

Annual catch-per-unit-effort data collected by the Yukon River Sub-district Y-5A Test Fish Wheel Project, 2012

R&M #06-12

Project Proponent: Patrick Moore, Garden Creek Fish Research Services, P.O. Box 61, Tanana, Alaska 99777, E-mail: patrick_moore23@hotmail.com, 907-366-7129

Project Partner: David Daum, Advanced Fisheries Services, 1540 Ivans Alley Fairbanks, Alaska 99709, E-mail: advfish@yahoo.com, 907-378-8848

Key Words: Alaska, catch patterns, chum salmon, *Oncorhynchus keta*, coho salmon, *Oncorhynchus kisutch*, migration timing, Tanana River, video capture, fish wheel.

Citation: Moore, P., and D. Daum. 2012. Annual catch-per-unit-effort data collected by the Yukon River Sub-district Y-5A Test Fish Wheel Project, 2012. Final report to the Yukon River Panel, RM-06-12.



Table of Contents

Introduction.....3
Objectives3
Methods.....3
Results.....4
Discussion.....5
Conclusions.....5
Recommendations.....6
Acknowledgments.....6
References.....7

List of Tables

Table 1. Video system equipment list.....8
Table 2. Video summary, Tanana, Y-5A, 2012.....9

List of Figures

Figure 1. Map and location of the Sub-district Y-5A Test Fish Wheel Project, 2012....10
Figure 2. Chum salmon per 24 hour (video), Tanana, Y-5A, 2012..... 11
Figure 3. Coho salmon per 24 hour (video), Tanana, Y-5A, 2012.....12

Introduction:

Summary:

Catch-per-unit-effort (CPUE) data were collected from Sub-district Y-5A Test Fish Wheel project in 2012. The operator accessed the fish wheel from Tanana by riverboat. The project is located six miles downstream of Tanana, Alaska at approximately river mile 695, on the south bank of the Yukon River. The fish wheel is positioned about 1/2 mile downstream from the mouth of Corbusier Slough. The slough is the farthest downstream entrance to the Tanana River (Figure 1). The salmon migrating past the site are considered to be primarily of Tanana River origin (Buklis 1981). The information was collected in 2012 using the same “trigger switch” video capture system initially tested and installed on the fish wheel in 2001 (Fliris 2001). In 2012, salmon species counted by the project were: Chinook salmon *Oncorhynchus tshawytscha*, chum salmon *O. keta*, and coho salmon *O. kisutch*. Other fish species captured, by common name, included: burbot, longnose sucker, sheefish, and three species of *Coregonus* whitefish (least cisco, humpback and broad whitefish). The numbers of these non-salmon species and Chinook salmon were very low compared to chum and coho salmon.

The Y-5A Test Fishwheel project operated from August 13 through September 24 in 2012. High water late in the season caused data collection to cease before the project end date of September 30. Data were collected for fall chum and coho salmon entering the Tanana River. Data were also collected for other fish species, including the tail end of the summer chum run. Video capture equipment was used throughout the season as the primary method of data collection.

Objectives:

The project has provided CPUE data to managers of ADF&G since 1993, with the exception of 2007. The Project gives the first indication of run timing and relative abundance of salmon stocks entering the Tanana River. The information gathered is used in-season to help apportion the salmon harvest on the Tanana and upper Yukon Rivers.

Study Area: Yukon River (Sub-district Y-5A), river-mile 695

Licenses and Permits: Alaska Department of Fish and Game Sampling Permit

Methods:

Data for this project are daily counts of all Tanana River salmon species caught by the fish wheel. *Format* – Catch-Per-Unit-Effort. *Custodians* - Alaska Department of Fish and Game, Fairbanks; U.S. Fish and Wildlife Service, Fairbanks; Patrick Moore, Tanana. *Availability* – Access to data available upon request to the custodians.

The Project began counting on August 13 and ceased operation on September 25 2012. Extremely high water on the Tanana River from late-season rainfall caused the project to stop data collection before the normal end date of September 30. The same fish wheel that was modified and used since the 2006 season was positioned in approximately the same spot as had been used in previous seasons. The same length of underwater lead was used as in the past to guide salmon to the fish wheel. Dave Daum (RM-07-12) arrived

prior to project start up and assisted with computer and equipment setup on the wheel and in the office in Tanana. Counting was done 24 hours a day, seven days a week, unless interrupted by maintenance, computer malfunction, or severe river conditions, i.e., high debris load or mud flows. An Onset StowAway TidbiT© water temperature data logger was installed on the fish wheel raft at about 1 m depth. Measurements were recorded daily at 1 h intervals.

The video capture equipment used by the project was the same as in 2001 (Fliris 2001; Table 1) and was operated in a similar manner. The “trigger switch” capture method (Daum 2005) was the primary method of data collection throughout the season. Video capture is the process of separating and storing only frames that contain fish from the total number of video frames processed in a day. The video system utilized a 12-volt surveillance camera mounted above an enclosed chute. A door, with a magnetic trigger switch attached, located at the bottom of the camera chute, opened whenever a fish passed through. The trigger switch in turn signaled a Panasonic Toughbook model portable computer to capture a set number of frames from the video camera and store them on the computer’s hard-drive. The capture software used was Salmonsoft FishCap 1.4.0. The system was checked daily to ensure that video capture was functioning properly. Live box counts (during low passage) and on-site manual counts (during high passage) were compared to the digitally produced files to ensure accuracy of the video system throughout the season. The digital video files (avi format) were copied to a removable IBM micro-drive for transportation from the fish wheel site. Files were then transferred to a computer in the operator’s office where the video frames were reviewed and the daily count of each fish species was done using Salmonsoft FishRev 1.4.0.

The counts were recorded in a logbook and then transferred to a Microsoft Excel worksheet. The daily tallies of each salmon species were adjusted for a 24-hour period. For days when counts were missed due to severe mud flows stopping the wheel from turning, daily counts were interpolated from 24-hr adjusted counts before and after the event. All the worksheets and video files were backed-up to Compact Disks (CD-R). The daily worksheet summary was forwarded by e-mail attachment to the Fairbanks office of the ADF&G. A live box was kept on the wheel for the duration of the project for backup in case the electronics failed.

Results:

In 2012, 829.84 hours of the 1,176 sampling hours possible (49 days) were sampled from August 13 to September 30 (Table 2). The fish wheel did not operate for 11 days during the 2012 counting season. The first event occurred from August 24–28, when mud flows down the Tanana River stopped the wheel from turning. These flows have happened in years past, usually during high water events. A second event happened from September 25–30, when high debris loads from extremely high water late in the season rendered the wheel inoperable. The fish wheel lead was swept away on September 25, along with the water temperature logger attached to the raft.

The total numbers of salmon counted were:

1. Chinook: 4

2. Chum: 20,195

3. Coho: 6,969

Whitefish species (*Coregonus*) counted were:

1. Least cisco: 173

2. Humpback: 51

3. Broad: 55

Other species and their numbers were:

1. Burbot: 6

2. Sheefish: 10

3. Longnose sucker: 35

A 24-h adjusted total CPUE of 21,904 chum and 7,668 coho salmon were estimated between August 13 and September 24. During the fall season, the chum salmon run slowly increased to a peak adjusted count on September 8 of 1,750 fish and subsequently declined through the end of the counting season (Figure 2). The coho salmon run exhibited similar characteristics to the chum salmon run; a slow increase to a peak on September 10 of 624 fish, followed by a general decline in numbers through the end of the counting period (Figure 3).

Discussion:

The wheel began operation approximately in the same site used in previous years. Mud flows that had hampered the fish wheel's operation during some past years were again present in 2012 and interfered with the counting operation for five days in August. A boat-mounted fish finder was used to monitor the formation and depth of the mud flows. Depth recordings were also taken daily from the inside and outside of the fish wheel raft. Water levels at the site were higher than normal during most of the Project's duration, with an unusual, late-season debris event causing the project to stop early on September 25.

Prior to the start of the Project's 2012 season, three new deep-cycle batteries and a Honda 2000 watt generator were purchased for the Project. With the technical assistance of Dave Daum (RM-07-12), the video equipment and new power supply were installed on the fish wheel. Equipment testing was completed on August 12 and the Project became operational on the contract start date of August 13.

The video equipment was fairly reliable throughout the season. On September 14, four hours of data were lost to a computer malfunction and on September 17, 10 hours were lost due to a generator/timer switch malfunction. Both problems were quickly troubleshot and rectified. Dave Daum's technical skills and troubleshooting ability, specific to this video system, contributed to this project's success.

Conclusions:

It is always challenging to operate a fish wheel near the mouth of the Tanana River. The unusually large amounts of silt and sand discharged out of the Tanana River can cause changes to the contour of the channel bottom and actively erode river banks. At times, high amounts of drift exiting the Tanana River during high water events can hamper fish

wheel operations in this area of the Yukon River. Despite these obstacles, the Project in 2012 was successful in accurately estimating the passage of fall chum and coho salmon entering the Tanana River. The 2012 totals for fall and coho salmon were the highest counts on record since the starting year for this operator in 2005.

Recommendations:

The project has operated for 19 years in the same approximate location and has been a reliable indicator of fall chum and coho salmon run timing and abundance. Every year there is a potential for weather conditions to produce water conditions that will be non-conducive to fish wheel operations, but this holds true for any fishwheel site, as well as any net or sonar site. One should expect a set of trying circumstances while operating a Yukon River test fish wheel project. It is recommended to set up and operate the wheel in the same manner and location as in previous years.

Acknowledgements:

The USFWS, through the Yukon River Panel, provided \$22,000 in funding support for this project from the U.S./Canada Treaty Implementation Funds under agreement number RM-06-12. Dave Daum (Advanced Fisheries Services, formally with USFWS) received R&M funds to assist with this project through RM-07-12.

References:

Buklis, L. 1981. Yukon and Tanana River Fall Chum Salmon Tagging Study, 1976-1980. Alaska Department of Fish and Game, Informational Leaflet No. 194, Juneau, AK.

Fliris, B. 2001. Modification of Video Storage Equipment for Purposes of Providing Accurate Catch-Per-Unit-Effort Data from the Sub-district 5A Test Fishwheel. A final report to the Yukon River Panel.

Daum, D. W. 2005. Monitoring fish wheel catch using event-triggered video technology. North American Journal of Fisheries Management 25:322-328.

Table 1. Video system equipment list.

POWER SUPPLY AND LIGHTS:

- 1 Honda EU2000I and 2 Honda EU1000I, portable generators (for recharging batteries and running night lights – 2 spares).
- 5 Trojan, SCS200, 115 amp hour, deep cycle batteries (1 spare)
- 1 Schumacher, Model SE-1-125, 1.5 amp automatic maintenance charger (use off-season)
- 1 Solar Converters Inc., Model BD-2 battery de-sulphator (use off-season)
- 1 Todd Engineering PC30b power supply/battery charger (fish wheel)
- 1 Portawattz 300 voltage inverter
- 2 90 Watt, General Electric Halogen Floodlights. (+ spares)
- 1 Electripik Surge Suppressor
- 2 Max serial interfaces (1 spare)
- 2 Radio Shack auto DC adaptor 273-1815 (1 spare)
- 2 Belkin F5U208 power supply (1 spare)

VIDEO EQUIPMENT:

- 2 Panasonic 1070dc Video Recorders (1 spare)
- 2 Panasonic AG-6124 Time Lapse Video Recorders (1 spare)
- 2 Panasonic WV-CP450/WV-CP454 Video Cameras (1 spare)
- 1 Computar Vari-Focus Lens TG272814FCS-2 (1 spare)
- 1 Pelco Waterproof Surveillance Camera Housing

COMPUTERS AND SOFTWARE:

- 1 Gateway GP7-600 computer (Video processing, storage, data analysis and archiving)
- 1 Intel Smart Video Recorder 3 capture card and software
- Salmon Soft Video Capture(Fish.Cap) version 1.4.0 and Fish Rev. version 1.4.0 (from Columbia River Intertribal Fish Commission)
- Microsoft Windows '98 second edition
- Microsoft Office 2000 Small Business Edition (for reports, spreadsheets, etc.)
- Adobe Photoshop 6 (photo processing)
- 2 Panasonic CF-48 Toughbooks (for direct video capture via trigger switch - 1 spare)
- 3 IBM Microdrives, 1 Gbyte capacity, with PC Card adaptors (for data transfer)

MISCELLANEOUS:

- 2 Pelican 1600 watertight storage cases (used on the fishwheel to house the recording VCR and for sending both VCR's to Fairbanks for cleaning and maintenance)
- Stowaway Tidbit, model TBI32-05+37, water temperature data logger

Table 2. Summary table of the fish species recorded through the Tanana River Test Fishwheel, Tanana, Y-5A, 2012.

Counting Date	Total Run Time (hr)	Chum Salmon	Coho Salmon	Cisco Whitefish	Humpback Whitefish	Broad Whitefish	Sheefish	Sucker	Other	Chum per 24 hr	Coho per 24 hr	Comments	Depth Off Bottom (feet)
	829.84	20195	6969	173	51	55	10	35		21904.47	7668.23		
8/13/2012	23.90	563	0	4	3	4	2	0	1 king	565.36	0.00	2 rpm nice day	0.2
8/14/2012	22.92	509	1	14	9	5	0	3		532.98	1.05	2 rpm nice day, moved wheel out 11 feet gained 1 foot in height	1.0
8/15/2012	23.77	358	2	6	2	2	0	1	1 king	361.46	2.02	2 rpm nice day gives way to clouds in p.m.	0.6
8/16/2012	23.95	526	6	6	1	1	0	0		527.10	6.01	2 rpm, showers but still a nice day	0.6
8/17/2012	23.93	441	4	2	1	0	0	0	1 king	442.29	4.01	2 rpm, dark day but only showers	0.6
8/18/2012	23.93	397	6	4	2	0	0	3		398.16	6.02	2 rpm, nice day with p.m. sprinkles	0.8
8/19/2012	23.94	364	6	5	0	0	1	1	1 burbot	364.91	6.02	2 rpm, nasty wet day	0.6
8/20/2012	23.95	362	14	9	0	1	3	2		362.76	14.03	2 rpm, rainy day but it could have been worse	0.5
8/21/2012	23.94	352	16	11	2	2	2	1		352.88	16.04	2 rpm, nice cloudy day	0.5
8/22/2012	23.96	307	26	8	0	1	1	2		307.51	26.04	1.5 rpm, nice sunny day	0.4
8/23/2012	13.34	99	5	3	0	0	0	0		178.11	9.00	mud flow stopped wheel	
8/24/2012										172.49	18.33	interpolated counts	
8/25/2012										166.86	28.53	interpolated counts	
8/26/2012										161.24	37.58	interpolated counts	
8/27/2012										155.61	47.11	interpolated counts	
8/28/2012										149.99	56.64	interpolated counts	
8/29/2012	3.99	24	11	0	0	0	0	0		144.36	66.17	2 rpm, pushed wheel out 6 feet, nasty day, river bottom 1 foot inside, 0 outside	1.0
8/30/2012	22.01	188	76	2	0	0	0	1		205.00	82.87	2 rpm, nasty wet rainy drizzle cold day, basket caught on lead while I checked	1.1
8/31/2012	23.81	117	103	3	0	0	0	1		117.93	103.82	2 rpm, nicer day with a few showers	1.2
9/1/2012	23.96	79	113	1	0	1	0	1	1 burbot	79.13	113.19	2 rpm, rain and miserable	1.2
9/2/2012	23.96	95	89	1	0	3	0	0		95.16	89.15	2 rpm, fog in am and sun in the pm	1.2
9/3/2012	23.93	182	140	2	1	2	0	1	1 king	182.53	140.41	2 rpm, another dreary day	1.2
9/4/2012	23.88	307	174	2	2	0	0	0	1 burbot	308.54	174.87	2 rpm, rain in the p.m.	1.5
9/5/2012	22.79	597	228	2	2	0	0	0		628.70	240.11	2 rpm, rain all day and cold, moved wheel in 8 feet as water is coming up	0.0
9/6/2012	23.81	1339	396	9	1	5	0	1		1349.69	399.16	2 rpm, rain showers wind and cold	0.4
9/7/2012	23.72	1600	558	11	7	4	0	3		1618.89	564.59	2 rpm, cold no rain, big stump in one basket, no telling how long, still 2 rpm	0.5
9/8/2012	23.72	1730	420	7	1	9	0	0		1750.42	424.96	2 rpm, partly sunny am frost quite cool	0.7
9/9/2012	23.78	1543	484	10	1	4	1	2		1557.28	488.48	2 rpm, nice day	1.0
9/10/2012	23.79	1620	615	5	0	1	0	1		1634.30	620.43	2 rpm, nice cool day, heavy frost in am	1.2
9/11/2012	23.80	1488	548	0	2	3	0	1	1 burbot	1500.50	552.61	2 rpm same weather as yesterday, with brisk NE wind	1.0
9/12/2012	23.86	1214	555	3	1	2	0	1		1221.12	558.26	2 rpm, nice day, less wind	0.8
9/13/2012	23.83	1002	538	7	4	0	0	2	1 burbot	1009.15	541.84	2 rpm, cloudy very lite sprinkles in pm	0.3
9/14/2012	17.52	530	312	2	0	1	0	1		726.03	427.40	2 rpm, computer locked up and lost one file	0.0
9/15/2012	23.34	603	402	9	0	0	0	2		620.05	413.37	2 rpm, moved wheel out 10 ft. to gain 1 ft. in depth, cloudy with lite rain	1.0
9/16/2012	23.81	488	205	3	1	0	0	1		491.89	206.64	2 rpm, changed out generator, NE wind 5 to 15 mph	0.9
9/17/2012	13.89	212	158	2	1	0	0	1		366.31	273.00	2 rpm, very windy, changed out generator again	0.5
9/18/2012	15.22	167	127	2	0	0	0	0		263.34	200.26	2 rpm, wheel stopped on the lead, suspect be large moose hunting boat	0.5
9/19/2012	23.94	174	126	2	0	0	0	0		174.44	126.32	2 rpm, raised wheel up, rainy and miserable	0.3
9/20/2012	23.96	150	100	9	3	0	0	1	1 burbot	150.25	100.17	2 rpm, small drift running in the river, rain and hard at times	0.3
9/21/2012	23.96	147	138	4	2	0	0	0		147.25	138.23	2 rpm, nice day	0.4
9/22/2012	23.96	161	134	2	2	0	0	0		161.27	134.22	2 rpm, cloudy day with a few sprinkles, lots of small drift	0.5
9/23/2012	23.96	146	107	1	0	2	0	1		146.24	107.18	2 rpm, rainy windy, lots of drift	0.8
9/24/2012	6.11	14	26	0	0	0	0	0		54.99	102.13	3 rpm, clear day 24 degrees in morning and 40 degrees at 2:30, lead broke debris from the flood on the tanana river knocked the fishwheel's lead out.	1.8
9/25/2012												the currant speed of the water and debris kept the wheel from operating for remainder of the season	
9/26/2012													
9/27/2012													
9/28/2012													
9/29/2012													
9/30/2012													

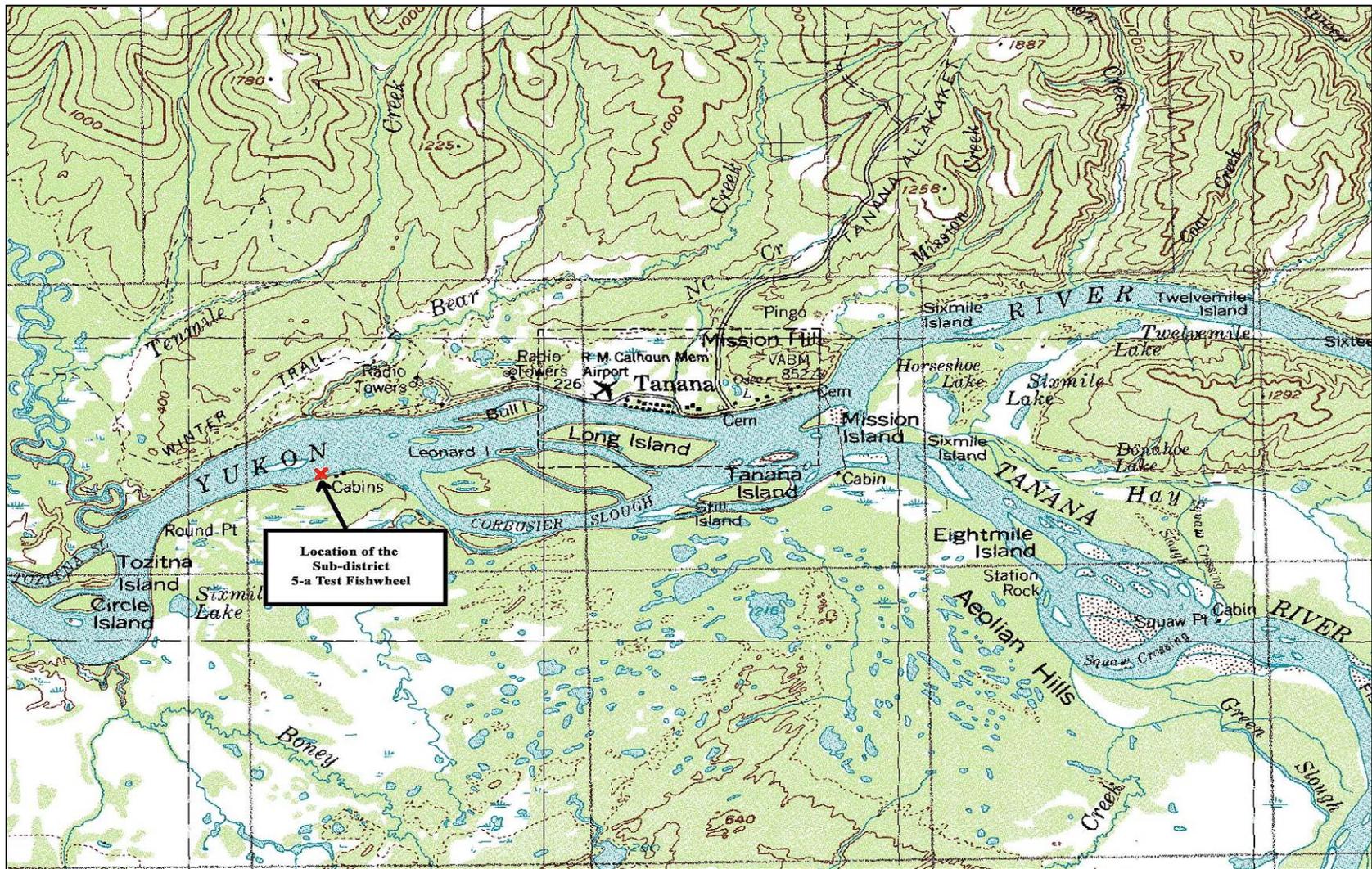


Figure 1. Map and location of the Sub-district Y-5A Test Fish Wheel Project, 2012.

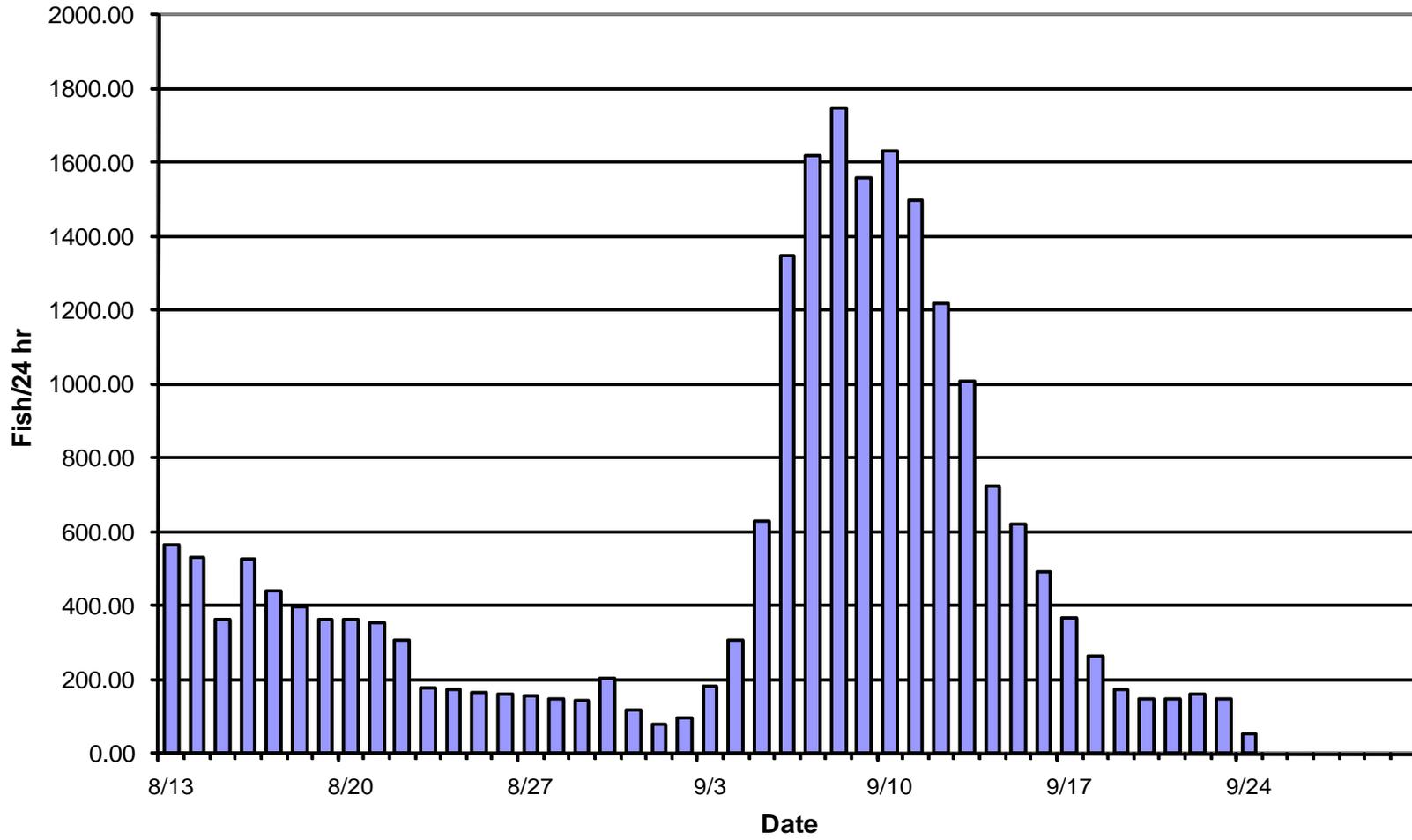


Figure 2. Chum salmon per 24 hours (video), Tanana, Y-5A, 2012.

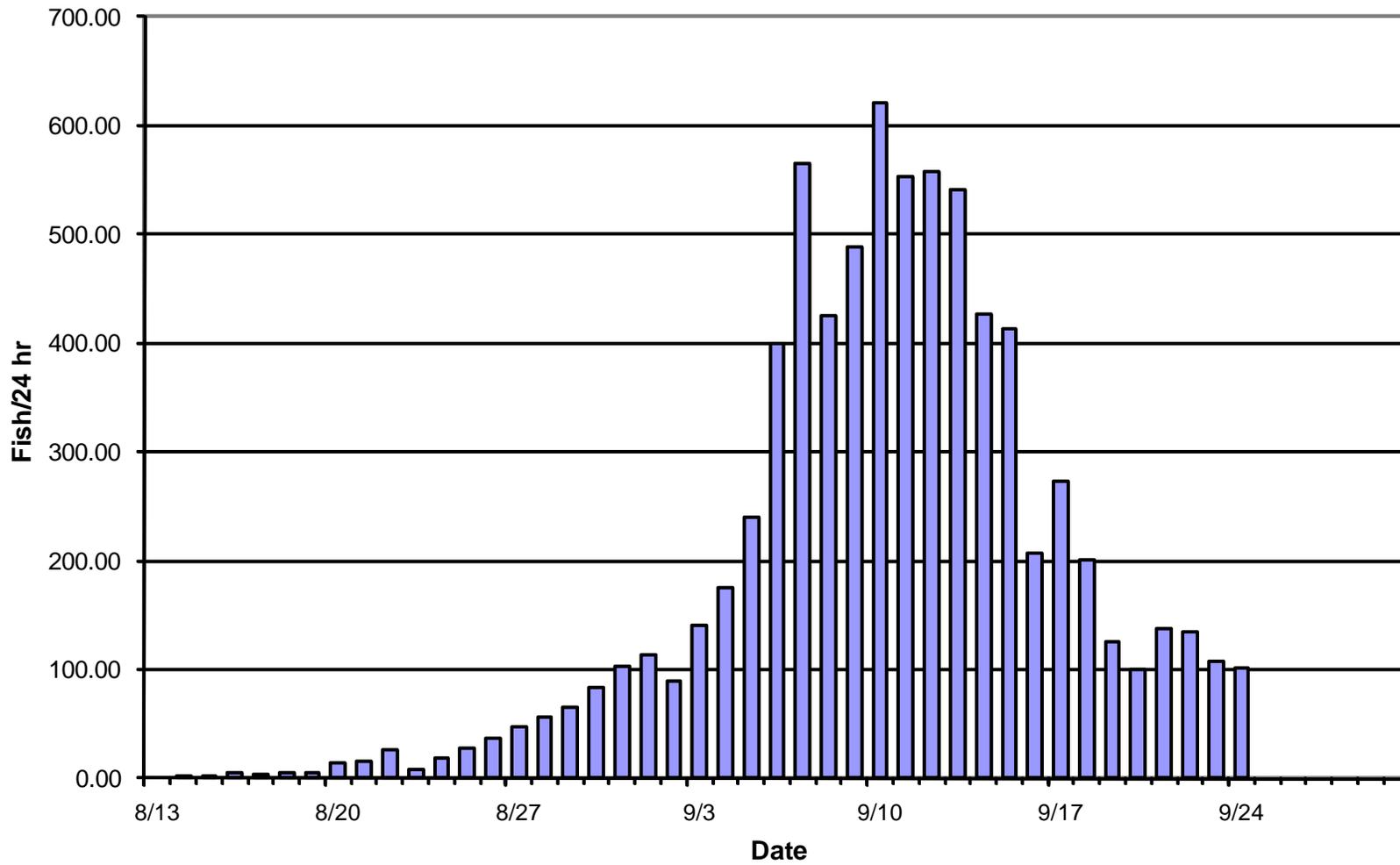


Figure 3. Coho salmon per 24 hours (video), Tanana, Y-5A, 2012.