

Original: Fish Division  
cc: Institute for Fisheries Research  
Education-Game  
Dr. Allison

INSTITUTE FOR FISHERIES RESEARCH Conservation Officer Clarence  
DIVISION OF FISHERIES Roberts  
MICHIGAN DEPARTMENT OF CONSERVATION P. H. Eschmeyer  
COOPERATING WITH THE H. L. Peterson  
UNIVERSITY OF MICHIGAN

ADDRESS  
UNIVERSITY MUSEUMS ANNEX  
ANN ARBOR, MICHIGAN

October 15, 1947

ALBERT S. HAZZARD, PH.D.  
DIRECTOR

Report No. 1132

OBSERVATIONS OF THE EFFECT OF DYNAMITE ON TROUT AND COMMON SUCKERS

By

L. N. Allison and P. H. Eschmeyer

Various members of the Staff of the Institute for Fisheries Research have on several occasions been requested to examine dead fish for the purpose of determining whether a blast, such as that made by dynamite or some other explosive, might have been the cause of death. Definite knowledge of the effects of an underwater blast on fish is important in the conviction of violators suspected of taking fish by means of explosives. The present experiment was undertaken on August 30, 1947, to record the injuries sustained by fish when exposed to a dynamite blast.

A site on the East Branch of the Au Sable River, on property of the State Fish Hatchery at Grayling, was chosen for the work. Mr. Hans Peterson, District Fisheries Supervisor, approved the choice of location. Conservation Officer Clarence Roberts and Fire Wardens Forest Annis and Johannes Jorgensen procured the dynamite and assisted in the experiment.

The location chosen for the blast was a hole about four feet deep in which trout and suckers were observed. The stream was blocked by a seine placed about fifty feet below the hole. One stick of dynamite (40 percent) was fastened to a pole thrust into the bottom of the stream bed near the center of the hole and exploded by means of a fuse

and cap. The blast turned up only three brook trout and two brown trout. Most of the fish had apparently been frightened by the activity associated with planting the charge and lighting the fuse.

In the second attempt, a seine block was placed immediately below the hole and another seine was hauled downstream from about fifty yards above the hole, to a point about twenty feet from the lower block and anchored there, thus confining the fish to a small area. The maximum depth of the water was about twenty-six inches at the upper seine and forty-one inches at the lower. It was noted that most of the trout stayed near the upper seine and most of the suckers near the lower.

One stick of dynamite was fastened to the weighted end of a short pole and placed about eight feet above the lower seine. Due to a defective fuse or cap, it failed to explode. With the hope of causing its detonation, one-half stick was placed beside it on the stream bottom. The resulting blast was caused by the explosion of only this one-half stick, as the one which had been placed in position earlier was found to have remained intact.

After the blast, thirty-three suckers from 7.7 to 14 inches long, four brown trout, two brook trout, and one rainbow trout were collected. Some floated on the water and others were rolled along the stream bottom by the current.

All trout and several common suckers stunned or killed by the blasts were examined in the laboratory. The results of the autopsies follow:

Blast at 11:30 A.M.; Autopsy at 2:30 P.M.

1. Brook trout - length, 7.0 inches.

External aspect: normal

Ribs: distal ends free of flesh in region of pelvic girdle,  
for a distance extending anteriorly for one inch

Air bladder: ruptured

Peritoneum: considerable hemorrhage evident

Kidneys: severe damage (maceration), especially at level  
of pelvic girdle; bloated with blood

Dorsal aorta: ruptured at level of pelvic girdle.

2. Brook trout - length, 6.5 inches

External aspect: normal, except for small amount  
of blood at vent

Ribs: free of flesh at pelvic girdle

Air bladder: ruptured

Peritoneum: severe hemorrhage

Kidneys: maceration at level of pelvic girdle;  
bloated with blood

Dorsal aorta: ruptured at level of pelvic girdle

3. Brook trout - length, 3.4 inches

External aspect: normal

Ribs: intact

Air bladder: ruptured

Peritoneum: ruptured at pelvic girdle

Kidneys: macerated at level of pelvic girdle

Intestine: ruptured in region of pelvic girdle

4. Brook trout - length, 6.3 inches

External aspect: normal; slight pressure produced  
blood at vent

Ribs: distal ends free of flesh in area of pelvic girdle

Air bladder: ruptured

Peritoneum: severe hemorrhage

Kidneys: externally intact, macerated internally

Dorsal aorta: ruptured at level of pelvic girdle

5. Brown trout - length, 5.8 inches

External aspect: normal, except for bloody vent

Ribs: distal ends of several free of flesh in  
region of pelvic girdle

Air bladder: ruptured

Peritoneum: some hemorrhage; blood vessels distended

Kidneys: some maceration; filled with blood

Dorsal aorta: ruptured at level of pelvic girdle

Blast at 2:00 P.M.; Autopsy at 3:00 P.M.

1. Brook trout - length, 6.5 inches

External aspect: normal, except for bloody vent

Ribs: normal

Air bladder: ruptured

Peritoneum: extensive hemorrhage

Kidneys: maceration at level of pelvic girdle

Dorsal aorta: ruptured at level of pelvic girdle

2. Brook trout - length, 6.6 inches

External aspect: normal

Ribs: normal

Air bladder: ruptured

Peritoneum: lesions at pelvic girdle

Kidneys: some maceration at level of pelvic girdle;  
accumulation of blood

Dorsal aorta: ruptured at level of pelvic girdle

3. Brown trout - length, 7.6 inches

External aspect: normal, except for blood at vent.

Ribs: slight lesions of flesh at distal ends at  
pelvic girdle

Air bladder: ruptured

Peritoneum: hemorrhage at level of pelvic girdle

Kidneys: filled with blood

Intestine: hemorrhage at level of pelvic girdle

Dorsal aorta: ruptured at level of pelvic girdle

4. Brown trout - length, 11.1 inches

External aspect: normal, except for bloody vent

Ribs: distal ends free of flesh in region of pelvic girdle

Air bladder: ruptured

Peritoneum: ruptured over kidneys

Kidneys: maceration at level of pelvic girdle

Body cavity: rupture of peritoneum over kidneys released blood  
which accumulated in posterior end of body cavity

Dorsal aorta: ruptured at level of pelvic arch

5. Brown trout - length, 8.9 inches

External aspect: normal

Ribs: normal

Air bladder: ruptured, hemorrhage at posterior end.

Peritoneum: blood vessels distended, no ruptures noted.

Kidneys: blood vessels ruptured.

Dorsal aorta: ruptured at level of pelvic arch. (Heart  
beating at time of examination.)

6. Brown trout - length, 7.8 inches

External aspect: normal, except for bloody vent

Ribs: free of flesh in region of pelvic girdle

Air bladder: ruptured

Peritoneum: lesions at the pelvic girdle

Kidneys: filled with blood

Dorsal aorta: ruptured at level of pelvic girdle

7. Common sucker - length, 10 inches

External aspect: normal

Ribs: normal

Air bladder: anterior chamber ruptured; extensive hemorrhage

Peritoneum: severe hemorrhage at level one-third distance  
from pectoral to pelvic girdle

Kidneys: severe maceration, vertebrae exposed for about one inch at  
level one-third distance from pectoral to pelvic girdle

Dorsal aorta: ruptured

8. Common sucker - length, 9.7 inches

External aspect: normal

Ribs: normal

Air bladder: anterior chamber ruptured

Kidneys: severe damage at level one-third distance  
from pectoral to pelvic girdle

Dorsal aorta: ruptured at level of kidney damage

Body cavity: filled with blood. Principal internal damage at level  
one-third distance from pectoral to pelvic girdle

9. Common sucker - length, 12.1 inches

External aspect: normal

Ribs: normal

Air bladder: anterior compartment ruptured

Peritoneum: extensive hemorrhage

Kidneys: severe damage at level one-third distance  
from pectoral to pelvic girdle

Dorsal aorta: ruptured at level of kidney damage

Three additional common suckers examined exhibited lesions identical to the three just described. The remaining twenty-seven specimens (7.7 to 14 inches in length) killed by the blast were discarded.

Table I summarizes effects of the dynamite blasts on fish in this experiment.

Table I

A Summary of the Effects of  
Dynamite on Trout and Suckers

	Trout	Common Sucker
External aspect	Normal; blood at vent in some cases	Normal
Ribs	Distal ends exposed at pelvic girdle in some specimens	Normal
Air bladder	Ruptured	Only anterior chamber ruptured
Peritoneum	General hemorrhage. Lesions at pelvic arch	General hemorrhage
Kidneys	Macerated at level of pelvic girdle	Macerated at level one-third distance from pectoral girdle to pelvic girdle
Dorsal aorta	Ruptured at level of pelvic girdle	Ruptured at level of kidney damage

It is evident from the above data that trout and common suckers incur internal damage of the same nature, but at different body levels. In trout, the focus of injury was at the level of the pelvic girdle in every case, while in common suckers it was located considerably more anterior, roughly one-third the distance from the pectoral to the pelvic girdle.

Although it is commonly stated that one obvious effect of a dynamite blast on fish is the loosening of the ribs, only a few specimens in this experiment demonstrated such damage. Those in which the ribs were torn loose from the flesh also showed greater general internal injury than in the specimens having undamaged ribs. Evidently the charge of dynamite which was used was too light to produce extreme effects, or most of the fish were

near the outer edge of the effective destructive limits of the charge. Many live fish were observed in the enclosure after the blast, indicating that one-half stick of dynamite (40 percent) is not immediately lethal to fish for any great distance. The upper seine block, the most distant from the blast, was approximately twelve feet away, and some fish between it and the blast survived.

Further experimentation would be desirable with heavier charges of dynamite and with more species of fish. In such tests fish in the immediate vicinity of the blast which are not immediately killed should be collected and held in a hatchery pond for observations of delayed mortality resulting from injuries not immediately fatal.

INSTITUTE FOR FISHERIES RESEARCH

L. N. Allison  
District Fisheries Biologist  
and  
P. H. Eschmeyer  
Assistant Fisheries Biologist

Report approved by A. S. Hazzard

Report typed by E. L. Preston