miles west of Castle Rock Creek was established as a control (for creel census purposes). The Big Green River is very similar to Castle Rock Creek.

## DESCRIPTION OF THE STUDY AND CONTROL AREAS

### Castle Rock Creek

Castle Rock Creek (also known as Fennimore Fork) originates near the city of Fennimore in northeastern Grant County and flows northeasterly for 22 miles to its junction with the Blue River.



Castle Rock Spring, "A bubbling brook pouring from the side of a hill." The 6 cfs flow of this spring stays at 50 F year around.

The middle 6.5 miles is classified as trout water and the uppermost 2.2 miles of this stretch was selected as the study area (Fig. 1). Specifically, the exact limits of the study area were from the County Highway Q bridge to the SE quarter of Section 30, T7N, R1W, upstream to the bridge on Church Road in Section 36, T7N, R2W.

Within the study area Castle Rock Creek averages 33 ft wide and 2 ft deep, and has a surface area of 8.9 acres. Normal flow at the upper and lower boundaries is approximately 4 cfs and 15 cfs, respectively. The gradient is approximately 20 ft/mile, total alkalinity is 200 ppm, and maximum summer stream temperatures normally do not exceed 70 F. Gravel, rubble, and boulders are the predominant bottom types except in pools, where sand and silt usually overlay those substrate types. Riffles and pools predominate and many of the pools are too deep to wade. Flooding is a problem in the watershed because the area is hilly and much of the land has been cleared for agricultural use. Virtually all of the stream banks are open and are heavily grazed by beef cattle. Siltation is a problem because of heavy runoff from plowed fields and bank erosion. DNR easements are present on all but the lowermost 200 ft of the study area.

### Castle Rock Spring

Castle Rock Spring, with a flow of 6 cfs, originates along County Highway Q in Section 36, T7N, R2W, and flows easterly for 0.2 miles to join Castle Rock Creek just downstream from the bridge on Church Road (Fig. 1). It maintains an annual temperature of 50 F, averages 10 ft wide and 1.2 ft deep, and has a surface area of 0.2 acres. All of the spring tributary is included in the study area and is under a DNR easement.

### Doc Smith Branch

Doc Smith Branch (also known as Cass Valley Creek) originates near the village of Montfort and flows northerly for 4 miles to its junction with Castle Rock Creek. The lower 1.8 miles are designated as trout water and the study area was established on the lower 1.4 miles. The study area segment averages 12 ft wide and 1 ft deep, and has a surface area of 2 acres. Normal flow at its junction with Castle Rock Creek averages 3.5 cfs. Total alkalinity is 190 ppm and maximum summer

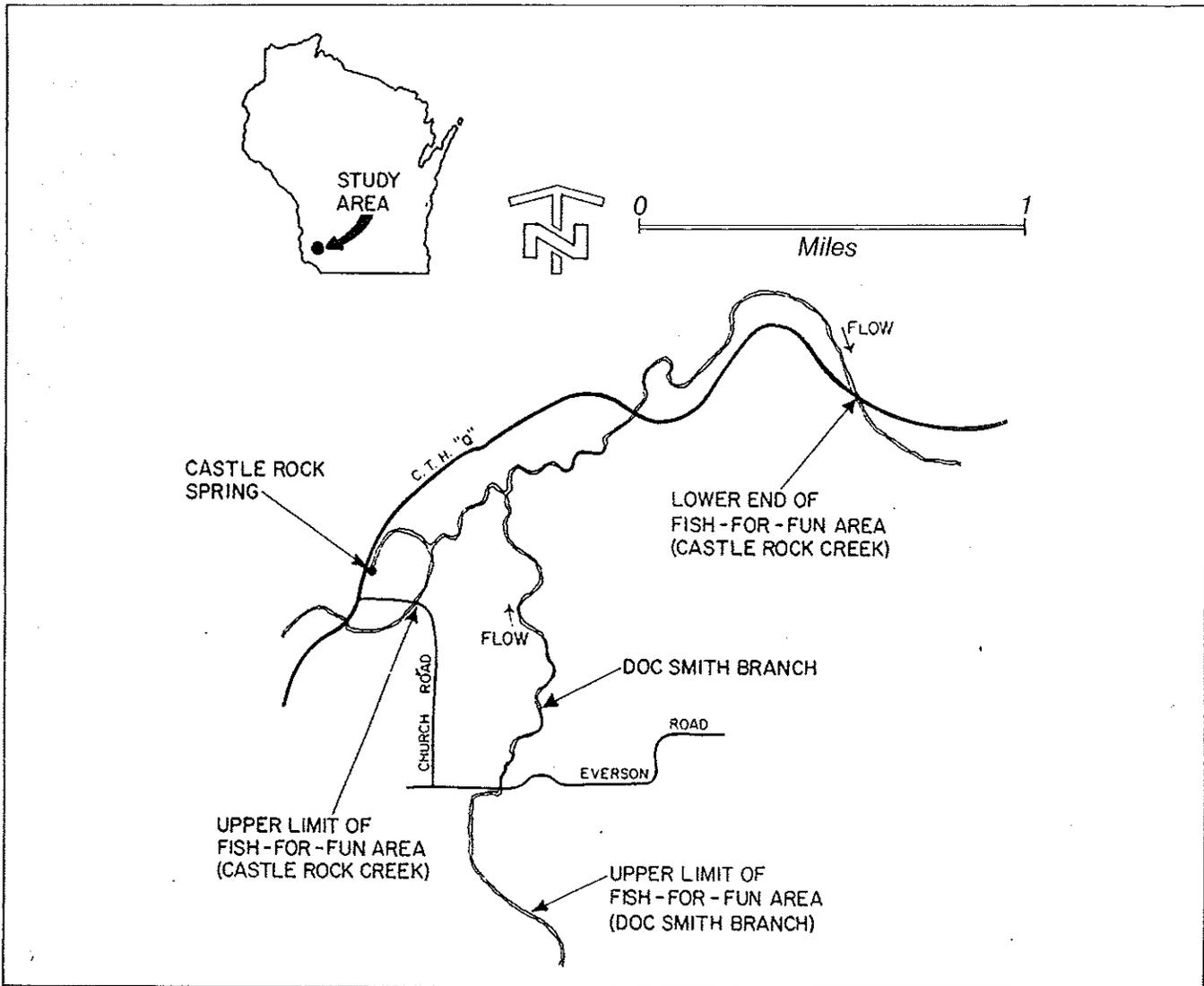


FIGURE 1. Location of the study area in Grant County showing Castle Rock Creek, Castle Rock Spring, and Doc Smith Branch.

temperatures can exceed 75 F, and may even exceed 80 F. Gravel, rubble, and boulders are the predominant bottom types. Riffles and pools are common and runs are scarce. The gradient is 20 ft/mile. The stream banks are open and heavily grazed by cattle. The land use problems are the same as on Castle Rock Creek. DNR easements are present on 90% of the study area.

#### Big Green River

The Big Green River originates just northwest of Fennimore and flows northwesterly for 12 miles to its junction with the Wisconsin River. All but the lowermost mile is trout water. It averages about 28 ft wide and 1.5 ft deep, and has a flow of 29 cfs. The gradient is approximately 20 ft/mile. Total alkalinity is 250 ppm. Sand, gravel, and rubble are the predominant bottom types. The use problems are the same as on Castle Rock Creek. DNR easements are present on about 9 miles of the stream.

#### MANAGEMENT HISTORY

##### Stocking

The middle 6.5 miles of Castle Rock Creek has been



Beef cattle graze the banks throughout most of the fish-for-fun area. The vegetation along the banks is normally much lower than this.

managed as trout water for most of this century and is one of the most popular trout streams in southwest Wisconsin. Natural reproduction of trout has always been very limited and for this reason, brook (*Salvelinus fontinalis*), brown, and rainbow (*Salmo gairdneri*) trout have been stocked at various times and in various numbers. The trout fishery is now maintained by stocking 4,000-5,000

brown trout fingerlings annually in October. Prior to 1976, most of the fingerlings were stocked in the study area, but since then, about half were planted in the study area and half below it.

Castle Rock Spring does not receive a stocking quota, but some fish planted in Castle Rock Creek (and possibly Doc Smith Branch) make their way into it.

Doc Smith Branch probably has been managed for trout as long as Castle Rock Creek has, but was never a popular trout stream. Currently, it receives a quota of 1,500 brown trout fingerlings at the same time Castle Rock Creek is stocked. No wild fingerling trout have ever been found in it.

The Big Green River is a very popular trout stream and is stocked with 10,000 brown trout fingerlings yearly.

#### Habitat Improvement

The easements on Castle Rock Creek, Castle Rock Spring, and Doc Smith Branch allow the DNR to implement various habitat improvements. Bank erosion was very severe on Castle Rock Creek and Doc Smith Branch when the easements were obtained. Seven thousand and 2,360 ft of bank, respectively, were riprapped on these streams within the study area. Almost all of the riprapping on Castle Rock Creek was done prior to 1977 whereas on Doc Smith Branch almost all was done in 1979. Occasional washouts of banks not yet riprapped still occur, but almost all of the eroding banks in the study area have been stabilized.

In 1974, Castle Rock Creek Spring was narrowed to create a trout spawning area by flushing out sand and silt and exposing underlying gravel and rubble. The entire stream was then fenced except for a 30-ft wide stretch at the lower end where a cattle and machinery crossing was established.

#### Regulations

Various types of seasons and regulations have been in effect for the past several years on these streams. Before 1975, the season and regulations were the same as for the rest of the state. In 1975 an experimental early trout season was established in 8 southwestern Wisconsin counties. The season ran from 1 January to 30 September with a minimum size of 6 inches and a bag limit of 5 trout/day. This season is still in effect on most of Castle Rock Creek, on the upper end of Doc Smith Branch, and on the rest of the trout streams in the 8-county block. In 1977 catch and release regulations were initiated in the study area. The season length remained the same, only artificial flies and lures were permitted, and no trout could be kept.

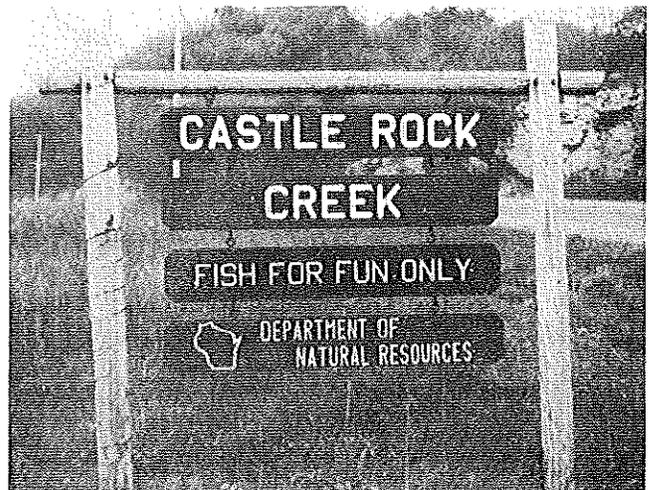
#### METHODS

##### Trout Populations

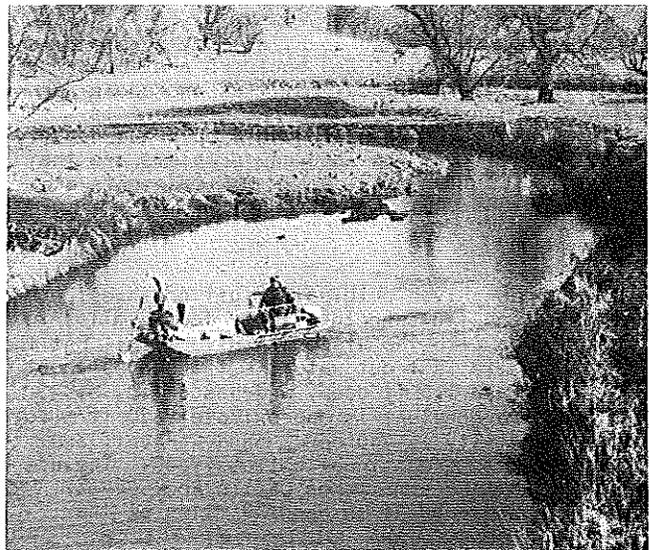
Double-run electrofishing surveys were conducted on the study area in spring and fall from 1976 through 1980 using a 250-volt DC stream shocker with 2 positive electrodes. Typically, 3 workers conducted the surveys: 2 using the electrodes and the 3rd pulling a small boat containing the generator, fish tub, and other miscellaneous gear. All fish captured on the 1st runs were measured to the nearest 0.1 inch, weighed to the nearest half ounce, and fin clipped (upper caudal). Fish captured on the 2nd runs were measured to the nearest half inch, examined for fin clips, and released. Populations were estimated using the



Todd Szmania of Milwaukee, Wisconsin, fishing Castle Rock Creek on the final day of the 1980 season. The bank to Mr. Szmania's right was riprapped in 1979.



Project sign located near a DNR parking lot in the middle of the fish-for-fun area.



Most of the large holes in Castle Rock Creek can't be surveyed effectively with a stream shocker. This mini boom shocker was used in fall 1980 to check for large trout. Very few unmarked large trout were found.

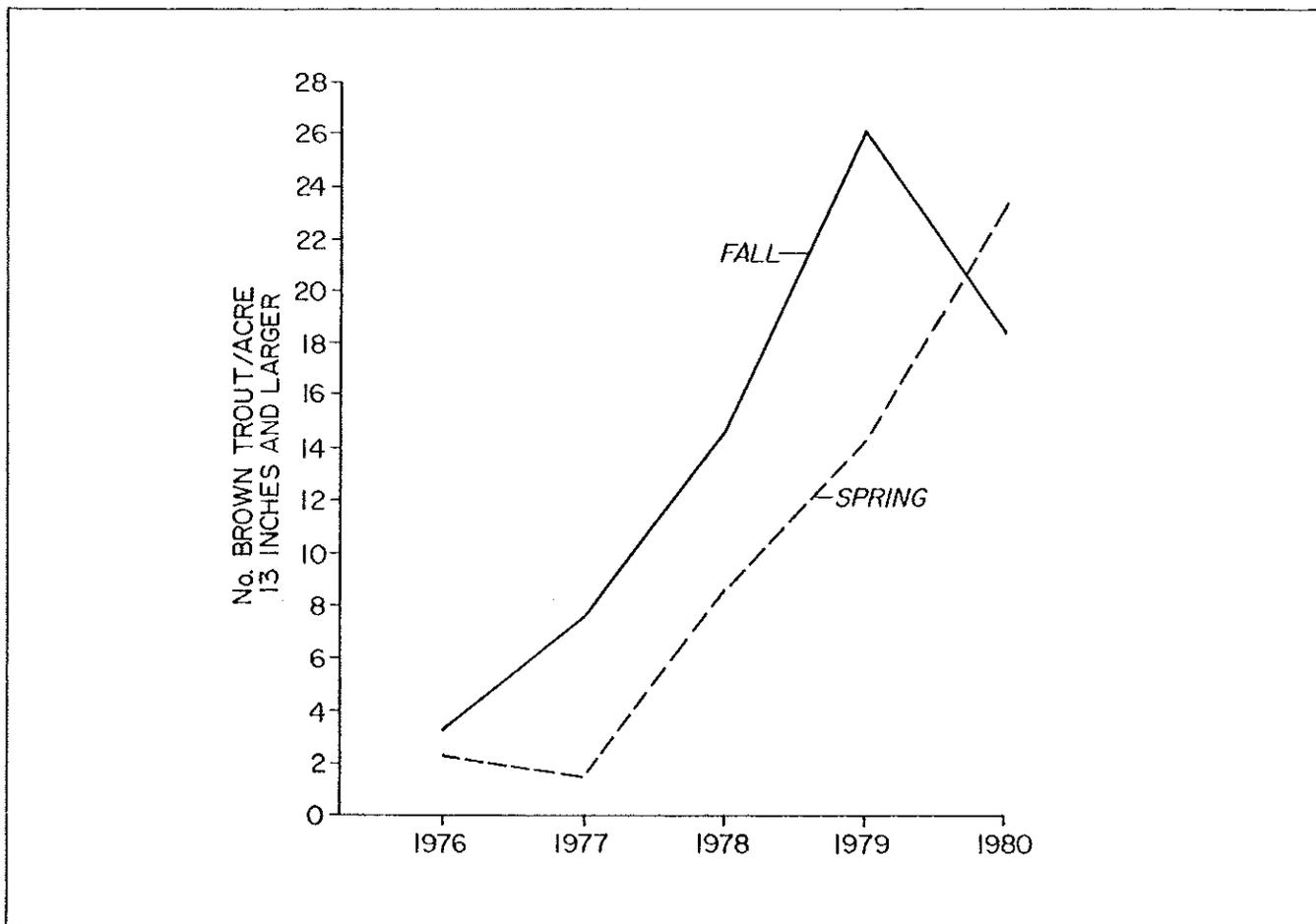


FIGURE 2. Number of brown trout/acre 13 inches and larger in the Castle Rock Creek portion of the study area, spring and fall 1976-80.

Petersen method (Everhart, Elpper, and Youngs 1975). Since few wild fingerlings were captured during the fall surveys, no population estimates were made on them.

Fish captured in Castle Rock Spring were considered to be Castle Rock Creek fish and were included in the Castle Rock Creek data. The length and acreage of the spring were added to those of Castle Rock Creek for computing standing crops and numbers of trout/acre and /mile.

#### Angling Success

A partial stratified angling and creel census was conducted from late May to early August in 1977 and 1978, and throughout the entire 9-month season in 1979 on the study area and on the Big Green River's 9-mile easement area. These areas were checked roughly every 2 hours, or 4 times/day, 5 days/week, except that whenever a 16-hour work day was scheduled, 8 checks were made. From January through mid-March 1979, the census was run at 4-hour intervals (5 days/week) and usually 3 checks were made. During this period, the census was not run if the temperature was below 10 F or if travelers' advisories were issued.

In conjunction with the 1979 creel census, an angler attitude survey was conducted on the study area. The summer census clerk handed out questionnaires and self-addressed envelopes to anglers.

## RESULTS

### Trout Populations

Castle Rock Creek and Spring. The protection given by the no kill rules allowed the adult brown trout population in the study area to increase dramatically until 1980 when a modest decline occurred (Fig. 2). In the fall of 1976, before the lure restrictions and no kill regulations went into effect, there were an estimated 3 trout/acre (12/mile) 13 inches and larger in the Castle Rock Creek portion of the study area. Following initiation of the special regulations on 1 January 1977, the fall density of trout 13 inches and larger increased to 7/acre (28/mile) in 1977, 14/acre (57/mile) in 1978, 26/acre (105/mile) in 1979, and dropped to 18/acre (73/mile) in 1980.

The total trout biomass (yearlings and adults) increased steadily from about 160 lb in fall 1976 to 901 lb in spring 1980, until fall 1980 when the biomass dropped to 577 lb. Fall averages were 18 lb/acre in 1976, 38 lb/acre in 1977, 75 lb/acre in 1978, 91 lb/acre in 1979, and 63 lb/acre in 1980 (Fig. 3). The maximum biomass observed was 99 lb/acre in spring 1980.

During the study period, total trout numbers ranged from a high of about 285/acre (1,083/mile) in spring 1978 to a low of 99/acre (375/mile) in fall 1980 (Fig. 4). Total trout loss (trout were free to move out of the study area) from spring to fall

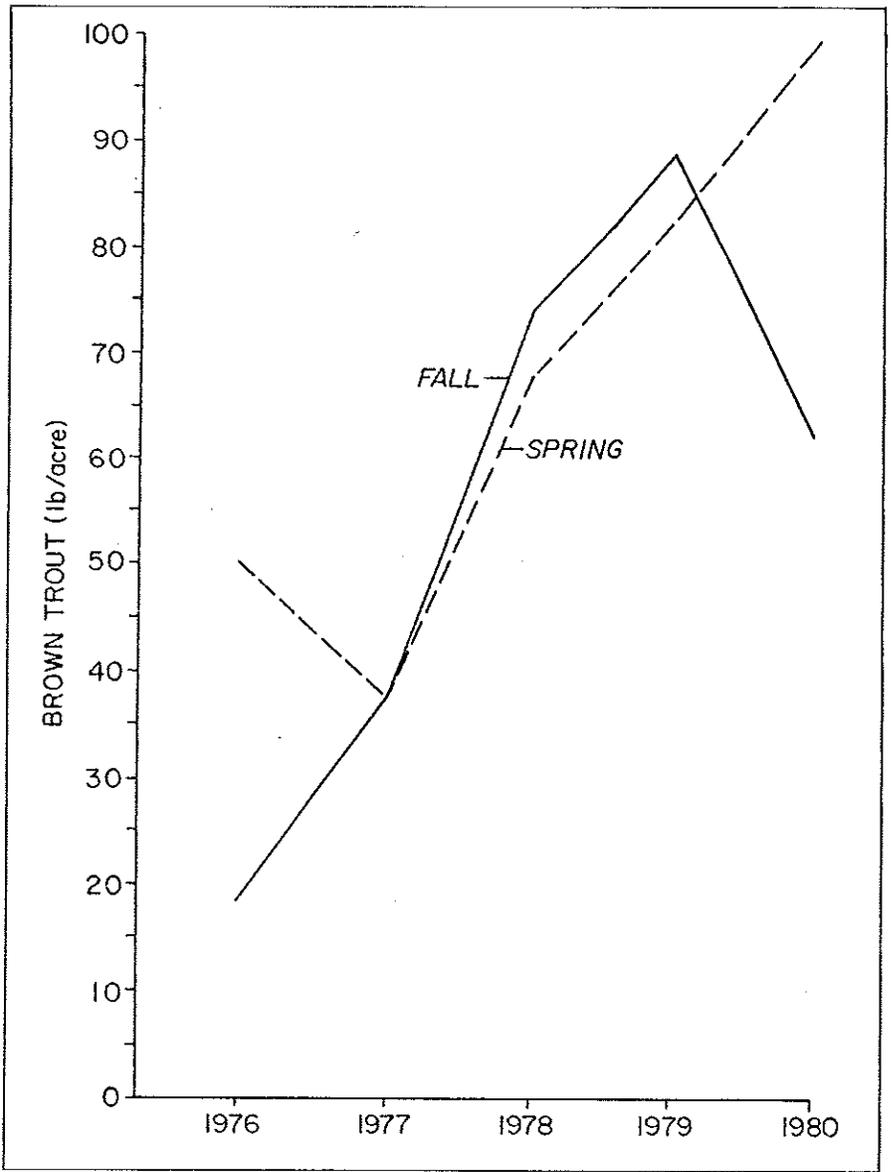


FIGURE 3. Standing crop of brown trout in the Castle Rock Creek portion of the study area, spring and fall 1976-80.

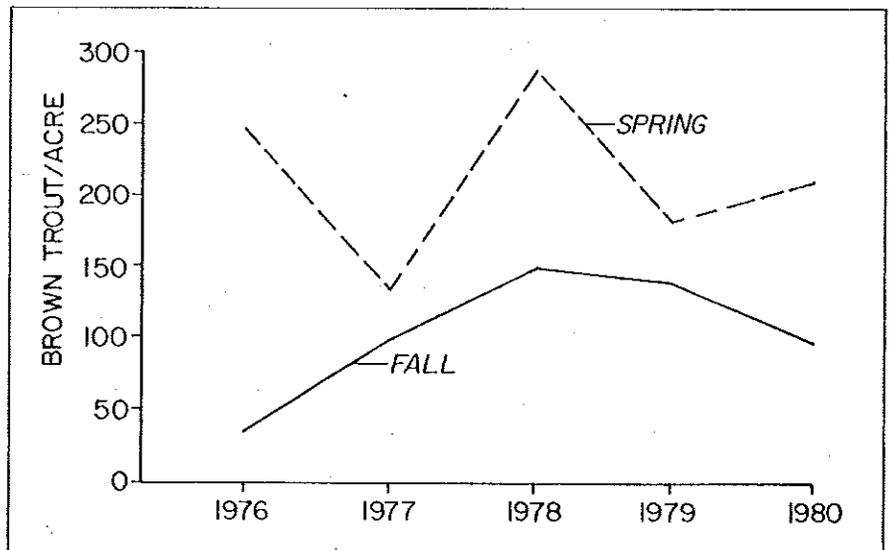


FIGURE 4. Number of brown trout/acre in the Castle Rock Creek portion of the study area, spring and fall 1976-80.

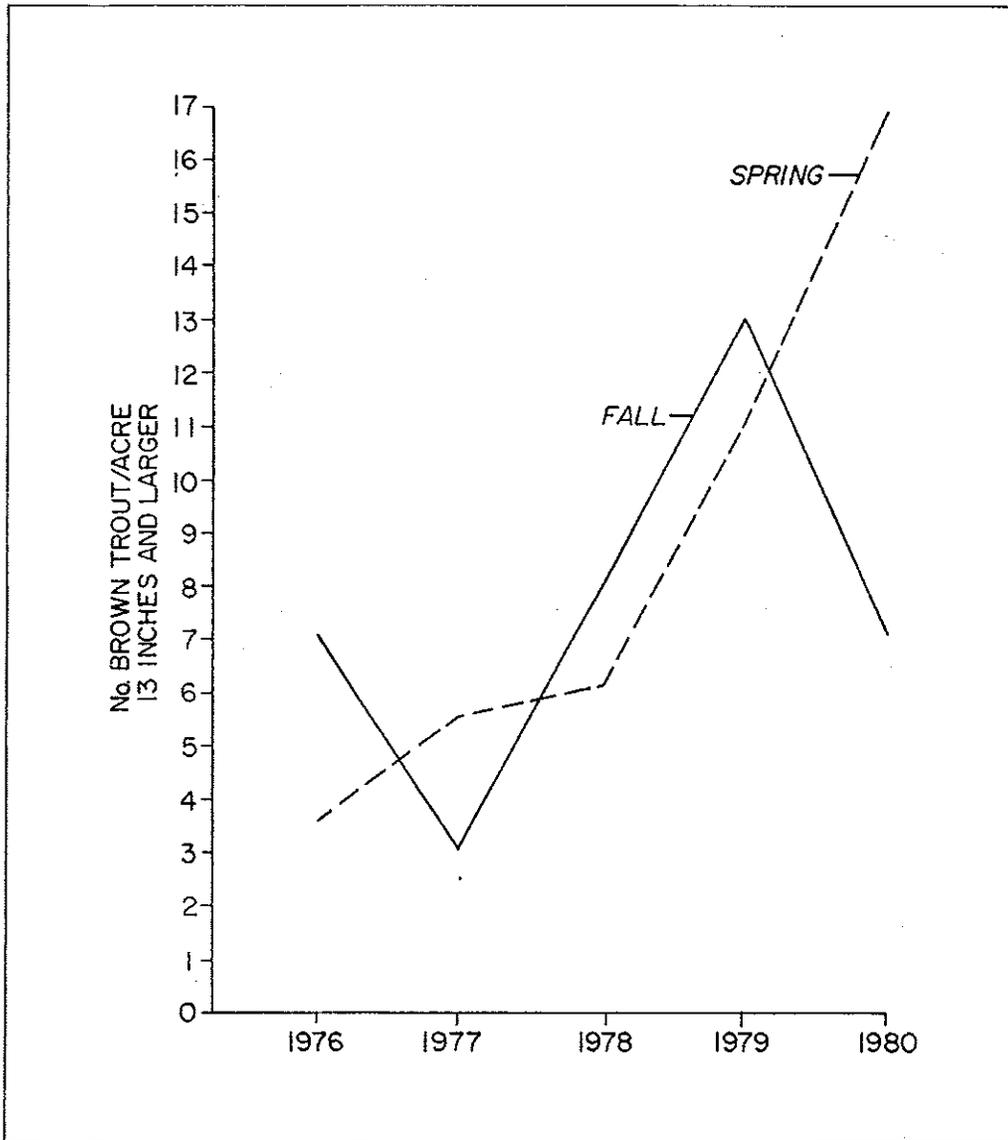


FIGURE 5. Number of brown trout/acre 13 inches and larger in the Doc Smith Branch portion of the study area, spring and fall 1976-80.

was highest in 1978 and 1980, when approximately half the population disappeared each time. Spring-to-fall loss was lowest in 1977 and 1979, and these years also had the lowest spring populations.

There were modest increases in the number of trout 20 inches and larger captured during the surveys each fall. Two were found in 1976, none in 1977, 5 in 1978 and 1979, and 4 in 1980.

Although there appeared to be a growth slowdown or stunting in the uppermost portion of the study area where trout were relatively more abundant, the general appearance of the captured trout was good.

Doc Smith Branch. Adult brown trout 13 inches and larger generally increased and then decreased sharply in the Doc Smith Branch portion of the study area after the special regulations were implemented on 1 January 1977. The increase followed the pattern observed in Castle Rock Creek except for an initial decline during the interval from fall 1976 to fall 1977. The density of trout 13 inches and larger reached a maximum of 17/acre (24/mile) in spring 1980 and then dropped to 7/acre (10/mile) in fall 1980. There were 7/acre in this

size range in 1976 before the project started (Fig. 5).

The total trout biomass showed consistent decreases from spring to fall throughout the study period (Fig. 6). However, there was a general increase from fall to fall (except in 1980) following the establishment of the no kill fishery. Fall biomass averaged 25 lb/acre in 1976, 30 lb/acre in 1977, 35 lb/acre in 1978, 45 lb/acre in 1979, and 12 lb/acre in 1980 (Fig. 6). The maximum biomass observed was 90 lb/acre in spring 1980.

Trout present in the study area ranged from a high of 435/acre (622/mile) in spring 1977 to a low of 23/acre (32/mile) in fall 1980 (Fig. 7). Spring to fall loss always exceeded 50% and in 1977 and 1980, it exceeded 80%.

#### Angling Success

Castle Rock Creek and Spring. In June-July 1977, the fishing pressure on Castle Rock Creek was approximately 56 hours/acre (215 hours/mile), and the catch rate was 0.8 trout/hour. In June-July 1978, the fishing pressure was about the same

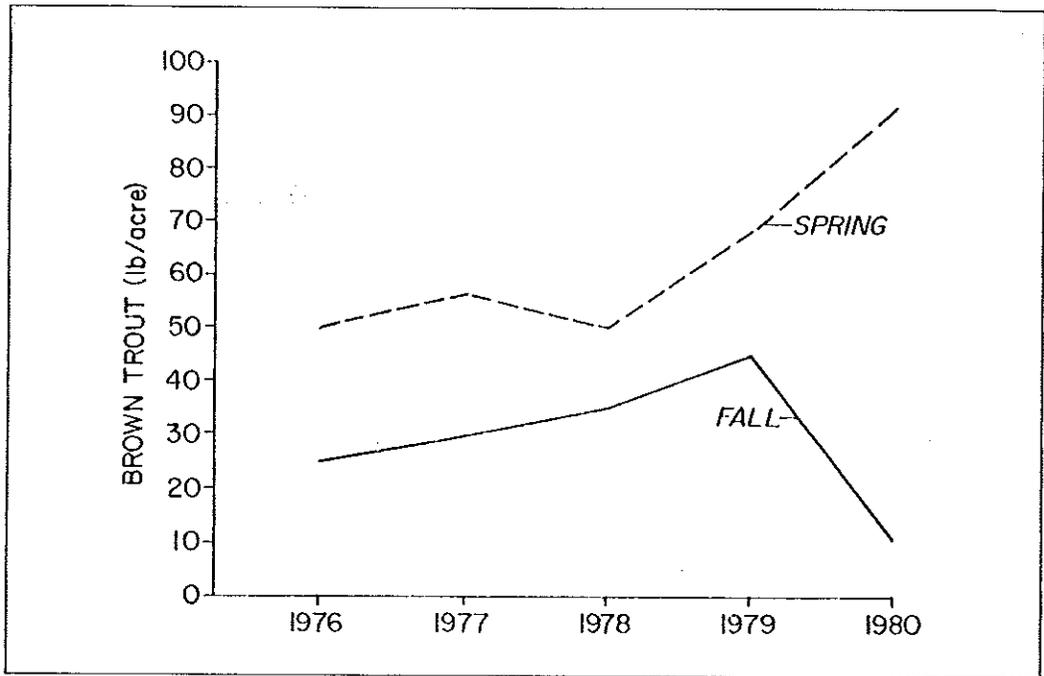


FIGURE 6. Standing crop of brown trout in the Doc Smith Branch portion of the study area; spring and fall 1976-80.

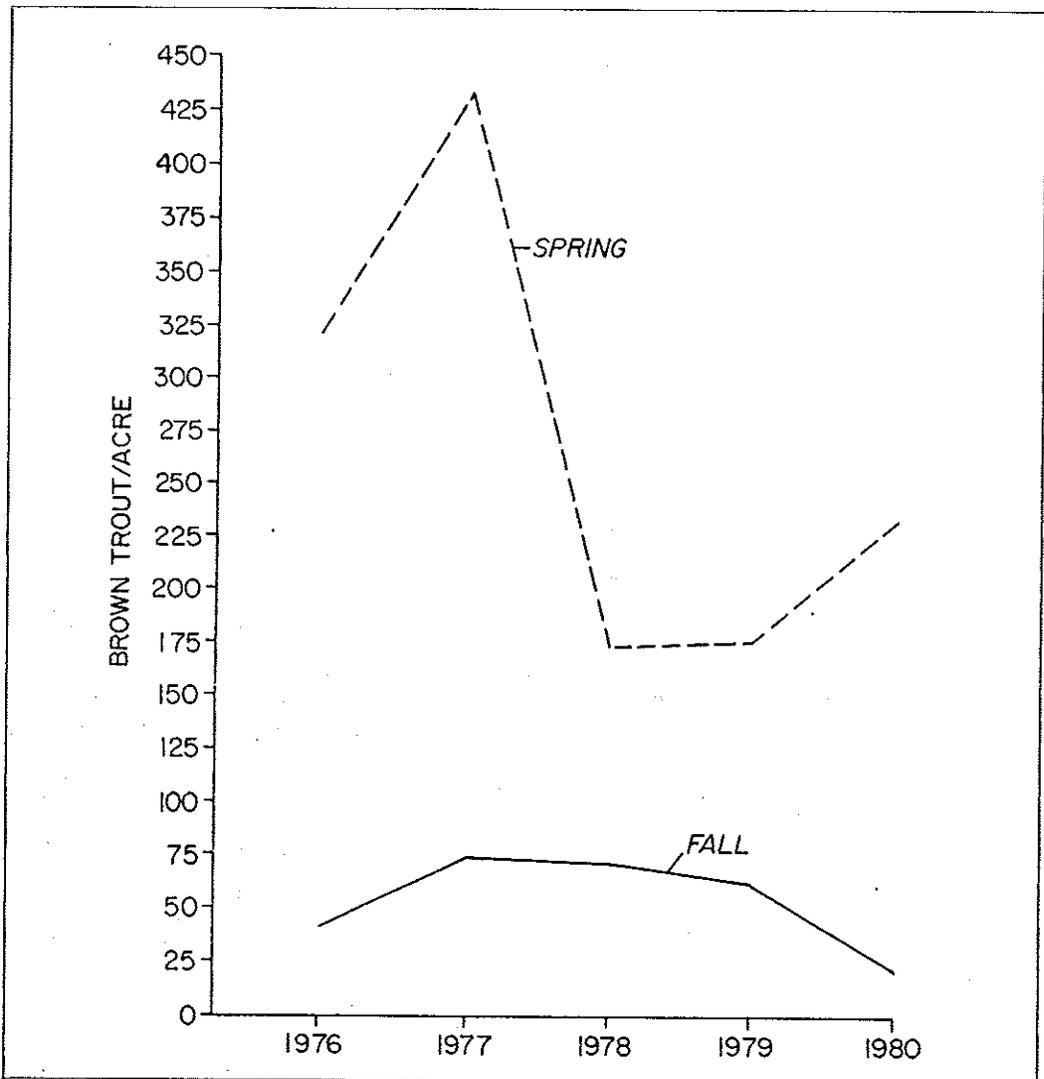


FIGURE 7. Number of brown trout/acre in the Doc Smith Branch portion of the study area, spring and fall 1976-80.

TABLE 1. 1979 creel census data from Castle Rock Creek fish-for-fun area.

Month	No. Anglers Interviewed	Actual Catch of Brown Trout	Catch/ Hour	Projected Catch of Brown Trout	Projected Fishing Pressure		
					Hours	Hours/Acre	Hours/MITE
January	1	0	0	0	10	1	4
February	9	33	2.45	265	108	12	45
March	41	65	1.04	331	319	35	133
April	97	256	1.55	1,673	1,081	119	450
May	41	69	1.26	540	428	47	178
June	31	145	2.55	650	255	28	106
July	38	188	2.37	1,011	427	47	178
August	33	132	1.39	368	264	29	110
September	59	232	1.45	671	465	51	194
Total or Average	350	1,120	1.64	5,509	3,357	369	1,398

TABLE 2. 1979 Creel census data for brown trout from the Big Green River in Grant County, Wisconsin.

Month	No. Anglers Interviewed	Actual Catch	Actual Harvest	Catch/ Hour	Harvest /Hour	Projected Catch	Projected Harvest	Projected Fishing Pressure		
								Hours	Hours/Acre	Hours/MITE
January	16	8	5	0.21	0.13	28	17	130	4	14
February	14	17	7	0.97	0.40	114	47	117	4	13
March	92	53	24	0.42	0.19	241	109	577	19	64
April	257	265	127	0.53	0.25	1,211	580	2,290	76	254
May	126	147	95	0.57	0.37	802	518	1,402	47	156
June	76	124	68	0.74	0.41	403	221	543	18	60
July	55	70	54	0.73	0.56	562	433	770	26	86
August	43	84	53	0.72	0.45	362	229	504	17	56
September	40	49	28	0.65	0.37	182	104	280	9	31
Total or Average	719	817	461	0.59	0.34	3,905	2,258	6,613	220	734

(51 hours/acre or 195 hours/mile), but the catch rate was 2.3 trout/hour.

In 1979, the fishing pressure for the entire 9-month season was approximately 369 hours/acre (1,398 hours/mile). The catch rate was 1.64 trout/hour and the total catch was estimated at 5,509 trout. The heaviest fishing pressure occurred in April (32%) and the least in January and February (Table 1).

Doc Smith Branch. Census clerks found only an occasional angler on Doc Smith Branch. For this reason, no attempt was made to determine fishing pressure and catch rates for this stream.

Big Green River. In June-July 1977, the fishing pressure on the Big Green River was approximately 56 hours/acre (185 hours/mile) and the catch rate was 0.4 trout/hour. In June-July 1978, the fishing pressure was 23 hours/acre (77 hours/mile), and the catch rate was 1.4 trout/hour.

In 1979, the fishing pressure for the entire 9-month season was approximately 220 hours/acre

(734 hours/mile). The catch rate was 0.59 trout/hour. The total catch was estimated at 3,905 trout with a harvest of 2,258. The heaviest fishing pressure occurred in April (35%) and the least in January and February (Table 2).

Angler Attitude Survey. Forty-five (62.5%) of the 72 surveys distributed to anglers in 1979 were returned. Responses provided anglers' opinions on their most recent trip to the fish-for-fun area. The results are shown in Tables 3 and 4.

Most of the anglers were male fly fishermen from south central and southeastern Wisconsin and northern Illinois. They generally were highly satisfied with the number, appearance, and fighting behavior of the trout they hooked as well as the lack of interference from other anglers and the overall quality of their trip.

#### DISCUSSION

##### Castle Rock Creek

The results of 4 years of catch and release fishing

TABLE 3. Summary of information received from the angler attitude survey in 1979.

Question	Number	Percent
Where do you live?		
Wisconsin	28	62
Illinois	16	36
Iowa	1	2
Other	0	0
Sex and Age		
male 16 years or older	42	93
female 16 years or older	1	2
male under 16 years	0	0
female under 16 years	1	2
Which stream did you fish this trip?		
Castle Rock Creek	33	73
Doc Smith Branch*	3	7
Both streams	9	20
What did you fish with?		
artificial flies	35	78
spinning lures	5	11
combination of flies & lures	3	7
another combination of above	2	4
How often have you fished in the DNR research area on Castle Rock Creek and Doc Smith Branch in the last 3 years?		
several times each year	25	55
1 or 2 times each year	12	26
this is my first time	9	20
Which of the following would you prefer?		
Keep regulations as they are now	26	58
Allow harvest of 1 trout over 12"	2	4
Allow harvest of 1 trout over 15"	5	11
Allow harvest of 1 trout over 18"	9	20
Other	3	7
What type of trout would you prefer to be stocked?		
stock only brown trout	20	44
stock all 3 species	19	42
other	9	20

\*Anglers often mistook Castle Rock Spring for Doc Smith Branch.

on Castle Rock Creek suggest that trout stocks can be built up in southwestern Wisconsin streams that have little or no trout reproduction but good habitat and water quality. At this point, it is not known if trout numbers can be increased further.

The approximately 100 lb/acre maximum biomass compares favorably with what Graff and Hollender (1977) reported for some specially regulated (and productive) Pennsylvania streams. About 714 lb/acre were present in Falling Spring Branch in 1977 and 580 lb/acre in Big Spring Creek in 1975. In 1975, Big Spring Creek contained about 308 brown trout and 241 rainbow trout/mile that were 15 inches and larger. The highest number of brown trout 15 inches and larger/mile found in the Castle Rock Creek portion of the study area was 31 in 1979.

The dense beds of aquatic vegetation present in Falling Spring Branch and Big Spring Creek probably allow larger than normal buildups of adult trout. Aquatic vegetation ranges from scarce to abundant in Castle Rock Creek and can change from abundant to scarce overnight as a result of flooding.

There are several possible explanations for the biomass peaking at about 100 lb/acre and for the 1980 decline:

(1) Carrying Capacity

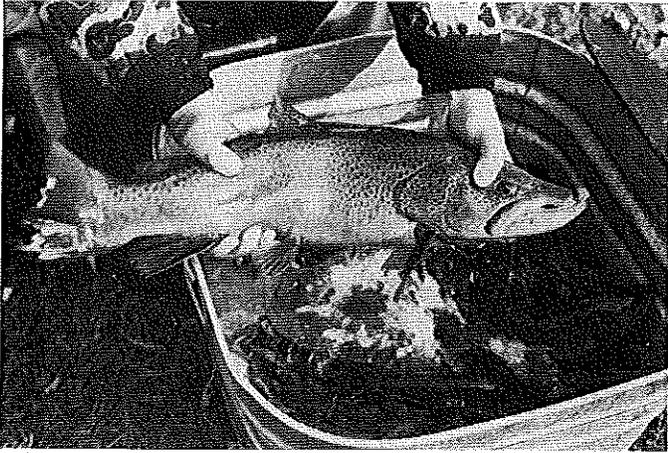
The ability of Castle Rock Creek and Spring to support yearling and adult trout may have been exceeded at 100 lb/acre. The population leveled off in 1978 and fell through 1979-80. Hunt and Brynildson (1964) found a similar trend in a 5-year study of wild brook trout in a headwater refuge in Lawrence Creek, Wisconsin. The data shown in Table 5 also suggest that the study area may have been carrying more yearling and adult trout than it should have in 1979. The streams listed are some of the best brown trout streams in Wisconsin. Castle Rock Creek was 1st in 13-inch and larger trout/mile, 2nd in 15-inch and larger trout/mile, and 3rd in 10-inch and larger trout/mile.

(2) Poaching

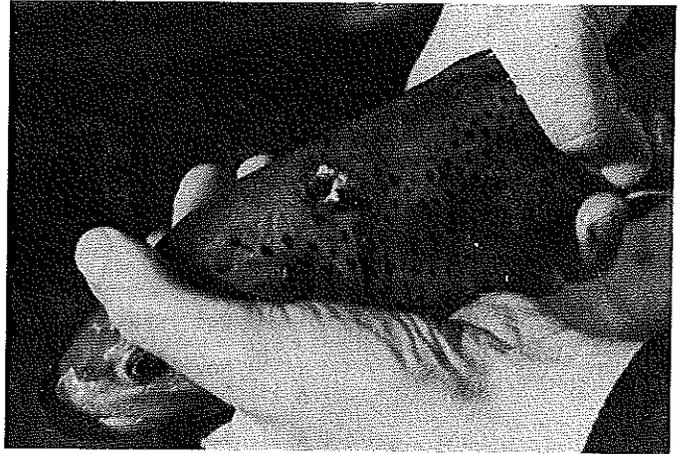
No census work was done in 1980, thus there was no one from the DNR visiting the stream regularly to keep anglers honest. Six persons were arrested in 1980 for fishing illegally in the study area.

TABLE 4. Opinions regarding most recent trip to Castle Rock Creek and Doc Smith Branch from the angler attitude survey in 1979.

Question	Highly Satisfied		Satisfied		Dis-satisfied		Highly Dis-satisfied	
	No.	%	No.	%	No.	%	No.	%
Number of trout hooked	23	51	15	33	3	7	1	2
Size of trout hooked	21	47	19	42	2	4	0	0
Physical appearance of trout hooked	25	56	17	38	0	0	0	0
Fighting behavior of trout hooked	28	62	13	29	1	2	0	0
Esthetic quality of stream	15	33	20	44	7	15	1	2
Lack of interference from other anglers	26	58	16	36	1	2	0	0
Overall quality of trip	27	60	15	33	1	2	0	0



Largest trout captured during the 1980 fall survey was this 24-inch, 5.3-lb hookjawed male.



Blue herons appear to kill a fair number of adult fish. This adult trout survived because its backbone wasn't damaged. Most of the dead fish found during the surveys had heron wounds.

### (3) Predation

The 5- to 6-inch fingerlings stocked annually were probably easy prey for the expanding adult population. Also, blue herons frequent the stream and prey on adult trout as well as fingerlings and yearlings. Many adult trout captured in the fall each year had old or new heron wounds (see photo). The adult trout are too large to be eaten by herons, but herons apparently cannot resist attacking them.

### (4) Record or Near Record Rainfall

Over 17 inches of rain was measured at the Wilson State Nursery at Boscobel in August and September 1980. The nursery is located about 10 miles northwest of Castle Rock Creek. This was more than half of the normal annual precipitation for this portion of Wisconsin and it caused considerable flooding on Castle Rock Creek.

### (5) Unknown Factors

Recent research (Anonymous 1980) on wild brown trout in Pennsylvania suggests that suitable foraging sites may be the most important factor in determining the number of adult brown trout that may inhabit a particular section of stream. It is not known how many sites are present in the study area or if fish of hatchery origin are affected by this.

The expected increase in lunker trout (20 inches and larger) did not seem to occur even though there was a slight increase in the number caught during the surveys. This was a disappointment because there appeared to be an abundance of habitat to support large trout.

Since no census work was done downstream from the study area, it isn't known if the catch and harvest fishery in lower Castle Rock Creek improved during the 4 years of no kill regulations. Shocker surveys showing an increasing trout population during the 4 years may have been due to increased stocking. A 1976 survey indicated that newly stocked trout did not tend to move downstream from where they were planted, so stocking of the downstream areas was increased after 1976.

In 1977, fishermen were not particularly attracted to Castle Rock Creek over the Big Green River and fishing pressure was about equal. This is probably understandable since the adult population of trout was relatively low. During summer 1978 and the

9-month season in 1979, there was about twice as much pressure on the study area as on the Big Green River.

In 1979, an estimated 1,640 trout were present in April and 1,270 in October in Castle Rock Creek. Since the projected catch that year was 5,509 fish, each trout (on the average) was caught about 4 times.

The average catch rate of 1.64 trout/hour on Castle Rock Creek in 1979 is considerably higher than that found in other census studies (Meyers and Thuemler 1976). This is probably because the anglers who utilize Castle Rock Creek are generally highly skilled fly fishermen, and most of the trout present are stocked fish.

### Doc Smith Branch

Although there were some similarities between the results on Doc Smith Branch and Castle Rock Creek, it appears that the no kill project on Doc Smith was a failure. At the end of 4 years, there were only 7 trout/acre 13 inches and larger and there were this many before the project started. Total trout biomass consistently decreased from spring to fall instead of increasing as it did in Castle Rock Creek. Total trout loss averaged around 75% from spring to fall during the 4 years of the project. The fall trout/acre population never exceeded about 80 fish and it dropped to 23 fish in 1980.

Surprisingly, the fish captured in fall always appeared to be in good condition. This apparent anomaly seems to be a common phenomenon in marginal trout streams in southwest Wisconsin. It would be expected that if conditions for trout survival were poor in a stream, those fish that did survive would not be in good condition.

The reason or reasons for the consistent declines in trout numbers and biomass from spring to fall are unknown. Summer water temperatures probably are the main problem. On 26 June 1980 at 5 p.m., Doc Smith Branch was 75 F at its junction with Castle Rock Creek, whereas Castle Rock Creek was 60 F. No detailed study of summer water temperatures in Doc Smith Branch has been done so it isn't known how warm the water gets.

### Local Angler Reaction

Grant County anglers generally have not been in

TABLE 5. Brown trout population data from 15 Wisconsin brown trout streams.

Stream	County	Class <sup>2</sup>	Date of Survey	Miles Surveyed	Number of Brown Trout/Mile				Total Pounds Brown Trout /Acre <sup>3</sup>
					6 Inches and Larger	10 Inches and Larger	13 Inches and Larger	15 Inches and Larger	
Castle Rock Creek	Grant	II	Oct 1979	2.4	570	370	98	31	91
Big Green River	Grant	II	Nov 1979	8.6	103	84	19	8	Unk.
Trout Creek	Iowa	I & II	Sep-Oct 1978-79	5.2	498	90	25	5	206
Mt. Vernon Creek	Dane	I & II	Sep-Oct 1978-79	6.1	559	189	35	30	125
Emmons Creek	Waupaca	I	Sep-Oct 1975-77	1.2	1,548	218	20	6	143
Radley Creek	Waupaca	I	Sep-Oct 1975-77	1.5	1,126	184	21	6	133
Lunch Creek	Waushara	I	Sep-Oct 1973-76	1.32	726	83	8	2	101
S. Branch Wedde Creek	Waushara	I	Sep-Oct 1975-77	1.1	955	97	8	1	163
Mecan River	Waushara	I	Sep-Oct 1975-77	1.4	772	107	18	6	74
N. Branch Beaver Branch	Marinette	I	Sep-Oct 1979	3.4	461	116	48	21	88
Race Branch <sup>1</sup>	St. Croix	II	Sep-Oct 1976-79	1.03	1,878	643	64	14	132
Willow Branch	St. Croix	II	Sep-Oct 1976-79	0.97	853	261	63	11	58
Kinnickinnic River	St. Croix	I	Apr 1973-77	0.98	3,126	569	15	1	193
Yellow River	Barron	I	Jun 1978	0.8	683	131	33	9	110
Eighteen Mile Creek	Bayfield	I	Sep 1979	5.3	836	156	73	33	118

<sup>1</sup>The survey area on Race Branch was through a special regulation zone.

<sup>2</sup>Class I streams require no stocking. Class II streams require stocking.

<sup>3</sup>Includes fingerlings except on Castle Rock Creek.

favor of this project. In 1977, Charles Roethe, a Fennimore Times assistant editor and a longtime trout fisherman, editorialized, expressing the feeling of many local anglers. He indicated that anglers were "gnashing their teeth" over this project and hoped that it would be short-lived. Apparently they are still gnashing because in 1979 only 11.4% of the anglers who fished the study area lived within 25 miles and almost 80% lived more than 50 miles from the area. On the Big Green River in 1979, 44.3% of the anglers lived within 25 miles and 45.8% lived further than 50 miles.

Another local viewpoint was expressed by Wendell Smith in the Muscoda Progressive on 3 April 1980:

"On a lighter note, when the DNR designated a portion of the Castle Rock trout stream a fish-for-fun stream, one that only artificial lures can be used on and where all fish caught must be returned to the water to be caught again another day, there was some weeping and wailing among local fishermen. Who, they asked, would be foolish enough to go fishing if they couldn't bring the catch home to brag about to the neighbor or at least to fry in the pan.

"Well it has turned out that the stretch of fish-for-fun has become one of the more popular

streams in the area. I have been on the stream twice in recent weekends and each time there were numerous people throwing spinners and flicking wet flies, hoping to catch a trout. Most of them were indeed fishing for fun, as not many were being caught. I didn't hear any grumbling among the anglers though. In fact, I had an interesting visit Saturday with a Milwaukee family who make the long drive from the big city quite regularly to fish the stream. They told me they like the early spring trout fishing and the Castle Rock is the closest and best place for them to do it. I don't really know how the fish-for-fun experiment has been as far as fish management is concerned; but for people management, it appears to be a success."

#### FUTURE MANAGEMENT

For at least the next several years, there will be no change in regulations. Pennsylvania (Graff 1978) has taken the position that many of their no kill streams should remain no kill while they are studied over a long period of time. In my opinion, this should also be done on the Castle Rock Creek and Spring and Doc Smith Branch Study Area.

Local anglers want the special regulations removed, but since there are about 100 miles of trout water within 15 miles of Fennimore that aren't specially

regulated, these anglers can't argue that there isn't any other place to fish. And within this radius, there are 2 streams where wild brown trout populations exceed the population in the no kill area on Castle Rock Creek.

About 40% of the anglers who responded to the angler attitude survey favored some type of harvest. Graff and Hollender (1977) found that the number of brown and rainbow trout 15 inches and larger in Big Spring Creek declined from 493 and 386, respectively, to 53 and 81 when the size limit was reduced from 20 inches to 15 inches. This dramatic decrease took place in only 9 months. These results suggest that the adult brown trout population in the study area could be quickly reduced by fishing pressure if even a high (13 inches or so) size limit were established.

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