

Bristol Bay Fisheries Collaborative Annual Report, 2019

Final Report

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Final Report

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Board of Directors, Bristol Bay Science and Research Institute

and

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Executive Summary

The Bristol Bay Fisheries Collaborative (BBFC) is a grass-roots initiative developed in 2016 by stakeholders in the Bristol Bay fishery to help stem the erosion of the State of Alaska's financial support for the Bay's fishery management. The 2019 season was the third season where BBFC-supported projects were used by the Alaska Department of Fish and Game (ADF&G) to manage Bay area salmon fisheries.

The Bristol Bay Science and Research Institute (BBSRI) and ADF&G work under a Memorandum of Agreement (MOA) that established a formal structure for a collaborative working relationship between the two organizations. The MOA requires an annual report each year. This is the third such report since the MOA was signed in October 2016 (Link et al., 2017, 2018). The report provides a summary of BBFC project results in 2019, an accounting of funds spent, and the recommended scope of the BBFC-supported "Core Program" in 2020. The Core Program is a suite of projects and activities intended to maintain high-caliber management of Bay area fisheries.

Expenditures on BBFC-supported salmon projects in 2019 (\$756,540) were ~\$25,330 less than originally forecast and budgeted in December 2018. BBSRI provided 50% of the total BBFC expenditures (\$378,270); followed by the Bristol Bay Regional Seafood Development Association (BBRSDA; \$181,095), twelve Bristol Bay salmon processors (\$181,095); and collectively, \$16,080 from other stakeholder organizations including the Bristol Bay Native Corporation, shipping companies AML and APL, Ekuk Village Council, and Kvichak Setnetters Association.

BBFC met its goal of maintaining a world-class management program. BBFC resurrected management capacity lost due to budget cuts in recent years. More fish were caught, fish stocks better utilized, and important long-term datasets were maintained, all in a more coordinated manner than would have occurred without BBFC. Again in 2019, cost-recovery fishing by ADF&G to raise funds for management was not implemented. None of the funds raised from stakeholders were spent to administer BBFC. The sustainability of BBFC to support a world-class fishery management system during this challenging fiscal environment will depend on continued success in rebuilding ADF&G's Bristol Bay budget and on keeping BBFC simple, transparent, and not overly burdensome to any one group of stakeholders.

The BBFC technical Working Group (WG) met on December 19, 2019 to review the 2019 program and discuss the scope of the 2020 program. Existing project budgets for both GF and BBFC support were discussed at length at this meeting. There was consensus that some additional work was needed to fully describe existing budgets and actual expenditures before a final scope for BBFC could be completed. The WG will meet in January to finalize the scope of the 2020 Core Program with a goal toward final decisions being made by February 15. Any changes in scope and associated costs will be finalized by February 15, 2020. Nushagak sonar-based enumeration project might be reduced in scope by lessening the operational dates, counting tower operations may be extended individually for 3-8 days, and the Port Moller Test Fishery, if done, will include a full-transect operation (i.e., two vessels).

Introduction

Fishery management in Bristol Bay exemplifies the world-class approaches the State of Alaska has developed over the six decades since statehood when it took control of managing its fisheries. In recent years, the State of Alaska's fiscal challenges have eroded its ability to maintain those fishery management systems. The Bristol Bay Fisheries Collaborative (BBFC) is a grass-roots initiative developed in 2016 by stakeholders to help stem the erosion of financial support for the Bay's fishery management (www.bbsri.org/bbfc).

In October 2016, the Bristol Bay Science and Research Institute (BBSRI) and the Alaska Department of Fish and Game (ADF&G) entered into a Memorandum of Agreement (MOA) on that developed a formal structure for collaboration between the two organizations (see Link et al. 2017 for additional details and for a copy of the MOA)¹. The MOA requires the formation of a working group (WG) that is charged with providing an annual report each year. This is the third annual report since the MOA was signed.

The four-person technical WG of the BBFC is charged with identifying projects and staffing levels that will help sustain a world-class fishery management system in Bristol Bay. The scope of projects and staffing identified by the WG constitutes the Core Program of the BBFC. The WG has two technical experts from each of ADF&G and BBSRI.

This report fulfils a requirement of the MOA to inform its principals, benefactors, and the public of the BBFC activities, project results, and an accounting of funds raised. In addition, the annual report provides an opportunity to review the scope of the Core Program. The report was finalized after a meeting of BBFC's WG in December 2019.

Working Group Meetings, Meetings of the Principals

On February 20, 2019, BBSRI's working group members (Link and Regnart) met with Commissioner Vincent-Lang, Director Rabung, and Deputy Director Bowers to brief the new leadership about BBFC and prepare them for a meeting of the principals of BBFC planned for March. On March 4, 2019, the principals to the MOA – the Commissioner of ADF&G and the BBSRI Board of Directors met in Anchorage. The annual meeting of the principals is set out as a requirement in the MOA and its purpose is to:

"...review the agreement, the Work Group performance and appointees, and discuss, identify, and coordinate the various activities pursuant to the MOA, or to discuss, identify and coordinate future opportunities that fall within the area of common benefits and interests."

At the conclusion of the March 4, 2019 meeting, Commissioner Vincent-Lang and BBSRI Chairman Samuelsen signed the MOA to reflect the current Administration's commitment to the agreement. Appendix A provides agendas from the meetings in February and March.

¹ The 2017 annual report is available at www.bbsri.org/bbfc

The Working Group met December 19, 2019. Agenda topics included:

- Review outcomes from the 2019 projects.
- Review an early draft of the annual report.
- Discuss the scope of the 2020 Core Program.
- Review existing General Fund expenditures and project budgets.

Outcomes from this meeting are summarized below (section: **Proposed Scope and Cost of the Core Program, 2020**)

The WG will meet again in January 2020, to approve refined financial information and the final scope of the Core Program in 2020. Finally, the annual meeting of the principals to the MOA (ADF&G Commissioner and BBSRI Board of Directors) will likely occur in February or March 2020.

Overview, Goals, and Scope of the Core Program

The overarching goal of BBFC was to reintroduce and maintain monitoring projects and management capacity to reestablish the State's ability to manage Bay fisheries that was present prior to recent deep budget cuts to ADF&G.

BBFC is not a research consortium, nor are any of the projects it promotes new to Bristol Bay. The suite of projects reestablished by BBFC's Core Program represent the evolution of the management system from statehood to the present. Its scope is less than what was done in the mid-1980s and is similar to the "Basic Program" described in the most recent Bristol Bay program review (Clark 2005).

BBFC addresses needs of management in a coordinated and less *ad hoc* manner than had been developing in recent years. As budgets and the Bay program were cut over successive years, ADF&G relied more and more on cost-recovery test fishing to generate revenue, and industry was asked more often to support projects that had been cut (e.g., Togiak and Igushik towers in 2016). Many stakeholders saw cost-recovery fishing in the Bay in its recent format as an inefficient means to raise money for management. In 2016, and prior to BBFC, fishermen and several processors stepped up to give money to ADF&G to eliminate cost-recovery fishing that season.

Many stakeholders see *ad hoc* fund raising as inefficient and potentially damaging because their support has the potential to embolden further budget cutting by the Administration or the Legislature. Solicitations for funding for projects that had been cut was often done in isolation, and the relative merit and value among projects was not clear, making donors weary of ongoing and unrelated requests. Working together, BBSRI and ADF&G developed BBFC to provide a rigorous approach for stakeholders to provide funding with less fear of further cuts and/or some projects receiving support over more valuable projects.

BBFC is not intended to be a permanent source of funding for ADF&G. Organizations that provide funding via BBFC, including BBSRI, believe that Bristol Bay fisheries warrant financial

support by the State of Alaska commensurate with the scope of the Core Program. All who support BBFC see it as a relatively short-term bridge to the State rebuilding its commitment via its operating budget (see more at www.bbsri.org/bbfc).

Keeping it Simple and Overhead to a Minimum

Given an overarching goal of resurrecting ADF&G's capacity to manage the fishery with projects that had been done in the past, stakeholders and ADF&G looked to create a simple process that would incur little indirect costs to administer. The goal was to apply all funds raised directly to projects fishery managers need to better manage the fishery. Toward this end, BBSRI does not charge for indirect costs associated with orchestrating BBFC, including financial administration, fund raising activities, and participation in the WG. Similarly, ADF&G charges no administrative overhead to participate in the WG activity and does not charge overhead on non-labor project costs. It reduced its indirect cost on labor to 10% for BBFC-funded projects. BBSRI charged a 5% overhead rate on the one BBFC project it operated in 2019.

Goals of Core Program

Four goals of a Core Program and the scope of projects to achieve them are summarized below and outlined in greater detail in the 2017 annual report (Link et al. 2017). Many of the projects described below as part of the Core Program are still within ADF&G's annual General GF budget; components that are not in the GF budget are characterized as BBFC-supported projects and represented 29% of the entire Core Program cost of \$2.691 million in 2019 (Table 1).

1. ***A team of professionals to collect and interpret information on the status of the fish stocks and regulate fishing effort.*** The cornerstone of ADF&G's management is the team of professionals who have the appropriate knowledge and experience to prosecute the fishery.
2. ***Protect weak stocks while exploiting productive stocks to the extent possible.*** A Core Program provides managers and industry with tools to prosecute the fishery in a manner that distributes effort and harvests across time within and among seasons to the greatest extent possible. This is done with field projects, historical datasets, and analytical tools that help managers to predict the remaining run so that escapement goals can be met, and harvests can be distributed through time. This goal represents effort greater than simply providing a "sustained yield"; it includes effort to maintain the economic health of the fishery.
 - a. ***Port Moller Test Fishery*** – Provides indices of abundance and genetic-based stock composition estimates from a sampling project 6-9 days travel from the inshore fishing districts. This allows managers additional time to protect weak stocks and exploit abundant stocks before fish have passed the fishing districts. The information is also used by fishermen and processors to determine how to position harvesting and tendering capacity, including haul-out tenders.

- b. ***District test fishing, in-river test fishing, and aerial surveys*** – Managers recruit commercial fishermen to conduct test fishing within districts and department employees operate in-river test fishing projects just upstream the fishing districts on the Ugashik, Egegik, and Kvichak rivers. Managers regularly fly the districts and river systems to gauge run strength prior to enumeration at upstream enumeration sites. Aerial surveys are used to determine the overall herring biomass, as well as the threshold biomass to open the season.
 - c. ***Salmon escapement enumeration*** – The Core Program includes towers on the Togiak, Igushik, Wood, Kvichak, Alagnak, Naknek, Egegik and Ugashik rivers, and the Portage Sonar project on the Nushagak River.
3. ***Maintain all existing stock-specific brood tables*** – Much of the data for this comes from projects listed in #2 above. This category represents the additions and marginal costs to maintain brood tables. These datasets, many of them covering six decades, enable us to track the health and productive capacity of all major salmon and herring stocks in the Bay. The data also provide the information to evaluate escapement goals, a fundamental cornerstone of fisheries management in the Bay. Finally, these data provide inputs to annual preseason forecasts, which assist fishery management and industry planning. In addition to escapement monitoring projects, the following are required to maintain brood tables:
 - a. ***AWL sampling***– Biological sampling at all enumeration projects and in the commercial salmon and herring catches.
 - b. ***Catch apportionment to Stock*** – Age composition and genetic-based assignment of district salmon catches to river of origin.
 - c. ***Operate selected counting towers sufficiently long to ensure adequate enumeration of annual escapement*** – late, large runs to several rivers have strained existing ADF&G project budgets to operated counting towers on the Wood, Igushik, Kvichak and Naknek rivers.
4. ***Provide modest support for program evaluation and investment in tools to lower program costs and expand and/or improve the value of fishing opportunities.*** It was originally envisioned by BBSRI that the Core Program should invest in regular review of the performance, cost effectiveness, and overall value of the specific monitoring projects. To date (2019), BBFC resources have not been used for this purpose.

BBFC Scope and Project Results, 2019

The Core Program, including state-funded projects and BBFC-funded projects and associated budgets established in early 2019 are provided in Table 1 below. These budgets were later refined, and the ADF&G labor overhead was folded directly into project specific budgets (Table 2) instead of itemized separately, as they are in Table 1. Appendix B summarizes the methods and results from the BBFC-supported projects in 2019.

Table 1. Original scope and cost of the BBFC Core Program by project and funding source, 2019, in thousands of dollars.

Program Component	Funding Source (in thousands)	
	ADF&G	BBFC
State Funded		
Program Mgt Eastside	347.2	
Fishery Monitoring Eastside	59.8	
Kvichak River Tower	46.9	
Naknek River Tower	51.7	
Egegik River Tower	52.7	
Ugashik River Tower	54.6	
Alagnak River Tower	-	
Bristol Bay Research	388.8	
Program Management Westside	459.5	
Fishery Monitoring Westside	37.8	
Wood River Tower	33.9	
Nushagak River Sonar	90.2	
Catch Allocation, Genetics	99.8	
Port Moller In-season Genetic Stock ID	79.2	
Togiak River Tower	60.0	
Igushik River Tower	50.0	
Subtotal (ADF&G)	1,912	
2019 Core Projects supported by BBFC		Thousands \$
Unfunded portion of Nushagak River Sonar		50.0
Kvichak River Inside Test		41.0
Egegik River Inside Test		51.0
Ugashik River Inside Test		48.0
District Catch Sampling		130.0
Port Moller Test Fishery		221.5
Alagnak River tower		50.0
Kvichak, Naknek post-season aerial surveys		14.7
Management/Research Fishery Biologist (6 mo.)		57.0
Nushagak River Sonar Coho/Pink		75.0
Subtotal		738.2
10% Indirect fee applied to ADF&G labor included above		40.3
Forecasted total, BBFC, 2019		778.5
Total, State funded and BBFC funded		2,690.5
BBFC as a % of total expenditures		29%

Summary of Expenditures in 2019

Actual expenditures on the BBFC salmon projects in 2019 were \$756,540, which was \$25,330 (3.2%) less than a revised preseason forecast \$781,870 (Table 2).

Table 2. Summary of forecasted and actual BBFC expenditures for salmon by project, 2019.

	Operator	Budget (\$)	Expenditures by Organization			Difference
			ADF&G	BBSRI	Total	
Port Moller Test Fishery	ADFG/BBSRI	221,500	54,784	149,933	204,718	-16,782
Kvichak R. inriver test fishery	ADFG	43,040	42,890	-	42,890	-150
Egegik R. inriver test fishery	ADFG	54,500	47,708	-	47,708	-6,792
Ugashik R. inriver test fishery	ADFG	51,700	47,592	-	47,592	-4,108
District catch sampling	ADFG	142,200	126,187	-	126,187	-16,013
Unfunded Nushagak sonar (June/July)	ADFG	53,730	53,735	-	53,735	5
Nushagak sonar, pink and coho (July/Aug)	ADFG	81,500	99,021	-	99,021	17,521
Alagnak R. tower	ADFG	53,000	63,635	-	63,635	10,635
Post-season aerial surveys (Naknek, Kvichak)	ADFG	14,700	8,979	-	8,979	-5,721
Management Trainee	ADFG	66,000	62,075	-	62,075	-3,925
Totals		781,870	606,608	149,933	756,540	-25,330
Percent of Budget					96.8%	-3.2%

Financial Contributors to BBFC in 2019

BBSRI solicited support from all who had contributed to BBFC in 2018. Table 3 provides an inclusive list of all organization that provided financial support to BBFC in 2019, and the amount of those contributions.

Table 3. Organizations that contributed money to support BBFC projects in 2019.

Contributor	Share of entire 2019 (\$)	Percent of Total
Bristol Bay RSDA (1,860 Driftnetters)	181,095	23.94%
Processors (12)	181,095	23.94%
Others		
Bristol Bay Native Corporation	5,000	0.66%
AML (Lynden)	4,000	0.53%
APL	3,000	0.40%
Ekuk Village Council	1,000	0.13%
Refund from State of AK, 2018 BBFC	1,980	0.26%
Kvichak Setnetters Association	1,000	0.13%
Individual fishermen	100	0.01%
Subtotal, Others	16,080	2.13%
Total (RSDA/Processors/Others)	378,270	50.0%
BBSRI Match	378,270	50.0%
Total \$ for 2019 Projects	756,540	

Proposed Scope and Cost of the Core Program, 2020

The Working Group met December 19, 2019 to discuss and develop a proposed scope for BBFC in 2020. The proposed Governor's budget for FY2021 proposes no cuts to the Bristol Bay Commercial Fisheries Division budget. The WG had far-ranging discussion that, among other topics, included a discussion about getting the area's fishery managers (i.e., the Fishery Biologist IIIs) more involved at the WG level. Changes to the Core Program in 2020 that were considered at this meeting were as follows.

- A full-transect fishing effort for the Port Moller Test Fishery. In 2019 the effort was funded under separate funding arrangements by BBSRI and the BBRSDA.
- Reducing the scope of the Nushagak sonar project extension from mid-August to July 25.
- Extending the duration of counting tower projects to more fully enumerate the escapement.
- Naknek-Kvichak aerial survey program.
- Role of the management trainee in 2020.

Most importantly, existing project budgets for both GF and BBFC support were discussed at length at this meeting. There was consensus that some additional work was needed to fully describe existing budgets and actual expenditures before a final scope for BBFC could be completed. The WG will meet in January to finalize the scope of the 2020 Core Program with a goal toward final decisions being made by February 15.

Conclusions

The third year of BBFC was a success. Stakeholders via BBFC funded 29% of the total cost of managing the near-record-catch Bristol Bay salmon run in 2019. The goal of BBFC to resurrect management capacity lost due to budget cuts in recent years was again met in 2019. More Fish were caught, stocks were better utilized, and important long-term datasets were maintained, all in a more coordinated manner than would have occurred without BBFC. Other highlights of this effort include the following.

- Successful fund raising – A total of \$756,540 was contributed by industry, communities, BBSRI, other regional organizations and government, and individual fishermen. None of these funds were spent to administer BBFC; all funds will be spent on projects to assist managers with managing the fishery.
- FY2020 Bay budget largely intact – ADF&G's Bristol Bay budget was not cut for fiscal year ending June 30, 2020. The Alagnak counting tower, which had been funded by a temporary or ephemeral source, was discontinued in 2019 and the project was funded by BBFC.
- The Governor's proposed FY2021 budget proposes to maintain funding (i.e., not cuts) to ADF&G's Bristol Bay budget.

- Cost-recovery test fishing – This was not implemented in 2019.
- The largest datasets on sockeye salmon productivity in the world were maintained, providing a knowledge base that provides for better preseason forecasts, evaluation of escapement goals, and general understanding of changes in productivity of these valuable salmon stocks.

The sustainability of BBFC to support a world-class fishery management system during this challenging fiscal environment will depend on continued success in rebuilding ADF&G's operating budget for Bristol Bay and on keeping BBFC simple, transparent, and not financially burdensome to any one group of stakeholders.

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Appendix B. Agendas from two BBFC meetings between BBSRI and ADF&G, 2019.

Meeting among ADF&G's Commissioner Vincent-Lang and Director Rabung; and BBSRI's Michael Link and Jeff Regnart. Feb. 20, 2019

Purpose of meeting

1. Introduce the Bristol Bay Fisheries Collaborative (BBFC) to the new ADF&G leadership.
2. Review progress over the last 2.5 years.
3. Highlight areas and tasks needing leadership's input and participation.
4. Prepare leadership for the meeting of principals on March 4.

Agenda

1. The Togiak herring letter, brief discussion.
 2. BBFC - review how we got here.
 3. What BBSRI and others envisioned with BBFC (goals).
 4. Review progress toward the above goals from BBSRI's perspective.
 5. Things for the Commissioner and Director to consider following this meeting.
 6. Review the purpose of the meeting of principals on March 4th.
 7. Review ideas of what BBSRI can do to help.
-

Meeting between the principals of the BBFC MOA, Commissioner Doug-Vincent Lang and the BBSRI Board of Directors, March 4, 2019.

Purpose of the Meeting

1. Opportunity for the Commissioner to outline State's perspective on the role/value of BBFC.
2. Provide an outlook for the Bristol Bay FY20 budget and discuss implications.
3. Seek agreement on areas for improvement and agree to meet in the fall.

Agenda

1. Commissioner provides description of the State's (Administration's) perspective on the role and value of BBFC.

2. To the extent practical, provide an outlook on the Bristol Bay FY20 budget (if cut, by how much). Discuss short- and long-term implications to BBFC.
3. What has gone well and areas for improvement for BBFC.
4. Contingency planning for 2019 season.
 - a. What components of the Core Program that ADF&G operates would be deemed essential?
 - b. How do we avert a disaster, should the legislative budgeting process run up to or beyond July 1?

Appendix B. BBFC Project Results in 2019.

ADF&G compiles a thorough summary of its management, including results of monitoring activities, for the Bristol Bay salmon fishery in its Bristol Bay Area Management Reports (AMRs), which are available online². This appendix is not intended to replicate to any extent the type of information contained within the 2019 AMR (Tiernan et al., in prep; see Salomone et al. 2019 from the 2018 season for the expected level of report detail). The purpose of project summaries below is to provide the scope of effort to support the financial expenditures of BBFC in 2019 for our benefactors and others.

Port Moller Test Fishery (PMTF)

Methods and results from the Port Moller Test Fishery (PMTF) are provided in the annual report (Link et al. 2019)³. An abbreviated executive summary from Link et al. (2019) is provided below. Table B-1 provides a summary of the level of effort and station-date catch indices from PMTF 2019.

In 2019, the Port Moller Test Fishery (PMTF) operated from June 10 to July 17 catching 4,010 Sockeye from 307 sets across Stations 2-24 using two vessels—the R/V *Pandalus* primarily fished Stations 2-12, while the F/V *Ocean Cat* focused on Stations 14-24. Furthermore, the start date for the F/V *Ocean Cat* was delayed until June 19 so that the test fishery could continue through July 17 (the *Pandalus* stopped fishing on July 9 due other research obligations). During July 10-17, the R/V *Ocean Cat* alternated between sampling the inner (Stations 2-12) and outer (Stations 14-24) transect each day. The 2019 project provided unprecedented spatial (Stations 2-24) and temporal (through July 17) coverage in PMTF’s 53-season history.

From this effort, we learned that the run was bimodal in 2019 (similar to 2018) with average catch indices peaking at Stations 10 and 18 with a valley centered on Station 14. This pattern was based only on sets and catches from June 20 to July 9 when the entire transect was able to be covered consistently with the two vessels. During these dates, the proportion of the run passing beyond Station 12 (Stations 14-24) averaged 0.54, was highly variable from day to day (range=0.26-0.87), and yet appeared to show an increasing trend throughout this time period.

The 2019 run was the fourth largest inshore run on record coming in at 56.5 million, and run timing was estimated to be 3-4 days late peaking in the inshore districts on July 8. The magnitude and lateness of the 2019 run was similar to those from recent years (2015-2018). As in 2018, without a second vessel we would not have known that the majority of the run passed beyond Station 12 nor been able to track the varying proportion that would have been missed. Sampling only Stations 2-12 would have made proximate forecasts of run magnitude more problematic during the season. As it was, our proximate forecast for the coming days made on

² <http://www.adfg.alaska.gov/index.cfm?adfg=commercialbyareabristolbay.salmon#management>

³ Available: www.bbsri.org/port-moller-test-fishery

July 4 (Interpretation #3), when 67% of the run was yet to arrive in the districts, tracked the inshore pattern well and accurately predicted the peak day of July 8. Furthermore, the magnitude of the fish arriving inshore during July 4-10 was only 12% below forecast (18.6 million were observed versus the forecast of 21 million).

Postseason analyses of genetic data parsed into early, middle, and late seasonal strata revealed stark contrasts between stock compositions for inner versus outer stations. In short, only sampling Stations 2-12 would have dramatically over-represented the Egegik District at Port Moller and under-represented the Naknek-Kvichak and Nushagak districts. Sampling the entire transect allowed stock composition forecasts to be much more reflective of inshore run.

Finally, the second vessel facilitated additional research into other possible mechanisms that could cause PMTF indices to be biased. We were able to test the effects of tide, water visibility, sea state and sea surface temperatures on the vertical depth of capture and on the differences in catch rates between the standard 60-mesh multistrand net versus a deeper (100 mesh) monofilament net. Results of this analysis suggests there are times when fish ran deeper in the water column and below the 60-mesh net and/or net material can have a significant and variable effect on the PMTF index.

Recommendations for project scope in 2020:

- Continue to augment the spatial and temporal test fishing coverage with a second vessel and crew.
- Continue to compare a monofilament net to multistrand net of equal depth.
- As time allows in 2020, we plan to sample in between the traditional even numbered stations to assess spatial patchiness of the run.

Table below is taken from the annual report and shows the test fishing index results from 2019. The data in the red hatches cells was obtained from an effort funded separately from BBFC. Specifically, this was obtained from as second vessel that was funded by the Bristol Bay Regional Seafood Development Association (BBRSDA).

Table B-1. Catch indices from the 2019 Port Moller Test Fishery, with those provided by the second vessel (F/V Ocean Cat) in red hatched cells.

Date	Daily Catch Index by Station												
	S2	S4	S6	S8	S10	S12	S14	S16	S18	S20	S22	S24	S26
10-Jun	15	3	0	13	2	0	0						
11-Jun	0	0	0	8	0	10	0	10					
12-Jun	0	5	0	0	0	0	0						
13-Jun	2	2	0	12	9	0							
14-Jun													
15-Jun	0	0	2	13	17	5	2						
16-Jun	0	2	10	21	32	2	0						
17-Jun	0	0	5	67	22	17	7						
18-Jun					36	22	55	38					
19-Jun				20	22								
20-Jun	2	5	69	29	21	19	5	0	34	0			
21-Jun	12	19	32	24	13	57	32	18	11	18	68	0	
22-Jun	12	39	68	39	25	100	16	16	0	43	24	14	
23-Jun	2	23	30	60	75	62	2	3	86	8	14	17	
24-Jun	0	0	5	17	45	7	2	5	46	20	0	20	
25-Jun	16	5	72	62	79	44	10	20	14	62	26	14	
26-Jun	2	49	8	64	60	36	29	47	108				
27-Jun	10	14	9	2	7	18	53	82	139	43	55	30	
28-Jun	5	5	45	34	79	20	30	29	38	34	20	3	
29-Jun	30	7	41	161	75	79	89	55	122	65	29	58	
30-Jun	0	5	34	51	98	23	69	85	78	60	60	52	20
1-Jul	0	60	5	24	33	42	52	166	93	16	7	16	
2-Jul	2	110	5	74	97	41	18	37		58	9	19	
3-Jul	4	34	28	12	0	58							
4-Jul	0	14	49	8	15	53	14	13	48	80			
5-Jul	0	0	30	18	30	9	0	27	74	9	20		
6-Jul	0	14	19	42	14	14	75	38	70	23	10		
7-Jul	0	5	2	18	34	26	32	130	14				
8-Jul	0	11	88	84	53	25	15	0	26	13	10		
9-Jul	0	7	0	0	5	5	2	10	18	24	0	5	
10-Jul							2	4	11	6	0	54	
11-Jul	0	64	18	35	82	41							
12-Jul		12											
13-Jul		4	36	10	62	50							
14-Jul							21	10	0	29	20	16	
15-Jul							17	11	17				
16-Jul		7	17	26	60	69							
17-Jul	3	12	8	10									

In-river Test Fisheries on the Egegik, Kvichak, and Ugashik rivers

All three test fisheries are operated in a similar manner and have been for ~50 years. Two-person crews set 25-fathom gillnets from a skiff for soak times of 5 to 15 minutes duration daily at the same stage of the two tides. Catches and effort is used to compute test indices for each tide that are standardized into units of “fish per 100 fathom hours”, which can be thought of as the estimated number of fish that would have been captured if the net had fished similarly well

for one hour. Managers compare daily test indices to current-year observations: 1) the number of fish above the test fishery as observed from aerial surveys, and 2) the number of fish observed at upstream counting towers 2-6 days later. From these relationships, managers can use the information from in-river test fisheries to estimate the number of fish upstream of the fishing district and the downstream of the counting towers (i.e., “Estimated River Fish”, or ERF).

Egegik In-river Test operated near Wolverine Creek, approximately 2 miles above the commercial district, from June 18 to July 12. A total of 190 sets were made and 3,451 fish captured in 2019. Figure B-1 provides daily estimates of the number of fish between the Egegik fishing district and the Egegik River counting tower day based on the in-river test fishery.

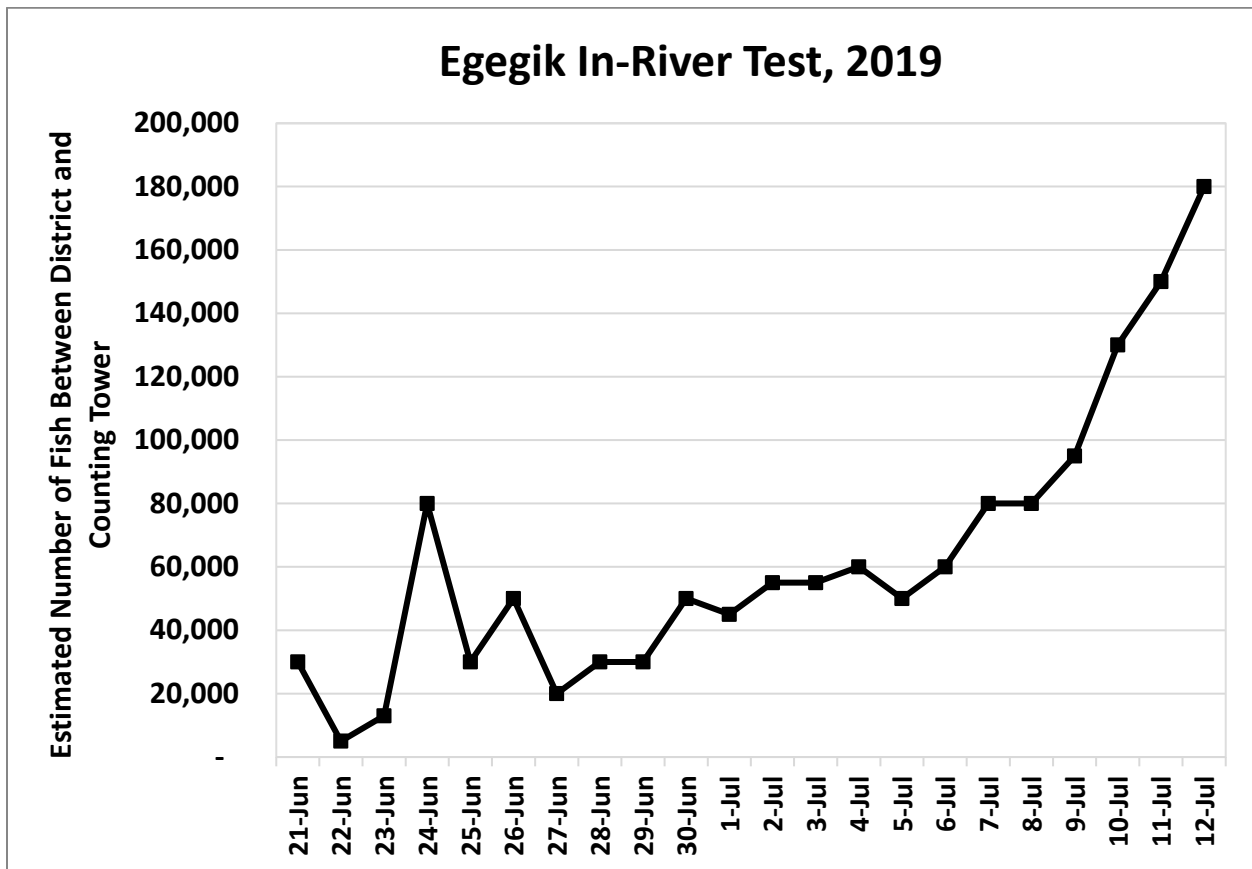


Figure B-1. Daily Estimated River Fish in the Egegik River in 2019 based on the in-river test fishery funded by BBFC.

Ugashik In-river Test operated at the usual site approximately 4 miles upstream from Ugashik Village from June 23 to July 21. A total of 191 sets were made and 1,936 fish captured. Figure B-2 provides the daily estimates of the number of fish between the district and upstream counting tower on the Ugashik River.

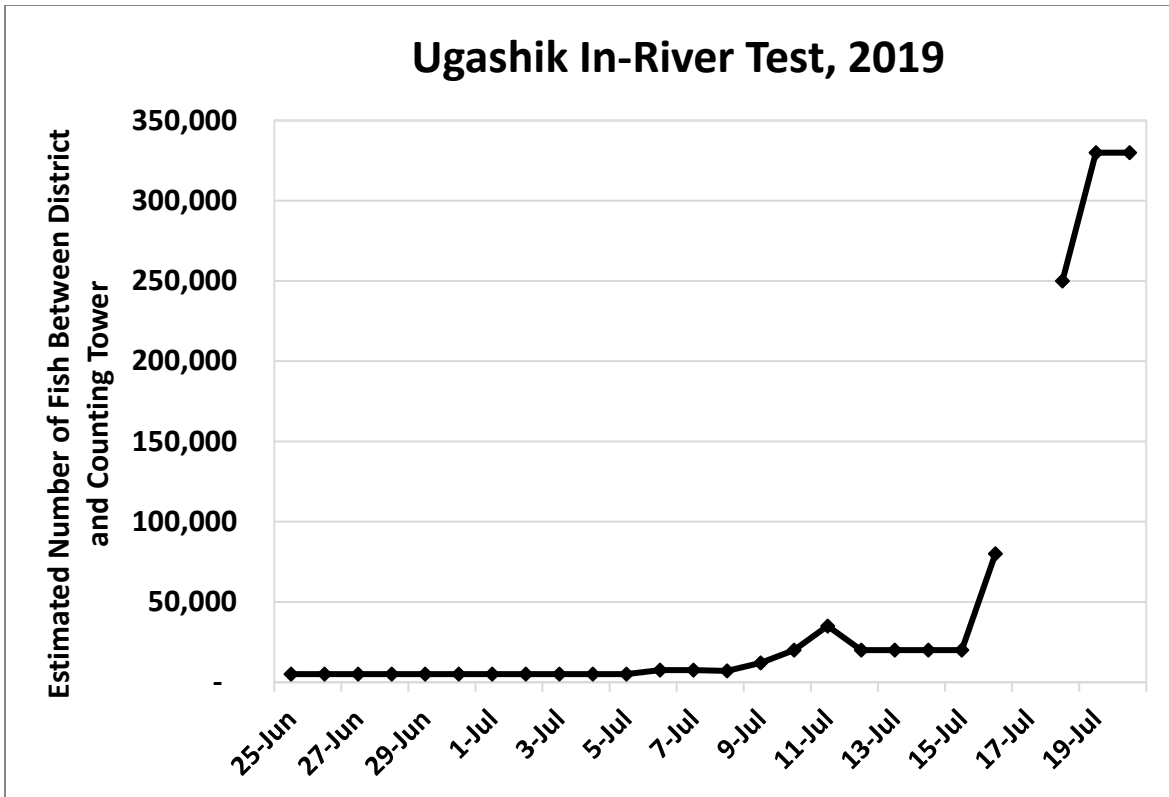


Figure B-2. Daily Estimated River Fish in the Ugashik River in 2019 based on the in-river test fishery funded by BBFC.

Kvichak In-river Test operated 0.5 miles below the Village of Levelock from June 23 to July 19. A total of 212 sets were made and 1,587 sockeye salmon were captured. Figure B-3 provides the daily estimates of fish between the test fish site and the counting tower near Igiugig.

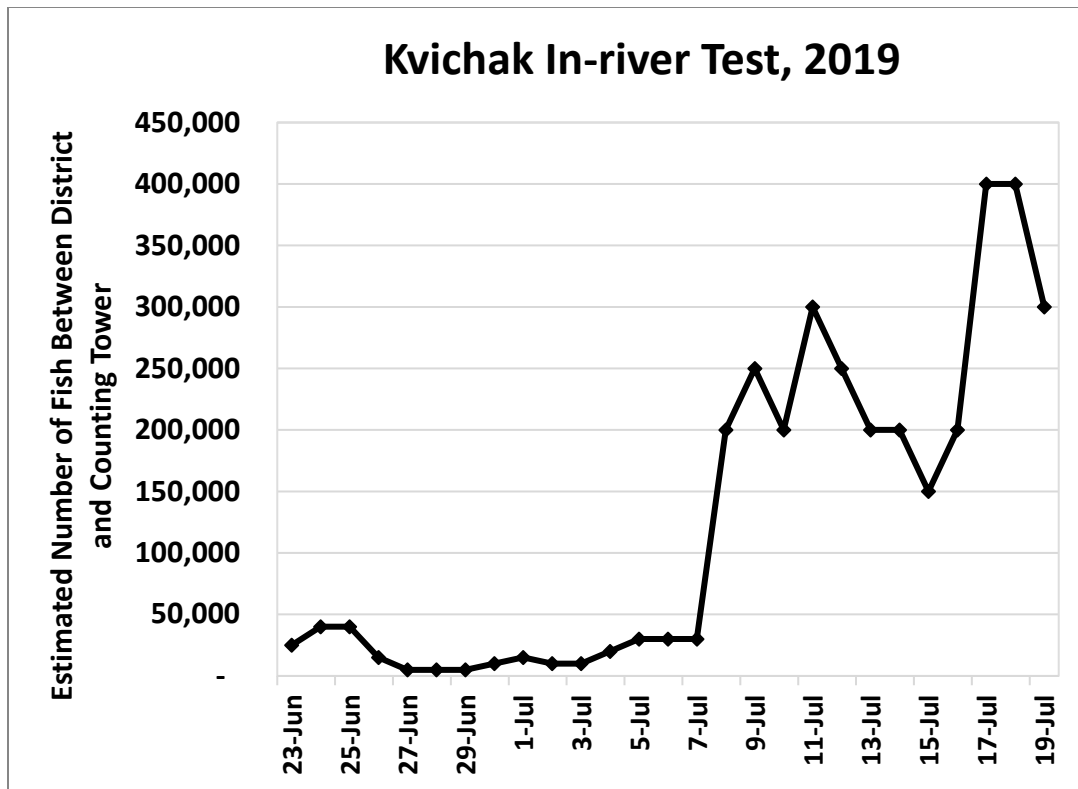


Figure B-4. Daily Estimated River Fish in the Kvichak River in 2019 based on the in-river test fishery funded by the BBFC and inseason aerial surveys.

Nushagak Sonar

The Nushagak River sonar has operated near Portage Creek since 1980⁴. In 2019, the 6-person field crew began their season on June 1 and commenced estimating the Nushagak River daily escapement on June 6. This season, project operations were extended past the July 20 end date until August 17 to estimate pink and Coho salmon escapement. Daily drift gillnet sampling was used to apportion raw sonar counts into daily estimates of sockeye, Chinook, chum, pink and Coho salmon (Table B-2). Combined across all species, 1.46 million salmon were estimated to have passed the Nushagak River sonar site in 2019.

The Nushagak River sonar counts are an integral part of the Nushagak District salmon management program. Managers depend on the daily counts and use them to inform management decisions daily. Sonar counts allow managers to make decisions that protect vulnerable stocks and provide fishing opportunity as appropriate to achieve escapement goals for all salmon species being monitored on the Nushagak River.

⁴ http://www.adfg.alaska.gov/index.cfm?adfg=sonar.site_info&site=8

Table B-2. Daily and cumulative escapement at the Portage Creek sonar site on the Nushagak River in 2019.

Date	Chinook		Sockeye		Chum		Coho		Pink	
	Daily	Cum	Daily	Cum	Daily	Cum	Daily	Cum	Daily	Cum
6/6/2019	208	208	270	270	26	26	0	0	0	0
6/7/2019	388	596	543	813	41	67	0	0	0	0
6/8/2019	108	704	323	1,136	7	74	0	0	0	0
6/9/2019	213	917	490	1,626	17	91	0	0	0	0
6/10/2019	291	1,208	794	2,420	109	200	0	0	0	0
6/11/2019	252	1,460	746	3,166	82	282	0	0	0	0
6/12/2019	227	1,687	805	3,971	84	366	0	0	0	0
6/13/2019	1,279	2,966	1,138	5,109	366	732	0	0	0	0
6/14/2019	1,362	4,328	1,689	6,798	596	1,328	0	0	0	0
6/15/2019	2,919	7,247	2,978	9,776	1,447	2,775	0	0	0	0
6/16/2019	4,175	11,422	4,463	14,239	7,898	10,673	0	0	0	0
6/17/2019	1,076	12,498	6,460	20,699	3,475	14,148	0	0	0	0
6/18/2019	317	12,815	5,366	26,065	1,565	15,713	0	0	0	0
6/19/2019	878	13,693	10,034	36,099	4,186	19,899	0	0	0	0
6/20/2019	4,713	18,406	31,703	67,802	10,343	30,242	0	0	0	0
6/21/2019	3,881	22,287	35,002	102,804	22,293	52,535	0	0	0	0
6/22/2019	2,001	24,288	13,673	116,477	7,570	60,105	0	0	0	0
6/23/2019	1,950	26,238	16,353	132,830	13,480	73,585	0	0	0	0
6/24/2019	2,066	28,304	13,278	146,108	11,503	85,088	0	0	69	69
6/25/2019	1,623	29,927	23,219	169,327	26,188	111,276	0	0	0	69
6/26/2019	1,094	31,021	16,591	185,918	12,717	123,993	0	0	0	69
6/27/2019	397	31,418	10,516	196,434	9,529	133,522	0	0	0	69
6/28/2019	1,209	32,627	16,150	212,584	3,185	136,707	0	0	0	69
6/29/2019	856	33,483	30,566	243,150	14,418	151,125	0	0	0	69
6/30/2019	1,787	35,270	65,393	308,543	32,510	183,635	0	0	0	69
7/1/2019	1,075	36,345	71,161	379,704	16,246	199,881	0	0	0	69
7/2/2019	792	37,137	25,380	405,084	28,593	228,474	0	0	1,587	1,656
7/3/2019	46	37,183	23,523	428,607	20,371	248,845	0	0	2,902	4,558
7/4/2019	362	37,545	21,509	450,116	19,721	268,566	0	0	0	4,558
7/5/2019	778	38,323	11,539	461,655	14,230	282,796	0	0	422	4,980
7/6/2019	339	38,662	12,517	474,172	16,268	299,064	0	0	0	4,980
7/7/2019	1,087	39,749	9,333	483,505	15,177	314,241	0	0	0	4,980
7/8/2019	91	39,840	21,318	504,823	10,385	324,626	0	0	0	4,980
7/9/2019	22	39,862	20,376	525,199	13,364	337,990	0	0	0	4,980
7/10/2019	74	39,936	28,900	554,099	21,972	359,962	0	0	0	4,980
7/11/2019	749	40,685	23,547	577,646	12,328	372,290	0	0	0	4,980
7/12/2019	0	40,685	19,555	597,201	16,981	389,271	0	0	0	4,980
7/13/2019	47	40,732	17,210	614,411	8,405	397,676	0	0	0	4,980
7/14/2019	0	40,732	16,064	630,475	11,476	409,152	0	0	0	4,980
7/15/2019	772	41,504	6,236	636,711	20,760	429,912	0	0	0	4,980
7/16/2019	0	41,504	3,410	640,121	20,835	450,747	0	0	578	5,558
7/17/2019	1,526	43,030	12,772	652,893	19,990	470,737	116	116	0	5,558
7/18/2019	325	43,355	11,359	664,252	18,622	489,359	0	116	0	5,558
7/19/2019	269	43,624	7,191	671,443	10,342	499,701	0	116	0	5,558
7/20/2019	0	43,624	4,076	675,519	14,638	514,339	0	116	0	5,558

-continued-

Table B-2. Continued.

Date	Chinook		Sockeye		Chum		Coho		Pink	
	Daily	Cum	Daily	Cum	Daily	Cum	Daily	Cum	Daily	Cum
7/21/2019	0	43,624	3,749	679,268	19,277	533,616	530	646	0	5,558
7/22/2019	0	43,624	8,890	688,158	15,105	548,721	551	1,197	0	5,558
7/23/2019	0	43,624	5,520	693,678	10,603	559,324	221	1,418	0	5,558
7/24/2019	140	43,764	2,002	695,680	5,301	564,625	1,095	2,513	162	5,720
7/25/2019	231	43,995	88	695,768	10,076	574,701	288	2,801	88	5,808
7/26/2019	195	44,190	253	696,021	9,646	584,347	243	3,044	253	6,061
7/27/2019	101	44,291	612	696,633	7,402	591,749	543	3,587	0	6,061
7/28/2019	37	44,328	379	697,012	5,134	596,883	476	4,063	0	6,061
7/29/2019	42	44,370	176	697,188	3,689	600,572	521	4,584	0	6,061
7/30/2019	64	44,434	182	697,370	3,799	604,371	125	4,709	0	6,061
7/31/2019	0	44,434	176	697,546	2,917	607,288	153	4,862	0	6,061
8/1/2019	0	44,434	187	697,733	2,048	609,336	220	5,082	0	6,061
8/2/2019	0	44,434	444	698,177	2,959	612,295	575	5,657	0	6,061
8/3/2019	0	44,434	510	698,687	7,948	620,243	2,204	7,861	0	6,061
8/4/2019	810	45,244	544	699,231	6,101	626,344	3,474	11,335	423	6,484
8/5/2019	531	45,775	346	699,577	4,036	630,380	2,354	13,689	287	6,771
8/6/2019	396	46,171	400	699,977	4,481	634,861	2,493	16,182	0	6,771
8/7/2019	592	46,763	406	700,383	3,858	638,719	5,128	21,310	0	6,771
8/8/2019	0	46,763	2,072	702,455	1,225	639,944	3,359	24,669	0	6,771
8/9/2019	0	46,763	1,506	703,961	1,129	641,073	1,307	25,976	0	6,771
8/10/2019	0	46,763	830	704,791	748	641,821	792	26,768	0	6,771
8/11/2019	0	46,763	658	705,449	875	642,696	754	27,522	0	6,771
8/12/2019	0	46,763	670	706,119	1,060	643,756	1,016	28,538	0	6,771
8/13/2019	0	46,763	558	706,677	603	644,359	585	29,123	0	6,771
8/14/2019	0	46,763	1,274	707,951	2,324	646,683	1,910	31,033	0	6,771
8/15/2019	0	46,763	750	708,701	2,615	649,298	11,471	42,504	267	7,038
8/16/2019	0	46,763	370	709,071	1,141	650,439	5,689	48,193	222	7,260
8/17/2019	0	46,763	278	709,349	725	651,164	3,659	51,852	156	7,416

Alagnak River Counting Tower

The Alagnak River counting tower was staff by three technicians and operated from June 24 through July 24, 2019 (Table B-3). In addition to hourly counts and daily estimates, fish were sub-sampled for scales (age) and length.

Table B-3. Daily and cumulative counts of sockeye salmon escapement at the Alagnak River counting tower, 2019.

Date	Number of Sockeye	
	Daily	Cumulative
06/24/19	0	0
06/25/19	780	780
06/26/19	840	1,620
06/27/19	546	2,166
06/28/19	756	2,922
06/29/19	816	3,738
06/30/19	1,290	5,028
07/01/19	3,054	8,082
07/02/19	3,534	11,616
07/03/19	3,528	15,144
07/04/19	2,340	17,484
07/05/19	3,204	20,688
07/06/19	3,804	24,492
07/07/19	6,168	30,660
07/08/19	20,466	51,126
07/09/19	31,296	82,422
07/10/19	33,762	116,184
07/11/19	38,262	154,446
07/12/19	62,796	217,242
07/13/19	81,294	298,536
07/14/19	44,376	342,912
07/15/19	31,158	374,070
07/16/19	24,132	398,202
07/17/19	68,874	467,076
07/18/19	84,084	551,160
07/19/19	94,656	645,816
07/20/19	89,346	735,162
07/21/19	37,122	772,284
07/22/19	25,254	797,538
07/23/19	12,552	810,090
07/24/19	10,368	820,458

District Catch Sampling

In 2019, a total of 35,101 fish were sampled for age (scales), length, and sex from Bristol Bay commercial harvest (Table B-4). The catch sampling crew consisted of four catch samplers in King Salmon, two in Dillingham, and one in Togiak. In addition, two scale agers stationed in King Salmon aged salmon scales collected from the commercial fishery and the escapement monitoring projects. These data are used to determine the age-specific harvest by stock in each district; information that is integral to building brood tables used in annual preseason forecasts,

escapement goal evaluations, and monitoring changes in freshwater and marine productivity over time.

Table B-3. Summary of the numbers of fish sampled in the Bristol Bay commercial fishing districts in 2019.

Fishing District	Number of Fish Sampled
Ugashik	1,945
Egegik	6,529
Naknek-Kvichak	8,056
Nushagak	12,024
Togiak	6,547
Total	35,101

Aerial Surveys of the Naknek, Kvichak, and Alagnak watersheds

Aerial surveys of spawning grounds in the Naknek, Kvichak, and Alagnak watersheds were conducted August 26–28, 2019. Surveys were timed to coincide with peak spawning periods. Escapement surveys provide indices that are used to assess spawning distribution to individual tributaries and unique habitats. These indices go into historical data sets for each watershed (the dataset for Kvichak pre-dates statehood). Surveys also provide managers with visual of spawning densities throughout each watershed and the ability to see variability of production within and among these three major watersheds.

In 2019, approximately 929,000 sockeye salmon were observed in the Kvichak drainage, which was 39 % of the estimated tower escapement of 2,371,242. Approximately 619,000 sockeye salmon were observed in the Naknek drainage, which was 21% of the estimated tower escapement of 2,911,470. Approximately 228,000 sockeye salmon were observed in the Alagnak drainage, which was 28% of the observed tower escapement of 820,458. The percentages of observed escapements in the aerial surveys compared to the tower counts were similar to previous years for each drainage.

Management Trainee

A BBFC-supported entry level Biologist position was added to area staff in 2018 to assist with project operations on the East side of Bristol Bay. This Fish Biologist I (FB I) was re-hired in 2019 and started on May 20 assisting with pre-season logistics in the Anchorage office before transitioning out to King Salmon on June 3. During the fishing season, the FB I was responsible for overseeing the operation of the three East Side inriver test fish projects. In addition, the FB I was trained in the day to day operations in the King Salmon office. After the fishing season, the FB I coordinated the breakdown of field camps, assisted with motor and boat maintenance, and preliminary data analysis until their season ended on August 14.