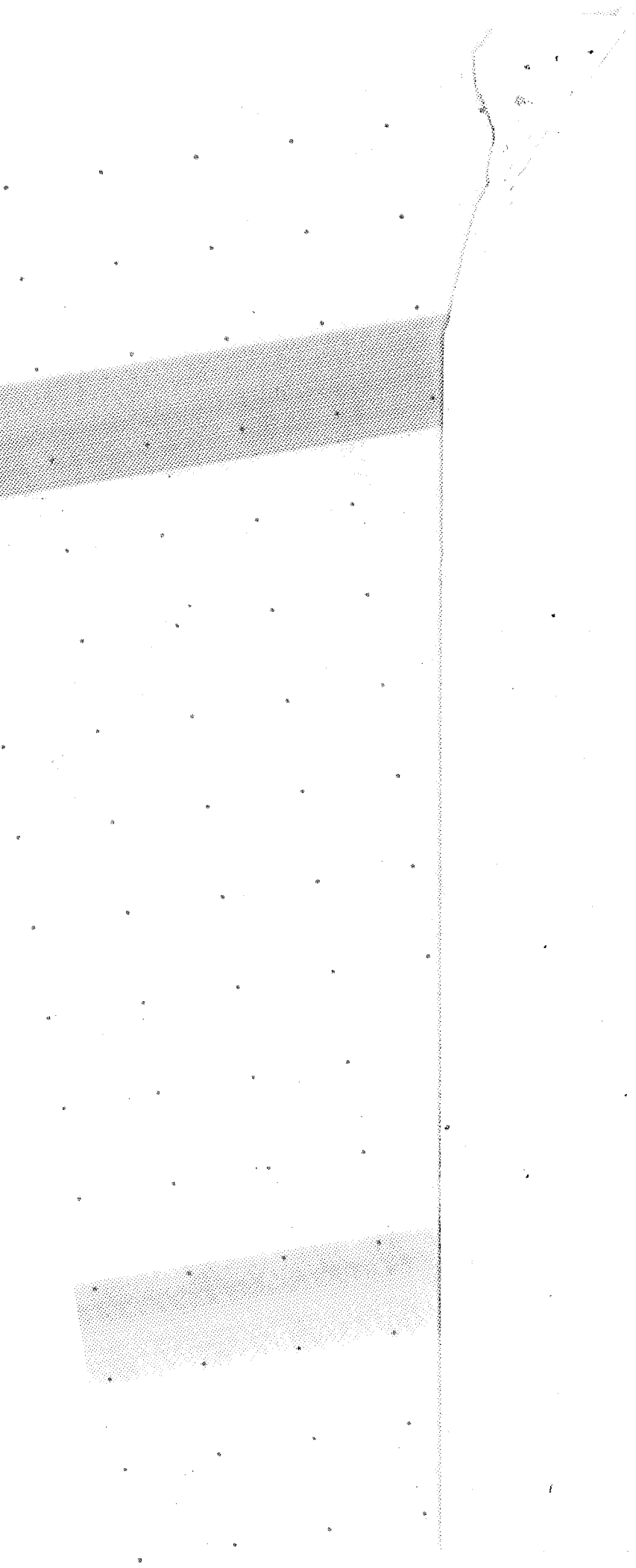

OPERATION OF THE CONOW FISH COLLECTION FACILITY SPRING OF 1980

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Prepared For

Philadelphia Electric Company

Fish Facility Operation Report

September 1980

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INTRODUCTION

The Conowingo Dam Fish Collection Facility (hereafter Fish Trap) has been operated since 1972 as part of a cooperative state, private, and federal effort to restore American shad to the Susquehanna River. Early goals of trap operation were to determine the number of American shad that could be collected from the Fish Trap location and to transport as many shad as possible upriver. The current goal is to monitor anadromous fish populations below Conowingo Dam. Operation of the fish trap is under the guidance of the Susquehanna River Anadromous Fish Restoration Cooperative and has been funded by Philadelphia Electric Company. Results of trap operation from 1972 to 1979 were summarized by McGhan (1977, 1978) and RMC (1979).

Objectives of the 1980 operation were to (1) monitor relative abundance of Alosa species in the Conowingo Dam tailrace, (2) monitor species composition of fish in Conowingo Dam tailrace, (3) obtain scale samples from selected anadromous fish species, and (4) collect American shad for radio tagging.

METHODS

Conowingo Dam is located on the Susquehanna River approximately 10 mi upriver of the confluence with Chesapeake Bay. The fish trap (Figure 1) is at the base of the Dam on the west side of the tailrace adjacent to the power house. Atraction water for the trap is provided by two small turbines (House Units). Discharge from the trap is controlled by flow from these turbines and by adjustable weir gates. Trap design has been described by Kotkas and Robbins (1976) and in the Operation and Maintenance Manual (Anon. 1972).

Trap operation in 1980 was scheduled to begin on 15 April, but high river flows (peak of 144,300 cfs on 16 April) delayed installation of trap motors. Operation began on 23 April but problems with the crowder gate occurred. Operation resumed on 25 April and continued daily through 29 April

in an effort to determine if substantial numbers of alosids were present in the tailrace. Normal operation (every third day) began on 2 May and continued through 13 June. Additional days of operation occurred following any day when 5 or more American shad were collected.

The trap was usually fished one half hour before sunrise to noon. Additional operation occurred whenever one or more shad were taken between 1100-1200 hr. On those days operation continued until no shad were collected for one hour. The trap was also operated at night during 8-9 May in a special effort to collect American shad for radio tracking.

Trap operation was similar to that described in the Operation and Maintenance Manual (Anon. 1972). Fishing time (i.e., time crowder gates were open ranged from 1 to 60 minutes depending upon abundance of fishes; the more fish, the shorter the time. Thirty minute fishing times were most frequently used. An intermediate crowder gate position (12-in. opening) was used throughout the season. The crowder doors were usually closed for 10 to 15 minutes between fishing periods, depending upon abundance of fishes and the time required to process catches.

Attraction velocity and flow were maintained at approximately 6.0 fps and 265 cfs by regulating House Unit discharge and weir gate position. Velocities were checked with a General Oceanics Model 2030 digital flow meter on 3 and 4 June (Table 1). Observed velocities and elevation differentials between the tailrace and the holding channel were oconsistent with results from previous years (Robbins, 1972).

Based on an agreement with the State of Maryland, Susquehanna Electric Company continuously released at least 5,000 cfs from Conowingo Dam from 23 April through 1 June. When the fish trap operated, this flow was usually discharged via the turbine (Unit No. 2) adjacent to the trap in an effort to attract fish to the west side of the tailrace.

Morpholine was released from the fish trap during a 24-hour period every sixth day starting 11 May as indicated in Table 3 and Figure 3. This chemical was used by the Pennsylvania Fish Commission to imprint larval shad reared at their Van Dyke Hatchery (Thompsontown, Pa) and stocked in Susquehanna River tributaries. It was hoped that adults resulting from these introductions would be attracted to the fish trap by morpholine release.

Fishes were processed as described by McGhan (1977). Catches were sorted in a 1.8 x 3.7 x 1.2 m tank supplied with running river water. Most catches were counted or subsampled and released to the tailrace. When mortalities due to dissolved oxygen deficiency were likely, the number of fish of each species was estimated and the catch was released.

American shad were dip netted from the sorting tank into a similar tank supplied with running river water. Healthy, actively swimming fish were either equipped with radio tags, fin clipped (left pelvic fin), or tagged with floy anchor tags. Tagged fish were observed for a short time to determine condition, and healthy individuals were released into the tailrace via a water filled pipe or box. Sex, length and spawning condition were determined and scale samples were taken when possible. Weight was taken only for the few individuals which died prior to release.

Length, weight, sex and scale samples were also taken from blueback herring, alewife, striped bass, and striped bass x white bass hybrid. Common names of fishes (Bailey et al. 1970) are used throughout the text and tables. A list of common and scientific names is given in Table 2.

River flow and temperature at the trap during trap operation are summarized in Figure 2. Flow ranged from 17,800 to 51,000 cfs. It fluctuated among days but generally decreased from April through June. Temperature ranged from 56.0 to 73.5 F and increased steadily through the season.

RESULTS AND DISCUSSION

In 30 days of fish trap operation, 372,380 fish representing 11 families and 43 species were caught in 403 lifts with a total fishing time of 117 hours (Table 3). Predominate species were gizzard shad (74.1%), channel catfish (10.5%), white perch (7.2%), carp (2.4%), and walleye (1.1%). Anadromous clupeids (alewife, blueback herring, American shad, and hickory shad) comprised 0.2% of the total catch. No American shad and relatively few resident fishes were collected during the one night time effort (Table 3) on 8-9 May 1980.

The clupeid catch has steadily declined since 1973 when anadromous clupeids comprised 35.1% of the total. In 1980, there was no substantial run of blueback herring and the collection of herring per lift never exceeded 60. The total catch of alewife (9) was the same as in 1979. This is the third consecutive year that fewer than 10 alewife were captured. This catch has declined from 143,880 alewife in 1973. One hickory shad was present in the 1980 catch. This was the first time it has been taken in the facility since 1975.

A total of 139 American shad was collected between 23 April and 13 June (Table 3, Figure 3). Four of these had been previously captured and marked at the trap. One fish radio tagged on 11 May was recaptured on 7 June. A second fish was floy tagged on 11 May and recaptured on 10 June. The third fish was floy tagged on 31 May and recaptured on 3 and 7 June. Twelve shad were successfully radio tagged and released.

Two peaks in catch of American shad occurred (Figure 3). The first occurred in late April at water temperatures of 58 to 59 F and flows of 37,800 to 42,000 cfs. The second peak occurred in late May and early June at water temperatures of 67 to 73.5 F and flows of 17,800 to 32,300 cfs. A similar pattern of shad catch was reported in previous years.

Life history data and scale samples were obtained from 132 American shad, 201 blueback herring, 5 alewife, 87 striped bass, and 216 striped bass x white bass hybrids.

LITERATURE CITED

Anonymous. 1972. Conowingo Dam Fish Collection Facility Operation and Maintenance Manual. Prepared for Philadelphia Electric Company, 24 p.

Bailey, R. M., J. E. Fitch, E. S. Herald, E. A. Lachner, C. C. Lindsey, C. R. Robins and W. B. Scott. 1970. A list of common and scientific names of fishes from the United States and Canada (third edition). Amer. Fish. Soc. Spec. Publ. No. 6: 150 p.

Kotkas, E. and T. W. Robbins. Studies of the American shad, Alosa sapidissima, in the lower Susquehanna River below Conowingo Dam (maryland), 1972-1976. Paper presented at the 1976 Atlantic Estuarine Research Society Fall Meeting, Cape May, New Jersey, October 14-16, 1976.

McGhan, G. L. 1977. Summary of the operation of the Conowingo Dam Fish Collection Facility during the spring of 1977. Ichthyological Associates, Inc., Drumore, Pa., Fish Facility Operation Report 6, prepared for Philadelphia Electric Company, 69 p.

McGhan, G. L. 1978. Summary of the operation of the Conowingo Dam Fish Collection Facility during the spring of 1978. RMC Ecological Division, Drumore, Pa., Fish Facility Operation Report 7, prepared for Philadelphia Electric Company, 37 p.

Radiation Management Corporation. 1979. Summary of the Operation of the Conowingo Dam Fish Collection Facility during the spring of 1979. RMC-Muddy Run Ecological Laboratory, Drumore, Pa., Fish Facility Operation Report 8, prepared for Philadelphia Electric Company, 28 p.

Robbins, T. W. 1972. Summary of the operation of the Conowingo Dam Fish Collection Facility during the spring of 1972. Ichthyological Associates, Drumore, Pa., Fish Facility Operation Report 1, prepared for Philadelphia Electric Company, 31 p.

Table 1. Summary of hydraulic measurements made at the Conowingo Dam Fish Collection Facility, 3-4 June 1980.

Discharge (cfs)	Weir Gate Setting (ft)	Velocities (ft/s) Holding Channel	Weir Gate 1	Weir Gate 2	Difference in Elevation (ft) Between Tailrace and Holding Channel
265	5.1	1	6-7	5-6	1.2-1.5
360	4.5	2	8	8	2.5

Table 2. List of scientific and common names of fishes collected in the Conowingo Dam Fish Collection Facility, 1980 (according to Bailey, et al., 1970).

Scientific Name	Common Name	Scientific Name	Common Name
Family - Petromyzontidae	Lampreys	Family - Ictaluridae	Freshwater catfishes
Petromyzon marinus	Sea lamprey	*Ictalurus catus*	White catfish
		Ictalurus natalis	Yellow bullhead
Family - Anguillidae	Freshwater eels	*Ictalurus nebulosus*	Brown bullhead
Anguilla rostrata	American eel	*Ictalurus punctatus*	Channel catfish
Family - Clupeidae	Herrings	Family - Percichthyidae	Temperature basses
Alosa aestivalis	Blueback herring	*Morone americana*	White perch
Alosa mediocris	Hickory shad	*Morone saxatilis*	Striped bass
Alosa pseudoharengus	Alewife	*M. saxatilis* x *M. chrysops*	Striped bass x white bass
Alosa sapidissima	American shad		
Brevoortia tyrannus	Atlantic menhaden	Family - Centrarchidae	Sunfishes
Dorosoma cepedianum	Gizzard shad	*Ambloplites rupestris*	Rock bass
		Lepomis auritus	Redbreast sunfish
Family - Salmonidae	Trouts	*Lepomis cyanellus*	Green sunfish
Salmo gairdneri	Rainbow trout	*Lepomis gibbosus*	Pumpkinseed
Salmo trutta	Brown trout	*Lepomis macrochirus*	Bluegill
Salvelinus fontinalis	Brook trout	*Micropterus dolomieui*	Smallmouth bass
S. fontinalis x *S. namaycush*	Splake	*Micropterus salmoides*	Largemouth bass
		Pomoxis annularis	White crappie
Family - Esocidae	Pikes	*Pomoxis nigromaculatus*	Black crappie
Esox lucius	Northern pike		
Esox masquinongy	Muskellunge	Family - Percidae	Perches
E. masquinongy x *E. lucius*	Tiger muskie	*Perca flavescens*	Yellow perch
		Stizostedion vitreum	Walleye
Family - Cyprinidae	Minnows and carps		
Cyprinus carpio	Carp		
Nocomis micropogon	River chub		
Notemigonus crysoleucas	Golden shiner		
Notropis amoenus	Comely shiner		
Notropis hudsonius	Spottail shiner		
Notropis spilopterus	Spotfin shiner		
Family - Catostomidae	Suckers		
Carpiodes cyprinus	Quillback		
Catostomus commersoni	White sucker		
Hypentelium nigricans	Northern hog sucker		
Moxostoma macrolepidotum	Shorthead redhorse		

1 2 3 4 5 6 7 8

23 25 26 27 28 29 30 31

TABLE 3.
NUMBERS OF FISH TAKEN DAILY AT THE
CONOWINGO DAM FISH COLLECTION FACILITY - 23 APRIL TO 13 JUNE 1980.

DATE	04/23/80	04/25/80	04/26/80	04/27/80	04/28/80	04/29/80	05/02/80	05/05/80
NO. LIFTS	9	16	12	16	10	11	11	13
FIRST LIFT	545	515	525	520	520	522	505	445
LAST LIFT	932	1409	1153	1540	1140	1158	1151	1158
OPERATING TIME (HRS)	3.78	8.83	6.55	10.33	6.33	6.60	6.77	7.17
FISHING TIME (HRS)	1.67	5.08	3.58	3.83	3.42	4.35	4.08	4.78
AVE RIVER FLOW (KCFS)	51.0	42.0	37.9	37.8	37.5	43.3	90.2	57.9
AVE WATER TEMP. (F)	58.0	58.0	59.0	59.0	58.0	60.0	57.0	60.0
MORPHOLINE USED?	NO	NO	NO	NO	NO	YES	NO	YES
AMERICAN EEL	8	2	10	1	-	-	13	9
BLUEBACK HERRING	-	1	-	6	5	-	-	-
HICKORY SHAD	-	-	-	-	1	-	-	-
ALEWIFE	-	1	1	-	2	-	2	2
AMERICAN SHAD	-	3	-	22	-	-	-	-
GIZZARD SHAD	7,336	5,440	6,538	26,382	5,565	2,916	1,822	9,434
ATLANTIC MENHADEN	-	-	-	-	-	-	-	-
RAINBOW TROUT	-	-	-	-	-	1	-	-
BROWN TROUT	-	2	9	1	4	4	9	4
BROOK TROUT	-	-	-	-	-	2	-	2
NORTHERN PIKE	-	-	1	-	1	1	-	-
MUSKELLUNGE	1	-	1	-	5	-	-	3
CARP	18	283	5	34	258	10	20	306
RIVER CHUB	-	-	-	-	-	1	-	-
GOLDEN SHINER	-	-	-	1	-	-	-	-
COMELY SHINER	-	-	-	-	-	-	-	-
SPOTTAIL SHINER	-	25	-	63	-	-	-	-
SPOTFIN SHINER	-	-	-	-	-	-	-	-
QUILLBACK	4	274	12	30	30	12	-	70
WHITE SUCKER	22	196	51	157	104	65	30	64
NORTHERN HOG SUCKER	-	-	-	-	-	3	-	-
SHORTHEAD REDHORSE	6	174	40	61	33	35	14	66
WHITE CATFISH	-	1	-	-	-	-	-	-
YELLOW BULLHEAD	-	1	1	-	-	-	-	-
BROWN BULLHEAD	-	1	2	-	-	4	-	-
CHANNEL CATFISH	256	335	249	209	108	735	571	2,520
WHITE PERCH	10	157	553	56	25	60	18	56
STRIPED BASS	-	-	-	-	-	-	-	-
ROCK BASS	-	-	-	1	-	-	-	-
REDBREAST SUNFISH	-	-	1	-	-	1	-	-
GREEN SUNFISH	-	-	-	-	-	-	-	-
PUMPKINSEED	-	-	-	-	-	-	-	-
BLUEGILL	-	-	-	-	-	-	-	-
SMALLMOUTH BASS	2	8	2	4	15	3	-	22
LARGEMOUTH BASS	-	5	-	-	-	-	-	-
WHITE CRAPPIE	-	1	-	-	-	-	-	-
BLACK CRAPPIE	-	-	-	-	-	-	-	-
YELLOW PERCH	-	1	20	-	-	-	-	-
WALLEYE	38	86	93	105	48	71	4	50
SEA LAMPREY	-	-	-	-	-	-	-	-
STRIPED BASS X WHITE BASS	2	0	4	-	-	-	-	6
TIGER MUSKIE	2	3	1	1	-	3	1	-
SPLAKE	-	-	-	-	-	-	-	-
	7,705	7,009	7,594	27,152	6,209	3,927	2,504	12,613

	9	10	11	12	13	14	15	16
TABLE 3 (CONT.)	38	39	41	42	44	47	50	53
DATE	05/08/80	05/09/80	05/11/80	05/12/80	05/14/80	05/17/80	05/20/80	05/23/80
NO. LIFTS	15	11	13	14	14	11	14	14
FIRST LIFT	440	2240	443	445	450	435	420	436
LAST LIFT	1125	420	1305	1146	1150	1138	1242	1155
OPERATING TIME (HRS)	6.75	5.67	8.17	7.02	7.00	7.05	8.37	7.32
FISHING TIME (HRS)	2.67	3.58	4.00	4.50	3.17	3.25	3.83	3.75
AVE RIVER FLOW (KCFS)	42.0	30.4	33.5	30.9	57.2	49.0	38.6	40.0
AVE WATER TEMP. (F)	64.8	64.0	64.0	64.5	63.0	65.0	65.5	55.0
MORPHOLINE USED?	NO	NO	YES	NO	NO	YES	NO	YES
AMERICAN EEL	-	1	10	20	14	15	15	-
BLUEBACK HERRING	-	1	11	-	1	-	1	1
HICKORY SHAD	-	-	-	-	-	-	-	-
ALEWIFE	-	-	1	-	-	-	-	-
AMERICAN SHAD	-	-	7	-	4	3	4	5
GIZZARD SHAD	18,060	2975	19,704	12,408	15,300	9,245	13,813	11,433
ATLANTIC MENHADEN	-	-	-	-	-	-	-	-
RAINBOW TROUT	8	-	-	-	-	-	8	-
BROWN TROUT	20	4	2	24	11	1	18	5
BROOK TROUT	-	-	-	-	-	-	-	-
NORTHERN PIKE	-	-	-	-	-	-	-	-
MUSKELLUNGE	1	-	3	-	-	-	-	-
CARP	432	2	-	76	156	508	336	554
RIVER CHUB	-	-	-	-	-	-	-	-
GOLDEN SHINER	-	-	1	-	-	6	-	-
COMELY SHINER	-	-	-	-	-	-	-	-
SPOTTAIL SHINER	-	-	-	-	-	-	-	-
SPOTFIN SHINER	-	-	-	-	-	-	-	-
QUILLBACK	132	-	16	-	32	18	32	55
WHITE SUCKER	30	5	10	8	2	69	8	23
NORTHERN HOG SUCKER	-	-	-	-	8	-	-	-
SHORTHEAD REDHORSE	58	2	4	24	20	67	116	57
WHITE CATFISH	-	2	8	20	10	16	136	4
YELLOW BULLHEAD	-	-	-	-	-	-	-	1
BROWN BULLHEAD	-	-	24	26	6	14	118	13
CHANNEL CATFISH	4,780	5,057	1,827	920	774	817	718	1,380
WHITE PERCH	5,240	189	3,287	1,228	902	1,090	598	875
STRIPED BASS	-	-	-	-	-	-	-	6
ROCK BASS	-	-	-	-	-	-	-	-
REDBREAST SUNFISH	-	-	-	10	10	43	50	20
GREEN SUNFISH	-	-	-	-	-	-	-	-
PUMPKINSEED	-	-	-	-	10	-	-	-
BLUEGILL	-	-	1	-	10	48	52	20
SMALLMOUTH BASS	103	10	11	36	4	21	2	13
LARGEMOUTH BASS	4	-	-	-	-	-	1	-
WHITE CRAPPIE	-	-	1	-	50	-	-	-
BLACK CRAPPIE	-	-	-	-	-	4	-	-
YELLOW PERCH	-	-	4	-	-	-	-	-
WALLEYE	171	56	42	104	35	86	218	138
SEA LAMPREY	-	1	-	-	-	-	-	-
STRIPED BASS X WHITE BASS	4	-	3	12	-	-	1	29
TIGER MUSKIE	-	-	-	-	-	2	1	1
SPLAKE	-	-	-	-	-	-	-	-
	29,043	8,305	24,977	14,915	17,359	12,073	16,246	14,633

	17	18	19	20	21	22	23	24
TABLE 3 (CONT.)	84	56	57	59	60	61	62	63
DATE	05/24/80	05/26/80	05/27/80	05/29/80	05/30/80	05/31/80	06/01/80	06/02/80
NO. LIFTS	14	17	11	10	17	11	11	10
FIRST LIFT	440	436	446	445	430	520	433	430
LAST LIFT	1153	1336	1148	1152	1236	1253	1220	1128
OPERATING TIME (HRS)	7.22	9.05	7.03	7.12	8.10	7.55	7.78	6.97
FISHING TIME (HRS)	4.00	4.67	3.83	2.47	3.92	3.42	5.33	4.58
AVE RIVER FLOW (KCFS)	37.8	32.3	26.6	25.1	20.8	20.9	19.8	18.2
AVE WATER TEMP. (F)	65.0	67.0	68.0	69.0	70.0	71.5	70.0	70.0
MORPHOLINE USED?	NO	NO	NO	YES	NO	NO	NO	NO
AMERICA. EEL	2	13	13	-	52	23	16	31
BLUEBACK HERRING	17	57	10	12	-	1	25	1
HICKORY SHAD	-	-	-	-	-	-	-	-
ALEWIFE	-	-	-	-	-	-	-	-
AMERICA. SHAD	-	10	1	14	8	2	19	6
GIZZARD SHAD	10,675	15,848	2,549	11,778	8,042	7,746	3,633	733
ATLANTIC MENHADEN	-	-	-	-	-	-	-	-
RAINBOW TROUT	-	-	-	-	-	-	5	-
BROWN TROUT	16	6	5	12	-	47	2	14
BROOK TROUT	-	-	-	-	-	-	-	-
NORTHERN PIKE	-	-	-	-	-	-	-	-
MUSKELLUNGE	1	3	1	1	-	1	2	1
CARP	10	44	442	2,095	2,182	124	34	230
RIVER CHUB	-	-	-	-	-	-	-	-
GOLDEN SHINER	-	-	7	8	-	-	-	-
COMELY SHINER	-	-	503	-	-	60	1	200
SPOTTAIL SHINER	-	-	501	20	-	40	-	200
SPOTFIN SHINER	-	-	-	-	-	-	90	200
GUILLBACK	-	5	303	420	274	368	20	314
WHITE SUCKER	8	73	35	120	25	17	4	2
NORTHERN HOG SUCKER	-	-	-	-	-	-	-	-
SHORTHEAD REDHORSE	23	96	47	216	85	53	29	2
WHITE CATFISH	-	18	53	21	66	15	7	19
YELLOW BULLHEAD	-	-	-	-	-	-	-	-
BROWN BULLHEAD	10	5	113	5	110	97	6	29
CHANNEL CATFISH	252	1,519	694	2,156	2,456	626	403	394
WHITE PERCH	422	1,175	423	574	1,744	1,650	643	1,295
STRIPED BASS	21	16	24	67	20	19	84	24
ROCK BASS	4	-	24	24	8	16	-	2
REDBREAST SUNFISH	24	101	156	106	97	105	111	72
GREEN SUNFISH	-	-	15	-	-	-	-	-
PUMPKINSEED	-	45	66	5	10	33	11	25
BLUEGILL	-	73	112	90	28	44	48	52
SMALLMOUTH BASS	11	51	8	53	3	10	36	2
LARGEMOUTH BASS	4	4	5	-	-	1	12	2
WHITE CRAPPIE	-	-	3	4	-	12	-	2
BLACK CRAPPIE	-	-	1	-	-	-	-	4
YELLOW PERCH	-	8	48	29	44	46	66	44
WALLEYE	94	183	161	290	387	204	286	150
SEA LAMPREY	-	-	-	-	-	-	-	-
STRIPED BASS X WHITE BASS	23	27	51	195	133	113	347	163
TIGER MUSKIE	1	1	1	1	1	3	1	4
SPLAKE	1	-	-	-	-	-	-	-
	11,624	19,375	6,362	18,338	15,765	11,356	5,932	4,219

25 26 27 28 29 30

64 65 68 69 71 74

TABLE 3 (CONT.)

DATE	06/03/80	06/04/80	06/07/80	06/08/80	06/10/80	06/13/80	TOTALS
NO. LIFTS	21	16	16	11	13	10	403
FIRST LIFT	407	416	410	413	405	420	-
LAST LIFT	1157	1210	1245	1200	1200	1145	-
OPERATING TIME (HRS)	7.83	7.90	8.58	7.78	7.92	7.42	222.13
FISHING TIME (HRS)	2.93	4.08	5.17	5.46	3.92	4.25	116.99
AVE RIVER FLOW (KCFS)	19.4	19.0	16.8	21.3	17.8	21.5	-
AVE WATER TEMP. (F)	73.0	73.0	73.5	73.5	73.5	72.0	-
MORPHOLINE USED?	NO	YES	NO	NO	YES	NO	-
AMERICAN EEL	64	12	2	9	13	10	377
BLUEBACK HERRING	122	23	162	13	25	9	502
HICKORY SHAD	-	-	-	-	-	-	1
ALEWIFE	-	-	-	-	-	-	9
AMERICAN SHAD	14	4	8	2	3	-	139
GIZZARD SHAD	21,052	8,442	3,473	836	6,505	6,053	275,736
ATLANTIC MENHADEN	-	-	16	-	-	-	16
RAINBOW TROUT	-	1	-	-	-	-	23
BROWN TROUT	2	29	2	-	-	5	253
BROOK TROUT	-	-	-	-	-	-	4
NORTHERN PIKE	-	-	-	-	-	-	3
MUSKELLUNGE	2	-	1	-	-	-	27
CARP	63	271	8	137	236	5	8,879
RIVER CHUB	-	-	-	-	-	-	1
GOLDEN SHINER	-	-	9	-	-	3	35
COMELY SHINER	-	-	-	-	-	-	761
SPOTTAIL SHINER	-	-	-	-	-	-	849
SPOTFIN SHINER	4	-	-	-	20	-	314
QUILLBACK	20	75	9	404	-	-	2,929
WHITE SUCKER	-	13	-	4	-	-	1,145
NORTHERN HOG SUCKER	-	2	-	-	-	-	13
SHORTHEAD REDHORSE	9	10	5	-	12	-	1,394
WHITE CATFISH	-	14	49	55	22	69	605
YELLOW BULLHEAD	-	10	-	-	5	-	18
BROWN BULLHEAD	10	10	15	10	22	35	675
CHANNEL CATFISH	2,385	1,609	815	1,552	717	2,095	38,929
WHITE PERCH	1,830	478	678	1,426	170	219	26,971
STRIPED BASS	117	68	21	139	32	84	2,504
ROCK BASS	2	-	5	-	1	1	68
REDBREAST SUNFISH	61	139	198	61	51	105	1,524
GREEN SUNFISH	-	-	-	-	-	1	16
PUMPKINSEED	46	43	25	28	30	69	446
BLUEGILL	30	69	97	35	37	96	942
SMALLMOUTH BASS	-	1	15	9	-	1	455
LARGEMOUTH BASS	-	1	1	1	-	-	41
WHITE CRAPPIE	-	-	12	10	-	-	100
BLACK CRAPPIE	-	-	4	-	-	2	15
YELLOW PERCH	4	11	18	24	2	4	373
WALLEYE	236	103	150	371	117	75	4,153
SEA LAMPREY	-	-	-	-	-	-	1
STRIPED BASS X WHITE BASS	237	139	602	395	84	85	2,674
TIGER MUSKIE	3	-	2	1	-	-	34
SPLAKE	-	-	-	-	-	-	1
	26,313	11,569	6,599	5,533	8,104	9,027	372,380

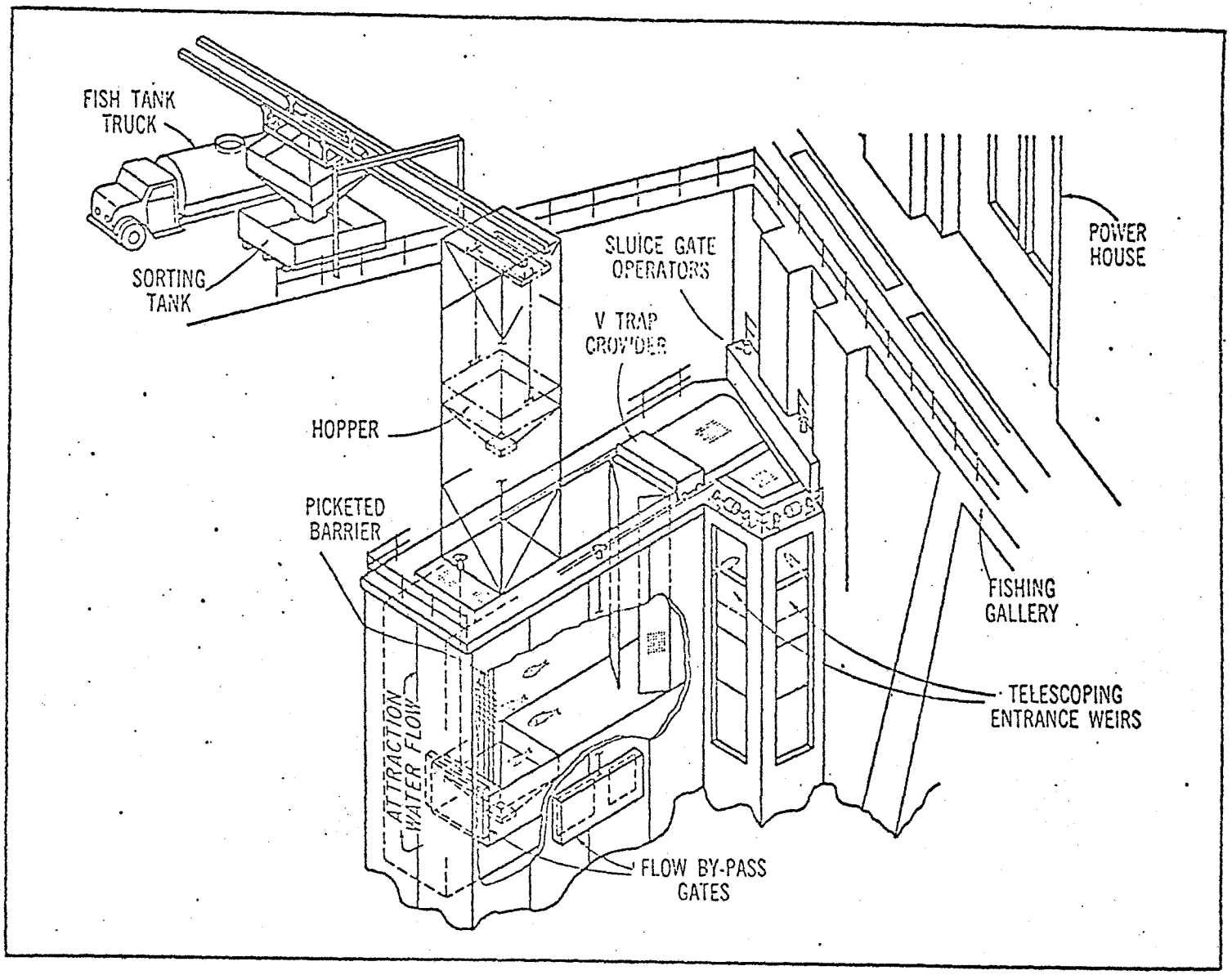

FIGURE 1

Schematic drawing of Conowingo Dam Fish Collection Facility, Anonymous (1972).

FIGURE 2

River flow (F) and water temperature (T) at Conowingo Dam Fish Collection Facility, 15 April–15 June 1980.

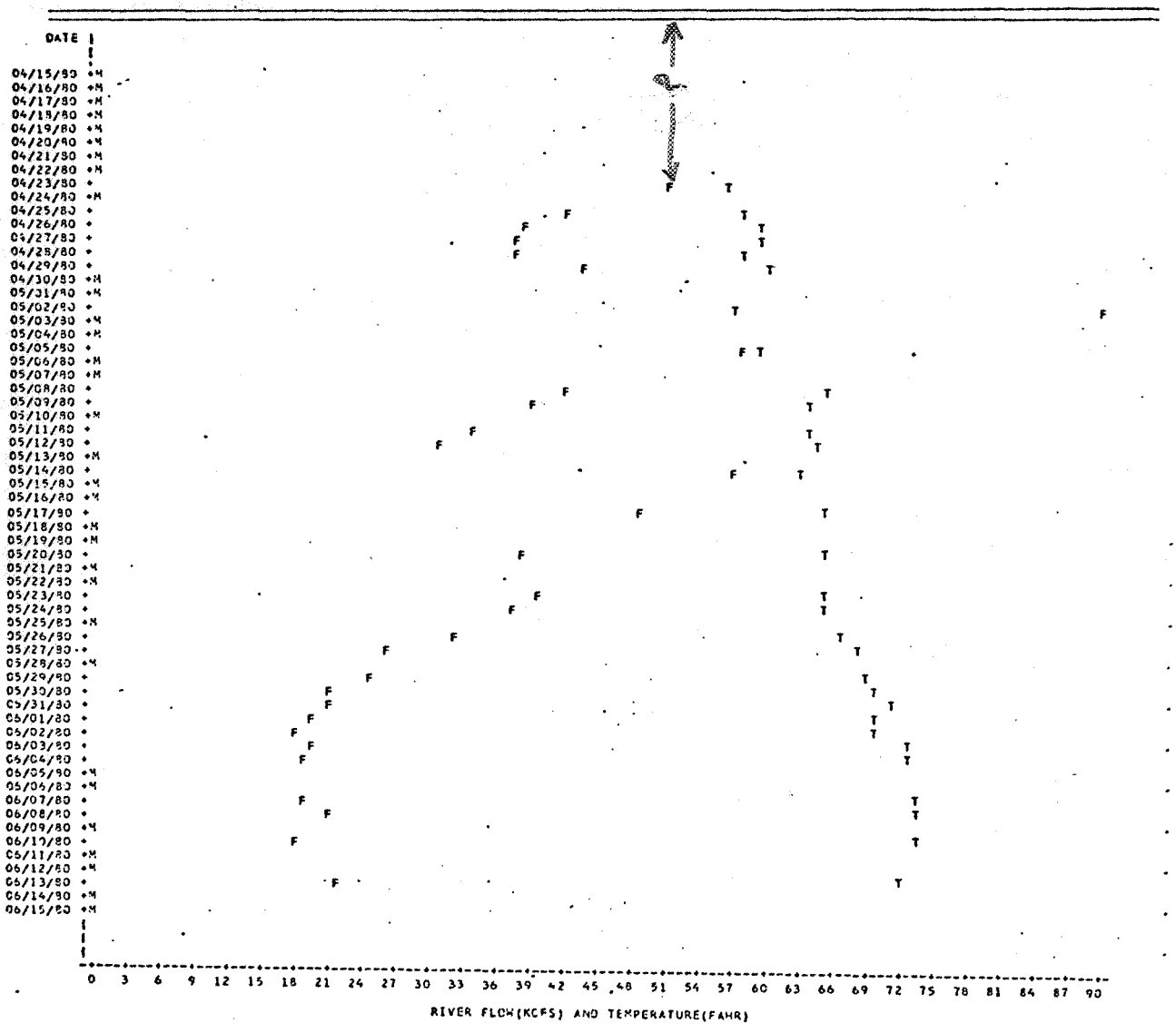

FIGURE 3

Daily catch of American shad at the Conowingo Dam Fish Collection Facility, 15 April-15 June 1980.