The Importance of the Bristol Bay Salmon Fisheries to the Region and its Residents

Prepared for

Bristol Bay Economic Development Corporation

September 2022

Prepared by

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Abbreviations

2021$	2021 dollars
ADCCED	Alaska Department of Commerce, Community and Economic Development
ADOLWD	Alaska Department of Labor and Workforce Development
ADOR	Alaska Department of Revenue
BBEDC	Bristol Bay Economic Development Corporation
BEA	U.S. Bureau of Economic Analysis
CFEC	Commercial Fisheries Entry Commission
DCA	Dillingham Census Area
DEED	Alaska Department of Education and Early Development
GDP	Gross domestic product
INN	Iliamna, Newhalen, and Nondalton Electric Cooperative
ISER	University of Alaska Institute of Social and Economic Research
PCE	Power Cost Equalization
PPI	Producer Price Index

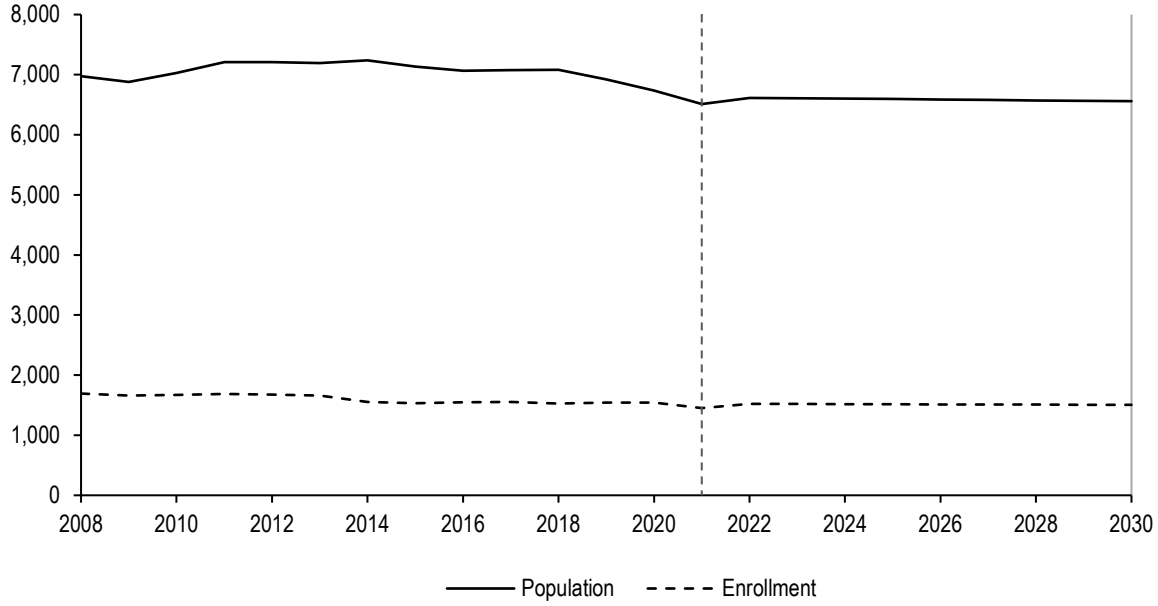
Executive Summary

Northern Economics was hired by Bristol Bay Economic Development Corporation (BBEDC) in the fall of 2021 to update its report on the importance of salmon to Bristol Bay (Northern Economics, 2009 and 2012). The current report seeks to update information up until 2020, or the most recent year that fishery and other socioeconomic data are available. In some cases, content has changed from the previous reports since data availability has changed over time, most notably with respect to cost of living and estimated operating costs, or elsewhere as noted. Here we summarize primary findings within each main section.

Population and School Enrollment

As of 2021, the entire population of all three Bristol Bay sub-regions was 6,961—a decline from the 2010 census where the population was 7,475 (Table 1). Between 1980 and 2021, the Dillingham Census Area is the only borough or census area to increase in population. Both the Lake and Peninsula Borough and the Bristol Bay Borough have declined over time, though the Lake and Peninsula Borough is projected to slightly increase in population by 2060, whereas the Bristol Bay Borough is expected to continue to decline. Similar to the population trend, school enrollment overall has decreased between 2008 and 2021—from 1,679 to 1,370, or a 18.4 percent decline, compared to a 7 percent decline in population in the same period. Trends at the community level are mixed, with most echoing the declining trend, particularly in larger schools such as the Naknek, Tanalian (Port Alsworth), and Dillingham schools. Dena'ina school (Pedro Bay) closed in 2010 and Egegik school closed in 2014 after their enrollments fell below 10 students. The only school which observed a net increase over the 2008 to 2021 period was the Twin Hills school—which increased from 14 to 20 students.

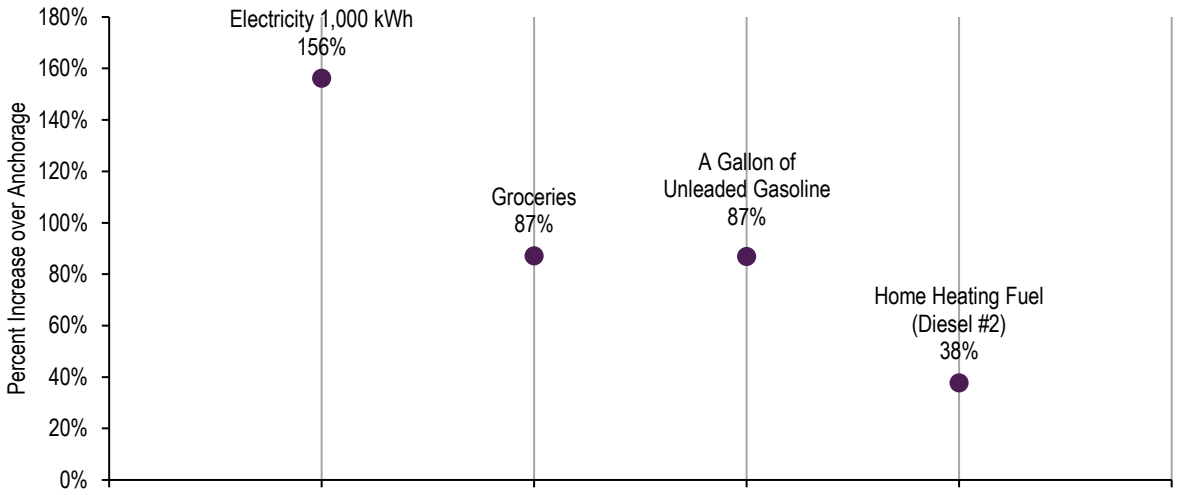
ES Figure 1. Actual and Forecast Population and School Enrollments in the Bristol Bay Region, 2008–2030



Cost of Living

The study team uses several metrics to ascertain the cost of living in the Bristol Bay region. The cost of groceries, fuel (unleaded gasoline, home heating fuel, and diesel fuel), electricity, and fuel for utilities are all much higher in the Bristol Bay region than in more populated parts of the state. Relative to Anchorage, the Bristol Bay region sees an average 156 percent increase in the cost of electricity per 1,000 kWh, an 87 percent increase in the cost of groceries for a week for a family of four, an 87 percent increase in the price of unleaded gasoline per gallon, and a 38 percent increase in the price of home heating fuel per gallon over the analysis period (1996–2021). This disparity can be seen in ES Figure 2, which is an average of sometimes sparse data over the analysis period and adjusted for inflation to 2021 dollars. Since the 2009 and 2012 importance of salmon to Bristol Bay reports, Bristol Bay and other rural areas' cost of living has continued to increase relative to Anchorage.

ES Figure 2. The Cost of Living in the Bristol Bay Region Relative to Anchorage

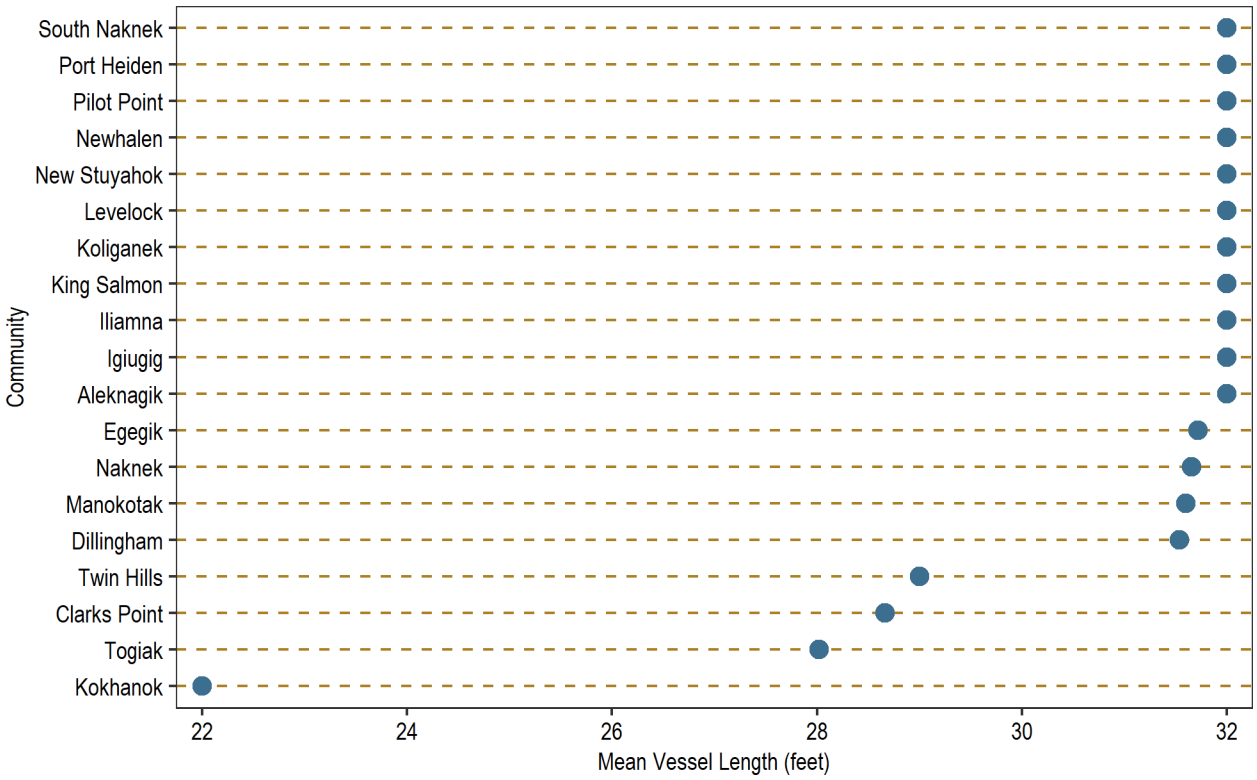


Source: Alaska Energy Authority (2022); Alaska Department of Labor and Workforce Development (2022); Northern Economics, Inc. analysis

Comparisons of Vessel Characteristics

Our 2012 report found that vessels operated by Bristol Bay residents were older, smaller, and shorter than vessels operated by individuals who reside outside of Bristol Bay communities. In addition, we found that Bristol Bay vessels had lower horsepower ratings, less fuel capacity, and a lower prevalence of refrigeration capabilities. We confirm that these trends hold into 2021, and in particular, find that heterogeneity in vessel sizes is more prominent in some communities than others. As of 2021, slightly more than half of the vessels active in Bristol Bay communities were 32-foot vessels (ES Figure 1). However, in Togiak, the majority of vessels are less than 30 feet, with 23 of 42 vessels falling in the 20–29 feet in length category—the average vessel length there is 28 feet.

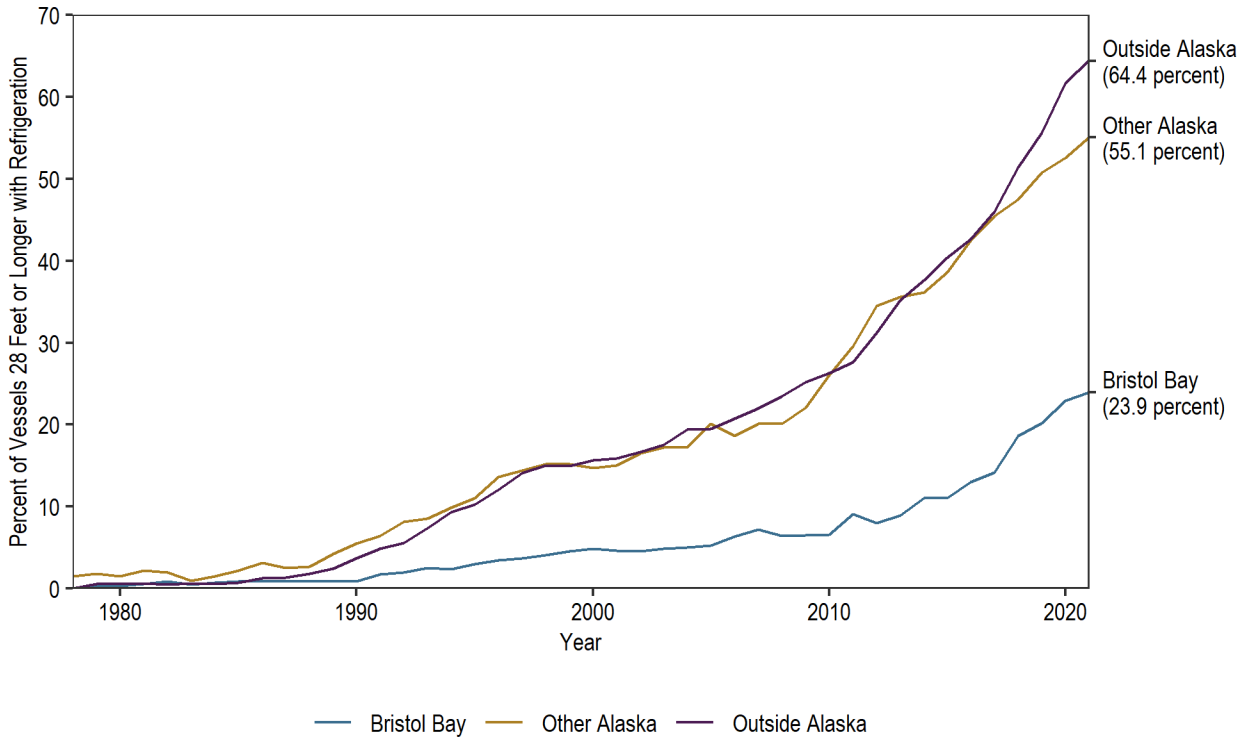
ES Figure 3. Mean Length of Vessels Owned by Bristol Bay Residents, by Community, 2021



Source: CFEC (2021)

Additionally, we find dramatic increases in the prevalence of refrigeration across all vessels. In our last report, ending in 2008, we found that only eight percent of vessels in Bristol Bay had some form of refrigeration compared to 22 percent of nonresident vessels—in 2021, 24 percent of Bristol Bay vessels over 28 feet in length had some form of refrigeration capacity compared to 64 percent of nonresident vessels (ES Figure 2). This illustrates that while refrigeration has increased sharply across all groups a persistent gap remains.

ES Figure 4. Prevalence of Refrigeration Over Time in Vessels Over 28 Feet by Owner's Residence, 1978–2021

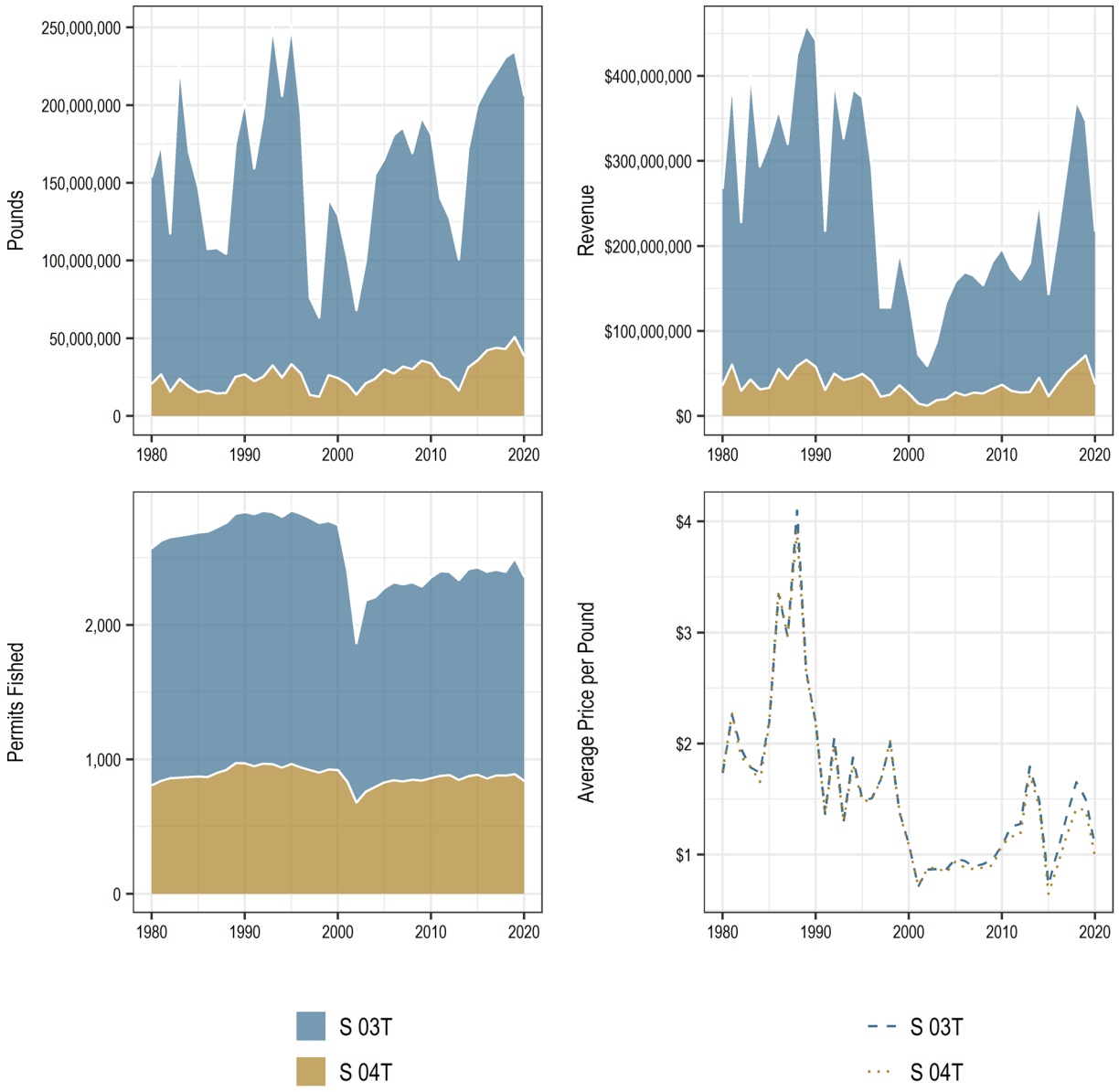


Economic Trends Across Bristol Bay Salmon Fisheries

Compared to setnet fishery, total landings, revenue, and participation are consistently highest in the drift net fishery, though prices have generally been similar (ES Figure 5). Since 2010, participation in the drift fishery has fluctuated around 1,500 permits fished, from a low of 1,488 permits fished in 2013 to a high of 1,605 in 2019 (Table 3). In the setnet fishery, annual participation has generally been around 880 permits fished, but dropped by approximately 50 permits between 2019 and 2020 to 840 permits fished.

Between 2017 and 2019, total driftnet revenues far exceeded the 10-year average of $190.8 million—in 2018, revenues reached $309.7 million. While participation levels in that year were similar to average, at 1,518 permits fished, 2019 saw a spike in participation to 1,605 permits fished—the highest level in a decade. However, in 2019, both average prices and total landings fell, leading to lower total revenues at $275.6 million. In 2019, we see record revenues were reached at $71.5 million, the previous highest grossing year in our time series was 1989 at $66.3 million. However, similar to the driftnet fishery, the 2020 setnet fishery experienced a drop in prices and landings. This resulted in a 46.6 percent decline in year over year revenues to $38.2 million—similar to the 10-year average of $38.2 million (ES Figure 5).

ES Figure 5. Economic Trends in the Drift (S 03T) and Setnet (S 04T) Fisheries Across All Permit Holders



Source: Commercial Fisheries Entry Commission (CFEC, 2021), Northern Economics, Inc. analysis

Driftnet Fishery

Since 2002 there has been a slightly upward trend in the total number of driftnet permits fished, largely accounted for by non-Alaska permit holders. This is in contrast to the number of permits fished by Bristol Bay region residents, which have slowly declined in the same time period. Overall, while Bristol Bay region permit holders have usually accounted for at least 25 percent of all permits fished, this dropped to 16 percent in 2020, due to a gradual increase in the share of non-Alaska and other Alaska resident permit activity. Consistent with the historical trend, in 2020, non-Bristol Bay resident permit holders (both other Alaska residents and non-residents) earned approximately $125,000 per permit fished while Bristol Bay region permit holders earned slightly less than $75,000.

Within the Bristol Bay Region, Dillingham Census Area stands out as the area with the consistently highest number of permits fished across the three sub-regions. In recent years, Bristol Bay Borough residents have surpassed Lake and Peninsula Borough as having the second highest number of permits fished. In terms of average earnings per permit fished. We also find that on average, Bristol Bay Borough residents tend to earn more per permit fished than other sub-regions. In 2020, Bristol Bay Borough Residents earned $97,229 per permit fished, while Lake and Peninsula Borough residents earned $86,208, and Dillingham Census Area residents earned $57,450, on average. Trends for average per capita revenue over the last 10 years are similar. In Bristol Bay Borough, the recent average per capita revenue was $5,750, in Dillingham Census Area it was $2,867, and in Lake and Peninsula Borough it was $1,635. The communities with the highest level of driftnet participation and earnings in each borough are first, Naknek, in Bristol Bay Borough, Dillingham, in Dillingham Census Area, and in recent years, Port Heiden in Lake and Peninsula Borough (Figure 37 and Figure 40). While BBEDC communities account for most, if not all, of revenue and participation from Bristol Bay and Dillingham Census Area communities, approximately 40 percent of total driftnet earnings, on average, come from non-BBEDC communities in Lake and Peninsula Borough (Figure 48).

Setnet Fishery

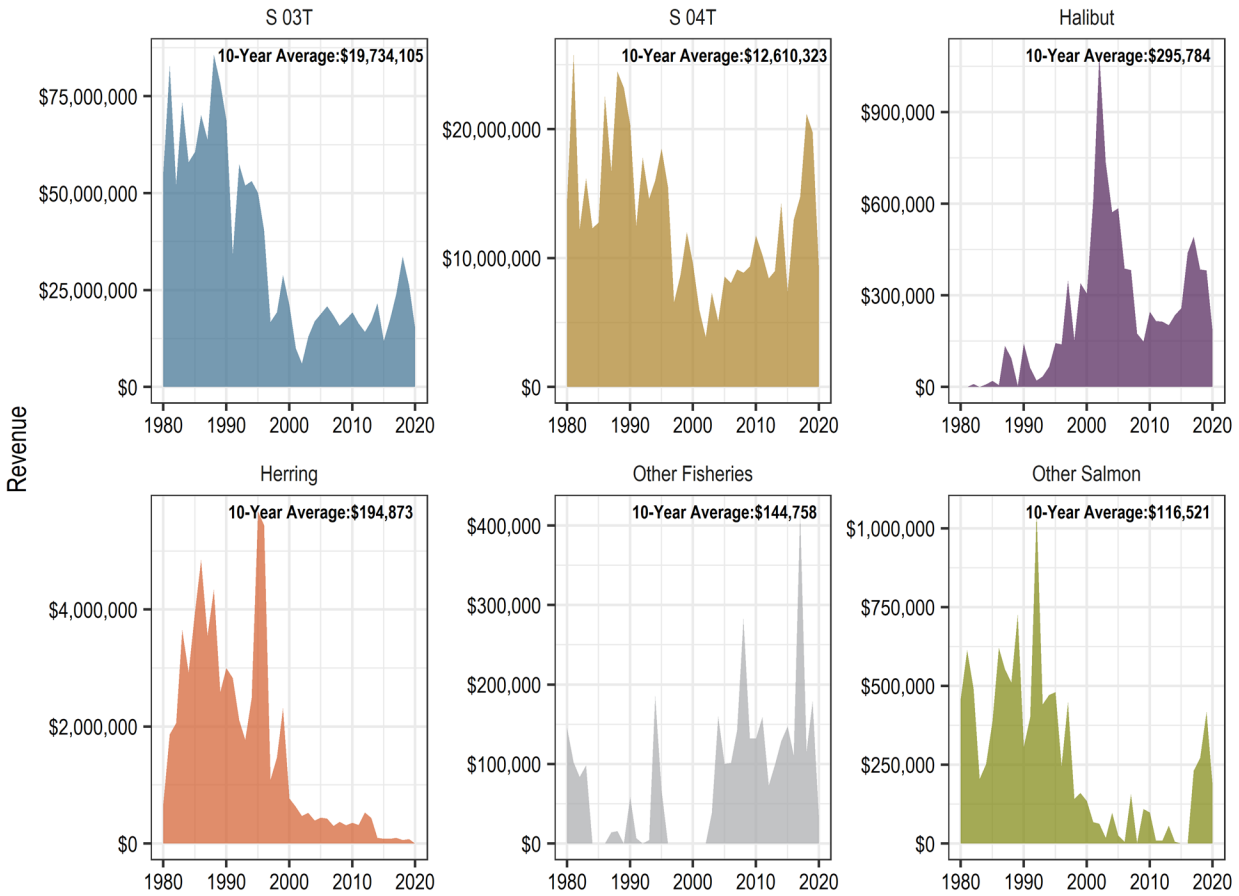
While Bristol Bay region permit holders have historically accounted for over 50 percent of all permits fished, this has slowly dropped to 38 percent in 2020, due to a gradual increase in the share of other Alaska resident permit activity (Figure 42). These trends are similar to the changes in total earnings by residence, shown in Figure 43, as well as the proportion of total earnings (Figure 44). Earnings by Bristol Bay residents topped $21.6 million in the setnet fishery in 2019, while total setnet earnings reached $70 million in the same year (Table 7). We find that in recent years, the gap between Bristol Bay residents' average earnings per permit fished and earnings from residents in other regions has widened, with non-Alaska permit holders earning more than $87,000 per permit fished in 2019 (record highs) while Bristol Bay region permit holders earned less than $70,000.

Within the Bristol Bay region, Dillingham Census Area has the highest level of S 03T permit activity, even as total permits fished has declined over time (Figure 45). Between 2015 and 2020, earnings from Dillingham Census Area permit holders accounted for 64.4 percent of total earnings across Bristol Bay residents, on average. Bristol Bay Borough's 10-year average per capita revenue was approximately $3,800, Dillingham Census Area was $1,795, and Lake and Peninsula Borough was $843. The top setnet fishery communities in each borough or census area in terms of participation and earnings are Naknek in Bristol Bay Borough, Dillingham in Dillingham Census Area, and Pilot Point in Lake and Peninsula Borough.

Other Fishery Revenue and Participation

We examined total revenue and permits fished in each of six listed fishery groups: S 03T (drift) salmon, S 04T (setnet) salmon, Other non-Area T salmon, Herring, Halibut, and other fisheries[1] for permit holders in BBEDC communities. Compared to the large total revenue contributions of the two Bristol Bay salmon fisheries, all other fisheries revenue represents a minor fraction of total revenues in BBEDC communities, especially in recent years, indicating that local permit holders have a strong reliance on Bristol Bay salmon fisheries for their fishery incomes. Between 2010 and 2022, earnings in the halibut fishery were the highest on average among the other fisheries at $295,784, followed by herring at $194,873. Earnings from both of these fisheries have been lower than historical levels, in the mid-1990s herring revenue exceeded $5 million, and in the early 2000s halibut revenue peaked at around $1 million.

ES Figure 6. Total Revenue by Fishery for BBEDC Community Permit Holders



[1] Residents of the Bristol Bay Region have participated in many other fisheries throughout Alaska, including the Dungeness, king, and tanner crab fisheries, as well as groundfish, sablefish, shrimp, and other shellfish fisheries.

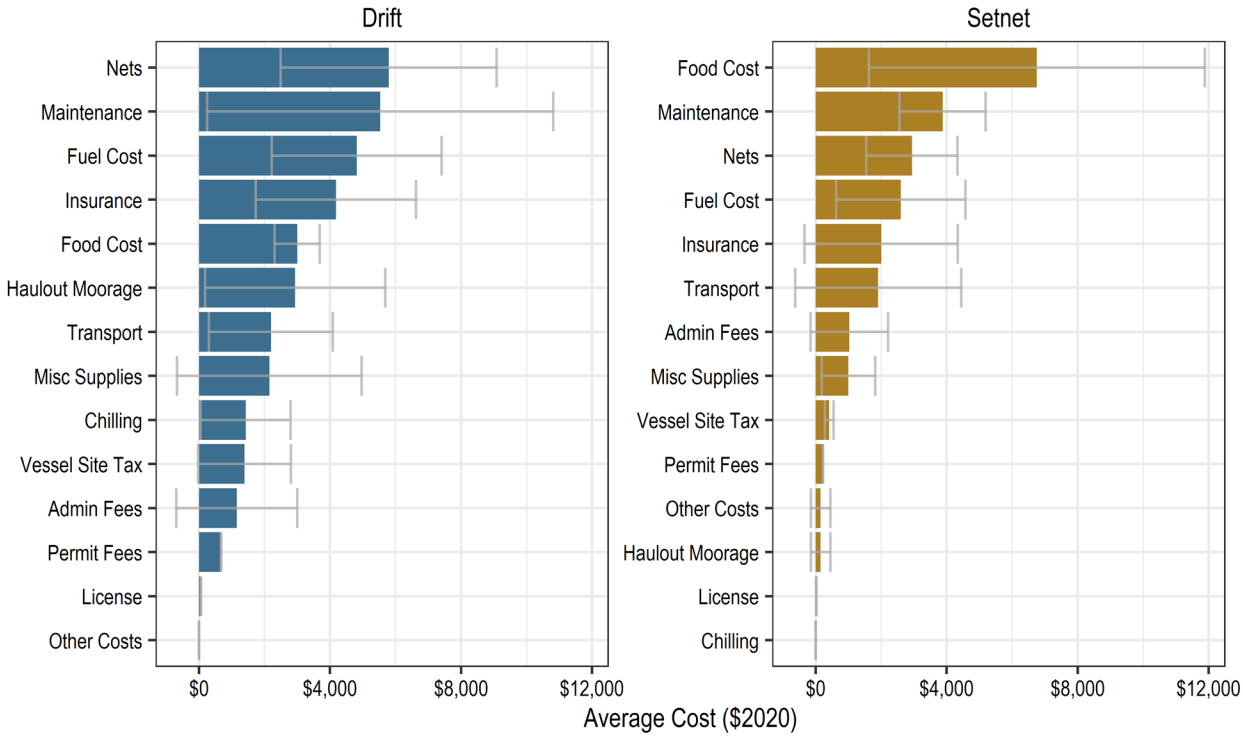
Estimated Operating Costs in the Set and Driftnet Fisheries

In the winter of 2021, we conducted 15 interviews with drift and set net permit owners to ask them about their operating costs in their 2021 fishing season, or their most recent fishing year that they have cost information. We used this information to generate average estimates of operating costs by fishery, and for Bristol Bay resident driftnetters, noting that due to the limited sample size it was not possible to estimate costs for other populations, such as for other Alaska residents or non-Alaskan residents.

Estimated operating costs for drift and setnet operations are shown in ES Figure 6. For driftnetters, nets were estimated to be the single largest operating cost, at $5,791 on average across the 11 interviews (Table 14). This included the costs of repairs, new web, and hanging. However, as shown by the standard deviation (in grey, ES Figure 6), reported net and maintenance costs were highly variable, and individuals often either reported net costs or maintenance costs ($5,550, on average, SD=$5,280) as the highest single cost. Other top expense categories for drift netters included fuel and insurance, averaging $4,800 and $4,200, respectively. Chilling costs were estimated at $1,400 a year, which included maintenance on an RSW system, ice, or any needed repairs. Several respondents noted that costs had been offset by BBEDC grant programs for RSW maintenance, at $1,000 per year. We estimate that on average $1,150 was spent on administrative services. This includes all expenses for an accountant, any legal fees, or association dues, though two interviewees reported that they did not pay for any administrative services, while two local residents noted that they were able to take advantage of tax preparation subsidies provided by BBEDC.

For setnetters, food costs were estimated as the highest single cost category at $5,000 a season, followed by maintenance costs at $3,875, and fuel costs at $3,850 (ES Figure 6). The variability around most operating costs is high for setnetters, in part because of the limited sample size in the interviews (four interviews total). Despite the small sample size, our results are consistent with expectations about costs in the fishery. Because vessels used in the setnet fishery are likely to be skiffs, fuel and other vessel-related maintenance costs are likely to be lower than for drift vessels. Food costs are also likely to be higher for setnetters since operations are likely to be based at the setnet site, and all crew may reside there for the season. Among the top costs, food costs were the most variable, ranging from $1,100 to $12,000. The individual interviews help explain some of this variability since at least one operator reported that their operation is a large family venture, where several family members come out for the summer to fish.

ES Figure 7. Average Estimated Operating Costs by Category and Fishery



Note: License and Permit Fees are technically fixed costs but are included in our overall calculations due to their availability. Additionally, error bars represent +/- one standard deviation of the calculated mean for each cost and therefore may include $0 or negative values.

Source: All costs are derived from Northern Economics Analysis, average revenue by fishery is from CFEC data

Economic Impacts of Bristol Bay Salmon Harvests

The drift and setnet salmon fisheries in Bristol Bay are major contributors to the economy of the Bristol Bay Region. In this section of the report, we estimate that the 2020 drift and setnet harvests of Bristol Bay salmon contributed 52% of the 2020 GDP in the Bristol Bay Region as estimated by the U.S. Bureau of Economic Analysis (BEA 2021). Northern Economics estimates that the total economic contribution of the salmon harvest in 2020 was $234,635,000 and comprised the following:

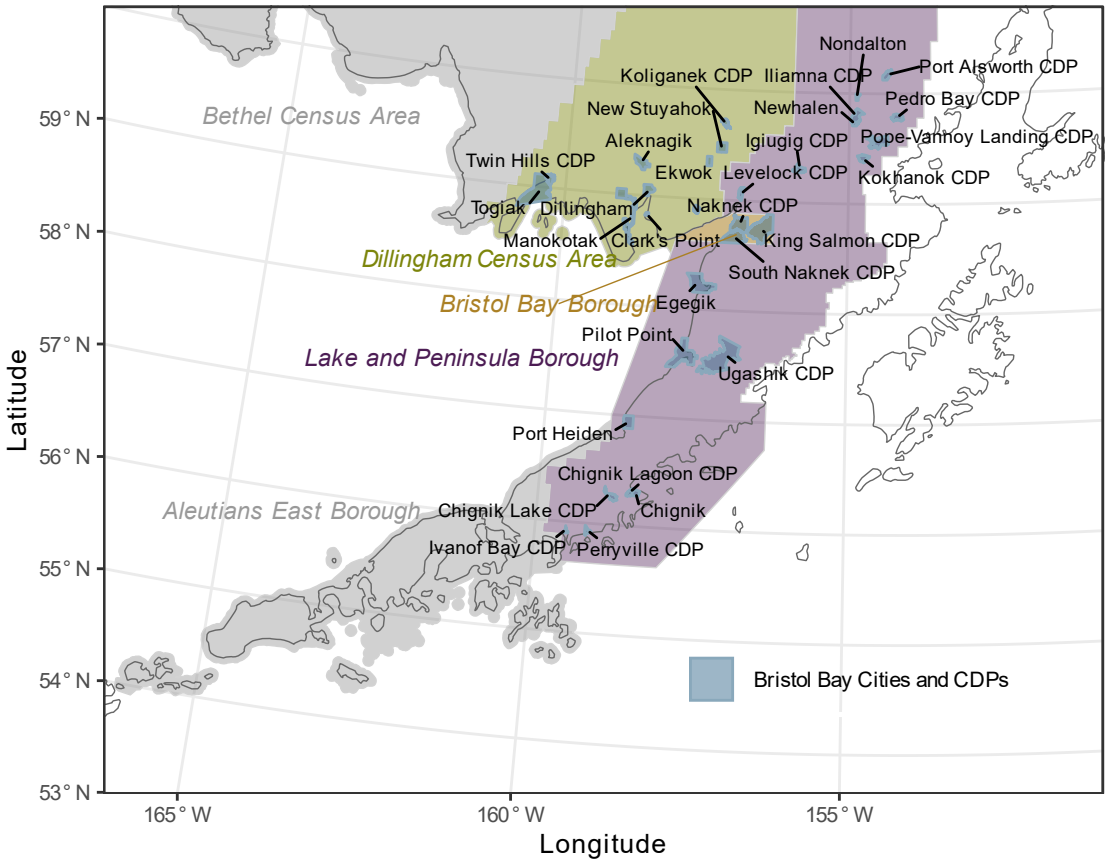
- Ex-vessel revenue in the 2020 drift net fishery equal to $179,970,000 as per CFEC (2021).
- Ex-vessel revenue in the 2020 set net fishery equal to $38,044,000 as per CFEC (2021).
- Fishery Business Taxes and Raw Fish Taxes from the 2020 Bristol Salmon Fishery of $9,579,000 as estimated by Northern Economics.
- Multiplier Effects of $7,039,000 as estimated by Northern Economics.

Introduction and Overview

Purpose and Scope

Northern Economics was hired by Bristol Bay Economic Development Corporation (BBEDC) in the fall of 2021 to update its report on the importance of salmon to Bristol Bay. In the past, Northern Economics has created two similar reports, one in 2009 and another in 2012. This report seeks to update information from those reports up until 2020, or the most recent year that fishery and other socioeconomic data are available. In some cases, content has changed from the previous reports since data availability has changed over time. In general, we present data for the entire Bristol Bay Region (Figure 1), including its three boroughs and census areas: Dillingham Census Area, Bristol Bay Borough, and Lake and Peninsula Borough. We also present data on individual Bristol Bay communities, and in some cases, aggregate results for BBEDC communities exclusively.

Figure 1. Map of the Bristol Bay Region



Source: ADOLWD shapefiles, map by Northern Economics

How this Document is Organized

This main document is organized by subject matter as follows:

- **Population and School Enrollment:** Population changes across Bristol Bay from 1980 with a projection to 2060, as well as school enrollment by community with a projection to 2030.
- **Cost of Living in the Bristol Bay Region:** Changes in food, home heating fuel, gasoline, electricity costs in Bristol Bay compared to Anchorage, as well as changes in the cost of fuel to utilities.
- **Comparisons of Vessel Characteristics:** This section compares vessel characteristics by residency, examining vessels' ages, lengths, years of participation (tenure), horsepower, gross tons, and prevalence of refrigeration.
- **Economic Trends Across Bristol Bay Salmon Fisheries:** This section focuses on changes in economic metrics for Bristol Bay region permit holders compared to other Alaska and Non-Alaska permit holders between 1980 and 2020. Specific metrics include total landings, revenue, permits fished, average prices, average revenue per permit, and per capita revenue.
    - **The Drift Gillnet Fishery:** In this section we focus on changes in economic metrics for the drift fishery exclusively, and present results at three different levels: for all drift permit holders, for Bristol Bay permit holders only by borough, and for Bristol Bay permit holders only by community.
    - **The Set Gillnet Fishery:** In this section we focus on changes in economic metrics for the setnet fishery exclusively, and present results at three different levels: for all setnet permit holders, for Bristol Bay permit holders only by borough, and for Bristol Bay permit holders only by community.
    - **Other Fishery Revenue and Participation:** This section compiles data for all Bristol Bay permit holders and examines how much of fishery revenue comes from non-Bristol Bay salmon fisheries over time. Unlike previous sections, this section focuses on fishery participation for BBEDC communities only.
    - **Drift and Setnet Fisheries Combined:** This section combines participation and earnings data for both Bristol Bay salmon fisheries to give a comprehensive look at the importance of both fisheries to the Bristol Bay region.
- **Estimated Operating Costs in the Set and Drift Gillnet Fisheries:** There has not been a comprehensive survey of operating costs for Bristol Bay salmon operations since 2003. In this section, we summarize results from a small survey of permit holders conducted by Northern Economics in the winter of 2021.
- **Economic Impacts of Bristol Bay Salmon Harvests:** This section extends the estimates of harvesting expenditures, develops estimates of multiplier effects, and estimates the total contribution of the 2020 harvest to the region's Gross Domestic Product (GDP).

Population and School Enrollment

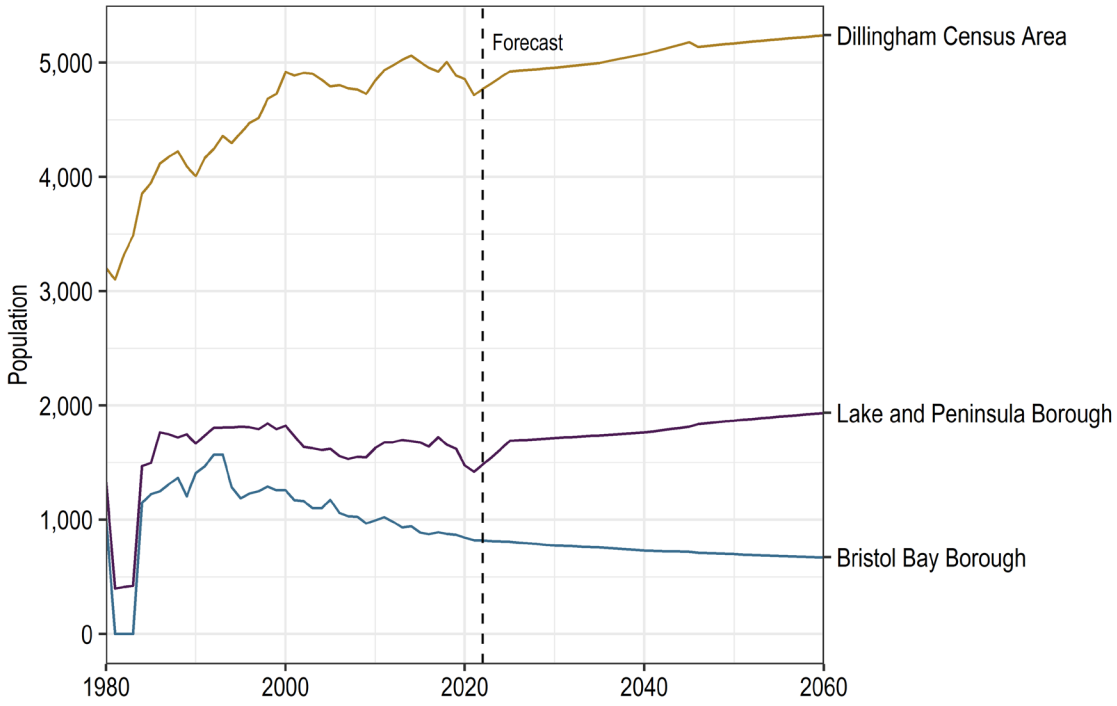
Population in the Bristol Bay Region

As with the rest of the nation, the population of Bristol Bay Communities is assessed every 10 years as part of the U.S. decennial census. In between decennial censuses, population is estimated by Alaska Department of Labor and Workforce Development (ADOLWD) based on a combination of permanent fund dividend application data along with the most recent decennial census. The most recent ADOLWD population estimates (for 2020 and 2021) were released in January 2022 (ADOLWD 2022a). The "population reset" that occurs with the decennial census often leads to large fluctuations in apparent population sizes over time. Figure 2 shows trends in total population of each borough or census area up to 2021. Data after 2021 represent a forecast of population, generated by ADOLWD up until 2045 and by Northern Economics up to 2060.[2]

Between 1980 and 2021, the Dillingham Census Area is the only borough or census area to increase in population. Both the Lake and Peninsula Borough and the Bristol Bay Borough have declined over time, though the Lake and Peninsula Borough is projected to slightly increase in population by 2060, whereas the Bristol Bay Borough is expected to continue to decline. As of 2021, the entire population of all three Bristol Bay sub-regions was 6,961—a decline from the 2010 census where the population was 7,475 (Table 1). The total population of the Dillingham Census Area was 4,718, the Lake and Peninsula Borough was 1,421 and the Bristol Bay borough was approximately 822 (Table 1).

[2] ADOLWD has projected populations by borough and census area out through 2045 in five-year increments. These forecasts are available online at *https://live.laborstats.alaska.gov/pop/projections/pub/popproj.pdf*. Northern Economics uses trends in community populations to fill in the years between the five-year increments (e.g., for 2022, 2023, and 2024) and to extend ADOLWD's forecast out an additional 15 years to 2060.

Figure 2. Bristol Bay Region Population by Borough or Census Area



Source: ADOLWD (2022a), Northern Economics, Inc. analysis

Table 1. Bristol Bay's Population 2006–2021

Year	Bristol Bay Borough	Dillingham Census Area	Lake and Peninsula Borough	Total Population
2006	1,058	4,806	1,559	7,423
2007	1,032	4,779	1,534	7,345
2008	1,027	4,767	1,552	7,346
2009	967	4,729	1,547	7,243
2010	997	4,847	1,631	7,475
2011	1,023	4,935	1,677	7,635
2012	983	4,978	1,679	7,640
2013	933	5,025	1,700	7,658
2014	943	5,063	1,687	7,693
2015	887	5,008	1,676	7,571
2016	875	4,958	1,642	7,475
2017	892	4,925	1,724	7,541
2018	877	5,007	1,658	7,542
2019	869	4,887	1,622	7,378
2020	844	4,857	1,476	7,177
2021	822	4,718	1,421	6,961

Source: ADOLWD (2022a), Northern Economics, Inc. analysis

Population Across Bristol Bay Communities by Borough or Census Area

Population estimates are also available at the community level. Due to the large number of communities within the entire Bristol Bay Region, a snapshot of population statistics for each community is provided in Table 2, which shows the most recent population estimate from the 2020 census, the average population since 1980, and the maximum population over the entire time series.

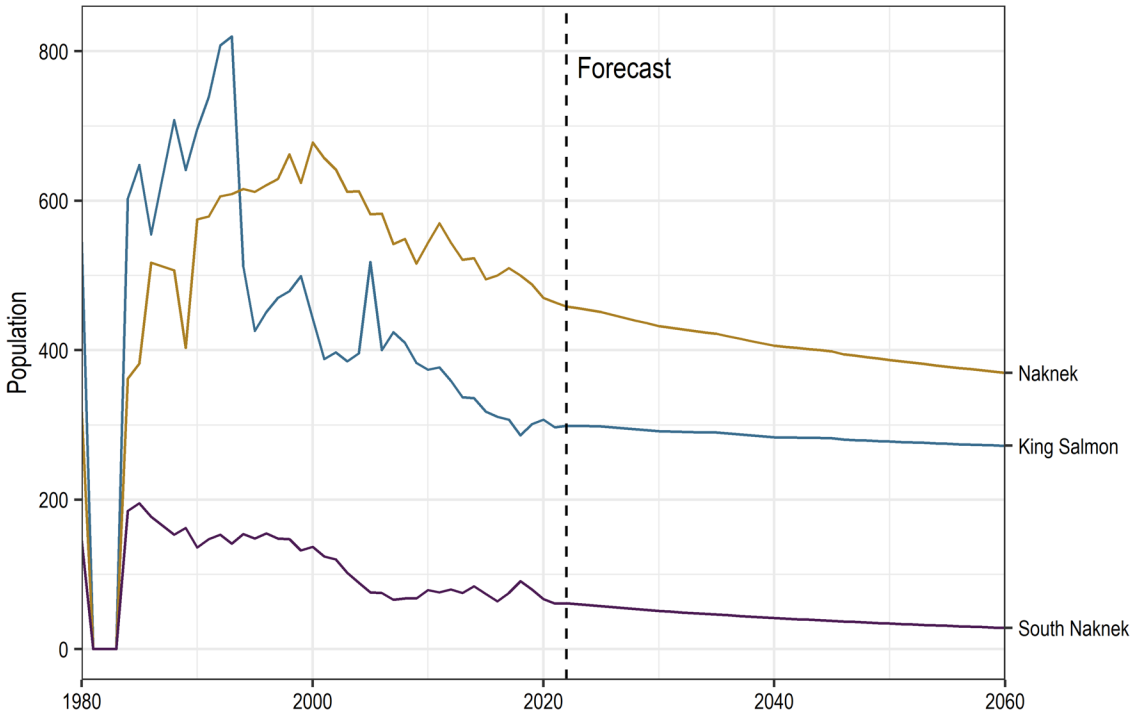
Table 2. Population Statistics by Community

Borough or Census Area	Area	2021 Population	2021 Borough Total	Average Population	Maximum Population
Bristol Bay Borough	Naknek	464	822	459	678
	King Salmon	297	822	363	820
	South Naknek	61	822	76	195
Dillingham Census Area	Dillingham	2,209	4,718	2,282	2,468
	Togiak	807	4,718	802	905
	New Stuyahok	480	4,718	484	550
	Manokotak	477	4,718	467	560
	Aleknagik	191	4,718	211	250
	Koliganek	176	4,718	183	230
	Ekwok	103	4,718	110	130
	Twin Hills	85	4,718	85	110
	Clark's Point	75	4,718	69	87
	Portage Creek	4	4,718	8	63
Lake and Peninsula Borough	Newhalen	178	1,421	201	265
	Nondalton	129	1,421	176	246
	Port Alsworth	181	1,421	172	291
	Kokhanok	139	1,421	166	210
	Iliamna	112	1,421	115	150
	Perryville	87	1,421	110	137
	Port Heiden	91	1,421	109	142
	Chignik	84	1,421	106	188
	Chignik Lake	63	1,421	87	164
	Levelock	65	1,421	79	132
	Chignik Lagoon	72	1,421	75	104
	Pilot Point	59	1,421	71	100
	Egegik	39	1,421	64	142
	Igiugig	61	1,421	61	88
	Pedro Bay	40	1,421	48	71
	Ivanof Bay	1	1,421	9	49
	Ugashik	3	1,421	7	17

Source: ADOLWD (2022a), Northern Economics, Inc. analysis

The entire trend for each population is shown in Figure 3, Figure 4, and Figure 5. Population estimates for Bristol Bay Borough communities are shown in Figure 3, for Dillingham Census Area communities (cities and CDPs) in Figure 4, and for Lake and Peninsula Borough communities in Figure 5. Forecasts for each community are based on a combination of the long trend of population in each community along with the borough/census area forecasts developed by ADOLWD out through 2045. Note that the sum of populations for all the communities of each borough/census area are equal to the borough or census area total for both historical years and forecast years.

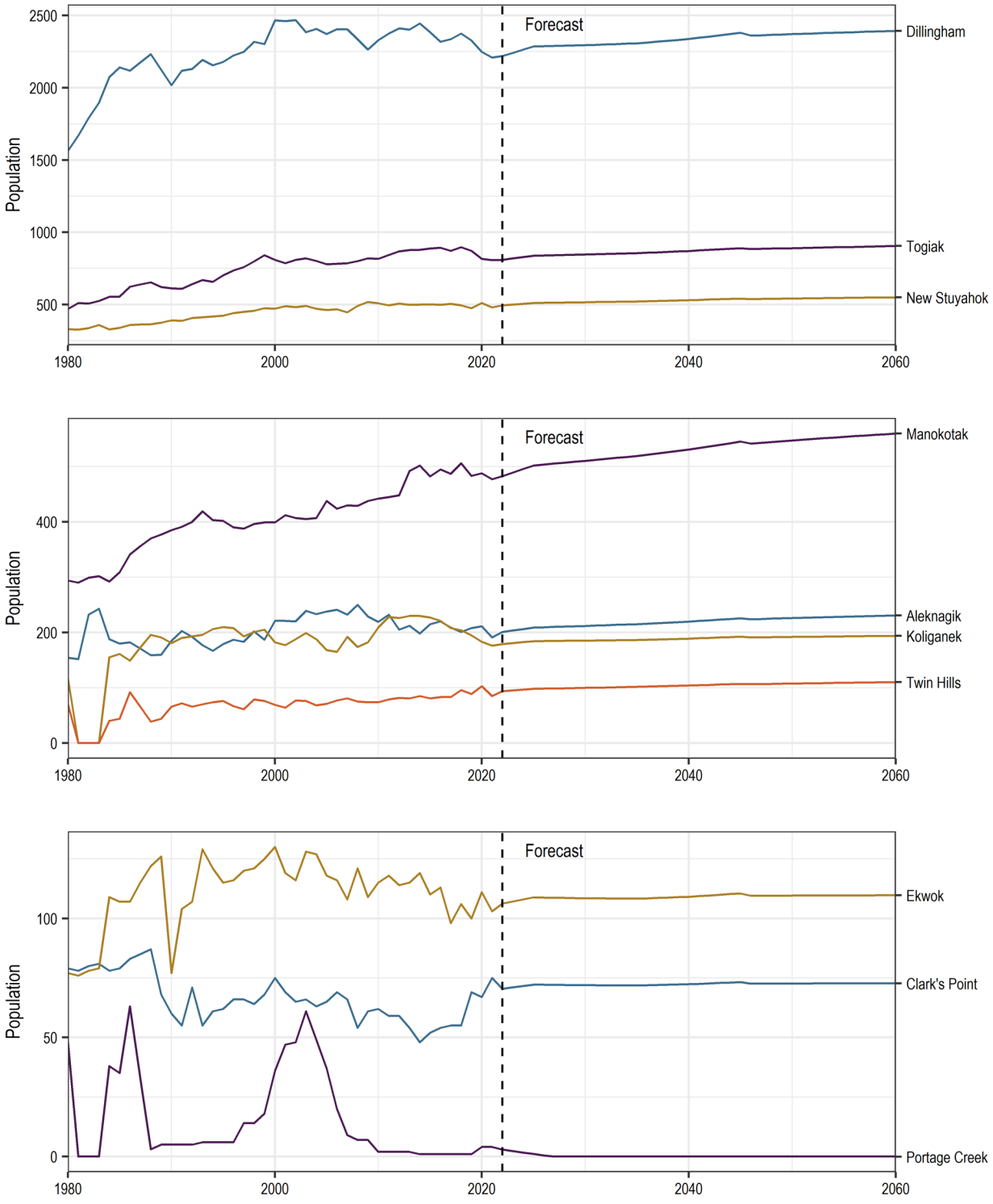
Figure 3. Bristol Bay Borough Population by Community



Source: ADOLWD (2020, 2022a), Northern Economics, Inc. analysis

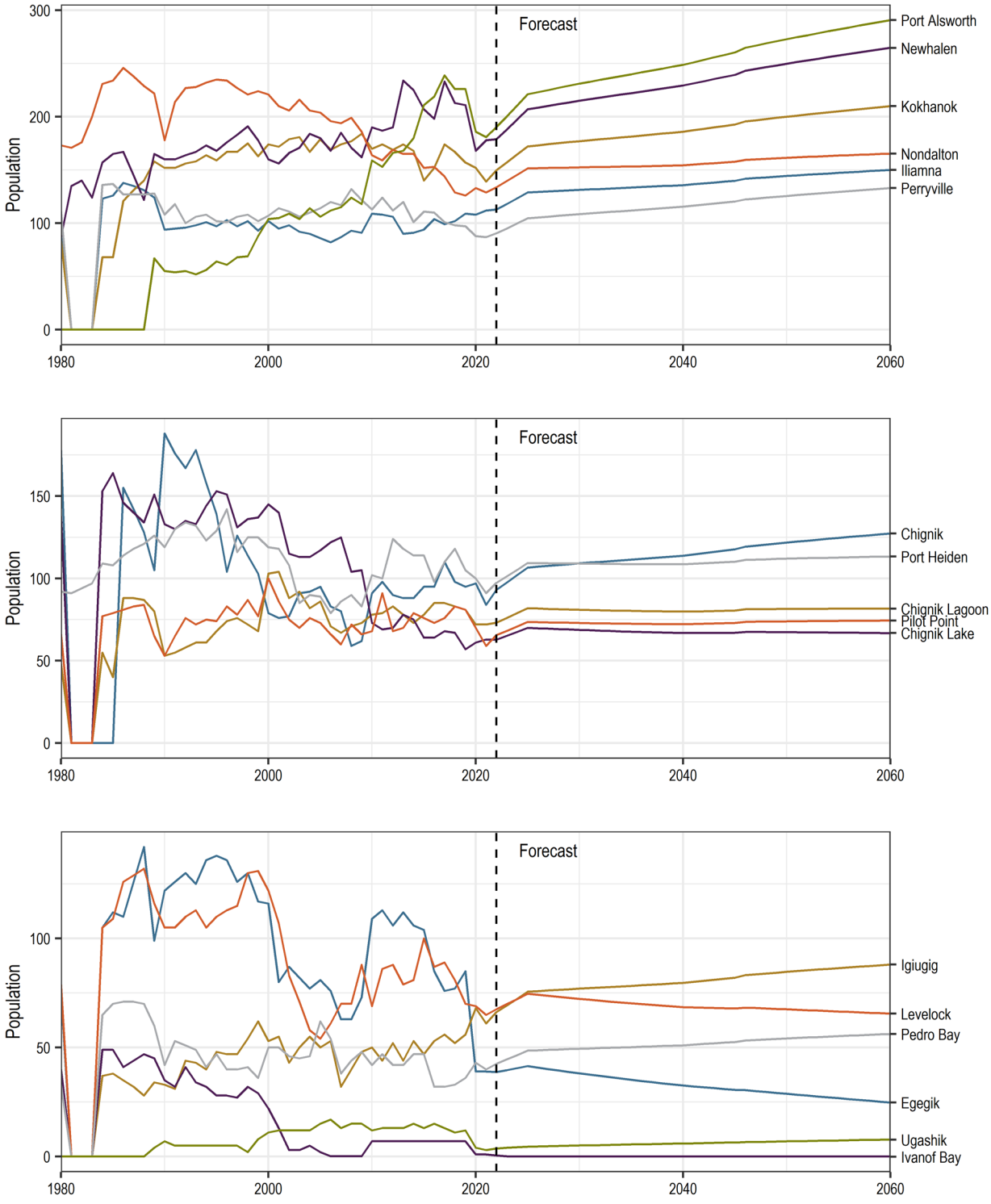
Both Figure 4 and Figure 5 (Dillingham Census Area and Lake and Peninsula Borough) are broken into three smaller "chartlets". Communities are placed into one or another of the chartlets based on forecast populations—the communities with the largest forecast population are in the top chartlet and communities with the smallest forecast populations are shown in the bottom chartlet.

Figure 4. Dillingham Census Area Population by Community



Source: ADOLWD (2020, 2022a), Northern Economics, Inc. analysis

Figure 5. Lake and Peninsula Borough Population by Community



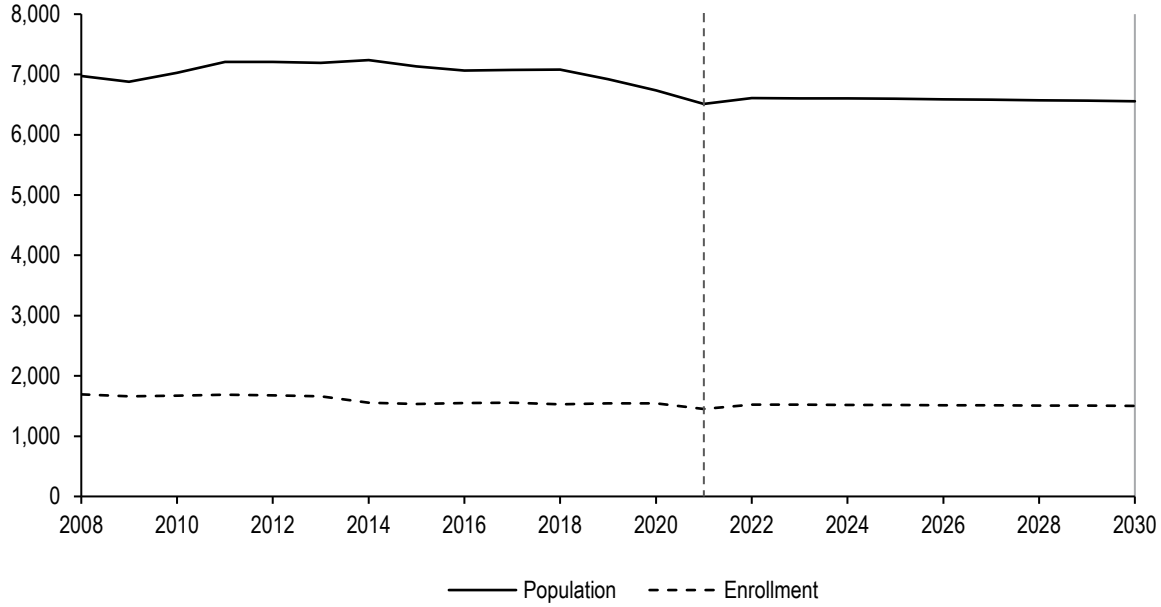
Source: ADOLWD (2020, 2022a), Northern Economics, Inc. analysis

School Enrollment

The Alaska Department of Education and Early Development (DEED) has an extensive database providing the general public access to data on the state's education system. Within DEED's data center, the Statistics & Reports section contains several levels of enrollment data (DEED 2022). For this report, the data analyzed are for school enrollment totals by grade from 2008 to 2021 and only for schools in the Bristol Bay Region. This includes the school districts within the Bristol Bay Borough (Bristol Bay Borough School District), Lake and Peninsula Borough (Lake and Peninsula Borough School District), and the Dillingham Census Area (Dillingham City School District and Southwest Region School District). Any enrollment data presented after 2021 are forecasted based on a Northern Economics, Inc. population forecast and a single factor regression analysis to predict future enrollment.

The enrollment and population trends for the Bristol Bay region as a whole can be seen in Figure 6. Similar to the trend in population in the region, school enrollment overall has decreased between 2008 and 2021—from 1,693 to 1,451, or a 17 percent decline, compared to a 7 percent decline in population in the same period.

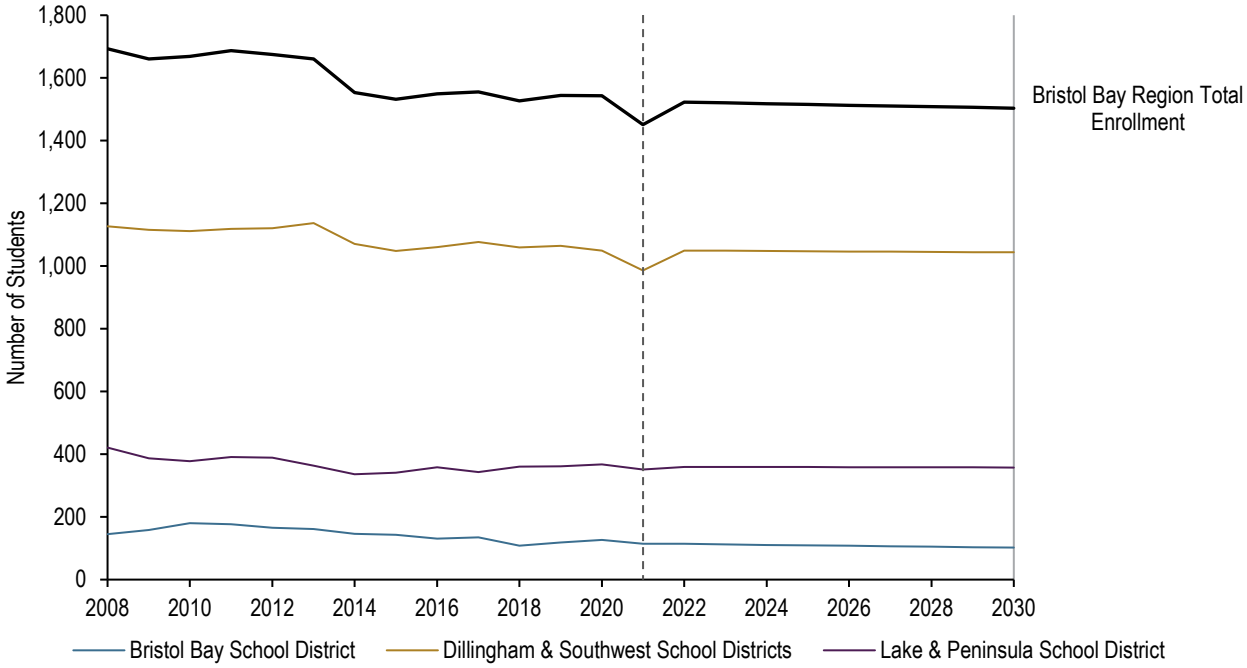
Figure 6. Actual and Forecast Population and School Enrollments in the Bristol Bay Region, 2008–2030



Source: DEED (2022), Northern Economics, Inc. analysis

Figure 7 breaks out enrollment trends and forecasts by borough. We observe that the general declining trend in school enrollment between 2008 and 2021 is observable across all boroughs and census areas, though some years experienced increases year-over-year.

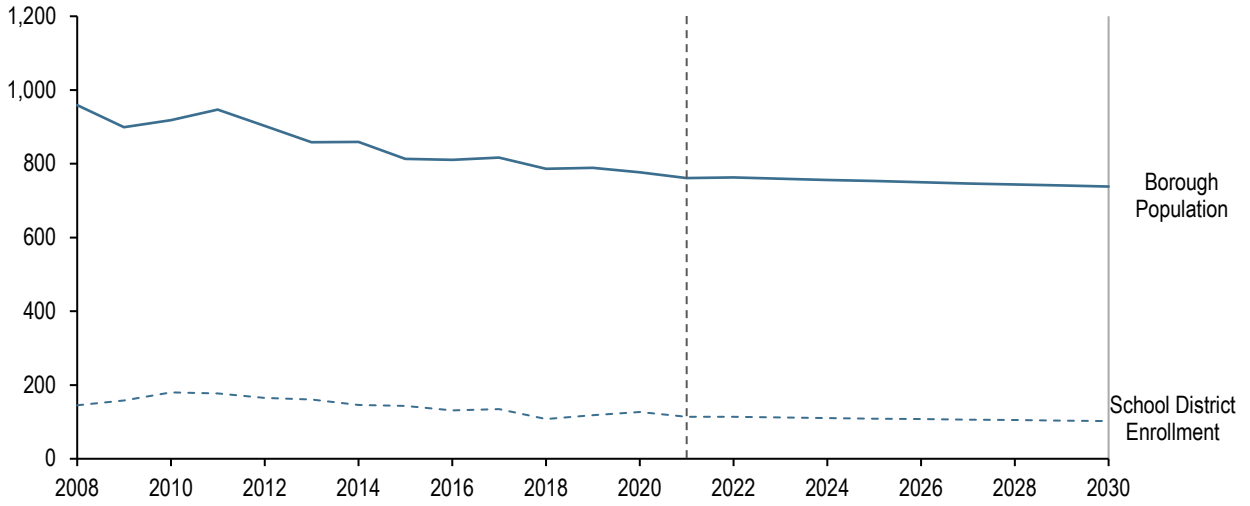
Figure 7. School Enrollment by Borough or Census Area



Source: DEED (2022), Northern Economics, Inc. analysis

Figure 8 focuses only on the Bristol Bay Borough and details both population and school enrollment trends and forecasts. The enrollment values are for all schools in the Bristol Bay Borough School District and population values only take into account the populations of

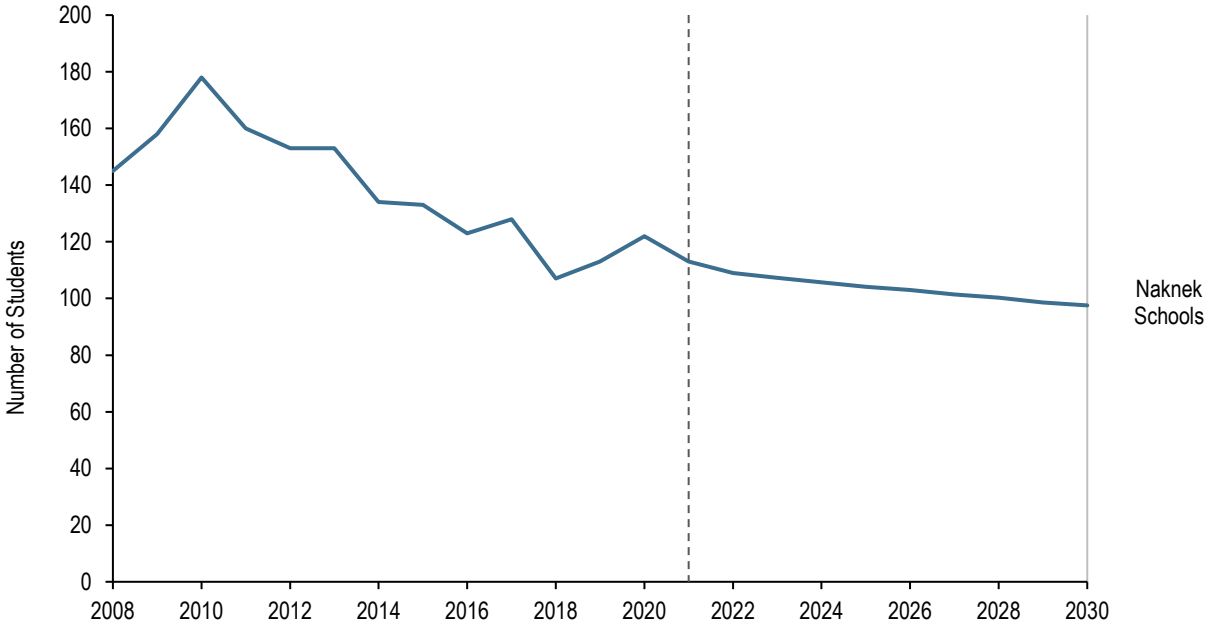
Figure 8. Actual and Forecast Population and School Enrollments in the Bristol Bay Borough, 2008–2030



Source: DEED (2022), Northern Economics, Inc. analysis

All schools in the Bristol Bay Borough School District are located in Naknek. Naknek Elementary School saw a 21 percent jump in enrollment for the 2010 school year (from 77 total students to 93) related to an 18-student increase in PreK enrollment that year (Figure 9). Enrollment dropped back to 77 students in 2012, then back up to 84 students in 2013 before dropping to a low of 53 students in 2017 (DEED 2022).

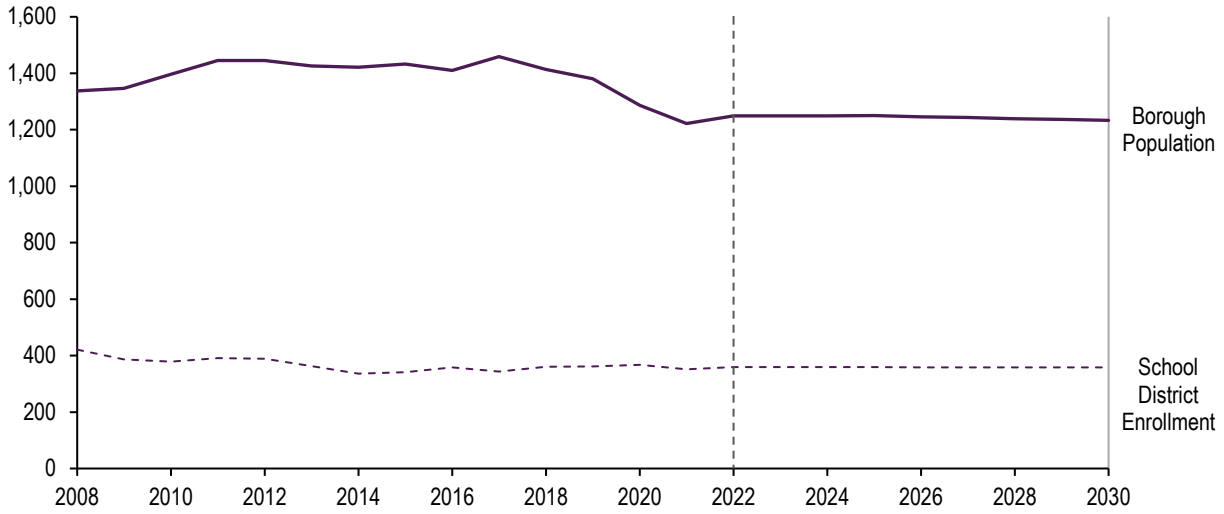
Figure 9. Actual and Forecast School Enrollments by School in the Bristol Bay School District, 2008–2030



Source: DEED (2022), Northern Economics, Inc. analysis

Figure 10 represents the total borough population and total district enrollment trends and forecasts in the Lake and Peninsula Borough from 2008 to 2030.

Figure 10. Actual and Forecast Population and School Enrollments in the Lake & Pen. Borough, 2008–2030

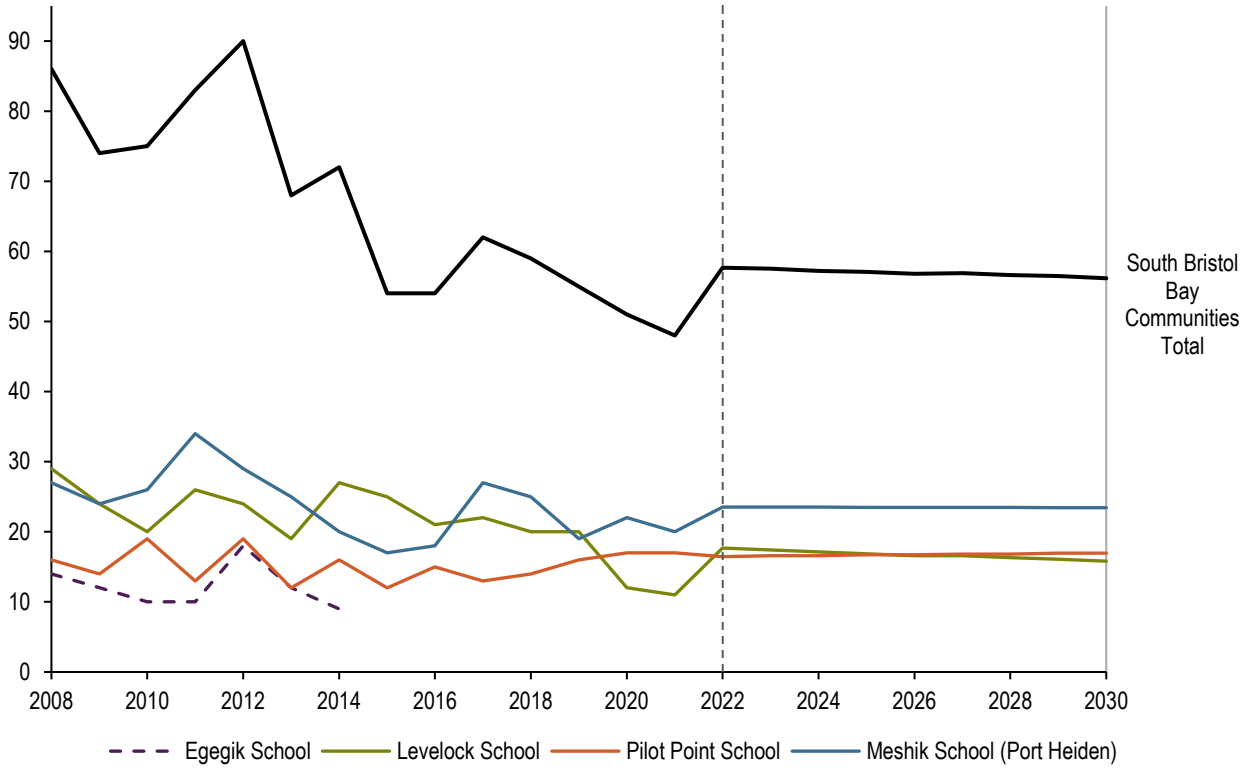


Source: DEED (2022), Northern Economics, Inc. analysis

There are several communities in the Lake and Peninsula Borough and the region spans a large portion of the Alaska Peninsula, so the borough's communities are separated into subregions: South Bristol Bay Communities, Lake Communities, and Gulf Communities. Of the borough, only the South Bristol Bay Communities are BBEDC members.

The South Bristol Bay Communities include Egegik, Levelock, Pilot Point, Port Heiden, and Ugashik. Ugashik is a low-population community and does not have a school and, as seen in Figure 11, Egegik's only school closed due to low enrollment after the 2014 school year (KDLG 2015). Low enrollment is defined as an Average Daily Membership of fewer than 10 students, which is also the cutoff for schools to receive funding from the state (DEED 2018). For this region, the study team is able to forecast individual school enrollment because each community has one school; hence, the community is used as a proxy for school enrollment.

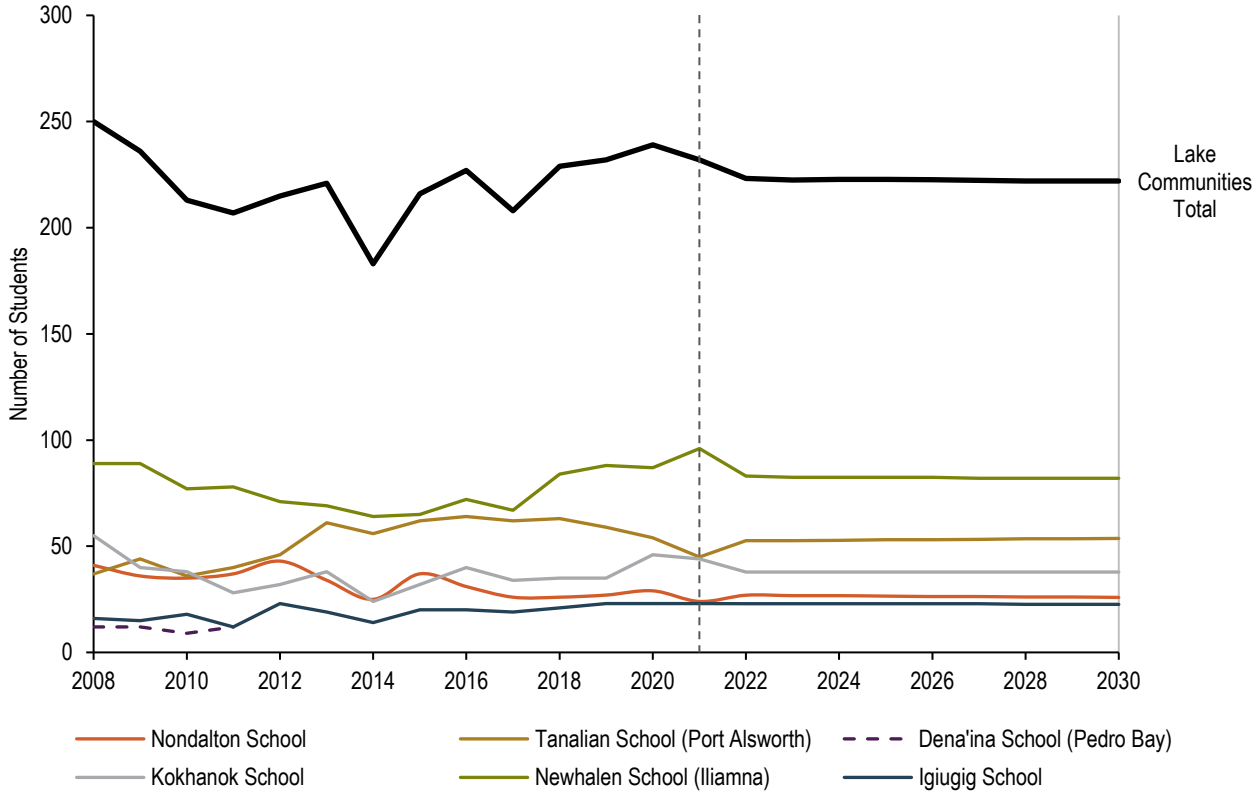
Figure 11. Actual and Forecasted Enrollments by School in the South Bristol Bay Communities, 2008–2030



Note: Communities in the South Bristol Bay Area are Egegik, Levelock, Pilot Point, Port Heiden, and Ugashik.
Source: DEED (2022), Northern Economics, Inc. analysis

Figure 12 highlights enrollment in Lake and Peninsula Borough's Lake Communities. This subregion has several schools, typically one in each community. The communities in this subregion are Iliamna, Newhalen, Port Alsworth, Kokhanok, Nondalton, Pedro Bay, and Igiugig. The Dena'ina School in Pedro Bay closed in 2010 due to low enrollment (DEED 2022).

Figure 12. Actual and Forecast Enrollments by School in the Lake Communities, 2008–2030

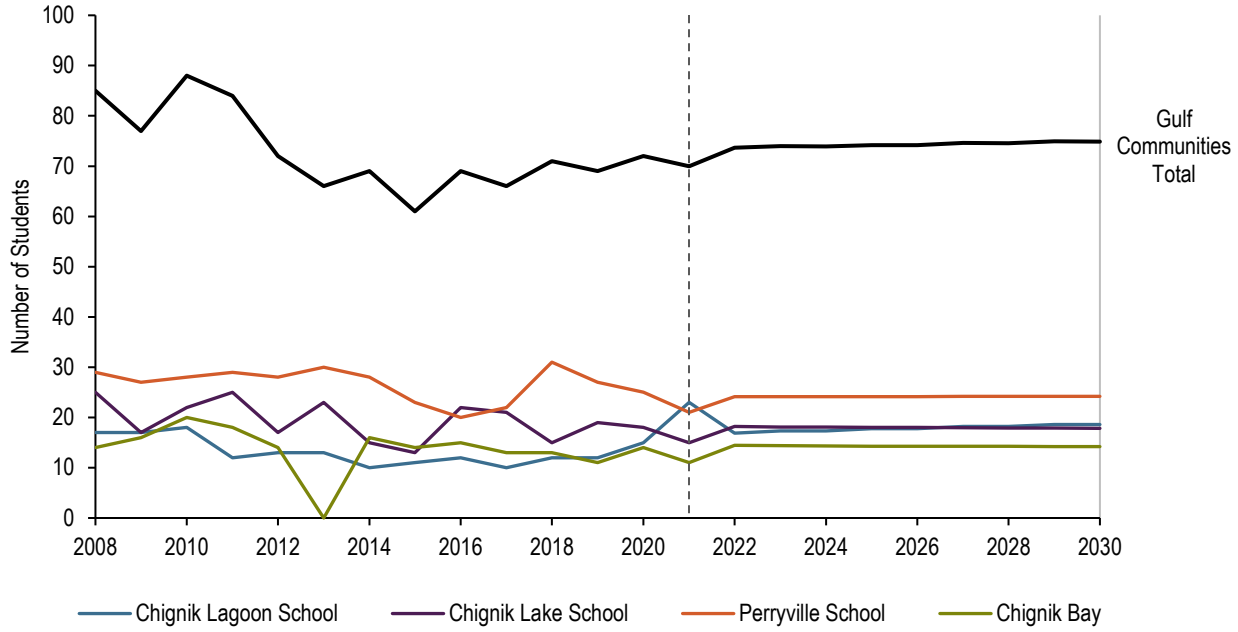


Note: Communities in the Lake Area include Iliamna, Newhalen, Port Alsworth, Kokhanok, Nondalton, Pedro Bay, and Igiugig. Dena'ina School in Pedro Bay closed its doors in 2010 due to low enrollment.

Source: DEED (2022), Northern Economics, Inc. analysis

Figure 13 shows the three schools in the Gulf Communities subregion of Lake and Peninsula Borough. Each school is located in a separate community and the communities associated with this subregion are Chignik, Chignik Lagoon, Chignik Lake, Ivanof Bay, and Perryville. Ivanof Bay does not report any school enrollment.

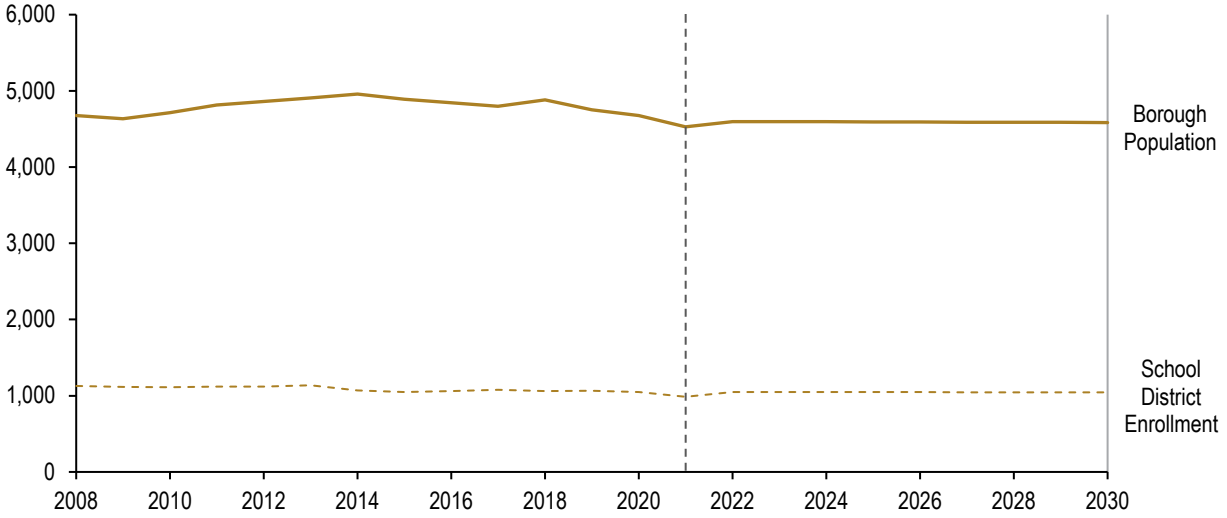
Figure 13. Actual and Forecast Enrollments by School in the Gulf Communities, 2008–2030



Note: Gulf Communities include Chignik, Chignik Lagoon, Chignik Lake, and Perryville.
Source: DEED (2022), Northern Economics, Inc. analysis

The Dillingham Census Area (DCA) is the most populated region in the Bristol Bay region. Seen in Figure 14, the district enrollment holds steady just around 1,000 students from 2008 to 2021 and the forecast shows a similar level.

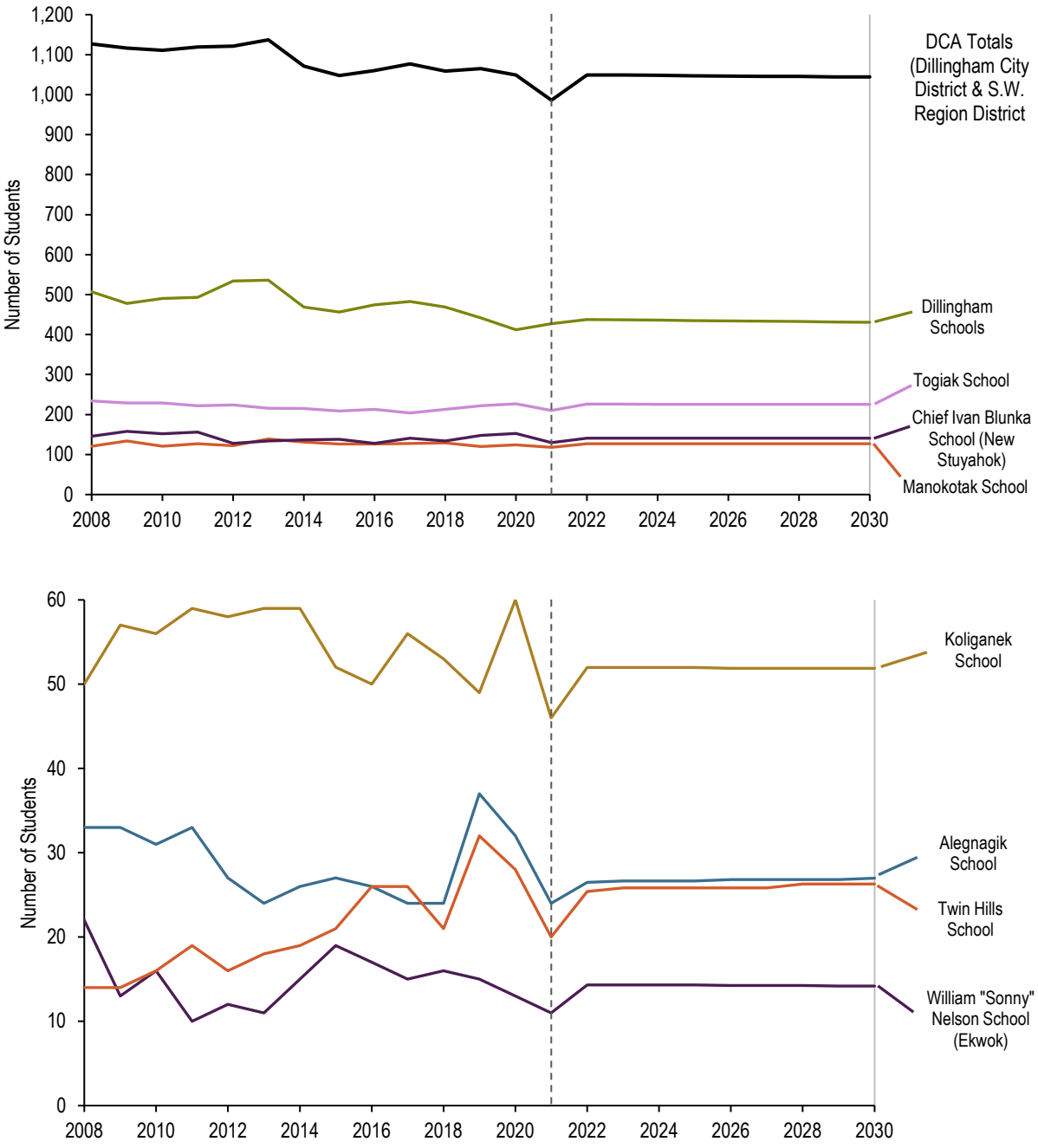
Figure 14. Actual and Forecast Population and School Enrollments in the Dillingham Census Area, 2008–2030



Source: DEED (2022), Northern Economics, Inc. analysis

Figure 15 groups school enrollment into two chartlets: schools with more than 100 students, and those with fewer than 100 students. The upper group also includes the borough-wide enrollment, which includes both the Dillingham City School District and the Southwest Region School District.

Figure 15. Actual and Forecast Enrollments by School in the Dillingham Area, 2008–2030



Source: DEED (2022), Northern Economics, Inc. analysis

The Cost of Living in the Bristol Bay Region

This section examines the cost of living in the Bristol Bay Region and makes comparisons to the cost of living in Anchorage. The study uses data from the University of Alaska-Fairbanks' Alaska Food Cost Survey to compare the long-term cost of food between Anchorage, Dillingham, and Naknek/King Salmon. There are other metrics used to establish the cost of living in the area and, overall, cost of living data are taken from a range of time periods. Cost differential and index data generally begin in 2008 (Table 3, Table 4, and Figure 16). Comparison data run from 1996 to 2020 (Figure 17, Figure 18, Figure 20, and Figure 21); high, low, and average diesel fuel price data span 1988 to 2021 (Figure 22); marine fuel prices are included for 1999 to 2021 (Table 5 and Figure 19); and data on prices paid by utilities are from 2008 to 2021 (Figure 23).

Data regarding the cost of living in rural Alaska are sporadic and difficult to interpret but there have been two thorough cost of living studies performed on communities within Alaska. Both were developed by the McDowell Group for the State of Alaska Department of Administration, one in 1985 one in 2008. There has been a considerable amount of time since the 2008 Alaska Geographic Differential Study, but researchers still reference the 2008 work because of its comprehensiveness and wide intrastate coverage. Table 1 shows the regions as they were evaluated in 1985, by election district boundaries, but in the 2008 study the Bristol Bay category is represented by Dillingham (McDowell Group 2008). Bristol Bay and other rural areas' cost of living continue to increase relative to Anchorage. For example, Anchorage, the base region, remains at 1 while the Bristol Bay region has grown 8 percent more costly over time.

Table 3. Comparison of 1985 and 2008 Geographic Cost Differentials

1985 District Name	1985	2008	Change
Yukon/ Kuskokwim	1.29	1.16	-0.13
Cordova/ Valdez	1.11	1.05	-0.06
Fairbanks/ Fort Yukon	1.03	1.02	-0.01
Anchorage (base region)	**1.00**	**1.00**	**0**
Kenai/ Cook Inlet	1.01	1.01	0
Icy Strait/ Lynn Canal	1.05	1.06	0.01
Palmer/ Wasilla	0.94	0.95	0.01
Ketchikan/ Prince of Wales	1.02	1.04	0.02
Seward	1.00	1.03	0.03
Nome	1.33	1.37	0.04
Petersburg/ Wrangell	0.98	1.04	0.06
Kodiak	1.06	1.12	0.06
Juneau	1.03	1.11	0.08
Bristol Bay (Dillingham)	*1.29*	*1.37*	*0.08*
Barrow/ Kotzebue	1.45	1.55	0.1
Bethel	1.39	1.53	0.14
Sitka	1.01	1.17	0.16
Wade Hampton	1.26	1.48	0.22
Aleutian Islands	1.26	1.49	0.23

Source: McDowell Group (2008)

We can also discuss cost of living in Alaska using the Department of Defense Cost of Living Index, but it cannot be compared to the Geographic Cost Differential studies because the military uses different metrics. The military does not consider housing when generating its differentials because the military has a housing allowance program, but housing is a key factor in the McDowell Group studies (ADOLWD 2022b; McDowell Group 2008). Nonetheless, this is another available index so is relevant to any cost of living in Alaska discussion. Figure 16 shows the trend over time.

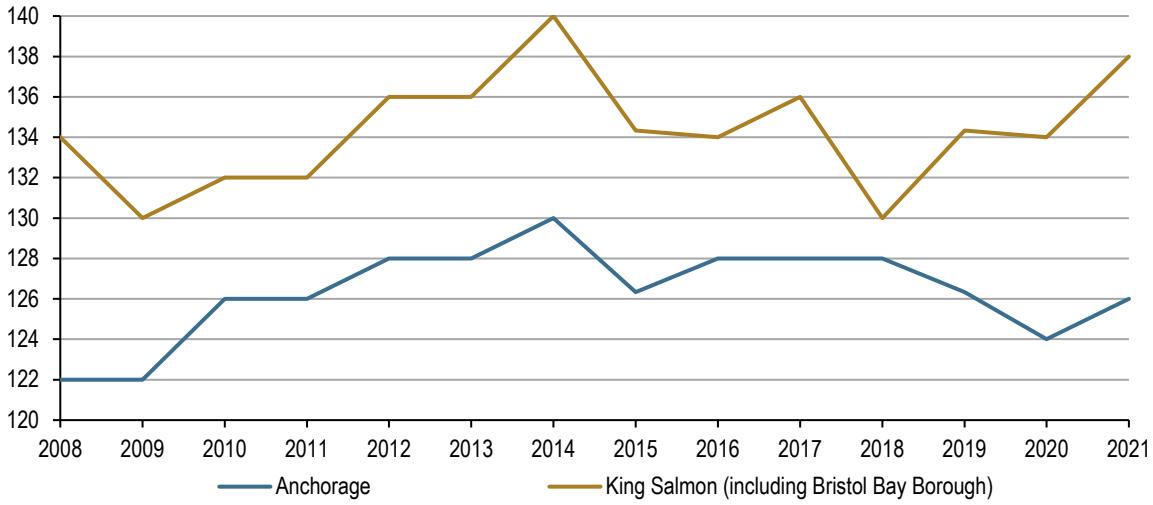
Table 4. Dept. of Defense COL Index, 2008–2021

Year	Anchorage	King Salmon (including Bristol Bay Borough)
2008	122	134
2009	122	130
2010	126	132
2011	126	132
2012	128	136
2013	128	136
2014	130	140
2015	126	134
2016	128	134
2017	128	136
2018	128	130
2019	126	134
2020	124	134
2021	126	138
Average	*126*	*134*

Source: ADOLWD (2022b)

Note: 2015 and 2019 have missing data, an average is used

Figure 16. Dept. of Defense COL Index Trend Over Time, 2008–2021



Source: ADOLWD (2022b)

Note: 2015 and 2019 have missing data, an average is used

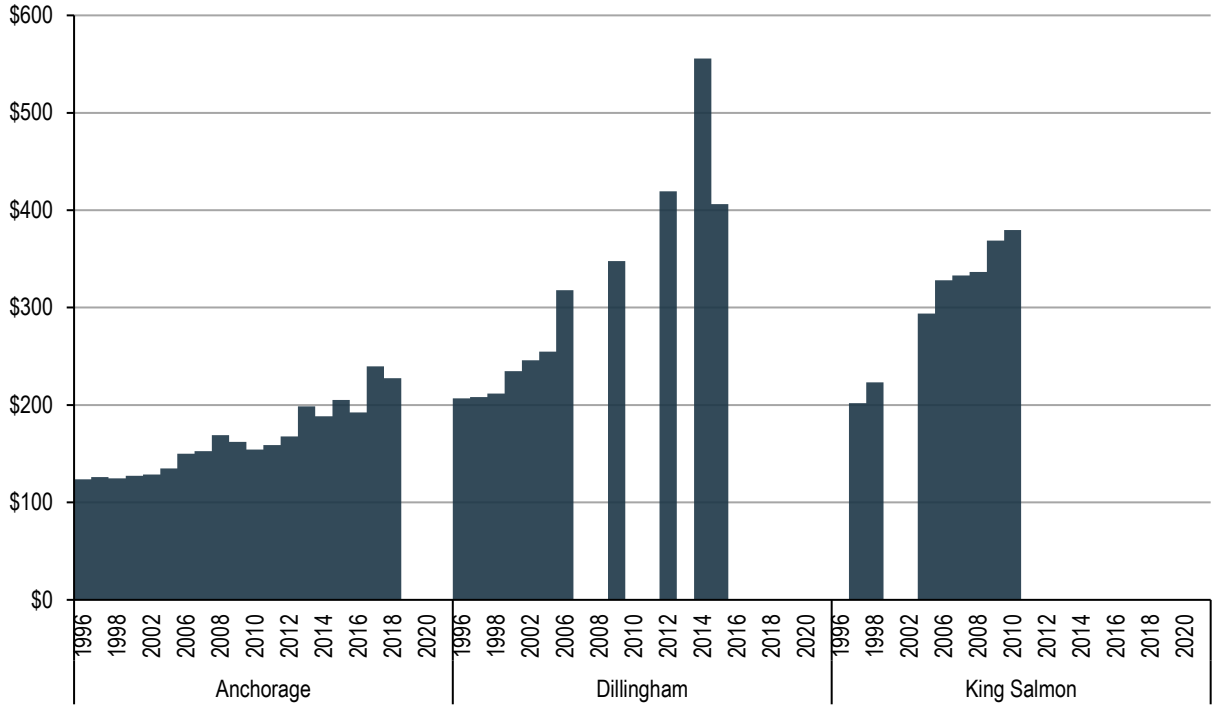
Cost of Living Comparisons

The Alaska Food Cost Survey was an extensive collection of cost-of-living information but has not been published since 2018; however, individual utility fuel prices and other fuel price data are available for later years from the Alaska Energy Authority (2022) and cost of living related Trends articles from the ADOLWD (2022b). This section pieces together all the available data from these sources.

Food Costs

Figure 17 data make it clear that food costs have risen more quickly in Dillingham and Naknek/King Salmon than in Anchorage. All food cost data in this study are representative of a family of four with two adults aged 20 to 50, and two children aged 6 to 11 (ADOLWD 2022b). For the Dillingham data that are available, reported food costs are at least twice that of Anchorage. Since many coastal, remote regions receive freight via barge line, the overage is likely related to the increasing cost of shipping food to the region due to rising fuel prices. In addition to sporadic data, year-to-year food costs are volatile. This is likely linked to commodity pricing, supply chain issues, and the price of fuel. According to the Food Cost Survey, Dillingham saw a 33 percent jump in prices from 2012 to 2014 followed by a 37 percent drop in 2015.

Figure 17. Comparison of Family Food Costs in Anchorage, Dillingham, and Naknek/King Salmon, 1996–2021



ADOLWD (2022b), Northern Economics, Inc. analysis

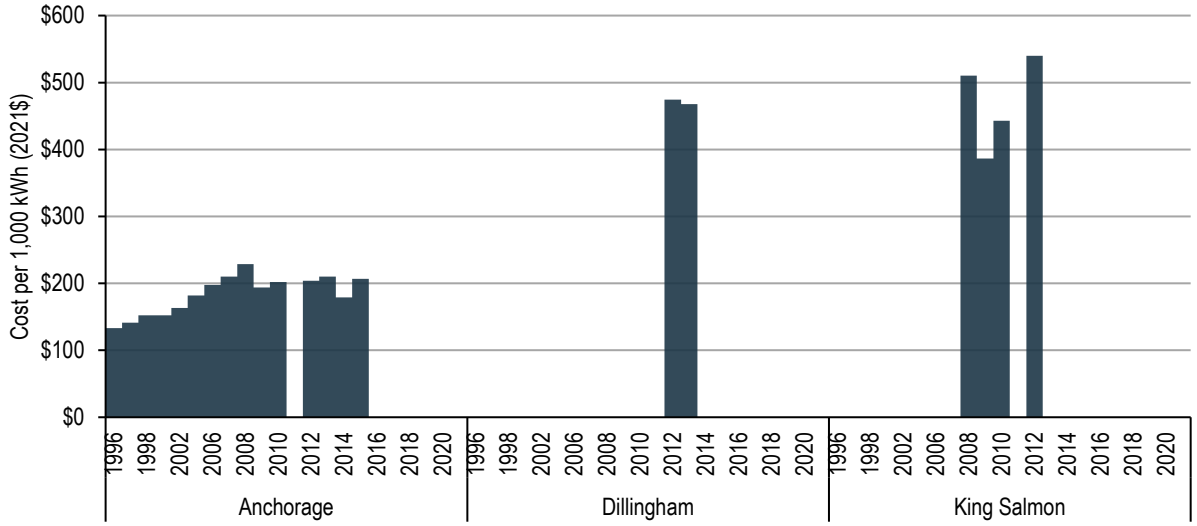
Note: All dollar amounts have been adjusted to 2021 dollars ($2021) using the CPI-U for all items

Electricity Costs

Electricity data are sparse but in Figure 3 it is evident that it is much cheaper in urban Alaska. Anchorage's utilities are powered by comparatively local natural gas supplies and hydroelectric facilities while the Bristol Bay Region relies on barged-in diesel and fuel oil. Hence, a change in the commodity price for fuel hits the region twice; once through the price of the commodity itself and once through energy intensive process of transportation.

The huge disparity in intrastate power consumption is another driving factor for rural electricity costs. Even with the state's Power Cost Equalization (PCE) program, electricity costs are exorbitant in less populous parts of the state. The PCE program, established in 1985, is a power-cost subsidy program for qualifying rural Alaska utilities to make the cost to end users comparable to those in more populated regions in Alaska. In the early years, program funding was as volatile as oil prices and would drop with state revenues (ISER 2012). The program did see a revitalization in 2000 when a PCE Endowment Fund was created and large deposits over the next 12 years helped it grow; the program was sufficiently funded but the share of eligible electricity sold to rural residents continued to drop (AVEC 2020). The fixed costs of running a utility are enormous and the PCE communities produce a fraction of the power their urban counterparts produce, meaning that the high cost is spread over few users. One study by the University of Alaska Anchorage's Institute of Social and Economic Research (ISER) states that Alaska's urban utilities produce 300 times as much power as the average PCE community (ISER 2012). Despite the PCE program, Bristol Bay residents are still deeply impacted by the cost of power.

Figure 18. Comparison of Electricity Costs in Anchorage, Dillingham, and Naknek/ King Salmon, 1996–2021



ADOLWD (2022b), Northern Economics, Inc. analysis

Note: All dollar amounts have been adjusted to $2021 using the CPI-U for electricity in Urban Alaska

Marine Fuel Prices: Diesel Fuel Price at the Pump

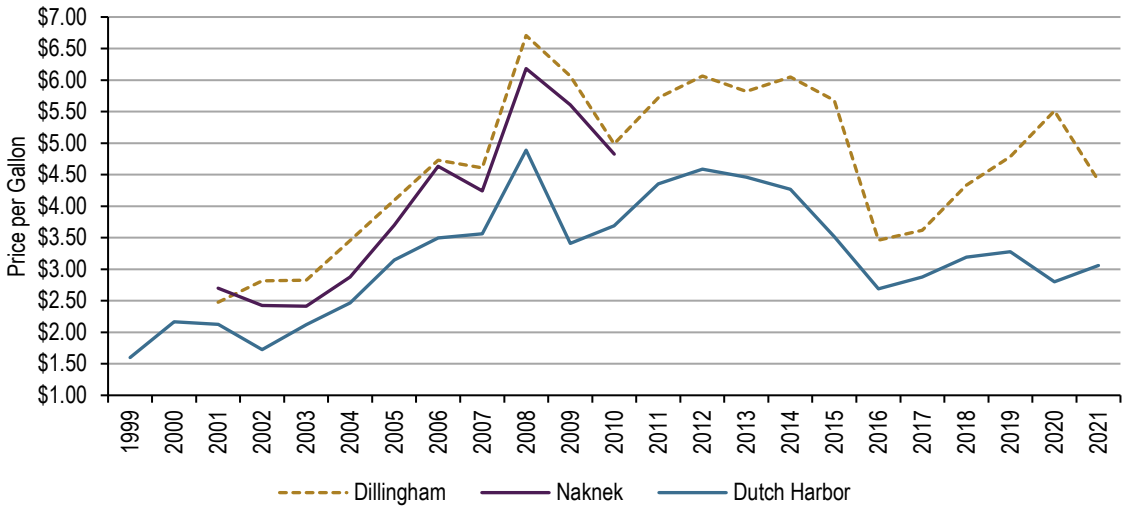
Because the subject of this report is marine activities, the study team included an analysis of regional marine diesel fuel prices paid by users. All prices have been converted to real 2021 dollars ($2021) (adjusted for purchasing power) using the U.S. Bureau of Labor Statistics' Consumer Price Index for Urban Alaska (2022) adjustment for all items. Dutch Harbor is included in the analysis because the city's data are complete for our analysis and all fuel distributed to the Bristol Bay villages passes through Dutch Harbor first (PSMFC 2022). We see that in 2008 when the price of oil exceeded $100 per barrel the price of fuel rose accordingly and then plummeted during the Great Recession. Again, fuel prices drop sharply by 2016 as the state of Alaska enters its own recession in 2015 and begin to recover just before the COVID-19 pandemic hits. Fuel is a major cost to fishermen, both commercial and recreational, and can heavily impact the incomes earned by the people of the region.

Table 5. Mean Marine Fuel Prices per Gallon at the Pump, 1999–2021

	Dutch Harbor		Dillingham		Naknek	
Year	Nominal	Real 2021$	Nominal	2021$	Nominal	2021$
1999	1.00	1.60				
2000	1.38	2.17				
2001	1.39	2.12	1.62	2.48	1.77	2.70
2002	1.15	1.72	1.88	2.81	1.62	2.42
2003	1.45	2.12	1.94	2.83	1.65	2.41
2004	1.73	2.47	2.43	3.45	2.02	2.87
2005	2.28	3.14	2.96	4.09	2.68	3.70
2006	2.61	3.50	3.53	4.73	3.46	4.63
2007	2.72	3.56	3.52	4.61	3.24	4.24
2008	3.91	4.89	5.36	6.71	4.94	6.18
2009	2.75	3.41	4.90	6.07	4.53	5.61
2010	3.04	3.69	4.10	4.99	3.97	4.83
2011	3.70	4.36	4.86	5.72		
2012	3.98	4.59	5.26	6.06		
2013	3.99	4.46	5.21	5.82		
2014	3.88	4.27	5.50	6.05		
2015	3.22	3.52	5.19	5.68		
2016	2.47	2.69	3.18	3.46		
2017	2.66	2.88	3.34	3.62		
2018	3.03	3.19	4.12	4.33		
2019	3.16	3.28	4.61	4.79		
2020	2.67	2.80	5.25	5.51		
2021	3.06	3.06	4.40	4.40		
Average		**3.19**		**4.68**		**3.96**

Source: PSMFC (2022); Northern Economics, Inc analysis

Figure 19. Mean Marine Fuel Price per Gallon Trend, 1999–2021

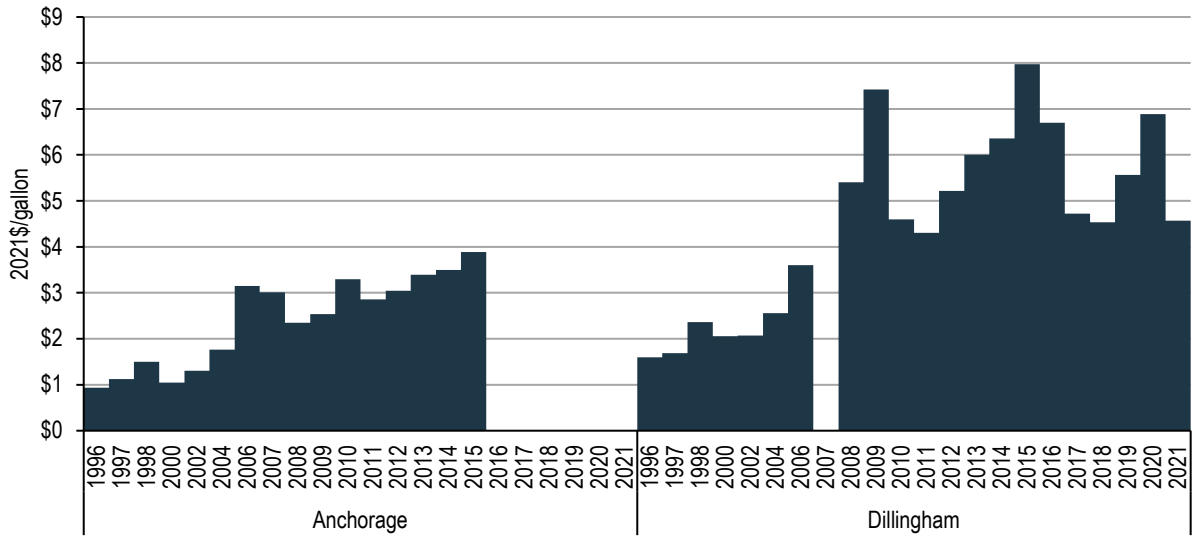


Source: PSMFC (2022); Northern Economics, Inc analysis

Unleaded Fuel Price per Gallon

Though data for Anchorage's unleaded gas prices are limited, it is clear in Figure 4 that Anchorage has seen a steady increase while Dillingham's price at the pump is a bit more volatile. From 2009 to 2021, Dillingham saw a 48 percent drop in real gas prices with prices peaking in 2015 at $7.97 (2021$) per gallon. The 2009 spike of $7.42 (2021$) per gallon is likely the result of oil prices spiking in 2008 and Dillingham residents using leftover, high-priced fuel that had been barged in in 2008 (U.S. Energy Information Administration, 2022). The prices are set by averaging the leftover fuel and new fuel prices. Since the price was so high in 2008, fewer people bought it making for a "fuel-price-hangover" in 2009. Since fuel must be barged to Dillingham but cannot be barged in during winter months due to sea-ice, the prevailing fuel price when the last barge arrives often sets the price until the following spring (Anchorage Daily News, 2010).

Figure 20. Comparison of Unleaded Gas Price per Gallon (2021$) in Anchorage and Dillingham, 1996–2021



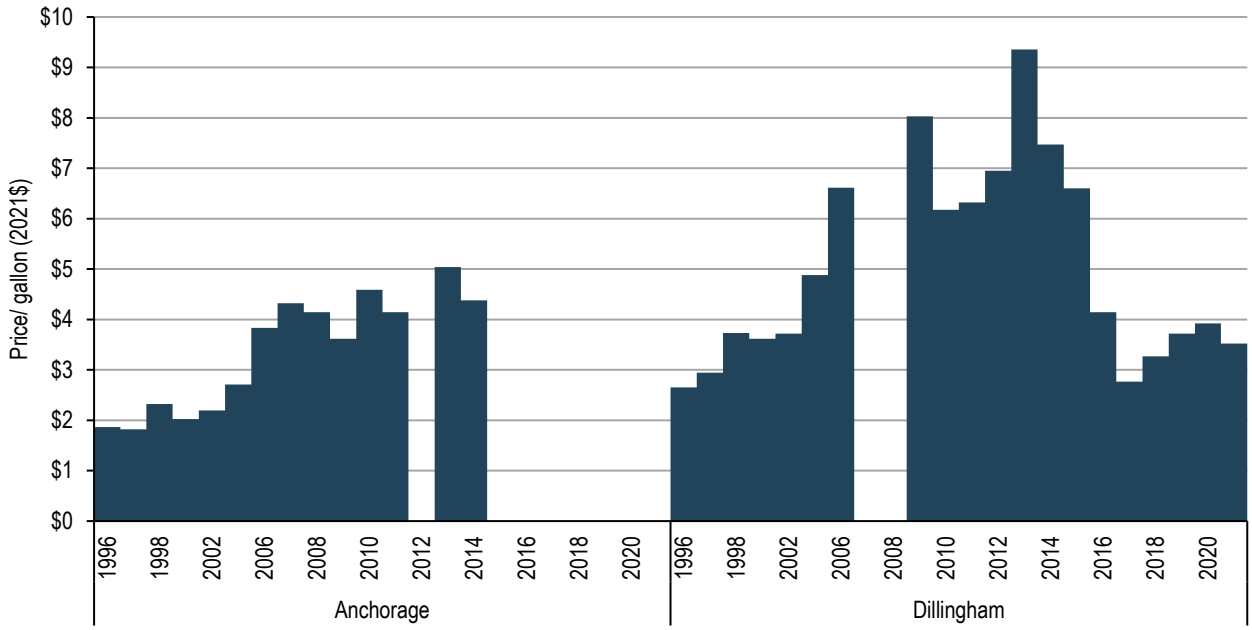
ADOLWD (2022b), Northern Economics, Inc. analysis

Note: All dollar amounts have been adjusted to 2021$ using the CPI-U for gasoline, unleaded regular in Alaska.

Home Heating Fuel

Figure 5 compares the cost of home heating fuel in Anchorage and Dillingham. The high price of fuel oil in Dillingham is directly related to the cost of shipping the fuel. In 2009 Anchorage prices dropped from the previous year and though there are no 2008 data for Dillingham, the price shot up in 2009 due to the high price of oil in 2008. Once again, the culprit is leftover, high-priced fuel from the previous year that was not consumed by residents. A result of how fuels are delivered to rural Alaska, this quirk prevents the region from being able to respond quickly and take advantage of major price swings. Of note, home heating fuel is not eligible for PCE assistance (AVEC 2020).

Figure 21. Comparison of Home Heating Fuel Prices in Anchorage and Dillingham, 1996–2021



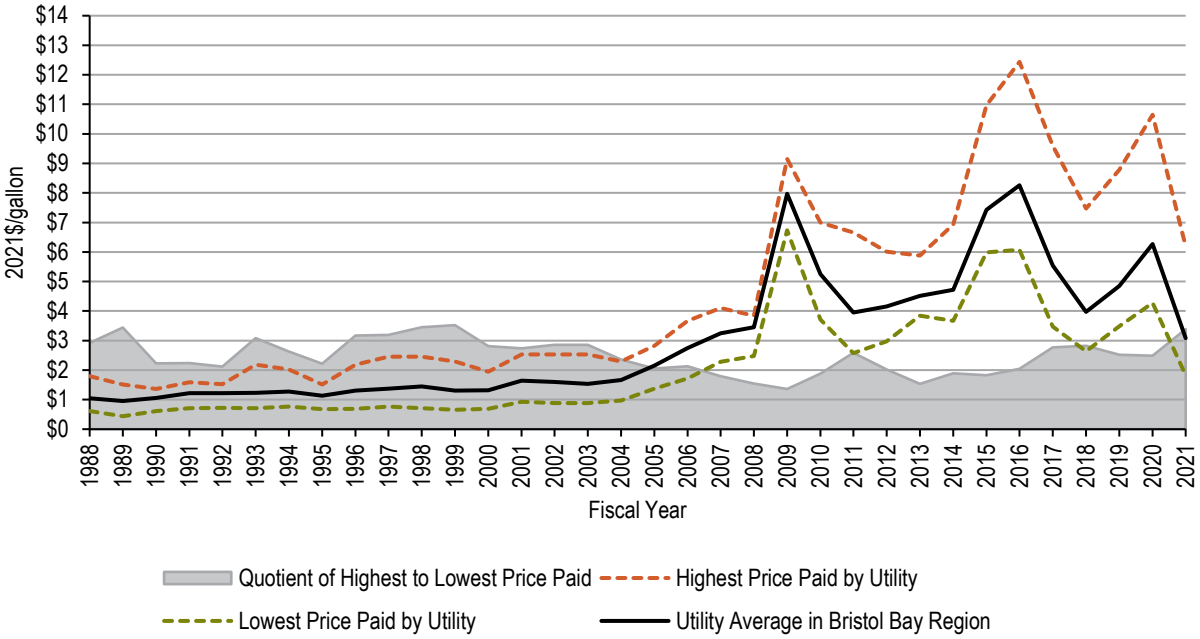
ADOLWD (2022b), Northern Economics, Inc. analysis

Note: All dollar amounts have been adjusted to 2021$ using the CPI-U for fuels and utilities

Fuel Cost to Utilities

There is a high degree of variability around the diesel prices paid by utility companies in the region. The price paid for diesel by the region's highest cost utilities can be greater than three times the price paid by the regions lowest cost utilities. In 2021, the highest price paid was $6.19, while the lowest was $1.83 (Figure 6). In addition, the highest cost utilities experience greater changes in their overall fuel costs. This effect is likely a result of the magnifying effect of having to transport small amounts of fuel to remote, inland regions. As noted above, in these cases the change in price is magnified as the retail price needs to reflect the change in the price of the commodity as well as the change in the price of transporting the fuel. Shown in Figure 6 is the trend for the highest price per gallon of diesel fuel, for the lowest price per gallon, and the average price per gallon. Dillingham historically has the cheapest gallon in the region and Igiugig the most expensive. After adjusting for inflation, the average price over time is $5.27 per gallon.

Figure 22. The Lowest, Highest, and Average Price of Diesel Fuel Paid by Utility in the Bristol Bay Region, 1988–2021

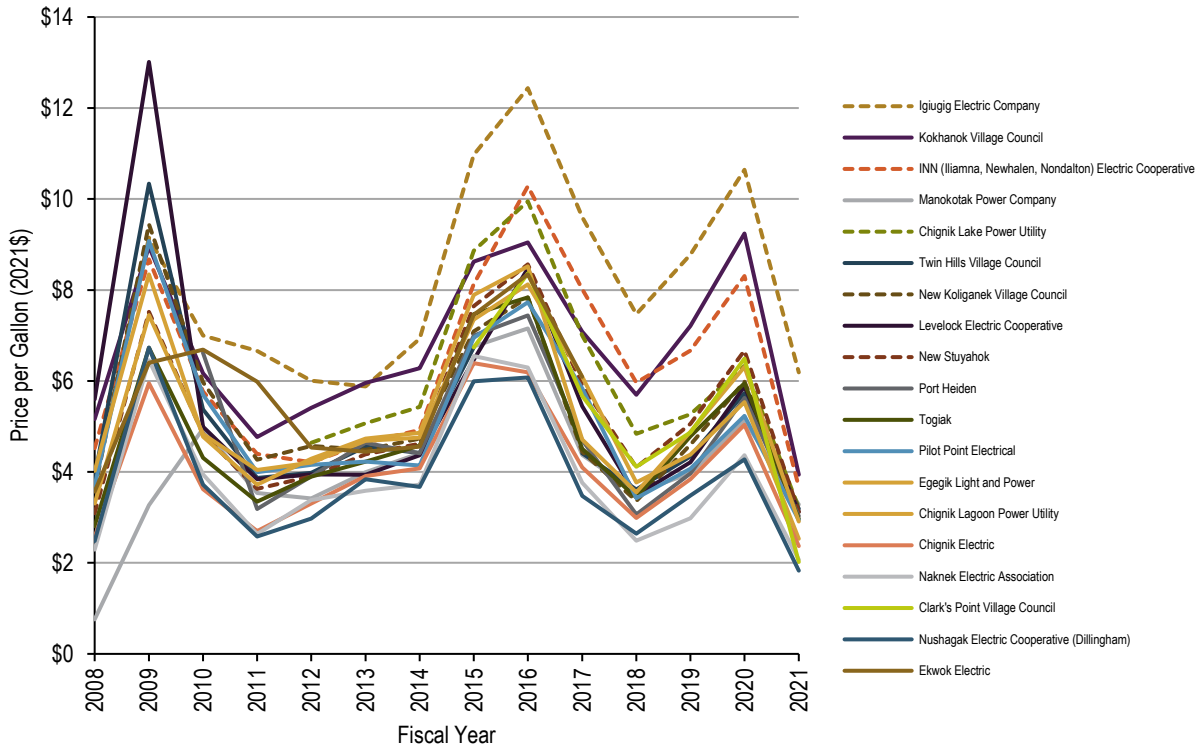


Source: Alaska Energy Authority (2022), Northern Economics, Inc. analysis

Note: All dollar amounts have been adjusted to 2021$ using the Producer Price Index (PPI) Commodity data for fuels and related products

Figure 7 shows the prices paid for diesel fuel by regional utilities at a community level, illustrating the variability in prices paid across the region. The legend is sorted from highest to lowest price paid in 2021. We observe cost differences between coastal communities such as Naknek and Dillingham and inshore communities such as Igiugig and Kokhanok, and the remote Lake Communities serviced by INN (Iliamna, Newhalen, and Nondalton) Electric Cooperative. These data, represented as averages in Figure 23, suggest that geographic location may be the most important determining factor in the price paid by utilities.

Figure 23. Prices Paid for Diesel by Specific Utility, 2008–2021

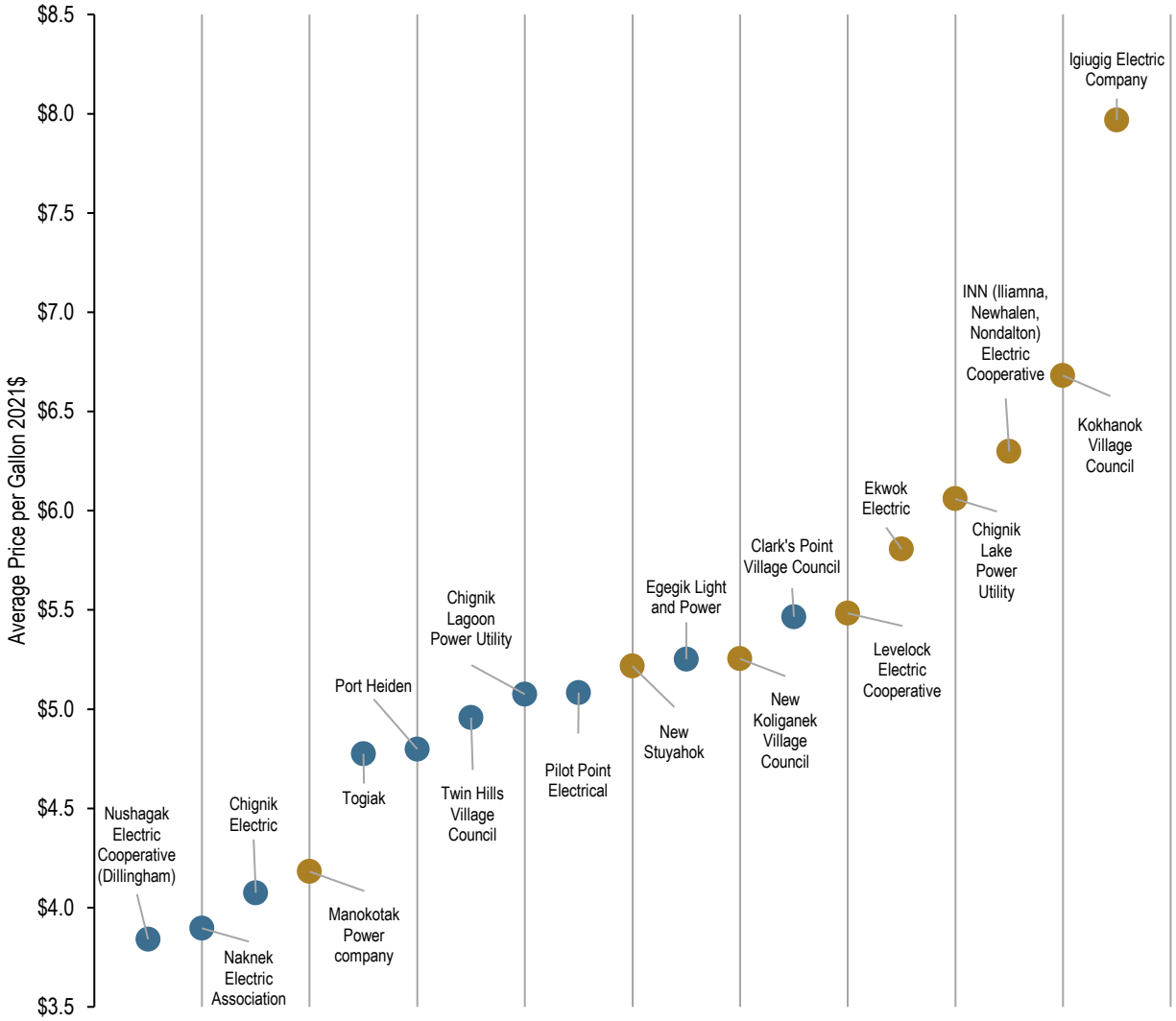


Source: Alaska Energy Authority (2022), Northern Economics, Inc. analysis

Note: All dollar amounts have been adjusted to 2021$ using the PPI Commodity data for fuels and related products

Figure 23 shows the distribution of communities based on the average price paid per gallon of fuel to their utility and Figure 25 shows a map of the region for reference. Utilities paying above the median price per gallon are generally further from the coast, relative to the utilities whose average price per gallon is below the median. This further reinforces the claim that geographic location and accessibility could be a driving factor in prices paid. Additionally, the prices paid are despite the fact that the PCE program has been in existence over the entire timeline of our analysis.

Figure 24. Average Price Paid by Utility, 2008–2021



Source: Alaska Energy Authority (2022), Northern Economics, Inc. analysis

Note: All dollar amounts have been adjusted to 2021$ using the PPI Commodity data for fuels and related products. Blue markers indicate a coastal community, gold markers indicate an inland community.

Figure 25. Map of the Bristol Bay Region's Coastal and Inland Communities

Source: Pebblewatch (2019)

Comparisons of Vessel Characteristics

This section compares selected vessel characteristics based on their owners' residence locations. It looks at distribution of vessel ages and lengths, their tenure as measured by the number of years the vessel has been active in Commercial Fisheries Entry Commission (CFEC) data, and their capacities as measured by horsepower, gross tons, and refrigeration.

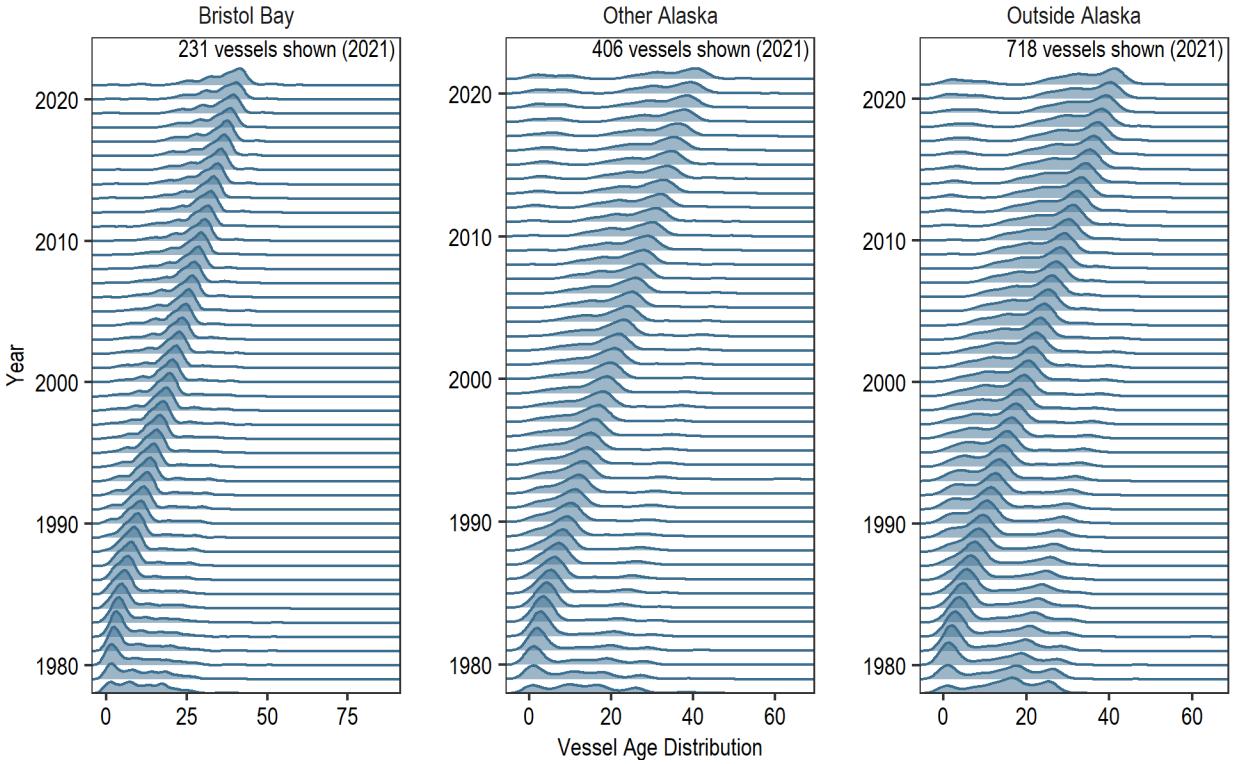
CFEC vessel registration data were download and processed for the years 1978–2021. Vessels were included if the vessel was specifically designated in CFEC permit data for the Bristol Bay Drift Gillnet Fishery (S 03T) as the vessel that would be used in the S 03T fishery for that year. This filtered list of vessels was then sorted into three bins based on the residence of the vessel owner:

- **Bristol Bay:** the vessel owner is a resident of a community in the Dillingham Census Area, the Bristol Bay Borough or the Lake and Peninsula Borough, with the exception of residents of Chignik, Chignik Lake, Chignik Lagoon, Ivanof Bay, and Perryville. These five excluded communities lie on the Gulf of Alaska and residents primarily participate in the Area L salmon fisheries.
- **Other Alaska:** the vessel owner is a resident of Alaska but does not live in the Bristol Bay Region as defined above.
- **Outside Alaska:** the vessel owner is not a resident of Alaska.

Our 2012 report found that vessels operated by Bristol Bay residents were older, smaller, and shorter than vessels operated by individuals who reside outside of Bristol Bay communities. In addition, Bristol Bay vessels have lower horsepower ratings, less fuel capacity, and a lower prevalence of refrigeration capabilities.

After incorporating the most recent data, we see that while there was a range vessel ages in the late 1970s, over time vessel ages became more consistent. Across all ownership groups, there has been an entry of slightly younger vessels over time. (Figure 16).

Figure 26. Distribution of Vessel Ages over Time by Owner's Residence, 1978–2021

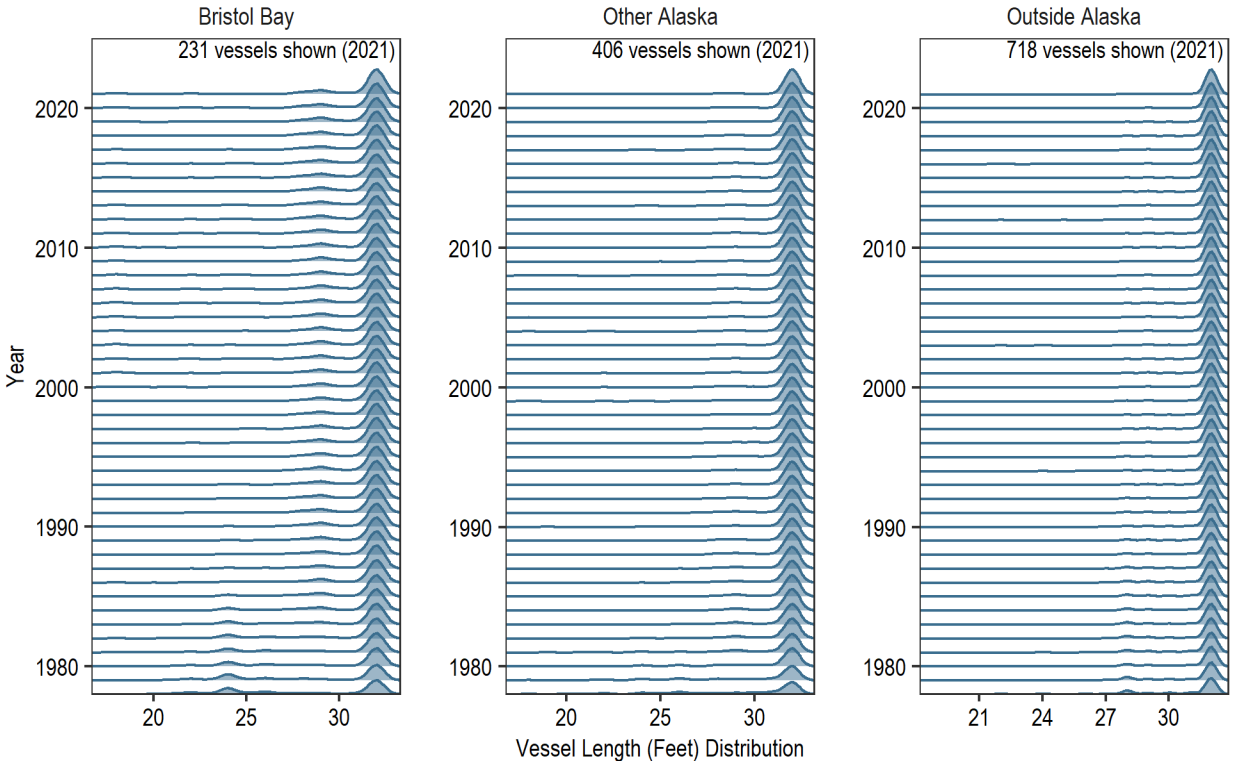


Source: CFEC (2021)

Across all ownership groups, vessels are largely 32 feet in length, though Bristol Bay-owned vessels include some under 30 feet. (Figure 17). This result is consistent with our previous findings and findings in the broader literature. Gho (2020) hypothesized that after limited entry was implemented in 1975 that there would be increased pressure for the local fleet to adopt vessel configurations that would maximize catch per day, and could lead to greater homogeneity in vessel sizes up to the 32-

foot cap. However, what was found was that this fleet remains heterogenous—this is visible in our results with a notable population of Bristol Bay vessels less than 30 feet in length (Figure 17).

Figure 27. Distribution of Vessel Length over Time by Owner's Residence, 1978–2021

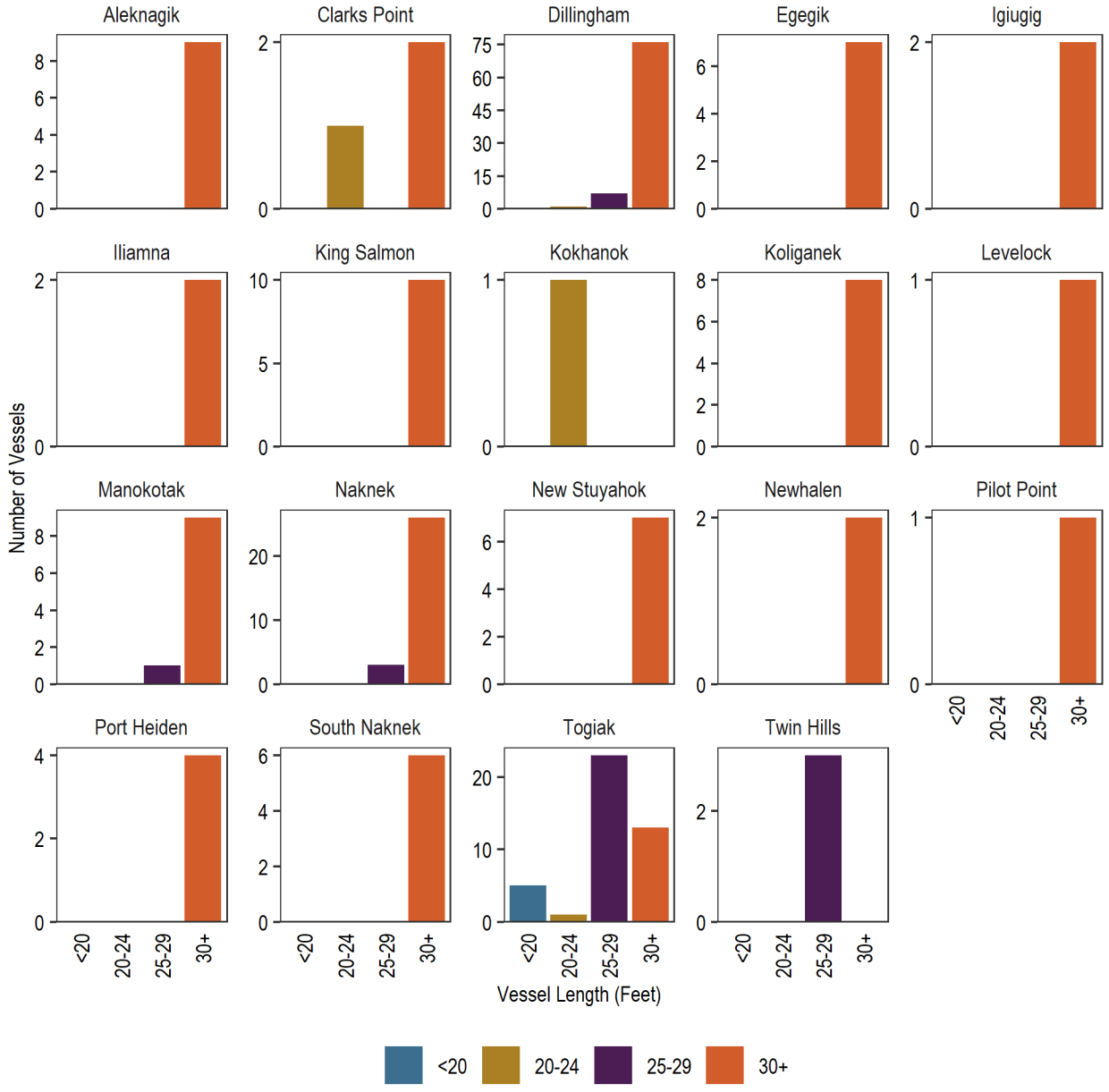


Source: CFEC (2021)

When looking at vessel size data across Bristol Bay communities, we observe that some communities are less heterogeneous than others. In 2021, among Bristol Bay residents, owners from most communities have vessels that are at least 30 feet in length, though a few have vessels in the 20–24

or 25–29-foot ranges. Of note are Togiak owners, where 23 of 42 vessels are between 25 and 29 feet and five vessels are under 20 feet (Figure 18).

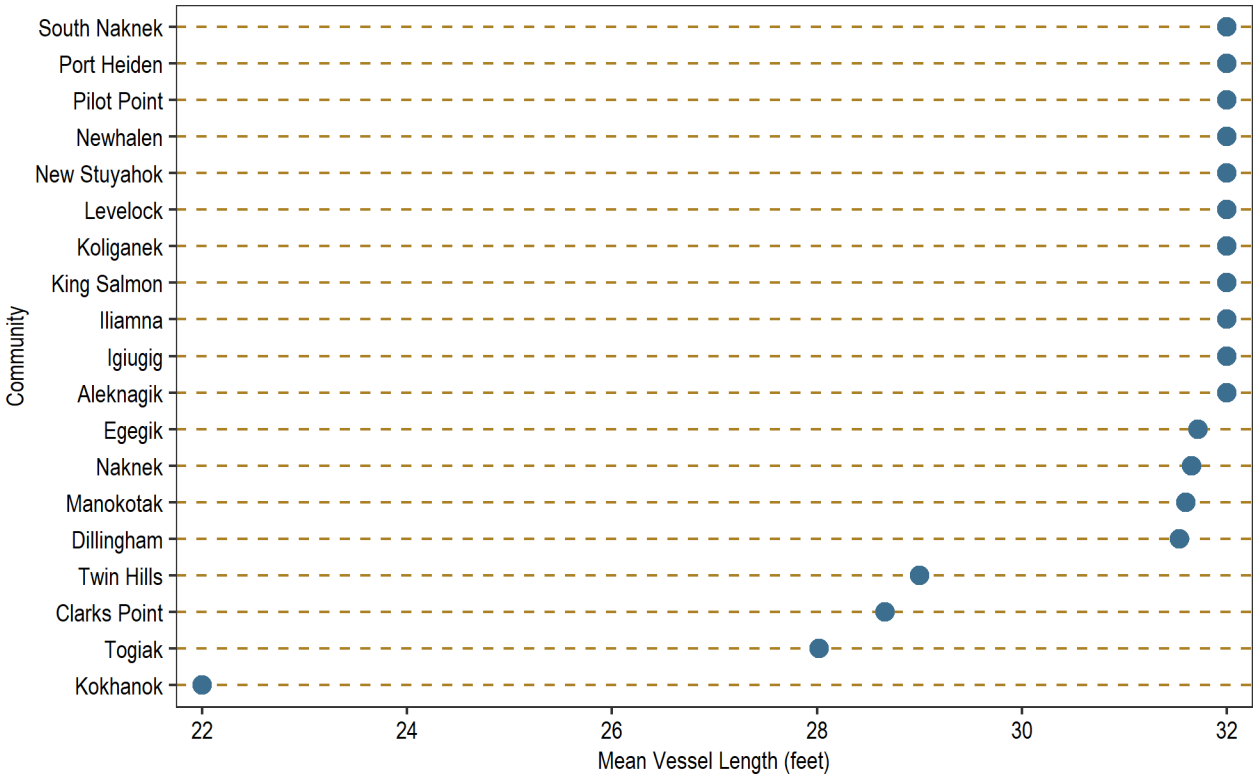
Figure 28. Distribution of Vessel Lengths Owned by Bristol Bay Residents, by Community, 2021



Source: CFEC (2021)

As of 2021, slightly more than half of the Bristol Bay communities had only 32-foot vessels. Residents of Egegik, Naknek, Manokotak, and Dillingham had vessels averaging 31–32 feet, while Twin Hills, Clarks Point, Togiak, and Kokhanok had vessels that averaged under 30 feet. (Figure 19)

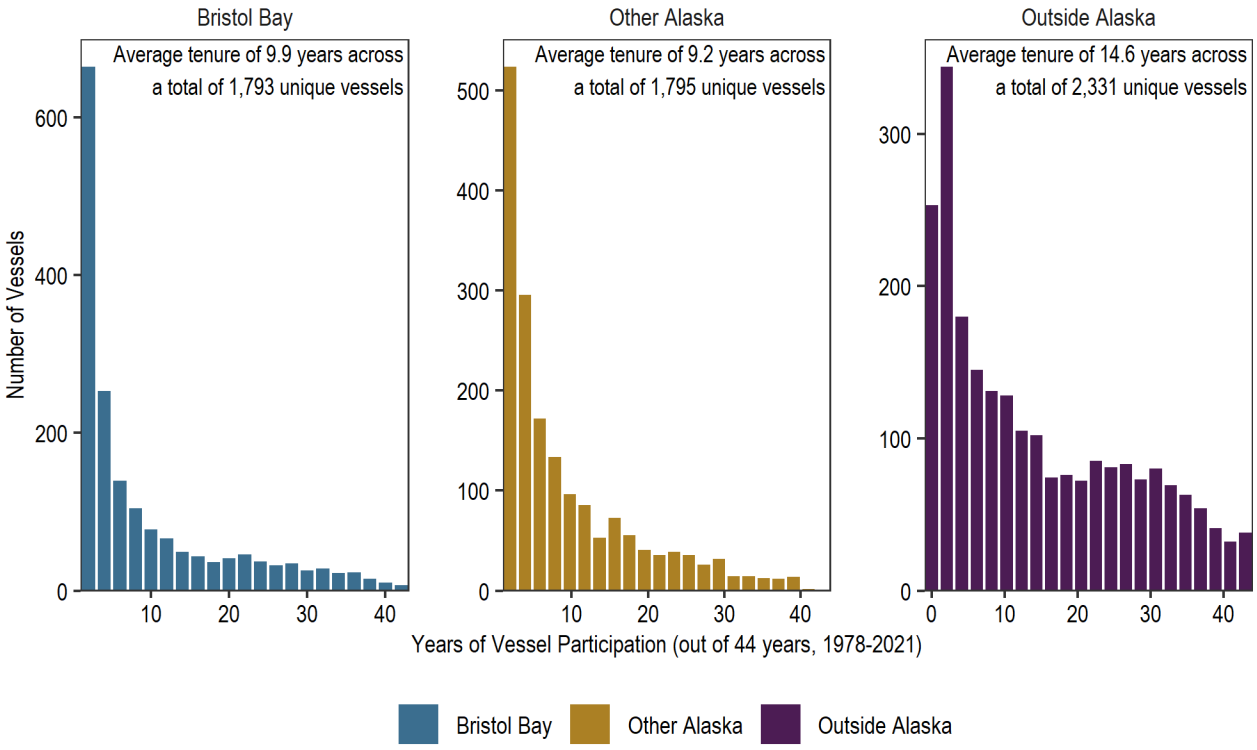
Figure 29. Mean Length of Vessels Owned by Bristol Bay Residents, by Community, 2021



Source: CFEC (2021)

Bristol Bay and Other Alaska-owned vessels tend to have a shorter tenure than those Outside Alaska, as measured by the number of years each vessel appears in the CFEC data. Bristol Bay-owned vessels average 9.9 years of participation, Other Alaska vessels 9.2 years, and Outside Alaska vessels 14.6 years (Figure 20).

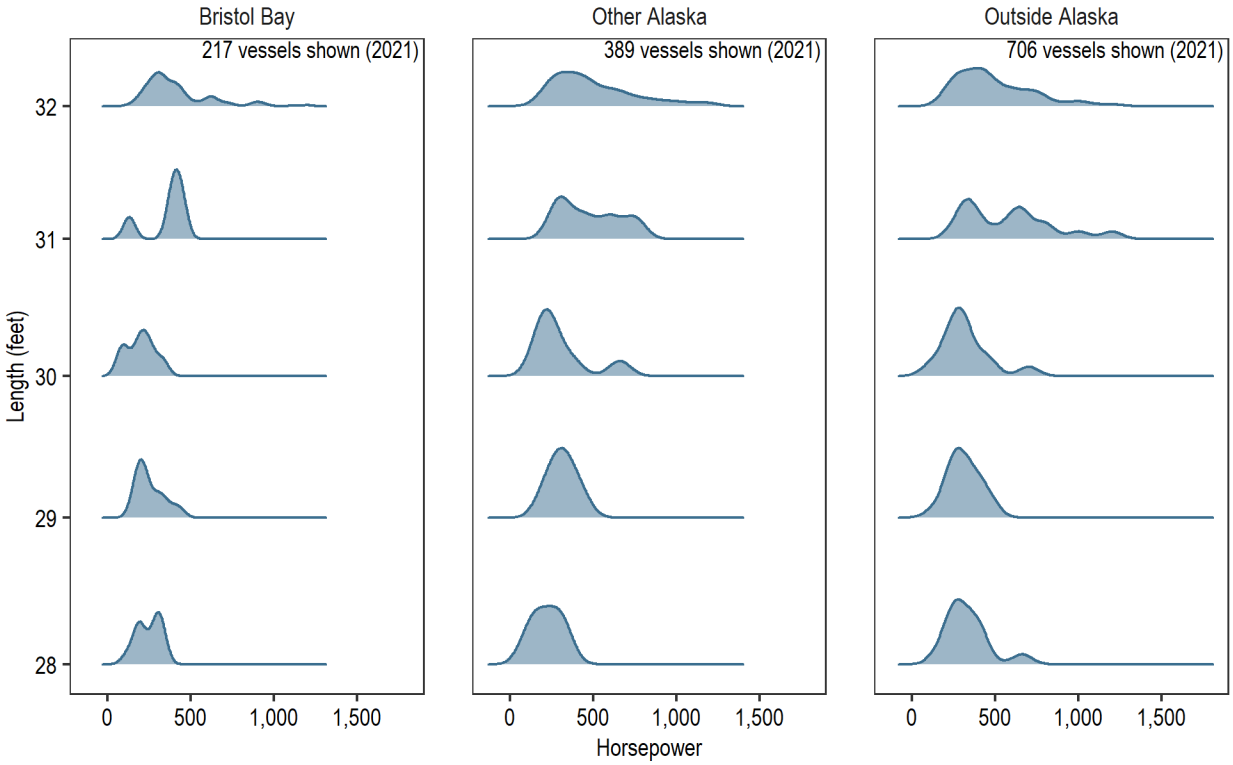
Figure 30. Vessel Tenure Based on Years of Participation (for 1978–2021) by Owner's Residence



Source: CFEC (2021)

Figure 21 shows the distribution of vessel horsepower by length for those vessels that have horsepower information available and are at least 28 feet in length.

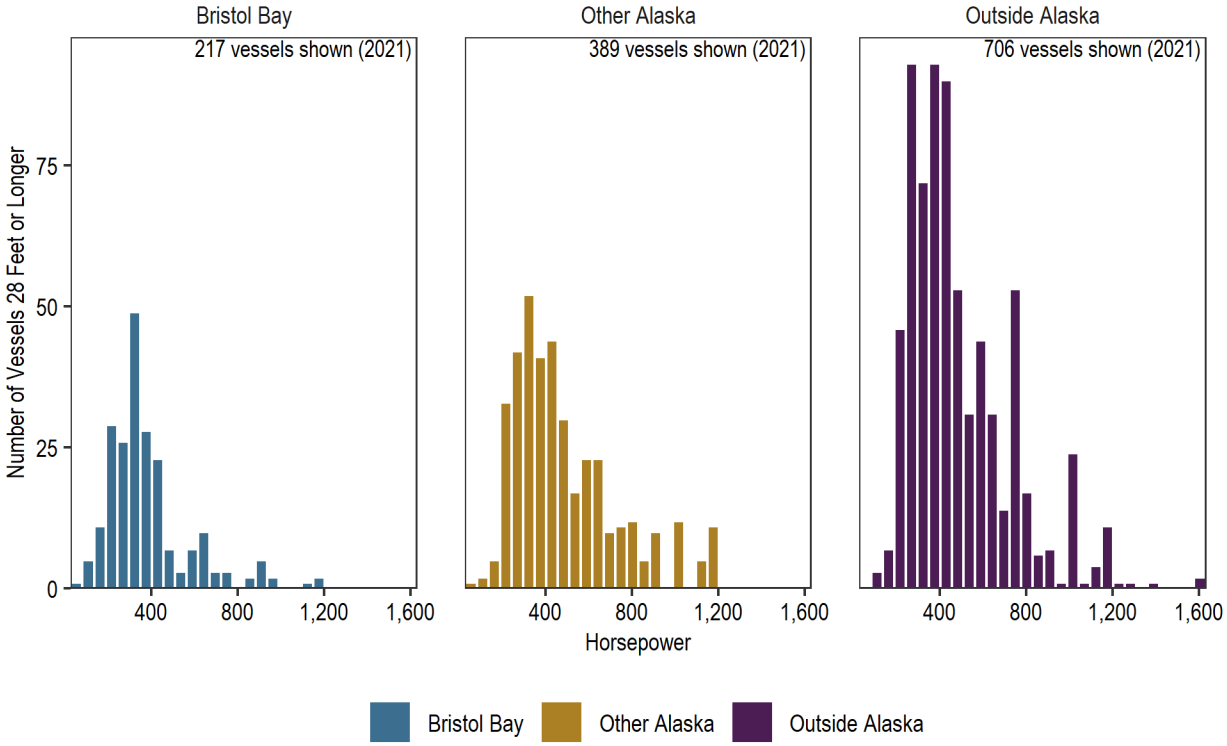
Figure 31. Distribution of Horsepower by Vessel Length and Owner's Residence, 2021



Source: CFEC (2021)

Figure 22 looks at the distribution of horsepower for vessels that are at least 28 feet in length and were active in 2021. Consistent with our previous results, we find that in 2021 Bristol Bay-owned vessels tend to have less powerful engines than vessels owned elsewhere.

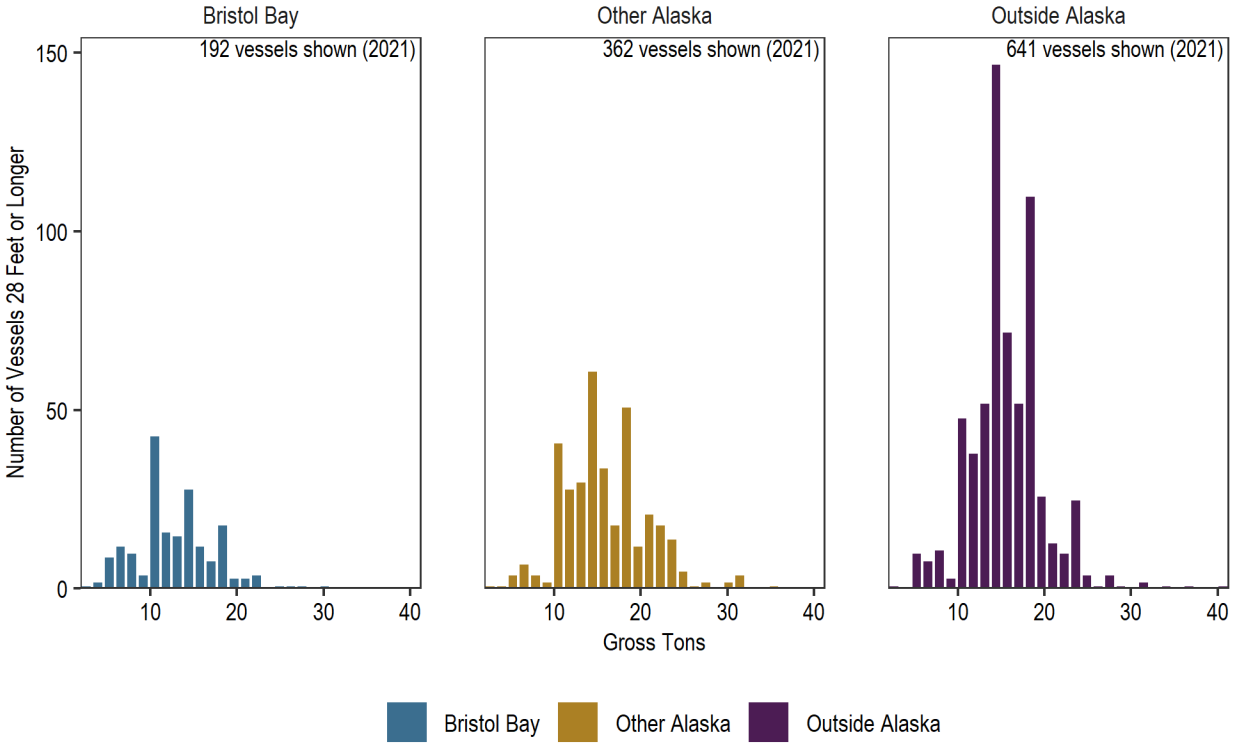
Figure 32. Distribution of Horsepower of Vessels of at Least 28 Feet f Length by Owner's Residence, 2021



Source: CFEC (2021)

The gross tonnage of vessels over 30 feet in length is somewhat more consistent across ownership regions than horsepower, though again, Bristol Bay-owned vessels tend to have slightly lower capacity than Other Alaska or Outside Alaska. (Figure 23)

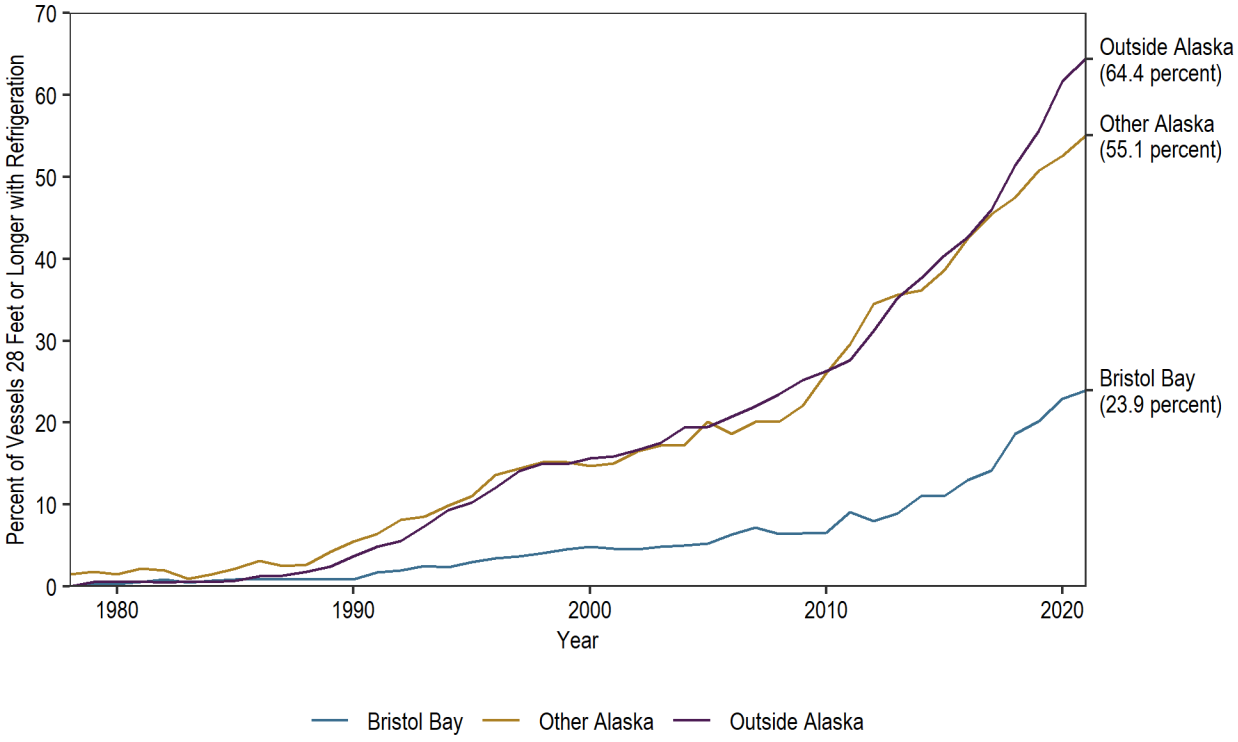
Figure 33. Distribution of Gross Tons of Vessels of at Least 28 Feet of Length by Owner's Residence, 2021



Source: CFEC (2021)

For vessels at least 28 feet in length, refrigeration is slightly more common (Figure 24), though again, it is less prevalent among Bristol Bay-owned vessels (24 percent) than it is for Other Alaska (55 percent) or Outside Alaska (64 percent). In 2008, we found that only 8 percent of vessels in Bristol Bay had some form of refrigeration compared to 22 percent of nonresident vessels, illustrating that while presence of refrigeration has increased sharply across all groups, there remains a persistent gap, particularly as compared to nonresident vessels.

Figure 34. Prevalence of Refrigeration Over Time in Vessels Over 28 Feet by Owner's Residence, 1978–2021



Source: CFEC (2021)

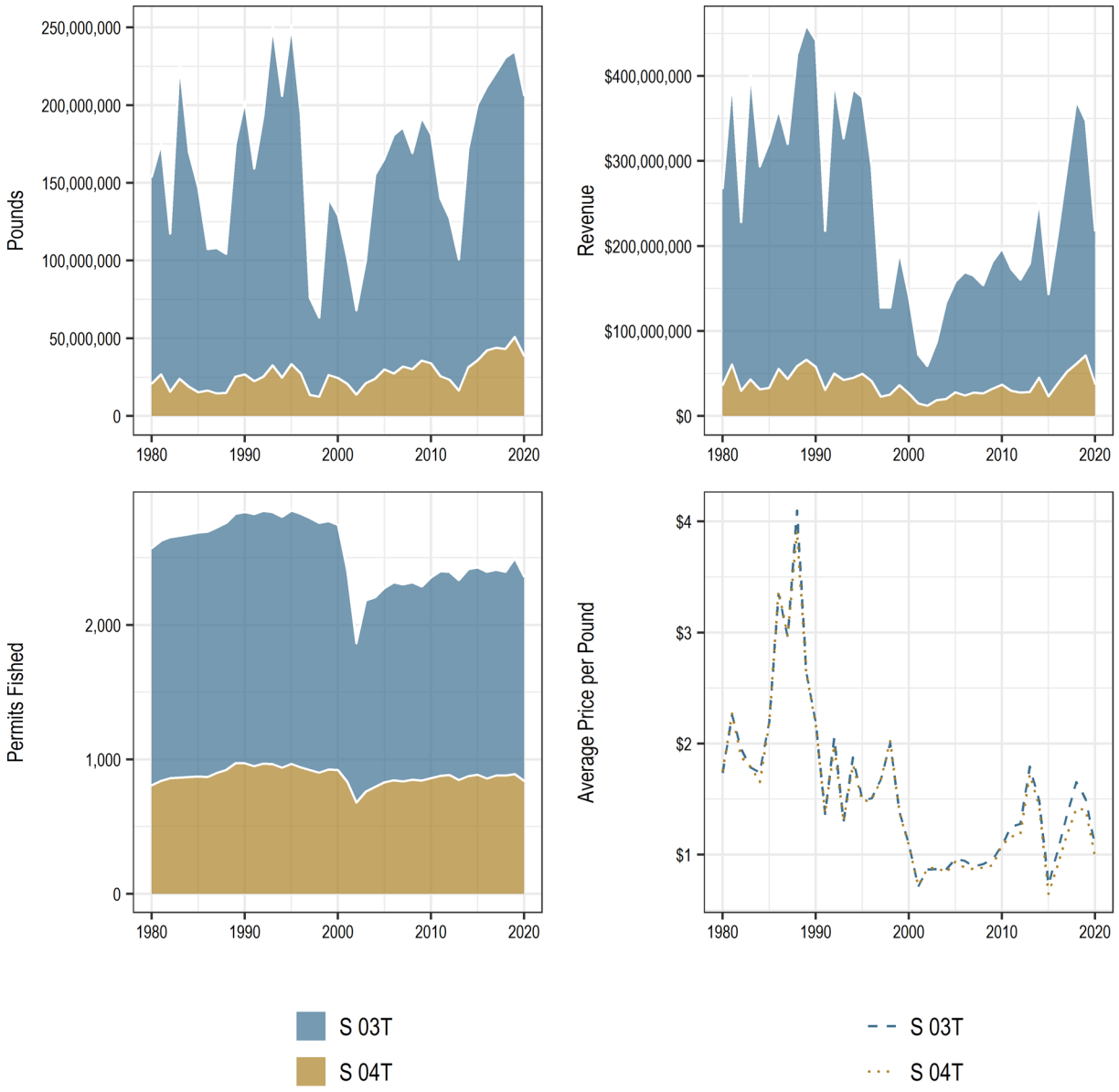
Economic Trends across Bristol Bay Salmon Fisheries

In the following sections, we primarily rely on CFEC estimated earnings and participation data (CFEC 2021). All dollars are shown in real 2021 dollars (2021$), except where otherwise noted and all values represent Northern Economics estimates of total landings and revenue since much of the data at the community level is considered confidential and withheld from official CFEC data files. Northern Economics uses average values from the smallest possible region to estimate missing values. We show data at several different levels in this section, across both the drift net and setnet fisheries, as well as aggregate economic trends for all permit holders broken out by residence: Bristol Bay residents, other Alaska residents, and all other, non-Alaska residents. In other sections, we provide data at this total level, broken out by fishery, and at the borough level, to get a finer scale look at trends within the Bristol Bay region, as well as the community level for all BBEDC communities.

Figure 25 shows a comparison of trends over time for the drift and setnet fisheries across all permit holders. Over time, fishery landings, revenue, and participation have been highest in the drift net fishery, though prices have generally been similar. Since 2010, participation in the drift fishery has fluctuated around 1,500 permits fished, from a low of 1,488 permits fished in 2013 to a high of 1,605 in 2019 (Table 3). 2017 through 2019 were some of the highest grossing years in the history of the fishery, with total revenues far exceeding the 10-year average of $190.8 million. Notably, in 2018, revenues exceeded $309.7 million. While participation levels in that year were similar to average, at 1,518 permits fished, 2019 saw a spike in participation to 1,605 permits fished—the highest level in a decade. However, in 2019, both average prices and total landings fell, leading to lower total revenues at $275.6 million.

In the setnet fishery, annual participation has generally been around 880 permits fished, but dropped by 50 permits between 2019 and 2020 to 840 permits fished. In 2019, we see record revenues were reached at $71.5 million, the previous highest grossing year in our time series was 1989 at $66.3 million. However, similar to the drift fishery, the 2020 setnet fishery experienced a drop in prices and landings. This resulted in a 46.6 percent decline in year-over-year revenues to $38.2 million—similar to the 10-year average of $38.2 million (Table 3).

Figure 35. Economic Trends in the Drift and Setnet Fisheries Across All Permit Holders



Source: Commercial Fisheries Entry Commission (CFEC, 2021), Northern Economics, Inc. analysis

Table 6. Ten-Year Recent Economic Trends Across All Permit Holders by Fishery

Fishery	Year	Revenue (2021$)	Pounds	Permits Fished	Average Price ($/lb)
S 03T- Drift	2010	$159,956,758	147,250,342	1,494	$1.09
	2011	$143,257,733	114,296,985	1,524	$1.25
	2012	$132,629,850	103,840,872	1,513	$1.28
	2013	$151,277,353	84,363,839	1,488	$1.79
	2014	$209,110,508	140,462,157	1,541	$1.49
	2015	$120,225,214	164,670,583	1,545	$0.73
	2016	$177,039,681	169,689,837	1,538	$1.04
	2017	$240,166,284	177,043,886	1,532	$1.36
	2018	$309,679,866	187,280,922	1,518	$1.65
	2019	$275,596,950	183,827,139	1,605	$1.50
	2020	$179,947,137	167,291,281	1,521	$1.08
	10-year Avg.	***$190,807,940***	***149,092,531***	***1,529***	***$1.30***
S 04T-Setnet	2010	$36,989,946	34,004,833	861	$1.09
	2011	$29,803,722	25,629,379	878	$1.16
	2012	$27,811,978	23,473,697	883	$1.18
	2013	$28,351,342	16,455,242	847	$1.72
	2014	$45,105,139	31,385,601	875	$1.44
	2015	$23,218,719	35,838,005	885	$0.65
	2016	$38,488,830	42,186,412	858	$0.91
	2017	$51,960,230	44,044,765	879	$1.18
	2018	$61,334,724	43,298,459	879	$1.42
	2019	$71,508,846	50,921,864	890	$1.40
	2020	$38,166,262	38,960,337	840	$0.98
	10-year Avg.	***$41,158,158***	***35,108,963***	***870***	***$1.19***

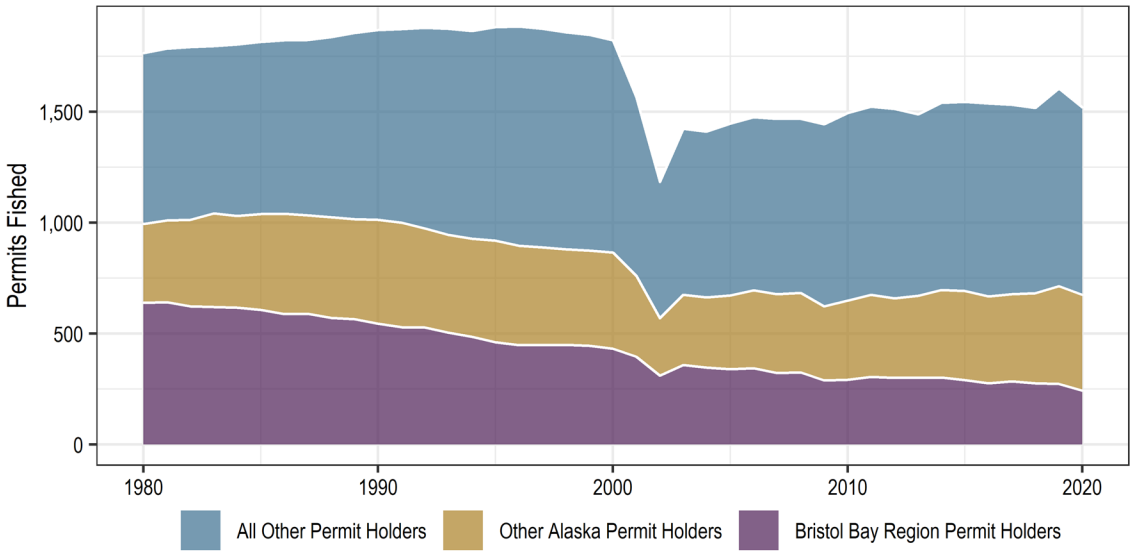
Source: Commercial Fisheries Entry Commission (CFEC, 2021), Northern Economics, Inc. analysis

The Drift Gillnet Fishery

Trends Across All Drift Permit Holders by Residence

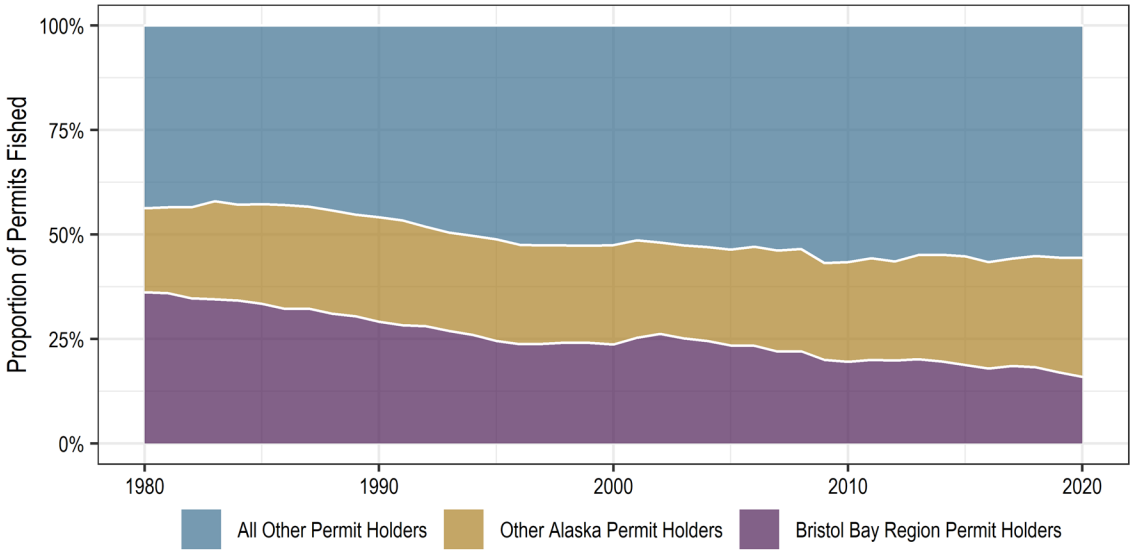
In this section we compare overall changes in S 03T, drift gillnet permit activity by residence as well as changes in earnings, focusing on trends in the Bristol Bay region as compared to other Alaska and all other, non-Alaska permit holders. Figure 26 shows changes in the number of drift permits fished over time and since 2002 there has been a slightly upward trend in the total number of permits fished, largely accounted for by non-Alaska permit holders. This is in contrast to the number of permits fished by Bristol Bay region residents, which have slowly declined in the same time period. Overall, while Bristol Bay region permit holders have usually accounted for at least 25 percent of all permits fished, this dropped to 16 percent in 2020, due to a gradual increase in the share of non-Alaska and other Alaska resident permit activity (Figure 27).

Figure 36. Total Number of S 03T Fishery Permits Fished by Residence



Source: CFEC (2021), Northern Economics, Inc. analysis

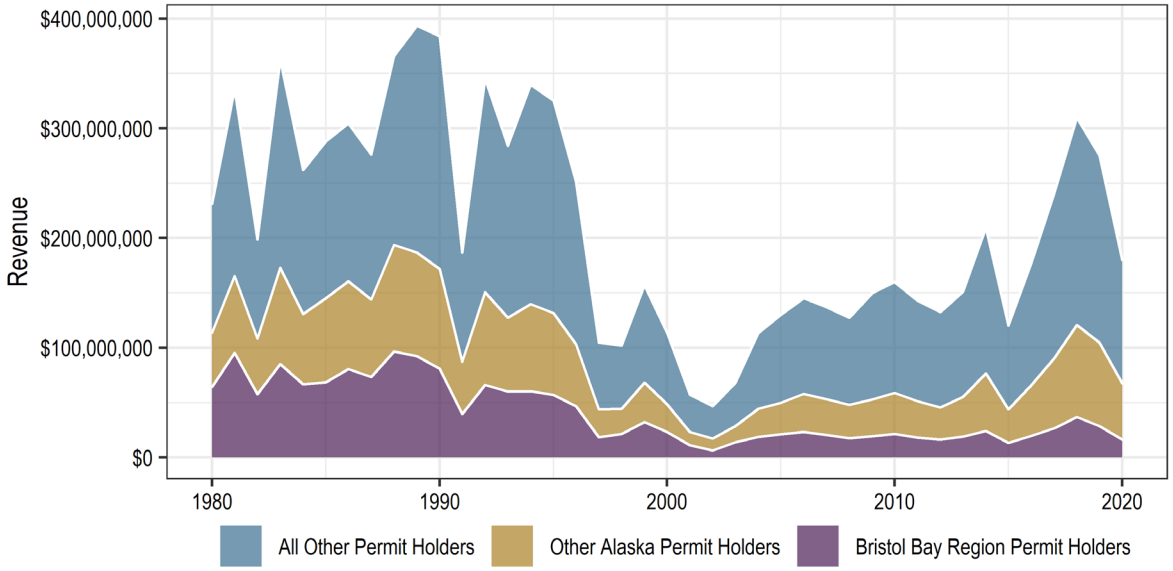
Figure 37. Proportion of S 03T Fishery Permits Fished by Residence



Source: CFEC (2021), Northern Economics, Inc. analysis

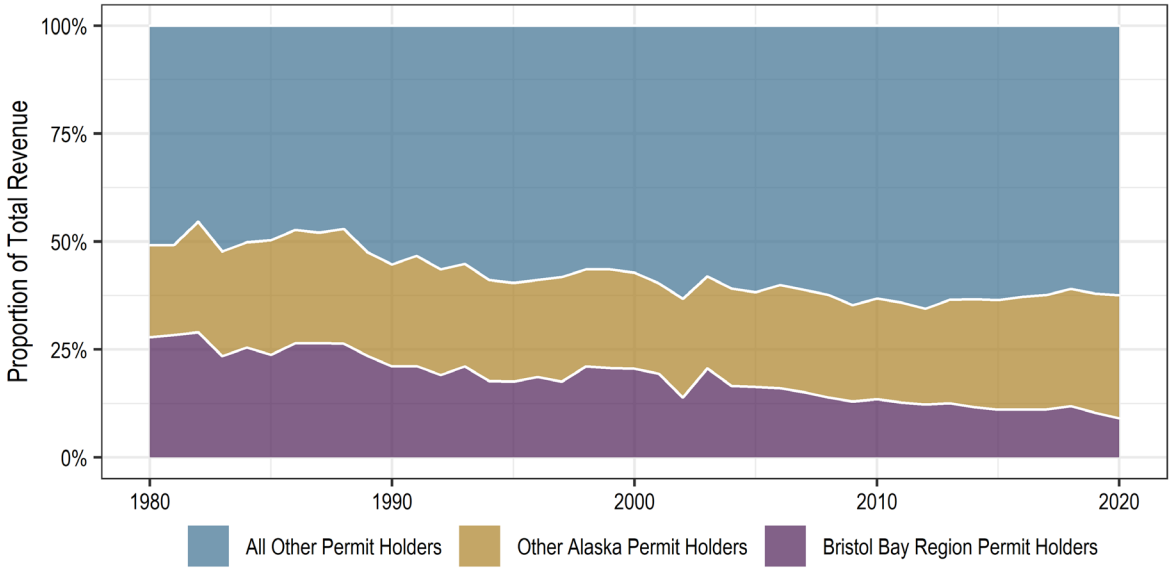
Trends in permit activity are generally echoed in total earnings by residency, where drift earnings have been highest across all non-Alaska permit owners and lowest for those in the Bristol Bay region (Figure 28). Earnings in the Bristol Bay Permit holders group as a proportion of total earnings are also a minority proportion (Figure 29). In recent years, earnings across all permit holders peaked in 2018 at $309.7 million. $188.8 came from non-Alaska permit holders, 84.1 from other Alaskan permit holders, and $36.8 came from Bristol Bay regional permit holders (Table 4).

Figure 38. Total S 03T Fishery Revenue by Permit Holder Residence



Source: CFEC (2021), Northern Economics, Inc. analysis

Figure 39. Proportion of S 03T Fishery Revenue by Permit Holder Residence



Source: CFEC (2021), Northern Economics, Inc. analysis

Table 7. Five-Year Trends in Bristol Bay Drift Fishery Metrics for All Permit Holders

Metric	Year	Bristol Bay Region Permit Holders	Other Alaska Permit Holders	All Other Permit Holders	Total
Revenue	2015	$13,300,347	$30,523,424	$76,401,443	$120,225,214
	2016	$19,643,588	$46,256,750	$111,139,343	$177,039,681
	2017	$26,780,169	$63,663,280	$149,722,835	$240,166,284
	2018	$36,809,834	$84,053,932	$188,816,100	$309,679,866
	2019	$28,670,206	$76,131,531	$170,795,214	$275,596,950
	2020	$16,405,215	$51,228,567	$112,313,356	$179,947,137
Proportion of Total Revenue	2015	11.06%	25.39%	63.55%	100.00%
	2016	11.10%	26.13%	62.78%	100.00%
	2017	11.15%	26.51%	62.34%	100.00%
	2018	11.89%	27.14%	60.97%	100.00%
	2019	10.40%	27.62%	61.97%	100.00%
	2020	9.12%	28.47%	62.41%	100.00%
Proportion of Permits Fished	2015	18.83%	25.95%	55.21%	100.00%
	2016	18.01%	25.42%	56.57%	100.00%
	2017	18.60%	25.65%	55.74%	100.00%
	2018	18.25%	26.68%	55.07%	100.00%
	2019	17.07%	27.41%	55.51%	100.00%
	2020	15.98%	28.47%	55.56%	100.00%
Permits Fished	2015	291	401	853	1,545
	2016	277	391	870	1,538
	2017	285	393	854	1,532
	2018	277	405	836	1,518
	2019	274	440	891	1,605
	2020	243	433	845	1,521

Source: CFEC (2021), Northern Economics, Inc. analysis

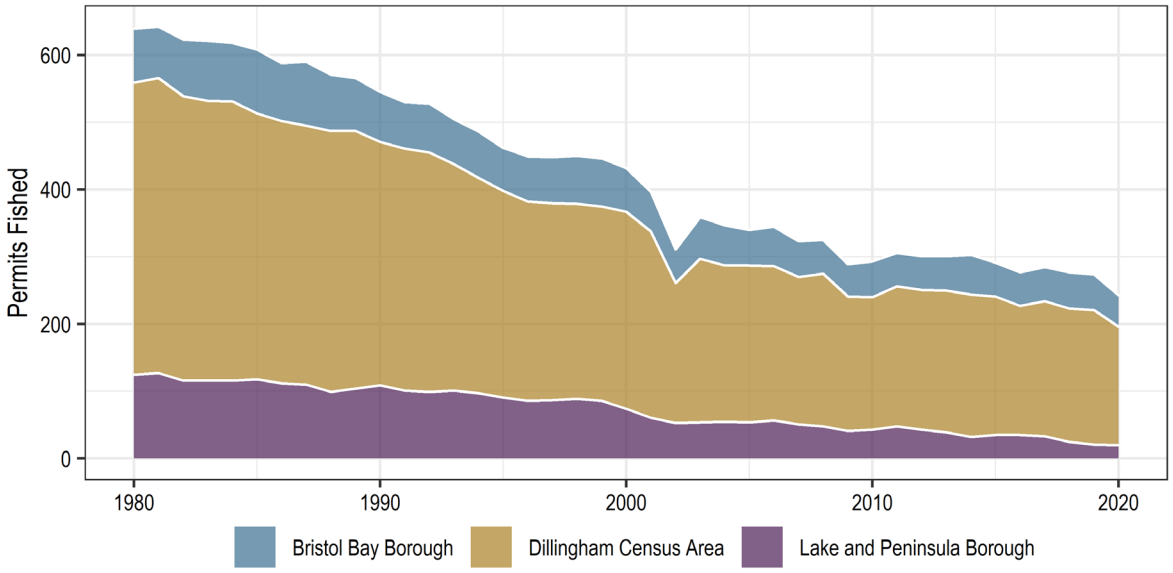
Trends in Bristol Bay Boroughs and Census Areas

Within the Bristol Bay Region, Dillingham Census Area stands out as the area with the consistently highest level of S 03T permit activity across the three sub-regions, even as total permits fished has declined over time (Figure 30). While historically Lake and Peninsula Borough has had the second highest number of permits, with well over 100 active permits in a given year, activity from permit holders in this sub-region has declined the most, allowing effort from Bristol Bay Borough to exceed it in recent years, even though activity has been the most constant across all three subregions over time (Figure 31).

Trends are even more pronounced in terms of fishery earnings. Dillingham Census Area-based permit holders have accounted for upwards of 60 percent of total earnings across Bristol Bay residents (Figure 33). and in the last few years, have accounted for between 70 and 72 percent of

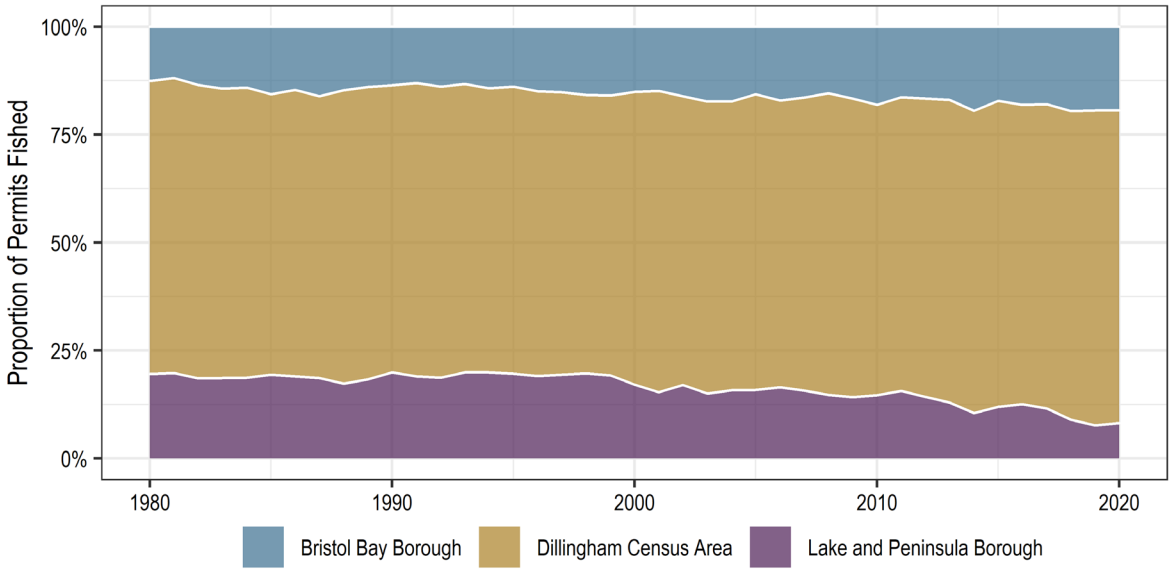
regional revenue (Table 5). In 2018, nearly $25 million was earned by Dillingham Census Area residents alone (Figure 32).

Figure 40. Total Bristol Bay S 03T Permits Fished by Borough or Census Area



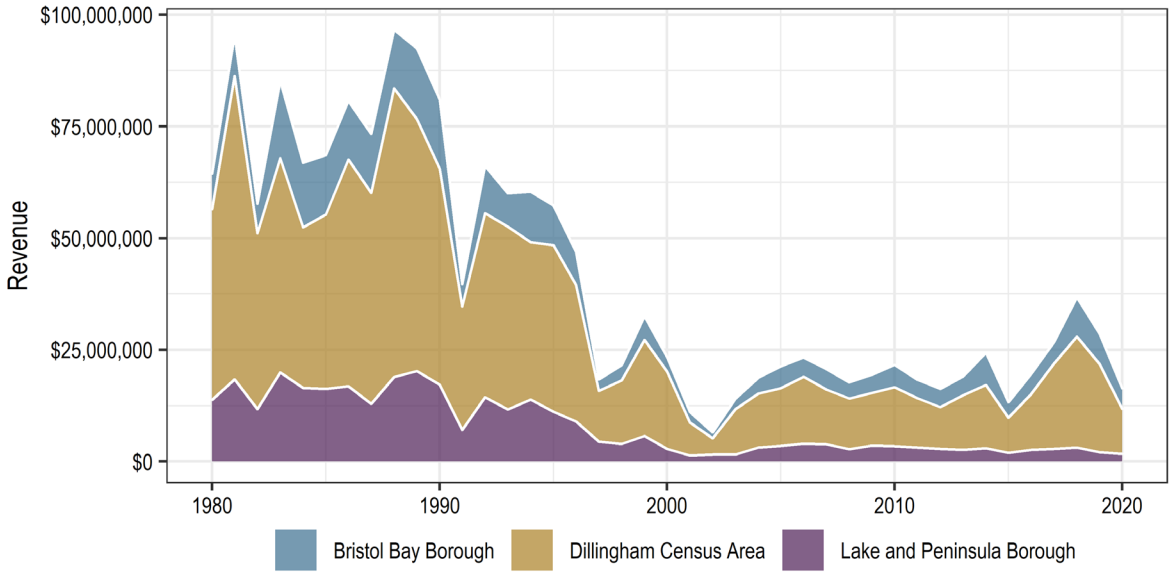
Source: CFEC (2021), Northern Economics, Inc. analysis

Figure 41. Proportion of Bristol Bay S 03T Permits Fished by Borough or Census Area



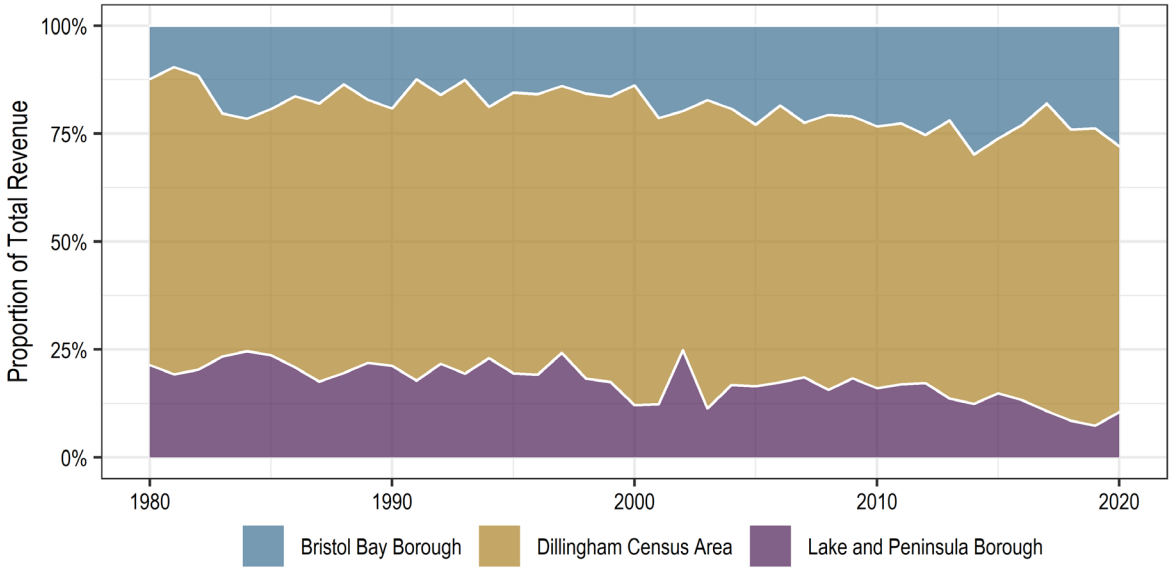
Source: CFEC (2021), Northern Economics, Inc. analysis

Figure 42. Total Bristol Bay S 03T Revenue by Borough or Census Area



Source: CFEC (2021), Northern Economics, Inc. analysis

Figure 43. Proportion of Bristol Bay S 03T Revenue by Borough or Census Area



Source: CFEC (2021), Northern Economics, Inc. analysis

Table 8. Five-Year Trends in Bristol Bay Drift Fishery Metrics for Bristol Bay Permit Holders

Metric	Year	Dillingham Census Area Permit Holders	Lake and Peninsula Borough Permit Holders	Bristol Bay Borough Permit Holders	Total Bristol Bay Region
Revenue	2015	$7,850,891	$1,979,532	$3,469,924	$13,300,347
	2016	$12,532,105	$2,607,428	$4,504,054	$19,643,588
	2017	$19,084,977	$2,881,763	$4,813,429	$26,780,169
	2018	$24,821,576	$3,139,922	$8,848,336	$36,809,834
	2019	$19,750,800	$2,113,134	$6,806,272	$28,670,206
	2020	$10,111,264	$1,724,166	$4,569,785	$16,405,215
Proportion of Total Revenue	2015	59.03%	14.88%	26.09%	100.00%
	2016	63.80%	13.27%	22.93%	100.00%
	2017	71.27%	10.76%	17.97%	100.00%
	2018	67.43%	8.53%	24.04%	100.00%
	2019	68.89%	7.37%	23.74%	100.00%
	2020	61.63%	10.51%	27.86%	100.00%
Proportion of Permits Fished	2015	70.79%	12.03%	17.18%	100.00%
	2016	69.31%	12.64%	18.05%	100.00%
	2017	70.53%	11.58%	17.89%	100.00%
	2018	71.48%	9.03%	19.49%	100.00%
	2019	72.99%	7.66%	19.34%	100.00%
	2020	72.43%	8.23%	19.34%	100.00%
Permits Fished	2015	206	35	50	291
	2016	192	35	50	277
	2017	201	33	51	285
	2018	198	25	54	277
	2019	200	21	53	274
	2020	176	20	47	243

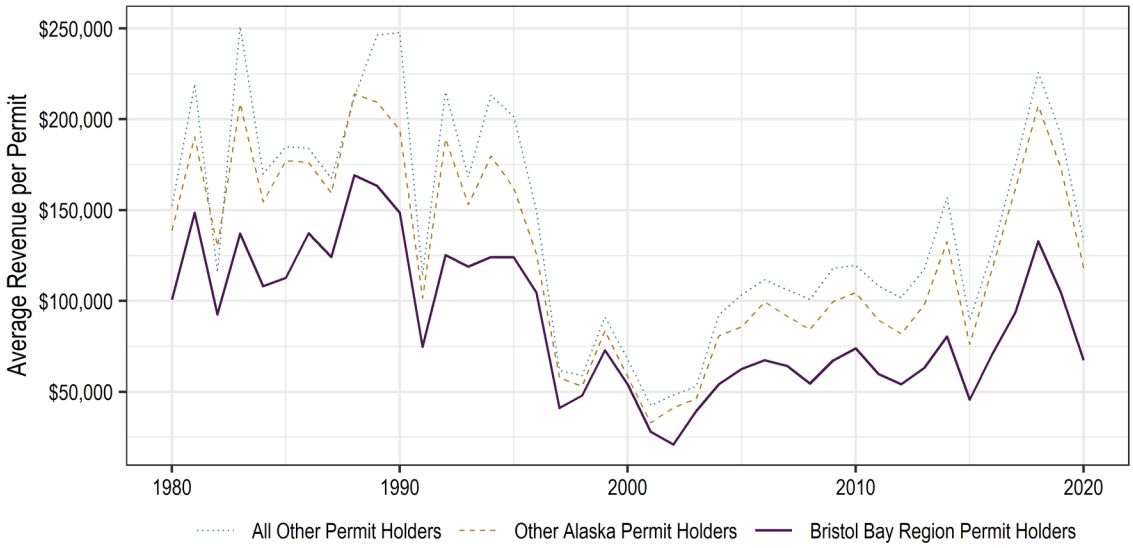
Source: CFEC (2021), Northern Economics, Inc. analysis

Comparing Average Earnings by Residence

Because the number of active permits and earnings vary drastically across regions and sub-regions, it is helpful to compare average earnings per S 03T permit fished. Figure 34 shows average revenue (earnings) per permit fished by region, with emphasis added to the Bristol Bay region. While other Alaska permit holders' and all other non-Alaska permit holders' average earnings have been similar in recent years, there remains a persistent gap between these two groups and average earnings by Bristol Bay region permit holders. In 2020, non-Bristol Bay permit holders earned approximately $125,000 per permit fished while Bristol Bay region permit holders earned slightly less than $75,000, on average. Due to data confidentiality restrictions, we are unable to show the distribution of earnings across residents and permit holders, but it is likely that there is considerable variability across permit holders with some earning much more than the average and others far less.

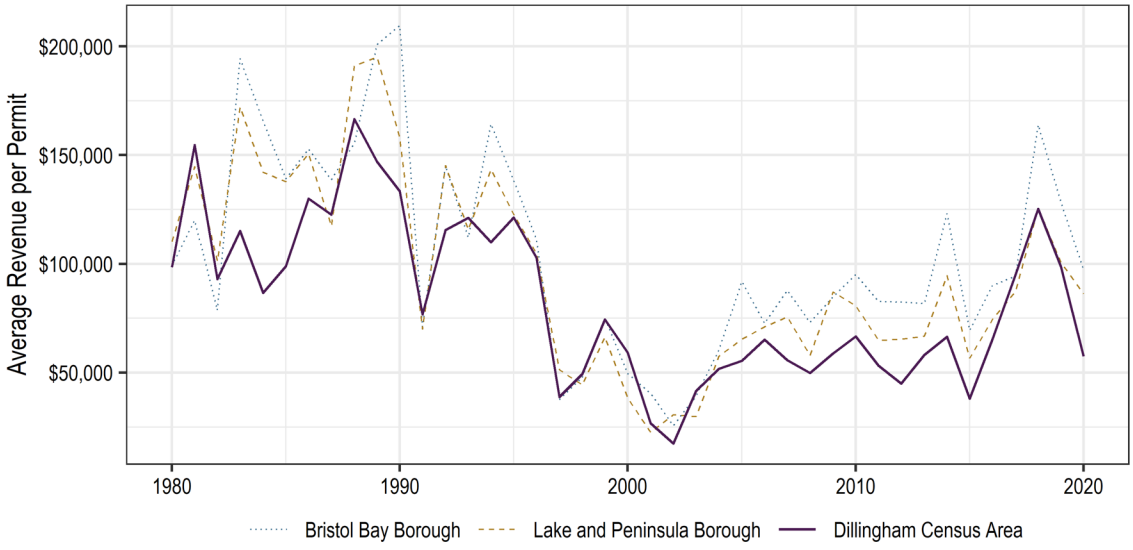
Within the Bristol Bay region, we find that on average, Bristol Bay Borough residents generally earn more per permit fished than other sub-regions. This was particularly pronounced in the mid-2010s, but is observable in recent years as well even as average earnings per permit fished increased across all three sub-regions (Figure 35). Dillingham Census Area and Lake and Peninsula Borough are more evenly matched, with Dillingham average earnings exceeding Lake and Peninsula earnings in some years, but in most cases Lake and Peninsula Borough permit holders earn slightly more.

Figure 44. Average S 03T Fishery Earnings per Permit Fished by Residence



Source: CFEC (2021), Northern Economics, Inc. analysis

Figure 45. Average Bristol Bay S 03T Fishery Earnings per Permit Fished by Borough or Census Area

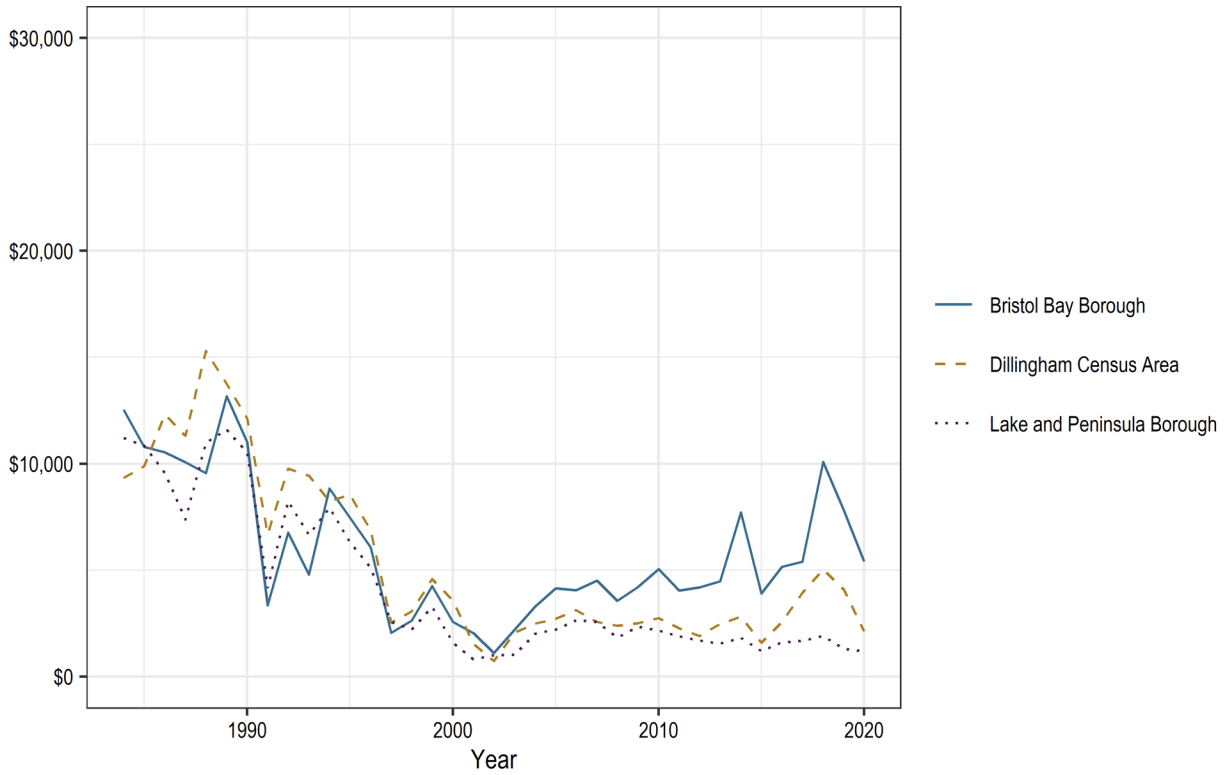


Source: CFEC (2021), Northern Economics, Inc. analysis

Drift Fishery Revenue Per Capita

We can look at the relative importance of drift fishery revenue relative to other boroughs in Bristol Bay by calculating per capita revenue, or average fishery earnings per person in the population (Figure 36). Overall, recent trends in per capita revenue for the drift fishery are similar to the trend for both the drift and setnet fisheries combined (see Figure 61 in *Drift and Setnet Fisheries Combined* section). Since at least 2002, revenue per capita has been highest for Bristol Bay Borough, followed by Dillingham Census Area and Lake and Peninsula Borough. However, it is worth noting that historically Dillingham Census Area had higher per capita revenues, but as its population has increased over time and other regions have decreased, Bristol Bay Borough has surpassed it. Unsurprisingly, with the removal of setnet fishery revenue, 10-year average amounts for all three boroughs are lower than the total. In Bristol Bay Borough, the recent average per capita revenue was $5,750, in Dillingham Census Area it was $2,867, and in Lake and Peninsula Borough it was $1,635.

Figure 46. Per Capita Revenue from the Drift Fishery



Source: ADOLWD (2022a), CFEC (2021), Northern Economics, Inc. analysis

Table 9.Ten-Year Average Drift Fishery Revenue Per Capita by Borough or Census Area

Area	2010–2020 Average Per Capita Revenue
Bristol Bay Borough	$5,750
Dillingham Census Area	$2,867
Lake and Peninsula Borough	$1,635

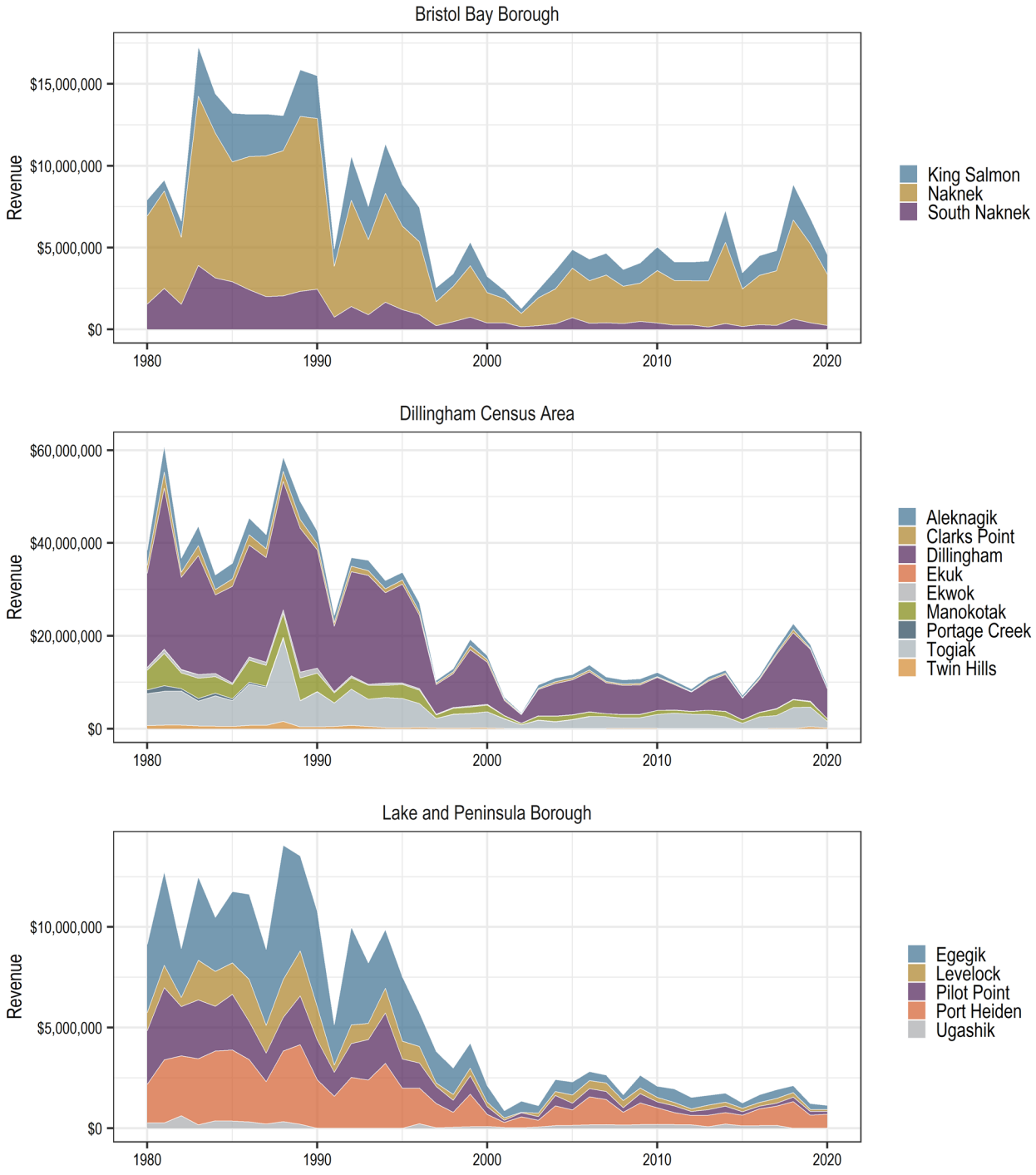
Source: ADOLWD (2022a), CFEC (2021), Northern Economics, Inc. analysis

Trends by Bristol Bay Community

In this section we examine drift fishery trends at an even finer level, at the level of each BBEDC community. Because of the number of communities within the Dillingham Census Area and Lake and Peninsula Borough, we identify the BBEDC member communities for simplicity, though the total contribution of non-BBEDC communities to a given borough or census area's total participation or earnings is visible in the proportion charts. As mentioned previously, much of the data at the individual community level is considered confidential and many data points are estimated by Northern Economics and are not official CFEC data. Therefore, fine scale interpretation of results at the community level should be treated with caution.

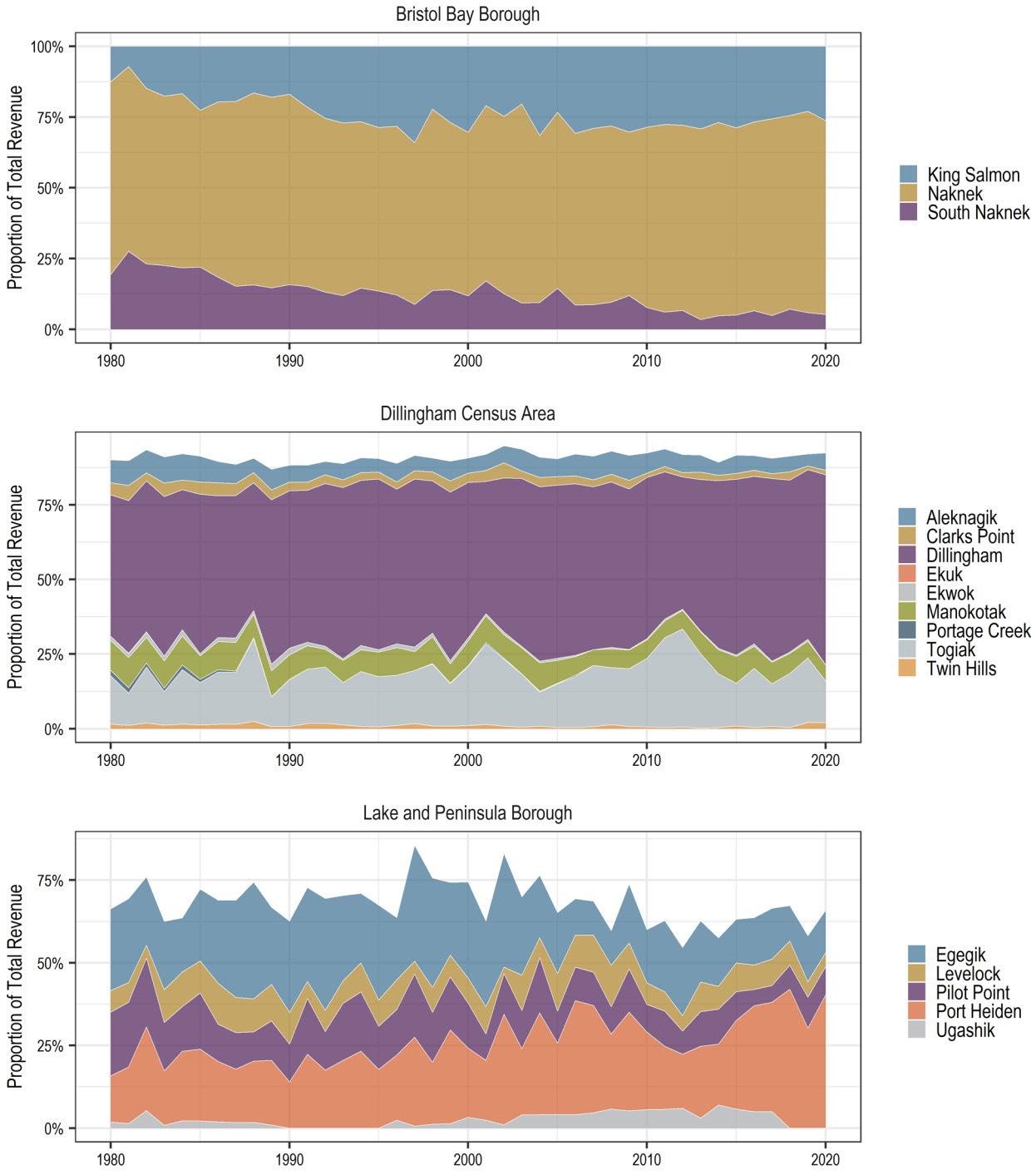
The communities with the highest level of S 03T participation and earnings in each borough or census area are first, Naknek, in Bristol Bay Borough, Dillingham, in Dillingham Census Area, and in recent years, Port Heiden in Lake and Peninsula Borough (Figure 37, Figure 39, and Figure 40). While BBEDC communities account for most, if not all, of revenue and participation from Bristol Bay and Dillingham Census Area communities, approximately 40 percent of total S 03T earnings, on average, come from non-BBEDC communities in Lake and Peninsula Borough (Figure 38).

Figure 47. Total S 03T Earnings for BBEDC Communities



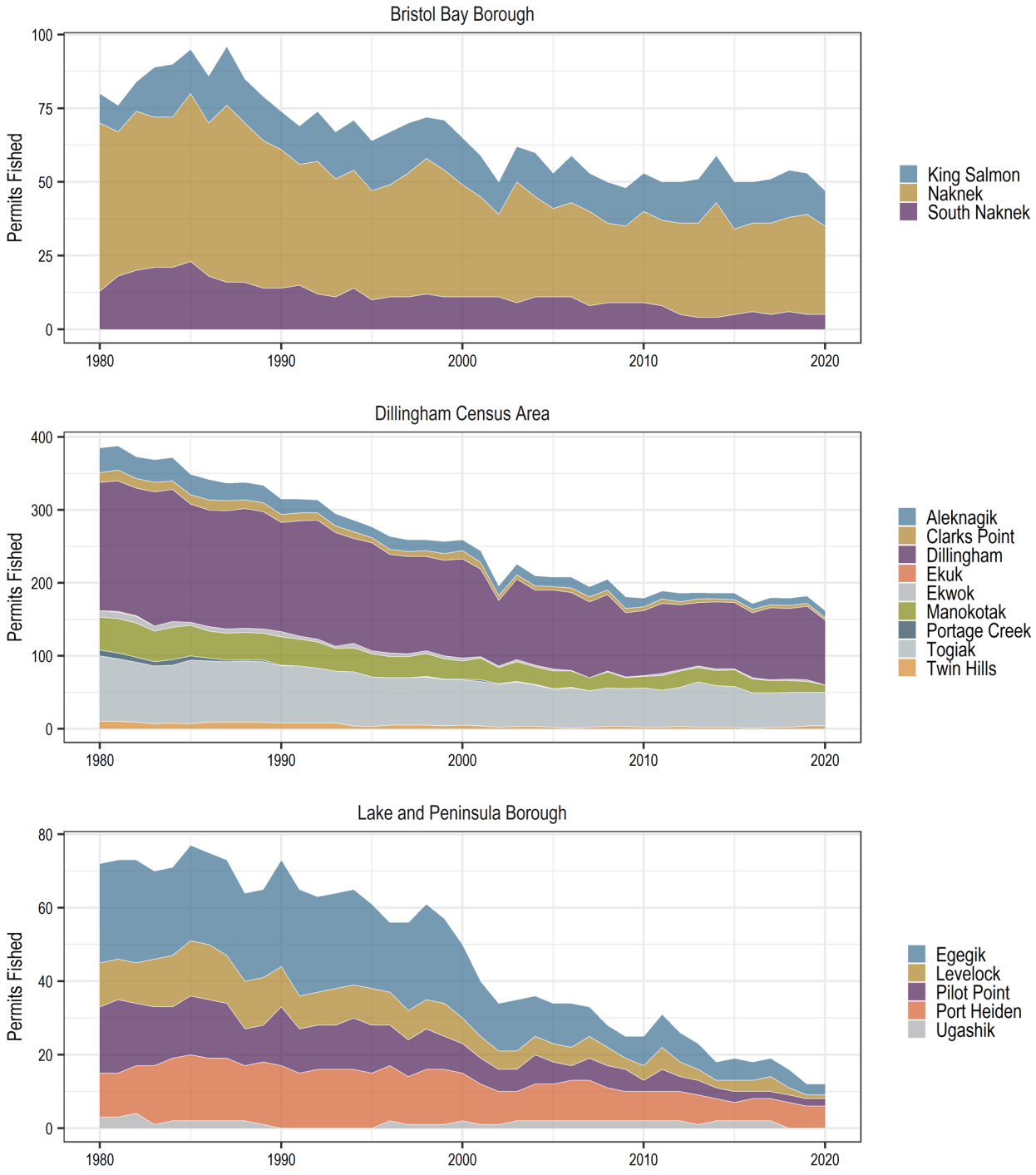
Source: CFEC (2021), Northern Economics, Inc. analysis

Figure 48. Proportion of Total S 03T Bristol Bay Earnings for BBEDC Communities



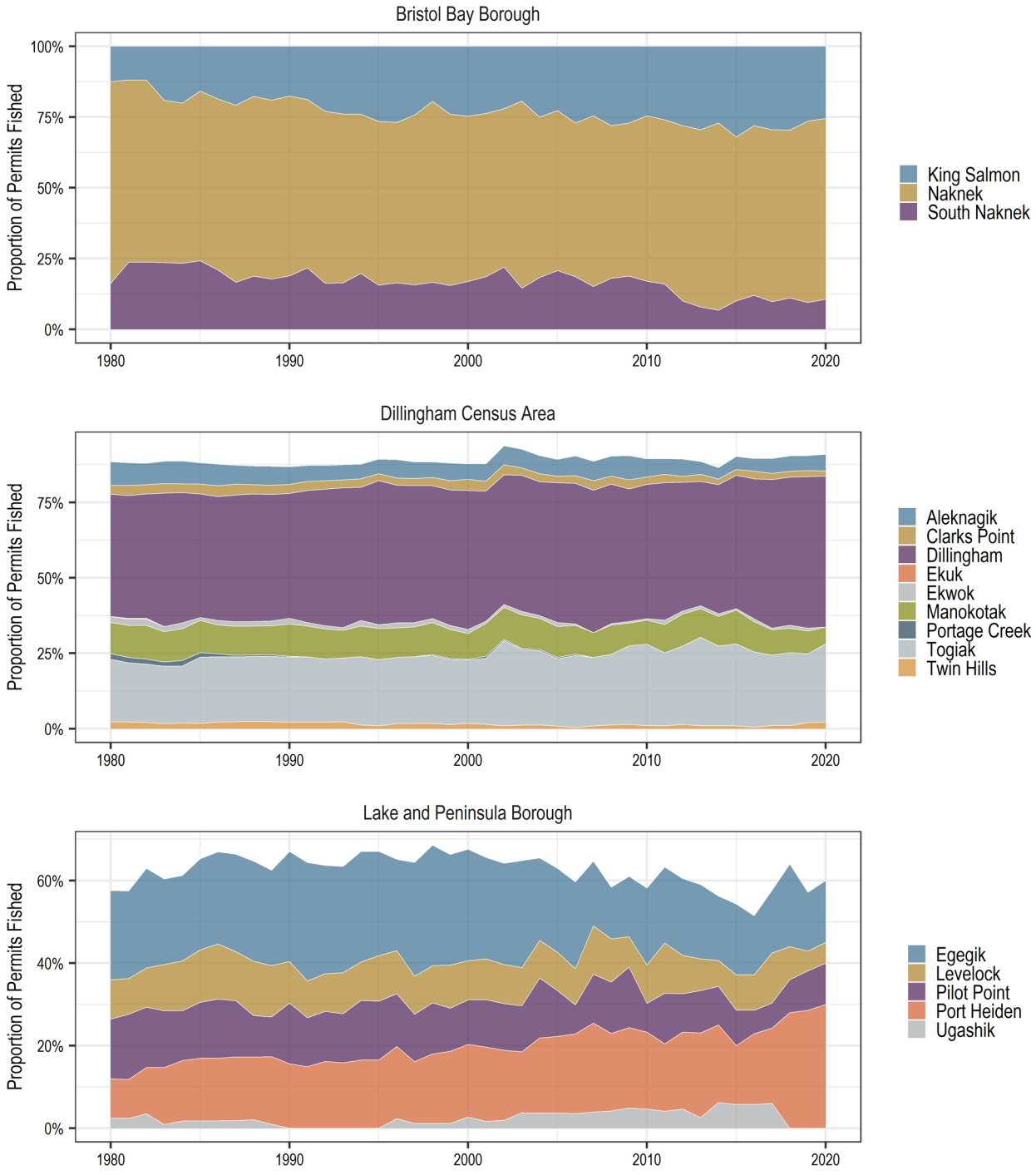
Source: CFEC (2021), Northern Economics, Inc. analysis

Figure 49. S 03T Permits Fished in BBEDC Communities



Source: CFEC (2021), Northern Economics, Inc. analysis

Figure 50. Proportion of Total S 03T Bristol Bay Permits Fished for BBEDC Communities



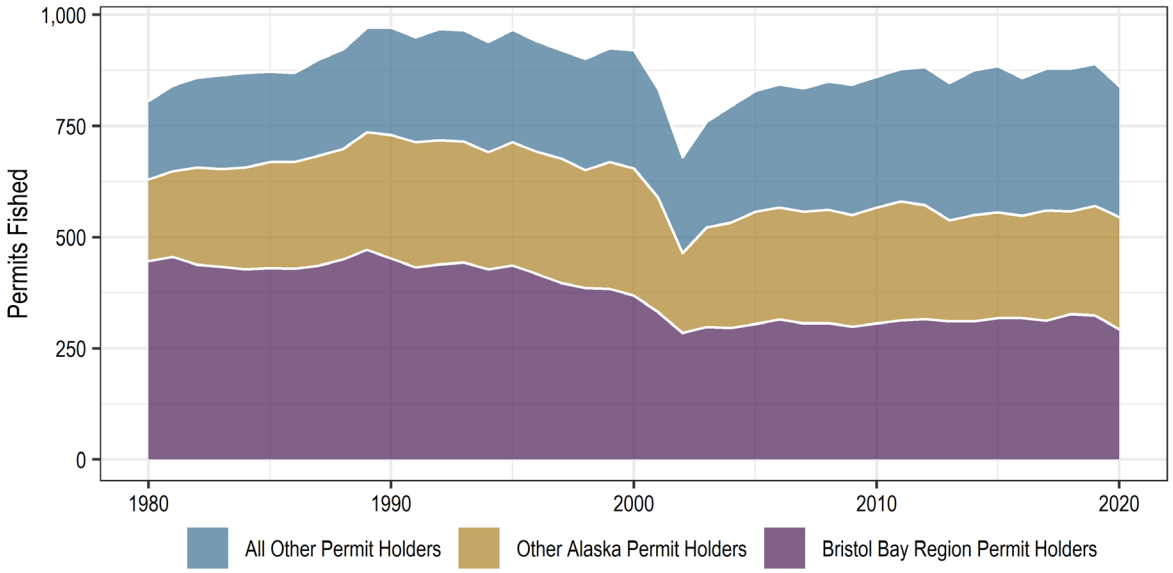
Source: CFEC (2021), Northern Economics, Inc. analysis

The Setnet Fishery

Trends Across All Setnet Permit Holders by Residence

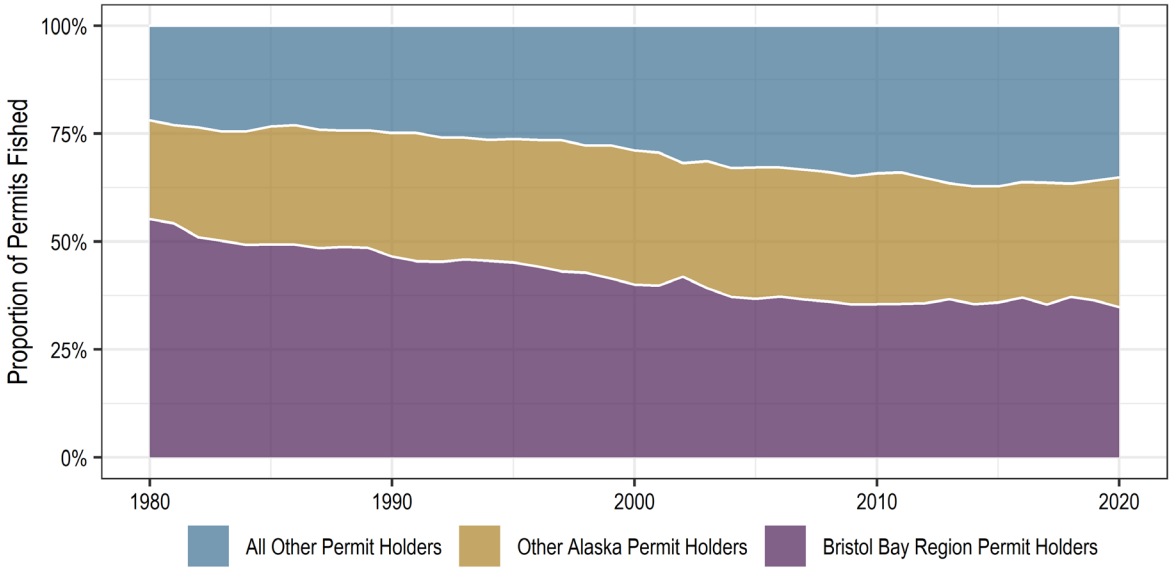
In this section we compare overall changes in S 04T setnet fishery permit activity by residence as well as changes in earnings, focusing on trends in the Bristol Bay region as compared to other Alaska and all other, non-Alaska permit holders. Figure 41 shows changes in the number of setnet permits fished over time; since 2002 there has been a slightly upward trend in the total number of permits fished, largely accounted for by increases across all three groups. While Bristol Bay region permit holders have historically accounted for over 50 percent of all permits fished, this has slowly dropped to 38 percent in 2020, due to a gradual increase in the share of other Alaska resident permit activity (Figure 42). These trends are similar to the changes in total earnings by residence, shown in Figure 43, as well as the proportion of total earnings (Figure 44). Earnings by Bristol Bay residents topped $21.6 million in the setnet fishery in 2019, while total setnet earnings reached $70 million in the same year (Table 7).

Figure 51. Total Number of S 04T Fishery Permits Fished by Residence



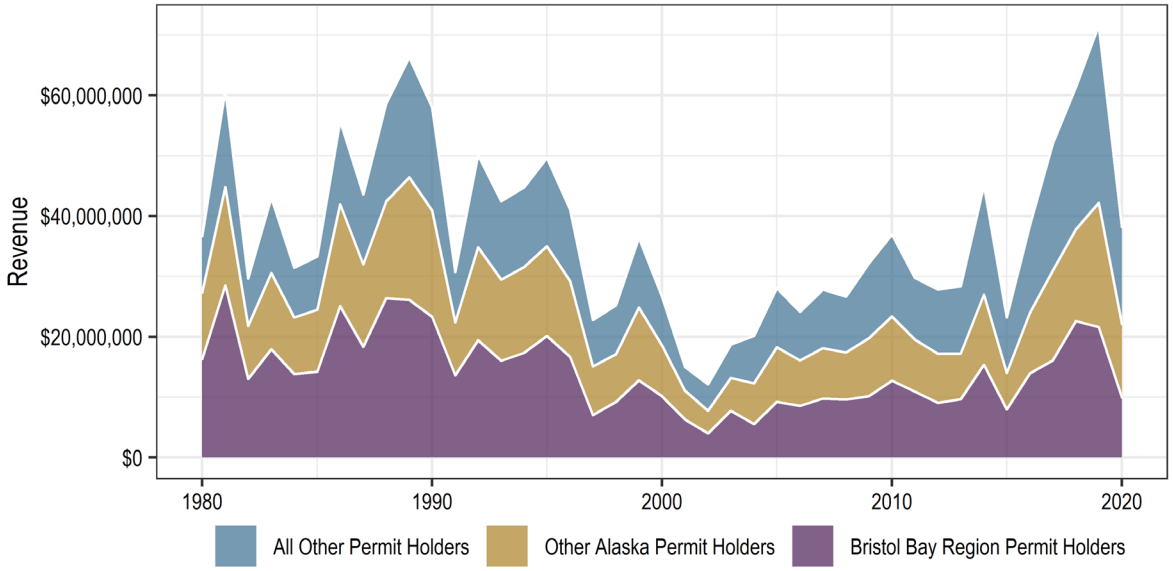
Source: CFEC (2021), Northern Economics, Inc. analysis

Figure 52. Proportion of S 04T Fishery Permits Fished by Residence



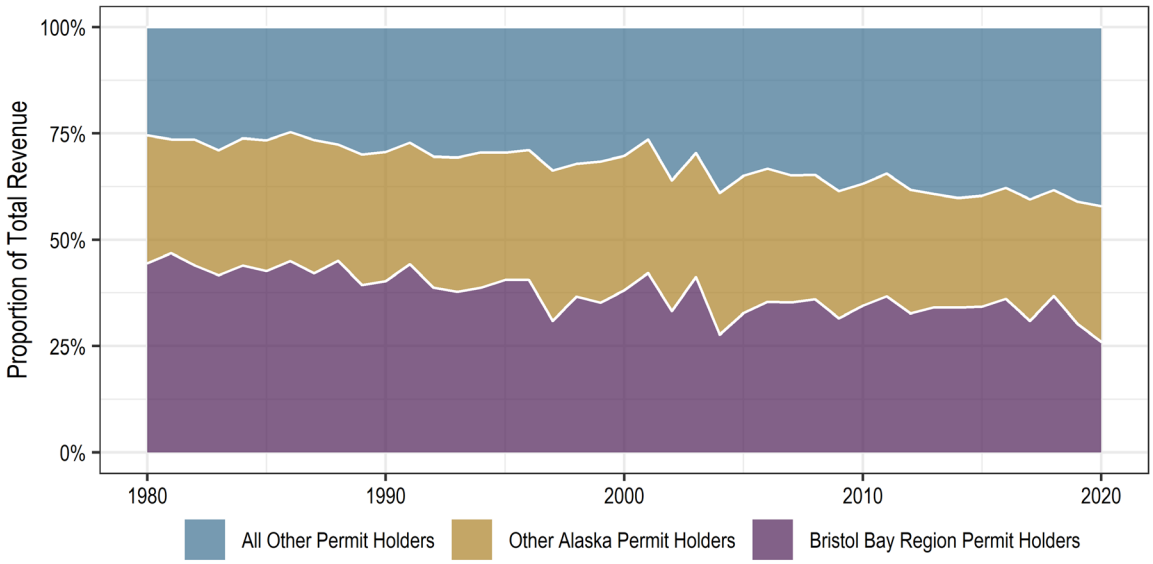
Source: CFEC (2021), Northern Economics, Inc. analysis

Figure 53. Total S 03T Fishery Revenue by Permit Holder Residence



Source: CFEC (2021), Northern Economics, Inc. analysis

Figure 54. Proportion of S 04T Fishery Revenue by Permit Holder Residence



Source: CFEC (2021), Northern Economics, Inc. analysis

Table 10. Five-Year Trends in Bristol Bay Setnet Fishery Metrics for All Permit Holders

Metric	Year	Bristol Bay Region Permit Holders	Other Alaska Permit Holders	All Other Permit Holders	Total
Revenue	2015	$7,970,877	$6,041,013	$9,206,830	$23,218,719
	2016	$13,925,168	$10,035,356	$14,528,307	$38,488,830
	2017	$16,081,306	$14,847,259	$21,031,665	$51,960,230
	2018	$22,601,299	$15,222,737	$23,510,688	$61,334,724
	2019	$21,643,914	$20,539,666	$29,325,266	$71,508,846
	2020	$9,938,086	$12,163,260	$16,064,916	$38,166,262
Proportion of Total Revenue	2015	34.33%	26.02%	39.65%	100.00%
	2016	36.18%	26.07%	37.75%	100.00%
	2017	30.95%	28.57%	40.48%	100.00%
	2018	36.85%	24.82%	38.33%	100.00%
	2019	30.27%	28.72%	41.01%	100.00%
	2020	26.04%	31.87%	42.09%	100.00%
Proportion of Permits Fished	2015	35.93%	26.89%	37.18%	100.00%
	2016	37.06%	26.81%	36.13%	100.00%
	2017	35.49%	28.21%	36.29%	100.00%
	2018	37.20%	26.28%	36.52%	100.00%
	2019	36.40%	27.75%	35.84%	100.00%
	2020	34.88%	30.00%	35.12%	100.00%
Permits Fished	2015	318	238	329	885
	2016	318	230	310	858
	2017	312	248	319	879
	2018	327	231	321	879
	2019	324	247	319	890
	2020	293	252	295	840

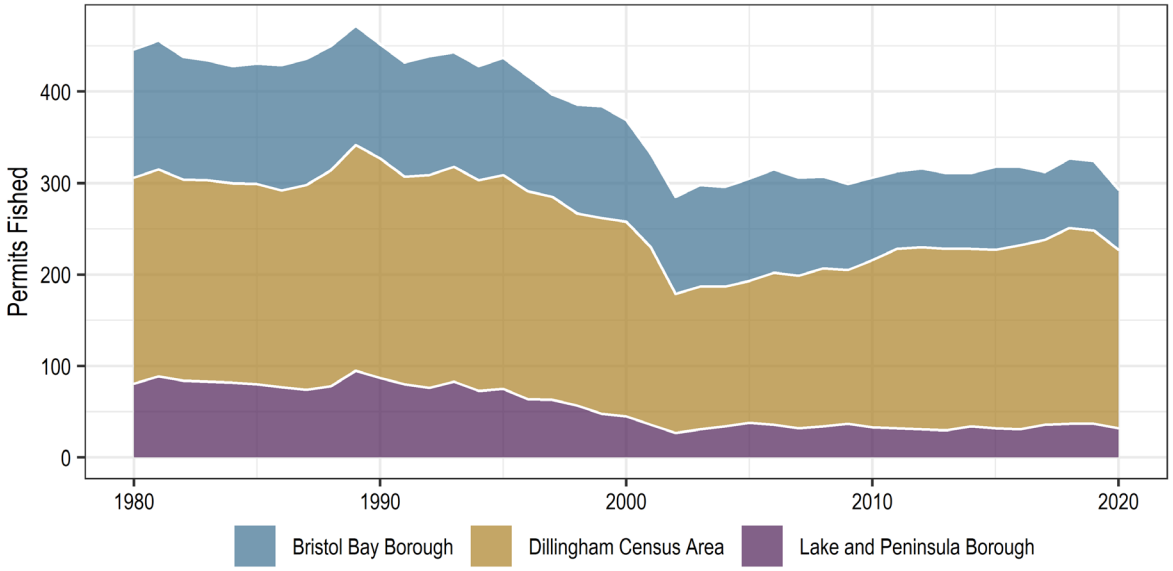
Source: CFEC (2021), Northern Economics, Inc. analysis

Trends in Bristol Bay Boroughs and Census Areas

Within the Bristol Bay region, Dillingham Census Area stands out as the area with the consistently highest level of S 03T permit activity across the three sub-regions, even as total permits fished has declined over time (Figure 45). Dillingham Census Area has increased in its prominence over time, with an increasing number of active permits per year as well as increasing share of total permits fished (Figure 46).

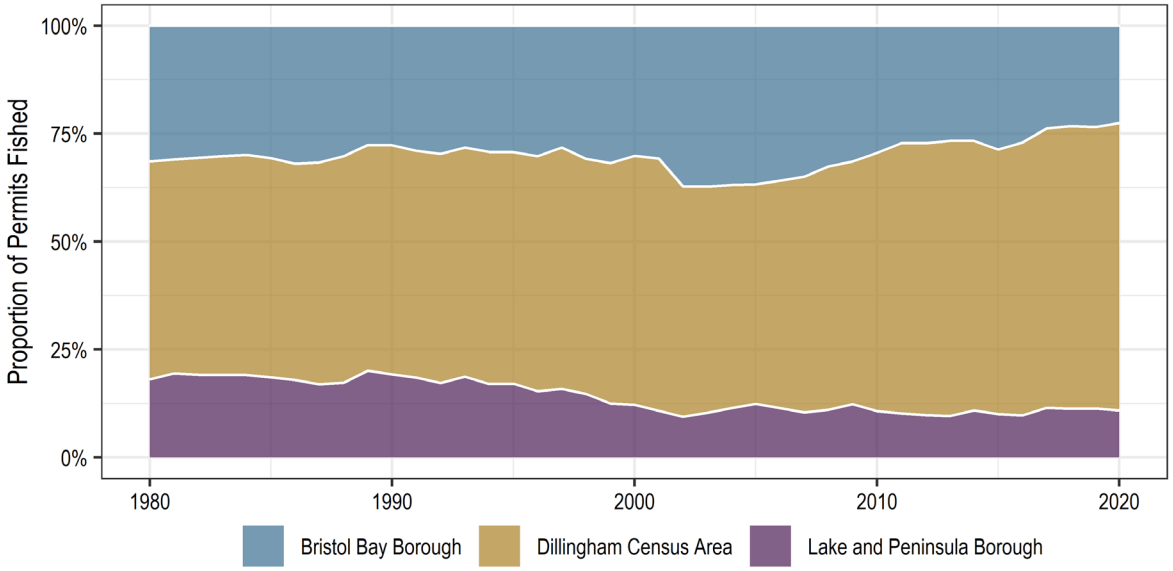
Trends are even more pronounced in terms of fishery earnings, with earnings from Dillingham Census Area-based permit holders accounting for upwards of 60 percent of total earnings across Bristol Bay residents (Figure 47). In 2018, $16.9 million was earned by Dillingham Census Area residents alone (Figure 48, Table 8).

Figure 55. Total Bristol Bay S 04T Permits Fished by Borough or Census Area



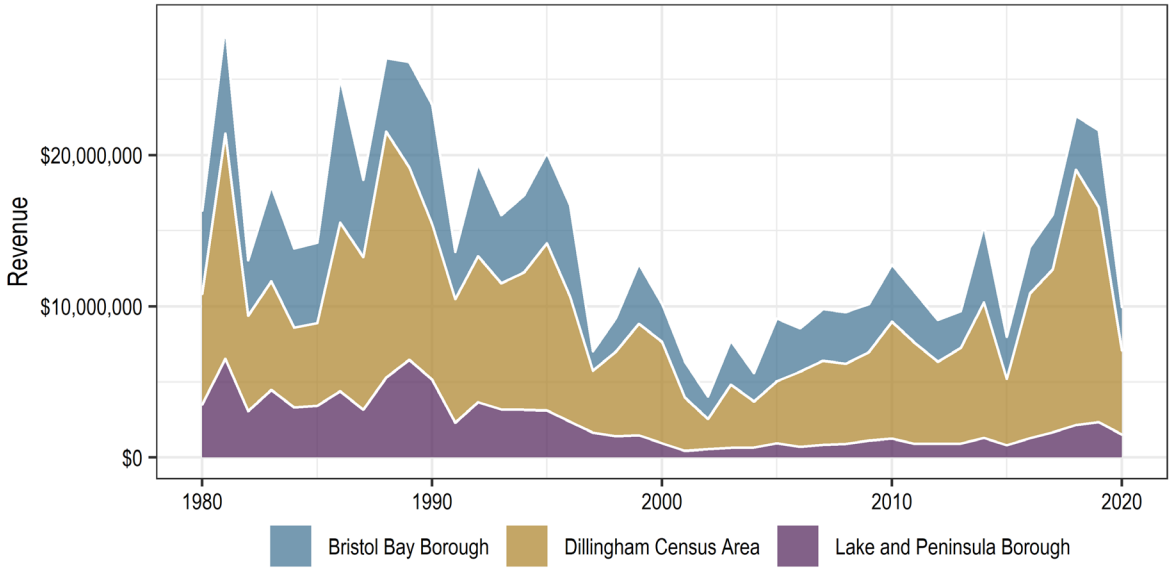
Source: CFEC (2021), Northern Economics, Inc. analysis

Figure 56. Proportion of Bristol Bay S 04T Permits Fished by Borough or Census Area



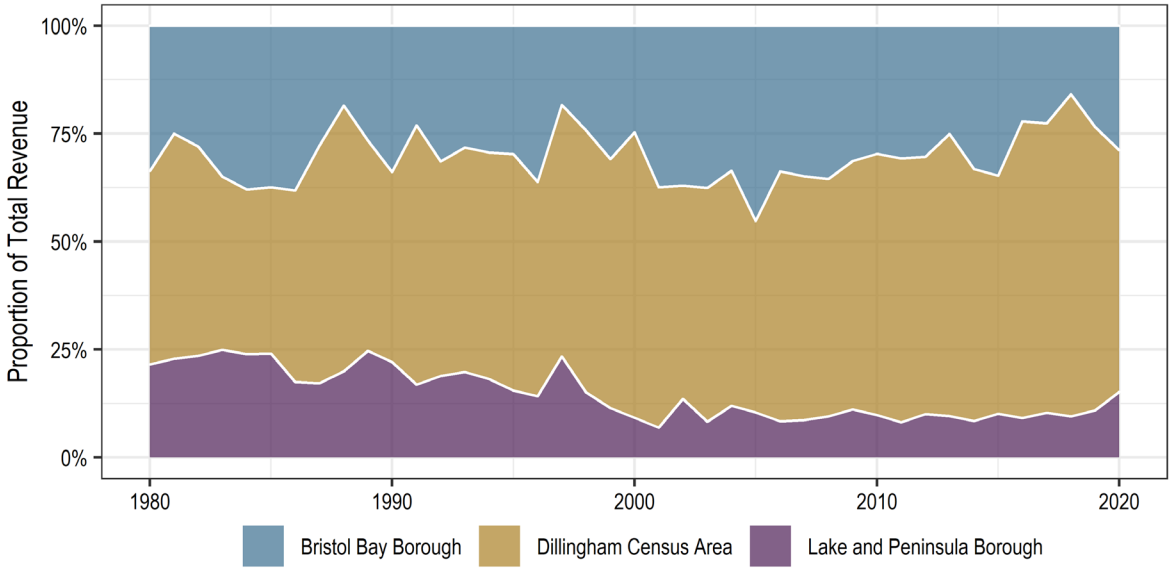
Source: CFEC (2021), Northern Economics, Inc. analysis

Figure 57. Total Bristol Bay S 04T Revenue by Borough or Census Area



Source: CFEC (2021), Northern Economics, Inc. analysis

Figure 58. Proportion of Bristol Bay S 04T Revenue by Borough or Census Area



Source: CFEC (2021), Northern Economics, Inc. analysis

Table 11. Five-Year Trends in Bristol Bay Setnet Fishery Metrics for Bristol Bay Permit Holders

Metric	Year	Dillingham Census Area Permit Holders	Lake and Peninsula Borough Permit Holders	Bristol Bay Borough Permit Holders	Total Bristol Bay Region
Revenue	2015	$4,390,518	$811,597	$2,768,762	$7,970,877
	2016	$9,570,813	$1,274,814	$3,079,541	$13,925,168
	2017	$10,776,257	$1,666,772	$3,638,277	$16,081,306
	2018	$16,864,009	$2,160,662	$3,576,628	$22,601,299
	2019	$14,208,361	$2,359,133	$5,076,420	$21,643,914
	2020	$5,560,556	$1,512,694	$2,864,835	$9,938,086
Proportion of Total Revenue	2015	55.08%	10.18%	34.74%	100.00%
	2016	68.73%	9.15%	22.11%	100.00%
	2017	67.01%	10.36%	22.62%	100.00%
	2018	74.62%	9.56%	15.82%	100.00%
	2019	65.65%	10.90%	23.45%	100.00%
	2020	55.95%	15.22%	28.83%	100.00%
Proportion of Permits Fished	2015	61.32%	10.06%	28.62%	100.00%
	2016	63.21%	9.75%	27.04%	100.00%
	2017	64.74%	11.54%	23.72%	100.00%
	2018	65.44%	11.31%	23.24%	100.00%
	2019	65.12%	11.42%	23.46%	100.00%
	2020	66.55%	10.92%	22.53%	100.00%
Permits Fished	2015	195	32	91	318
	2016	201	31	86	318
	2017	202	36	74	312
	2018	214	37	76	327
	2019	211	37	76	324
	2020	195	32	66	293

Source: CFEC (2021), Northern Economics, Inc. analysis

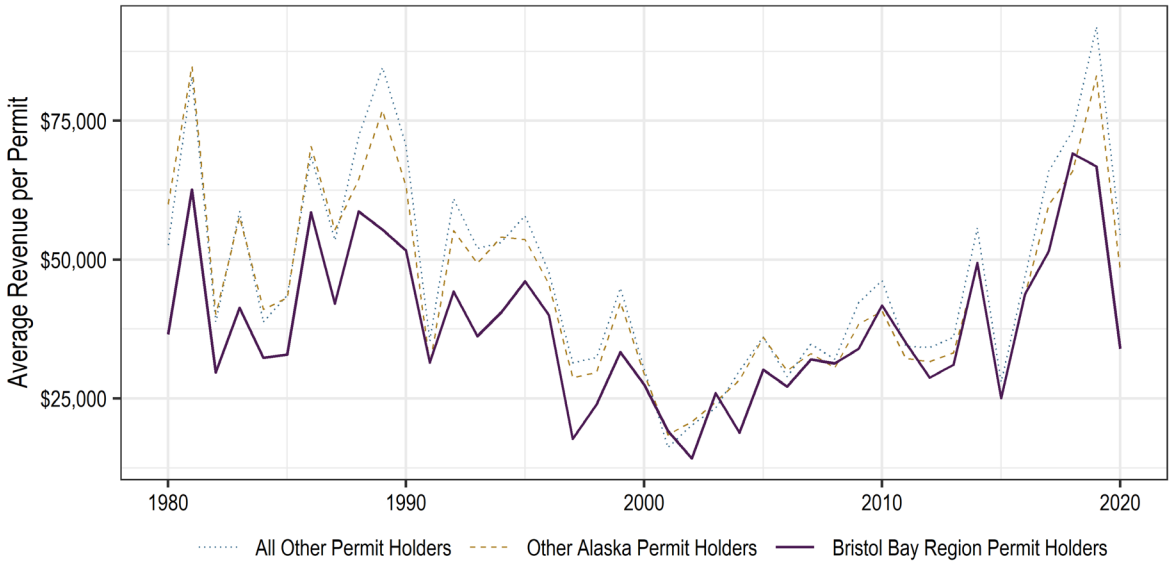
Comparing Average Earnings by Residence

Because the number of active permits and earnings vary drastically across regions and sub-regions, it is helpful to compare average earnings per S 04T permit fished. Figure 49 shows average revenue (earnings) per permit fished by region, with emphasis added to the Bristol Bay region. Since the mid-2000s, earnings across all three groups have been similar, but in recent years, the gap between Bristol Bay region permit holders and other regions has widened, with non-Alaska permit holders earning more than $87,000 per permit fished in 2019 (record highs) while Bristol Bay region permit holders earned less than $70,000, and this gap persisted into 2021.

Figure 50 shows each sub-region within Bristol Bay and shows that there is considerable variability in average earnings across each borough and census area year to year. In 2019, average earnings

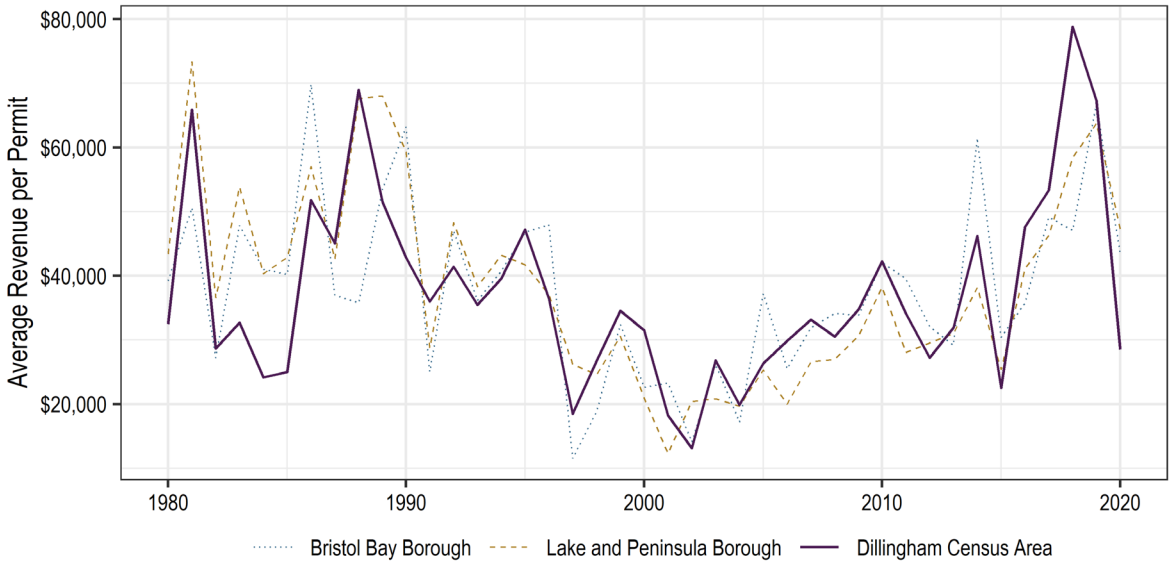
were all quite similar, while in 2018, Dillingham Census Area residents earned more on average than in any year in the time series before plummeting in 2020.

Figure 59. Average S 04T Fishery Earnings per Permit Fished by Residence



Source: CFEC (2021), Northern Economics, Inc. analysis

Figure 60. Average Bristol Bay S 04T Fishery Earnings per Permit Fished by Borough or Census Area

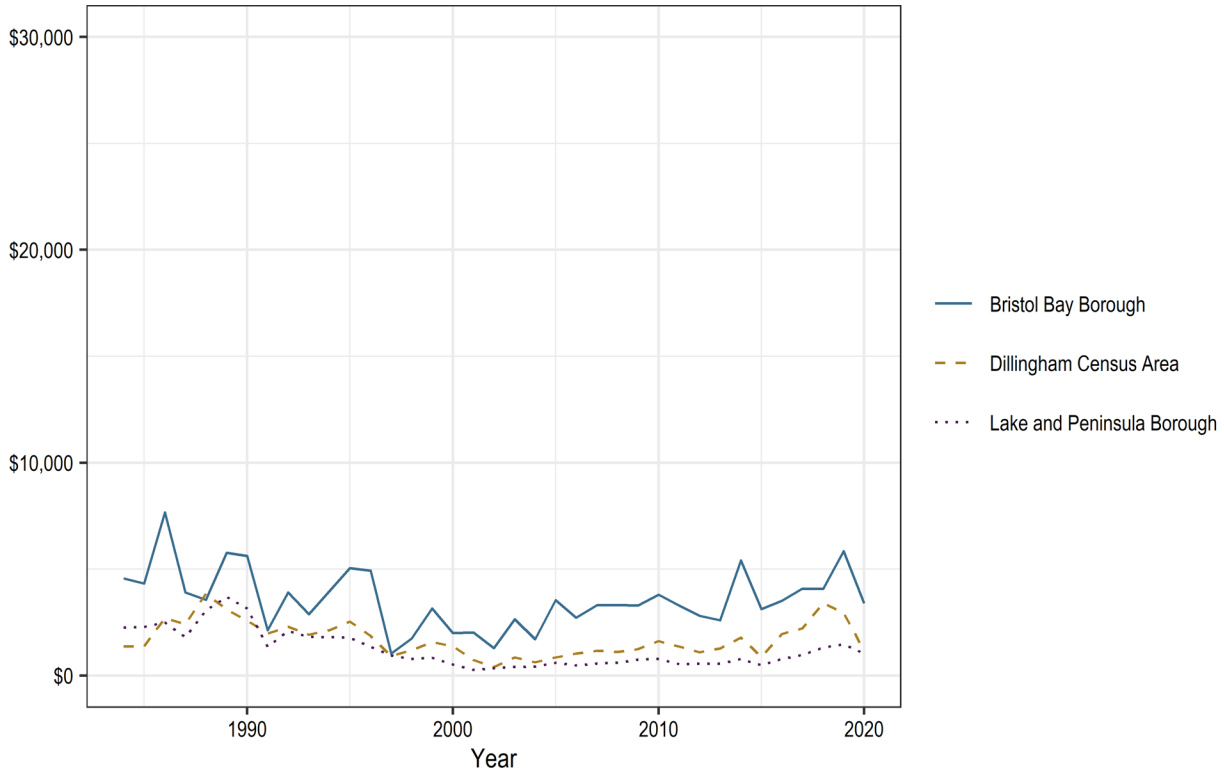


Source: CFEC (2021), Northern Economics, Inc. analysis

Setnet Fishery Per Capita Revenue

For the setnet fishery, per capita revenue is consistent with overall trends for both fisheries together, as well as the standalone trend for the drift fishery, with Bristol Bay Borough having the highest per capita revenue, due to an outsized share of fishery revenue relative to its total population size (Figure 51). Because total revenues from the setnet fishery are less than the drift fishery, per capita revenues are smaller for every borough or census area as a result. Bristol Bay Borough's 10-year average per capita revenue was approximately $3,800, Dillingham Census Area was $1,795, and Lake and Peninsula Borough was $843 (Table 9).

Figure 61. Per Capita Revenue from the Setnet Fishery by Borough or Census Area



Source: ADOLWD (2022a), CFEC (2021), Northern Economics, Inc. analysis

Table 12. Ten-Year Average Setnet Fishery Revenue Per Capita by Borough or Census Area

Area	2010–2020 Average Per Capita Revenue
Bristol Bay Borough	$3,812
Dillingham Census Area	$1,795
Lake and Peninsula Borough	$843

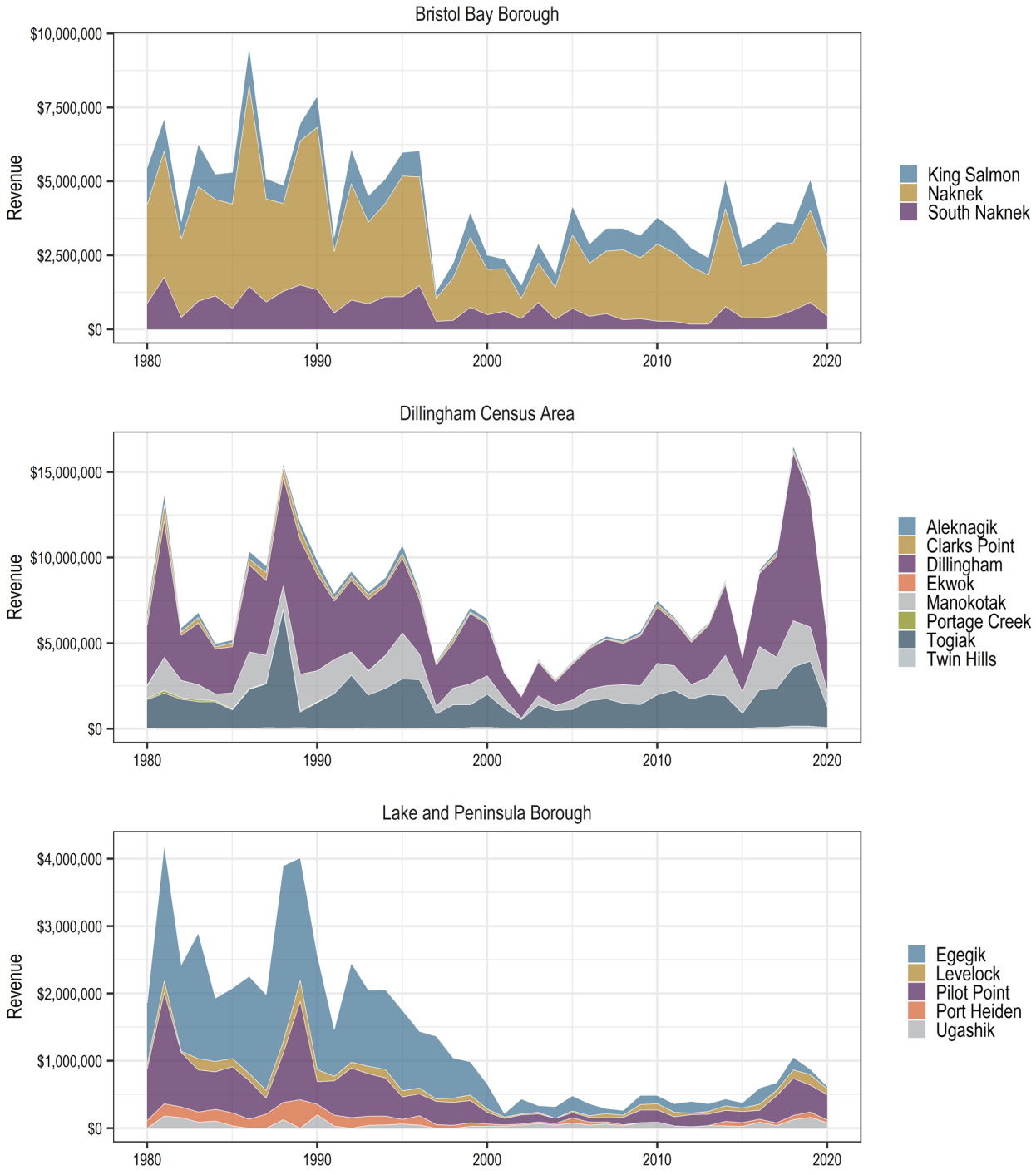
Source: ADOLWD (2022a), CFEC (2021), Northern Economics, Inc. analysis

Trends by Bristol Bay Community

In this section we examine setnet fishery trends at an even finer level—at the level of each BBEDC community. Because of the number of communities within the Dillingham Census Area and Lake and Peninsula Borough, we identify the BBEDC member communities for simplicity, though the total contribution of non-BBEDC communities to a given borough or census area's total participation or earnings is visible in the proportion charts. As mentioned previously, much of the data at the individual community level is considered confidential and many data points are estimated by Northern Economics and are not official CFEC data. Therefore, fine scale interpretation of results at the community level should be treated with caution.

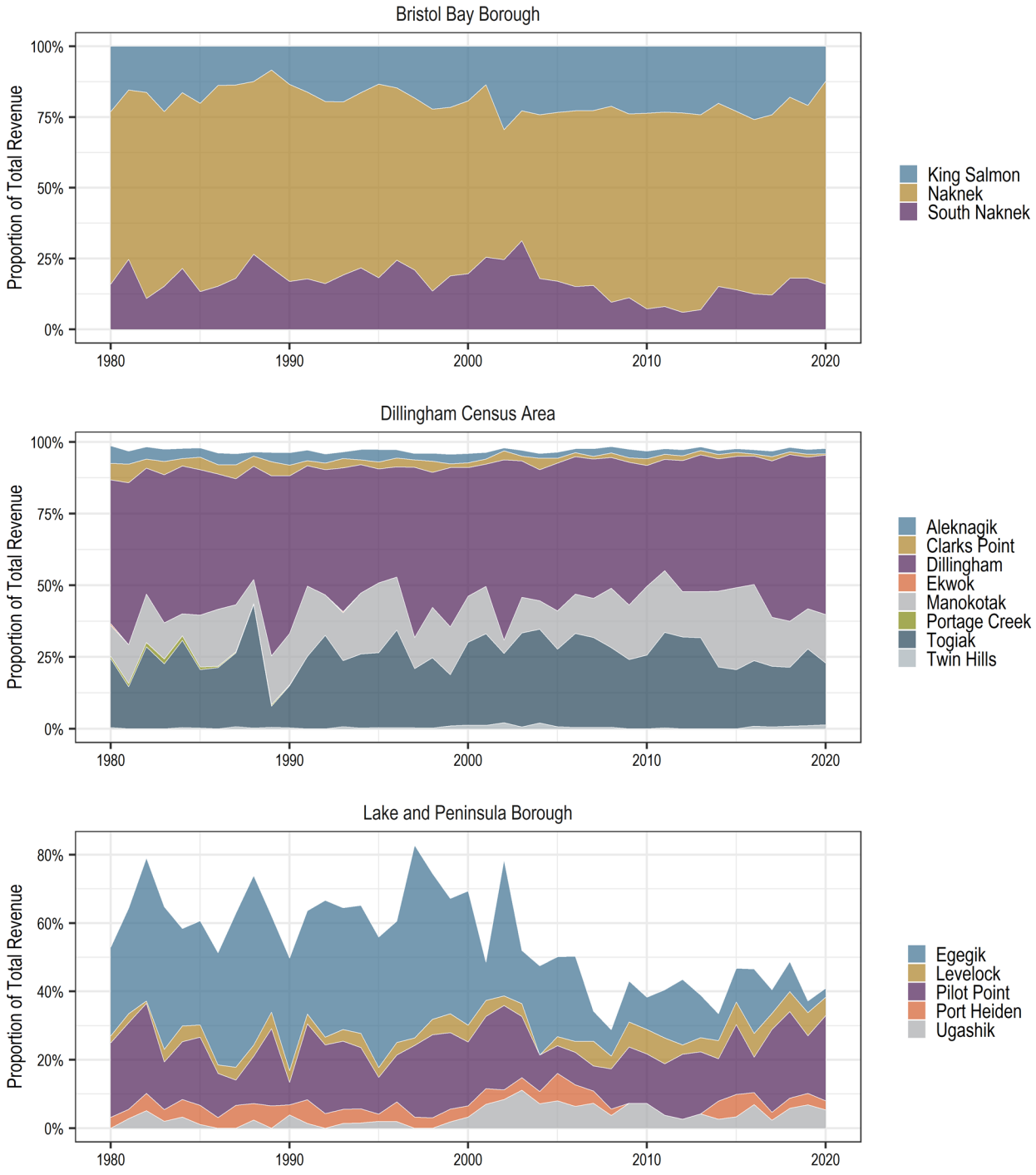
The top setnet fishery communities in each borough or census area in terms of participation and earnings are Naknek in Bristol Bay Borough, Dillingham in Dillingham Census Area, and Pilot Point in Lake and Peninsula Borough (Figure 52, Figure 53, Figure 54, and Figure 55).

Figure 62. Total S 04T Earnings for BBEDC Communities



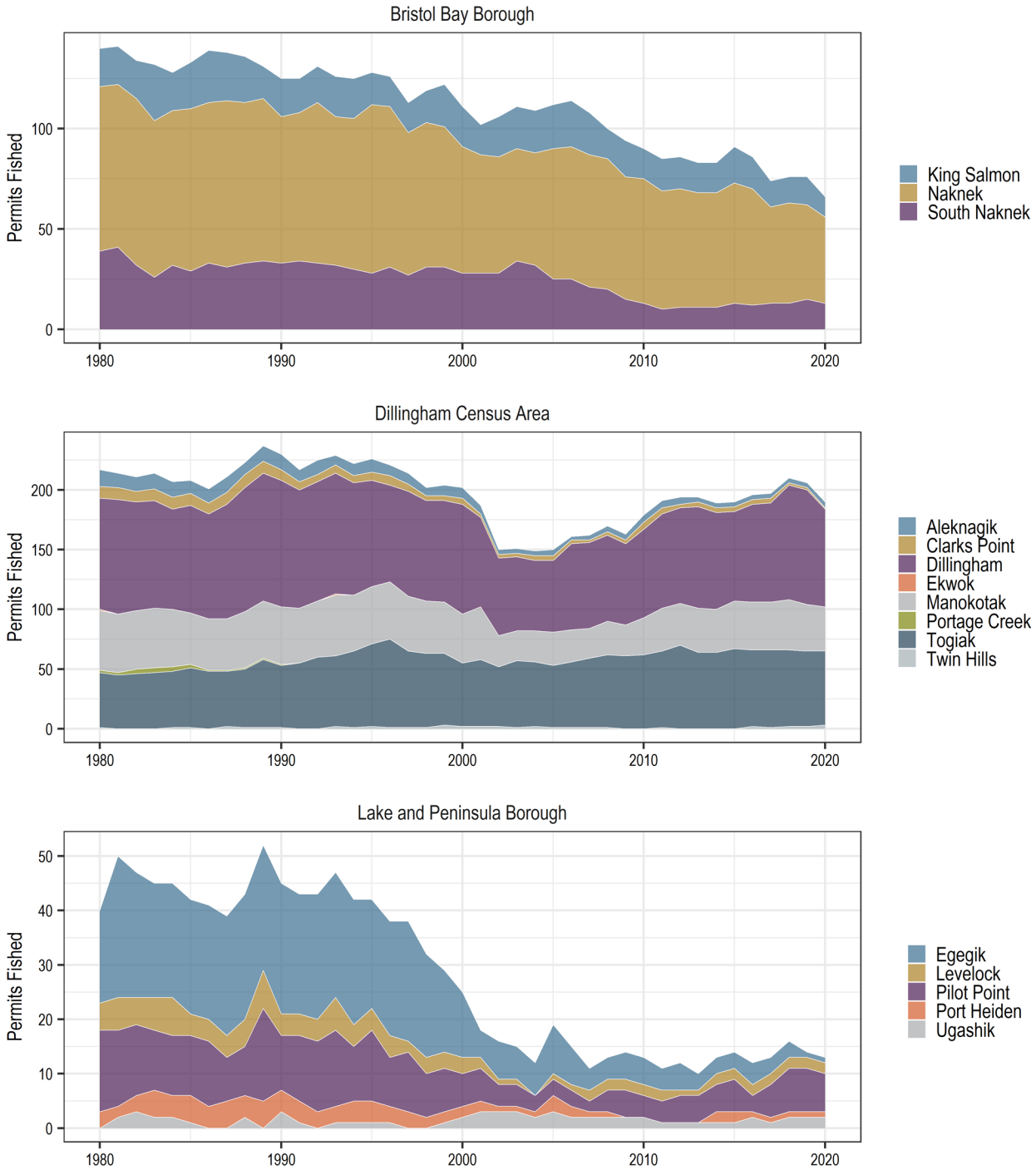
Source: CFEC (2021), Northern Economics, Inc. analysis

Figure 63. Proportion of Total S 04T Bristol Bay Earnings for BBEDC Communities



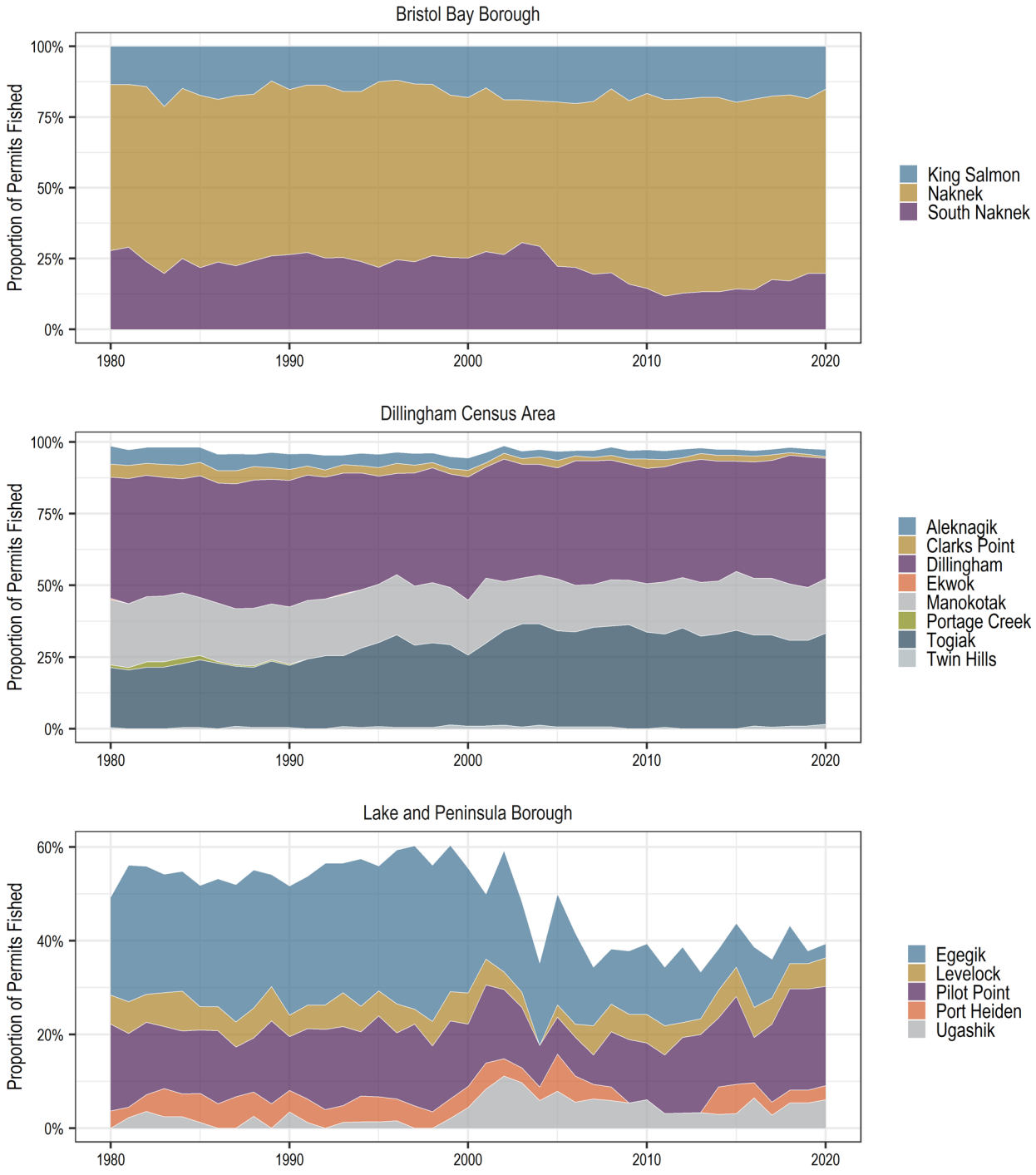
Source: CFEC (2021), Northern Economics, Inc. analysis

Figure 64. S 04T Permits Fished in BBEDC Communities



Source: CFEC (2021), Northern Economics, Inc. analysis

Figure 65. Proportion of Total S 04T Bristol Bay Permits Fished for BBEDC Communities



Source: CFEC (2021), Northern Economics, Inc. analysis

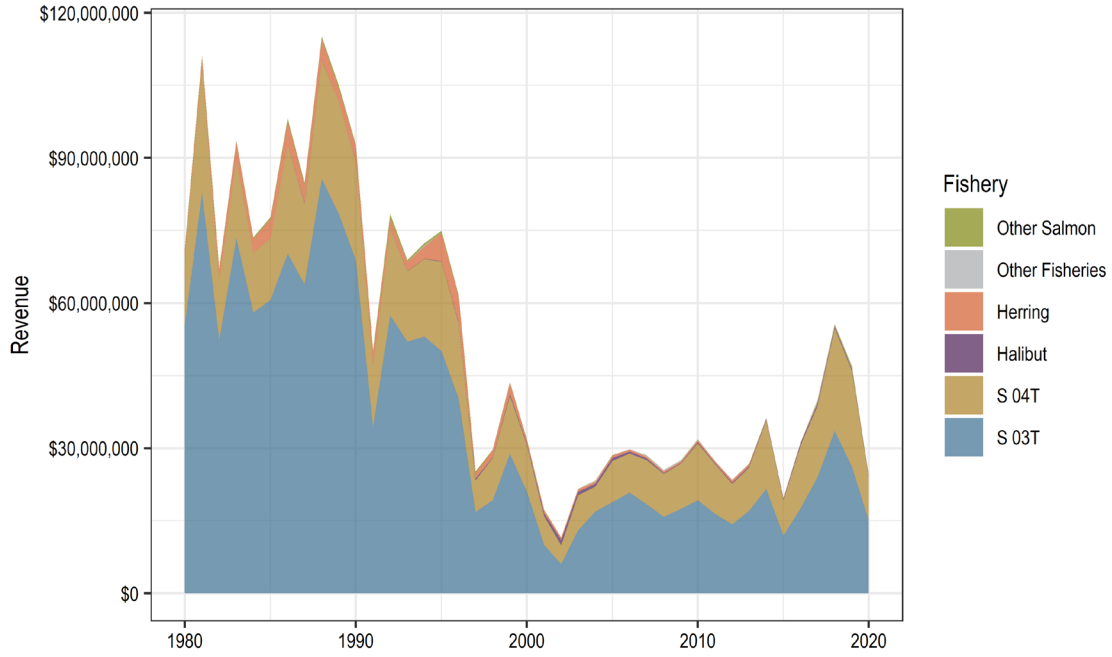
Other Fishery Revenue and Participation

In addition to looking at trends for each of Bristol Bay's salmon fisheries, we can also look at other sources of fishery revenue for Bristol Bay resident permit holders, and as a result, get a complete picture of the importance of salmon compared to other sources of fishery revenue. In this section, in contrast to other sections, we focus solely on permit holders from BBEDC communities within Bristol Bay, to get a finer scale look at trends. In addition, because primary data for this section are at the individual community level, similar to the results for salmon fishery data at the community level, much of the data is considered confidential and NEI's proprietary algorithms are used to estimate revenues when data are restricted. As a result, we can paint a picture of general trends, but numbers in any given year and fishery should be considered rough estimates at best.

Figure 56 shows the composition of total revenue for each of six listed fishery groups: S 03T (drift) salmon, S 04T (setnet) salmon, Other non-Area T salmon, Herring, Halibut, and other fisheries.[3] Compared to the large total revenue contributions of the two Bristol Bay salmon fisheries, the other fisheries are barely visible due to low annual totals, indicating that local permit holders have a strong reliance on Bristol Bay salmon fisheries for their fishery incomes. Portfolio and income diversification has been shown to help confer resilience in times of market or regulatory change in fisheries, while high reliance on single fisheries has been shown to be an indicator of vulnerability (e.g., Cline, Schindler and Hilborn (2017), Kasperski and Holland (2013)).

[3] Residents of the Bristol Bay Region have participated in many other fisheries throughout Alaska, including the Dungeness, king, and tanner crab fisheries, as well as groundfish, sablefish, shrimp, and other shellfish fisheries.

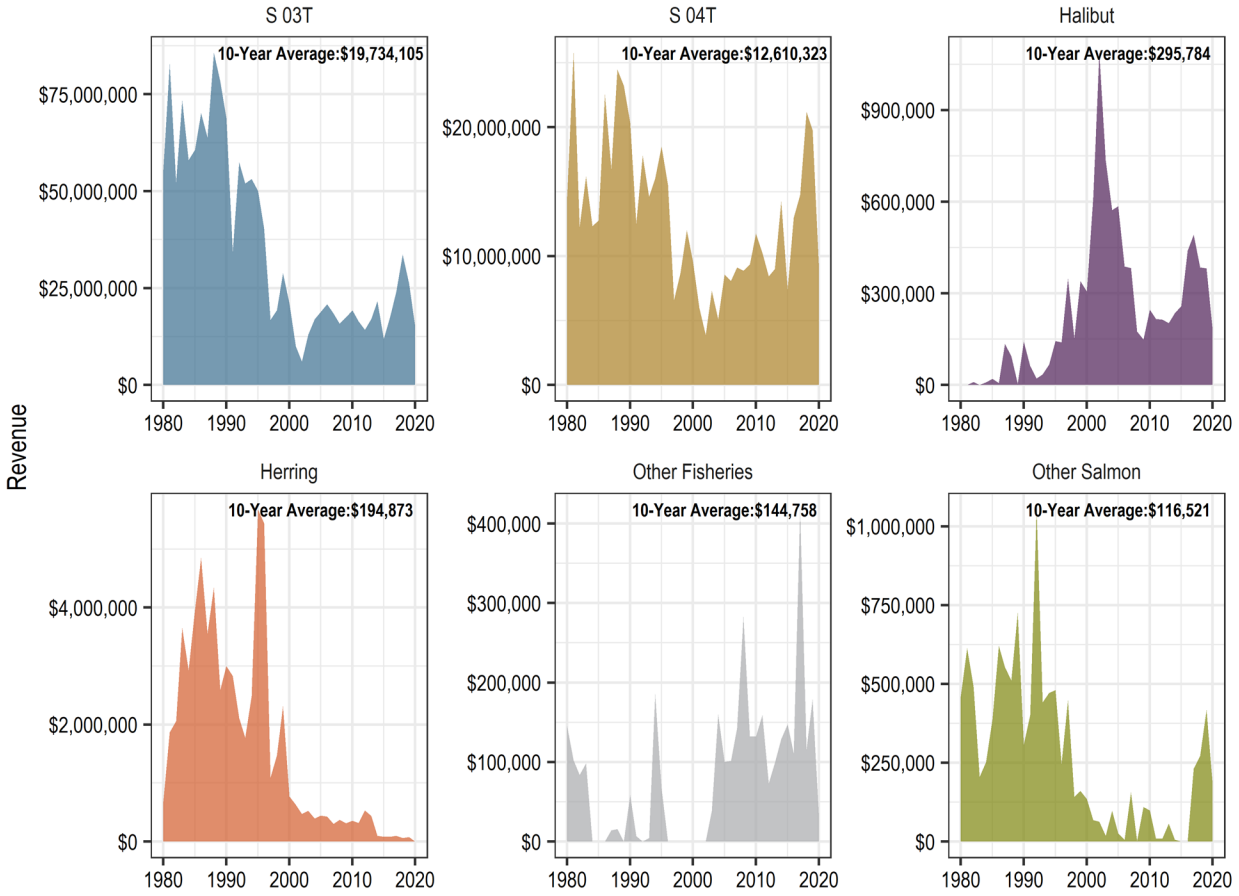
Figure 66. Composition of Total Revenue for BBEDC Community Permit Holders by Fishery



Source: CFEC (2021), Northern Economics, Inc. analysis

Figure 57 shows the trend for each fishery independently, to better visualize trends in fishery value over time to BBEDC communities. Between 2010 and 2020, the drift and setnet fisheries have generated $19.7 million and $12.6 million in revenue for BBEDC community-based permits, respectively. The second highest 10-year average fishery is the halibut fishery, at $295,784, though during some of the leanest years in salmon history in the early 2000s, this fishery is estimated to have generated around $1 million. The herring fishery has the third highest 10-year average, at $194,873, though historically this fishery contributed to upwards of $4 to $5 million annually. Other fisheries and other salmon fisheries also generate relatively small amounts to total fishery revenues over the last decade at $144,758 and $116,521, respectively.

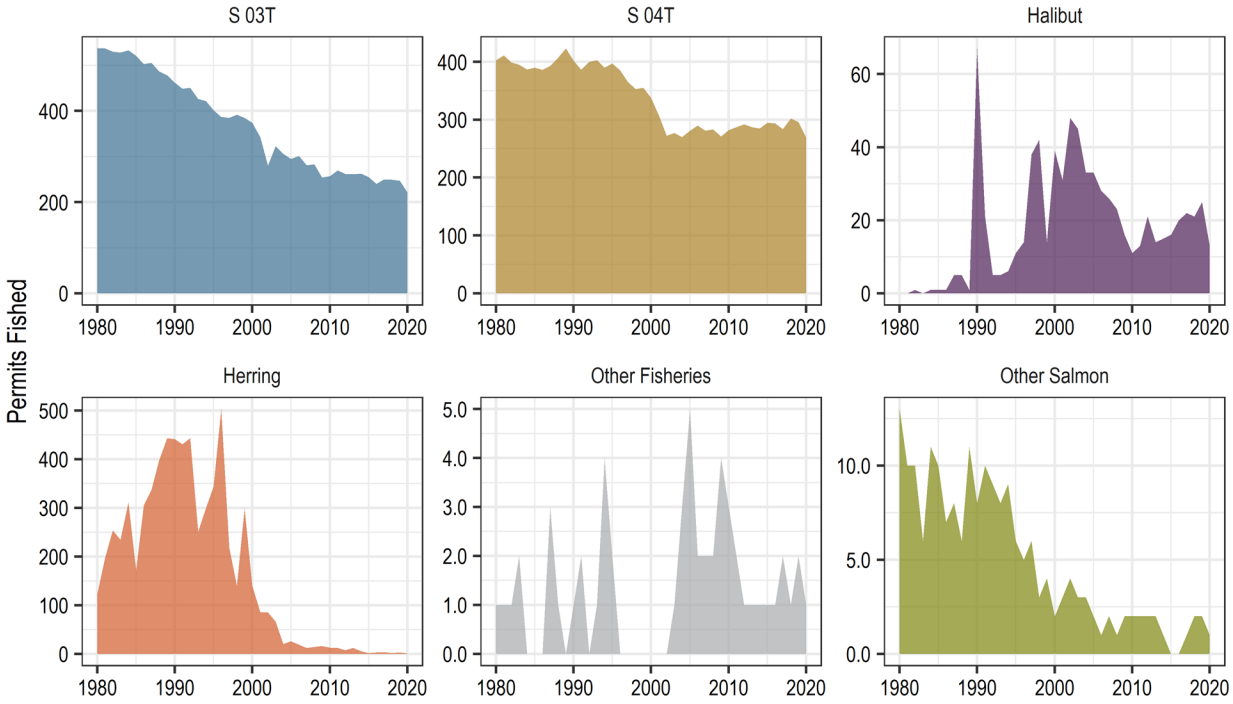
Figure 67. Total Revenue by Fishery for BBEDC Community Permit Holders



Source: CFEC (2021), Northern Economics, Inc. analysis

Figure 58 shows how participation, measured by number of permits fished, has changed over time. Most fisheries have experienced declines in total participation over time alongside decreases in total revenue. The exception is halibut, which has experienced large fluctuations over time from near 0 to 60 permits fished but has increased over the last decade from approximately 10 permits per year to 20. Herring has observed the most dramatic decline in fishery revenues and participation. Historically, there were as many active permits in the herring fishery as in either Bristol Bay salmon fishery, over 400, but this precipitously fell off in the early 2000s, to the near zero participation levels seen over the last handful of years. In total, very few BBEDC community members actively fish in either other salmon fisheries or in our "other fishery" group—in recent years, two or fewer have been fished in any given year.

Figure 68. Total Permits Fished by Fishery for BBEDC Community Permit Holders



Source: CFEC (2021), Northern Economics, Inc. analysis

Drift and Setnet Fisheries Combined

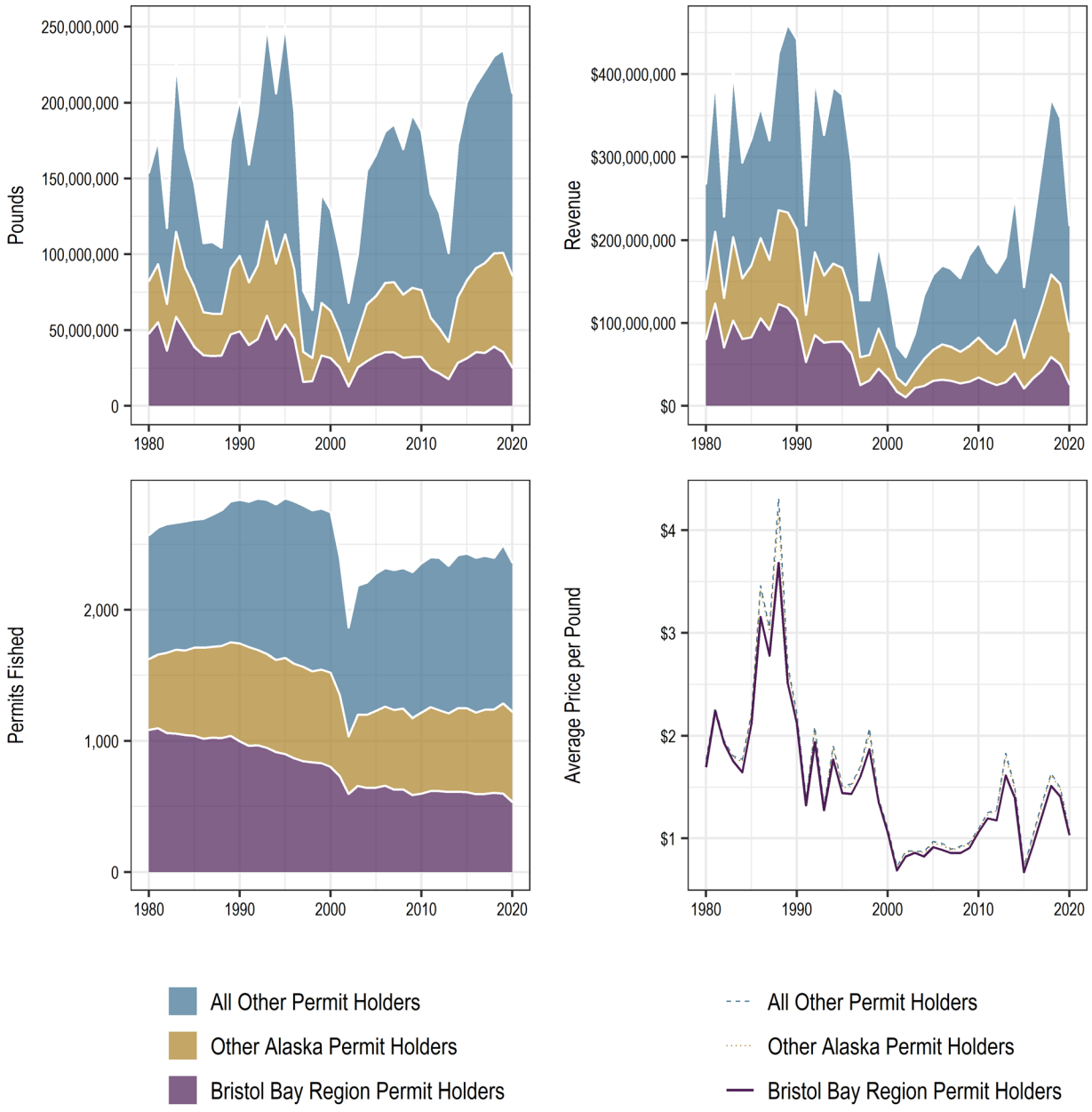
Trends in Landings, Participation, and Earnings

Figure 59 shows a summary of economic trends for all S 03T and S 04T permit holders by area of residence between 1980 and 2020. For Bristol Bay Region permit holders, defined as those residing in any Bristol Bay borough or census area, all indicators have declined over the entire time period (pounds, number of permits fished, earnings, and average prices). This is in contrast to the trend across all permit holders, as indicated by the top line in each chart, that shows considerable variability over time. In recent years landed pounds have been at near historical highs, and after adjusting for inflation, landed value, or total estimated earnings, has approached levels not seen since the early 1990s. Since 2002, the total number of permits fished has increased slightly, due to an increase in the number of active non-Alaska resident permit holders and a decrease in Bristol Bay local permit holder activity. Similarly, in recent years, the share of revenue and pounds landed by non-Alaska permit holders has increased—in 2018 and 2019, Alaska permit holders landed between 86 and 100 million pounds across both fisheries, while non-Alaska permit holders landed approximately 130 million. Earnings by non-Alaska residents were over $212 million in 2018, while

Bristol Bay residents earned $59 million and other Alaska residents earned $99 million in the same year.

Despite landing volumes rebounding considerably, revenue gains have not been as pronounced, in part due to declining prices (Figure 59). Inflation-adjusted prices show a generally steep decline in historical prices from the 1980s to the early 2000s, followed by a gradual increase until 2012, where average prices plummeted, causing a decline in year-over-year revenue despite a large increase in landing volume that year. Since 2012, prices have generally increased until 2020, where prices dropped yet again to just over one dollar per pound—nearly a 50 cent drop from 2018 prices (Table 10).

Figure 69. Trends in Landings, Revenue, Permits Fished, and Average Price across Bristol Bay Salmon Fisheries



Source: CFEC (2021), Northern Economics, Inc. analysis

Table 13. Five-Year Trends in Bristol Bay Salmon Fishery Metrics

Metric	Year	Area			
		All Other Permit Holders	Other Alaska Permit Holders	Bristol Bay Region Permit Holders	Bristol Bay Region Total
Revenue	2015	$85,608,272	$36,564,437	$21,271,224	$143,443,934
	2016	$125,667,650	$56,292,105	$33,568,756	$215,528,511
	2017	$170,754,499	$78,510,539	$42,861,475	$292,126,514
	2018	$212,326,788	$99,276,669	$59,411,134	$371,014,590
	2019	$200,120,479	$96,671,197	$50,314,120	$347,105,796
	2020	$128,378,272	$63,391,827	$26,343,300	$218,113,400
Pounds	2015	117,711,465	51,219,891	31,577,232	200,508,588
	2016	121,009,894	55,166,503	35,699,852	211,876,249
	2017	126,837,938	59,151,688	35,099,025	221,088,651
	2018	129,891,959	61,382,329	39,305,093	230,579,381
	2019	133,784,324	65,249,177	35,715,502	234,749,003
	2020	120,248,283	60,463,258	25,540,077	206,251,618
Permits Fished	2015	1,182	639	609	2,430
	2016	1,180	621	595	2,396
	2017	1,173	641	597	2,411
	2018	1,157	636	604	2,397
	2019	1,210	687	598	2,495
	2020	1,140	685	536	2,361
Average Price ($/lb)	2015	$0.73	$0.71	$0.67	$0.72
	2016	$1.04	$1.02	$0.94	$1.01
	2017	$1.35	$1.33	$1.22	$1.32
	2018	$1.63	$1.62	$1.51	$1.61
	2019	$1.50	$1.48	$1.41	$1.48
	2020	$1.07	$1.05	$1.03	$1.06

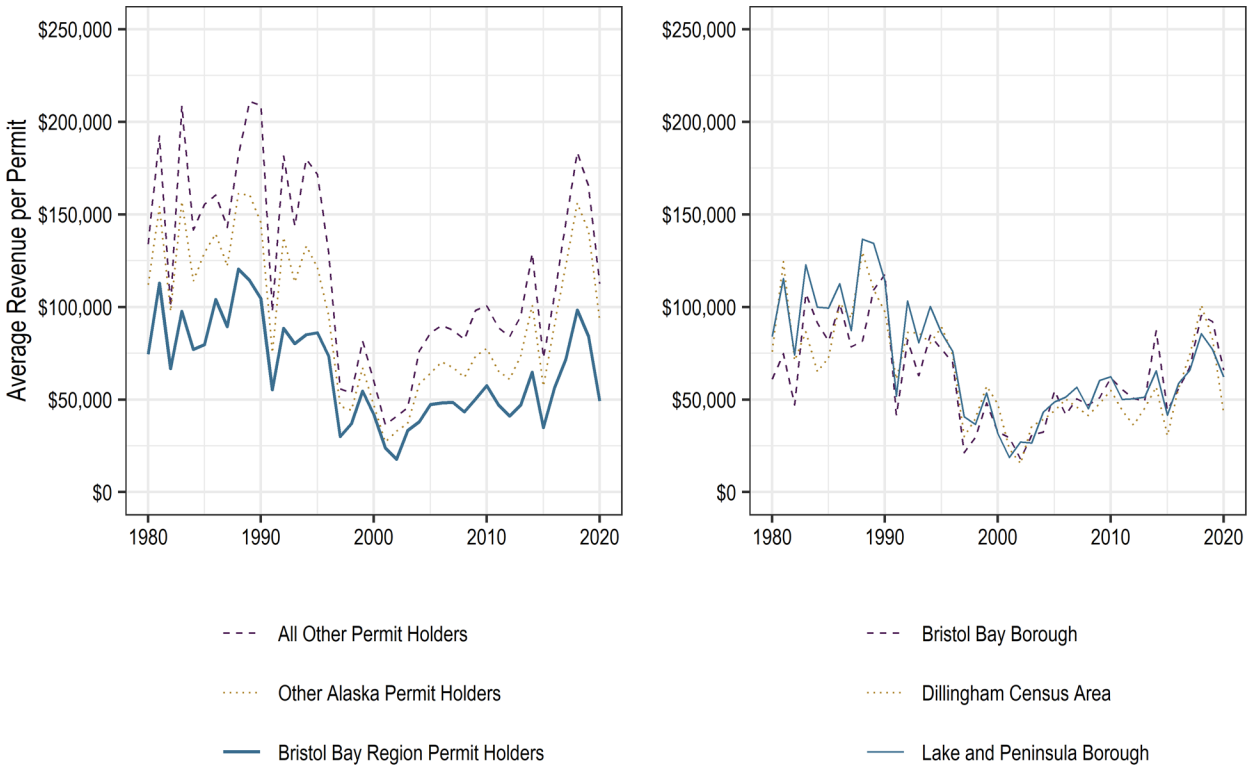
Source: CFEC (2021), Northern Economics, Inc. analysis

Average Earnings per Permit Fished

Similar to the other aggregate metrics, average earnings (revenue) per permit fished have varied over time across all regions and subregions (Figure 60). Across all salmon fishery permit holders (S 03T and S 04T), it is clear that on average, Bristol Bay region residents earn less per permit fished than other Alaska or non-Alaska residents, in 2018, Bristol Bay residents earned approximately $98,500 per permit fished, compared to $183,500 for non-Alaskans and just over $156,000 for other Alaskans (Table 11). Among the Bristol Bay boroughs and census areas, earnings per permit fished are more similar, but vary year to year. Historically, Lake and Peninsula Borough often had the highest average earnings per permit fished, but especially in recent years, Dillingham Census Area and Bristol Bay Borough each have surpassed it, notably in 2018 (Table 12). Between 2018 and 2020, average earnings per permit decreased across all three areas to $65,793 for Bristol Bay Borough,

$62,247 in Lake and Peninsula Borough, and $42,242 in Dillingham census area. Year over year changes between 2019 and 2020 were most pronounced for Dillingham Census Area, where average earnings decreased nearly 50 percent (-$40,384), compared to 29 percent in Bristol Bay Borough (-$26,321), and 19 percent in Lake and Peninsula Borough (-$14,861).

Figure 70. Average Revenue per Permit Fished Across Bristol Bay Salmon Fisheries



Source: CFEC (2021), Northern Economics, Inc. analysis

Table 14. Average Revenue per Permit Fished for All Bristol Bay Permit Holders

Year	All Other Permit Holders	Other Alaska Permit Holders	Bristol Bay Region Permit Holders
2010	$100,652	$77,613	$57,458
2011	$89,094	$65,446	$47,288
2012	$83,806	$60,994	$41,134
2013	$95,117	$73,386	$46,920
2014	$128,774	$101,006	$64,727
2015	$72,427	$57,221	$34,928
2016	$106,498	$90,648	$56,418
2017	$145,571	$122,481	$71,795
2018	$183,515	$156,095	$98,363
2019	$165,389	$140,715	$84,137
2020	$112,613	$92,543	$49,148

Source: CFEC (2021), Northern Economics, Inc. analysis

Table 15. Average Revenue per Permit Fished by Bristol Bay Area of Residence

Year	Bristol Bay Borough	Dillingham Census Area	Lake and Peninsula Borough
2010	$61,703	$54,892	$62,302
2011	$55,516	$43,966	$50,178
2012	$50,559	$36,307	$50,363
2013	$49,202	$45,447	$51,224
2014	$87,081	$56,775	$65,551
2015	$44,246	$30,527	$41,659
2016	$55,762	$56,242	$58,822
2017	$67,614	$74,097	$65,921
2018	$95,577	$101,179	$85,493
2019	$92,114	$82,626	$77,108
2020	$65,793	$42,242	$62,247

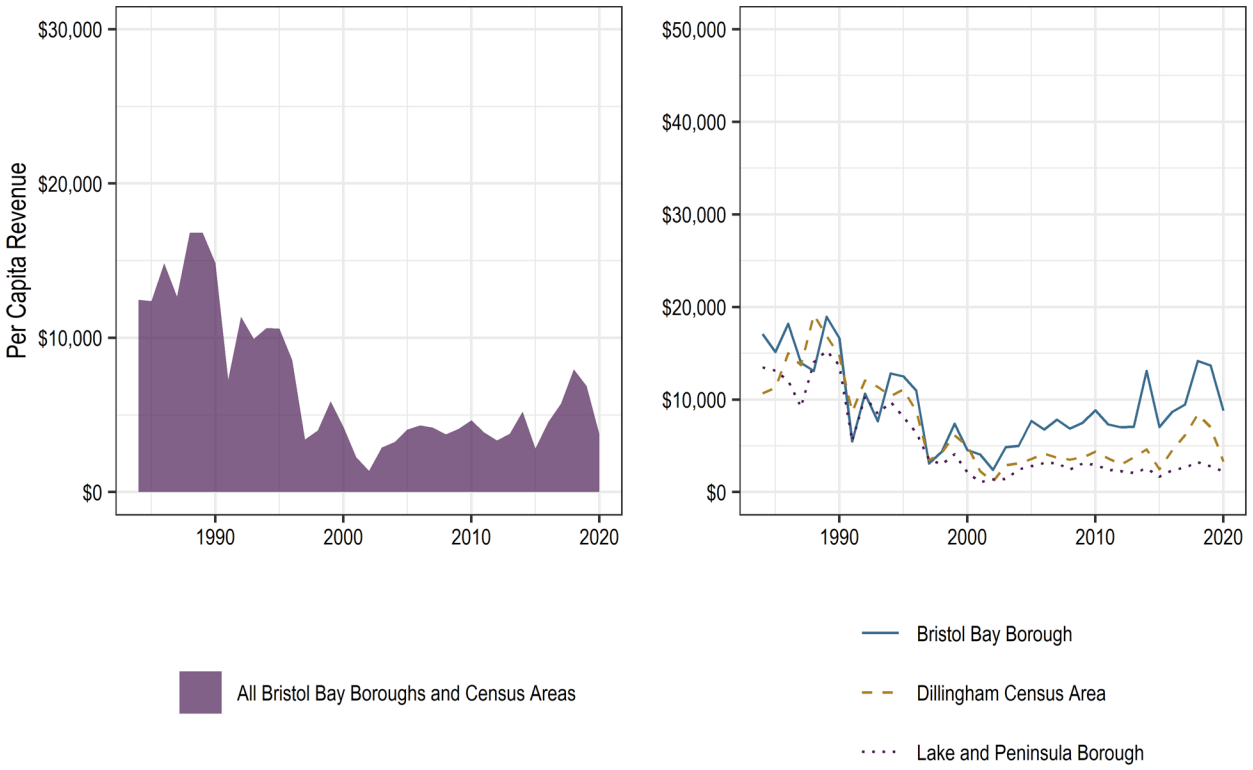
Source: CFEC (2021), Northern Economics, Inc. analysis

Per Capita Revenue

Because the populations of each borough and census area vary extensively and have changed over time (Figure 2), we can standardize total revenue for each area by its population and calculate per capita revenue (total revenue or earnings divided by total population). Per capita revenue can be used to illustrate the importance of fishery incomes of residents to the local economy or be compared to census bureau estimates of total per capita income by area. Here, per capita revenue helps demonstrate the importance of fishery earnings for local Bristol Bay economies.

As discussed in the Population section of this report, generally the combined population size of the entire Bristol Bay region has declined over time, and as discussed earlier in this section, total salmon fishery revenues have also generally declined, but rebounded some in recent years. Putting together these trends, we observe that per capita revenue has similarly rebounded to a high of approximately $8,000 per person in 2018 but declined to $3,700 in 2020. On average, between 2010 and 2020, per capita revenue has averaged $4,783 (Table 13).

Figure 71. Per Capita Revenue Across All Bristol Bay Salmon Permit Holders



Note: Time series is truncated to 1984 due to missing population estimates for some boroughs or census areas.
Source: ADOLWD (2022a), CFEC (2021), Northern Economics, Inc. analysis

Looking across the boroughs and census areas, Bristol Bay Borough, which has the lowest population of the three areas, has seen the largest increases in per capita revenue over the last 20 years and exceeds both Dillingham Census Area and Lake and Peninsula Borough per capita revenue. Over the last ten years, the average per capita revenue of the Bristol Bay Borough is $9,561, while Dillingham Census Area is $4,663, and Lake and Peninsula Borough is $2,479 (Table 13).

Table 16. Ten-Year Average Bristol Bay Per Capita Revenue

Area	2010–2020 Average Per Capita Revenue
Bristol Bay Borough	$9,561
Dillingham Census Area	$4,663
Lake and Peninsula Borough	$2,479
Total Bristol Bay Region	$4,783

Source: ADOLWD (2022a), CFEC (2021), Northern Economics, Inc. analysis

Estimated Operating Costs in the Set and Drift Gillnet Fisheries

Introduction

As part of this study, Northern Economics sought to update available information on operating costs in both the drift and set net fisheries in Bristol Bay. The last comprehensive study of operating costs was conducted by CFEC in 2003, which was updated by Northern Economics as part of our 2009 report to BBEDC. Since the last time operating costs were assessed it is likely that there have been structural changes in operating costs, in part because of the dramatic changes in chilling practices. According to Bristol Bay Regional Seafood Development Association's survey of Bristol Bay Processors, over 83 percent of purchased product was chilled in 2021, in comparison to 29 percent back in 2009 (Northern Economics, 2022).

To modernize these cost estimates, Northern Economics was supplied the contact information for 25 permit holders from BBEDC, as well as the contact information for processors in the region, to see if they might be willing to share contact information for their fleet. Of these, we were able to conduct 15 interviews—11 drift net permit holders and 4 setnet permit holders. In the past, the sample size was large enough that we could obtain separate cost estimates for Bristol Bay locals, other Alaska residents, and non-Alaska residents by fishery; however, because of the more limited sample in this year's survey we present only estimates for the drift and setnet fisheries as a whole, as well as an estimate of costs for Bristol Bay local driftnetters; since they composed the largest subgroup of the sample. Overall, the vast majority of interviews were of local Bristol Bay residents (12 of 15), 10 of whom reside in Dillingham. The remaining three interviews were composed of two non-Alaska residents and one resident of Homer, Alaska.

Because the sample size of our survey was limited, especially for setnet operations, caution should be used when interpreting or extrapolating cost estimates here to outcomes for the entire fishery, such as what overall operating profit margins are in the fleet. Instead, estimates and observations from the interviews should be used as a general guide to the relative costs for different cost components, as well as emergent differences between fisheries in terms of cost structures.

Each interviewed permit holder was asked about their operating costs from their most recent fishing year, generally fishing year 2021. In some cases, people drew from more general experiences from a few recent years since some costs like maintenance costs are "lumpy"[4] and not typical of an average fishing season. Where possible, such costs were averaged over several recent seasons if an interviewee had their tax documents readily available.

[4] 'Lumpiness' refers to costs of production that do not increase smoothly with the level of production, or effort and often do not occur every year.

Specific cost categories that were asked about during interviews included:

- Crew share and what (if any) costs were deducted from the share
- Transportation
- Food
- Fuel
- Maintenance
- Nets
- Supplies
- Insurance
- Chilling
- Vessel or Site Tax
- Administrative fees
- Any "other" operating costs

While they are not technically operating costs, Northern Economics also obtained state commercial fishing and license and permit fees from CFEC and included these costs as well in our calculations. Permit fees were assigned based on fishery in CFEC's Permit Fee Table for the 2022 fishing year.[5] For vessel licenses, we used the vessel license fees from CFEC's 2022 Commercial Vessel License Application.[6] For calculating license fees, we assumed that vessels operated in the setnet fishery are skiffs and less than 25 feet in overall length, while we assumed that all drift net vessels are between 25 and 50 feet overall in length, given that maximum length is 32 feet (5 AAC 06.341(a)). In order to estimate net operating revenue, or gross revenue less operating costs and crew share, we obtained 2020 estimates of average gross revenue per permit fished from CFEC's annual participation and earnings data and applied these estimates to each interview based on place of residence (CFEC 2021). Northern Economics standardized crew shares across interviews by subtracting any deducted costs and applying the share to get the total crew share as a percent of revenue.

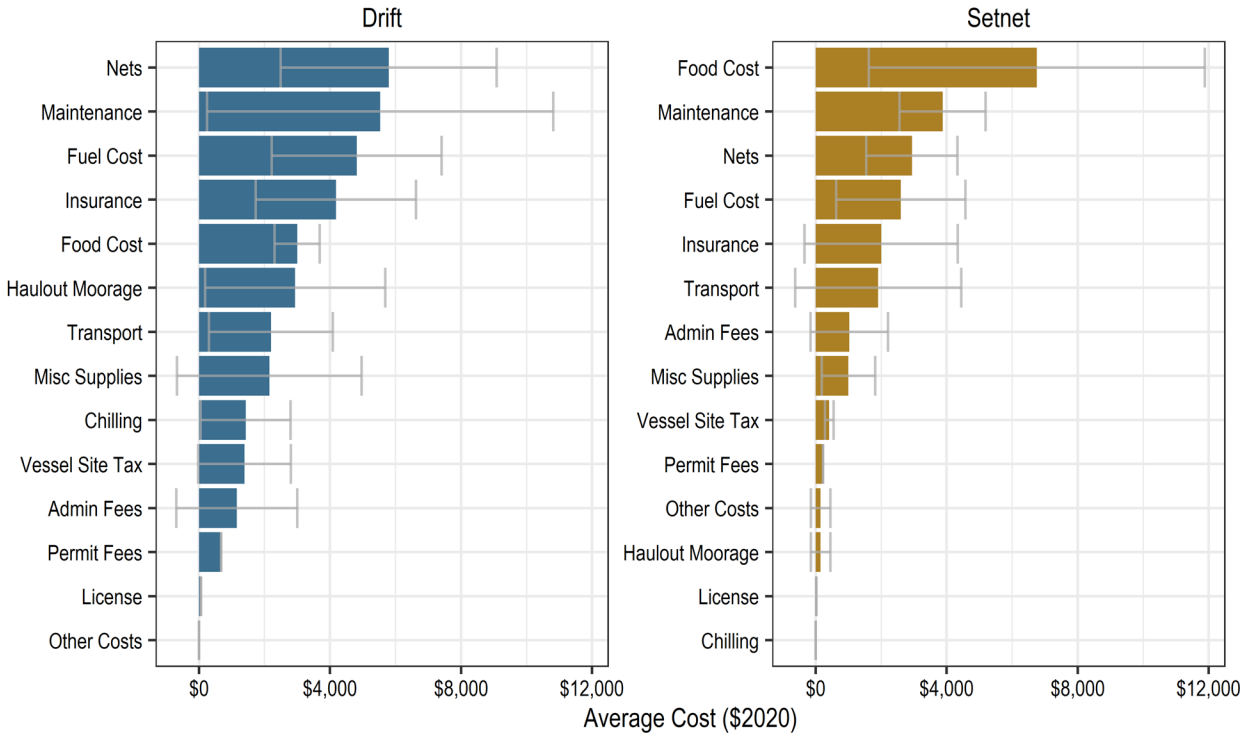
Breakdown of Operating Costs and Net Operating Revenue by Fishery

Estimated operating costs for drift and setnet operations are shown in Figure 62. For drift netters, nets were estimated to be the single largest operating cost, at $5,791 on average across the 11 interviews (Table 14). This included the costs of repairs, new web, and hanging. However, as shown by the standard deviation (in grey, Figure 62), reported net and maintenance costs were highly variable, and individuals often either reported net costs or maintenance costs ($5,550, on average, SD=$5,280) as the highest single cost. This result makes sense in the context of our interviews as several respondents indicated that it was challenging to estimate maintenance costs since on good years they tend to invest a little more and in lean years they tend to spend less on maintenance. Another factor is that maintenance costs tend to be lumpy and high amounts might be incurred infrequently, rather than being spread out evenly over time or vary by level of effort, as other operating costs would be. Another complicating factor includes the presence of stacked permits, operations using stacked permits can utilize more gear than non-stacked permits, which increases

[5] Available at: https://www.cfec.state.ak.us/forms2022/Permit_Fee_Table.pdf
[6] Available at: https://www.cfec.state.ak.us/forms2022/Commercial_Vessel_License_Application.pdf

total annual net costs. Other top expense categories for drift netters included fuel and insurance, averaging $4,800 and $4,200, respectively. Several drift net operators noted that they participated in insurance pools. Chilling costs were estimated at $1,400 a year, which included maintenance on an RSW system, ice, or any needed repairs. Several respondents noted that costs had been offset by BBEDC grant programs for RSW maintenance, at $1,000 per year. We estimate that on average $1,150 was spent on administrative services. This includes all expenses for an accountant, any legal fees, or association dues, though two interviewees reported that they did not pay for any administrative services, while two local residents noted that they were able to take advantage of tax preparation subsidies provided by BBEDC.

Figure 72. Average Estimated Operating Costs by Category and Fishery



Note: License and Permit Fees are technically fixed costs but are included in our overall calculations due to their availability. Additionally, error bars represent +/- one standard deviation of the calculated mean for each cost and therefore may include $0 or negative values.

Source: All costs are derived from Northern Economics Analysis, average revenue by fishery is from CFEC data

Table 17. Drift Net Fishery Operating Costs

Cost Category	Mean Cost ($2020)	Standard Deviation	Cost as Proportion of Revenue
Administrative Fees	$1,151	$1,846	1.6%
Chilling	$1,425	$1,375	1.9%
Food	$3,000	$690	4.1%
Fuel and Oil	$4,814	$2,590	6.5%
Haulout and Moorage	$2,937	$2,754	4.0%
Insurance	$4,182	$2,446	5.7%
License	$60	$0	0.1%
Maintenance	$5,535	$5,284	7.5%
Miscellaneous Supplies	$2,150	$2,817	2.9%
Nets	$5,791	$3,293	7.8%
Other Costs	$0	$0	0.0%
Permit Fees	$675	$0	0.9%
Transportation	$2,197	$1,892	3.0%
Vessel or Site Tax	$1,393	$1,415	1.9%
Total	**$35,309**	**$26,401**	**47.8%**

Note: License and Permit Fees are technically fixed costs but are included in our overall calculations due to their availability

For setnetters, food costs were estimated as the highest single cost category at $5,000 a season, followed by maintenance costs at $3,875, and fuel costs at $3,850. The variability around most operating costs is high for settnetters, in part because of the limited sample size in the interviews (four interviews total). Despite the small sample size, our results are consistent with expectations about costs in the fishery. Because vessels used in the setnet fishery are likely to be skiffs, fuel, and other vessel-related maintenance costs are likely to be lower than drift vessels. Food costs are also likely to be higher for setnetters since operations are likely to be based at the setnet site, and all crew may reside there for the season. Among the top costs, food costs were the most variable, ranging from $1,100 to $12,000. The individual interviews help explain some of this variability since at least one operator reported that their operation is a large family venture, where several family members come out for the summer to fish.

Table 18. Setnet Fishery Operating Costs

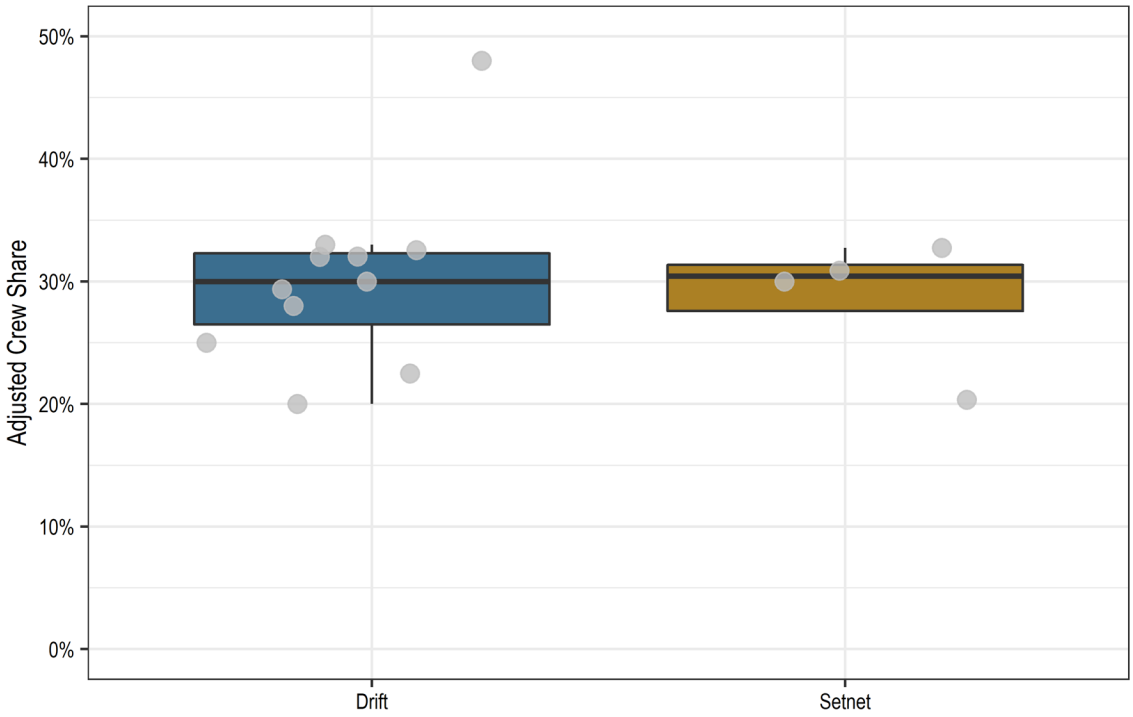
Cost Category	Mean Cost ($2020)	Standard Deviation	Cost as Proportion of Revenue
Administrative Fees	$1,025	$1,184	3.2%
Chilling	$0	$0	0.0%
Food	$6,750	$5,123	21.3%
Fuel and Oil	$2,600	$1,971	8.2%
Haulout and Moorage	$150	$300	0.5%
Insurance	$2,000	$2,337	6.3%
License	$24	$0	0.1%
Maintenance	$3,875	$1,315	12.2%
Miscellaneous Supplies	$1,000	$816	3.2%
Nets	$2,938	$1,390	9.3%
Other Costs	$150	$300	0.5%
Permit Fees	$225	$0	0.7%
Transportation	$1,910	$2,531	6.0%
Vessel or Site Tax	$413	$131	1.3%
Total	**$23,059**	**$17,400**	**72.8%**

Note: License and Permit Fees are technically fixed costs but are included in our overall calculations due to their availability

In addition to asking permit holders about specific operating costs, we also asked about crew remuneration. We asked permit holders two questions about how they pay their crew: 1) the total share of gross revenue they pay to crew; and 2) whether any costs were deducted from the gross revenue before applying the share, or if the crew pays directly for any costs. Five of 14 respondents indicated that they do not deduct any costs or have the crew pay for any costs directly, the remaining respondents indicated a combination of deducting taxes (including fish taxes), fuel, transportation, license fees, or simply taking a fixed proportion off the top for the boat (e.g., 10 percent). The most commonly deducted cost was fuel costs (four), followed by taxes (three) and transportation costs (two), noting that in some cases multiple costs were deducted before applying the share.

We adjusted the reported crew shares by applying stated deducted costs and cost amounts from the survey to make them comparable across respondents and represent the true proportion of gross revenue that is allocated to crew (Figure 63). The adjusted crew share was very similar across the drift and setnet fishery interviews, with an average of 28.5 percent and 30.2 percent allocated to crew in the drift net and setnet fisheries, respectively. The most commonly reported share was 33 percent but ranged from 20 to 48 percent. Crew sizes were also very similar across fisheries, with 2.9 crew in the average drift operation and 3 crew in the average setnet operation, not including the captain.

Figure 73. Adjusted Crew Shares by Fishery

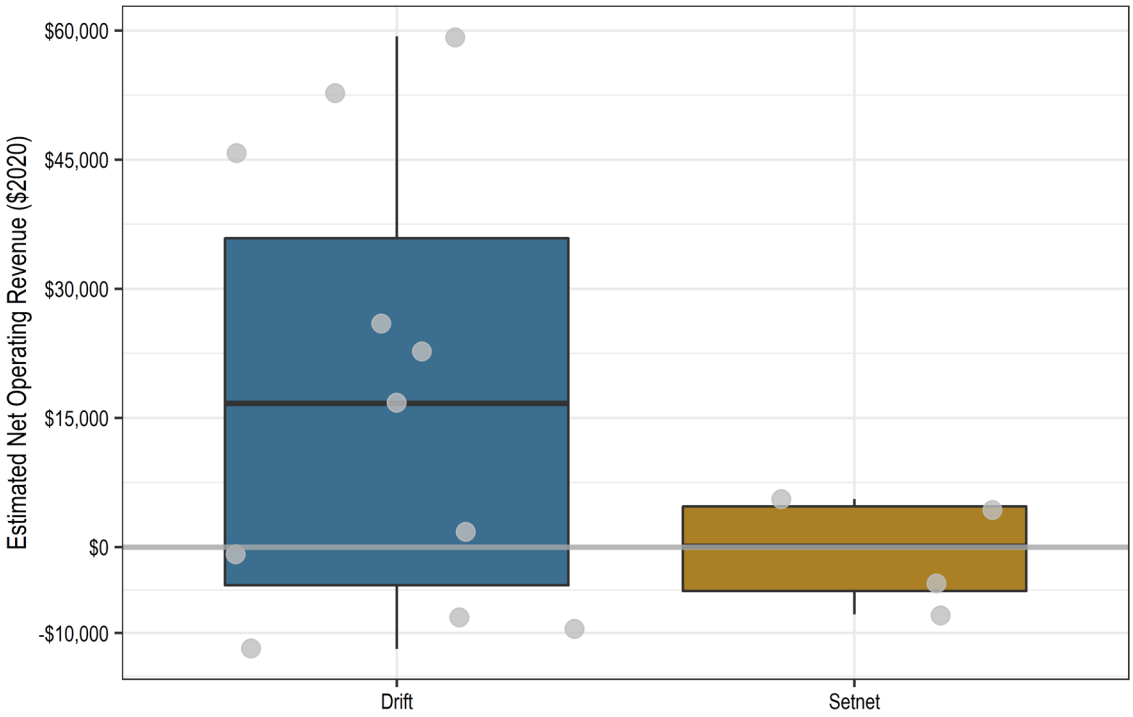


Note: Boxes represent interquartile ranges of the data, the horizontal solid black bar represents the median across all cost interviews, while the vertical bars represent the range of the data. Individual grey points represent each individual data point (interview) collected in the survey.

Source: All costs are derived from Northern Economics Analysis

For each interview, net operating revenues were estimated by subtracting total estimated operating costs and crew wages from average CFEC gross revenues by place of residence and fishery (Figure 64). Again, the vast majority of interviews were of local Bristol Bay residents (12 of 15), mostly Dillingham (10). Other places of residence included Homer, Alaska; Virginia; and Seattle, Washington. For drift net operators, net operating revenue ranged from a high of $60,000 to a low of -$12,000 and a median of $17,000. Across the four setnet operations surveyed the range was much lower, from $6,000 to -$8,000 and a median value of right around zero. When comparing this to the estimates from Northern Economics' last study of operating costs, back in 2009, the estimated margins for watershed drift net participants is similar to the estimated net operating revenue in this study at approximately $19,300 in 2020 dollars, after adjusting for crew payments (Northern Economics, 2009). This is not true for the setnet fishery, however, which was estimated to have approximately $15,000 in net operating revenue for local watershed and other Alaska residents. This discrepancy is likely accounted for by the very small sample sizes in our study as well as by using average revenues by residency and fishery—especially considering that 2020 revenues were, on average, lower per permit, than 2019 (see Figure 49 in the *Comparing Average Earnings by Residence* section for more information). Net operating revenues are likely greater than zero in both fisheries since all costs have yet to be accounted for, such as loan payments, vessel upgrades, or fish taxes.

Figure 74. Net Operating Revenue by Fishery

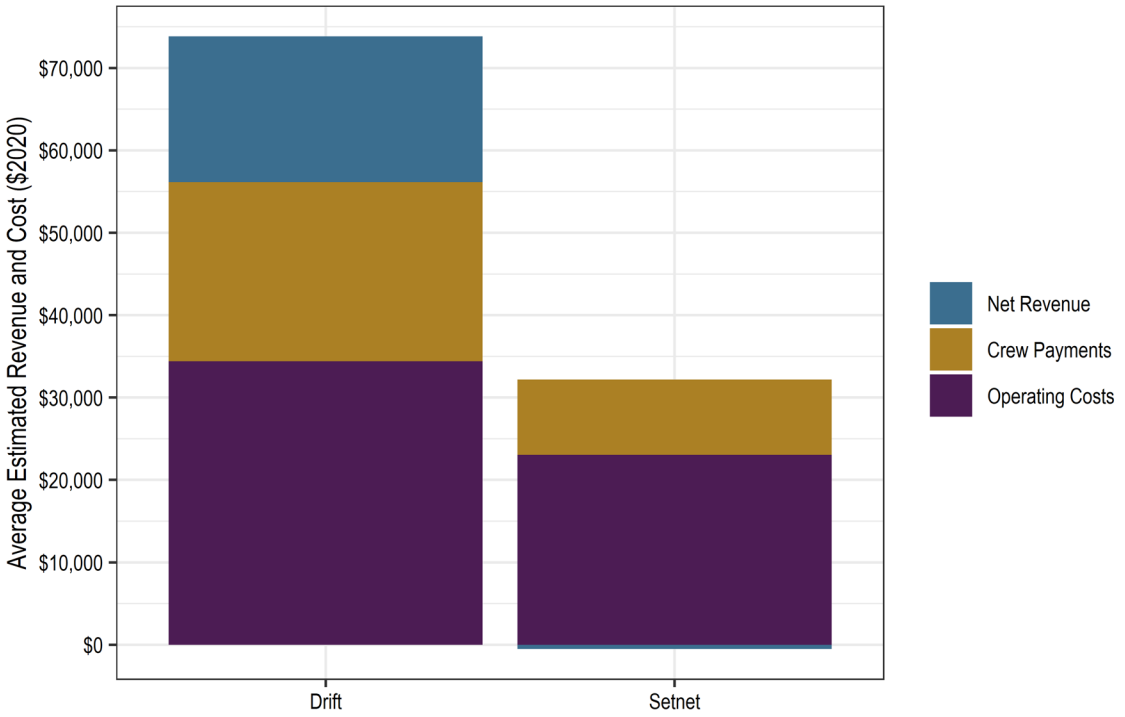


Note: Boxes represent interquartile ranges of the data, the horizontal solid black bar represents the median across all cost interviews, while the vertical bars represent the range of the data. Individual grey points represent each individual data point (interview) collected in the survey.

Source: All costs are derived from Northern Economics Analysis, average revenue by fishery is from CFEC data

Figure 65 and Table 16 break down average net operating revenue, operating costs, and crew payments by fishery. For drift netters, estimated costs including crew shares amount for 77 percent of estimated revenue, and for setnetters, costs exceed revenue, at 102 percent. Our estimates are likely biased high, since due to our small sample size of interviews it is likely that interviewed permit holders may have earned more than average CFEC-estimated revenues from the fishery. In addition, as mentioned previously, fishermen often spoke generally about costs from a couple of fishing seasons and 2018 and 2019 average revenues were much higher than 2020 (Figure 59), so reported costs may be more reflective of the generally lucrative fishery over the last few years. Caution should be exercised when interpreting all cost estimates, particularly for the setnet fleet where only four interviews were conducted. At least one drift net fisherman interviewed reported that his cost structure generally reflects an even split to crew, to expenses, and to the owner (33 percent each), or 67 percent to the expenses we include in our estimate, a 10 percent difference.

Figure 75. Operating Costs, Crew Payments, and Net Operating Revenue



Note: Averages represent arithmetic means.

Source: All costs are derived from Northern Economics Analysis, average revenue by fishery is from CFEC data

Table 19. Average Revenue, Operating Costs, and Crew Sizes by Fishery

Fishery	Category	Value
Drift	Average Crew Size	2.9
	Adjusted Crew Share	30.2%
	Average Crew Payments	$21,742.1
	Average Revenue	$73,846.2
	Average Operating Costs	$ 34,406.4
	Total Costs Including Crew Payments	$56,887.0
	Net Operating Revenue	$ 17,697.7
Setnet	Average Crew Size	3.0
	Adjusted Crew Share	28.5%
	Average Crew Payments	$9,121.7
	Average Revenue	$31,656.7
	Average Operating Costs	$ 23,059.0
	Total Costs Including Crew Payments	$ 32,180.7
	Net Operating Revenue	-$524.0

Note: Averages represent arithmetic means.

Source: All costs are derived from Northern Economics Analysis, average revenue by fishery is from CFEC data

Bristol Bay Drift Fishery Operating Costs

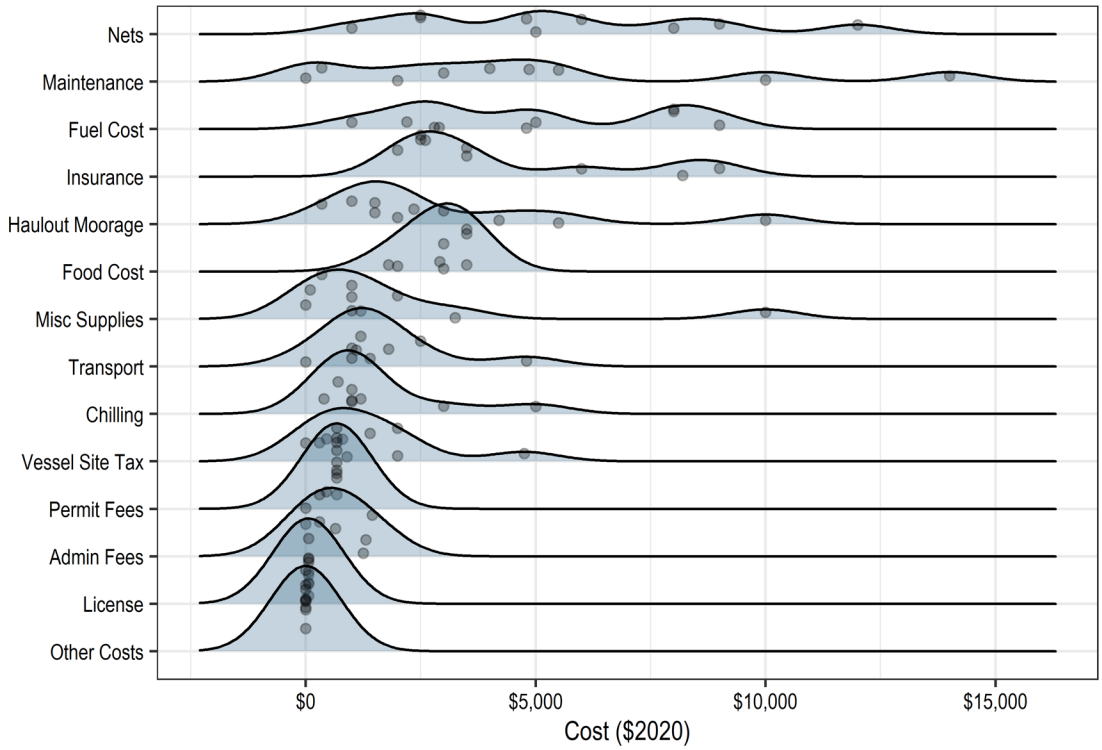
Because a majority of our survey respondents were drift net permit holders and residents of Bristol Bay communities (9 of 15) we can look separately at their costs. In past studies, Northern Economics has looked at results for local residents, other Alaska residents, and out of state residents separately because there might be significant differences in their cost structures stemming from differences in transportation costs, haulout or boat storage costs, or even the scale of the operation. Even among only among local drift netters, haulout and moorage costs tended to be variable among respondents, ranging from near $0 to $10,000, though as shown in Figure 66, most respondents reported costs of around $2,500. Based on the interviews, it is likely that such costs are only accounting for haulout, since for locals, boats can be stored on their property. Costs as a proportion of revenue are much less variable (Figure 67). Because local drift netters account for such a large proportion of the total drift net interviews, the magnitude of average costs is generally similar to what was reported in the previous sections, with nets being the highest average cost, followed by maintenance, fuel, insurance, haulout and moorage, and food as other top cost categories (Table 17).

Table 20. Bristol Bay Resident Drift Net Average Operating Costs

Operating Cost Category	Average cost ($2020)	Minimum costs ($2020)	Maximum Cost ($2020)	Average cost as proportion of revenue
Administrative Fees	$634	$0	$1,450	1.08%
Chilling	$1,589	$400	$5,000	2.49%
Food	$2,913	$1,800	$3,500	5.00%
Fuel and Oil	$4,856	$1,000	$9,000	8.53%
Haulout and Moorage	$3,156	$350	$10,000	4.96%
Insurance	$4,422	$2,000	$9,000	7.59%
License	$60	$60	$60	0.10%
Maintenance	$4,856	$0	$14,000	8.80%
Miscellaneous Supplies	$2,100	$0	$10,000	3.59%
Nets	$5,644	$1,000	$12,000	9.62%
Other Costs	$0	$0	$0	0.00%
Permit Fees	$675	$675	$675	1.12%
Transportation	$1,644	$0	$4,800	2.82%
Vessel or Site Tax	$1,400	$0	$4,750	2.51%

Source: All costs are derived from Northern Economics Analysis, average revenue by fishery is from CFEC data

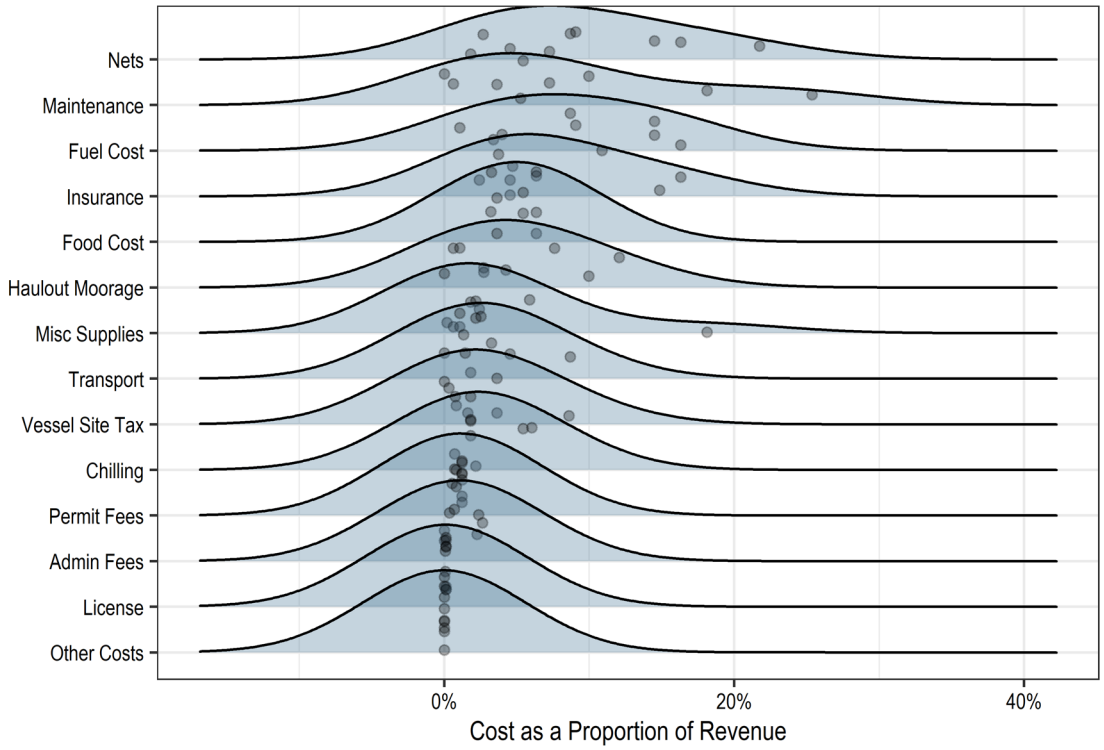
Figure 76. Bristol Bay Drift Fishery Operating Costs



Note: Individual blue points represent each individual data point (interview) collected in the survey.

Source: All costs are derived from Northern Economics Analysis, average revenue by fishery is from CFEC data

Figure 77. Bristol Bay Drift Fishery Operating Costs as a Proportion of Revenue



Note: Individual blue points represent each individual data point (interview) collected in the survey.

Source: All costs are derived from Northern Economics Analysis, average revenue by fishery is from CFEC data

Economic Impacts of Bristol Bay Salmon Harvests

This section provides a summary of the economic impacts of salmon harvests in Bristol Bay. In theory, a careful assessment of economic impact of salmon harvest will allow us to assess how much of the total gross domestic product (GDP) of the region can be attributed to the salmon fishery. For purposes of this report, *economic impacts* are limited to harvesting activities, including fish tax revenues, along with the multiplier effects of the expenditures of drift and setnet fishing operations and local government expenditures. This assessment of economic impacts explicitly excludes the economic contribution of the processing of Bristol Bay Salmon.[7]

The total economic impacts of the Bristol Bay Salmon Harvesting Sector include the following:

1) **Direct Effects**: Expenditures made by fishing operations plus net incomes after expenditures that accrue to permit holders and crew members. For this assessment the direct effects also include Raw Fish Taxes assessed by local governments and Fishery Business Taxes assess by the State and shared to local governments.

2) **Indirect Effects:** This is a multiplier effect that captures the impacts of local (within the region) expenditures of suppliers to the salmon harvesting operations in Bristol Bay. Examples include the local expenditures of the fuel dock and the boatyard.

3) **Induced Effects:** This is also a multiplier effect that captures the local impacts of spending of local households that are directly involved in the fishing operations (permit holders and crew) as well as the household spending of local employees of the suppliers to the harvesting sector. The induced effects also include the household spending of local government employees that are attributed to "fish taxes" from salmon harvests.

The economic impacts are measured with respect to the following economic indicators:

1) **Output Impacts:** Output is the total amount of spending at the local level including net income of resident crew and permit holders—in this case "local" is defined as the Bristol Bay Region. Output impacts include direct output effects, indirect output effects, and induced output effects.

2) **Employment Impacts:** Employment is measured in terms of the number of jobs created and/or supported by the activity (i.e., salmon harvesting operations and the resulting local fish taxes).

[7] The two previous versions of *The Importance of the Bristol Bay Salmon Fisheries to the Region and its Residents* from 2009 and 2012 also explicitly excluded the processing sector. The decision to exclude processing impacts in the earlier reports was made by BBEDC leadership.

Expenditures and Accrued Fish Taxes in the Bristol Bay Salmon Fisheries

As indicated above, the primary drivers of economic impacts are expenditures that are made to local suppliers to harvest Bristol Bay Salmon, the net income from salmon harvesting accruing to resident permit holders and crew members, and fishery related taxes that are collected by local governments or shared with local governments within the state of Alaska.

As described in the Section titled *Estimated Operating Costs in the Set and Driftnet Fisheries* Northern Economics used an interview process to generate updated estimates of expenditures in the two salmon fisheries. Because the majority of interviews conducted were of local permit holders, we use these updated expenditure estimates for local resident permit holders only. Fishery expenditures of Other Alaska permit holders and Non-Alaska permit holders were determined by combining our estimates of local expenditures with estimates derived from the original CFEC survey that was conducted back in 2003, per our previous report's economic assessment. Table 21 and Table 22 show our estimates by expenditure category and place of residence in the two fisheries.

Because of the small number of interviews used to update expenditures within the current study, all of the estimates in these tables and the remainder of this section should be interpreted with caution.

Table 21. Expenditures per Permit in the Drift Fishery by Place of Residence

Expenditure Categories	Local Bristol Bay	Other Alaska	Non-Alaska	Weighted Average of All Permit Holders
Transport, Chilling, & Food	$6,600	$6,800	$9,600	$8,300
Fuel & Oil	$4,800	$4,200	$4,500	$4,400
Maintenance Nets, Gear & Storage	$16,400	$18,400	$18,200	$17,900
Insurance, Property Taxes, Fees, & Services	$7,500	$8,500	$10,500	$9,400
Income to Crew & Permit Holders (before loan payments)	$32,200	$80,400	$90,300	$78,200
Total Expenditures per Permit by Residence	$67,500	$118,300	$133,100	$118,200

Note: Estimates have been rounded to the nearest $100 to indicate the lack of precision inherent in these estimates. Weighted averages reflect the relative proportion of permits across resident categories.

Source: Developed by Northern Economics.

Table 22. Expenditures per Permit in the Setnet Fishery by Place of Residence

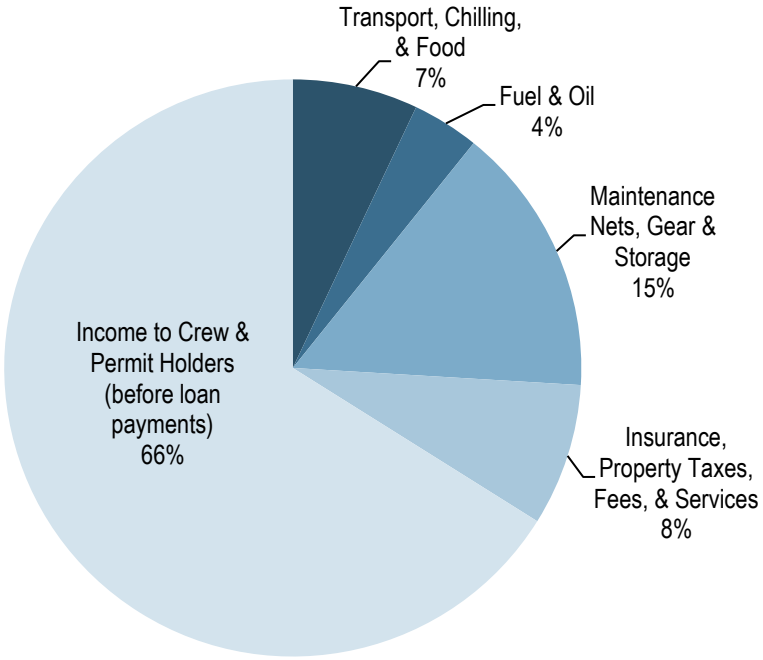
Expenditure Categories	Local Bristol Bay	Other Alaska	Non-Alaska	Weighted Average of All Permit Holders
Transport, Chilling, & Food	$8,700	$9,200	$9,900	$9,300
Fuel & Oil	$2,600	$2,400	$2,600	$2,500
Maintenance Nets, Gear & Storage	$8,000	$7,800	$8,000	$7,900
Insurance, Property Taxes, Fees, & Services	$3,700	$3,700	$3,700	$3,700
Income to Crew & Permit Holders (before loan payments)	$10,900	$25,000	$30,200	$21,900
Total Expenditures per Permit by Residence	$23,000	$23,100	$24,200	$23,400

Note: Estimates have been rounded to the nearest $100 to indicate the lack of precision inherent in these estimates. Weighted averages reflect the relative proportion of permits across resident categories.

Source: Developed by Northern Economics.

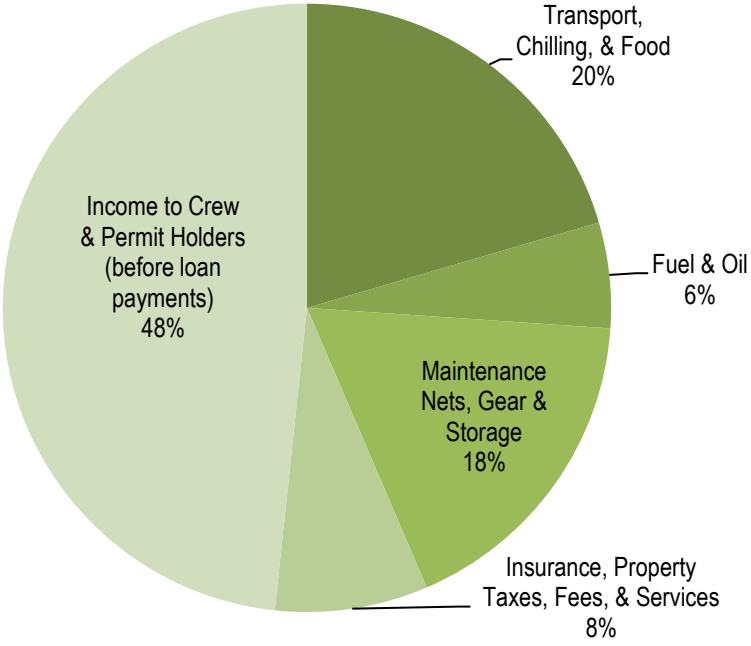
Figure 78 and Figure 79 present the weighted average distribution of expenditures by category for all drift net operations and all setnet operations. In both cases the largest share of expenditures goes to net income to permit holders and crew members.

Figure 78. Weighted Average Distribution of Expenditures by Category for All Drift Net Operations



Source: Developed by Northern Economics.

Figure 79. Weighted Average Distribution of Expenditures by Category for All Setnet Operations



Source: Developed by Northern Economics.

Expenditures per permit as shown above have been multiplied with the number of permit holders by place of residence in Table 23 and Table 24, which show total estimated expenditures by place of permit holder residence, noting that total expenditures, if net income to crew and permit holders is included, equals the total ex-vessel revenue in the two fisheries of $215.85 million.

Table 23. Total Expenditures in the Drift Fishery by Place of Residence

Expenditure Categories	Local Bristol Bay	Other Alaska	Non-Alaska	All Drift Net Operations
Transport, Chilling, & Food	$1,609,000	$2,959,000	$8,087,000	$12,655,000
Fuel & Oil	$1,170,000	$1,820,000	$3,761,000	$6,751,000
Maintenance Nets, Gear & Storage	$3,988,000	$7,954,000	$15,345,000	$27,287,000
Insurance, Property Taxes, Fees, & Services	$1,813,000	$3,684,000	$8,842,000	$14,339,000
Income to Crew & Permit Holders (before loan payments)	$7,827,000	$34,818,000	$76,293,000	$118,938,000
Total Expenditures = Total Ex-vessel Revenue	$16,407,000	$51,235,000	$112,328,000	$179,970,000

Note: Estimates have been rounded to the nearest $1,000 to indicate the lack of precision inherent in these estimates.

Source: Developed by Northern Economics.

Table 24. Total Expenditures in the Setnet Fishery by Place of Residence

Expenditure Categories	Local Bristol Bay	Other Alaska	Non-Alaska	All Setnet Operations
Transport, Chilling, & Food	$2,537,000	$2,327,000	$2,923,000	$7,787,000
Fuel & Oil	$762,000	$603,000	$767,000	$2,132,000
Maintenance Nets, Gear & Storage	$2,333,000	$1,969,000	$2,349,000	$6,651,000
Insurance, Property Taxes, Fees, & Services	$1,080,000	$925,000	$1,088,000	$3,093,000
Income to Crew & Permit Holders (before loan payments)	$3,183,000	$6,302,000	$8,896,000	$18,381,000
Total Expenditures = Total Ex-vessel Revenue	$9,895,000	$12,126,000	$16,023,000	$38,044,000

Note: Estimates have been rounded to the nearest $1,000 to indicate the lack of precision inherent in these estimates.

Source: Developed by Northern Economics.

The economic output of the fishery also includes fish taxes generated from the harvest of salmon in the region. The state of Alaska and several local governments collect fish taxes based on fixed percentages of ex-vessel revenue from all species landed. Fish taxes collected in the salmon fishery include the Alaska Fishery Business Tax, which is collected at a rate equal to 3 percent of total ex-vessel revenue, 50 percent of which is shared with local governments. Based on ex-vessel revenues of $218 million, the total Fishery Business Tax attributable to the Bristol Bay Salmon fisheries in 2020 is estimated to equal $6.5 million, 50 percent of which ($3.25 million) is shared with local governments in the region.

The Alaska Department of Revenue (ADOR) reports (in what we will refer to as the Shared Taxes Report) the total amount of the Fishery Business Taxes that were collected and shared with local governments in Fiscal Year 2021 was $6.4 million, with another $6.4 million retained by the state of Alaska. This is a total amount that is 1.973 times the amount that would have been collected from the Bristol Bay salmon fishery during the 2020 calendar year based on a 3 percent tax rate. We believe

the difference is likely attributable to the inclusion of taxes in the Shared Tax Report from all fisheries in the region, and because of the mismatch between calendar years and fiscal years. For this report we include the direct calculation in our estimates rather than the numbers in the Shared Taxes Report.

Two communities in the region (Egegik and Manokotak) as well the two boroughs (Bristol Bay Borough and Lake and Peninsula Borough) separately collect Raw Fish Taxes. The Alaska Department of Commerce, Community, and Economic Development (ADCCED) reports these tax revenues in their annual Alaska Taxable Report. The most recent version reports FY 2021 Raw Fish Tax collection of $5.99 million (ADCCED, 2022). We believe that the same level of "over-reporting" relative to the 2020 salmon revenue is likely in this report as was seen in the ADOR's Shared Tax Report. Therefore, we estimate that the actual Raw Fish Taxes collected by local governments within the Region from the 2020 fishery were equal to $5.99 million ÷ 1.973 or $3.04 million, where the 1.973 is the estimated overage factor seen in the ADOR Shared Taxes report.

In summary, a total of $9.54 million of fish taxes is considered part of the economic output of the Bristol Bay salmon fishery. This total comprises $3.04 million in locally collected raw fish taxes, $3.25 million in Fishery Business Taxes shared to the boroughs and communities within the region, and $3.25 million in Fishery Business Taxes that are retained by the state of Alaska.

Indirect, and Induced Effects in the Bristol Bay Region

The indirect and induced effects (collectively referred to as the "multiplier effects") result from additional business sales and economic activity as permit holders and their crews make expenditures to get their vessels ready to fish, and when they spend their earnings within the region. If calculated correctly, these types of additional effects should only include expenditures that are made within the region and should not include sales from firms that are not located in the region. From this perspective, most of the income of non-resident permit holders and crew should not be used in the estimate of local multiplier effects.

Table 23 and Table 24 in the previous section show total estimated expenditures by place of permit holder residence, but these data do not yet take into account the location to which those expenditures accrue. While most of the local resident expenditures accrue to local business and households, a significantly smaller percentage of the expenditures of operations of permit holders that reside in Other Alaska and Non-Alaska locations accrue to the Bristol Bay region.

This assessment uses the same set of "location quotients" that were used in the two previous studies, and which are summarized in Table 25. Multiplying these location quotients by total expenditures within each permit holder residence region will yield the estimate of the total amount of spending that occurs within the Bristol Bay Region that is shown in Table 26. This table also indicates the total fish tax that was shared with or collected by boroughs and cities within the Bristol Bay Region. Together the total spending within the Bristol Bay Region ($51.7 million) and total fish taxes shared

with or collected within the region ($12.4 million) result in the estimated total direct economic output of the Bristol Bay salmon harvest within the region in 2020 ($64.2 million).

Table 25. Location Quotient for Both Drift Setnet Fisheries by Permit Holder Place of Residence

Detailed Expenditure Category	Local Bristol Bay	Other Alaska	Non-Alaska
Chilling	100%	100%	100%
Transportation	100%	5%	5%
Food	40%	15%	15%
Fuel, oil, and lubricants	100%	100%	100%
Maintenance	35%	35%	35%
Nets	20%	20%	20%
Miscellaneous gear/supplies	25%	5%	5%
Moorage, gear storage	100%	100%	100%
Insurance	0%	0%	0%
Property tax	100%	100%	100%
Vessel license fees	0%	0%	0%
Permit renewal fees	0%	0%	0%
Administrative services	75%	5%	5%
Income to Crew & Permit Holders	100%	5%	5%

Source: Developed by Northern Economics.

Table 26. Total Expenditures within Bristol Bay Region by all Salmon Permit Holders by Place of Residence

Expenditure Categories	Local Bristol Bay	Other Alaska	Non-Alaska	Total Spending within the Bristol Bay Region
Transport, Chilling, & Food	$2,522,000	$1,112,000	$2,126,000	$5,760,000
Fuel & Oil	$1,932,000	$2,424,000	$4,528,000	$8,884,000
Maintenance Nets, Gear & Storage	$2,681,000	$5,203,000	$9,237,000	$17,121,000
Insurance, Property Taxes, Fees, & Services	$895,000	$1,058,000	$1,871,000	$3,824,000
Income to Crew & Permit Holders (before loan payments)	$11,010,000	$2,056,000	$4,259,000	$17,325,000
Total Expenditures per Permit by Residence	**$19,040,000**	**$11,853,000**	**$22,021,000**	**$52,914,000**

Note: Estimates have been rounded to the nearest $1,000 to indicate the lack of precision inherent in these estimates.

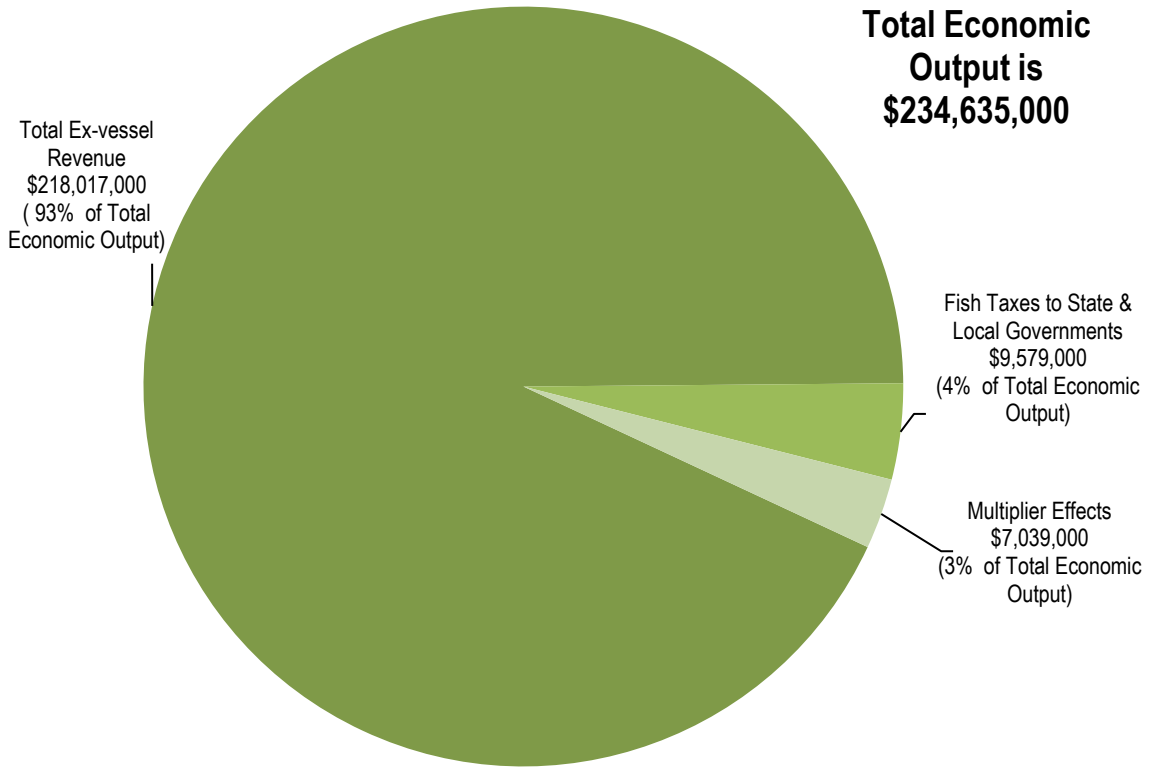
Source: Developed by Northern Economics.

The multiplier effects that augment economic output and employment are all calculated based on the total expenditures shown in Table 26. The indirect and induced effects (collectively called multiplier effects) all rely on sector-by-sector economic activity data collected and estimated by IMPLAN™, a leading provider of input-output software and data. Using the most recent IMPLAN™ data available (2019) for the Dillingham Census Area, Bristol Bay Borough, and Lake and Peninsula Borough, Northern Economics created a regional matrix of direct, indirect, and induced multipliers for output, employment, and labor income. Multiplier effects from the local government spending of Raw Fish Taxes ($3.05 million) and shared portion the Fishery Business Taxes ($3.25 million) are also estimated.

Total economic output impacts and total employment impacts are summarized in Figure 80 and Figure 81. Total economic output from harvesting activities includes the following:

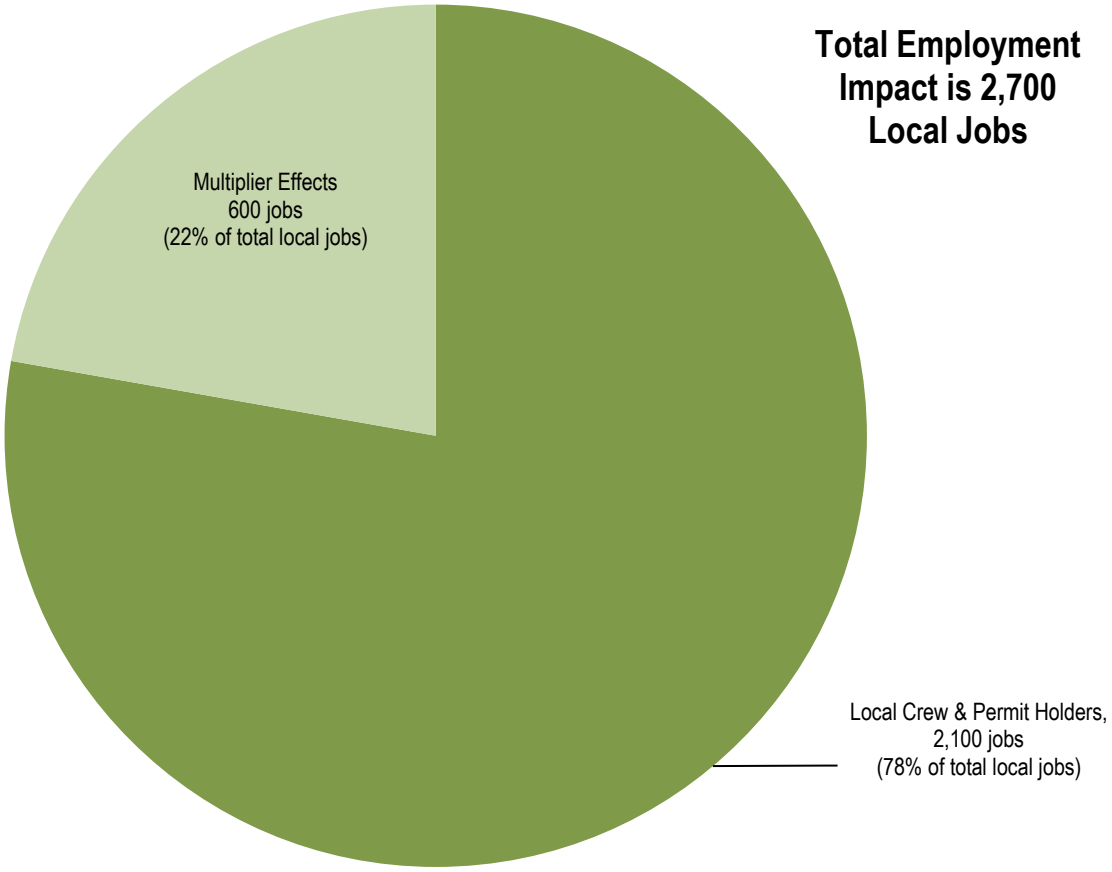
- All of the direct effects from the fishery regardless of the permit holder's place of residence (i.e., $179.97 million from the drift fishery and $38.04 million from the setnet fishery or $218 million in total); includes $137.3 million of income to permit holders and crew, and $80.7 million in total expenditures.
- All of the Raw Fish taxes and the Fishery Business Taxes collected from the fishery including Fishery Business Taxes that remain with the state of Alaska ($9.6 million in total).
- Multiplier Effects from income from local crew and permit holders' expenditures/business sales made to local firms within the Bristol Bay Region including spending of fish-tax revenues by local governments. As shown in Table 26, local fishery expenditures were $52.9 million.

Figure 80. Summary of Economic Output Impacts in the Bristol Bay Region from the Harvest of Bristol Bay Salmon



Note: Estimates have been round to the nearest $1,000 to indicate the lack of precision inherent in these estimates.
Source: Developed by Northern Economics using data from IMPLAN Group LLC (2021).

Figure 81. Summary of Employment Impacts in the Bristol Bay Region from the Harvest of Bristol Bay Salmon



Note: Estimates have been round to the nearest 100 jobs to indicate the lack of precision inherent in these estimates.
Source: Developed by Northern Economics using data from IMPLAN Group LLC (2021)

Economic Impacts Compared to the Region's Gross Domestic Product

The U.S. Bureau of Economic Analysis (BEA) generates estimates of the GDP of each borough and census area in Alaska. According to the BEA, the Bristol Bay Region's GDP was $451.4 million in 2020 (BEA 2021, after adjusting to 2020 dollars). In general, a region's GDP is approximately equal to its total economic output.

This study estimates that the Bristol Bay salmon harvesting sector contributed $234.6 million to the region's GDP (see Figure 80 above and Table 27 below); this accounts for 52 percent of the Bristol Bay Region's GDP.

It should be noted that all of the ex-vessel revenue generated in the Bristol Bay salmon fisheries—regardless of the place of residence of the permit holder—is counted toward the regional GDP. In addition, all fish taxes collected either by the state or by local governments also count toward the region's GDP. The multiplier effects are estimated using: a) fishery related expenditures/business

sales that occur within the region; B) the spending of fish tax revenues by local government, and C) the household spending of salmon fishery income of local permit holders and crew members.

Table 27. Contributions to GDP from the Harvest of Bristol Bay Salmon

Drift Fishery Revenue	Setnet Fishery Revenue	Raw Fish Tax and Local Share of Fishery Business Tax	State Share of Fishery Business Tax	Multiplier Effects of Fishery Expenditures in the Region	Total Economic Contribution to GDP
$179,970,000	$38,044,000	$6,309,000	3,270,000	$7,679,000	$234,635,000
See Table 23	See Table 24	See the fish tax discussion on page 104		See Figure 80	Sum of Columns 1– 5

Source Estimated by Northern Economics.

Table 28. Estimated Real Gross Domestic Product of Alaska and its Borough and Census Areas 2017–2020

State, Municipality, Borough, or Census Area	2017	2018	2019	2020	Rank in 2020
Alaska	$61,517,131,000	$60,517,096,000	$60,615,864,000	$57,006,964,000	--
Aleutians East Borough	$256,304,000	$223,860,000	$240,739,000	$217,054,000	19
Aleutians West Census Area	$437,983,000	$426,949,000	$423,838,000	$409,542,000	14
Anchorage Municipality	$24,031,018,000	$24,178,773,000	$23,975,875,000	$22,736,714,000	1
Bethel Census Area	$755,616,000	$763,725,000	$760,737,000	$735,851,000	9
Bristol Bay Borough	$136,747,000	$148,192,000	$142,209,000	$122,285,000	22
Denali Borough	$296,311,000	$297,869,000	$295,020,000	$231,275,000	18
Dillingham Census Area	$277,476,000	$277,698,000	$271,890,000	$244,631,000	17
Fairbanks North Star Borough	$6,086,262,000	$6,013,610,000	$5,971,786,000	$5,787,528,000	3
Haines Borough	$116,996,000	$124,966,000	$123,497,000	$96,722,000	25
Hoonah-Angoon Census Area	$108,654,000	$109,259,000	$113,246,000	$103,163,000	24
Juneau City and Borough	$2,712,633,000	$2,669,362,000	$2,616,705,000	$2,481,873,000	6
Kenai Peninsula Borough	$3,320,925,000	$2,987,357,000	$3,072,348,000	$3,024,310,000	4
Ketchikan Gateway Borough	$934,964,000	$931,233,000	$952,949,000	$846,832,000	7
Kodiak Island Borough	$818,425,000	$799,428,000	$815,516,000	$773,356,000	8
Kusilvak Census Area	$158,005,000	$160,388,000	$161,292,000	$160,739,000	21
Lake and Peninsula Borough	$100,603,000	$106,170,000	$97,297,000	$84,521,000	26
Matanuska-Susitna Borough	$2,731,139,000	$2,776,745,000	$2,905,943,000	$2,879,851,000	5
Nome Census Area	$469,903,000	$465,034,000	$463,421,000	$449,365,000	12
North Slope Borough	$12,478,750,000	$11,421,914,000	$11,807,598,000	$10,391,764,000	2
Northwest Arctic Borough	$797,645,000	$782,462,000	$757,582,000	$705,409,000	11
Petersburg Borough	$204,756,000	$205,140,000	$210,644,000	$210,043,000	20
Prince of Wales-Hyder Census Area	$280,586,000	$286,333,000	$299,864,000	$296,149,000	15
Sitka City and Borough	$495,370,000	$505,032,000	$501,455,000	$437,843,000	13
Skagway Municipality	$116,759,000	$112,081,000	$113,281,000	$80,408,000	27
Southeast Fairbanks Census Area	$787,078,000	$747,830,000	$685,084,000	$707,829,000	10
Valdez-Cordova Census Area[1]	$2,423,669,000	$2,385,018,000	$2,562,807,000	#VALUE!	--
Wrangell City and Borough	$112,408,000	$112,596,000	$107,746,000	$106,651,000	23
Yakutat City and Borough	$29,195,000	$30,544,000	$32,884,000	$35,199,000	28
Yukon-Koyukuk Census Area	$296,384,000	$310,592,000	$307,053,000	$291,661,000	16
Bristol Bay Region	$514,826,000	$532,060,000	$511,396,000	$451,437,000	

Source: Adjusted to 2020 real values by Northern Economics from U.S. BEA (2021) data that are listed shown in 2012 dollars.

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