

Bristol Bay Sockeye Salmon

UW-FRI

Inseason Report #2

June 23, 2020

1 Forecast Summary

The run size estimate from the inseason forecast model **does not** differ significantly from the preseason forecast (Table 1). This model weights the overall run size prediction based on the historical accuracy of the preseason forecast, and predictions based on standardized Port Moller test fishery catches and catch plus escapement to date, on June 21. Thus far Port Moller test fishery indices are similar to the previous four years (2016-2019) for this date, and are consistent with what is expected for a run at the preseason forecast assuming average run-per-index (RPI) and travel time (TT). All other inseason data currently support preseason predictions for run size and distribution among river systems.

At this point in the season, forecast weights are: 85.4% preseason forecast, 11.5% Port Moller catch per unit effort (CPUE), and 3.1% catch plus escapement. These weights indicate the preseason forecast has been the most reliable predictor of run size at this point in the season, in previous years.

Daily updates to many of the figures presented in this report are available as part of the UW-FRI online supplement:

<https://alaskasalmonprogram.org/bristol-bay-daily-updates/>

Table 1: 2020 FRI in-season forecast (in thousands) summary.

Forecast	Sockeye	Projected harvest
Preseason forecast	48,920	36,220
Inseason model	48,920	36,220

Table 2: 2020 FRI pre-season sockeye salmon forecast (in thousands).

DISTRICT	RIVER	AGES				TOTAL
		1.2	1.3	2.2	2.3	
Nak\Kvi		4,495	8,387	1,132	497	14,511
	Kvichak	2,624	2,773	470	106	5,973
	Naknek	959	4,070	600	367	5,996
	Alagnak	912	1,544	62	24	2,542
Egegik		1,554	6,076	1,366	1,189	10,185
Ugashik		2,437	1,383	359	44	4,223
Nushagak		11,985	6,696	241	80	19,118
	Wood	10,690	3,147	215	45	14,097
	Nushagak	984	2,903	14	27	4,044
	Igushik	311	646	12	8	977
Togiak		145	716	19	3	883
Totals		20,616	23,258	3,117	1,813	48,920

*The Nushagak River total includes 116,000 0.3 and 1.4 age fish not included in the body of the table

2 Port Moller CPUE

The UW-FRI Port Moller index (stations 2-14) through June 21 is consistent with what would be expected for a Bristol Bay sockeye run matching our preseason forecast of 48.9 million sockeye. However, given the limited Port Moller test fishery sampling in 2020, these indices should be treated with caution at this point.

Figure 1 (page 4) shows the 2020 daily UW-FRI Port Moller index (grey and black bars) compared with expected daily indices (red shaded region) for a run that is on track to meet the 2020 preseason forecast, in a year with average (1990-2019) run-per-index (RPI) and travel time (TT).

Run-per-index (RPI) is the number of fish that arrive inshore per fish caught in the Port Moller test fishery and travel time (TT) is the number of days required for fish to travel between the Port Moller transect and fishing districts and counting towers. As examples, we have also included expected daily indices for a 2020 run equal to the preseason forecast but with the RPI and TT observed in years 2016-2019 (blue lines with symbols; Figure 1, page 4).

Expected daily Port Moller index values in Figure 1 (red shaded region) are generated by:

1. Calculating expected daily C+E for a 48.9 million fish run (preseason forecast) with *average* run timing and arrival distribution.
2. Scaling daily C+E predictions down to Port Moller index values by dividing by *average* RPI.
3. Lagging these values backward in time to when those fish should pass the Port Moller transect based on *average* travel time (TT).

Figure 1 (page 4) indicates daily UW-FRI Port Moller indices are similar to expectations for a 2020 run at the preseason forecast, if run timing, RPI, and TT are similar to 1990-2019 averages.

The years 2017-2019 exhibited *higher* than average RPI, given the offshore migration pattern and likelihood that a substantial proportion of returning sockeye was not available to the traditional test fishery transect. This is why the expected index values (blue curves with symbols) are below the red curve describing the expected Port Moller index values if *average* RPI and TT are observed this year. If RPI in 2020 is similar to the high value observed in 2019, then daily indices matching what is shown in Figure 1 (page 4) by the blue curve marked with “+” symbols would be consistent with a run size equal to our preseason forecast.

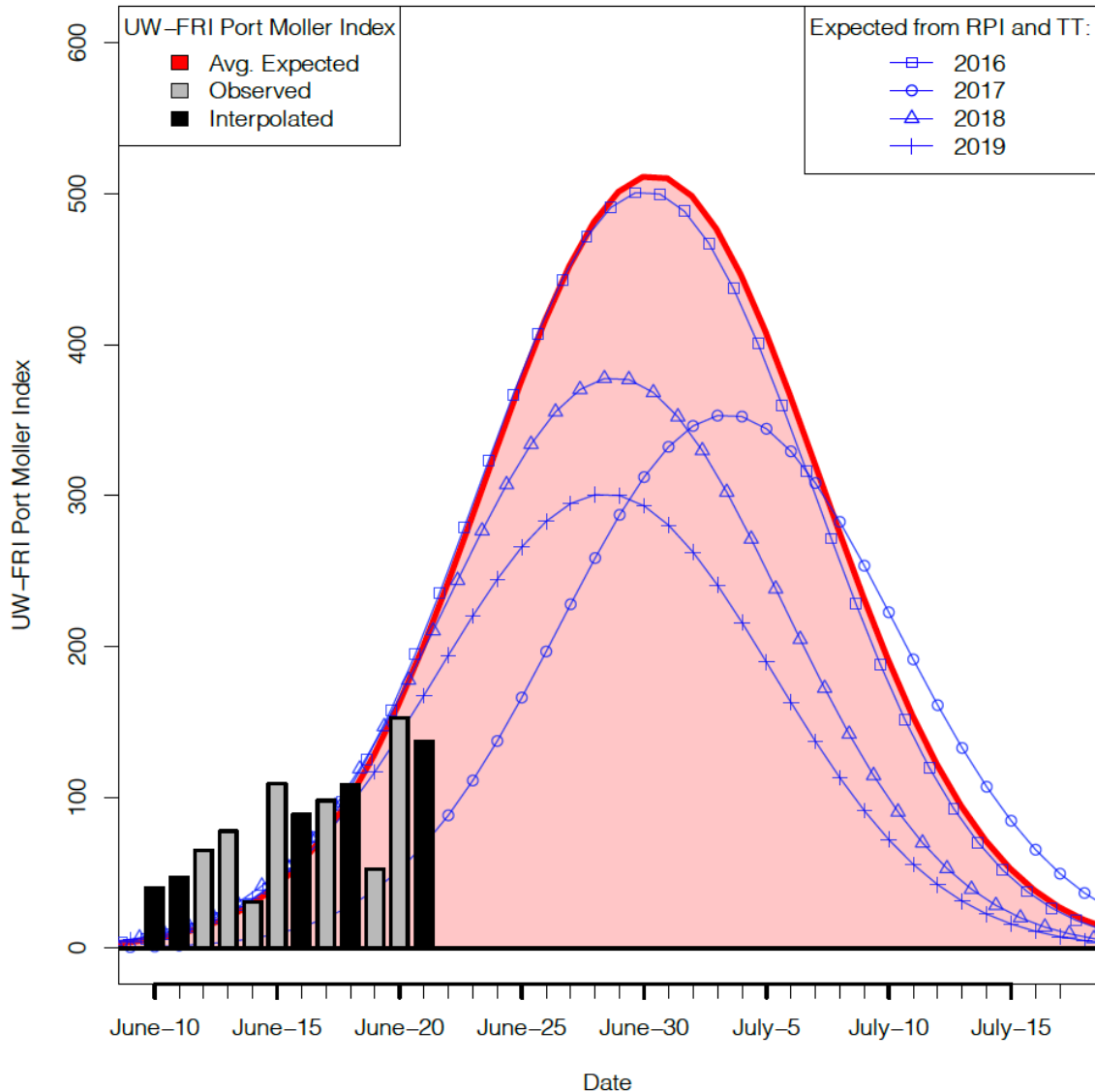


Figure 1. Comparison of Expected & Observed Daily Port Moller Index: 2020 observed and interpolated (gray and black bars) UW-FRI Port Moller Index is compared with expected daily index values (red line and shaded area) for a Bristol Bay run equal to the preseason forecast with average run timing, and exhibiting average Port Moller to inshore travel time (TT) and run-per-index (RPI). Expected daily index values for a run at the preseason forecast, with TT and RPI equal to those observed in 2016-2019 are plotted as blue lines and symbols.

4 Catch and Escapement

Run size predictions based on cumulative catch plus escapement (C+E) have poor accuracy at this early point in the season. This is largely due to inter-annual variation in run timing, and differences in the start of escapement enumeration and variation in early season fishing opportunity among years.

Figure 2 (page 6) shows the median inshore return date (i.e. date at which 50% of each year's catch and escapement is observed) for each year 1965-2019, relative to the average (i.e. 0 on the vertical axis). From this we see:

1. Run timing for Bristol Bay as a whole exhibited some of the most extreme values on record 2013-2016: 7.6 days early in 2013, 5.2 days late in 2016.
2. The 2019 run was slightly *later* (+ 1.9 days) than the long-term average, and each of the last 5 years (2015-2019) have been *later* than the long-term average.
3. Late run timing for Bristol Bay as a whole in 2015-2019 resulted primarily from late inshore run timing to the Naknek-Kvichak and Egegik districts, and to the Ugashik District in 2018-2019.

Figure 3 (page 7) displays a comparison of observed 2020 cumulative C+E (gray dots with a line) with daily expectations given the preseason forecast and average arrival timing and compression (blue line) and shows that observed C+E to date is in line with expectations. Figure 4 (page 8) displays daily catch and escapement compared with recent years (2016-2019). These figures indicate that very little C+E has been observed in recent years, or is expected through this date for a run consistent with our preseason forecasts.

Both figures are updated daily as part of the UW-FRI online supplement:
<https://alaskasalmonprogram.org/bristol-bay-daily-updates/>

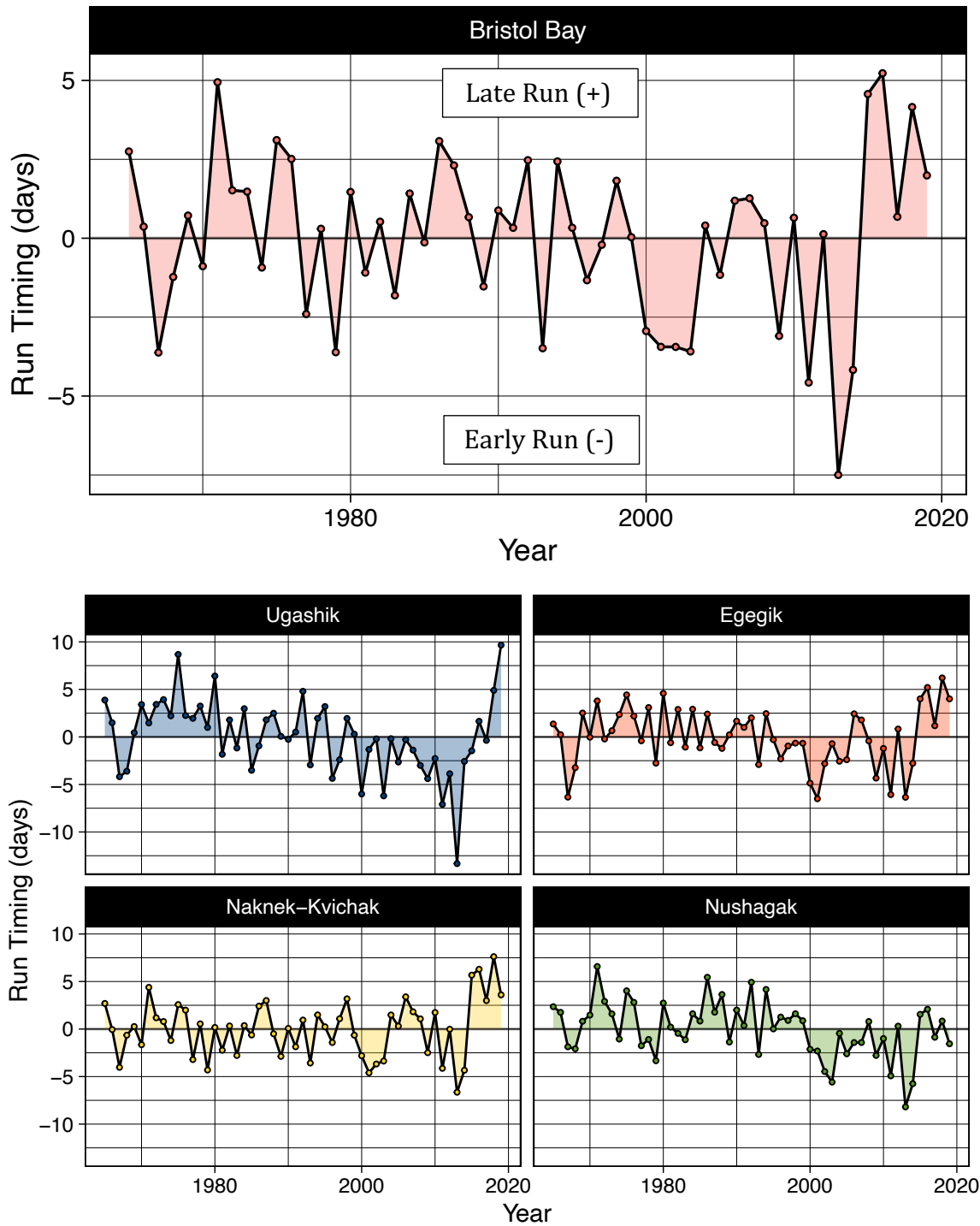


Figure 2. Historical Run Timing: Annual differences in the median date for the inshore return (i.e. the date at which 50% of total catch and escapement is recorded), from the long-term average (1965-2019) in number of days. Negative values (< 0) indicate years with **early** arrival timing, while positive values (> 0) indicate **late** arrival timing, relative to the average.

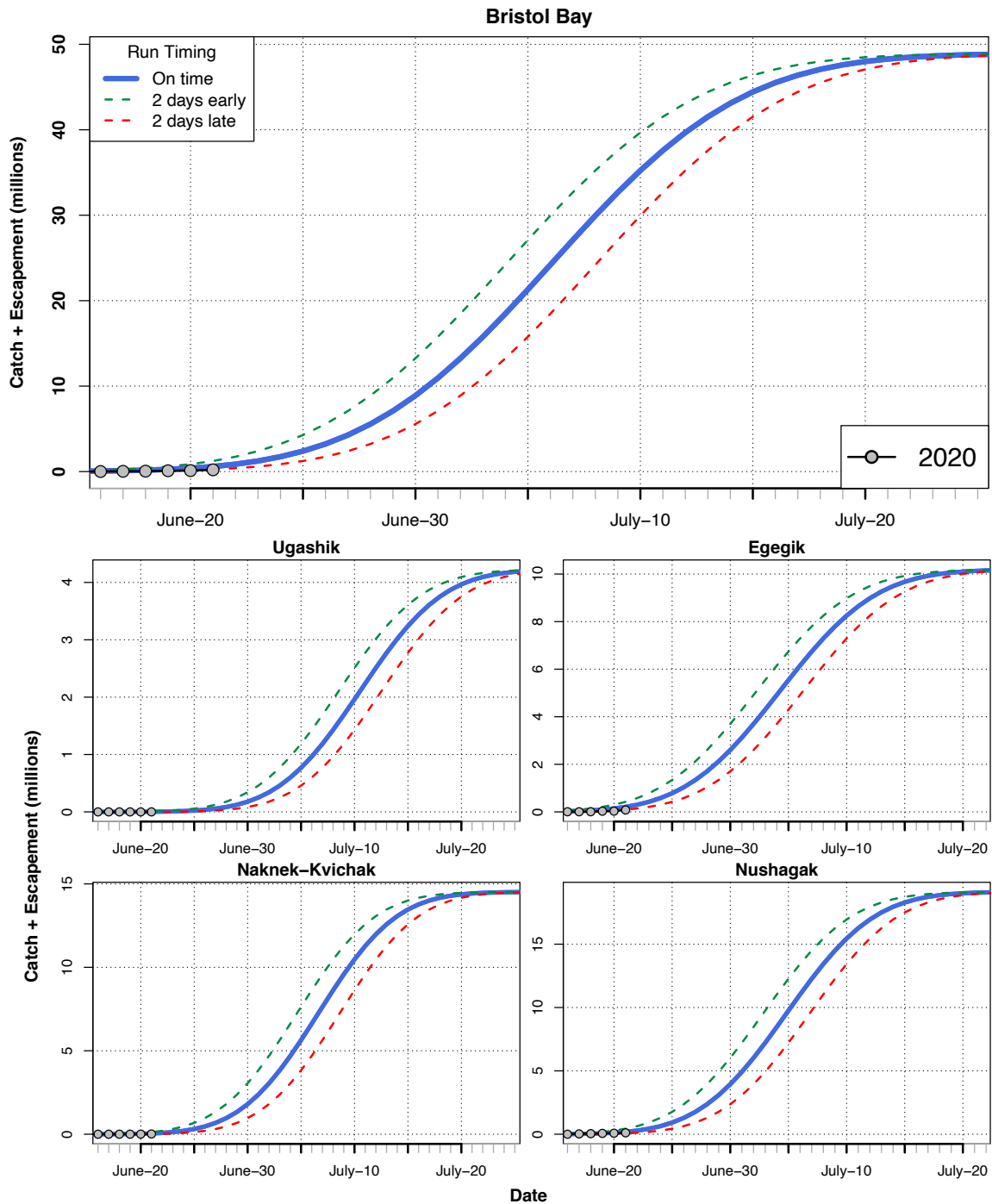


Figure 3. Cumulative C+E Comparison: Comparison of daily cumulative C+E observed for Bristol Bay in 2020, and expected daily values (blue curve). Expected daily values are calculated relative to the 2020 preseason forecast and the average distribution of inshore arrivals (1980–2019). Connected gray dots show the 2020 observed daily cumulative C+E. Green dashed line represents expectations if the run is 2 days early, red dashed line if the run is 2 days late.

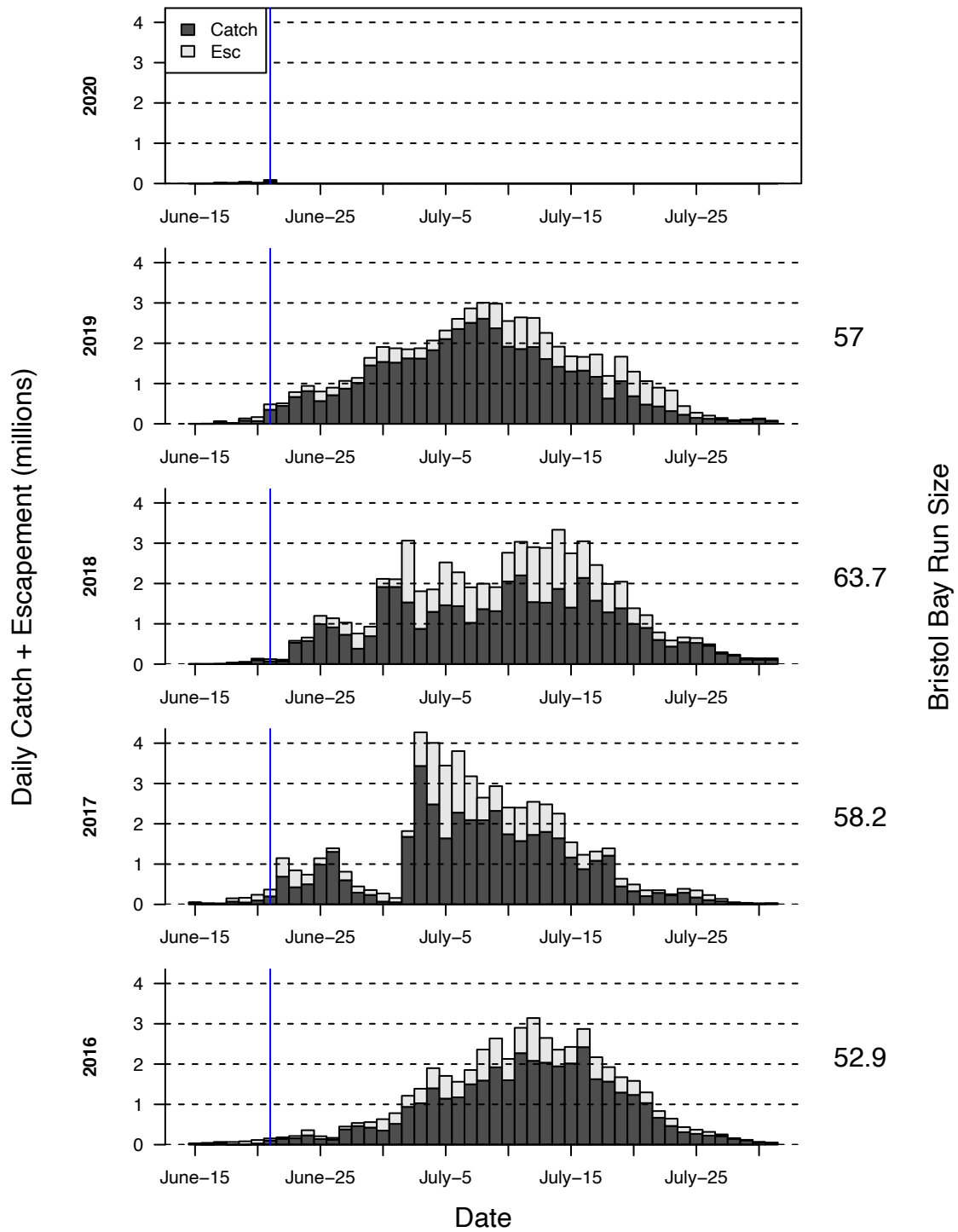


Figure 4. Daily Catch and Escapement: Observed catch and escapement for years 2016–2019 as stacked bars, compared with 2020 (top). Escapements are in light gray and catches in dark gray. The total Bristol Bay run size in millions of sockeye is listed on the right hand axis.

5 Port Moller Genetics

The first report of the genetic composition of sockeye passing the Port Moller test fishery transect was released by the Alaska Department of Fish and Game, Gene Conservation Laboratory, on June 22. Samples collected June 19-20 indicate that all stock components have representation in sockeye migrating pass the test fishery transect. Genetic stock proportions for June 19-20 are very similar to preseason forecast proportions for each stock. However, at this early point in the season (prior to June 26-27) Egegik is on average over represented in test fishery genetic samples, relative to its final proportion of the total Bristol Bay run. Egegik’s consistent over representation in early season test fishery samples is due to its early run timing relative to other stocks (Figure 5, page 9). Thus, we would expect increased Egegik representation in the next sets of genetic samples from the test fishery, if on track with its preseason forecast of 10.2 million salmon.

We will provide a more detailed discussion of the inseason genetic data, and how predictions based on these data compare with preseason forecast proportions by district and observed catch and escapement by district, when additional genetic stock composition estimates are available.

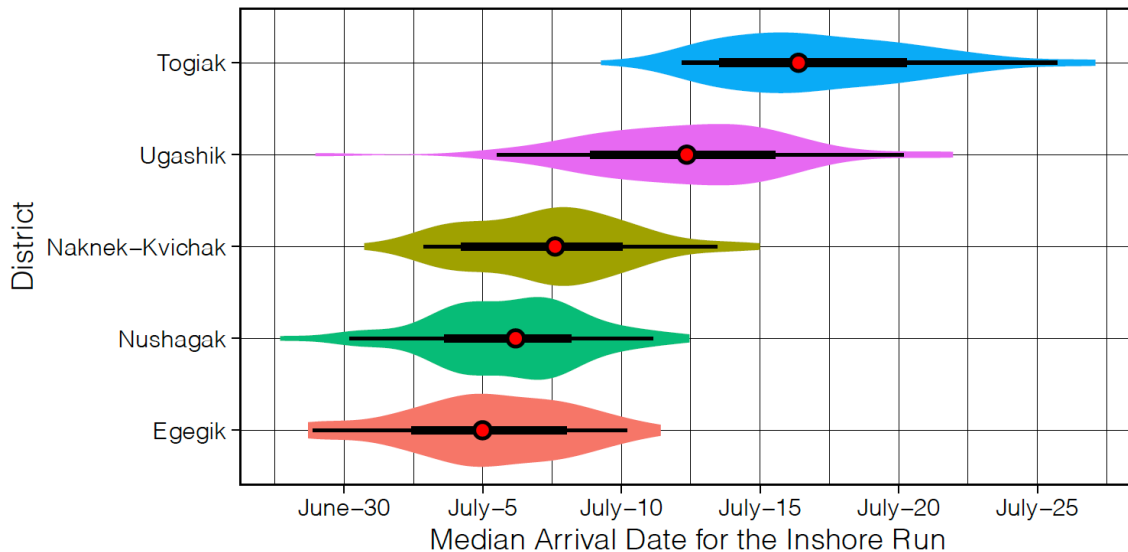


Figure 5. Median Return Date by District: Caterpillar plots describe the distribution of median inshore return dates, across years by district. Median return date is the date on which 50% of the total annual catch + escapement is recorded in each district. The red dots display the median date of return for each district for the time series 1965-2019, the range of the thick lines encompass the centermost 50% median return dates, the thin lines describe the centermost 95% of median return dates for each district across years. The shaded areas illustrate the distribution of median return dates across years for each district.

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The Alaska Department of Fish and Game collects the catch, escapement, and age composition data integral to these analyses. The Bristol Bay Science and Research Institute (BBSRI) operates the Port Moller test fishery, data from which becomes a substantial part of the analysis included in UW-FRI inseason reports. The Alaska Department of Fish and Game Gene Conservation Laboratory analyzes genetic samples collected during the Port Moller test fishery. We thank both BBSRI and ADF&G for making these data available to us prior to and during the Bristol Bay season. We appreciate all of the hard work by individuals collecting data at counting towers, dockside, and on the test fishery boat.

Appendices

A1. Cumulative UW-FRI Port Moller index: Comparison of cumulative daily indices (sum of the sockeye catch per hour fished for stations 2-14, with interpolations for missing stations and days) 2001-2020 and total run size in millions of sockeye.

Date	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
June 10	23	34	15	32	38	13	16	11	20	3	45	2	34	63	47	28	37	23	33	40
June 11	52	100	24	67	71	43	40	17	40	36	112	28	69	104	110	62	101	90	51	87
June 12	80	169	44	103	109	53	63	59	105	39	176	48	145	137	148	109	163	121	62	162
June 13	126	229	75	193	130	77	89	116	184	81	289	86	299	193	182	181	184	202	99	239
June 14	168	430	155	292	205	140	134	156	253	131	408	107	553	267	280	246	290	223	162	260
June 15	219	631	256	427	285	217	161	259	340	165	624	128	704	292	360	264	487	298	201	369
June 16	338	813	509	593	420	332	234	325	549	249	809	187	857	376	465	387	587	374	270	468
June 17	503	961	601	796	531	476	304	485	843	279	1,037	237	1,069	476	676	504	737	527	387	566
June 18	596	1,090	689	933	660	657	421	807	1,032	432	1,241	293	1,217	588	927	612	877	594	549	664
June 19	775	1,248	742	1,155	810	979	485	1,061	1,319	521	1,449	412	1,407	711	1,179	732	1,017	699	680	716
June 20	897	1,500	884	1,314	906	1,226	559	1,455	1,596	742	1,781	507	1,642	823	1,424	832	1,100	760	832	869
June 21	1,030	1,707	1,049	1,640	1,068	1,541	735	1,782	1,930	985	2,057	682	1,917	1,059	1,600	929	1,181	908	1,020	1,006
June 22	1,222	1,974	1,186	1,906	1,277	1,799	883	2,255	2,242	1,359	2,528	805	2,145	1,202	1,901	1,138	1,344	1,235	1,318	-
June 23	1,322	2,302	1,379	2,047	1,469	2,233	1,056	2,619	2,522	1,629	2,833	1,282	2,358	1,477	2,106	1,319	1,477	1,492	1,574	-
June 24	1,444	2,645	1,506	2,354	1,697	2,703	1,235	3,101	2,726	1,854	3,208	1,496	2,559	1,730	2,463	1,527	1,717	1,679	1,650	-
June 25	1,600	2,948	1,710	2,832	1,952	3,231	1,314	3,616	2,983	1,975	3,526	1,724	2,791	1,841	2,791	1,795	1,879	1,931	1,939	-
June 26	1,726	3,242	1,842	3,278	2,283	3,760	1,683	4,049	3,719	2,134	3,932	1,885	2,932	1,995	3,333	2,142	2,060	2,157	2,186	-
June 27	1,896	3,513	2,276	3,324	2,707	4,131	1,907	4,798	4,283	2,399	4,151	2,022	3,064	2,211	3,709	2,388	2,449	2,478	2,299	-
June 28	2,043	3,816	2,643	4,356	3,014	4,800	2,145	5,338	4,937	2,545	4,455	2,180	3,287	2,420	4,124	2,508	2,584	2,826	2,516	-
June 29	2,150	4,093	2,897	4,749	3,353	5,409	2,404	5,740	5,600	2,668	4,738	2,374	3,438	2,674	4,420	2,599	2,920	2,998	2,999	-
June 30	2,260	4,243	3,073	5,075	3,555	5,693	2,732	6,328	6,249	2,804	4,936	2,572	3,572	2,906	4,883	2,916	3,221	3,457	3,279	-
July 1	2,360	4,398	3,179	5,231	3,898	5,937	2,893	6,877	6,893	3,176	5,221	2,846	3,688	3,085	5,246	3,244	3,613	3,747	3,494	-
July 2	2,473	4,548	3,343	5,518	4,117	6,355	3,094	7,392	7,411	3,449	5,411	3,042	3,787	3,311	5,542	3,615	3,875	3,943	3,841	-
July 3	2,595	4,696	3,528	5,763	4,265	6,912	3,287	7,696	7,902	3,806	5,516	3,293	3,881	3,547	5,968	4,011	4,112	4,667	4,029	-
July 4	2,663	4,885	3,726	5,933	4,432	7,164	3,504	8,072	8,271	4,016	5,692	3,423	3,924	3,790	6,480	4,508	4,548	4,920	4,182	-
July 5	2,724	4,981	3,954	6,310	4,658	7,496	3,693	8,538	8,608	4,209	5,815	3,515	4,010	4,033	6,991	4,917	4,727	5,189	4,269	-
July 6	2,783	5,055	4,108	6,488	4,849	7,965	4,195	9,070	8,986	4,383	5,915	3,588	4,053	4,243	7,507	5,293	5,002	5,524	4,447	-
July 7	2,818	5,079	4,246	6,602	5,060	8,274	4,410	9,361	9,321	4,600	6,032	3,611	4,087	4,485	8,077	5,677	5,314	5,855	4,546	-
July 8	2,851	5,121	4,367	6,715	5,205	8,613	4,645	9,561	9,613	4,754	6,095	3,682	4,114	4,766	8,667	6,178	5,523	6,177	4,823	-
July 9	2,877	5,157	4,474	6,811	5,330	8,826	4,791	9,761	9,864	4,890	6,143	3,723	4,134	4,940	9,281	6,667	5,640	6,483	4,842	-
July 10	2,898	5,185	4,565	6,889	5,436	9,003	4,980	9,923	10,076	5,007	6,181	3,753	4,149	5,117	9,733	7,105	5,850	6,769	4,978	-
July 11	2,913	5,205	4,643	6,950	5,524	9,148	5,152	10,051	10,252	5,108	6,208	3,775	4,160	5,298	10,230	7,272	6,202	7,087	5,249	-
July 12	2,925	5,219	4,708	6,997	5,597	9,264	5,308	10,151	10,396	5,193	6,229	3,790	4,168	5,466	10,714	7,496	6,428	7,331	5,385	-
Total run	28.1	17.9	26.8	44.8	40.3	43.8	46.3	42.1	41.6	41.3	31.8	31.8	25.7	41.5	59.9	52.9	56.2	63.7	57.0	-

A2. GOA Sockeye Escapement: 2014-2020 cumulative sockeye escapements to select Gulf of Alaska river systems.

