

THE SPRING SALMONID FISHERY NEAR A THERMAL DISCHARGE IN LAKE ERIE AT DUNKIRK HARBOR¹

DAVID L. BIMBER² and ANTHONY A. NIGRO,³ Environmental Resources Center and the Department of Biology, State University College, Fredonia, NY 14063

ABSTRACT. A creel survey was conducted from 10 March to 30 April 1977 in Dunkirk harbor located on the eastern shore of Lake Erie. Coho salmon (*Oncorhynchus kisutch*), rainbow trout (*Salmo gairdneri*), and brown trout (*Salmo trutta*) comprised 55% of angler harvest. Finclips indicated that 13.5% of coho salmon caught in the harbor had been stocked in Ohio tributaries of the lake. Average catch per unit effort estimates for the salmonid part of the catch were 0.298 fish per hour (pier) and 0.322 fish per hour (boat) for successful salmonid anglers. The estimated total weight of the salmonid catch taken during the study was 610 kg.

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INTRODUCTION

U.S. and Canadian agencies have sporadically sought to augment Lake Erie's salmonid fishery since the late 1870s when the first large-scale stocking of salmonids began (Parsons 1973). In recent years, renewed interest has been directed at this part of the sport fishery with the reintroduction of coho (1967) and chinook (1970) salmon. Zarbock (1977) estimated that sport fishing in Lake Erie will double by the year 2000. The improvement in quality fishing opportunities provided by the developing salmonid fishery is a primary concern of anglers and fishery managers. This study was designed as a preliminary survey to assess the importance of a seasonal salmonid fishery in Lake Erie's eastern basin.

Dunkirk harbor is located on the southeast shore of Lake Erie, mid-way between the cities of Buffalo, NY and Erie, PA. The harbor has a surface area of 106 ha and

depths ranging to 6 m. The harbor contains at least 36 fish species, limited communities of aquatic macrophytes, and moderately abundant beds of *Cladophora* spp. Warm water effluent is discharged into the harbor from a fossil-fueled electric generating station creating a thermal plume extending through our survey area and 1.8–2.1 km along the shoreline to the northeast. At 55% of maximum generating capacity, the long-term average for the Dunkirk station, plant discharge replaces approximately 50% of harbor water volume every 24 hr, resulting in increases of 3.0–9.4 C over ambient lake temperatures (Texas Instruments, Inc. 1977a). More detailed descriptions of the biological and physical characteristics of the harbor may be found in Texas Instruments, Inc. (1977a, 1977b and 1977c).

METHODS

Two weekdays and one weekend day were randomly chosen for weekly sampling from 10 March to 30 April 1977. Each day was divided into 3 daylight periods (0700–1100, 1100–1500 and 1500–1900 hrs, EST), and a direct contact roving census of pier and boat anglers was conducted during one randomly selected period each sample day. All pier anglers were interviewed and a small number of boat anglers were contacted as they landed at boat launching areas in the harbor. Anglers were asked questions on age, residence, fishing effort and fish species

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²Present address: Great Lakes Research Division, Institute of Science and Technology Building, University of Michigan, Ann Arbor, MI 48109.

³Present address: U. S. Fish and Wildlife Service, National Fishery Research Center, Grand Coulee, WA 99133.

sought. Lengths, weights, scale samples and general notes on finclips, tags and condition were recorded for all fish examined. Mean estimates of total catch, angling effort and angler numbers were determined and extrapolated to include the entire study period.

RESULTS AND DISCUSSION

Twenty-one periods were sampled out of a possible 156 (13.5%); 250 pier and 35 boat anglers were interviewed. Most anglers (56.8%) lived within 50 km of Dunkirk and 41.6% resided from 50 to 150 km away, mostly in the Buffalo, NY area. Many (38.4%) fished at the pier less than once per week but 23.2% fished daily when salmon were available. About 62%, 32% and 6% of the total harbor angler population utilized the pier, boats and shoreline, respectively. Weekend angling pressure in the harbor was more than twice the weekday rate. Detailed summaries of angler data are available from the authors upon request.

Catches included coho salmon (*Oncorhynchus kisutch*) (49%), freshwater drum (*Aplodinotus grunniens*) (26.8%), yellow perch (*Perca flavescens*) (5.7%), carp (*Cyprinus carpio*) (5.1%), goldfish (*Carassius auratus*) (4.5%), brown trout (*Salmo trutta*) (3.2%) and rainbow trout (*Salmo gairdneri*) (2.5%). Northern pike (*Esox lucius*), muskellunge (*E. masquinongy*) and white sucker (*Catostomus commersoni*) made up the remaining 2.5% of the catch (table 1). Approximately 13.5% of the coho salmon

examined had finclips indicating that they were stocked in Ohio tributaries of the lake (W. Shepherd, NYSDEC, Region 9, Olean, NY, pers. comm.). Length and weight statistics for all fish examined during our study are available from the authors upon request. An estimated salmonid catch of 610 kg was obtained by multiplying the mean weight of all salmonids examined (0.945 kg) by the combined period catch means for pier and boat anglers.

Estimates of total angler numbers, effort (fishing hours), salmonid and total catch are indicated in table 2. Angler effort is probably more representative of angling pressure than angler number. Successful salmonid anglers (those that caught fish) had catch per effort (CPE) rates of 0.298 fish/hr (pier) and 0.322 fish/hr (boat). All successful anglers (salmonid and non-salmonid) had CPE rates of 0.723 fish/hr (pier) and 0.389 fish/hr (boat) (table 3). Comparisons with stream salmonid fisheries, 0.29–0.30 fish/hr (Erman 1972) and 0.25–0.35 fish/hr (Southward and Douglas 1972) indicate a relative degree of similarity. Spigarelli and Thommes (1976) characterized a rainbow-brook trout fishery in a thermal plume in Lake Michigan where CPE rates of 8.8–7.6 hr/fish were attained by anglers. Unfortunately, a paucity of published information exists concerning the in-lake salmonid

TABLE 1
Angler catch summary.

Species	Total catch %	Mean length (mm)	Mean weight (kg)
Coho salmon (<i>Oncorhynchus kisutch</i>)	49.0	448	0.897
Freshwater drum (<i>Aplodinotus grunniens</i>)	26.8	392	0.594
Yellow perch (<i>Perca flavescens</i>)	5.7	258	0.258
Carp (<i>Cyprinus carpio</i>)	5.1	397	1.52
Goldfish (<i>Carassius auratus</i>)	4.5	345	0.718
Brown trout (<i>Salmo trutta</i>)	3.2	447	1.37
Rainbow trout (<i>Salmo gairdneri</i>)	2.5	447	0.95
Northern pike (<i>Esox lucius</i>)	1.3	644	2.1
Muskellunge (<i>Esox masquinongy</i>)	0.6	526	1.04
White sucker (<i>Catostomus commersoni</i>)	0.6	496	1.53

TABLE 2

Estimates of total angler number, catch and effort for the Dunkirk harbor fishery. Estimates represent 95% confidence limits for the entire study period (10 March-30 April 1977).

Interval of estimate	No. anglers	Effort (hrs)	Salmonid catch	Total catch
Pier				
Period 1	693-1107	809-1216	48-77	109-224
Period 2	684-1125	1076-1618	48-150	238-584
Period 3	715-1022	1012-1827	104-344	195-409
Boat anglers (total)	386-498	1584-2040	313-403	386-498

fishery of Lake Erie and further comparison is not possible.

Heated effluent from power generating stations may have beneficial influence upon localized winter fisheries, in this instance, by providing a warm water area free of ice pack which tends to attract forage and quality gamefish as well as anglers. Dunkirk harbor, NY, during the winter and spring, supports a relatively productive small-scale fishery, attracting substantial numbers of anglers from western New York State. The establishment and maintenance of a stocked salmonid population in Lake Erie is a primary source of motivation for a majority of these winter-spring sport fishing enthusiasts.

TABLE 3

Mean catch per effort (fish caught/hr) for the spring, sport fishery in Dunkirk harbor (10 March-30 April 1977).

Category	Successful anglers	All anglers
Pier		
Salmonid catch	0.298	0.097
Total catch	0.723	0.231
Boat		
Salmonid catch	0.322	0.197
Total catch	0.389	0.244

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