



3.3 Social Systems

This section provides relevant information about social systems in the affected environment, including:

- The economy (Section 3.3.1);
- Sociocultural systems (Section 3.3.2);
- Subsistence activities and patterns (Section 3.3.3);
- Cultural resources (Section 3.3.4);
- Land ownership and land uses (Section 3.3.5);
- Recreation and visual resources (Section 3.3.6);
- Wilderness (Section 3.3.7); and
- Transportation (Section 3.3.8).

3.3.1 Economy

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By the definition of the Trans Alaska Pipeline System (TAPS) in Stipulation 1.1.1.22 of the Federal Grant, the Alaska North Slope (ANS) fields and the marine transportation link are not parts of the pipeline system. However, these other systems are clearly linked to the pipeline in economic terms (none of these elements could “stand alone”) and are conveniently discussed as a group, rather than as individual elements. Thus, both the ANS fields and the marine transportation link are included in the discussion of economics. Historical economic impacts, which are reflected in a description of the affected environment because the entire production/transportation system has been in operation since 1977, include *direct*, *indirect*, and *cumulative economic* effects of the pipeline system. [Because the system elements are in different geographic areas, it is possible to disaggregate effects in other parts (Sections 3.3.2 through 3.3.8) of this discussion.]

For the ROW renewal decision, however, the ANS fields, pipeline, and associated marine transportation link are an operating system. Historical economic impacts are discussed in this description of the affected environment. Future impacts associated with the recommended and no-action alternatives are examined in Section 4.

Except where noted, all dollar figures are stated in terms of money of the day (MOD). Figures adjusted to constant dollars are prefixed by the base year (e.g., 1998 dollars).

3.3.1.1 Importance of ANS/TAPS to the National Economy

The ANS oil fields have been termed “one of the...most important in the history of the domestic crude oil industry” (Cicchetti, 1972) and the largest in North America (GAO, 1999). Thus, these fields are sufficiently large to have national, as well as state and local, significance. This subsection provides facts and economic data to illustrate and quantify their national importance. The follow points summarize this subsection:

- From 1977 to 1988, ANS production grew from 7 to 25 percent of domestic crude output. Even in 1998, ten years after reaching maximum output, ANS output accounted for approximately 20 percent of U.S. crude production.
- ANS output reduced the balance-of-trade deficit in crude petroleum by approximately \$268 billion from 1977 to 1999.
- ANS output contributed approximately \$40.2 billion to the federal government in various taxes and royalties from 1977 to 1999.



BP Exploration (Alaska) Inc.

Photo 3.3-1. Production facility at Prudhoe Bay for separating water and gas from crude oil.



- ANS production has provided a market for U.S.-flagged tankers and jobs for U.S. seafarers. In 1999, for example, tankers in the ANS trade accounted for 37 percent of the tonnage of the total U.S. seagoing tanker fleet (20 percent on a ship-count basis).

ANS Production in Context

The first barrel of ANS crude reached the Valdez Marine Terminal at 11:02 p.m. on July 28, 1977, and was shipped to ARCO's Cherry Point, Washington refinery on the *ARCO Juneau* on August 1, 1977 (APSC, 1999c; Mead 1978). Total TAPS throughput in the first year of operation was 112.3 million bbl, which increased to a maximum of 744.1 million bbl in 1988 before beginning a gradual decline (APSC, 1999c). Even in the first calendar year of operation, this output accounted for a substantial proportion of domestic crude production. Figure 3.3-1 shows ANS and total Alaska crude oil production from 1977 to 1998 plotted as a percentage of total domestic crude production. As can be seen, ANS production dominates total Alaska production, and Alaska production has accounted for a significant proportion of total domestic crude production, rising to approximately 25 percent in 1988. In 1998, ten years after reaching maximum output, ANS production accounted for nearly 1 bbl out of every 5 produced domestically — a significant contribution to total domestic crude output.

ANS Output and Balance of Trade

The U.S. has substantial crude oil reserves. Until World War II, U.S. crude production was sufficient to satisfy domestic consumption. Since then, domestic demand has

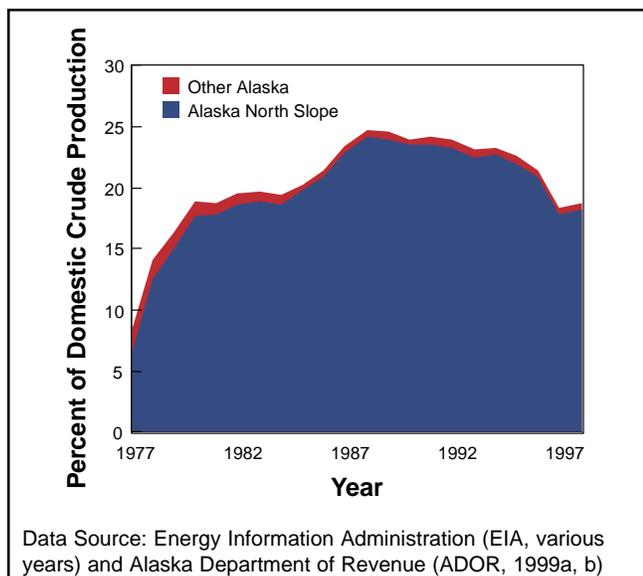


Figure 3.3-1. ANS and other Alaska crude oil as a percentage of domestic crude production, 1977-1998.

outstripped supply, and the U.S. has become a net oil importer, a fact that has geopolitical as well as economic implications. In 1950, net petroleum imports accounted for only 8.3 percent of domestic demand (API, 1991; Section IX, Table 1; Section X, Table 1). In 1999, crude oil imports supplied approximately 58 percent of domestic demand, and this figure is expected to grow (EIA, 1999e).

ANS production reduces U.S. dependence on foreign sources of oil. Crude oil is imported to the U.S. from many producing areas, including countries in the Western Hemisphere, Africa, and the Middle East. Because many oil-producing countries are politically unstable and/or have uneasy relations with the U.S., this dependence is problematic and creates challenges for military/foreign policy. Crude oil self-sufficiency is no longer feasible for the U.S. However, the U.S. National Energy Strategy that was articulated in 1991 established two objectives — expand U.S. production and reduce U.S. consumption — to enhance energy security (Thomas et al., 1993). ANS production contributes to the first of these objectives.

From a trade perspective, import dependence results in a negative balance of payments in the crude oil sector — a balance that has been improved historically because of ANS production. Figure 3.3-2, for example, provides a time series of the balance of payments in crude oil (i.e., the value of crude oil exports minus the value of crude oil imports in

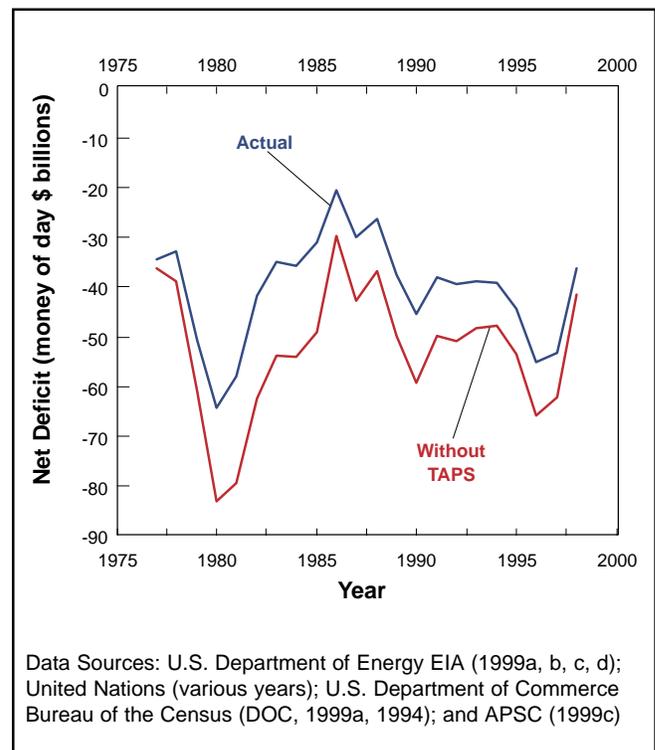


Figure 3.3-2. U.S. net balance-of-trade in crude oil as reported and estimated assuming no ANS/TAPS outputs.



each year) for the 22-year period from 1977 to 1998. The blue line in Figure 3.3-2 shows the actual negative balance of payments and the red line the estimated balance of payments in each year that would have resulted if ANS production was not available and domestic demand was unchanged. As can be seen, the actual balance of payments was negative for all years, ranging from approximately -\$20 billion to -\$64 billion (in 1980 following the Iranian Revolution). If ANS production were not available, the trade deficit would have been even greater, by an aggregate amount of approximately \$268 billion figured at the average domestic crude price over the 22-year period. Thus, the presence of ANS/TAPS output reduced but did not eliminate the balance-of-payments deficit in crude oil.

If ANS production did not occur and instead an equivalent quantity of crude oil was imported, the balance of trade in crude oil would have been more negative by an average of 23 percent. Because crude oil imports account for such a large fraction of the U.S. balance of trade, the contribution of ANS production is particularly important. From 1977 to 1998, the total balance of trade in goods and services (Council of Economic Advisors, 1998) would have been more negative by an average of nearly 14 percent without ANS production.

Federal Revenues Derived from ANS Output

ANS production provides revenues directly to federal, state, and local governments. Federal government revenues are realized in the form of federal income taxes paid by ANS producers and TAPS owners, windfall profits taxes from 1980 to 1988 when the Crude Oil Windfall Profit Tax Act of 1980 was in effect, and federal royalties on onshore and offshore developments. Income taxes — including taxes on ANS production, windfall taxes, and TAPS operation — have been studied (Deakin, 1989) for the 11-year period from 1977 to 1987. A time series of federal royalties can be found in MMS (1993a, 1997b). From 1977 to 1987, federal revenues from ANS/TAPS operations totaled nearly \$25 billion — an average annual revenue of approximately \$2.25 billion.

The Deakin analysis has not been updated. However, Berman et al. (1984), and more recently Eppenbach (1993), have made projections of federal and state revenues for the period beyond that covered in the Deakin analysis. Although federal and state revenue projections differed in absolute or relative terms, both studies projected modest revenue declines for both federal and state revenues as ANS production decreases. The authors of this section of the Environmental Report used a regression model to update the estimates of federal income tax made in the Deakin

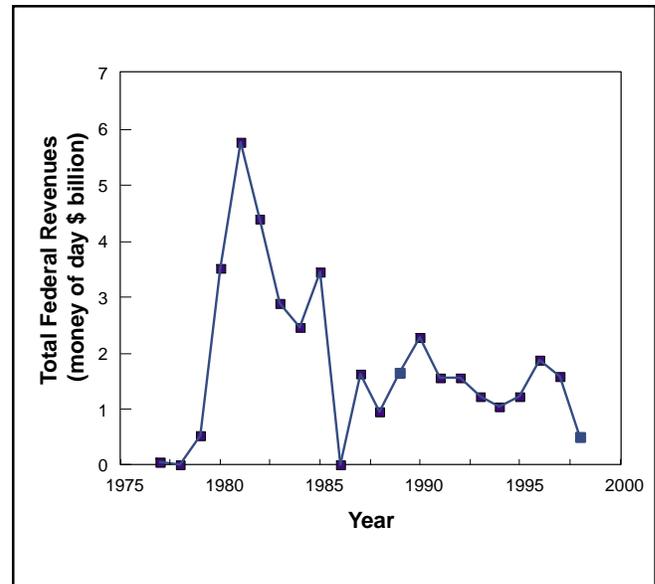


Figure 3.3-3. Federal royalties and income taxes from Alaska North Slope and TAPS operations 1977-1998. Taxes, effective tax rates, and royalties all affect this revenue. The Crude Oil Windfall Profits Tax Act passed in 1980 and was in effect until 1988, although crude price declines rendered the effective amount of the tax at zero for years after 1985. The peak federal revenues in 1981 were largely the result of the runup in oil prices in that year and the effect of the windfall profits tax.

analysis. The independent variables employed include ANS wellhead price and TAPS throughput. The regression is statistically significant, with an R^2 value of approximately 0.9. Figure 3.3-3 shows the estimated federal revenues (including windfall profits tax, federal income taxes on ANS producers, TAPS taxes, and federal royalties) from 1977 to 1998 based on the Deakin estimates through 1987 and the regression predictions for the years 1988 through 1998. On a cumulative basis, ANS/TAPS contributed approximately \$40.2 billion to the federal government, an average of slightly more than \$1.8 billion annually.

ANS Output and Federal Maritime Policy

Besides supporting the national objectives of fostering domestic crude production, limiting balance of payments deficits, and realizing revenue, ANS/TAPS output furthers U.S. maritime policy by providing opportunities for U.S. tankers, seafarers, and the domestic shipbuilding industry.

Under the Merchant Marine Act of 1920 (the so-called Jones Act), all shipments between U.S. ports must be carried on U.S.-flagged and -built vessels (built without construction differential subsidies and operated without operating differential subsidies) and crewed by U.S. merchant seamen (Committee on OPA 90, 1998). This law is designed to preserve an essential core of the American merchant fleet.



In the past 50 years the number of U.S.-flagged ships has declined precipitously. For example, the number of U.S. tankers alone totaled 951 in 1947 (API, 1991). By 1999, there were only about 100 U.S.-flagged tankers (depending on definitions, the number of tankers in the U.S. tanker fleet in 1999 varies from 93 to 126 according to estimates provided by the U.S. Maritime Administration [MARAD, 1999a, b, c, d]). Part of this decline is the result of replacing older, slower, smaller ships with larger, faster, more efficient ones (MARAD, 1998b), and part the result of changing shipment patterns and the declining competitiveness of U.S.-flagged vessels in comparison to those of other nations. (U.S. tankers remain relatively competitive [USDOE, 1994], but tanker construction cost differentials between U.S. and foreign shipyards are material [Committee on OPA 90, 1998].) The overall trend is not consistent with U.S. policy (MARAD, 1998a, b; 1999a) designed to “foster and maintain a United States Merchant Marine capable of meeting economic and national security requirements . . . reverse the precipitous decrease in the number of ships in the United States-flag fleet and the Nation’s shipyard and repair capability . . . and stabilize and eventually increase the number of mariners available to crew the United States merchant vessels.”

Shipments from the VMT to other U.S. ports beginning in 1977 provided impetus for construction of additional tankers to serve the ANS trade and created more jobs for seafarers and those who build and maintain “Jones Act tankers.” A small number of foreign-flagged tankers was employed to ship ANS crude to the U.S. Virgin Islands under an exemption in the Jones Act. These shipments ended in 1997 (GAO, 1999).

In 1993, for example, about 32 full-time-equivalent Jones Act tankers were used to transport ANS crude oil (USDOE, 1994) — a significant proportion of the U.S. tanker fleet at that time (Labar, 1995). Although 32 full-time-equivalent tankers were required, some 45 tankers (USDOE, 1994) were engaged in the trade on a part-time basis. Figure 3.3-4 shows estimates of the required number of full-time-equivalent and total tankers based on a simplified, but conservative, mathematical model that considers the average haul distance, tanker size in deadweight tons (dwt), loading and unloading times, delays, and the ratio of total tankers to full-time equivalents. This figure also shows corresponding estimates for various years made by USDOE (1994) denoted by the individually plotted points. In the peak throughput year for TAPS of 1988, ANS tanker trade provided employment for about 2,600 full-time-equivalent seafarers, assuming 27 billets per tanker, and 2.36 crew/billet (USDOE, 1994 based on MARAD estimates).

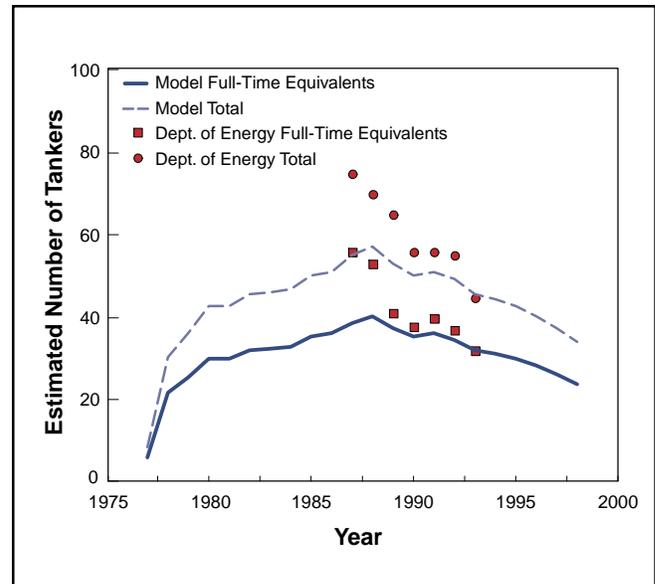


Figure 3.3-4. Estimates of the full-time equivalent and total number of tankers engaged in the ANS trade based on conservative assumptions. Corresponding estimates for certain years made by USDOE (1994) are shown as individual points.

According to U.S. General Accounting Office estimates (GAO, 1999), U.S. shipyards built over 50 tankers in the 1970s and 1980s to carry crude oil from Valdez to distant refineries. GAO (1999) cites estimates by shipbuilding officials that construction of a tanker generates approximately “1,000 U.S. shipyard jobs for the 18 months it takes to construct a tanker.” Thus, construction of 50 tankers entailed approximately 900,000 person-months of labor. Additionally, tankers serving the ANS trade undergo major, scheduled dry-dock repairs about twice every five years at a cost of \$1 million to over \$10 million each (GAO, 1999), generating additional jobs at domestic ship-repair facilities. GAO (1999) estimated that about 10 to 15 such repairs have occurred annually for tankers serving the ANS trade, and the average annual number of overseas repairs of ANS tankers was 3.4 from 1989 to 1998 (GAO, 1999).

Generally, the decline in ANS output will require fewer tankers, although the actual number of tankers required at any given time will depend on the particular marketing and transportation patterns prevailing at the time. The ANS trade will still employ a substantial percentage of the Jones Act tanker fleet and therefore support U.S. maritime policy objectives. Moreover, despite future declines in the aggregate number of tankers in this trade, there will be new tanker construction associated with shipment of ANS crude (Committee on OPA 90, 1998). This is because many of the tankers now in this trade will need to be scrapped or sold to comply with the Oil Pollution Act of 1990 (OPA 1990), which mandates, with few exceptions, that all tank vessels



in U.S. waters be double-hulled by the year 2015. A phase-out schedule for U.S. tankers, including those engaged in the ANS trade, has been developed (Labar, 1995; GAO, 1999). Many of these will be replaced by new construction, generating revenues for domestic yards and continued employment for shipbuilders and seafarers. Section 4.3.3 presents estimates of the OPA 90-compliant tankers needed to support continued operation of ANS/TAPS.

Ship Escort/Response Vessel System Tugs

Finally, it should be noted that advances in tug design have evolved from TAPS operational needs. Two new tugs, called *enhanced tractor tugs*, were built by Dakota Creek Industries in Anacortes, Washington, at a cost of \$15 million each to provide tanker escort service, ship handling, fire-fighting, and emergency response. Each tug is crewed by five people and can store up to 1,666 barrels (bbl) of oil. Both of the enhanced tractor tugs began working in the SERVS fleet in 1999 (APSC, 1999a, b, 1997a).

3.3.1.2 Importance of ANS/TAPS to the State Economy

This section discusses the characteristics of Alaska's economy including data on gross state product (GSP), diversity of economic activity, cyclical and seasonal fluctuations, personal income, population and employment, prices, sources of state funds, and economic regions. Salient data on the importance of ANS/TAPS to the state economy are highlighted.

Basic Industry

Petroleum production, transportation, and refining is the largest basic sector activity in Alaska. This industry accounted for 19 percent of the total GSP in 1998 (Table 3.3-1) according to estimates by the Institute of Social and Economic Research (ISER) of the University of Alaska, Anchorage (UAA). The share of GSP is heavily influenced by the price of oil and the level of production, both of

Table 3.3-1. Alaska gross state product by sector (money of day \$ million).

	1961	1970	1980	1990	1998
Total	\$938	\$2,165	\$20,276	\$25,787	\$22,052
Private Basic	114	400	13,766	14,214	6,985
Petroleum	6	207	12,807	11,930	4,280
Seafood	69	110	583	1,123	953
Mining	7	9	37	330	699
Tourism	11	21	169	411	658
Forest Products	22	53	171	370	230
Air Cargo	0	0	0	50	167
Public Basic	355	606	1,279	2,403	2,778
Military	183	326	599	1,231	1,233
Federal Civilian	172	281	681	1,172	1,545
Infrastructure	195	401	1,647	2,309	3,100
Construction	72	187	694	815	1,090
Transportation*	45	104	408	601	815
Public Utilities	78	110	546	893	1,195
Support	211	524	2,383	4,574	6,483
Services*	53	138	768	1,680	2,462
Trade*	92	220	787	1,540	2,098
Finance	52	138	720	1,205	1,730
Misc. Manufacturing	12	24	102	131	167
Agriculture	2	3	7	18	27
State and Local Government	62	235	1,200	2,287	2,705

*Net of tourism, air cargo, and oil pipeline.
Source: Goldsmith (1999a).



Alaska Pipeline Service Company

Photo 3.3-2. Photo of tanker with escort vessels in Prince William Sound.

which vary over time. In 1980, for example, it was 68 percent. Figure 3.3-5 shows a time trend of several key components of GSP demonstrating both the importance and volatility of the petroleum sector.

Most of the oil production comes from the Prudhoe Bay region on the North Slope. Most is transported through TAPS to Valdez in Southcentral Alaska and thence to market by tanker. Cumulative North Slope production from 1977 through calendar year 1998 was 12.521 billion bbl according to data from the Alaska Department of Natural Resources (ADNR, 1999c). (Through 1999, the total production has exceeded 13 billion bbl.) North Slope oil reserves developed and under development at the start of 1999 were 11.277 billion bbl, and production during 1998 was 450.834 million bbl. The large natural-gas reserves on the North Slope — approximately 30 trillion cubic feet — have not yet been commercially developed (CERA, 1999a; Sherwood and Craig, 2000). Two refineries at North Pole just outside Fairbanks, and one at Valdez process a small portion of North Slope production — about 21 million bbl in 1997 — primarily for consumption in the state (ADNR, 1999c). A fourth oil refinery at Nikiski processes Cook Inlet and imported crudes. (This refinery at one time processed ANS crude but ceased using it because the refinery had no market for the heavy residual refined products.)

The development of North Slope oil resources has contributed to the state economy through several mechanisms. Relevant statistics include:

- Through 1998, about \$42.6 billion (1998 dollars) was invested in production facilities on the North Slope (Table 3.3-2) (BP, Annual; Deakin, 1989).
- Data on total in-state procurement spending by the industry are not available, but oil industry wages paid in Alaska attributable to North Slope activities through 1997 were \$12.4 billion in 1998 dollars as

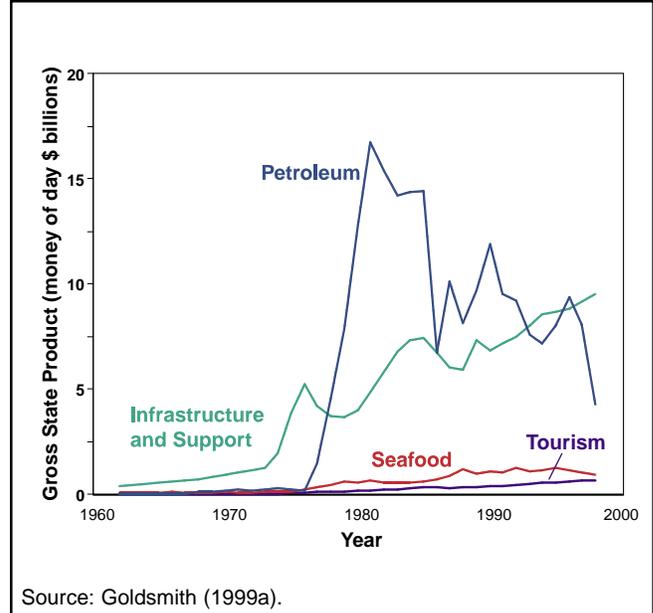


Figure 3.3-5. Alaska gross state product by sector (money of day \$ billion). Source: Goldsmith (1999a).

Table 3.3-2. Alaska North Slope investment through 1998 (\$ million).

	Cost (money of day \$ million)	Estimated Cost (1998 \$ million)
Prudhoe	\$17,500	—
Kuparuk	5,500	—
Endicott	1,236	—
Point McIntyre	750	—
Lisburne	1,800	—
Milne Point	781	—
Niakuk	154	—
Total	\$27,721	\$42,596

Note: Excludes investments in Badami, Northstar, Alpine, Point Thomson, and other nonproducing fields. Sources: BP, Annual; Deakin (1989)

shown in Figure 3.3-6 (ADOL, Annual Employment). Payroll associated with TAPS operation through 1998, excluding contractors, totaled nearly \$1.7 billion in 1998 dollars (Table 3.3-3).

- Figure 3.3-6 also shows a time series of employment. After rapid growth in the early years, employment peaked in 1991 at slightly more than 9,000 workers and has been declining in recent years due to falling production and to cost-saving measures.
- Total annual expenditures for pipeline operations and maintenance, including special projects, have been several times as large as the annual payroll (Table 3.3-4).



Table 3.3-3. Pipeline-related employment and wages.

Year	Employment	Alyeska Pipeline Service Company Payroll	
		Money of Day (\$ million)	1998 (\$ million)
1978	N/A	\$27	\$56
1979	N/A	30	56
1980	N/A	34	57
1981	N/A	37	58
1982	N/A	39	59
1983	N/A	40	60
1984	N/A	43	60
1985	N/A	44	61
1986	N/A	46	62
1987	1,439	47	63
1988	1,597	48	64
1989	1,922	53	70
1990	2,434	68	84
1992	3,047	110	126
1993	3,077	102	113
1994	3,639	127	138
1995	2,512	107	113
1996	2,173	90	93
1997	2,017	85	86
1998	2,074	81	81
1999	2,096		
Total		\$1,344	\$1,662

N/A: Not available.

Note: Employment includes workers under contract and special projects employment. In 1998 these categories totaled 854 and 411, respectively. Payroll estimated by author. Payroll excludes contract and special projects workers.

Source: APSC, Annual, Earnings; ADOL, Annual, Employment.

The total market value of North Slope oil production delivered to refineries through the end of fiscal year 1998 was \$246 billion (MOD), or \$330 billion in 1998 dollars (based on data from ADOR, 1999c). State revenues from North Slope oil for the same period were \$54.2 billion, or \$73.5 billion in 1998 dollars (Table 3.3-5). Revenues attributable to North Slope oil production totaled \$51.3 billion, and revenues from TAPS pipeline operations were \$2.9 billion. Most production revenues come from the severance tax and state royalties, while both production and transportation contribute to the state property tax and the corporate income tax. Most revenues have been deposited in the state General Fund, but a part of royalties and settlements has gone into the Alaska Permanent Fund and the Constitu-

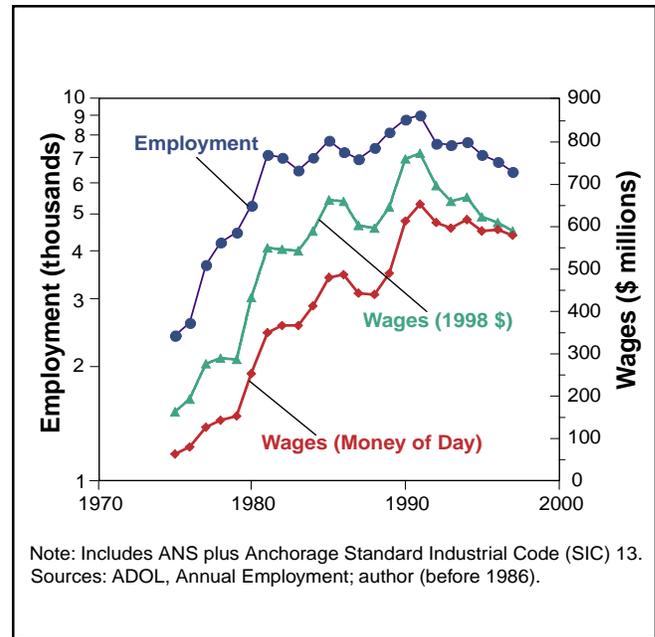


Figure 3.3-6. Alaska North Slope oil employment (left axis) and wages in money of day and 1998 dollars (right axis).

tional Budget Reserve, which were established to save part of the revenues from depleting assets such as petroleum.

Local governments have received \$4.4 billion in revenues through 1998 — \$5.6 billion in 1998 dollars — directly from production and transportation of North Slope oil (Table 3.3-6). This represents the portion of the state property tax on oil and gas production and transportation facilities that is shared with the local governments of the North Slope Borough (NSB), the Fairbanks North Star Borough, the City of Valdez, and Anchorage. Of total state property tax revenues collected since 1975 of \$6.6 billion, 66 percent was passed directly to these local governments.

Employment in the petroleum industry is small in relation to GSP (Table 3.3-7) (ADOL, 1982b). The employment level is not closely related to the level of production (ADOL, 1989b). In recent years, oil and gas industry employment has declined as oil production has dropped. Nonetheless, because of the high cost of labor, the petroleum industry payroll is the largest of the private basic industries in the state, and wage rates in oil-related industries are the highest in the state (Figure 3.3-7). The industry in Alaska is unique in many other areas including public ownership of land, dominance of production in huge fields, high costs, and dominance by large corporations (ADOL, 1983b).

Other Basic Industries

Other major basic industries in Alaska include seafood, mining, tourism, forest products, international air cargo,



Table 3.3-4. Alyeska Pipeline Service Company TAPS expenditures (1998 \$ million).

Year	Personnel	Outside Services	Equipment Supplies	Total Operations/Maintenance	Projects	Total
1987	\$98	\$62	\$134	\$294	\$49	\$343
1988	98	70	155	323	63	386
1989	105	155	177	437	169	606
1990	124	179	218	521	368	889
1991	148	205	153	506	279	784
1992	182	217	121	519	183	702
1993	160	218	98	477	134	611
1994	192	220	98	511	369	880
1995	155	206	82	443	198	641
1996	125	199	82	406	138	544
1997	114	183	96	392	173	565
1998	108	177	90	375	116	491
1999	105	167	88	360	135	495
2000	116	163	81	360	152	512
Total 1987-2000	\$1,830	\$2,421	\$1,674	\$5,924	\$2,524	\$8,448
2001 (Estimated)	\$124	\$161	\$78	\$362	\$202	\$565

Note: Personnel expenditures include payroll, benefits, and other worker-related spending. For this reason, totals are greater than those shown for payroll alone in Table 3.3-3.

Source: APSC, Annual, Earnings.

and the federal government. Salient characteristics of these industries are briefly summarized below.

Seafood Industry. The seafood industry is the second largest private basic industry in Alaska measured by GSP. The larger part of the industry impacting the Alaska economy is the harvesting and processing of salmon, shellfish, and halibut, which together had an ex-vessel value of \$881 million in 1995 (ADF&G, 1997). Fishermen in small boats with limited entry permits operate out of the coastal communities throughout the state, harvesting a variety of species in different locations at different seasons of the year. Processing facilities located in many of these communities prepare the harvest for market. For many coastal communities such as Kodiak, Homer, Cordova, Sitka, and Ketchikan, the income of resident fishermen and the processing facilities is one of the most important contributors to the local economy. This is in spite of the fact that a large share of permits to fish for these species are owned by non-Alaskans and many seasonal workers come to Alaska to

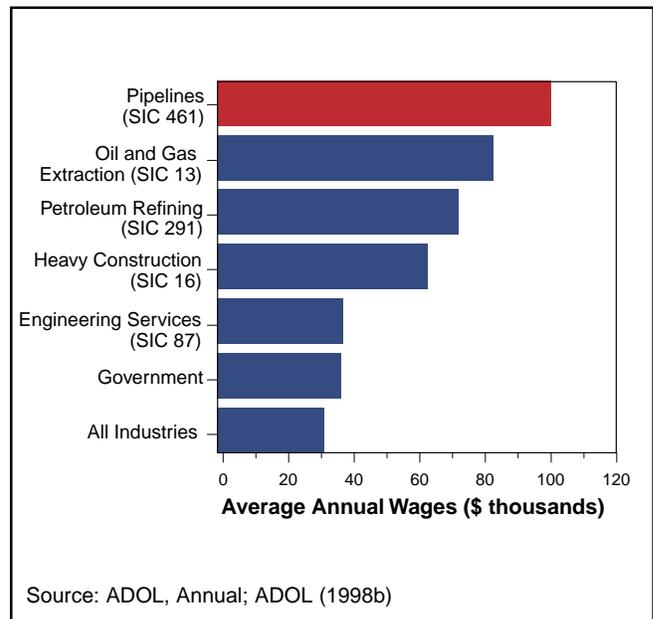


Figure 3.3-7. Average annual wages by industry in Alaska, 1997.



Table 3.3-5. State revenues North Slope oil production and pipeline operations, 1978-1998.

	Money of Day (\$ million)	1998 (\$ million)
Total	\$54,228	\$73,471
Share Attributable to North Slope	51,309	69,198
General Fund Revenues	40,538	56,274
Severance Tax	18,835	24,611
Royalties	4,365	19,020
Corporate Income Tax	3,608	5,076
Bonuses and Rents	1,530	4,080
Special Settlements	1,109	1,466
Property Tax	597	914
Reserves Tax	494	1,106
Constitutional Budget Reserve Revenues	4,931	5,266
Share Attributable to Pipeline	2,919	4,273
Corporate Income Tax	1,259	1,771
Property Tax	1,660	2,501
Item: Totals for Allocated Taxes		
Corporate Income Tax	4,867	6,848
Property Tax	2,257	3,415

Note: Includes property taxes starting in 1975. Includes North Slope Bonus in Fiscal Year 1970.

Source: ADOR, 1998; Alaska Permanent Fund Corporation, Annual.

Table 3.3-6. Property tax revenues, 1975-1998.

	Nominal (money of day \$ million)			Constant (1998 \$ million)		
	Total Collected	Local Share	State Share	Total Collected	Local Share	State Share
Jurisdiction						
North Slope Borough	\$4,479	\$3,888	\$590	\$5,837	\$4,932	\$904
Valdez	548	358	190	800	481	320
Fairbanks Northstar Borough	224	116	108	322	156	166
Anchorage	26	19	7	34	24	10
Unorganized Borough (a)	1,362	0	1,362	2,016	0	2,016
Total	6,638	4,381	2,257	9,009	5,593	3,415
Pipeline	2,134	474	1,660	3,138	637	2,501
North Slope	4,504	3,907	597	5,870	4,956	914

Note: (a) Retained by state government.

Source: ADCED, Annual.

crew on the fishing boats and work in the processing plants (McDowell Group, 1989; Knapp and Smith, 1991).

The income of these commercial fishermen is sensitive to world market conditions as well as fluctuations in the size of the annual harvest — for example, the ex-vessel value of the salmon harvest has ranged from \$263 million to \$789 million between 1988 and 1998 (ADF&G, 1999a). And because the number of harvesters is constrained by regulation, per-capita income from fish harvesting changes considerably from year to year, and fixed costs are high. In consequence, when fish prices are high and the harvest is good, per-capita fisherman income is high and the communities dependent on fishing are economically healthy. In years when prices and harvest are low, communities dependent on the fishery do poorly. Management of the resource has resulted in generally high harvests, and the resource is fully utilized. As a result, further expansion in this industry must come from adding value in processing. Increased competition from fish farming in recent years has put downward pressure on the market price of salmon.

The other part of the industry is the bottom fishery, which in contrast to salmon, shellfish, and halibut, is a low-value, high-volume fishery dominated by large operations in western Alaska. In 1995 the ex-vessel value of the harvest was \$511 million (ADF&G, 1997). Large ships harvest the bottom fish and process it into surimi (fish paste) and other products or send the harvest to shore-based processors in Dutch Harbor and other western Alaska ports. The impact of the bottom fishery on the Alaska economy comes when these large ships are owned by Alaskans, when they use the services of Alaska ports, when they employ Alaska residents, and when processing occurs in shore facilities.

Employment in the seafood industry is relatively con-



stant from year to year. Most harvesters are self-employed, either as captains or crew members of boats, and their numbers are not reported in wage and salary employment statistics. Processor employment is the largest component of the manufacturing industry in Alaska. After processing, the wholesale value of all seafood produced in 1995 was \$2.508 billion (ADF&G, 1997). The low wages in the fish processing sector account for the low average wage in manufacturing in the state.

Mining. The mining industry is the third largest contributor to private basic-sector gross product. It consists of a small number of world-scale hard-rock mines in the Southeast, Interior, and Northwest parts of the state; one coal mine serving both Alaska and export markets; and many smaller operations and exploration activities. Zinc production at the Red Dog Mine in Northwest Alaska contributes the largest share to the total value of production, followed by gold from the Fort Knox Mine in the Interior, and gold and silver from the Green’s Creek Mine in South-

east Alaska. Smaller mines primarily produce gold and silver. The total value of mineral production in 1998 was \$904 million — \$505 million of zinc, \$173 million of gold, \$82 million of silver, \$49 million of lead, and \$95 million of all others (ADNR, 1999a).

Production from these mines is based on the most current technology, and this, together with the large scale of their operations, provides some stability to employment in spite of fluctuating world metal prices. Smaller operations are more vulnerable to world market conditions, as is the level of exploration and development of new prospects.

Employment in mining has been increasing but remains small and is confined to exploration, development, and primary production. Minerals are exported without processing because of the high cost of business in the state. Mining payrolls are important to the economies of the communities adjacent to the mines, although the Red Dog Mine draws workers who are residents of many communities throughout the state. Many people working in the mining sector are

Table 3.3-7. Annual average employment (thousands).

	1961	1970	1980	1990	1997
Total	94.829	133.868	209.787	283.906	311.305
Private Basic	11.101	16.248	34.227	47.936	50.063
Oil and Gas	0.599	2.692	7.955	11.908	10.096
Seafood	7.034	8.483	15.429	18.692	19.112
Mining	0.594	0.354	0.526	1.217	1.593
Tourism	1.045	1.536	5.794	10.474	15.068
Forest Products	1.829	2.759	3.953	4.712	2.376
Air Cargo	0.000	0.424	0.570	0.933	1.818
Public Basic	48.100	48.536	39.719	41.861	35.395
Military	32.500	31.425	22.003	23.132	18.054
Federal Civilian	15.600	17.111	17.716	18.729	17.341
Infrastructure	10.878	15.271	24.426	26.777	30.743
Construction	4.053	6.893	10.169	10.278	12.734
Transportation	4.150	5.707	8.515	10.760	11.718
Public Utilities	2.675	2.671	5.742	5.739	6.291
Support	16.550	35.374	75.125	116.332	141.496
Services	5.282	10.822	27.380	45.630	58.038
Trade	7.745	14.751	27.076	41.766	49.812
Finance	1.520	3.098	7.654	9.165	10.957
Misc. Manufacturing	0.694	1.340	2.655	3.364	3.492
Agriculture	0.022	0.076	0.224	.567	1.055
Proprietors	1.287	5.288	10.137	15.841	18.143
State and Local Government	8.200	18.439	36.290	51.000	53.607

Source: Goldsmith (2000b).

Oil and Gas: Exploration, production, transportation, refining
 Seafood: Harvesting (including proprietors) and processing
 Timber: Harvesting and processing
 Mining: Wage and salary only (excludes proprietors)
 Tourism: Transportation, trade, and services employees

Transportation: Net of pipelines, air cargo, and tourism
 Trade: Net of tourism
 Services: Net of tourism
 Proprietors: Net of fish harvesters
 Manufacturing: Net of seafood processing, petroleum refining, and forest products harvesting and processing



self-employed, and these workers are not reported in wage and salary employment statistics.

Tourism. The tourism industry consists of the share of business in the trade, services, and transportation sectors identified with nonresident pleasure visitors to the state. The number of pleasure visitors exceeds 1 million per year, bringing more than \$800 million in tourist spending into the state (McDowell Group, 1999a). Activity is concentrated in Southeast Alaska, where tour ships have a large share of the market, and in Southcentral Alaska, where several large operators provide a variety of sightseeing package tours. Many visitors come to fish, hunt, and engage in other outdoor activities, and these visitors are more likely to be independent travelers. Small numbers of tourists visit the less accessible communities, mostly by air.

The number of tourists has grown rapidly in recent years, and virtually every sizable community has felt the effects. For some communities, such as Skagway, tourism is now the most important private basic sector of the economy. The industry is very seasonal, with most visitors arriving during summer. This leads to some transiency in the tourism workforce because Alaska community labor markets are not large enough to absorb the seasonal swings in demand for workers. As a result, nonresidents fill a large portion of jobs in tourist-driven industries (ADOL, 2000).

The industry employs a large number of people, particularly during the peak summer months. On an annual average basis, employment is comparable to the seafood industry, which is also quite seasonal. Because wage rates for most jobs are relatively low, the contribution to local economies from tourism payrolls appears low. Not included in the wage and salary employment statistics are a large number of self-employed who work in the industry. This includes many of the guides and other small operators that provide “Alaskan experiences” that the large tour operators are not equipped to do.

Forest Products. The forest products industry, centered in Southeast Alaska, consists of the harvesting and processing of Alaska timber. This industry is not only vulnerable to fluctuations in world market prices, but also dependent on political decisions on the use of publicly owned timber. Though the growth in harvest from Native lands resulted in a boom early in the 1990s, the decline in allowable harvests from public lands and other factors resulted in a severe decline in this industry through the 1990s.

Pulp mills in Sitka and Ketchikan, mainstays of the economies in both communities, closed in the mid-1990s, and several sawmills have also gone out of business. Alternate types of wood processing facilities are under consideration, but none has yet to move beyond planning.

Employment is now primarily limited to timber harvesting and milling. These activities are still important to many of the Southeast Alaska communities, but the contribution of the timber payroll is not as important as it once was. Several of these communities are struggling to find ways to diversify their economies, with the assistance of federal funds made available for that purpose.

Air Cargo. International air-cargo activity operating primarily from Anchorage International Airport is another important private-sector basic industry in Alaska. This industry grew rapidly in the 1990s in response to growth in the international air-cargo market, taking advantage of the location of Anchorage between the U.S. West Coast and important Pacific Rim markets (Goldsmith, 1998). Several of the largest international carriers have built freight transfer facilities at the airport, and many others use the services of the airport. The jobs in this industry pay relatively high wages, and the payroll is an important contributor to the strength of the Anchorage economy.

Military. Military spending is one of the largest nonpetroleum sources of basic economic activity in the state. Major Army and Air Force bases are located in Anchorage and Fairbanks, and a large Coast Guard base is at Kodiak. Smaller installations are located in other communities. The number of active duty personnel has declined in recent years with the closure of bases on Adak Island and at King Salmon in Southwest Alaska, as well as Delta and Galena in the Interior. Reductions of personnel at the remaining bases have also affected the total.

Rising pay and capital spending to upgrade facilities have partially offset the economic effect of the decline in the number of active duty personnel. Fairbanks and Kodiak are most dependent on military spending.

Federal Government. Federal (civilian) spending has always been an important element of the Alaska economy. The largest numbers of federal employees in the state are with the U.S. Departments of Interior, Transportation, Agriculture, and Health and Human Services, as well as the U.S. Postal Service (ADOL, 1996). Federal employees in these and other departments are located in virtually every community in the state, although they are concentrated in the urban centers of Anchorage, Fairbanks, and Juneau.

Direct federal spending for construction, as well as capital and operating grants to state and local governments and nonprofits, also contributes to the economy of the state and communities throughout the state. In recent years, Alaska has ranked near the top among states in per-capita federal grants (DOC, 1998). Many of these grants target the building of infrastructure such as roads, ports, water and sewer facilities, and other utilities, and the provision of services



in rural Alaska that were formerly provided directly by federal employees.

Other. Two other important sources of purchasing power supporting the Alaska economy are the Alaska Permanent Fund Dividend and miscellaneous nonwage personal income. The dividend is an annual cash payment to every Alaskan from the income earned by investing the saved portion of state royalties from petroleum production. The total dividend distribution in 1999 was about \$1 billion, larger than the payroll of any of the basic industries of the state (Alaska Permanent Fund Corporation, Annual). The dividend is an important component of household income in every community in the state.

Although small compared to most other states, the share of the Alaska population over 65 is growing as more people choose to retire in the state. Retirees provide a source of personal income to support economic activity in communities throughout the state.

Total Employment

The majority of jobs in Alaska are in infrastructure, support, and state and local government. Transportation is the largest employer in the infrastructure sector — including pipeline workers and those whose jobs depend on tourism and international air cargo. Air and water transportation are both important because of the large part of the state that is inaccessible by road. These regions hold a small share of the population, but much of the basic economic activity occurs in remote locations. This also accounts for the importance of communications and public utilities, since the many small Alaskan communities distributed across the state require access to regional centers, as well as electric and water and sewer service. The construction industry is dependent on the investment decisions of both the private sector and government.

Jobs in the infrastructure sector are relatively high-paying and are sought after by many Alaska residents, and with the exception of construction, are relatively stable from year to year. Many are located in smaller communities and rural parts of the state, and some of these rural jobs are filled by urban residents who commute to rural or remote work sites for temporary assignments.

Support jobs are concentrated in trade, services, and finance, with a small number involved in manufacturing and agricultural production for the Alaska market. Wholesale trade serves the needs of the large retail sector as well as industry, and because of its distribution function, its jobs are primarily in the urban areas and regional centers. Retail trade is well-represented in the economy by a mix of large national chain stores that entered the Alaska market in the

1990s, as well as smaller, locally owned businesses. Retail sales are influenced not only by the household income of residents (including the Permanent Fund Dividend), but also by the large number of tourists and seasonal workers that come to the state. Furthermore, the young average age and transiency of the population contribute to a large retail-trade sector. Since shopping opportunities in smaller communities are more limited and because the available shopping options in urban areas have been increasing rapidly in recent years, retail trade sales tend to be concentrated in urban Alaska and regional centers. Rural residents travel to urban areas to shop or send to city stores “bush orders” that are delivered inexpensively through the bypass mail system of the U.S. Postal Service.

Service businesses also tend to be concentrated in urban areas. This is particularly true of business services, but is also the case for many types of personal services such as health care. Most hospital beds in the state are in the four hospitals in Anchorage. The level of activity in services is sensitive not only to household income and the needs of tourists and nonresident workers, but also the demands of businesses in the state, and public spending. Engineering services, for example, are very sensitive to the level of construction spending. Health services are sensitive to the level of Medicaid and Medicare spending.

Finance is concentrated in urban Alaska, where much of the business of the state takes place. Manufacturing for the Alaska market consists mostly of publishing and some food, while agriculture is mostly greenhouse production and some mariculture.

The support sector generates the largest number of jobs in the economy. Some have high wages, particularly in business and professional services, but more are at the lower end of the wage scale.

The concentration of state and local government workers in Alaska is 41 percent above the national average (DOC, 1997). This is partially due to the need to provide public services to a population scattered among over 200 communities, many of which are not connected to the limited road system. Furthermore, the public ownership of many of the natural resources in the state means that the government has an important management function absent in most other states. State government employment, including the University of Alaska, is concentrated in the urban centers of Anchorage, Fairbanks, and Juneau where it is an important component of the local economy. In contrast, local government employment is more evenly distributed across the communities of the state, and in smaller communities represents one of the largest sources of jobs in the schools and administration.



Government Expenditures

Figure 3.3-8 shows state and local government expenditures per capita in 1996 (the latest year available) for the top 20 states. Alaska spending per capita has been the highest among all states for many years. In 1996, Alaska's spending per capita of \$11,745 was slightly more than 2.4 times the median of \$4,870 among the states and 2.23 times the mean of total spending. This spending pattern for Alaska reflects not only differences in the costs of goods and services,¹ limited infrastructure, low population density, and other factors, but also the fact that Alaska provides more services than do other states. Alaska's proportionately large expenditures per capita have been financed by the infusion of oil and gas revenues, among other sources. (The contribution of the oil and gas industry to Alaska's unrestricted General Fund revenues is presented below.)

Alaska also has the highest level of state debt per capita. Figure 3.3-9 shows state-government debt per capita in 1996 (the latest year available) for the top 20 states. Alaska's debt per capita has been the highest among all states for many years (Mead, 1978). In 1996, Alaska's state debt per capita of \$11,234 was nearly 2.9 times the median of \$3,923 among the states. This statistic is not presented to claim that the state is insolvent or unwisely managed. However, it does show that the state has been more willing than all others on a per-capita basis to accept debt burdens.

The Geographic Diversity of Economic Activity

Great economic diversity exists among the three major regions of Alaska: the Railbelt, Maritime Alaska, and the Interior.

Railbelt. This region is named for the Alaska Railroad that runs from Seward, through Anchorage and the Matanuska Valley, and north to Fairbanks. This area, which contains 72 percent of the state population, includes the four borough census areas of Anchorage, Fairbanks, Matanuska-Susitna, and the Kenai Peninsula, (ADOL, 1999c). Its communities are linked by road, and it has the most diverse economy of the state. It serves as the headquarters and staging area for much of the economic activity (in particular, petroleum, mining, and construction) that takes place in the more remote parts of the Interior. It is the home for most of the workers who commute to jobs at remote sites (ADOL, 2000) and many commercial fishermen (ADF&G, 1999e). It is the trade and service center for smaller communities in the Interior and much of Maritime Alaska. The largest military installations are in the Railbelt,

and most federal government workers are stationed here. Most tourist visitors to the state spend some time in the Railbelt, and most Alaskans who live in the Railbelt spend their recreation dollars there as well.

Labor force participation in the Railbelt is high, and the unemployment rate is relatively low (ADOL, 1999f). The large workforce and small senior population contribute to a high level of per-capita income relative to both the national average and the rest of the state. The size of the population is sensitive to employment opportunities. When employment opportunities are growing, the population increases with migration from other parts of the state and the rest of the U.S. When employment opportunities are falling, out-migration causes the population to grow more slowly (ADOL, 1998a). Although a large number of Alaska Natives² live in the Railbelt, they are under-represented as a percentage of the Railbelt population compared to the rest of the state (ADOL, 1999d).

Maritime Alaska. This region consists of the smaller communities without road access along the Alaskan coast from Ketchikan in the south to Dutch Harbor far to the north and west.³ About 16 percent of the state population lives in these communities. There are about a dozen communities with populations over 1,000 along this crescent; the largest community is Juneau, the state capital. Numerous smaller communities are interspersed among them. These communities grew up around the exploitation of natural resources, primarily fishing, and because of size, location, and other circumstances, are less economically diversified than the Railbelt communities. The larger communities such as Ketchikan and Juneau have the most economic diversity. Juneau, besides being the state capital, is the location of a large silver mine, the Greens Creek Mine; is a popular tourist destination for cruise ships; and is home to some commercial fishermen. Small communities such as Cordova and Dutch Harbor, which are almost completely dependent on commercial fishing, are less diverse.

Because of their more fragile economic base, the support economies of these communities are not as well-developed as in the Railbelt, although large retailers have moved into some of these markets. The relative lack of economic diversification also makes these communities more susceptible

¹Adjusting for differences in the cost of living between Alaska and the other states, the average per-capita Alaska spending is approximately 1.9 times the average for the other states (Goldsmith, 2000a).

²"Native American" is an ethnic designation used by the U.S. Bureau of Census and the Alaska Department of Labor. It includes all Native Americans, as well as a small number of Natives belonging to tribal groups from other states. The terms "Alaska Native" or "Native" are more common and are used in the rest of this document.

³For this summary, "Maritime Alaska" is defined as the following census areas: Kodiak, Valdez-Cordova, Dillingham, and all census areas in Southeast Alaska.

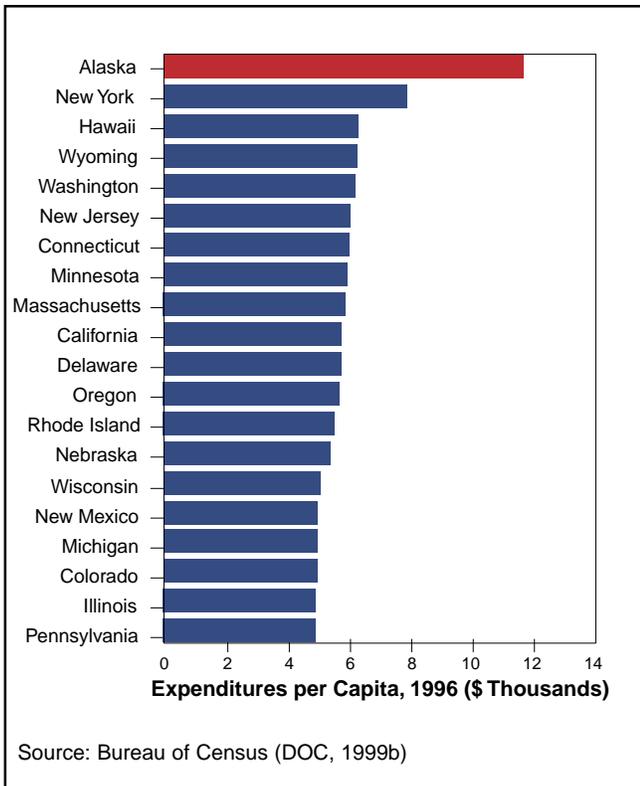


Figure 3.3-8. Twenty states listed in descending order of combined state and local expenditures per capita, 1996.

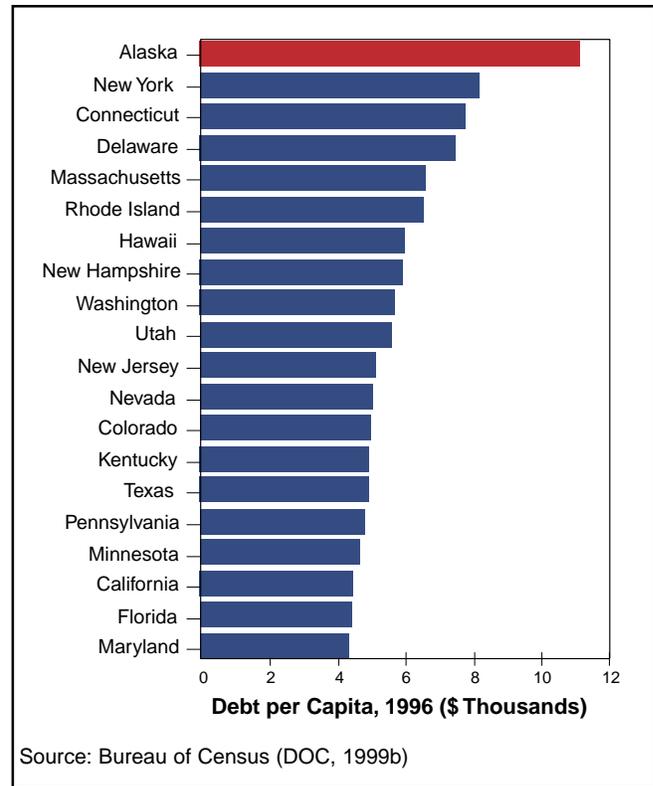


Figure 3.3-9. Twenty states listed in descending order of debt per capita, 1996.

to a downturn in one natural resource market than is the case for the Railbelt. In recent years, growth in these communities has lagged behind the Railbelt.

Labor force participation in Maritime Alaska is not as high as in the Railbelt, and seasonal employment — in industries like fishing and tourism — is more important. Population growth is less directly tied to employment opportunities than the Railbelt as residents move in and out of the labor market in response to employment opportunities rather than migrate.

Household income is more variable, depending on the fishing season or other resource cycles. The Alaska Native population is under-represented in the larger Maritime communities compared to the state as a whole.

Interior Alaska. The remaining Alaskans (about 12 percent) live in this region, which consists of nearly 200 small communities mostly off the road system. Access is primarily by air or boat. These communities range in size from Bethel, Barrow, and Nome, with populations of 4,000 to 5,000 each, to places with a handful of families. The largest of these communities are regional centers for rural parts of the state. Petroleum production, mining, fishing, and tourism are the most important private basic industries in the Interior, but few communities receive much direct economic benefit from their proximity to these resources.

Petroleum and mining are largely enclave-type developments from camps, the most productive fisheries are closer to the Maritime communities, and tourism is dominated by businesses located in the more urban parts of the state.

Most of these communities are cash-poor from the lack of a viable private-sector economic base, and their small size makes it difficult to support retail and service businesses. Much of the cash in many of these communities comes from the state and federal governments through a variety of programs providing grants and services to local residents and governments. These are administered by local governments, village corporations, tribal councils, and other quasi-government organizations. Per-capita personal income is below the Railbelt and the national average. At the same time, the cost of living, based on the cost of a standard marketbasket of goods and services, is considerably higher than in Anchorage because most food and manufactured goods must be shipped to Interior villages by air or water (University of Alaska, 1998).

The population is primarily Alaska Native, and most households engage in subsistence activities. Because of subsistence participation, the labor-force participation rate is relatively low. However, the unemployment rate in most places is quite high because the number of job opportunities is limited. In many communities most of the jobs pay-



ing a cash wage are with the government — the post office or school — or with the electric utility. In larger places there are more opportunities with the local government or other quasi-government organizations, and a limited number of jobs in small businesses. Publicly funded construction projects are another important source of wage income.

Considerable resources have been invested in providing public infrastructure in small Interior communities, and living conditions have improved considerably in terms of access to health care, education, and social services; electricity, communications, and other public utilities; and economic opportunities. Nevertheless, money to maintain infrastructure and programs is becoming more scarce, many communities still lack basic utilities, and economic opportunities are not growing fast enough to keep up with the growing working-age population. Many Interior residents choose to move to the Railbelt or Maritime communities because of the greater economic opportunities available in those places, but many choose the subsistence lifestyle of the Interior in spite of the limited opportunities for cash income which that choice entails.

Cyclical and Seasonal Fluctuations

Cyclical and seasonal instability of the economy is an important consequence of the dominance of natural-resource production in Alaska's economy. Natural-resource production tends to be both cyclical and seasonal. The cyclical nature of resource production is reflected in the ex-vessel value of the salmon harvest to commercial fishermen. In the last 10 years, it has ranged from \$263 million to \$789 million, depending on the size of the run and the market price (ADF&G, 1999d). This instability means the income for communities dependent on fishing can vary considerably from year to year, making planning difficult for households, businesses, and governments.

The seasonality of resource production is reflected in the employment in fish processing. For example, in 1997 in the Valdez-Cordova Census Area, monthly fish processing employment averaged 499, but it was 1,168 in the peak summer month of July and only 57 in December (ADOL, 1998b). The labor market in small communities, and for the state as a whole, is unable to absorb these seasonal swings. As a result, seasonal industries tend to have a large nonresident workforce, and the local economies cannot generate as large a support structure as places where income is more stable and remains within the community with residents.

Personal Income

An increasing share of personal income now comes from nonwage sources such as the Alaska Permanent Fund

Dividend (PFD) (Goldsmith, 2000b). Figure 3.3-10 shows the dividend paid to each resident of Alaska in dollars and as a percentage of per-capita income from 1980 to 1999. The Permanent Fund Dividend Program was established in 1980. Court challenges required modification of this program, and the first checks were distributed at the end of 1982, which accounts for the spike in the curves shown in Figure 3.3-10. In subsequent years, the dividend has increased, as has the significance of this dividend relative to per-capita income. Because the dividend is paid on a per-person basis, the relative significance on a household basis is greater for large low-income families.

The PFD helps to insulate the economy from the fluctuations in income associated with natural-resource production. A portion of wages paid to workers in the state leaves when seasonal workers and nonresidents temporarily employed in Alaska leave the state at the end of their work assignments. This residence adjustment also helps to insulate the economy from seasonal variation, but the loss of purchasing power represented by this adjustment also takes away a source of growth for the economy.

There are large differences across the state in the importance and even direction of the residence adjustment (DOC, 1997). The largest outflow is from the North Slope Borough, where about three-quarters of all wages reported go to nonresidents of the borough — the oil field workers. In contrast, the Matanuska-Susitna Borough, adjacent to Anchorage to the north, has a net inflow of wages equal to

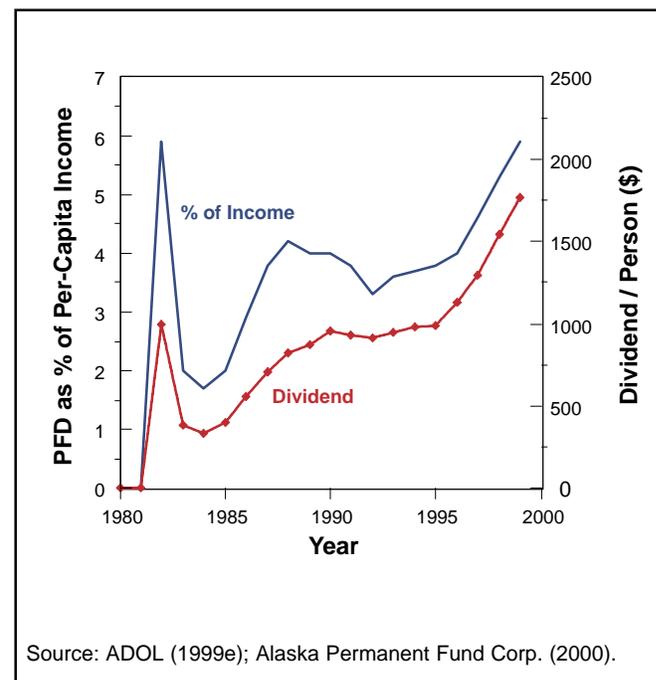


Figure 3.3-10. Permanent Fund Dividend in dollars per person and as percent of per-capita income.



nearly two-thirds of the wages paid to workers in the borough. Although much of this residence adjustment is due to the borough’s location as a suburb of Anchorage, a portion comes from remote-site workers bringing their paychecks to their homes in the borough. This is substantiated by the fact that there is also a net inflow of wage income into the Kenai Peninsula Borough — equal to about 15 percent of the wages paid in the borough — even though the population centers in the borough are not close enough to Anchorage to be considered suburbs. Much of that inflow comes from wages paid on the North Slope. Table 3.3-8 shows that most North Slope oil workers live in the Railbelt and that few live in or near the oil fields.

Per-capita personal income in Alaska is no longer above the national average, as it was for many years, largely because the average annual wage is not growing. Most new jobs in recent years have been in lower-paying industries, while the economy has been losing high-paying jobs in industries such as petroleum and timber.

Labor Market and Total Population

The population is 74 percent white, 17 percent Alaska Native, and 9 percent other (ADOL, 1999d). The average age is less than the national average, and Alaska Natives are younger than the state average (23 percent of the Alaska Native population is under 10). Only 5 percent of the population is over the age of 65. About 3 percent of the population is active-duty military.

The population is quite mobile, particularly in the Railbelt, but less so than in the past. As recently as the 1970 census, only 48 percent of males reported living in Alaska 5 years earlier. By 1990, the percentage had increased to 76 percent (DOC, 1972, 1982, 1993). Non-Natives are more likely to make their decisions about where to live based on the availability of jobs than are Natives, but the large Native population in the Railbelt suggests that a portion of Alaska Natives choose where to live on the basis of job opportunities.

Labor-force participation rates are higher for whites than Alaska Natives. In 1990, the rates were 88 percent for white males and 69 percent for Alaska Native males (DOC, 1993). This is partially a reflection of the desire of many Natives to pursue a subsistence lifestyle while living in the Interior and also reflects the absence of job opportunities in many Interior communities. Participation rates are also high for females, with 68 percent of white and 51 percent of Alaska Native women reporting to be in the labor force.

Unemployment rates in Alaska are generally higher than the national average for a number of reasons:

- First, in many smaller communities the availability of

Table 3.3-8. Place of residence of North Slope oil workers (percent).

	Residency Determination	
	Permanent Fund Dividend	Driver's License
Outside Alaska	29.8%	13.0%
Anchorage/Mat-Su	44.0	54.5
Gulf Coast	14.7	18.3
Interior	9.0	11.1
Northern	1.4	1.7
Southeast	0.5	0.6
Southwest	0.7	0.9
Total	100.0%	100.0%

Note: Gulf Coast includes the census areas of Valdez-Cordova, Kenai Peninsula, and Kodiak. Interior includes Fairbanks, Southeast Fairbanks, Yukon-Koyukuk, and Denali. Northern includes North Slope Borough, Northwest Arctic Borough, and Nome. "Oil workers" includes SIC 13, but excludes construction industry workers.

Source: ADOL (2000) and author's estimate.

cash wage jobs is very limited. In many instances, particularly in the Interior, the published unemployment rates under-represent the extent of the unemployment because job seekers become discouraged and stop looking for work.

- Second, the seasonality of many jobs in construction, seafood, timber, and tourism means that the typical worker may spend more time unemployed than elsewhere.
- Third, competition for jobs from nonresident temporary workers may keep residents from obtaining jobs.

The percentage of nonresident workers in some industries is quite large, reflecting an easy flow of workers into and out of the state in response to the changing availability of jobs. One result is that the unemployment rate tends to be pro-cyclical, at least during expansions. When the number of jobs increases rapidly, the number of migrant job-seekers who come to Alaska increases more rapidly, causing the amount and rate of unemployment initially to increase (ADOL, 1977). Out-migration of these workers depends on their expectations of continuing job opportunities in the state. For example, the Out-migration after the construction of TAPS in the late 1970s was modest because of the expectation at the time that construction of a gas pipeline would commence in a year.

Public Sector

Much of Alaska is divided into organized boroughs, similar to counties in most states, but a part of the state is in the unorganized borough. Borough governments are required by law to provide certain public services, while the

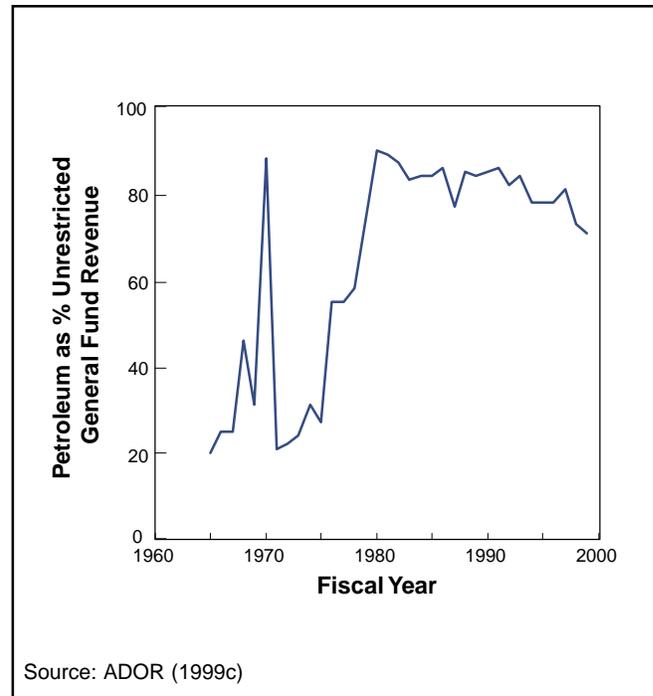


state provides those services directly to the residents of the unorganized borough. Communities both within and outside the organized boroughs are incorporated into cities that provide additional local services. Three areawide boroughs combine a city and borough government into a single entity. Because of the existence of the unorganized borough, the modest tax base in many cities and boroughs, and the evolution of public service delivery in the state, state government provides a larger share of the public services in Alaska than in most states. For example, the state provides public education in the unorganized borough and provides most of the funding for public education in the cities and boroughs through foundation grants.

The largest source of general-purpose (General Fund) revenues for the state is petroleum production and transportation. Figure 3.3-11 shows a time series of the percentage of unrestricted General-Fund state revenues accounted for by the petroleum industry (1965-99). From 1988 to 1998, oil and gas revenues accounted for an average of 82 percent of such revenues. Taxes are levied on property, income, and production. Since the state owns the land from which most petroleum is produced, it also receives a royalty on production, as well as bonuses and lease payments. The remaining general-purpose revenues come primarily from a corporate income tax and various fees and licenses. The state currently has neither a statewide sales tax nor a personal income tax. Revenues from natural resources other than petroleum account for a small part of the total (ADOR, 1999c).

State revenues have consistently been less than general-purpose expenditures during the 1990s, and the deficit has been covered by drawing down the state's cash balances accumulated from oil revenues collected in earlier years. At the same time, the revenues collected from petroleum production and transportation have been falling due to declining production. The practice of relying on petroleum revenues and cash balances to cover the cost of general government can continue for only a few more years before large new revenue sources will be required, or the state general-purpose budget will need to be cut by about 50 percent (Goldsmith, 1999b). This assumes continuation of ANS production. If this revenue source were not available, the budget situation would be much more serious.

The second largest source of state revenues is federal grants for both capital spending and operations. These funds are restricted for use in specific programs and cannot be used to reduce the deficit in the General Fund. A sizable portion of these grants is to build the physical infrastructure of the state up to a level comparable to other states and foster economic development.



Source: ADOR (1999c)

Figure 3.3-11. State revenues from the petroleum industry as a percentage of unrestricted General Fund revenues, 1965-1999.⁴

The third major source of state revenues is the Alaska Permanent Fund. This fund was established in 1976 as a permanent savings account for a portion of the royalties paid to the state from petroleum production on state lands. Since the flow of these revenues was temporary, the rationale was to convert a depleting natural-resource asset into a sustainable financial asset. Deposits also served to prevent spending all the petroleum revenues when received. This reduced unnecessary expenditures and overheating the economy from a large and unsustainable cash infusion.

The Permanent Fund has grown to the point where at an oil price of \$16/bbl, the annual earnings are as large as the declining revenues from oil. The balance in the fund (\$26.7 billion on October 24, 2000) is constitutionally protected from being spent, but the earnings are appropriated by the state legislature each year. The largest portion of these earnings is distributed to Alaska residents as an annual cash dividend (the PFD). The rest of the earnings have up to now been saved through deposits into the balance of the fund, where they are then protected from being spent.

Local government revenues come primarily from a combination of sales taxes, property taxes, and transfers from state government and revenue sharing of locally generated taxes; assistance for specific programs like primary and

⁴The approximately 65 percent increase in petroleum revenues in Fiscal Year 1970 was due to oil lease sales that increased Alaskan state revenue by about \$900 million (MOD) (Roderick, 1997).



secondary education; and general aid. Most of the smaller communities have a very limited tax base and rely heavily on the state to finance their operations. This results from the uneven geographic distribution of marketable natural resources in the state, the absence of manufacturing that is not directly related to resource production, and the concentration of most business activity in the Railbelt and larger communities in Maritime Alaska. The notable exceptions are the North Slope Borough and Valdez, which are able to collect sizable revenues from property taxes on petroleum property in their jurisdictions, and the Northwest Arctic Borough, where the large Red Dog Mine is located. Table 3.3-9 shows that oil and gas property taxes account for 98 percent and 78 percent of the property tax collections of the North Slope Borough and the City of Valdez, respectively. Each of these local governments has a permanent fund that provides another source of revenue not available to most communities in the state. Thus, oil property-tax revenues are 66 percent and 63 percent of total revenues for the North Slope Borough and the City of Valdez, respectively.

Although several factors mentioned above explain why public spending per capita has always been higher than the national average (Figure 3.3-8), the large oil revenues collected by the state since the mid-1970s account for an increase in spending in the early 1980s and a gradual decline since that time. Oil revenues allowed the state to extend programs and services to more communities and residents, to expand the scope of programs, to add new programs, and to build basic physical infrastructure lacking in many communities. The result is a level of public service delivery in the Railbelt and many Maritime communities that is generally comparable to communities in the rest of the U.S. The level of public service delivery in the Interior has improved, but the absence of adequate water and sewer systems in many villages shows that is still not comparable to communities in the rest of the U.S. (ISER, 1999). The General

Fund deficit and declining petroleum revenues represent a challenge to state and local government to maintain the current level of public service delivery.

Price Level

The Anchorage cost of living is between 5 and 20 percent above the national average (ACCRA, 1999; ADOL, 1999a; Goldsmith, 2000b). The primary reasons are the necessity of importing virtually all consumer and producer goods from the contiguous 48 states, the absence of competition in the supply of many goods and services, the small scale of operations in many industries in the state, government dominance of labor markets, and “sticky” prices that go up easily during a boom but take longer to come down afterward. The differential is narrowing, based on the rates of annual inflation in Anchorage compared to the U.S. average. Since 1960, the Anchorage consumer price index has increased faster than the U.S. average only in one out of every four years (Goldsmith, 2000b).

Outside Anchorage in the rest of the Railbelt, the Maritime region, and particularly the Interior, the cost of living — measured by pricing an Anchorage market basket in different locations — is higher by a margin that varies with the size and accessibility of the community. The cost of getting goods and services to communities accessible only by air, the small scale of business operations, and the absence of competition all play a role in keeping prices and the cost of living high. Harsh climate, logistical problems, and shortages of trained manpower create additional problems that add to the cost of doing business in the Interior (University of Alaska, 1998).

The Alaska Permanent Fund Dividend and the absence of a personal income tax reduce the income required to purchase a market basket of goods and services. This tends to hold wage rates down relative to the measured price differential compared to other locations (ADOL, 1999a).

Table 3.3-9. Local government for 1998 (\$ millions).

	Oil and Gas Property Tax	Total Property Tax	Total Revenues	Oil and Gas Percent of		Government Debt	Cash Reserves
				Property Tax	Total Revenues		
North Slope Borough	\$207.190	\$211.675	\$313.370	97.9%	66.1%	\$777.459	\$423.848
Fairbanks North Star Borough	4.553	58.111	63.885	7.8	7.1	94.215	11.690
City of Valdez	13.777	17.581	21.931	78.4	62.8	3.280	62.000
Anchorage	1.033	227.061	324.902	0.5	0.3	616.305	50.689

Note: "Cash reserves" excludes proceeds of the sale of Anchorage Telephone Utility in 1999, and cash reserves of the City of Fairbanks.
 Source: ADCED (1998 and 1999).



3.3.1.3 Importance of ANS/TAPS to Regional Economies in Alaska

Regions in the Study Area

North Slope Borough. The population of 9,632 is divided among seven small communities and Barrow, the regional center where 60 percent of the population lives. Separate from these Alaska Native communities is the North Slope petroleum complex, where several thousand oil and construction workers live in camps and run the North Slope oil fields. With few exceptions, these workers are not residents of the borough but commute from homes in other parts of the state and nation (ADOL, 2000, 1988b; Marshall, 1993; North Slope Borough, 1999).

The cash economy of the borough is largely dependent on North Slope oil production. Although only a small share of residents work in the oil fields, the borough imposes a property tax on the production and transportation facilities in its jurisdiction. Since its imposition, this tax has produced \$4.932 billion (1998 dollars) for the borough, allowing it to undertake a large capital-improvement program and to institute public services previously unavailable in the borough. This is reflected in the fact that excluding the petroleum enclave at Prudhoe Bay, 39 percent of employment in the borough is in local government, mostly with the borough and the school district (Table 3.3-10). Furthermore, a share of services employment reflects the delivery of public services by quasi-governmental agencies like the tribal councils and nonprofit affiliates of the Arctic Slope Regional Corporation (ASRC), the Native corporation headquartered on the North Slope. The construction industry is still a major employer, but the capital improvement program peaked in the 1980s, and public capital spending is much less than previously.

The borough receives about two-thirds of its revenues from petroleum property taxes and a large share of the rest as income on its permanent fund, funded by tax revenues saved from former years. As the value of these assets depreciates, tax revenues have also been falling, and the borough budget is smaller today than in previous years. The borough does have a large outstanding debt (Table 3.3-9) which is being repaid by property tax revenues. As of 1999, this debt was approximately \$777 million, or \$80,716 per capita, based on a population of 9,632.

The ASRC is another important source of employment and income for the region. It is estimated that about 40 percent of its revenues, approaching \$1 billion annually, come from subsidiaries providing construction, fabrication, environmental, and engineering services to the petroleum industry (*Alaska Business Monthly*, 1999). It is also actively

involved in the refining industry in the state, as well as other activities that provide employment and dividends for shareholders both within and outside the borough.

As evident in Table 3.3-11, the pattern of personal income in the borough follows that of employment. Of total wages reported paid to workers in the borough of \$533 million in 1997, at least \$363 million left the region with enclave workers living in other parts of the state (DOC, 2000). Borough residents get a larger share of their income from wages and a smaller share from other sources than most other parts of the state. Wages are high, reflecting the high cost of living in the borough, but per-capita income is slightly below the state average.

Most borough residents participate in subsistence. This source of noncash income influences the labor-force participation rate for cash work.

Yukon-Koyukuk Census Area. In terms of area, the Yukon-Koyukuk Census Area is the largest in the state, covering much of the upper Yukon River basin, but it is one of the smallest in population with 6,372 people. They live in 42 communities, the largest of which, Fort Yukon, has about 600 people. McGrath and Galena, each with about 500 people, are the next largest communities. The communities in close proximity to the pipeline are all smaller. The population is 71 percent Alaska Native. In recent years, population growth in this census area has been the slowest in the entire state due to net out-migration.

Wage employment is limited in this census area because most of the population lives in remote locations in very small communities. There is a very limited private-sector economic base, and 42 percent of all jobs are directly provided by the state and local governments in the region. Many of the jobs in the service sector are funded through government grants to nonprofits, and most of the construction employment is based on public spending. Infrastructure and support jobs in retail trade are limited by the small amount of personal income in the region. Most residents participate in subsistence activities.

The local-government tax base in most communities is limited by the absence of private-sector economic activity. The sales tax is the primary method used to generate local income. Many communities are unincorporated and being in the unorganized borough, receive their services directly from the state government.

Less than half of personal income is from wages, and per-capita income is considerably below the state average.

Fairbanks North Star Borough. The population of the borough, 83,773, is centered in the City of Fairbanks and the surrounding communities of College and North Pole, with the remainder concentrated along the highways radi-



ating north and south from Fairbanks. Since it is a regional center for much of Interior Alaska, many Fairbanks residents work outside the borough on the North Slope, at remote construction sites, and at other jobs that bring income into the economy. There is some seasonality in employment due to the importance to the economy of mining and tourism, as well as arctic construction. Alaska Natives comprise approximately 6 percent of the population.

The main drivers of the Fairbanks economy are the military (Fort Wainwright and Eielson Air Force Base); the University of Alaska; mining (including the Fort Knox Gold Mine); tourism; regional transportation, construction, and other services to Interior businesses and households; petroleum refining; and TAPS (Huskey, 1995). It is headquarters for Doyon, Ltd., the Native corporation encompassing much of Interior Alaska, with the second largest number of shareholders.

The borough and the City of Fairbanks have a diversified revenue base. Seven percent of borough revenues come from the property tax on TAPS. As its assessed value declines, revenues from the pipeline have been falling.

Total personal income in 1997 was \$1.8 billion. In spite of the residents bringing paychecks home from North Slope and other remote-site jobs, there is a net outflow of wages, largely due to nonresidents employed in seasonal jobs. Per-capita income is below the state average.

Southeast of Fairbanks. This census area stretches southeast from Fairbanks to the Canadian border along the Alaska Highway. About half of the population of 6,283 live in and around the two communities of Delta and Tok, both at highway junction points. The rest of the population is scattered among 12 communities, only one of which, Eagle, is much larger than 100 people. Although Alaska Natives are slightly under-represented in the total population, sev-

Table 3.3-10. Full- and part-time employment by place of work, 1997.

	North Slope Borough			Yukon-Koyukuk Census Area		Fairbanks North Star Borough		Southeast Fairbanks Census Area		Valdez-Cordova Census Area	
	Number	%	% Net Oil/Gas	Number	%	Number	%	Number	%	Number	%
Employment by place of work	8,609	100.0%		2,892	100.0%	48,979	100.0%	2,681	100.0%	7,076	100.0%
Mining (oil and gas)	3,271	38.0	0%	113	3.9	1,139	2.3	37	1.4	0	0.0
Construction	392	4.6	7.3	0	0.0	2,471	5.0	68	2.5	308	4.4
Transportation	483	5.6	9.0	207	7.2	3,091	6.3	221	8.2	1,094	15.5
Trade	618	7.2	11.6	349	12.1	9,090	18.6	570	21.3	855	12.1
Finance, services	1,559	18.1	29.2	716	24.8	14,194	29.0	630	23.5	1,851	26.2
Federal civilian and military	97	1.1	1.8	164	5.7	10,986	22.4	692	25.8	327	4.6
State government	50	0.6	0.9	117	4.0	3,792	7.7	124	4.6	399	5.6
Local government	2,088	24.3	39.1	898	31.1	2,635	5.4	242	9.0	707	10.0

Source: DOC (1998a). Includes wages and salary and proprietor employment.

Table 3.3-11. Economic and demographic indicators.

	North Slope Borough	Yukon-Koyukuk Census Area	Fairbanks North Star Borough	Southeast Fairbanks Census Area	Valdez-Cordova Census Area
Population - 1999	9,632	6,372	83,773	6,283	10,333
Percent Native Alaskan - 1998	56%	71%	70%	14%	14%
Earnings by place of work (million) - 1997	\$533.3	\$72.4	\$1,444.3	\$69.2	\$230.2
Residence Adjustment (million)	(\$363.0)	(\$15.8)	(\$148.0)	\$6.6	(\$24.8)
Earnings by place of residence	\$131.2	\$51.0	\$1,196.2	\$71.1	\$188.6
Personal income (million)	\$171.4	\$106.7	\$1,808.7	\$111.5	\$278.9
Per capita personal income	\$23,725	\$17,826	\$21,417	\$19,870	\$26,743
Unemployment rate - 1997	5.5%	15.9%	7.6%	12.7%	11.1%

Sources: Population: ADOL (1999d); North Slope Borough population: ADCED (1999); Percent Alaska Native: ADOL (1998a); Personal income: DOC (1998b); Unemployment rate: ADOL (1998b).



eral of the smaller and more remote communities are largely composed of Natives.

The largest employer in the census area has been the Fort Greely Army Base adjacent to Delta. With state and government jobs included, 40 percent of all jobs are with the government. A share of the service jobs is supported by government grants to nonprofits for the delivery of public services, and a share of the construction employment is also based on government capital spending. Tourist activity and services to other highway travelers are the other main economic driver for the region. Infrastructure and support jobs in retail trade are limited by the small amount of personal income in the region. Many residents participate in subsistence activities.

The closure of Fort Greely, which is currently underway, will take away the biggest employer in the region. Local officials are looking at alternative uses for the facilities at the fort that would support jobs for Delta.

The local-government tax base in most communities is limited by the absence of private-sector economic activity. The sales tax is the primary method used to generate local income. Many communities are unincorporated and being in the unorganized borough, receive their services directly from the state government.

Sixty-four percent of personal income is from wages. Per-capita personal income is among the lowest in the state.

Valdez-Cordova Census Area. Valdez is home to about 40 percent of the 10,333 residents of this census division. The other sizable community is Cordova, about half the size of Valdez. The other communities over 200 are Copper Center, Tazlina, Glennallen, Kenny Lake, and Whittier. The rest of the population is scattered in smaller communities along the highway system and the coastline. The Alaska Native population is 14 percent of the total and concentrated in some of the smaller and more remote communities. The Native share of the population is less in the larger communities of Valdez and Cordova.

The main economic drivers for the census area are the TAPS pipeline and terminal, the refinery at Valdez, commercial fishing, tourism, and state government offices. Alyeska is the largest private employer in Valdez, and several contractors working for Alyeska in construction, transportation, environmental services, and security are also very important. The refinery is the other large private employer in Valdez, while seafood processing facilities are located in both Valdez and Cordova, which are also home to many commercial fish harvesters. People working in the tourist industry — for example, as charter fishing-boat operators — are sole proprietors (ADOL, 1999g).

The City of Valdez tax base is heavily dependent on the

pipeline and terminal, with 63 percent of total revenues coming from property tax on oil-related facilities. As its assessed value declines, revenues from TAPS have been falling, necessitating reductions in the budget. The city has established a permanent fund to save a portion of the oil revenues collected in past years.

High wage rates in jobs related to TAPS are an important source of wage income, although proprietor income from fishing and tourism is also important. Per-capita income is above the state average.

Regions Outside the Study Area

Anchorage. This is the largest city in the state and with the adjoining Matanuska-Susitna Borough, the home to 308,381 — just over half the residents of the state. About 8 percent of the population is Alaska Native, but 20 percent of the entire Native population of the state lives here. Anchorage is a modern city with all the amenities found in cities of comparable size in the contiguous U.S. The Matanuska-Susitna Borough has in recent years become closely integrated with the Anchorage economy through an improved highway link. A large share of the residents of the borough commute daily to Anchorage to work. Many residents of both the borough and the city also work in the enclaves on the North Slope and elsewhere.

The main drivers of the Anchorage economy include the military (Fort Richardson and Elmendorf Air Force Base), federal civilian employment, state government including the University of Alaska, and much of the trade, business, transportation, and other infrastructure services for Interior and Maritime Alaska. Six Native corporations — Aleut Corporation, Bristol Bay Native Corporation, Calista Corporation, Chugach Alaska Corporation, Koniag Incorporated, and Cook Inlet Region Incorporated — have offices in Anchorage.

The stability of the economic base has resulted in the most highly developed support economy in the state. There is some seasonality related primarily to tourism and construction, and nonresidents do take out of the state some of the wages paid.

The local-government tax base depends primarily on the property tax. A small share of total revenues, 0.3 percent, comes directly from petroleum production and transportation property, although a much larger share is indirectly dependent on petroleum. Anchorage has no sales tax.

Nearly half of statewide personal income accrues to Anchorage residents. Because of a high labor-force participation rate combined with relatively high average wage rates, per-capita personal income is above the average for the state.



Kenai Peninsula Borough. Adjacent to Anchorage in the south and connected by road, this borough has a population of 48,952. The largest concentration of people is in the area surrounding the cities of Kenai and Soldotna. Homer and Seward are the other two communities with populations greater than 1,000. The rest of the residents are scattered primarily along the road system connecting these communities. Eight percent of the population is Alaska Native. Although the borough is adjacent to Anchorage, the distance by road of any of its four largest communities to Anchorage is more than 100 miles. As a result, its towns are not as closely integrated with Anchorage as those in the Matanuska-Susitna Borough. Many Kenai Peninsula residents now commute to the remote petroleum camps on the North Slope.

The main drivers of the Kenai Peninsula Borough economy include oil and gas production and processing, seafood, tourism, government employment, transportation services, and some timber production. The port of Nikiski near Kenai is home to the state's largest oil refinery, as well as two gas-processing facilities, one producing liquefied natural gas for export and the other manufacturing ammonia-urea. BP Amoco announced in June 2000 that it had selected Nikiski as the site for an \$86 million facility to test gas-to-liquids technology. In recent years, Nikiski has also been the site of construction of modules for the North Slope oil fields. The Alaska Railroad runs through the borough and terminates at the port of Seward, where the Alaska state ferry and cruise ships call during summer.

The local-government tax base depends on a combination of property and sales taxes. A small share of total revenues comes directly from petroleum production and transportation property associated with Cook Inlet.

Like the Matanuska-Susitna Borough, there is a net inflow of wages from residents working outside the borough. Most of this comes from remote sites because daily commuting to Anchorage is not feasible by car. Nonwage income is high because of the many commercial fish harvesters and small businesses providing services to tourists and visitors from Anchorage. With these industries, the economy is seasonal and personal income can vary considerably from year to year depending on the fishing season. The per-capita income is below the state average despite high wage rates in petroleum.

Rest of State. The portions of Maritime Alaska and Interior Alaska not adjacent to TAPS comprise the rest of the state. The characteristics and diversity of this part of the state are described above in the discussion of geographic diversity of economic activity.

3.3.1.4 Alaska Native Community

Employment

A large share of employed Alaska Natives either work directly for the government or in jobs in industries such as services and construction that are supported by government funding (McDiarmed et al., 1998). Job opportunities in other industries are limited in the small communities where most Natives live. A small percentage of Natives are employed by the 12 Native corporations (Colt, 1991). Native corporations own approximately 93 percent (Hull and Leask, 2000) of all private land in Alaska. These corporations are developing natural resources and expanding into other economic sectors as diverse as catering and construction. Most Natives participate in subsistence.

Unemployment

Because there are few jobs that pay a cash wage in many smaller Native communities, unemployment is high, particularly during the winter. Official unemployment rates such as reported in the 1990 census (16 percent for all Alaska Natives) significantly underestimate the size of the problem in rural Alaska because of the discouraged-worker effect. Fifty-six percent of Native adults were reported as not working at the time of the census (McDiarmed et al., 1998).

Population

Seventeen percent of Alaskans, or 104,085, are Alaska Natives. While most live in the small rural communities in the Interior and Maritime Alaska, 26 percent now live in the Railbelt. The median age of the Native population is 23.

Income

Per-capita money income of Alaska Natives is below the state average because a smaller percent of the population works for money wages, and the average wage is below the state average (DOC, 1993). Transfers, including federal programs for Native Americans and the PFD, are important sources of money income in Native communities.

Public Resources

Federal programs supporting rural Alaska residents and communities, many of which are passed through state government, are the largest source of public resources for Alaska Natives. Many state programs also target rural Alaska, but declining revenues are reducing the state's ability to adequately fund these programs. Local sources of public resources are limited in most rural parts of the state.



Alaska Native Communities

The majority of smaller Alaska Native communities have fewer than 500 inhabitants and are accessible only by small aircraft or boat in the summer. The quality of housing is substandard by national standards, and imported fuel oil is used to generate electricity and provide space heating. Water and sewer utilities and solid waste management are primitive. Local health care is provided by health aides. Telecommunications and television are available, and the school is the largest public building in the community.

Pressure on Natural Resources

Growing Alaska Native and total Alaska populations are both putting increasing pressure on resources used by Alaska Natives for subsistence. Increasing accessibility to rural areas is also contributing to the increase in demand.

3.3.1.5 Other Historical TAPS/ANS Impacts

ANS production and TAPS throughput have had substantial and positive economic impacts since oil was first discovered on the North Slope. This subsection provides additional material on historical and cumulative impacts. (Cumulative impacts are discussed in more detail in Section 4.5.) This subsection covers three main topics: economic impacts of construction, economic impacts of pipeline operation and North Slope oil production, and economic impacts of the *Exxon Valdez* oil spill.

Construction

There are several different estimates of the total number of direct jobs attributable to construction of the pipeline (ADOL, 1978; Goldsmith and Huskey, 1978; Fairbanks North Star Borough, 1978). All exceed original employment projections by a considerable margin (Goldsmith and Huskey, 1978; GAO, 1978). As a result, the actual impact was greater than anticipated.

Construction occurred from 1974 through the summer of 1977, with 1975 and 1976 the years of greatest activity. According to the Fairbanks Community Information Center, employment was 8,155 in 1974, 20,371 in 1975, 20,162 in 1976, and 5,433 in 1977. The work was highly seasonal, with an estimated 28,072 working during the summer of 1975. Of this total, about 80 percent were construction workers, with the rest in managerial, professional, technical, and clerical positions.

These jobs directly increased wage and salary employment statewide nearly 20 percent above the 1973 level. The increase in wages and salaries was considerably greater because of the high average wage rate in the construction

sector, the real increase in that wage rate, and the high number of hours of overtime paid to the average pipeline worker (Thomas et al., 1977). Statewide, wages in the construction sector grew from \$154 million in 1973 to a peak of \$1.466 billion in 1976, subsequently falling to \$433 million in 1978 (Goldsmith, 2000b).

The multiplier effect of this infusion of employment and income was less than it might have been because a large share of the wages was paid to nonresident workers who left the state in the off-season and when the construction was completed. Nonetheless, the economy expanded significantly. Wage and salary employment increased from 110,000 in 1973 to 171,000 in 1976 — an increase of 55 percent in three years. Wages and salaries increased over the same period from \$1.326 billion to \$3.972 billion, an increase of 200 percent. Per-capita income grew from \$6,493 to \$11,500, an increase of 77 percent (Goldsmith, 2000b).

Project completion did not result in a significant drop in either employment or wages. From the peak in 1976, employment fell 5 percent over a two-year period, wages fell 17 percent, and per-capita income increased by 2 percent. The modest drop is attributable to the large share of non-residents in the construction workforce, the pent-up demand created by the high construction wages paid to residents, government spending from oil revenues, oil patch spending, and spending in anticipation of the construction of a gas pipeline.

The small Alaska labor market was unable to supply all the workers needed for TAPS, particularly because many required special skills which Alaska workers did not have. As a result, many of the jobs were taken by workers from outside the state, some of whom stayed only as long as their job tenure, and some who made permanent moves to the state. The State of Alaska worked to minimize the flow of migrant job seekers in order to minimize their impact on public services as well as competition for the jobs (Thomas et al., 1997). This effort was partially successful. In 1975 during the early construction phase, the statewide unemployment rate fell from the year before, indicating a tightening of the labor market. This was particularly significant because the U.S. unemployment rate in 1975 was 8.5 percent, the only time it has been above the Alaska rate since 1970. When construction was complete, the unemployment rate rose, but many of the workers left the state and were able to find jobs elsewhere (ADOL, 1976).

The unemployment rate was influenced by the false boom which occurred in 1970 when workers moved to Alaska in anticipation of an early start date for pipeline construction which did not materialize. In the summer of



Photo 3.3-3. Pipe is wrapped and placed in trench during TAPS construction.

1970, the unemployment rate in Anchorage climbed from 8.8 to 11.2 percent, a reversal of the usual summer drop. This false boom impacted many businesses that invested in anticipation of an expansion of business that never materialized. In addition, the public resources in Anchorage and other communities were strained by these migrants (ASHA, 1971). During this time, the state mobilized to minimize some of the anticipated adverse effects of rapid population growth associated with construction.

Population increased 24 percent between 1973 and 1977, when it peaked at 418,000 before dropping back to 412,000 the following year. The number of people actually in the state during the peak construction periods was higher, but no estimates of this peak have been made. The population growth put a strain on the infrastructure of the state and the economy.

The housing shortage was reflected in high rents and low vacancy rates for apartments. In Anchorage, the winter vacancy rate for apartments was 1.4 percent in 1975. The situation was self-correcting as high rents led to a housing construction boom which peaked in 1977 just as pipeline construction finished. The apartment vacancy rate peaked at 32 percent in 1979 (Municipality of Anchorage, 1991). Public utilities, roads, hospitals, and other public facilities suffered from overcrowding, and private business demand grew rapidly. Construction of public facilities and commercial buildings responded but generally, like housing, only with a lag.

One impact felt by everyone was the inflation resulting from the rapid growth in demand for housing and other consumer goods as well as labor. Inflation in Anchorage as measured by the Consumer Price Index was usually below the national average, but it was higher from 1974 through 1976. Afterward, Anchorage inflation returned to its pre-pipeline-construction trend, but the Anchorage cost of liv-

ing, compared to the U.S. average, remained above the pre-pipeline level until 1980 (Goldsmith, 2000b).

For businesses and government, the demand for labor created by TAPS caused a serious employee turnover and recruitment problem, both for those that could afford to pay higher wages to keep or hire employees and for those who could not (ADCRA, 1976). Wage rates tend to be “sticky,” particularly in industries where the workforce is highly unionized, and businesses and governments that bid up wages to hold employees found themselves with higher wage bills long after completion of the pipeline.

The population increase led to an increase in the demand for public services. The increase in school enrollments was much less than anticipated, largely because pipeline workers chose to leave their families behind when moving temporarily to work on the pipeline. Reported incidents of crime increased. Although public and private facilities providing welfare assistance were strained, it was less than anticipated (Thomas et al., 1977).

Neither the cost to state and local governments of providing impact assistance nor the revenues generated by pipeline construction have been calculated. Such an exercise is complicated by the problem of determining which effects to attribute to pipeline construction and which to other factors such as population growth in anticipation of gas pipeline construction. Costs included the per-capita expenditures associated with an increase in the population, those associated with increases in per-capita requirements for services, and those associated with an increase in labor and other costs for service delivery. In many instances, the growth in expenditures could not keep pace with growth in demand, and in others, the cost associated with the congestion and temporary deterioration in the quality of services was probably less than the expenditures that would have been required to avoid the loss.

State revenues increased between 1973 and 1977 from \$208 million to \$874 million, mostly from the petroleum property tax and the petroleum reserves tax. However, a large part of the increase was also due to the personal income tax, which peaked at \$210 million in 1977 compared to \$43 million in 1973. Local revenues increased from \$216 million in 1973 to \$500 million in 1977, mostly from increased transfers from the state and petroleum property taxes (Goldsmith, 2000b).

The economic effects of construction were felt throughout the state, but the direct effects primarily affected communities such as Fairbanks and Valdez along the pipeline route, as well as Anchorage. Resident workers came from throughout the state to work on the pipeline, and the inflation it caused was felt by all households, businesses, and



governments. The job, income, and population growth, as well as the dislocations associated with the rapid change, were more concentrated in the pipeline communities.

A study after construction calculated that 5,770 Alaska Natives were hired to work on the pipeline (Naylor and Gooding, 1978), including trainees. Accurate data are not available to compare this figure to either the total number of persons hired to work on the project or the Native population. Shareholders of each of the 12 in-state Native regional corporations were represented, with Doyon, Ltd., the corporation headquartered in Fairbanks, having the largest share of the total, 27 percent. Half of the Natives hired worked eight weeks or less, and 25 percent worked for two weeks or less. The majority of the jobs held by Natives were in the low-skill or unskilled categories. Much of the employment was directly tied to training, either by the government or on the job. Data on the length of tenure and job characteristics of the overall workforce are not available for comparison.

Pipeline Operation and North Slope Oil Production.

The operation of TAPS and the production and sale of North Slope oil which the pipeline has made possible have made petroleum the most important basic industry in the state, and the growth it has produced has transformed the economy (ADOL, 1981). The economic importance of oil is based on three components: spending in the oil patch, public spending funded by petroleum revenues, and spending from the earnings of financial assets accumulated from petroleum revenues (Alaska Permanent Fund Corporation, Annual Report).

More than half of the 200,000 new jobs in Alaska since 1963 can be attributed to petroleum (Goldsmith, 1997; ADOL, 1986). During this period, the rate of job growth in the state averaged twice that of the U.S. as a whole. Today, petroleum accounts for between 110,000 and 120,000 total jobs, including activity associated with Cook Inlet (Goldsmith, 1997). This represents 38 percent of all jobs — divided among spending in the oil patch (10 percent), spending of petroleum revenues (25 percent), and spending from the earnings of the Permanent Fund (3 percent). Numerous other studies have documented the importance of petroleum for the economy (ADOL, 1999b; Huskey, 1995; AOGA, 1984; Tuck, 1982; McDowell Group, 1999b, 2000; Goldsmith, 1985; Kresge, Morehouse et al., 1977; Kresge, Seiver, et al., 1984; Tussing, 1984; Reaume, 1999).

When Alaska became a state, the economy was dominated by federal government employment, with a very thin veneer of infrastructure and support employment. Economic dependence on marginal, seasonal, and cyclical natural-resource industries contributed to an economy with

a seasonal and transient workforce. Petroleum added a strong and stable new industry to the economic base of the state. In addition, the sheer magnitude of the private and public income generated by petroleum helped the Alaska economy to mature and stabilize through growth and diversification of its infrastructure, support, and government sectors. Most of the jobs attributable to petroleum are in these sectors other than the oil industry. This growth and maturity in turn have led to a reduction in the cost of living and doing business in the state, making it more attractive to many people as a place to live and to many businesses as a place to operate.

Job growth has been accompanied by growth in the real per-capita personal income of Alaska residents through high wages, business profits, PFDs, and other state and local government transfer and subsidy programs dependent on oil revenues — such as subsidies to offset the high cost of electricity in the Interior, the high private mortgage-interest rates of the early 1980s, and the high cost of higher education (Leask et al., 1987). From 1960 to 1973, real per-capita personal income was below the national average, after adjusting for the higher cost of living in Alaska. It rose above the national average in 1974 and remained above through 1986. Since then, growth in relatively low-wage jobs has continued to erode the real per-capita income so that now it is about 14 percent below the U.S. average, about where it was in 1968 (Goldsmith, 2000b). During the years of high incomes, the cumulative per-capita personal income above the U.S. average amounted to \$17,500 in nominal dollars per resident.

When Alaska became a state, there was concern whether the tax base would be sufficient to raise the necessary funds to provide the basic services required under the constitution (ALC, 1962). Petroleum revenues allowed state and local governments to fund preexisting programs more adequately and to put new programs in place to build a public infrastructure, promote economic development, counteract the high cost of living, and deliver a full range of public services (Goldsmith, 1990). State expenditures per capita, net of federal transfers, increased from being equal to the U.S. average in 1965, after adjusting for the cost of living, to a peak of more than three times the U.S. average in the early 1980s (Goldsmith, 2000a). Only a negligible part of this increase can be identified as additional costs to state government of regulation and oversight of the petroleum industry itself (Goldsmith, 1995). Per-capita public expenditures, in excess of twice the U.S. average between 1979 and 1992, amounted to \$23,000 in nominal dollars per resident.

In response to growing job opportunities, high incomes, and the benefits of public expenditures, Alaska population



growth was fueled by net in-migration every year from 1965 through the early 1990s, except during the lull after TAPS construction and during the recession in the late 1980s. Between 1970 and 1990, the population increased by 245,000 — 93,000 of which were from in-migration. The urban areas were the biggest gainers. This growth in population put pressure on fixed resources.

Pipeline operation and North Slope oil development have affected the economies of every region of the state through many channels. The development and operation of the oil fields have cost billions of dollars, much of which has been spent in Alaska for engineering, construction, oil field, catering, environmental, transportation, wholesaling, security, and other services. Workers from every part of the state as well as other states travel to the North Slope oil fields to work (ADOL, 1983a). State expenditures funded by oil revenues have paid for public services and the construction of an infrastructure in every community. Oil revenues have funded other public programs to foster economic development throughout the state and to counter the high cost of living and doing business. They have eased the burden on individuals and other natural resource industries of supporting the costs of government.

The PFD directly added 5.3 percent to per-capita income in 1998 (Goldsmith, 2000b). The total per-resident distribution since the inception of the dividend in 1982 through 1999 has been \$16,500 in nominal dollars. Each Alaskan gets an equal share, independent of circumstances, and as a result, the impact in low-income households and communities is greater as a percentage than in higher-income households and communities. In the Wade Hampton Census Area, which is the region of Alaska with the lowest per-capita income, the PFD was 11 percent of total income in 1997 (ADOL, 1999e).

The North Slope Borough and the City of Valdez have experienced the most direct economic impacts of pipeline operation and North Slope oil production. A comparison of economic indicators from 1997 with those of 1970, before development got underway, shows the magnitude of the change, most of which can be traced directly to petroleum.

In the North Slope Borough, employment by place of work increased 359 percent, from 1,876 to 8,609. It peaked at 11,038 in 1983. Total real personal income increased 302 percent, from \$43.5 million to \$174.9 million (1998 dollars). It peaked at \$183 million in 1995. Real per-capita personal income increased 92 percent, from \$12,589 to \$24,209. It peaked at \$36,742 in 1976. Population increased from 3,456 to 7,224.

In the Valdez-Cordova Census Area, employment by place of work increased 220 percent, from 2,213 to 7,076.

It peaked at 10,613 in 1976. Total real personal income increased 238 percent, from \$84.2 million to \$284.6 million (1998 dollars). It peaked at \$376.2 million in 1976. Real per-capita personal income declined 18 percent, from \$33,121 to \$27,289. It peaked at \$67,165 in 1976. Population increased from 5,018 to 10,430. Pipeline and terminal employment have created a stable employment base in a community formerly dependent on the highly seasonal seafood industry, regional transportation, and government (ADOL, 1982a).

Growth in most industries in the state can be attributed to petroleum activity, either as a direct result of doing business with oil companies, from the spending of income generated by the industry, or from public-infrastructure investments and operating program expenditures reducing the cost of doing business in the state or directly stimulating economic activity. The growth of the air cargo industry in Anchorage is partly due to the availability of jet fuel refined in the state from North Slope crude oil.

Fish harvesters and processors have experienced some business losses due to oil spills associated with the transportation of oil, although they have received monetary compensation. There is no evidence that diversion of capital and labor from the fishing industry has occurred as a result of petroleum activity. Like other industries, the seafood industry has been impacted by the general environment of greater economic diversity, lower costs of doing business, higher level of public services, and greater investment in a public infrastructure associated with the economic growth from petroleum activities.

Many economic effects of TAPS operation and North Slope oil production are irreversible. These include the physical infrastructure built with oil revenues, the human capital acquired by Alaska residents working to produce and transport the oil, and the Permanent Fund (Goldsmith, 1985).

As anticipated, Alaska Natives have shared in the positive and negative economic impacts of the operation of TAPS and production of North Slope oil through the direct and indirect employment opportunities created, the public expenditure of oil revenues by the state and local governments, the increased accessibility of Native communities adjacent to the pipeline, and the increase in the non-Native population (Schlickeisen et al., 1971).

Alaska Natives are under-represented as a percentage of the pipeline (JPO, 1997) and the North Slope oil production workforce (McDiarmed et al., 1998; Colt, 1991) based on either population or labor force, just as they are for most industries in Alaska. Nonetheless, this is an important source of income for those who participate in these high-



wage jobs.

Overall, the number of employed Alaska Natives increased 75 percent during the 1970s and 49 percent during the 1980s, but these growth rates trailed the increase in those for non-Natives. Over this period, the Alaska Native unemployment rate has remained virtually unchanged. Even though the economic growth since 1970 provided employment opportunities for many Alaska Natives, many other Alaska Native job-seekers were unable to find jobs at the same time that many immigrants were more fortunate (McDiarmed et al., 1998).

Median family income of Alaska Natives has risen more rapidly than all Alaskan families between 1970 and 1990. It stood at 47 percent of the state average in 1970 and had reached 58 percent by 1990, but most of the relative growth came in the 1970s. The percent of Alaska Native households below the poverty limit has been cut in half from 44 percent in 1970 to 21 percent in 1990, but it remains much greater than the non-Alaska-Native rate of 5 percent (DOC, 1972, 1982, 1993).

A number of other indicators point to a narrowing of the standard-of-living gaps between Alaska Natives and the overall Alaska population. For example, the share of the rural housing stock less than 10 years old and occupied by Alaska Natives increased from 20 to 50 percent between 1970 and 1980, accompanied by a substantial reduction in the share of units with overcrowding and without plumbing. At the same time, the average household size dropped from 5.2 to 3.8 persons (Kruse, 1984). Most rural communities are now electrified, and most have both a primary and secondary school. The percentage of the Alaska Native population with a high school education or currently enrolled increased from 37 to 73 percent between 1970 and 1980 (AFN, 1989). Transportation access and communications facilities in rural Alaska have been improved. The Alaska Native infant mortality rate has decreased from 22 per thousand in 1977 to 14 in 1987 (Alaska Natives Commission, 1994).

At the same time, these indicators show that Alaska Natives as a group still lag behind the general population in standard of living and that further improvements are becoming more difficult to achieve in the face of declining oil revenues and other factors (AFN, 1989). Social and health problems related to the increase in the population of young Alaska Natives — such as alcoholism, drug abuse, sexually transmitted diseases, child abuse, and suicide — are on the rise (Alaska Natives Commission, 1994), but there is no clear link between these phenomena and the oil industry.

It is impossible to determine how much of the change in indicators of standard of living of Alaska Natives is attrib-

utable to activities associated with TAPS operation and North Slope oil production; to federal expenditures in support of Native and rural Alaska; to the Alaska Native Claims Settlement Act, which helped clear the way for TAPS construction; and to other forces of change. No comprehensive study has yet documented the impacts that state expenditures made possible from oil revenues have had on rural and Native Alaska. However, a 1989 Alaska Federation of Natives report noted, in discussing the role that the public sector has had on Alaskan villages, “Fortuitously blessed with massive oil revenues, in the mid-1970s the Alaska Legislature began spending large amounts of public money in rural Alaska. State spending purchased capital improvements and community services and raised the level of per-capita income in Native villages closer to that of urban residents” (AFN, 1989).

There are numerous examples of programs which have been implemented or expanded since North Slope oil development, which have targeted rural Alaska, and which have been funded from general revenues. These include power cost equalization, rural development grants, housing assistance, rural school vocational education, community health and emergency medical services grants, and village public safety officers (State of Alaska OMB, 1986). Other statewide programs have also been expanded and impacted the rural areas. These include municipal assistance and revenue sharing, school construction, and the satellite campuses of the University of Alaska. Per-capita state expenditures for capital projects, payments to communities, and payments to individuals were larger in rural Alaska in the mid-1980s (Snow and Depue, 1990), although the total economic impact of state spending was greater in urban areas (ADOL, 1985).

Exxon Valdez Oil Spill. The spill occurred in 1989, spilling approximately 257,000 barrels of crude oil (see Appendix B) and causing economic impacts. Exxon spent approximately \$2.2 billion on cleanup activities during 1989, 1990, and 1991 (Exxon Corp., 1999; Etkin, 1998). No complete accounting of these expenditures has been published, but from descriptions of the activities, the direct impact on the Alaska economy can be characterized. Expenditures to hire cleanup workers, to charter boats to assist in the cleanup efforts, and to rent equipment and purchase supplies all affected the economy. A small portion of the response expenditure reimbursed federal, state, and local governments for their cleanup costs during this period, and these activities also impacted the economy. Exxon also paid over \$300 million in compensation claims to commercial fishermen during this period (Exxon Corp., 1999). (This payment partially covered the subsequent court award in



the class action lawsuit requiring Exxon to pay \$287 million in compensatory damages to commercial fishermen.) An indeterminate share of total expenditures was made outside Alaska or went to nonresident workers and vessel owners.

In 1991, a settlement was reached between Exxon and the State of Alaska and the federal government on various criminal charges against Exxon and civil claims for recovery of natural resource damages resulting from the spill. The criminal fine of \$150 million was reduced to \$25 million. In addition, Exxon agreed to pay \$100 million, divided between the state and federal government, as restitution for injuries caused to fish, wildlife, and lands in the spill region. The federal share of the criminal settlement has been used primarily to fund habitat protection. The state share has been spent on fisheries and recreation-related capital improvements and research.

In the civil settlement with the federal and state governments, Exxon agreed to pay \$900 million over ten years, with the proviso that an additional \$100 million could be claimed to restore resource losses not known or anticipated at the time of the settlement. The proceeds of this settlement are administered by the *Exxon Valdez* Oil Spill Trustee Council. The largest share, \$392 million, has been budgeted for habitat protection through the purchase of critical parcels of land. Habitat acquisitions to date total 635,770 acres at a cost to the Council of \$343 million. The rest of the budget has been allocated as follows: \$180 million for research and restoration, \$173 million to reimburse state and federal governments for damage assessment and cleanup, \$40 million to Exxon for cleanup requested by federal and state authorities in 1991 and 1992, and the balance for future activities and administration (*Exxon Valdez* Oil Spill Trustee Council, 2000).

Alaska paid a civil settlement of \$98 million to commercial fishermen, Natives, and other affected parties.

Commercial fishermen, Alaska Natives, and others brought suits against Exxon for compensatory and punitive damages. Of the various plaintiffs, only commercial fishermen, Alaska Natives, Native corporations and local governments were allowed to proceed. Other plaintiffs such as fish processors and tourist businesses that suffered only indirect harm from the spill had their claims dismissed. This suit resulted in awards and settlements of over \$300 million in compensatory damages, mostly to commercial fishermen and subsistence users; most of this amount was offset by prior claims payments.

In addition to the compensatory damages, Exxon was directed to pay \$5 billion in punitive damages. Exxon has appealed the punitive damage award, which if paid will go

to the more than 30,000 original plaintiffs in the case according to a plan created by the plaintiffs' attorneys and approved by the court (Etkin, 1998).

The 1989 payroll of an estimated 11,000 workers associated with cleanup activities, together with procurement and chartering of 628 vessels, pumped enough income into the economy in a short time to create a boom in Valdez and hasten the recovery of the state economy from the recession which began in 1986 (ADOL, 1989a, d; 1990; 1991). By comparison, the loss of employment in the fishing and tourist industries was small, with many workers taking cleanup-related jobs (IAI, 1990d), and compensatory payments largely offset income losses to the fish harvesters.

Total earnings reported in the Valdez-Cordova Census Area doubled from \$173 million to \$360 million between 1988 and 1989. Employment increased by 31 percent, most directly related to the cleanup. Although other sectors were strained by the temporary flood of workers, the obviously seasonal, rural, and transient nature of the spill activity did not generate a large local multiplier effect. A similar but smaller boom impacted the Kenai Peninsula, where earnings increased 20 percent and employment increased 10 percent. The state unemployment rate, which was unusually high due to the recession, dropped in 1989 to its lowest level since at least 1978 as the easy availability of spill-related jobs drew Alaskans from other part of the state to work on the cleanup. When these Alaskans returned home, they took their earnings with them, generating a multiplier effect throughout the economy (ADOL, 1989c). A part of these earnings also left the state with nonresident workers.

The cleanup effort during the next two years involved fewer workers than in 1989, and the economies of the region began to return to normal. The impacts of the approximately \$1 billion paid by Exxon to the state and federal governments for restoration efforts began to be felt shortly



Photo 3.3-4. Shoreline cleanup work during Exxon Valdez spill.



thereafter. This money continues to support capital and operating expenditures related to restoration of the resources of Prince William Sound, and for the purchase of critical habitats. These expenditures had greatest effects on the regional economies in the Prince William Sound area.

Additional oil spill prevention and response expenditures by Alyeska are another continuing economic effect of the oil spill. Since the spill, the TAPS owners have increased expenditures on oil spill prevention and response. Annual expenditures are about \$60 million, and about 300 people are employed in SERVS. These expenditures had greatest effects on the Valdez economy, which is consequently larger than it was before the spill (ADOL, 1992).

Opinions differ on whether the economic costs and losses different groups suffered have been adequately compensated by Exxon, and also whether economic activity in the commercial fishing and tourism industries is as high as it would have been without the oil spill. However, the overall economic activity in the state and region, as measured by employment and income, continues to be positively impacted by continued spending associated with the spill.

3.3.2 Sociocultural Systems

By M. Galginaitis, C. Gerlach, P. Bowers, and C. Wooley

3.3.2.1 Introduction and Definition

A sociocultural system encompasses the social organization, behavior, and values of the society. The analytical construct of “social organization” is the combination of regularities in those behaviors and values. The description and analysis of sociocultural systems can occur on any of several levels from the global to any small, definable, and bounded group. The sociocultural systems described in this document are regional and community systems that might be affected by the proposed or no-action alternatives. These are divided into three study areas: *North Slope*, *Central TAPS*, and *Valdez/Prince William Sound (PWS)*. Selected communities that have the highest potential to be directly affected by ROW renewal are examined here.

Sociocultural systems are dynamic and influenced by many interacting causes and effects. Attributing effects or changes to specific actions or factors is difficult. For example, TAPS was only one element inducing and influencing sociocultural change in Alaska. Alaska Native and Euroamerican contact, statehood, and many other factors combined to shape events. The federal legislative conjunction of these processes — the Alaska Native Claim Settlement Act (ANCSA) and the Alaska National Interest Lands

Conservation Act (ANILCA) — also contributed to major changes in social organization and cultural value systems (Hopson, 1976; Arnold, 1978; Klausner and Foulks, 1982; Berger, 1985; Downs, 1985; Chance, 1990; IAI, 1990c).

Broadly defined, economic activity is one basic determinant of sociocultural change. Economic factors are thus the starting points in assessing change.

3.3.2.2 Description of Sociocultural Systems Past and Present

The TAPS ROW traverses three distinct geographic and sociocultural areas:

- Organized communities within the North Slope Borough (North Slope study area);
- Communities within approximately 20 miles of the centerline of the ROW (Central TAPS ROW study area). This study area is further partitioned into northern, central, and southern segments; and
- Communities in PWS along the shipping channel from Valdez to Hinchinbrook Entrance (Valdez/PWS study area).

Regional and community sociocultural systems are described for the three major groups of communities for history and social structure (including language and resource harvest), economics, and institutional organization.

The overall study area is quite large and includes many different communities (Figure 3.3-12). Moreover, recent EAs and EISs have focused on the Alaska North Slope, necessitating the inclusion herein of additional up-to-date material on communities in the Central TAPS and Valdez/PWS study areas. The following overview may be useful:

- With the notable exception of communities in the Fairbanks North Star Borough (FNSB), most contain fewer than 1,000 persons and many are much smaller (<100 persons). The “community” of Livengood has no permanent residents.
- Ethnicity, measured as the percentage of Alaska Natives, varies significantly among the study communities. The North Slope communities have a substantial majority of Alaska Natives. Communities in the Central TAPS study area are mixed, some predominantly Alaska Native (e.g., Stevens Village and Rampart), and others substantially Caucasian (e.g., Delta Junction, Glennallen, Paxson, Gakona), and some mixed (e.g., Chistochina, Chitina, Copper Center). The four Valdez/PWS communities include Valdez and Cordova, which are predominantly Caucasian, and Tatitlek and Chenega Bay, which have a majority of Alaska Natives. Population-ethnicity diagrams pro-

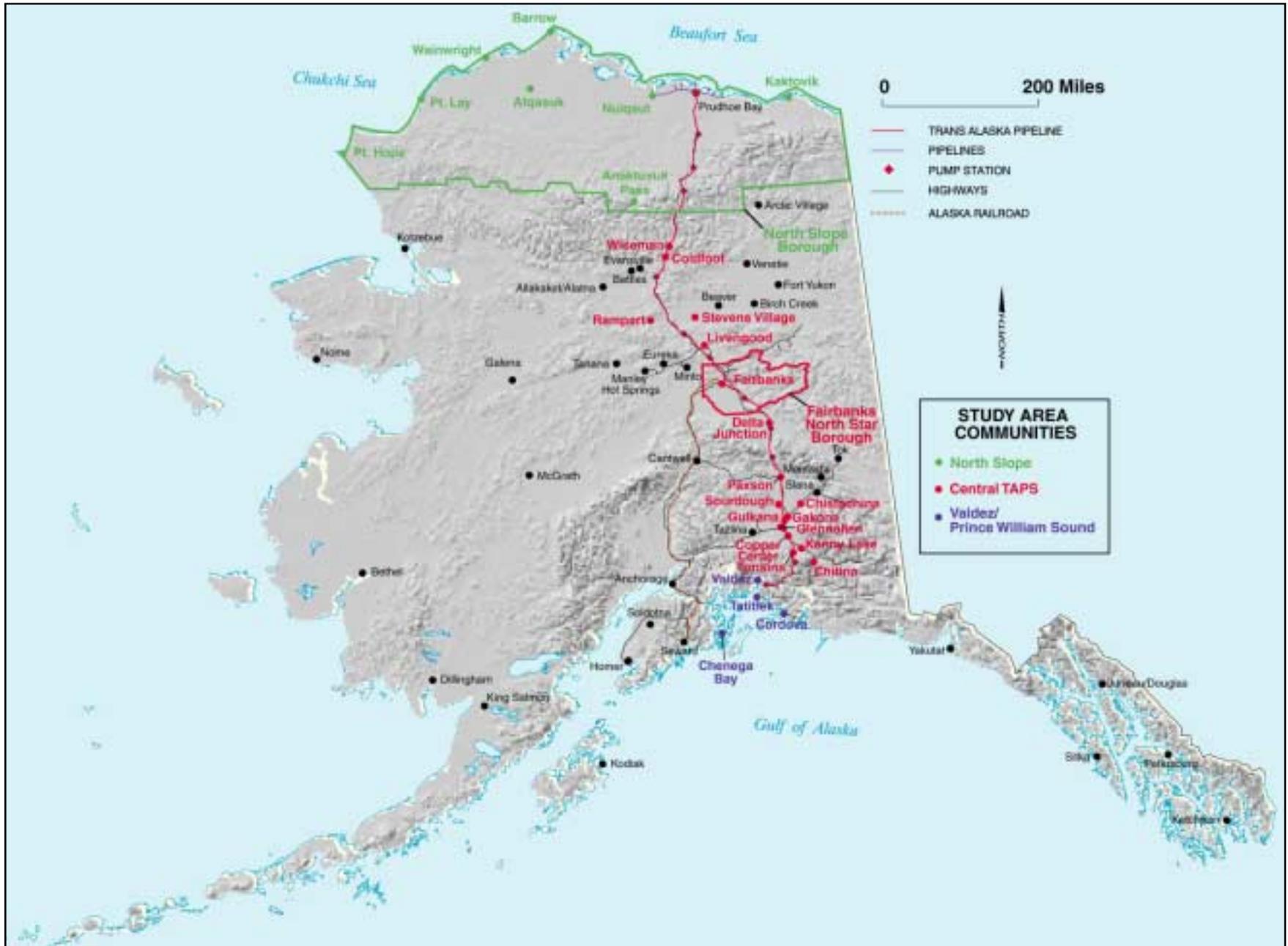


Figure 3.3-12. Communities in North Slope, Central TAPS, and Valdez/Prince William Sound study areas.





vided later summarize available statistics.

- Median household incomes vary considerably among these communities. In general terms, all North Slope communities have median household incomes larger than those for the U.S.; most have median household incomes greater than that for Alaska. All communities in the Central TAPS study area have median household incomes less than that for Alaska, and most have median household incomes less than that for the U.S. In the Valdez/PWS study area, Valdez and Cordova have median household incomes greater than either the U.S. or Alaska, and Tatitlek and Chenega Bay have incomes less than either of these benchmarks. Horizontal bar charts presented later summarize median household income data for these communities relative to Alaska and the U.S. overall.
- Employment patterns vary with the community. Workers in the FNSB and Valdez are employed in the oil and gas industry, either directly or through allied service industries. Most other communities are significantly less industrialized. In these communities, state and local government, schools, or Native corporations are often major employers. Subsistence figures more importantly in their economies and social structures. Unemployment and underemployment are concerns of many communities.
- The oil and gas industry, including the pipeline and marine transportation links, affects all Alaskans' lives in terms of the Alaska PFD, revenues to state and local governments (and, therefore, services provided by these institutions), and other indirect economic effects. All thus have an important stake in the decision whether or not to renew the TAPS ROW. North Slope communities derive substantial income from this industry, and many FNSB and Valdez residents are employed directly or indirectly by this industry. Most other communities are not directly affected by this industry, but indirect and cumulative economic effects on these communities are important.

Each community is unique to a degree, with its own history, social organization, and employment patterns. Details are provided below.

North Slope Communities

History and Social Structure. Aboriginal North Slope social organization is not well-known in terms of local detail (Oswalt, 1967; Damas, 1984; IAI, 1989, 1990c). Ethnographic observation dates only from the beginning of Euroamerican contact (Ray, 1885; Murdoch, 1892; Nelson, 1899) and is not systematic. Traditional oral history and ar-

chaeological evidence speak to the pre-contact period, but tend to be either very general or particular in scope.

The broad model of pre-contact North Slope social organization based on this evidence consists of a dynamic system composed of small kinship-based, territorially defined local groups of subsistence hunters (Chance, 1966; Burch, 1975, 1998; Damas, 1984). Each local group depended on a seasonal pattern of resource harvest in its territory, and this pattern then formed the essential order of their group lives. The order shifted with annual differences in abundance and distribution of animals, with weather, and with other natural environmental conditions. Some of the coastal Iñupiat communities whose subsistence patterns were heavily tied to the harvest of marine mammals — Point Hope, Point Barrow, Cape Lisburne — were occupied by relatively large numbers of people for long periods. Most other settlements across the North Slope were seasonal hunting and fishing camps. Some of these settlements were situated in areas of multiple subsistence resources. Others were located to take advantage of dense concentrations of a single resource such as fish or caribou, or to facilitate trading opportunities.

Although Euroamerican contact greatly affected traditional Iñupiat social organization, the fundamental organizational feature is that kin-related groups express their cultural identity and values through the idiom of subsistence and the pattern of subsistence activities. Euroamerican contact introduced new resources such as food items and technology that enhanced both subsistence hunting and wage-earning opportunities. The introduction of new disease pathologies, commercial whaling, missionaries and their churches, government-established schools, health services, military recruitment, and Distant Early Warning (DEW) Line site construction produced impacts on Iñupiat sociocultural systems and social organization (Salisbury, 1992; IAI, 1990c; Klausner and Foulks, 1982; Chance, 1966; Bockstoce, 1986; Worl, 1978). Inter-marriage between Euroamerican whalers and traders and Iñupiat women created a major new population dynamic. Its principal feature was the incorporation of the newcomers and their offspring in the existing kin-based social units. Development of the North Slope oil industry — dating from the first exploratory programs in what is now NPR-A through the discovery and development of Prudhoe Bay, Kuparuk, satellites, and other discoveries — transformed the economic basis of the North Slope region as a whole.

Historically, perhaps the most significant changes include the Iñupiat adoption of Euroamerican technology and the shift in Iñupiat settlement patterns from a system of many small, territorially confined local groups to that of a



more limited number of large, permanent communities located in a shared regional territory. The relatively recent establishment of permanent settlements at Anaktuvuk Pass, Kaktovik, Nuiqsut, Point Lay, and Atkasuk are evidence of this, especially in the context of the formation of the NSB. The formation and actions of the borough and its communities are the most concrete expressions of these cultural continuities — a successful result of the adoption, integration, and manipulation of “modern” resources in an Iñupiat sociocultural system (Hopson, 1976; Harcharek, 1995; Morehouse and Leask, 1978; McBeath and Morehouse, 1980; McBeath, 1981; Morehouse et al., 1984; Shepro and Maas, 1999).

Before the discovery and development of oil and gas on the North Slope and formation of the NSB, the population of the five villages of Barrow, Kaktovik, Anaktuvuk Pass, Point Hope, and Wainwright totaled about 2,500 people. Each village had limited political power, social services, and infrastructure. Housing was privately built, sometimes out of salvaged or donated materials, and was often cramped and marginal. Attending high school required leaving the North Slope, and wage employment opportunities were relatively few and generally involved support positions at the school or DEW Line sites. Per-capita and household incomes were low, both in absolute and relative terms, and North Slope residents relied heavily on local subsistence resources for food, clothing, and heat (Foote, 1959, 1960a, b, 1961; Gubser, 1965; Spencer, 1959; Sonnenfeld, 1956; Ingstad, 1954; Rodahl, 1963; Nelson, 1969; Van Valin, 1945; VanStone, 1962; Brosted, 1975).

This characterization of North Slope communities remained fundamentally unchanged in the early 1970s, even after the Prudhoe Bay discovery, and serves as a pre-TAPS set of conditions. The NSB was not organized until 1972. The Federal Field Committee for development planning in Alaska documented the limited facilities in the existing North Slope communities of that time (Abrahamson, 1968; FFC, 1967, 1968, 1969, 1971a, b). The NSB sponsored its own more elaborate socioeconomic community facility inventory in 1973 (Dupere & Associates, 1973). One important difference was that beginning in 1963, Barrow residents were finally able to heat their homes with natural gas from the South Barrow Gas Field, which had been developed and used only to supply federal government facilities near Barrow. This decreased home heating costs dramatically, a direct and concrete benefit to Barrow residents from oil and gas development.

Trends in salient population statistics for Barrow (the largest community) and the NSB are presented in Figure 3.3-13, along with population figures for the state. Both the

state and the North Slope communities have grown significantly since 1939. The state grew at a rate that was approximately 1.5 times that of the North Slope communities between 1939 and 1970. After 1970 as Alaska North Slope oil was developed, the reverse was true. The majority of NSB growth since 1970 has been in the three communities established after the incorporation of the borough (Nuiqsut, Point Lay, and Atkasuk). Further, large investments have been made in the local, state, and federal infrastructures of all NSB communities. NSB villages outside Barrow receive multimillion-dollar allocations for infrastructure projects through the NSB Capital Improvements Program.

Figure 3.3-14 shows data on the population and ethnicity of the North Slope communities for 1999 according to data from the Alaska Department of Community and Economic Development (ADCED) Alaska community database. The same format is used to present population and ethnicity data from each of the other study areas. Population is shown on a logarithmic scale on the y-axis. Ethnicity data are shown on a linear scale on the x-axis. Although there is more to ethnicity than merely a tabulation of the percentage of Alaska Natives as opposed to Caucasian or other, this simple measure captures the first-order differences among the communities. Shown also on the x-axis as the dashed vertical line is the percentage of Alaska Natives in Alaska as a whole (17 percent).

The overall population of the NSB was 9,632 in 1999. All North Slope communities have a greater percentage of Alaska Natives than the state as a whole. Barrow is the larg-

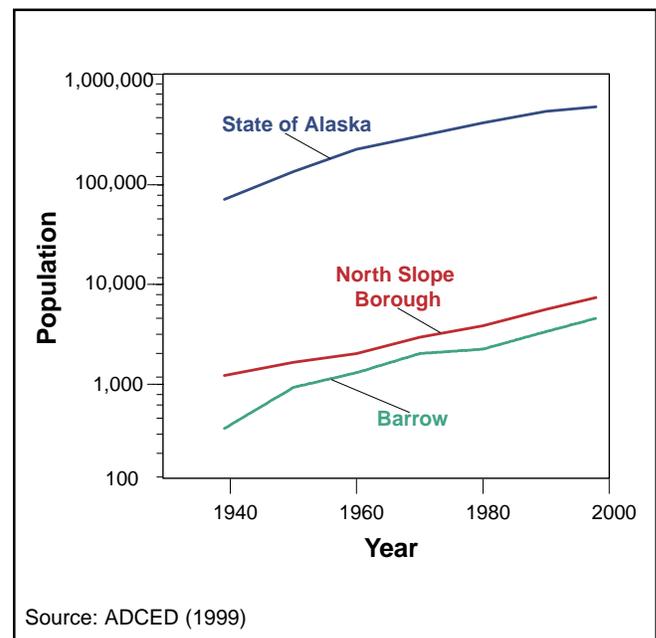


Figure 3.3-13. Population trends for the State of Alaska, North Slope Borough, and Barrow.

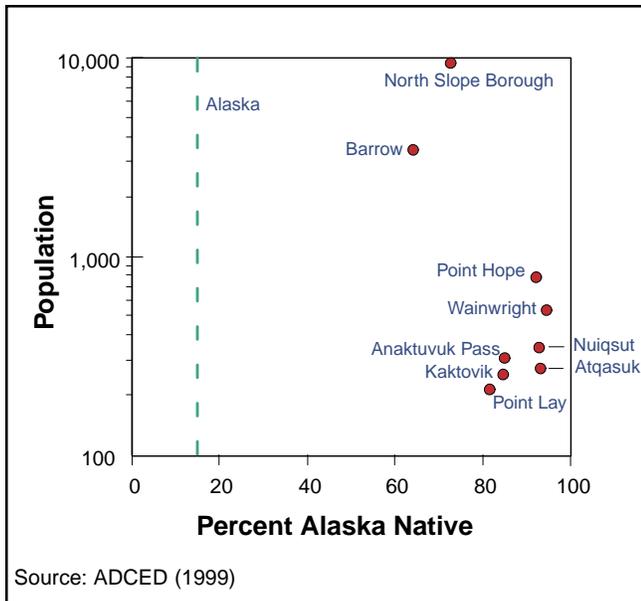


Figure 3.3-14. Population and ethnicity data, North Slope study area communities, 1999.

est North Slope community (population 4,438) and has the lowest percentage (63.9 percent) of Alaska Natives. Although there are small differences in the ethnicity of the other North Slope communities, all have a population consisting of at least 80 percent Alaska Natives.

Language retention and use are one measure of cultural identity. The NSB is conducting a census of knowledge of the Iñupiaq language in all NSB communities (Iñupiaq is the native language of the Iñupiat). This census will enumerate and assess the fluency of those who can speak and read Iñupiaq. For the NSB as a whole (Shepro and Mass, 1999), Iñupiaq is the primary language for 9 percent of the households, English for 49 percent, both equally for 34 percent, English and a language other than Iñupiaq for 7 percent, and another language for 1 percent. About 28 percent of NSB residents speak Iñupiaq fluently, and 26 percent can read Iñupiaq. For individual communities the primary household language varies, in a range of 4 to 23 percent for Iñupiaq, 28 to 67 percent for English, and 29 to 60 percent for both. Nuiqsut has the greatest percentage of households using primarily Iñupiaq and the fewest using only English, and is equal to Anaktuvuk Pass when “Iñupiaq” households were added to “Iñupiaq and English” households (about 71 percent of households). Individual fluency in Iñupiaq is highest in Atqasuk, Wainwright, and Nuiqsut, and lowest in Barrow, Point Lay, Point Hope, and Anaktuvuk Pass. The percentage of individuals fluent in Iñupiaq declined slightly between 1993 and 1998.

NSB community social organization is strongly kinship oriented. Kinship provides “...the axis on which the whole

social world turned” (Burch, 1975). Traditionally, households were composed of large extended families, and communities were primarily kinship units. The present trend is away from extended family households, in the direction of “nuclear family” units, because of a number of factors — among them regional demographic changes, increased mobility, an increase in the housing supply, and changing economic relationships among people (Harcharek, 1995; Shepro and Mass, 1999; Chance, 1990; Jorgensen, 1990). Inter-household coordination and sharing both within and between communities continues to demonstrate the central importance of kinship for contemporary Iñupiat social organization (ADF&G, 1999f; Shepro and Maas, 1999).

The social organization of the North Slope Iñupiat also extends far beyond the boundaries of households and kinship. While subsistence activities, sharing, and the ceremonial cycle serve as the ideological focus for the expression of these concepts, the full range of institutions is encompassed in this conceptual organizational system. This topic is developed further in the discussion of subsistence below.

North Slope Communities Economics. The history and current dynamics of the socio-economics of the North Slope are well-documented. A regional overview and a discussion of each community are provided in IAI (1990c) and McNabb and Galginaitis (1992). All past Beaufort Sea and North Slope oil and gas lease sales EISs and associated agency documents incorporated by reference provide summary descriptive information and analyses. The State of Alaska (ADNR, 1997, 1998, 1999) similarly provides relevant summary information.

The schedule of subsistence activities particular to each community fundamentally affects the organization (especially in terms of time utilization) of economic activity in each community. All NSB communities demonstrate similar dynamics in this regard, differing because of the distri-



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Photo 3.3-5. Barrow is the largest North Slope Borough community (July 2000).



bution and abundance of subsistence resources, as well as employment opportunities. The latter is influenced primarily by NSB-sponsored maintenance and construction projects in each village and the proximity of oil and gas development. Although only small numbers of NSB residents are directly employed by oil and gas operating companies, NSB residents are more commonly employed through support contractors. It should be noted that local monitoring of the oil and gas industry occurs through the NSB Planning Department, which issues development permits with environmental and other stipulations. NSB representatives and local residents also participate in the EA/EIS process for each individual development project. The involvement of ASRC in oil and gas industry includes the provision of support and subcontracted tasks, as well as direct involvement in the development of land for which it owns subsurface rights. Service Area 10 has been developed by the NSB to provide services for Prudhoe Bay industrial development.

Figure 3.3-15 shows the distribution of employment in 1998 among residents of the North Slope communities. The NSB is the largest single employer. Other employment categories are the school district, Native American corporations, government (federal, state, and city), and other (Shepro and Maas, 1999). This distribution varies slightly from community to community, but the NSB pattern is broadly representative. Oil and gas employment is included in the “other” category.

NSB Revenues and Expenditures. The NSB relies primarily on property-tax receipts to fund its operations and pay interest and principal on its bonds. This tax base consists overwhelmingly (95 percent) of petroleum-industry-related property. While the establishment of a NSB “permanent fund” has diminished the reliance on the property tax in recent years, the NSB still collected 71 percent of its revenue from the property tax in fiscal year 1995. The NSB is still, and will continue to be, dependent on the oil and gas industry for most of its budget. In turn, the NSB is the largest employer and the principal capital investor in the region. The NSB’s ability to sell bonds for funding capital investments, maintaining facilities, and providing services has been the main driver of local economies on the North Slope since incorporation of the NSB.

NSB revenues peaked in 1987 at \$249 million and declined in 1991 to \$221 million (BLM and MMS, 1998). Revenues for 1992 through 1995 ranged from \$224 to \$235 million. These figures are projected to decline somewhat, barring substantial investment by the oil and gas industry, due to depreciation of the existing tax base (Associated Press, 1998a, b; BLM and MMS, 1998). The NSB is seek-

ing to reduce its operating budget, and has become more conservative in the amount of bonds sold to finance capital improvements.

The oil and gas industry (including TAPS) directly affects few North Slope communities (Anaktuvuk Pass, Nuiqsut, Kaktovik, and Barrow). However, petroleum exploration, development, and production activities have substantial indirect/cumulative effects on these communities as a result of the revenue provided.

The NSB in 1998 had 4,191 residents aged 16 to 64. The NSB labor force consisted of 3,823 people, of whom 2,114 (55 percent) were permanently employed full-time. Part-time and seasonal employment accounted for 745 (19 percent) of the labor force, and unemployment for up to an additional 19 percent. Information for 7 percent of the labor force is lacking. Underemployment, defined as working fewer than 40 weeks in the previous year, in the NSB as a whole was estimated to be as high as 40 percent of the total labor force, although only 13 percent of the work force self-reported themselves as underemployed. Unemployment has increased since the 1993 NSB census, and there are indications that underemployment has increased as well. The NSB directly employs 41 percent of those working for wages. An additional 12 percent work for the school district, 17 percent for the Native American corporations, 2 percent for city governments, 3 percent for the federal government, and 25 percent for other employers.

The labor force in all NSB communities except Barrow is at least 84 percent Iñupiat. Barrow’s labor force is about 50 percent Iñupiat, and the NSB’s as a whole about 58 percent, reflecting the large size of Barrow relative to the other villages. The NSB’s unemployed and underemployed are disproportionately Iñupiat. Iñupiat comprise 70 percent of

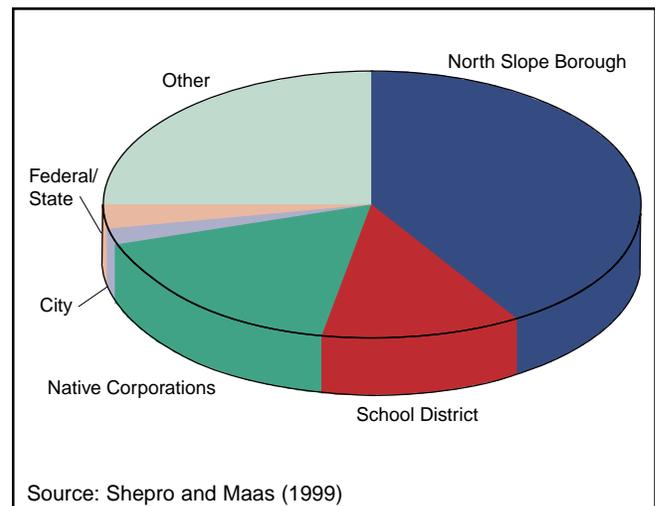


Figure 3.3-15. Major employers of residents of the North Slope Borough in 1998.



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Photo 3.3-6. The North Slope community of Nuiqsut.

the NSB's population, 58 percent of its labor force, and 88 percent of its unemployed.

Figure 3.3-16 shows the median household income (dollars MOD) for the North Slope study area communities, the State of Alaska, and the U.S. as a whole in 1990, the latest year for which these data are available pending completion of the year 2000 census. The communities shown in Figure 3.3-16 are ranked in descending order. Median household incomes today would be 20 to 30 percent larger because of inflation and real income growth. Although there are several possible measures of community income, this is preferred because it is less distorted by extremes and is more representative of the household. This measure is used to describe all other communities considered in this analysis. As can be seen, the median household income for all North Slope communities in 1990 was greater than that for the U.S. as a whole (\$29,943 in 1990). The median household income of five of the eight communities, as well as the NSB as a whole, exceeded that for Alaska (\$39,298) in 1990.

Income statistics are useful, but need to be interpreted with care. For example, Iñupiat households typically contain a larger number of members than non-Iñupiat households — a fact which affects per-capita incomes. In addition, because most market goods are more expensive in Alaska (and within Alaska, on the North Slope) than in the U.S. as a whole, incomes themselves do not indicate purchasing power. Finally, incomes do not reflect the contribution of subsistence activities, which reduce the need for food purchases or the level of services provided by state or local government. These limitations acknowledged, median household income statistics are available for most communities in Alaska and are useful for comparison.

NSB Institutional Organization. The NSB derives most of its funding and bonding capacity from taxation on petroleum industry facilities (Section 3.3.1). The NSB was formed as an institution to capture significant benefits from

oil and gas development in this region and as a means to address social and political issues. One important issue is the protection of subsistence and the Iñupiat relationship to the land. Resettlement of the communities of Nuiqsut, Point Lay, and Atqasuk soon after the establishment of the NSB increased the number of permanently settled North Slope Iñupiat communities from five to eight. Those who resettled these communities cited a return to their ancestral lands and the pursuit of a subsistence lifestyle as their primary motivations (Hopson, 1976; Brown, 1979; Neakok et al., 1985).

As described above, the NSB provides most government services for the communities of the North Slope potentially affected by the petroleum industry. The NPR-A EIS (BLM and MMS, 1998) predicted that future fiscal and institutional growth would slow because of economic constraints on direct Iñupiat participation in oil-industry employment and growing constraints on the statewide and NSB budgets, although NSB revenues have remained healthy and the borough's own permanent fund continues to grow. The NSB has maintained its role as the primary employer in the region, through the provision of services and maintenance of facilities built through the Capital Improvements Program, as well as continued (though perhaps reduced) construction of infrastructure (Harcharek, 1995; Kruse et al., 1983; IAI, 1990c; Shepro and Mass, 1999). ASRC, the for-profit Native regional corporation formed under ANCSA, accounts for substantial regional and statewide economic activity and employment through its many subsidiaries and

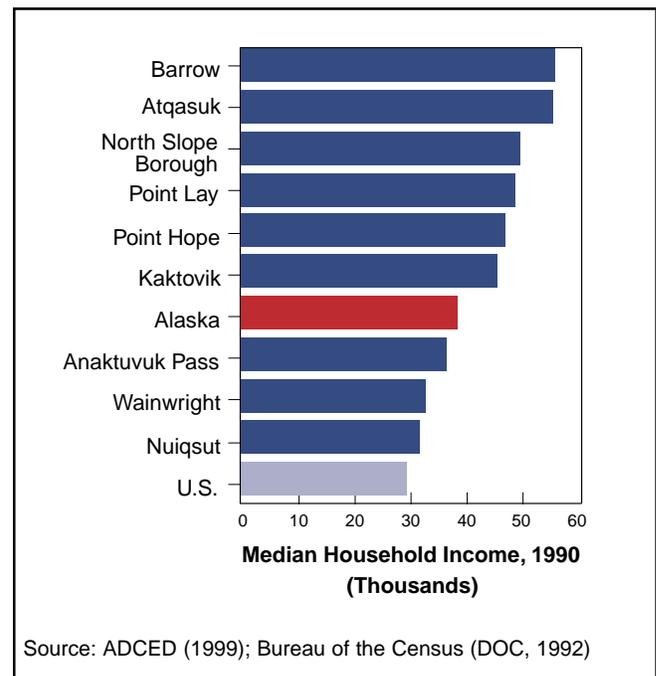


Figure 3.3-16. Median household income of North Slope communities, Alaska, and the United States in 1990.



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Photo 3.3-7. Kaktovik on the coast near the Canadian border (July 2000).

has become one of the largest employers in Alaska (ADOL, 1999h).

All North Slope communities also have for-profit Native village corporations. Of these, Barrow, Nuiqsut, and Kaktovik are particularly active. All North Slope communities also have city councils (although Point Lay is not formally incorporated under State of Alaska law) and some form of traditional council (Indian Reorganization Act or Traditional). In addition, there are two regional nonprofit organizations of importance: the Iñupiat Community of the Arctic Slope (ICAS) and the Arctic Slope Native Association (ASNA). The North Slope Subsistence Regional Advisory Council, organized under ANILCA and consulting with the Federal Subsistence Board, advises on North Slope subsistence-use regulations. In each village there is some form of village subsistence advisory group. For whaling villages, the village Whaling Captains Association often fulfills this function. Nuiqsut also has a formal Subsistence Oversight Panel, formed in conjunction with the Alpine Development Project. All communities have a formal Village Coordinator funded by the NSB, whose responsibility is to facilitate interactions and reduce overlap and inefficiency among this complicated system of organizations and agencies. This system creates significant local employment opportunities.

Numerous research efforts are underway in the North Slope communities. These efforts are associated with NSB, federal, petroleum company, or private initiatives and require time and effort from the local populations. Such activities — and especially public hearings and the National Environmental Policy Act process — have become a component of NSB institutional life (Brosted, 1975).

Barrow, as the administrative hub of the NSB, is a spe-

cial case. Institutional development and concentration are more heavily developed there than in the outlying villages.

Central TAPS Study Area

Communities in the Central TAPS study area are scattered in the vicinity of the pipeline ROW, beginning south of the Brooks Range in the north to Thompson Pass in the south. The communities of the study area (Figure 3.3-12) are segregated into three geographic sections for discussion in this report. The northern segment consists of Coldfoot and Wiseman; the central segment consists of Delta Junction, FNSB, Stevens Village, Livengood and Rampart; and the southern segment includes the Copper River Basin communities of Tonsina, Gakona, Glennallen, Gulkana, Kenny Lake, Copper Center, Chistochina, Chitina, and Paxson-Sourdough.

Figure 3.3-17 provides population and ethnicity data for Central TAPS study area communities (Livengood is not included because it has no year-round population). In terms of aggregate population, this study area is dominated by FNSB with a 1999 population of nearly 84,000. With this exception, populations of the various communities range from very small (e.g., Coldfoot, Gakona, and Wiseman with populations of 18, 22, and 20 persons, respectively) to the small community of Delta Junction with a population of 889. These communities differ substantially with respect to ethnicity. Several, including FNSB, Delta Junction, Kenny

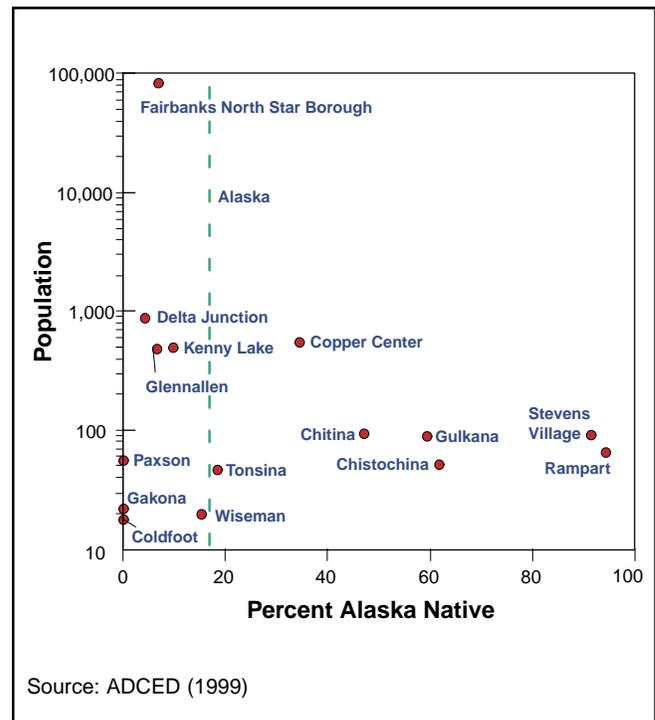


Figure 3.3-17. Population and ethnicity data, Central TAPS study area communities, 1999 (Livengood has no year-round population).



Lake, Glennallen, Paxson-Sourdough, Gakona, and Coldfoot, have percentages of Alaska Natives that are less than that for Alaska as a whole (17 percent). The other communities range from slightly more than 18 percent in Tonsina to 94.1 percent in Rampart. With the exception of FNSB, all these communities are quite small. With respect to ethnicity, these communities are quite heterogeneous. Individual community profiles are presented below.

Northern Segment: History and Social Structure.

Located at Milepost 175 on the Dalton Highway, **Coldfoot** began as a boom town during the second gold rush to the upper Koyukuk in 1899 (Mills, 1998). The first townsite plat was recorded with the Koyukuk District Recorder in 1901, and a Northern Commercial Company store was established in 1902. Coldfoot peaked between 1902 and 1904, with a post office, two stores, a gambling house, two roadhouses, seven saloons, a number of brothels, two lawyers, and one doctor. Shortly thereafter, gold strikes farther up the Koyukuk, especially around Nolan/Wiseman in 1907, led to the gradual abandonment of Coldfoot and the relocation of many residents to Wiseman by 1912 (Mills, 1998).

Wiseman is located roughly 10 miles north of Coldfoot on the Dalton Highway. The town originated as Wright's Roadhouse at the confluence of Wiseman Creek and the Middle Fork of the Koyukuk River, where it gradually formed between 1907 and 1912 by miners from Coldfoot who were seeking better claims on the nearby gold-producing creeks. Although originally known as Wright's City, the town became Nolan with the establishment of a post office in 1909 (Orth, 1967). The post office name was changed to Wiseman in 1923, where it functioned until its discontinuation in 1956. The population of Wiseman gradually declined through the 1930s and more rapidly after the federal mandate that nonessential mining cease in 1942 with the outbreak of World War II.

Central Segment: History and Social Structure. This segment consists of the culturally, ethnically, and economically heterogeneous communities of Delta Junction, the FNSB, Stevens Village, Livengood, and Rampart. With the exception of Stevens Village and Rampart, the other communities in the vicinity of this segment are predominately non-Alaska Native and participate in the cash economy to varying degrees.

Livengood is primarily a mining community located 70 miles northwest of Fairbanks on the Elliott Highway (Orth, 1971). Although the area has had permanent residents in the past, it is now occupied on a seasonal basis only.

Alaska Native groups apparently occupied the area around Livengood for 9,000 years, and the aboriginal occu-

pation was primarily seasonal and intermittent. Gold was discovered in the Livengood area shortly before 1914, first on Olive Creek and then on Livengood Creek, with the success of these prospects prompting a stampede in the area. By 1918, the Livengood population was over 1,500, with an estimated 5,000 living in the area. By 1919, the short-lived boom was over, and most Livengood residents had moved to better prospects in the Fairbanks mining district.

Stevens Village is a Koyukon Athabascan community on the north bank of the Yukon River, approximately 22 miles upriver from the Dalton Highway. In historic times, the Stevens Village area was occupied by the Gwich'in for an unspecified period of time before arrival of the Koyukon in the 1800s (Slobodin, 1981; Andrews, 1977). Multiple Koyukon place names reflect intensive Koyukon use and habitation (Stevens Village Council, 1999). Prior to direct contact with Russian and Euroamerican traders in their territory, both the Gwich'in and Koyukon traded for foreign goods through a complicated network of intermediaries (McClellan, 1981; Hosley, 1981). The primary effect of the arrival of European traders in the area was to shift the economic cycle to trapping in winter and trading in spring.



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Photo 3.3-8. Wiseman (August 2000).



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Photo 3.3-9. Coldfoot (August 2000).



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Photo 3.3-10. Stevens Village (June 2000).

Trapping stimulated the need for more effective forms of transportation, specifically large dog teams, and this in turn made fishing more important in the annual cycle to provide food for the dog teams. The pre-contact pattern of high seasonal mobility, and the communal and cooperative form of social organization that existed, gave way to a more sedentary lifestyle with a two-season migration. During winter, people lived in residential villages near their traplines, with a summer move to fish camps on major salmon streams and rivers (Hosley, 1981).

As with the Ahtna and other Alaska Native groups, disease was a factor in the alteration of both Gwich'in and Koyukon territorial boundaries in the Stevens Village area. Dall (1870) notes that a scarlet fever epidemic depopulated the Yukon River upstream from the Ramparts, near the contemporary community of Rampart (Raymond, 1871). Although the Alaska Native population was probably not annihilated (Schneider, 1976), the general depopulation of the area provided opportunity for the Koyukon from down river and the Koyukuk Valley to enter the region for trade (VanStone and Goddard, 1981). Apart from epidemic diseases, other forces of cultural change began with a series of gold strikes in the 1880s. The strikes brought a significant number of Euroamericans to the region, and many stayed to trap and trade after the gold fever faded. Trapping, and to a lesser extent mining, freight hauling, and wood cutting for the Yukon River steamers, in combination with subsistence hunting, continued to be important economic activities into the twentieth century.

The prospect of inundation of the Yukon Flats by the proposed Rampart Dam in the 1960s stimulated concern from local residents about development at the expense of natural resources. The Rampart Dam project was not economically feasible and was never undertaken. During the latter half of the 1960s, the proposed construction of TAPS

brought considerable opposition from Stevens Village residents. Stevens Village continues to strenuously oppose TAPS in particular, and oil and gas development in general.

In 1969, Stevens Village was one of a number of plaintiffs in a lawsuit seeking to prevent the Secretary of the Interior from issuing a ROW permit for TAPS and the attendant Haul Road (now the Dalton Highway). This lawsuit was an issue as Congress debated ANCSA.

Rampart is situated in the Rampart Canyon area on the Yukon River, just beyond the west end of the Yukon Flats. The community is near the former territorial border of the Koyukon and Gwich'in Athabascans. Rampart was first described by Raymond (1900) as a Gwich'in fishing camp, but during the 1800s the Koyukon incursion displaced the Gwich'in, with the latter becoming more numerous and politically and culturally dominant (John, 1959; VanStone and Goddard, 1981). Disease was a factor in the alteration of Gwich'in and Koyukon territorial boundaries in the Rampart and Stevens Village areas. Dall (1870) describes the scarlet fever epidemic that depopulated the section of the Yukon River upstream from the Ramparts, near the present-day village of Rampart. The general depopulation of the region allowed the Koyukon from down river and from the upper-Koyukuk Valley to enter the area for trade, contributing eventually to the establishment of both Rampart and Stevens Village (VanStone and Goddard, 1981).

Russian and Euroamerican explorers apparently moved through this area for the first time in the 1860s. Soon after, there came a series of traders and missionaries who established trade and contact along the length of the Yukon River, including the Rampart area. Euroamerican incursion altered the indigenous seasonal land-use pattern to include winter trapping, spring trading, and more intense fishing in summer and fall to harvest enough to feed the large dog



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Photo 3.3-11. Rampart (July 2000).



teams required to efficiently run and maintain an economically profitable trapline. The communal, cooperative, and highly mobile precontact lifestyle gave way to a more sedentary pattern, with a distinctive two-season migration similar to the one in Stevens Village. During winter, people lived in villages with nearby traplines, while summer found them in more or less seasonally permanent fish camps scattered up and down the Yukon River (Hosley, 1981).

Gold was discovered in a series of strikes beginning in the 1880s, culminating with the major Klondike strike of 1897. In 1894, John Minook found gold on what is now called Minook Creek (Schneider, 1976). Minook filed a claim in 1896, and the next year Rampart City was established to supply the mining camps that had sprung up in the hills south of the Yukon River. The cosmopolitan nature of the town is evidenced by the fact that Wyatt Earp and his wife Josie spent at least one winter here enroute to Nome, and that the population swelled to between 1,500 and 2,200 mostly Euroamericans between 1898 and 1899. A few stayed to trap and trade after gold mining declined (Schneider, 1976; Hosley, 1981). During the gold mining peak, Rampart boasted a newspaper, hotels, saloons, a library, a fire department, a hospital, a number of stores, and other businesses. With the coming and going of the gold rush, the traditional Athabascan pursuit of subsistence resources — in combination with trapping, wood cutting to supply the Yukon River steamers, freight hauling, and even some mining — formed a new economic pattern on the Yukon that persisted into the twentieth century. With subsequent gold strikes, most of the Euroamerican population moved to other areas.

In 1900, an important and successful agricultural experiment station was established across the Yukon River from Rampart. From the perspective of both the University of Alaska and the U.S. Department of Agriculture, this was an important setting for experiments in high-latitude farming and gardening. Considerable emphasis was placed on forage crops such as brome hay and barley, and subsistence produce such as potatoes and various greens. This successful station was closed permanently in the early 1920s (ADCED, 1999). An airstrip was constructed in 1939 (ADCED, 1999), and regular air service began after 1948 (Betts, 1997). Today, Rampart residents combine subsistence harvesting, fishing, wood cutting, and trapping, with some work in the mines to form the contemporary economic pattern. The Baan O Yeel Kon Village Corporation was established under provisions of ANCSA (Betts, 1997).

The **Fairbanks North Star Borough** (FNSB) is a predominantly non-Native district centered 358 miles north of Anchorage at the junction of the Richardson, Steese, and



Photo 3.3-12. Fairbanks.

D. Lehman (courtesy: Alyeska Pipeline Service Company)

Parks Highway, in the Tanana River valley (Orth, 1971). The FNSB, incorporated in 1964, encompasses an area of 7,361 square miles (19,065 square kilometers) and includes the incorporated cities of Fairbanks and North Pole. The FNSB also includes the unincorporated communities of College, Ester, Fox, Harding, Lake, Moose Creek, Pleasant Valley, Salcha, and Two Rivers. Major facilities/institutions in the FNSB include the land-grant University of Alaska and the military installations of Eielson Air Force Base and Fort Wainwright. About 22 percent of the FNSB population consists of military personnel and their families.

Alaska Natives, who presently comprise 7 percent of the FNSB population, have used the Tanana River valley for nearly 12,000 years (Holmes et al., 1996). However, aboriginal occupation was largely seasonal and intermittent. One Athabascan community, Saachaege (known by early explorers as Salchaket), thrived along the Salcha River. The Salcha band contained about 30 individuals around 1900, but dispersed after the discovery of gold in 1902 (Andrews, 1975).

Fur traders Al Harper and Jack McQuesten were the first non-Natives known to have entered the Tanana River valley, arriving sometime in the early 1870s. By 1875, a trading post was in operation 75 miles upriver from the mouth of the Tanana, and Euroamerican and Athabascan contact and interaction were probably well-established by this time (Andrews, 1975).

In 1901, E.T. Barnette established his trading post on the Chena River, near the current location of downtown Fairbanks (Cole, T., 1981). In 1903, Judge James Wickersham moved the seat of the Third Judicial District from Eagle on the upper Yukon River to Fairbanks. The City of Fairbanks was incorporated in the same year. After the first gold strike in the Fairbanks area by Felix Pedro, the community economy was driven by gold mining.

The community underwent an economic boom from



1904 to 1909, with rapid population increase, urbanization, and a bonanza in gold mining. From about 1910 to 1923, Fairbanks was in decline; population decreased as did gold production. From about 1924 until the onset of World War II, Fairbanks was revitalized, largely due to completion of the government-owned railroad, which fostered development of the Healy coal fields. Readily available coal facilitated the industrialization of mining operations, primarily by the Fairbanks Exploration Company. The company, noted for its large gold dredges and engineering features such as the Davidson Ditch, was a mainstay of the Fairbanks economy during the Great Depression (Bowers and Gannon, 1998; Cole, D., 1999).

In 1942, with the drastic reduction in gold mining as “nonessential” to the war effort, Fairbanks began a shift to a military town (Cole, D., 1999). Fairbanks and adjacent Ladd Field were important locations during World War II. With construction of TAPS in 1974-77, Fairbanks further shifted toward a service center for pipeline maintenance activities and for support of North Slope oil development (Dixon, 1978). Fairbanks is currently the center of supply, transportation, and administrative oil-development activities in this region (ADCED, 1999; Huskey, 1995).

Between 1970 and 1976, the FNSB population increased by an estimated 37 percent, from 30,618 to 42,000 (Kruse, 1976). The Fairbanks population remained relatively high, even after pipeline construction was completed in 1977. By 1980, the population had risen to 53,983, and by 1999, it had further increased to a high of 83,814. The FNSB population is culturally and ethnically diverse, including approximately 63,751 Caucasians, 3,663 American Indians, 1,547 Eskimo, 120 Aleut, 5,553 African Americans, 1,998 Asian Pacific Islanders, and 1,088 representing other ethnic groups estimated for 1990 (ADCED, 1999). The city of Fairbanks accounts for approximately 37.5 percent of the population of the FNSB.

Delta Junction is a predominately non-Alaska-Native community approximately 79 miles southeast of Fairbanks, near the junction of the Alaska and Richardson Highways. (Orth, 1971). Although Alaska Native groups occupied the eastern Interior for nearly 12,000 years (Holmes et. al, 1996), populations in the immediate vicinity of Delta Junction appear to have been sparse. Lieutenant Henry Allen, the first non-Alaska-Native to traverse the area, reported encountering no Alaska Native inhabitants from just south of the Robertson River to the mouth of the Goodpaster River (Allen, 1900). However, during an 1898 expedition into the same country, Lieutenant J.C. Castner encountered Alaska Natives from the upper Copper River who were hunting caribou (Castner, 1900). Castner also encountered

prospectors in search of gold, although no gold was ever discovered in commercial quantity. Soon after gold was discovered around Fairbanks in 1902, a trail was established from Valdez to Big Delta, a place situated north of the present location of Delta Junction.

Traffic passing through the Delta Junction area resulted in a resident population of predominately Euroamericans. Roadhouses began to appear around the turn of the twentieth century. The Sullivan Roadhouse and Bates Landing (the latter now known as Rika’s Roadhouse) were constructed in 1906 (Delta Junction Chamber of Commerce, 1999; Alaska Historical Society, 1999). Travelers followed a wilderness road along the east bank of the Tanana River to the Fairbanks mining district. In 1911, Lieutenant Billy Mitchell of the U.S. Army Signal Corps established a military reservation at Big Delta, as part of the Washington/Alaska Military Cable and Telegraph System (ADCED, 1999). In 1919, the trail from Valdez to Fairbanks was upgraded to become what is now the Richardson Highway.

The military significance of Alaska and the development of Delta Junction were established during World War II. The U.S. Army constructed the 1,500-mile-long Alaska Highway from Dawson Creek, British Columbia, to the present location of Delta Junction from 1942 to 1943 (Campbell, 1995). Allen Army Base was created along the Alaska Highway roughly 5 miles south of Delta Junction as a transfer station for Lend-Lease aircraft en route to the Soviet Union. This station became permanent in 1948 and was renamed Fort Greely in 1955. With increasing traffic on the Alaska Highway and development of the military installation, the Big Delta population slowly migrated to the present location of Delta Junction (Delta Junction Chamber of Commerce, 1980).

With the discovery of oil at Prudhoe Bay in 1968 and



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Photo 3.3-13. The community of Delta Junction (June 2000).



construction of TAPS from 1974 to 1977, Delta Junction entered a new phase of its boom-and-bust development economy. In 1975, a pipeline construction camp located about 8 miles north of Delta Junction reached a population of 1,536, roughly twice that of Delta Junction itself (Northwest Alaskan Pipeline Company, 1980). At the time, the community was unprepared for the population influx resulting from pipeline construction. City services were limited, with no ambulance service and no water or sewer system during construction (Rural Impact Program, 1977). In 1978, primarily with oil revenues, the Hammond Administration stimulated development of commercial agriculture in the Delta area (Snodgrass et al., 1982).

Currently, Delta Junction is facing economic decline with the scheduled phase-out of Fort Greely. Plans for a National Missile Defense System (NMDS) site there may partially offset the impact of the fort closure.

Southern Segment: History and Social Structure.

Copper River Athabascans probably had early contacts, either direct or indirect, with Europeans as early as the 1790s, when the Russians established trading posts in PWS (Reckord, 1983). They did not successfully penetrate the Copper River Basin until 1819, when Kilimovsky established a trading post at Taral (VanStone, 1955). Subsequent Russian explorations of the area met with disaster when Serebrennikov and company were massacred near an upper Ahtna village in 1845 (Ketz and Arndt, 1987). Regional famine led to the abandonment of the Taral Post during the winter of 1849 and 1850 (Ketz and Arndt, 1987). The most significant exploration of the area by a non-Alaska-Native was by Lieutenant Henry Allen in 1885, when he followed the Copper River to the Tanana and beyond (Allen, 1900). Allen was accompanied by Ahtna Athabascan people for various parts of the journey (Allen, 1900; Sheppard, 1999).

The Alaska Native residents of the area, the Ahtna, speak an Athabascan language that shows some similarities to Tanaina, but is generally distinct from neighboring groups (Kari, 1977; de Laguna and McClellan, 1981). In historic times, Ahtna settlements consisted of winter residential settlements and short-term hunting and fishing camps (Ketz, 1983). Winter villages were controlled by a “chief,” either a wealthy man who was a leading chief of the region or a head of an extended household (de Laguna and McClellan, 1981). Major communities or settlement groups had their own areas for hunting, fishing, and berry picking. The Ahtna were involved in a widespread trading network that involved the Eskimo, other Athabascans, the coastal Eyak and Tlingit, probably the coastal Chukchi of Siberia, and the Russians (de Laguna and McClellan, 1981). This pattern of widespread trade and interaction lasted until well

after initial contacts with Euroamericans.

Between 1900 and 1940, Ahtna sociocultural systems were affected by mining activities and the development of inter-regional transportation systems. Gold strikes at Eagle, Valdez Creek, and other locations brought an influx of miners into the region (Reckord, 1983). The miners introduced new diseases, including the 1919 Spanish influenza that decimated many Alaska Native communities and fundamentally altered the demographic structure (Ahtna, Inc. 1973). Between 1910 and 1939, the Kennicott Copper Mine near McCarthy was the largest industry in the region. This development stimulated construction of the Copper River and Northwestern Railroad, which was built between 1908 and 1911 and connected the Kennicott mines with PWS (Reckord, 1983). The transportation system expanded when construction of the Richardson Highway connected Valdez and Fairbanks between 1905 and 1914. Construction of the Glenn Highway as a result of World War II connected Anchorage with the Alaska Highway at Tok (Reckord, 1983).

Over the last 30 years, the population has been transformed from predominately Alaska Native to the present mixture. Only Chistochina and Gulkana still have Alaska Native majorities. This is not to say that Alaska Native culture ceased to be a significant force in the social and cultural fabric of the area. However, the increasing presence of Euroamericans reflects accelerated social and economic changes for Ahtna residents of the area.

The economic and service center of the region is **Glennallen**, a predominately non-Alaska-Native community located near the junction of the Glenn and Richardson Highways (Orth, 1967). Copper Center, located between Mileposts 100 and 105 on the Richardson Highway, has shifted from Alaska Native to predominately non-Alaska Native over the past 30 years. **Copper Center** has a slightly larger population than Glennallen, but far fewer businesses



© 2000 AerialMap U.S.

Photo 3.3-14 Glennallen (August 1997).



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Photo 3.3-15. Copper Center (June 1995).

(Copper Valley Economic Development Council, Inc. 1992). Glennallen is one of the few communities in the Copper River region that is not located near the site of a pre-existing Alaska Native settlement (ADCED, 1999). Jobs in the service sector involve the most households in eight of the ten communities, with construction a leading employer in two. Federal and state government employment involves the next highest percentage of households for four communities.

Central TAPS Study Area Community Economics

Figure 3.3-18 shows these Central TAPS study area communities ranked in descending order of median household income in 1990, along with comparable data for the State of Alaska and the U.S. as a whole. Median household incomes for this group of communities in 1990 ranged from \$4,999 for Wiseman to \$38,750 for Gulkana.

In contrast to the North Slope communities, all these communities had median household incomes in 1990 less than that for Alaska (\$39,298). Several, including Chistochina, Kenny Lake, Tonsina, Rampart, Chitina, Stevens Village, and Wiseman, had median family incomes less than that for the U.S. overall (\$29,943).

Northern Segment Economics. During construction of TAPS in the 1970s, a construction camp and airstrip were established near the old Coldfoot settlement. With the 1979 BLM establishment of public service areas along the Dalton Highway, Coldfoot was one of two locations chosen. In 1981, Coldfoot Services, a truck stop that eventually included a hotel, a restaurant, and a recreational vehicle (RV) park, was established. There is no current information available on subsistence and economic activities, apart from the fact that most Coldfoot residents are employed by Coldfoot Services, the BLM, or a state agency.

Wiseman residents participate in a mixed subsistence and cash economy. Community members hunt, fish, gather

berries and greens, and run traplines as a cash-producing activity. Caribou, moose, and Dall sheep comprise the primary game resources used by Wiseman residents, and meat and other resources are actively shared within and outside the community. Because fish populations are low, fishing is not an important subsistence activity.

All ten Wiseman households fall below the poverty line, with a median household income of \$4,999 (ADCED, 1999). Of the 16 potential workers in Wiseman, eight have jobs, all in mining. Trapping, tourism, cabin and campground rental, and work in Coldfoot provide limited sources of local income. Nonlocal sources of cash include commercial fishing, trucking, and construction (Scott, 1993).

Central Segment Economics. Road construction and maintenance during World War II provided some economic support for Livengood, but the most significant burst of economic activity occurred when Livengood became a primary center for storage and transfer of pipe during construction of TAPS (APSC, 1975). TAPS resulted in short-term growth, but this diminished significantly as soon as construction ended. The ADCED database contains no information on economic conditions in Livengood. Seasonal employment is still vested primarily in mining.

In 1999, the resident Stevens Village population was 92 individuals scattered among 37 households (ADCED, 1999). Residents, who are primarily Alaska Natives, rely

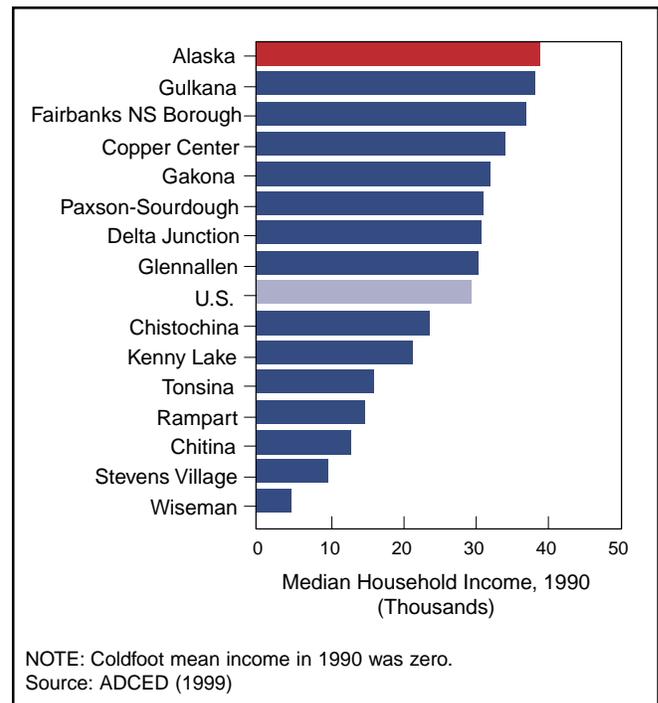


Figure 3.3-18. Median household income of TAPS study area communities, 1990.

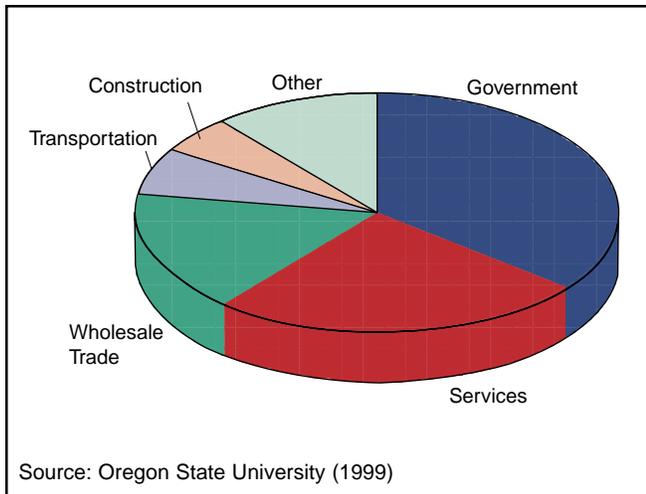


Figure 3.3-19. Distribution of Fairbanks North Star Borough employment by sector, 1997.

heavily on subsistence activities for their livelihood today, since full- or part-time wage-earning opportunities are few. Employment is sometimes available with the local school, the clinic, Village Council, and store. Seasonal employment is available fighting fires in the summer or doing construction work. Four individuals in the community hold commercial fishing permits (ADCED, 1999).

The FNSB economy is relatively diverse by Alaskan norms, with much of the impetus for local employment related directly to North Slope oil and gas development. Total employment in FNSB was 49,979 in 1997 (Oregon State University, 1999). Figure 3.3-19 shows the distribution of FNSB employment among various sectors and industries in 1997. The government (federal, state, local, and military) was the single largest employer, followed by services (which includes oil-field services and related); wholesale trade; transportation and public utilities; construction; finance, insurance, and real estate; mining; and other. Although the FNSB economy is relatively diversified, it has a much higher dependence on government than a typical city in the contiguous 48 states.

Although the Tanana River Basin has been used historically for subsistence by a variety of Native and non-Alaska Natives (Andrews, 1975), the FNSB is not considered rural as defined in ANILCA, and borough residents are not considered subsistence users. The Division of Subsistence, ADF&G, does not maintain community profiles for Fairbanks. Although ADF&G collected limited data on the Tanana River salmon fishery in 1981, this information was collected before implementation of ANILCA and before eligibility criteria were established for the subsistence fishery. For the two-year study period, at least half of those surveyed would not meet the “customary and traditional”

criteria established in federal law (Caulfield, 1981). The Department of Wildlife Conservation, ADF&G, has harvest data from 1982 to the present. These data are recorded with residency, permit type, game management unit in which animals were harvested, and mode of transportation to and from hunting areas.

Delta Junction had a population of 889 in 1999 (ADCED, 1999). As of 1994, there were about 75 operating farms in the area. Other employment opportunities are provided by Alyeska Pipeline Service Company and by a small number of local businesses that cater primarily to the tourist trade and traffic during summer. Alyeska employed 74 Delta residents in 1994. During the same period, most jobs were provided by the federal government, with transportation, communications, utilities, and self-employment accounting for the rest. With the scheduled closure of Fort Greely in 1999-2001, employment statistics will change significantly. Since none of the communities in the Delta area is a federally recognized ANCSA entity, the residents are not considered rural subsistence users.

The 1999 population of Rampart was 66. The population has fluctuated greatly through time, reflecting mostly the rise and decline of gold mining. Today, there are numerous unoccupied structures in Rampart — a legacy of occupation and abandonment by Euroamericans and of the gold rush in the early 1900s.

Rampart residents rely heavily on subsistence for their livelihood, since full- and part-time wage-earning opportunities in the community are few. Limited employment opportunities may be offered at the local school, village store, health clinic, or Village Council. Some seasonal employment is available through the BLM fire protection program. Five people hold commercial fishing permits. Of the 56 Rampart residents age 16 and older in 1990, 87.5 percent were not active in the wage labor force. Only seven were actually employed in the community. The Alaska Community Database shows 43 percent employed in health services, 28.5 percent in mining, and 28.5 percent in public administration, but these frequency assessments clearly mask the small number of people actually employed.

Copper River Economics/Resource Harvest. Like many rural Alaska Native villages, the Copper River Basin communities have undergone an historical and economic transformation from a primary emphasis on subsistence to a mixed cash-and-subsistence economy. Since the mid-1970s, this shift is reflected in part by an increased emphasis on the cash economy as indicated by lower per-capita harvest levels in all communities throughout the region (Stratton and Georgette, 1984; McMillan and Cuccarese, 1988).



Historically, much of the cash economy centered on trapping, commercial mining, and the delivery of services for travelers and miners. The region now has a more diversified economic base and a greater number of employment options in state and federal government, although Alaska Natives living away from the major service centers probably do not have equal access to such employment opportunities. From the 1970s to the present, the trend has been toward greater involvement in the wage-labor and cash economy throughout the region. The schedule and intensity of subsistence activities in each community are partly related to the availability of wage labor. All of the Copper River Basin communities are similar in this respect, although wage-labor opportunities and a non-Alaska-Native majority in Glennallen and Copper Center result in a more stable economic base and less dependence on subsistence resources here than in the smaller outlying villages and towns. Specific subsistence activities and harvest activities are discussed in Section 3.3.3.4.

Valdez/Prince William Sound

The Valdez/PWS communities considered in this analysis include Chenega Bay, Cordova, Tatitlek, and Valdez (Figure 3.3-12).

Population and Ethnicity. Figure 3.3-20 presents 1999 data on population and ethnicity (percentage Alaska Natives) for these four communities. These appear to form two clusters: the small, predominantly Alaska Native communities of Chenega Bay and Tatitlek, and the larger, predominantly non-Alaska-Native communities of Cordova and Valdez. In terms of 1999 population, the communities vary in size from Chenega Bay with 69 villagers to Valdez with 4,164 residents. Cordova with 11.1 percent and Valdez with 5.9 percent have populations with a smaller percentage of Alaska Natives than the average for the State of Alaska (17 percent). Chenega Bay with 69.1 percent and Tatitlek with 86.6 percent have a larger percentage of Alaska Natives than the State of Alaska.

History and Social Structure. The cultural history of PWS before Euroamerican contact is known primarily through oral traditions and archaeological data that indicate the region was the homeland of aboriginal people for thousands of years. The Alutiiq-speaking people who lived in PWS before contact were residents of various geographically based local groups (de Laguna, 1956), and Eyak-speaking people lived in various locations near the Copper River delta (Birket-Smith and de Laguna, 1938; Oswalt, 1967). During the contact period (post-1741), the cultural boundaries in the Copper River/Controller Bay area fluctuated among various Eyak, Chugach, and Tlingit groups who

inhabited the region (de Laguna, 1972, 1956; de Laguna et al., 1964; Johnson, J.C.F., 1984). Many current Alaska Native residents of the four modern PWS communities are descendants of these groups, although in-migration and intermarriage with Alaska Natives from other regions and with non-Alaska Natives has occurred.

The broad social patterns before Euroamerican contact point to local group control and use of maritime and some terrestrial resources, supplemented by trade. Local groups appear to have been hierarchically structured, including higher- and lower-ranking families, commoners, and a portion of the population who were slaves taken in battle. The economy was based on adaptations to the changing yet productive coastal environment. They used watercraft to hunt marine mammals; they trapped, netted, and caught fish; and they preserved and stored numerous littoral and terrestrial resources for shared consumption (de Laguna, 1956; Fitzhugh and Crowell, 1988).

The post-contact period can be divided into these broad categories: the Russian fur trade (1785-1869), the American fur trade (1869-1910), whaling (1840-1930), fox farming (1918-1935), commercial fishing (1890-present), and mining (1900-present). Initial contact, after the brief 1741 Vitus Bering “discovery” of Alaska Native presence on Wingham and Kayak islands, occurred in the 1780s and 1790s (Steller, 1988). Russian and Spanish explorers, as well as English and American traders seeking sea-otter pelts, caused major cultural disruptions by bringing trade goods as well as exotic diseases into the region, resulting in

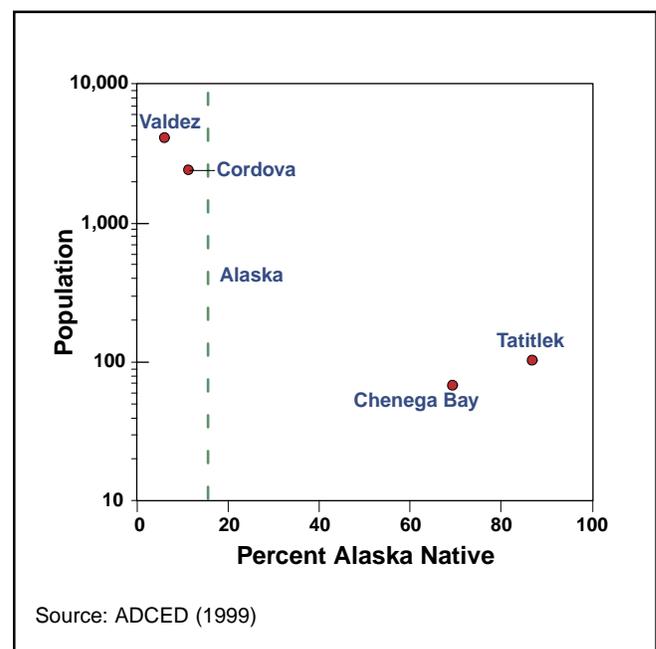


Figure 3.3-20. Population and ethnicity data for Valdez/Prince William Sound communities, 1999.



a reordering of the size and distribution of the local social units, as well as their subsistence cycles (Hassen, 1978). Commercial whaling and sea-otter hunting reduced the population of those important species nearly to extinction. The villages known to have persisted into the 1800s include the Eyak village of Alaganik and the Chugach villages of Tatitlek, Chenega, Nuchek, and Kiniklik.

Throughout the mid- to late 1800s, as diseases decimated human populations and as seasonal fur-hunting expeditions to former local-group territories were undertaken, seasonal habitations and travel camps were used. More extensive Russian contact in the 1800s also involved sea-otter and terrestrial-mammal hunting, the introduction of Russian Orthodox Church teachings, and the development of an educated Alaska Native and Russian/Native Creole population (Pullar, 1997). The syncretism of Russian Orthodoxy and Alaska Native culture persists in area villages.

The Alutiiq populations continued to decline because of epidemic diseases, especially in the 1890s and 1920s. Depopulation caused changes in settlement and subsistence patterns, although hunting furbearers in exchange for trade goods continued. Gold mining in the Klondike resulted in the settling of Valdez in 1898 as the stampedeers' jumping-off point into the Klondike gold fields. The U.S. Army built Fort Liscum in 1900 at the present site of the Valdez Marine Terminal, to assist miners who either ran out of supplies or otherwise were not successful in the gold rush. Valdez continued to prosper in the early 1900s, when gold and copper discoveries in PWS were developed.

Copper mining at the Ellamar mine adjacent to Tatitlek began in 1902. Tatitlek's population increased between 1900 and 1910 when work related to the Ellamar mine drew villagers from Nuchek (Stratton, 1990). The Cordova area also figures prominently in the history of PWS, as well as the cultural, political, and industrial history of Alaska. Cordova's townsite was formed in about 1906 as a port associated with the Kennicott copper discovery and the Copper River and Northwestern Railroad. Other early twentieth century activities affecting the Cordova area included commercial fishing, the attempted development of the Bering River coal field, and the Katalla oil refinery.

Industrial developments have affected the size and nature of the region's population. The non-Alaska-Native population in the more accessible and economically diversified communities of Valdez and Cordova grew during the twentieth century. During the same period, the predominantly Alaska Native villages of Chenega and Tatitlek maintained relatively small and homogeneous populations. Chenega and Tatitlek also relied on the larger Valdez and Cordova for some supplies, which used to be shipped by

boat (Bilderback, 1956) or purchased directly in town by village residents.

The commercial fishing industry has shaped the history, culture and social organization of the PWS communities, and it continues to be the dominant force in the local economy. Commercial fishing is an increasingly expensive and competitive business (MMS, 1993b). However, fishing also provides a lifestyle and an avenue for the gathering of fish from commercial nets for subsistence use. Fishing also provides access to areas of PWS for subsistence hunting and other resource-gathering activities.

Extensive commercial fishing in PWS began in the early 1900s, as Valdez's first cannery opened in 1917. Many "outsiders" including Scandinavians and Chinese laborers came to the region during this time. Commercial fishing initially focused on salmon and herring, and later expanded to include halibut, shrimp, rockfish, clams, and crab. In the mid-1900s, Chenega villagers adjusted to the economic opportunities presented by the commercial fishing industry by taking up seasonal residence at the "Shipyard" site near the Port Nellie Juan cannery (Stratton and Chisum, 1986). By the 1940s, Cordova also had become dependent on commercial fishing, and many Tatitlek residents fished for the Cordova canneries. During the 1950s and 1960s, fur trapping and seal bounties also provided area residents a source of cash to supplement commercial fishing. In the 1950s and 1960s, Chenega and Tatitlek village residents fished commercially and worked at canneries in the summer or as winter caretakers of the canneries.

Valdez's connection to the Southcentral Alaska road system is unique among PWS communities. Valdez was the original gateway to Interior Alaska before the Alaska Railroad was constructed between Seward and Fairbanks in 1923. The road that became the present-day Richardson Highway made Valdez a transportation hub into the Interior. Although commercial fishing has been a prominent socioeconomic feature of Valdez, state government employment with the Harborview Hospital (a state facility for the handicapped), the Alaska State Troopers, and a state regional highway maintenance facility fostered a dependence on state employment during the 1950s and 1960s.

In 1964, destructive tsunamis associated with the Great Alaska Earthquake killed 26 of 76 Chenega residents, devastating the community on Chenega Island. The survivors were evacuated to Cordova, and many later moved to Tatitlek when houses were completed for them (Davis, 1984). After passage of ANCSA in 1971, survivors formally applied for village status. Eligibility hearings were held in 1974, and in 1984, approximately 60 people resettled at the new Chenega Bay village on Evans Island.



PWS villagers have experienced minimal direct impacts from TAPS construction and pipeline operations, although some village residents have taken advantage of TAPS-related employment opportunities, and some are employed by Alyeska or its contractors in Valdez. In 1989, the *Exxon Valdez* oil spill (EVOS) and the associated cleanup activities created significant impacts on the PWS communities. Thousands of workers and others came to Valdez for the cleanup. This influx resulted in social and subsistence disruptions, but also provided an economic windfall for the regional economy (see MMS, 1993b for socioeconomic impacts to each community; see also Wooley, 1995 and Jorgensen, 1996 for cultural and socioeconomic impacts of the spill and subsequent litigation). PWS community residents participated in the cleanup to varying degrees. Residents who did not participate directly were also affected by the local population influx, fishing closures, and various other social impacts (MMS, 1993b).

Many area residents have participated in industry oversight committees enacted as a result of EVOS and OPA 90, including the PWS Regional Citizens Advisory Council (RCAC). Residents have also been involved in restoration work, including the Chugach Regional Resources Committee that provides input for subsistence restoration projects. Other restoration programs have been initiated including elders-youth conferences, harbor-seal harvest assistance, and shellfish restoration projects. Many residents, especially area fishermen, have been actively involved in oil spill preparedness and response in the communities and have worked for the Ship Escort/Response Vessels System (SERVS).

Chenega Bay and Tatitlek. The PWS communities of Chenega Bay and Tatitlek are unincorporated communities. Because of their small size, the nature of their Alutiiq culture and history, and the economic history of PWS, these communities have very different socioeconomic structures than the predominately non-Alaska-Native towns of Valdez and Cordova.

Traditional Alutiiq local groups were comprised of extended family units sharing multi-room houses. Communities were based on related kin united by residence and ties to certain territory. Some matrilineal tendencies (kinship considered through mother's side) have been noted for the Alutiiq; however, kinship was probably bilateral (both mother's and father's), based on language terminology. Russian (Eastern) Orthodoxy replaced traditional shamanic beliefs after breakdown of traditional society in the late 1700s. Russian Orthodoxy remains central to the religious identity of many local residents. Chenega Bay, Tatitlek, and Cordova have Russian Orthodox churches, and Valdez also

has a small Orthodox community, but no church (St. Vladimir's Orthodox Theological Seminary, 1999). The Orthodox Church has also influenced local language, economics, social activities, and kinship (Davis, 1984). While the Alutiiq and Russian languages are no longer spoken daily, some traditional knowledge of both languages still exists and is used and transmitted across generations.

Compared to the traditional Alutiiq social organization, the contemporary villages of Chenega Bay and Tatitlek exhibit a more Western type of social organization (separate nuclear family units within a wage-earning economic system) as a result of historic-era acculturation, the influence of ANCSA corporation economics, and government-sponsored construction and social programs. In Chenega Bay, additional changes in village social organization occurred in the 20 years after the earthquake and tidal wave as the survivors adapted their lives to new surroundings in Cordova, Tatitlek, and elsewhere before building the new village of Chenega Bay. However, beneath the external changes, the harvesting and communal sharing of wild resources remain widespread in Tatitlek and Chenega Bay (Fall and Utermohle, 1999) — evidence of the Alutiiq cultural background of these communities. The continuing practice of communal wild-food sharing reflects underlying cultural values distinct from Western social mores in which the individual nuclear family generally procures and consumes food in relative isolation from neighbors.

Both Chenega Bay and Tatitlek have for-profit Alaska Native village corporations and IRA (Indian Reorganization Act) councils recognized by the Bureau of Indian Affairs. The Chugachmiut regional nonprofit organization (formerly North Pacific Rim) operates the Tatitlek and Chenega Bay health clinics. The Chugach Regional Resources Committee provides input on local subsistence issues, including EVOS restoration projects. Subsistence hunters from PWS



Frank Flavin (for Alyeska Pipeline Service Company)

Photo 3.3-16. The Prince William Sound community of Chenega Bay.



communities are also actively involved in the Alaska Native Harbor Seal Commission, a tribal consortium concerned with management of harbor seals. The Chenega Village Council operates the local facilities serving roughly 25 village homes with water, sewer, electricity, fuel delivery, and the landfill. The Tatitlek Village Council operates similar local facilities serving roughly 35 village homes. Both Tatitlek and Chenega Bay are actively involved in the Prince William Sound Economic Development Council (PWSEDC), a recently established forum fostering economic growth and development in Chenega Bay, Cordova, Tatitlek, Valdez, and Whittier (PWSEDC, 1999). Tatitlek and Chenega Bay are also directly affected by, and have input into, the Prince William Sound Aquaculture Corporation (PWSAC) regarding the corporation's influence on local commercial and subsistence fisheries.

Valdez and Cordova. These communities are organized like other communities of their size and nature in Alaska. Valdez, with its close association to the oil and gas industry, has been compared to the town of Kenai, whereas Cordova more closely resembles Southeast Alaska fishing communities such as Petersburg. Valdez is organized as a municipality and has an extensive array of public services. Housing is comprised of mobile homes, apartments, and single family homes.

Valdez has a large tax base and employment related to Alyeska, as well as a cargo-and-container shipping facility that continues the community's tradition as a transportation hub. The U.S. Coast Guard (USCG), the Valdez Fisheries Development Association, and the Valdez Native Association are active local employers. (Recent summaries of Valdez social and economic life are available in MMS, 1993b, and Tomrdle and Miraglia, 1993. Earlier sources include Morsell et al., 1979, and City of Valdez, 1992).

The March 27, 1964, earthquake destroyed old town



Photo 3.3-17. The Valdez boat harbor is home to numerous fishing vessels.

Danny Daniels for Alyeska Pipeline Service Company

Valdez. The relocation and rebuilding of Valdez were followed by the construction and operation of TAPS and the VMT beginning in 1973. The construction phase, in particular, introduced further permanent economic and population growth in Valdez, and brought direct and indirect socioeconomic impacts to area communities. Robbins (MMS, 1993b) describes the impact of these events. Tourism played an increasingly important role in the growth of PWS communities in the 1990s because of the area's spectacular scenery and outdoor recreation opportunities.

Changes in the classification and reporting of ethnic categories have obscured the diverse Alaska Native ethnic backgrounds present in the Cordova area. However, as a percentage of the overall population in Cordova, the Alaska Native population is decreasing. An updated discussion of the Alaska Natives in Cordova, including Eyak Corporation and Chugach Alaska Corporation, is found in MMS (1993b).

Housing in Cordova is a combination of single-family homes, trailers, and apartments. Most households are nuclear family groups or single persons; 76.3 percent had two or more people. Cordova is accessible by air and boat, but is not involved in large cargo shipping. Other organizations central to life in Cordova and Valdez are PWSAC, the Cordova District Fishermen's Union, and the Prince William Sound RCAC.

Prince William Sound Community Economics. Figure 3.3-21 shows the median household incomes of the Valdez/PWS communities in 1990 (the latest year available) ranked in descending order, together with that for the State of

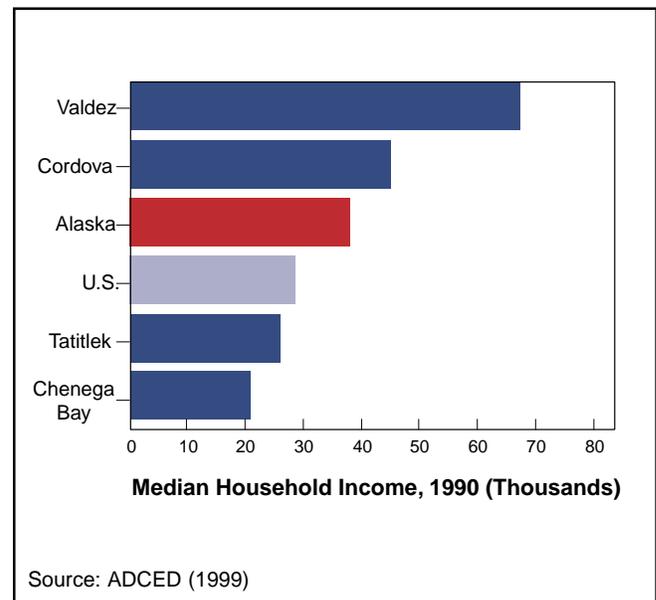


Figure 3.3-21. Median household income of Valdez/Prince William Sound communities, 1990.



Alaska and the U.S. as a whole in the same year. Valdez (\$68,570) and Cordova (\$46,304) had median household incomes greater than that for either Alaska or the U.S. as a whole. Tatitlek (\$27,188) and Chenega Bay (\$22,083) had median household incomes lower than Alaska or the U.S.

Chenega Bay and Tatitlek residents continue to depend on seasonal commercial fishing for cash income, augmented by seasonal labor on local construction projects, village corporation employment, and activities related to EVOS restoration and SERVS. Dividends resulting from the EVOS trustee land sale have been distributed and may have triggered a recent migration of residents from Chenega Bay. Although all of the communities have access by air, the Chenega Bay and Tatitlek airstrips have only recently been expanded, and local transportation is still primarily by boat.

Current employment includes fish processing and oyster farming, some residents still hold commercial fishing permits, and subsistence harvests continue to account for a large percentage of the local food supply (ADCED, 1999). Oyster farming has been initiated at Tatitlek and Chenega Bay. Increased sport hunting and sport fishing in PWS have presented subsistence harvesters with competition for wild resources. A coho salmon hatchery at Boulder Bay near Tatitlek is being built to enhance salmon returns for local subsistence use, and a fish and game processing facility is also under construction. In the 1990s, logging of village and regional corporation lands on Montague Island and near Tatitlek employed PWS residents and produced some corporate income (MMS, 1993b). The recent sale of village corporation lands to the state and federal trustees as part of the EVOS restoration has resulted in additional corporate income and shareholder dividends.

The oil and gas industry — particularly TAPS oil transportation — drives the economy of Valdez. This contrasts

with the community of Cordova, whose people are generally opposed to non-fishing-related industrial growth (Morsell et al., 1979). The Petro-Star refinery, which opened in 1993, produces jet, marine, and heating fuel, and also provides a significant tax base for Valdez (Tomrdle and Miraglia, 1993). Alyeska and the other companies related to the oil and gas industry provide the majority of the tax base for the infrastructure and administrative amenities that Valdez provides its citizens (MMS, 1993b). The declining tax base that typically follows decreased or discontinued oil and gas production, transportation, and shrinking property valuations presents a major fiscal problem for the City of Valdez.

Cordova’s primary industry in the TAPS era has been fishing and fish processing. Commercial fishing dominates Cordova’s economy. Cordova’s fishing industry changed significantly during the 1970s due to the limited-entry system and the construction of modern multi-species (as opposed to exclusively salmon) fish processors located in the Cordova industrial park (Alaska Consultants, 1979). In the 1970s, government employment was second in importance to fishing and fish processing. Local and state government had a small presence at the time, as was particularly true of communities with economies heavily dependent on fishing and fish processing.

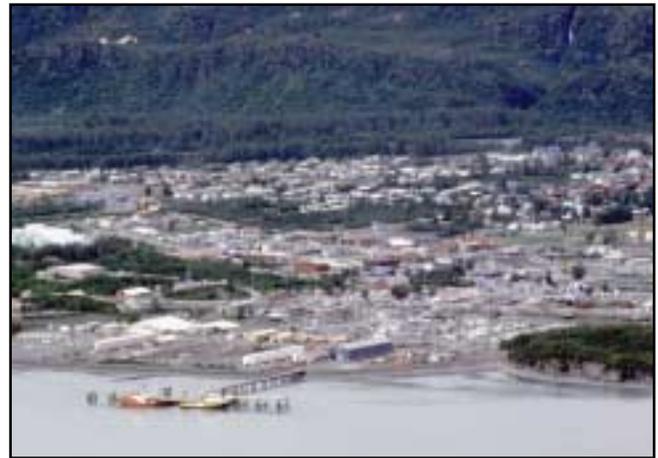
A summary of Cordova’s growth and economic development through the 1980s (MMS, 1993b) describes the many ways Cordovans have worked to protect and stabilize the fishing industry, rather than diversify the local economy. Projects such as a deepwater port, the Copper River Highway, and the Bering River coal development have brought out conflicting goals for development among the various Cordova constituencies.

Cordova presently supports a large fishing fleet and several fish-processing plants, although government jobs pro-



David Predeger for Alyeska Pipeline Service Company

Photo 3.3-18. The community of Tatitlek.



David Predeger for Alyeska Pipeline Service Company

Photo 3.3-19. Valdez.



State of Alaska

Photo 3.3-20. The boat harbor at Cordova.

vide important employment income. Nearly 400 residents hold commercial fishing permits, and nearly half of the households have a member whose work is associated with fish harvesting or processing. Cordova has seen an increase in tourism, as it has become a destination for cruise-ship companies. The large employers are North Pacific Processors, Cordova School District, the hospital, the city, and the State Department of Transportation. The U.S. Forest Service and USCG also have personnel in Cordova, and the Prince William Sound Science Center is based in Cordova to study and monitor the ecosystem of PWS.

3.3.3 Subsistence

By M. Galginaitis, C. Gerlach, P. Bowers, and C. Wooley

3.3.3.1 Definition of Subsistence

The term *subsistence* has different definitions and meanings emerging from a complicated legislative and social history (Davidson, 1974; Arnold, 1978; Lewis, 1978; Lonner, 1980; Kelso, 1981, 1982; Worl, 1982; Schwarber, 1983; Case, 1984, 1989; Berger, 1985; Caulfield and Brelsford, 1991; Kancewick and Smith, 1991; Naiman, 1996; Loescher, 1999). ANILCA provides the operational basis for definition of the term in this document. Other legislative acts and regulatory actions relevant for the understanding of subsistence management issues on federal lands include the Federal Subsistence Management Regulations (36 CFR 242 or 50 CFR 100), the Federal Advisory Committee Act (FACA), and the Federal Advisory Committee Management Regulations (41 CFR 101-6).

ANILCA explicitly recognizes that for rural Alaskans (Native and non-Native) *subsistence* includes a complex set of behaviors and values that extend far beyond the harvest and consumption of wild resources. The current regulations

define *subsistence use* as “the customary and traditional uses by rural Alaska residents of wild, renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools of transportation; for the making and selling of handicraft articles out of inedible by-products of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal or family consumption; and for customary trade” (FSB, 1999). For some resources in certain areas, the Federal Subsistence Board (FSB) has determined that all rural Alaskan residents are qualified subsistence users. For other resources, the FSB has made more restrictive “customary and traditional” determinations of eligibility. To show customary and traditional use, a community or area is evaluated in terms of:

- The time, depth, and consistency of its use;
- Seasonal repetition over many years;
- Efficiency in terms of effort and cost;
- Consistency of harvest or use of fish and wildlife in proximity to the community or area;
- Historic or traditional means of handling, preparing, preserving, and storing fish and wildlife that have been used by past generations;
- The inter-generational transmission of hunting and fishing skills, values, and knowledge;
- Sharing and distribution of the harvest;
- Dependency on a wide variety of fish and wildlife resources available in an area; and
- The provision of substantial cultural, economic, social, and nutritional elements to the community or area.

Subsistence is historically rooted in Native and Alaskan culture, economy, and tradition. The nine factors listed above attempt to integrate salient aspects of subsistence into criteria for a regulatory definition of “customary and traditional use.” These criteria do not fully capture the sociocultural significance of subsistence. This topic addressed below, followed by a detailed description of actual subsistence harvest patterns for each of the regions.

3.3.3.2 Sociocultural Significance of Subsistence

Harvest and consumption are the most visible aspects of such a system and the most logical entry point for examining a social system with a subsistence ideology. The fundamental values of such societies are expressed in the *idiom* of subsistence, so that kinship, sharing, and subsistence resource-use behaviors (preparation, harvest, processing, consumption, celebration) become inseparable (Langdon and Worl, 1981; Elanna and Sherrod, 1984). Worl (1979)



and Nelson (1979) describe subsistence as a central focus of North Slope personal and group cultural identity in addition to its economic role. Hopson (1976, 1978) establishes the political and ideological power of subsistence as an organizing concept for the North Slope Borough. Simeone (1998) documents the central place subsistence has in village life and identity in Athabascan communities. McNeary (1978) and North Pacific Rim (1981) describe the socioeconomic aspects of subsistence in the changing cultural landscape of the PWS region. In each region, communities express their unique identities based on their enduring connections between current residents, those who used the areas in the past, and the wild resources of the land. Elders' conferences, spirit camps, and other information exchange and gathering events serve to solidify these cultural connections between generations and between the people and the land and its resources. While all local subsistence economies are similar, the general values and central organizing concepts have many common threads.

Many studies have examined the relationship between the subsistence and wage economies and how both subsistence and wage activities are integrated into rural Alaskan socioeconomic systems. (General theoretical or conceptual treatments are available in Wolfe, 1983; Wolfe et al., 1984; and IAI, 1988.) Although not always made explicit, it is recognized that all rural communities and rural socioeconomic systems are not the same. One salient variable is the ethnic composition of the community. Others include the diversification of the local economy and the availability of wage employment.

An extensive series of community studies focusing on local patterns of wild-resource use as a component of the overall economy was conducted during the 1980s in a wide range of communities throughout Alaska (e.g., Sobelman, 1985; Reed, 1985; Stratton, 1989, 1990, 1992; Galginaitis et al., 1984; and IAI, 1989). Some of these communities are predominately Alaska Native, others are predominately non-Alaska Native, and others are more ethnically mixed. Some have developed wage or self-employment economies, while others have few such opportunities. In the NSB, both subsistence activities and wage economic opportunities are highly developed and highly dependent on each other (Kruse et al., 1981; Kruse, 1982, 1991; Harcharek, 1995; Shepro and Maas, 1999). Those most active in subsistence activities tend to be those who are also very involved in the wage economy. Monetary resources are needed to most effectively harvest subsistence resources, both as an individual (e.g., to purchase a boat, snowmachine, all-terrain vehicle, fuel, guns and ammunition) or as the head of a collective crew (e.g., for whaling).

Rural Alaskans harvest over 40 million pounds of wild foodstuffs annually (Wolfe, 1996) — food produced through hunting, fishing, and gathering averages just over one pound of wild food per person per day. Nobmann (1997) compares harvest data to a type of “food balance sheet.” Harvest data describe the amount of wild food available to a certain group of people and are a rough estimate of what is eaten. Actual consumption varies from what is harvested or brought into the kitchen. However, few wild-food consumption studies have been undertaken in Alaska.

Subsistence foods consist of a wide range of fish and game products that are generally rich in nutrients, often low in fats, and contain less harmful fats than many non-Alaska-Native foods (Nobmann, 1997). Social, emotional, spiritual and cultural benefits are other important aspects of subsistence food harvesting and sharing that contribute to personal and community health.

According to 1990 estimates (Wolfe, 1996), the annual wild food harvest in rural Alaska was 375 pounds per person, compared to 22 pounds per person in urban Alaska. Assuming that on average, 0.2 pounds of wild food contains 0.44 grams of protein, and 2.94 pounds of wild foods contains 2,400 kilocalories, the amount of wild food harvested in 1990 represented 243 percent of the rural population's protein requirements and 35 percent of the population's calorie requirement. In contrast, the food reportedly harvested by urban residents represented 15 percent of their protein requirements and 2 percent of their calorie requirements. Clearly, wild foods represent a major source of healthy foodstuff in rural Alaska.

Socioeconomic and state and federal subsistence studies often use fixed income figures to describe how many Alaska Natives live below the poverty level in a given village. Regardless of how economists define the poverty level, villagers feel that they live well and are functioning members of an active cultural tradition if they are able to obtain most, if not all, of their food from the land and to share these foods with neighbors and kin.

3.3.3.3 Activities That Make up Subsistence

Subsistence encompasses a wide range of activities, the most visible and easily documented of which is the actual harvest of subsistence resources. This and later sections describe selected aspects of subsistence-resource harvest activities for potentially affected communities in each of the three study areas. Summary descriptive information for several regions and communities in those regions is available (Schroeder et al., 1987).



North Slope Communities

North Slope subsistence-resource harvest activities have been relatively well-documented, and the following discussions incorporate by reference the most pertinent agency information syntheses for recent federal and state oil and gas lease sales and early planning efforts (USACE, 1997; ADNR, 1997, 1998, 1999; USACE, 1999; BLM, 1978, 1979, 1983a, b; MMS, 1979, 1982, 1984, 1990; BLM and MMS, 1998). These sources for the most part contain a regional overview as well as a discussion of relevant communities, with a presentation of more detailed information as required. Each is also supported by an extensive record of public hearing testimony as well as written comment, which is also incorporated by reference.

Each North Slope community exhibits a unique pattern of subsistence resource use. This section addresses the types of resources used and the seasonality of harvest for each village. This information is displayed in Figure 3.3-22, which is based on NSB Contract Staff (1979). Figure 3.3-22 is a qualitative presentation, with the height of the curves indicating level of effort. The figure must be interpreted with caution, because of the following:

- For each village, it presents only the suite of resources normally harvested and the period(s) during which those resources would be expected to be available. The level of expected harvesting effort is estimated for each resource for the period of its availability. No assessment of actual harvest or the importance of each resource is implied by this representation.
- Actual subsistence effort and harvest vary from year to year. The mix of resources harvested and the timing will vary due to annual resource variability in abundance and distribution, weather, time constraints, resource-harvester characteristics, and other factors. The subsistence cycle for any specific year could differ materially from that shown in Figure 3.3-22.
- The pattern represented is aggregated, so that some individuals may actively participate in only a subset of the activities included in overall annual cycle.

Thus, only a long time-series (based on informant experience, other local or traditional knowledge, and/or systematic recorded observations) can truly represent a community subsistence pattern. Specific short-term information might misrepresent the long-term pattern but is important to indicate the range of behavioral adaptability of subsistence-resource harvesters.

The relative importance of different subsistence resources and the variation that can be expected from year to year are addressed in the next section. Key general points

introduced by Figure 3.3-22 are:

- Each village relies on a unique combination of subsistence resources, but caribou are part of each village's subsistence-use pattern, and are the most important terrestrial subsistence resource in terms of edible weight.
- Fish are also harvested by residents of all villages and is a primary resource for all except Anaktuvuk Pass (an inland community with limited direct access to fish resources). Anaktuvuk Pass residents still consume a significant amount of fish obtained through trade or other sharing.
- Communities which harvest whales depend heavily on that resource but do have some ability to partially compensate for years of low or no harvest of whale (more reliance on other resources), sharing from other communities.
- Nuiqsut, Kaktovik, and Barrow harvest and consume significant amounts of caribou, fish, and whales (and other marine mammals). Anaktuvuk Pass exhibits a narrower subsistence pattern dependent primarily on caribou. Marine resources are obtained through trade, sharing, or participation in the harvest activities of other communities.

Central TAPS

Annual harvest patterns specific to the Central TAPS study-area communities are described elsewhere in this report. Given that there is a gradual but distinctive ecological gradient from south to north across the study area, the patterns of the Copper River Basin communities contrast with those of the villages scattered along the central and northern segments of the TAPS study area.

The Copper River Basin communities procure and use a wide variety of subsistence resources, although salmon is clearly a dominant component of the subsistence system. The major factor affecting patterns of Native use is historic right to the use of specific fishing sites (Simeone and Fall, 1996, p. 62; Sheppard, 1999, p. 4). The presence of roads, proximity to population concentrations, and pre-existing and long-established use are at least partially responsible for the clustering of fish-wheel sites. Land ownership along the Copper River is dominated by Ahtna, Inc., and the National Park Service, and therefore there are relatively few areas where non-Natives can establish fish-wheel sites. Regardless of who owns or controls the land, local Natives feel that they have historical rights to procure the salmon, in all of their seasonal manifestations, and use the river as they have for generations.

Apart from the importance of salmon, Copper River

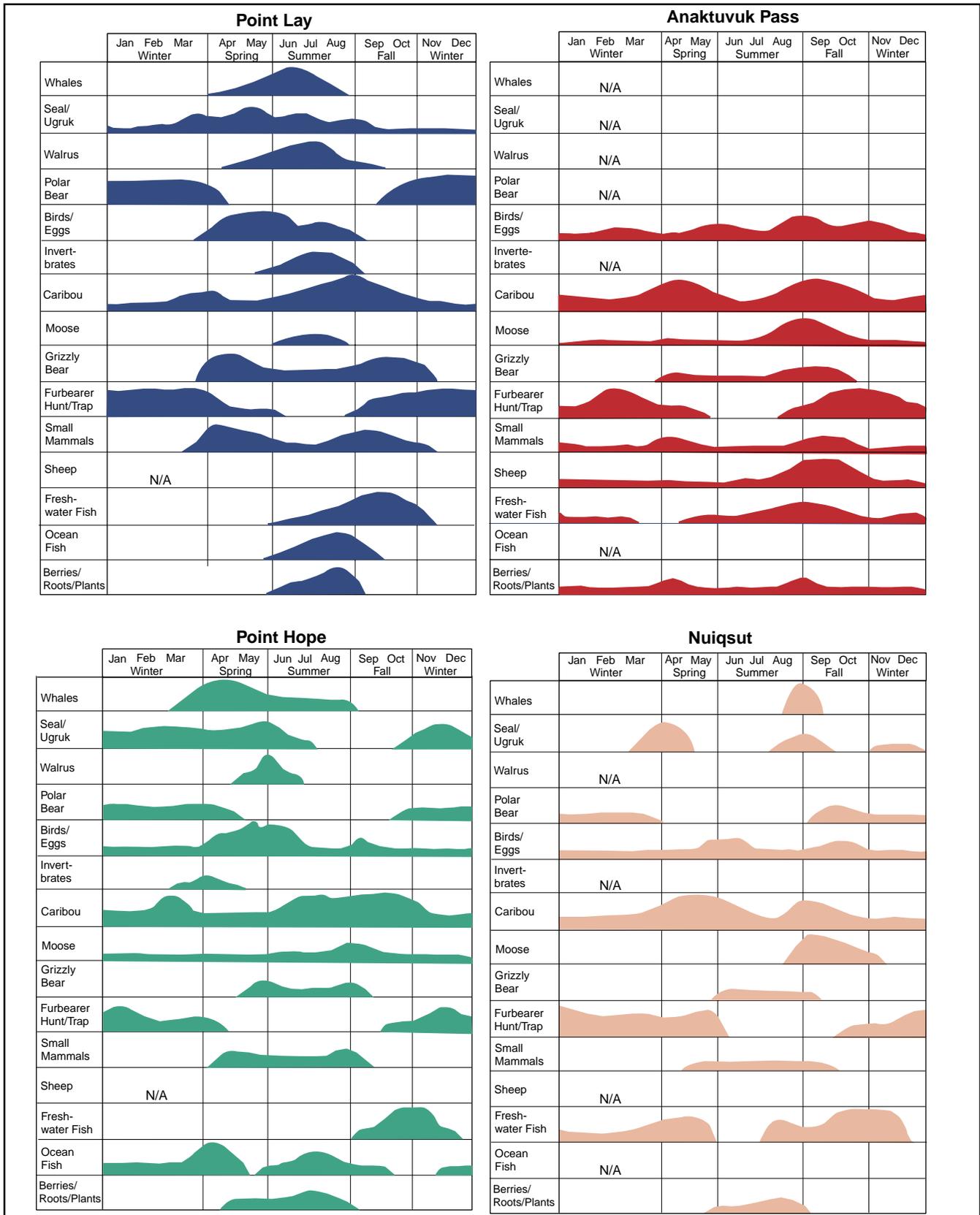


Figure 3.3-22. Qualitative presentation of annual subsistence cycle for North Slope communities. Patterns indicate desired periods for pursuit of each species based on the relationship of abundance, hunter access, seasonal needs, and desirability. Heights of graphs indicate level of effort (after NSB Contract Staff, 1979).



households harvest berries, caribou and moose. However, big-game hunting is seemingly restricted to less than half of the households in most of the communities; the implication is that even in those communities with large and diverse harvests, major resources are acquired by a minority of community members (Sheppard, 1999, p. 4). The use of minor resources such as freshwater fish or other large game tends to be idiosyncratic and depends primarily on local availability. Hunting of upland game birds may not be as significant to Alaska Natives as it is to non-Natives, but the use of porcupine and hare is favored by Native Copper River Basin Native inhabitants. Only those resources that are acquired in quantity or in “large packages” are primary sources of resource distribution. Shared resources include salmon, caribou and moose. Moose, in particular, are very important in traditional ceremonial activities.

Wiseman is a predominately white community, but the residents there are still actively involved in the practice of a subsistence lifestyle. For Stevens Village and Rampart, summer and fall salmon harvests are extremely significant subsistence activities (Betts, 1997; Borba and Hammer, 1996). Moose continue to be important, with the best harvest areas being along the Yukon River and associated sloughs and tributaries, and around inland lakes and meadows. The harvest of waterfowl and the procurement of small game are also important parts of the seasonal subsistence round. Berries and other wild plant foods are also collected, although their importance tends to vary along individual lines. Wiseman is best characterized as a mixed subsistence/cash economy lifestyle, although it may be that all Interior villages should be characterized in the same manner. Wiseman community members hunt, fish, gather berries and greens for food, and run traplines for cash — the extent of their involvement with trapping depending on the price of fur. Wiseman residents procure moose, black and grizzly bear, Dall sheep, and a variety of small game and furbearers such as wolf, lynx, marten, fox, beaver, mink, weasel, snowshoe hare, grouse, ptarmigan and marmot. When caribou occasionally venture into the Wiseman area, they are pursued (Scott, 1993, p. 23).

Valdez/Prince William Sound

Throughout the twentieth century, people harvested wild resources for trade and sustenance, adapting their harvests to the changing environmental and cultural conditions. Although the cultural matrix of subsistence has changed, the current residents of the PWS region, particularly the villages of Chenega Bay and Tatitlek, continue to rely heavily on subsistence fishing and hunting for their food. As in many areas of Alaska (Wolfe and Bosworth, 1994), PWS

residents participate in a mixed subsistence/cash economy. Subsistence foods provide PWS residents, particularly villagers, with some economic stability and a strong measure of cultural identity.

As in other regions, each community in PWS has a unique resource-harvest cycle that fluctuates with changes in resource availability, weather conditions, seasonal employment opportunities, and in smaller communities, the productivity of certain key harvesters. The annual harvest cycles are described in detail for Chenega Bay (Stratton and Chisum, 1986), Tatitlek (Stratton, 1990), Cordova (Stratton, 1992), and Valdez (Tomrdle and Miraglia, 1993).

Salmon and other fish including halibut and herring remain a vital and generally available subsistence resource, and are taken in large quantities during the spring, summer, and fall by residents of all communities. The spring herring spawn (with roe on kelp and other delicacies) is particularly valued among villagers from Tatitlek and Chenega Bay. Marine mammal harvests have varied as their populations have fluctuated, but sea lions and when available, harbor seals are taken opportunistically by Alaska Native villagers throughout the year. Deer and moose hunting by residents of all PWS area communities occurs in the fall and extends into winter. Waterfowl hunting primarily occurs in the fall, and black bear hunts in spring and fall. Intensive shellfish harvests occur during spring, and berry gathering is a fall activity. During summer, a spirit camp at Nuchek on Hinchinbrook Island has been instrumental as a forum for area youth to learn harvesting, processing, and traditional values from village elders.

3.3.3.4 Subsistence Harvest Patterns

This section provides data on subsistence harvest patterns for communities in the North Slope, Central TAPS, and Valdez/PWS study areas. Following is an overview:

- Subsistence has central importance to the communities in the study areas. A subsistence discussion is found in all ERs and EISs addressing oil and gas developments in Alaska. Selection of the proposed action or no-action alternative could, in principle, affect subsistence (see Section 4).
- Historical impacts of operation of TAPS and ANS fields on subsistence are difficult to assess, because comparable, accurate, and relevant pre-TAPS harvest data are not available for all communities.
- Quantitative harvest data are useful, but measure only one aspect of subsistence.
- Except where otherwise noted, harvest data are presented below in terms of aggregated categories in-



cluding marine mammals such as bowhead whales, walrus, seals, and sea lions; terrestrial mammals such as caribou, moose, and bear; fish (most importantly salmon, but an “other fish” category is also provided); and “other” (a broad category including birds, eggs, and vegetation). These categories facilitate interpretation of the graphs. (References contain more detailed subsistence-harvest data.)

- Because there is substantial variability in annual harvest data, data are presented for several years when available. Data from only one year provide a less precise estimate of typical harvests.
- Data are presented for the latest year(s) available, but data from more recent years may be more representative of actual harvest patterns.
- Year-to-year variation in the per-capita harvest is magnified by the fact that some species have a disproportionate effect on harvest totals. For example, bowhead whales weigh 2,000 pounds at birth and range to a maximum size of about 60 feet with a weight of 120,000 pounds (ADF&G, 1994a). A small difference in the number of bowhead whales harvested by a community translates to a large variation in per-capita harvest.
- Reported harvest data are in various units of measurement, including total pounds (dressed pounds),⁵ pounds per household, and pounds per capita. Where possible, harvest data are expressed in common units of pounds (dressed) per capita (lb/capita).
- Harvest data differ from consumption data (available for some areas) on a community-by-community basis. Some communities use part of the harvest for sharing with others. However, harvest data provide a more relevant measure of economic importance and are presented in this section.
- There are statistically significant community-to-community differences in per-capita harvest. Wolfe and Walker (1987) performed a careful statistical analysis of harvest data. They found that the amount harvested varies substantially among communities. (There are also significant differences between rural and urban communities [ADF&G, 1994]). These differences are

reflected in the data presented below.

- Significant community-to-community differences exist in the composition and size of the harvest. Bowhead whale harvesting, for example, is confined to some of the North Slope communities. Fishing is important in many areas, but typically accounts for a majority of the harvest in the Central TAPS and Valdez/PWS study areas.
- The monetary value of subsistence harvests is substantial when compared with cash incomes of families in many rural areas (ADF&G, 1994). The “replacement value” of subsistence harvests in comparison to cash income varies with the region of Alaska.⁶
- Harvest success is a complex function of effort, technology, population dynamics, migratory routes, weather conditions, ice and sea conditions (for marine mammals), availability of food, population of predators, competition from nonlocal hunters, regulatory-agency management policies, and industrial activity. These variables are intercorrelated and their effects are difficult to distinguish.

North Slope Communities

This section uses quantitative subsistence-harvest information from a number of additional sources (ADF&G, 1999f; Harcharek, 1995; Shepro and Maas, 1999; Hall et al., 1985; Brower and Opie, 1996, 1997; S. R. Braund & Associates, 1988, 1989, 1993; and IAI, 1990a, b). This represents most if not all of the quantitative data available. Other information for selected resources and communities may exist but is not readily available. Bowhead whale harvests are the exception, as nearly complete information for this resource is available.

Anaktuvuk Pass. Only one year of subsistence harvest data is available from Anaktuvuk Pass (Brower and Opie,

⁵Harvest figures are converted from *round* to *dressed* weight. As noted in Wolfe and Walker (1987): “Although it varies by community and species, in general “dressed weight” is about 70 to 75 percent of round weight for fish, 60 to 65 percent of round weight for game, and 20 to 60 percent of round weight for marine mammals [whales, seals, walrus]. Dressed weight is the portion of the kill brought into the kitchen for use, including bones for particular species. It represents an estimate of the pounds of usable wild resources harvested by the sampled households during the study year.”

⁶Determination of the appropriate “price” of various subsistence harvests in “replacement value” studies is not straightforward, because subsistence harvesting has a social as well as economic component, many species have no established market price (some are not permitted to be sold by law), and other challenges exist to a comprehensive methodology. To illustrate, National Oceanographic and Atmospheric Administration (NOAA) rules (50 CFR 230.4) contain a number of prohibitions relating to aboriginal subsistence whaling. For example, only licensed whaling captains or crew under the control of those captains may engage in subsistence whaling. They must follow the provisions of the relevant cooperative agreement between NOAA and a Native American whaling organization (e.g., Alaska Eskimo Whaling Commission), the aboriginal hunters must have adequate crew, supplies, equipment, and they may not receive money for participating in the hunt. No person may sell or offer for sale whale products from whales taken in the hunt, except for authentic articles of Native handicrafts. Because these rules specifically prohibit sale of whale meat, a “market price” is difficult to establish. (For details, see www.polarpub.com.)



1996). For the 1994-95 season, caribou constituted 83 percent of the community’s total subsistence harvest. This is consistent with Binford’s estimate that 85 to 88 percent of the Anaktuvuk Pass “subsistence diet” consisted of caribou (Binford, 1978). Moose and sheep accounted for 13 percent and fish about 4 percent of the harvest. The number of caribou taken was estimated at 311 animals, yielding 444 pounds of edible meat per household (148 lb/capita). This was reported to be a “low caribou” year, which is supported by the number of caribou estimated to be taken in prior years: 592 in 1990, 545 in 1991, 600 in 1992, and 574 in 1993 (ADF&G, 1999f). Pounds of edible meat per household varied from 846 to 985 (282 to 328 lb/capita) for these years.

Caribou is the most important subsistence resource harvested by Anaktuvuk Pass residents. However, they consume a much wider range of resources obtained through sharing or other exchanges with residents of other communities (Harcharek, 1995; Shepro and Maas, 1999). When caribou are less available, secondary resources such as moose, sheep, and fish become more important, but cannot fully compensate for the “missing” caribou (NSB Contract Staff, 1979).

Anaktuvuk Pass residents have expressed concern that ANS oil and gas development and associated activities (particularly at Alpine and NPR-A) may adversely affect the number of caribou that pass through this area. This number is a complex function of population size, possible shifts in habitat use, the number and location of natural predators (wolves in this case), hunting pressure and human presence (possible avoidance behavior), as well as industrial development. Caribou harvested by Anaktuvuk Pass villagers come principally from the Teshekpuk Lake Herd and the Western Arctic Herd — as opposed to the Central Arctic Herd. Available data indicate that the size of both of these herds have increased in recent years and are currently stable (see Section 3.2).

Barrow. Three years of quantitative data are available for Barrow: 1987 to 1989 (Figure 3.3-23). Marine mammals and caribou are both extremely important for Barrow residents, and especially for Barrow Iñupiat residents (Harcharek, 1995; Shepro and Maas, 1999). Because of its size and the relatively wide distribution of the resources upon which its population depends, Barrow’s community subsistence harvest varies less from year to year than for the smaller NSB villages. (Whaling is discussed in a separate section below.)

Kaktovik. A complete subsistence-harvest survey was conducted in Kaktovik in 1985, 1986, and 1992 (Figure 3.3-24). In addition, a survey of caribou harvest was com-

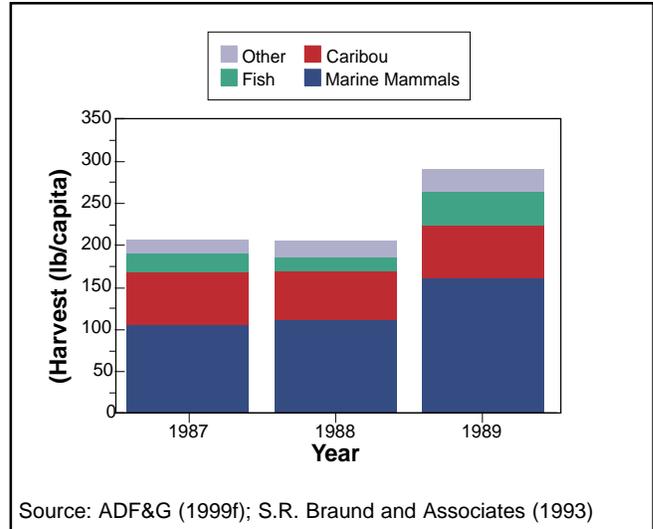


Figure 3.3-23. Selected summary quantitative subsistence-harvest data, Barrow.

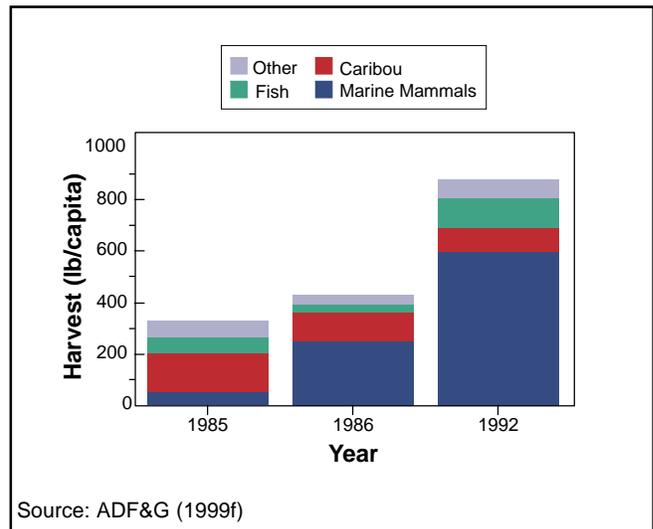


Figure 3.3-24. Selected summary quantitative subsistence-harvest data, Kaktovik.



©Chris Arend Photography

Photo 3.3-21. Butchering a whale at Barrow.



pleted in 1987, 1990, and 1991. The total caribou harvest was reasonably consistent, averaging approximately 21,000 lb/yr, with the exceptions of a somewhat low figure in 1990 and a peak in 1985, which was a year in which no bowhead whale was landed in Kaktovik. (Some Kaktovik residents were members of successful crews which whaled in other villages.) Thus, increased caribou hunting could have been a response to the lack of a bowhead harvest. It should also be noted that while three bowheads were taken in both 1986 and 1992, those taken in 1992 were much larger. The per-capita harvest of marine mammals in 1992 was twice as high as that in 1986. In 1986, significantly more caribou were harvested in terms of edible pounds per capita than in 1992. Fish are also a significant subsistence resource.

Nuiqsut. A complete subsistence-harvest survey was conducted in Nuiqsut in 1985, 1993, and 1994-95 (Figure 3.3-25). Of note is that Nuiqsut harvested a bowhead in only one of these years. However, their success rate has been such that 1993 was actually the more typical year. Conceptually, the Nuiqsut subsistence harvest can be divided into thirds — a third each for fish, caribou (and moose), and marine mammals. Years when whales are not harvested require more use of fish and caribou, as reflected especially in 1985. The overall harvest in 1994 and 1995 was significantly less than in the other two years.

Bowhead Whales. The harvest of bowhead whales is one of the most important subsistence activities for several communities on the North Slope and merits more discussion. The EIS for NPR-A (BLM and MMS, 1998) notes that the “bowhead whale is the preferred meat and the subsistence resource of primary importance [to several communities on the North Slope], because it provides a unique and powerful cultural basis for sharing and community cooperation... In fact, the bowhead could be said to be the foundation of the sociocultural system.”

The communities of Little Diomed, Savoonga, Gambell, Wales, Kivalina, Point Hope, Wainwright, Barrow, Nuiqsut, and Kaktovik participate in whaling activity to various degrees. Barrow is the most important in terms of total harvest. Figure 3.3-26 shows a time series of the number of whales harvested for Barrow, Kaktovik, and Nuiqsut from 1964 to 1997. The harvest has been quite variable. Factors contributing to this variability include quotas, level of effort, weather, ice conditions, and whale migration routes.

The Iñupiat people used traditional methods of whaling until the mid-1800s. Beginning in 1848 (USACE, 1999), commercial whalers began to use new weapons and techniques that made hunting more effective — ultimately decimating whaling stocks. Subsistence whaling returned to

low levels at the end of the commercial whaling era in the 1920s. More recently, the harvest increased to the point that there was concern over possible over-harvesting (USACE, 1999). Based on erroneous estimates of the bowhead whale population, the International Whaling Commission (IWC) voted to ban aboriginal hunting rights to the bowhead whale in 1977. Alaska Natives formed the Alaska Eskimo Whaling Commission (AEWC) to organize the whaling communities, fight this ban, and argue for revised quotas. New studies revised upwards the estimated bowhead whale

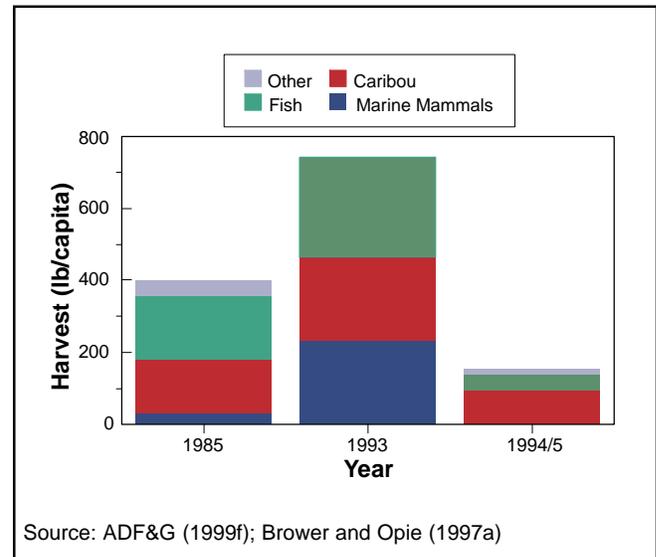


Figure 3.3-25. Selected summary quantitative subsistence-harvest data, Nuiqsut.

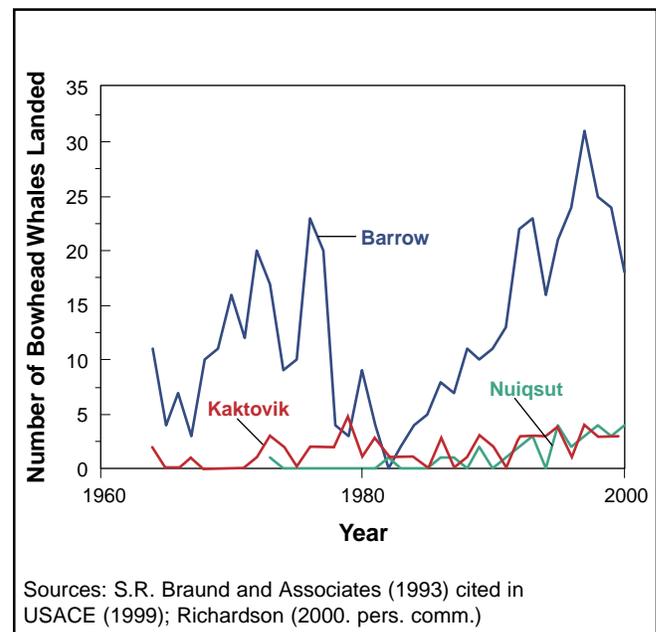


Figure 3.3-26. Documented annual bowhead-whale harvest for Barrow, Kaktovik, and Nuiqsut, 1964-1997.



population to 8,200 in 1993.

The subsistence harvest of bowhead whales in Alaska is now managed by a cooperative agreement between the AEWG and the National Marine Fisheries Service, with oversight by the IWC. The cooperative agreement was enacted to meet IWC requirements, and provides local management. Harvest quotas are determined from estimates of the size and growth rate of the bowhead whale population and from the number of whales landed per capita and the population size of each Alaska Eskimo community. Enforcement of the bowhead harvest quota is based on the honor system where each community is given a number of strikes. A percentage of the unused strikes can be carried over to the next year, and within a year unused strikes can be transferred between communities.

The AEWG is now charged with allocation and enforcement of quotas.⁷ Quotas apply to the number of whales struck (e.g., by harpoons) and/or landed and have increased from 20 struck/14 landed in 1978 (USACE, 1999) to 75 strikes in 1999 (including some carryovers from previous years). The AEWG allocates this quota among the ten whaling communities. Thus, the observed harvest data shown in Figure 3.3-26 reflects changing quotas as well as hunt success.

Weather, ice and sea conditions, and availability of food affect the bowhead whale migration (USACE, 1999). Changing weather affects where whales are encountered and harvested in any year. When whalers must travel farther to find whales, costs are higher, as are the chances of being caught in bad weather and of meat spoiling.

Alaska Natives are concerned that oil and gas development activity on the ANS will adversely impact the harvest because, among other reasons, whales sometimes avoid loud noises. Seismic exploration activity is of particular concern. This impact is not associated with operation of TAPS, but rather with exploration and production activities on the ANS and is discussed further in the section on cumulative impacts.

Central TAPS Study Area

Subsistence harvest patterns for the communities in the Central TAPS study area are not as well-researched and described as subsistence activities in PWS and on the North Slope. Subsistence harvest information for the Copper

⁷The IWC quota for 1998 through 2002 is a total of 280 bowheads landed (average 56 per year). The number of bowheads struck in each of these years cannot exceed 67, with some exceptions for carryovers from previous years. Current village annual quotas set by the AEWG include 3 for Kaktovik, 4 for Nuiqsut, and 22 for Barrow (Richardson, 2000, pers. comm.).

River Basin communities is more complete than elsewhere in this study area. Even there, the quantitative data are limited to one or two years of observation and are often reliable only for selected game species and fish stocks. Most ADF&G subsistence studies are community-based, although parts of Interior Alaska are summarized only at the regional level. Only those communities and areas that meet the “rural” and the “customary and traditional” criteria for subsistence-resource users as defined in ANILCA are described below. Only the Copper River Basin communities of Chistochina, Gakona, Gulkana, Kenny Lake, Chitina and Tonsina, and the central and northern communities of Stevens Village and Wiseman satisfy these criteria.

Figure 3.3-27 provides harvest data for Central TAPS communities for 1987 (Gerlach et al., 2000; Sheppard and Gerlach, 2000) ranked in descending order of the total harvest per capita. These communities differed significantly in total harvest in that year. Although there is substantial year-to-year variability, it is likely that these communities differ significantly in average subsistence harvest.

The overall importance of the various species harvested, in terms of the percentage contribution to the total, was quite similar. Salmon, for example, was the largest con-

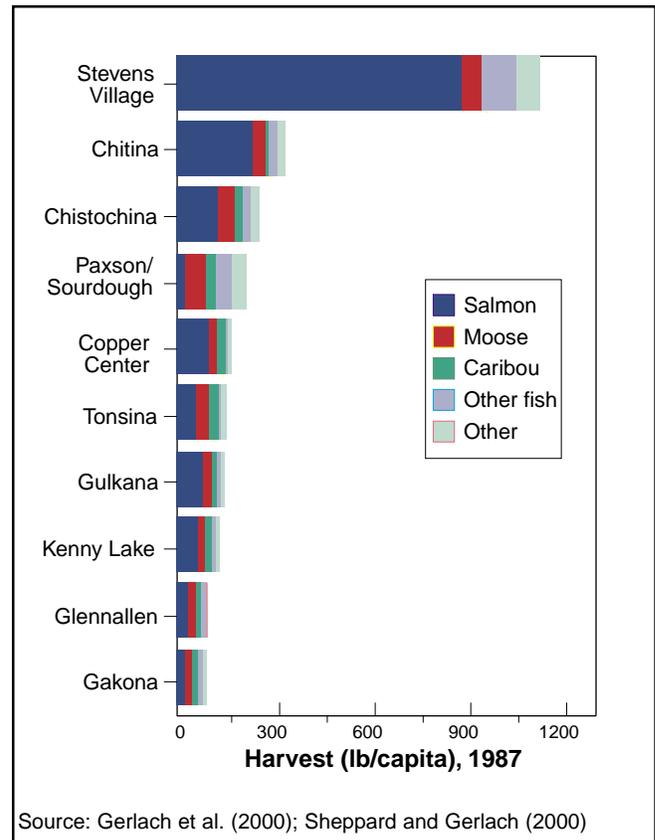


Figure 3.3-27. Harvest data for rural communities in the Central TAPS study area, 1987.



tributor to the total in nearly all communities, typically accounting for about half of the total. Other fish were also important. Terrestrial mammals, including moose and caribou, accounted for a substantial fraction of subsistence harvests. Note the difference between the subsistence mix of these communities compared to those on the North Slope — among other things, these Central TAPS communities do not engage in whaling. Marine mammals are not harvested.

Copper River Basin Communities. Between 1982 and 1987, the total harvest for six Copper Basin communities increased from approximately 240,000 to 360,000 pounds. The total harvest went down for Gakona and Gulkana, with most of the decline accounted for by smaller harvests of moose and salmon. However, the harvest in other Copper River communities increased significantly during this period. Instead, these communities are best characterized in terms of tiers of resource use. At the lowest tier, only berries are commonly harvested. At the next level, households harvest salmon and berries. The most intensive usage is characterized by the harvest of salmon, caribou, moose, and berries. It should be noted that the hunting of big game is generally restricted to less than 50 percent of the households in all of the Copper Basin communities. Even in communities with large and diverse harvests, a minority of community members harvest the major subsistence resources.

Shared resources include salmon, caribou, and moose. A factor affecting the latter, in particular, is the central role of moose in potlatching and ceremonies which involve significant sharing of food among Alaska Native residents.

Alaska Native natural-resource use is based on historic rights to the use of specific fishing sites (Simeone and Fall, 1996). The presence of roads, proximity to population concentrations, and long-established use are responsible, in part, for the clustering of fish-wheel sites. Since ownership along the Copper River is dominated by Ahtna, Inc., and the National Park Service, there are relatively few areas where non-Alaska Natives establish fish-wheel sites (Simeone and Fall, 1996). Regulations restrict dipnetting to the Chitina area. For the last 20 years, trapping has not been a significant subsistence or economic activity.

Stevens Village. Harvest information for Stevens Village was collected by the Division of Subsistence, ADF&G, and by Doyon, Inc. (Sumida, 1988; Patterson, 1974). The ADF&G data were gathered in 1984-85 from 30 households representing 100 percent of the village. Salmon were harvested primarily by means of fish wheels and gill nets, with much of the harvest used to feed dogs. Other types of fish were harvested by setting traps or nets throughout the year (Sumida, 1988). Moose were usually harvested during

the fall along rivers and sloughs, or from Yukon River islands accessible by boat. Bears were harvested incidentally to the pursuit of other subsistence activities. Waterfowl were harvested from lakes, ponds and sloughs in the spring, especially before breakup on the Yukon River. Both small and large game were hunted during the winter along with trapping. Berry picking occurred in the summer and fall in areas adjacent to the village and downstream in the Yukon River Canyon. Wood harvesting took place year-round, with particularly favored locations upstream along the Yukon River. Moose hunting was an especially important subsistence activity in the fall.

Salmon accounted for the majority of the 1984 harvest. King salmon were particularly important in the community network of distribution and exchange (Sumida, 1988). The combination of whitefish and other fish species comprised about 10 percent of the total edible harvest. Although moose were an important subsistence resource and were highly sought after, the success rate for moose was lower than for most species. In 1984, the moose harvest contributed only 5 percent to the total harvest. Black bear and birds were also highly valued by community residents.

Rampart. Subsistence fishing is a significant activity in Rampart. Harvest levels for chinook and summer and fall chum salmon for 1995 are reported in Betts (1997). A reported 1,235 chinook, 1,104 summer chum, and 2,803 fall chum were harvested by 27 Rampart households in 1995. Using harvest tickets maintained by the ADF&G from 1990 to 1995, Betts (1997) determined that only 12 moose were taken during this period. With a stated commitment of Rampart residents to the importance of moose in their diet and culture, such a low number may reflect low moose numbers, underreporting or no reporting of game taken by local residents, or some undetermined cause.

In 1966, salmon were harvested primarily by means of fish wheels and gill nets both up and down the Yukon



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Photo 3.3-22. Fish wheel on the Yukon River.



River, as well as on side streams and creeks (Betts, 1997). Much of the chum harvest was used for redistribution or barter, since there are currently few dogs in the community. Other fish species were harvested with gill nets or with rod and reel. During the winter, nets were sometimes set under the ice, and hook-and-line gear was used for jigging through the ice. Salmon were widely shared in the community and are important for covered-dish suppers and potlatch ceremonies (Betts, 1997). Moose were said to be an important subsistence resource, with harvest typically occurring on or near the Yukon or near inland lakes and meadows. Moose meat was and is widely shared and is sometimes reserved for potlaches (Betts, 1997). Bears were usually harvested incidentally to the pursuit of other subsistence resources (Betts, 1997). Waterfowl were primarily harvested on waterways from boats, or on foot near inland lakes and sloughs in the spring (Betts, 1997). Hunting of both large and small game was typically done with rifles in relatively close proximity to the village, or incidentally to other subsistence activities. Berry picking was, and continues to be, important in the summer and fall, especially along the banks of the Yukon. Wood harvesting was accomplished by floating cut logs downriver in the fall, or by hauling them behind snowmachines or trucks in the winter (Betts, 1997).

The most complete subsistence-harvest information for the community as a whole is available in Patterson (1974) on the basis of information collected in 1973 and extrapolated from an incomplete database created by Doyon, Inc. The Patterson report is limited in many ways, such as the fact that it does not include information about the number of households participating in the survey or the village population size at the time of the survey. Total pounds harvested are reported to be approximately 46,000 pounds, but reliable harvest quantities by species are not available.

Wiseman. Wiseman residents practice a subsistence lifestyle. The best available subsistence information is an ADF&G study by Carol Scott for the 1990-91 harvest year, and the harvest summaries maintained by the Division of Wildlife Conservation, ADF&G, for Game Management Unit 24 from 1988 to 1995 (Scott, 1993). Wiseman residents hunt, fish, gather berries and greens for food, and run traplines as a source of cash. Moose, black bear, grizzly bear, Dall sheep, wolf, lynx, marten, fox, beaver, mink, weasel, snowshoe hare, red squirrel, grouse, ptarmigan, and marmot are harvested regularly. Caribou occasionally venture into the Wiseman area and are harvested when they do. The moose harvest is extremely important to Wiseman residents because this species provides such a large quantity of meat per animal (Scott, 1993). The amount of meat neces-

sary to last through the winter varies with the number of children in a household. In years when hunting success is low for highly desired species such as moose, every effort is made to compensate by harvesting another species.

The practice of passing harvested resources around the community is an acknowledged and accepted part of the local lifestyle (Scott, 1993). Most residents consider the sharing of meat to be traditional, and a few also believe that sharing resources provides them with greater hunting success. How much is shared and who participates in the sharing vary from year to year. In part, the nature and extent of sharing depend on how much is harvested each year per household.

From 1990 to 1991, 87 percent of the Wiseman community was directly associated with trapping, so that at least one member of a household maintained a trapline. During this period, approximately 1,140 miles of established trapline were claimed and used, suggesting a large-scale pattern of land and resource use. Wiseman residents also actively garden and collect wild plants to produce a source of fresh vegetables and greens not otherwise available.

Valdez/Prince William Sound

This section incorporates quantitative subsistence harvest data for PWS from the ADF&G Subsistence Division reports (Fall, 1995; Fall et al., 1996; Fall and Utermohle, 1999; Stratton and Chisum, 1986; Stratton, 1989, 1990, 1992; Tomrdle and Miraglia, 1993), as well as data from the ADF&G Subsistence Division community profiles database (ADF&G, 1999f). The majority of the data were collected for studies undertaken by the ADF&G since EVOS to assess spill impacts and to collect data on subsistence-harvest restoration. Two studies (Fall, 1995; Fall et al., 1996) were conducted in association with the U.S. Minerals Management Service (MMS), and one (Fall and Utermohle, 1999) was undertaken jointly by ADF&G and the Chugach Regional Resources Commission. Maps of community-based harvest areas are published in most ADF&G studies and are also available at the ADF&G Subsistence Division. Before 1989, the available data (McNeary, 1978; Stratton and Chisum, 1986) did not rely on systematic household surveys.

Valdez. In 1993, the Joint Boards of Fish and Game ruled that Valdez was an urban area; i.e., subsistence was not a principal characteristic of the economy, culture, and way of life. A Valdez "Nonsubsistence Use Area" including the Valdez city limits was created in GMU 6D (ADF&G, 1999f). This meant that Valdez residents no longer qualified for priority use of fish and game on federal lands. Valdez residents now must apply for available Tier II permits to

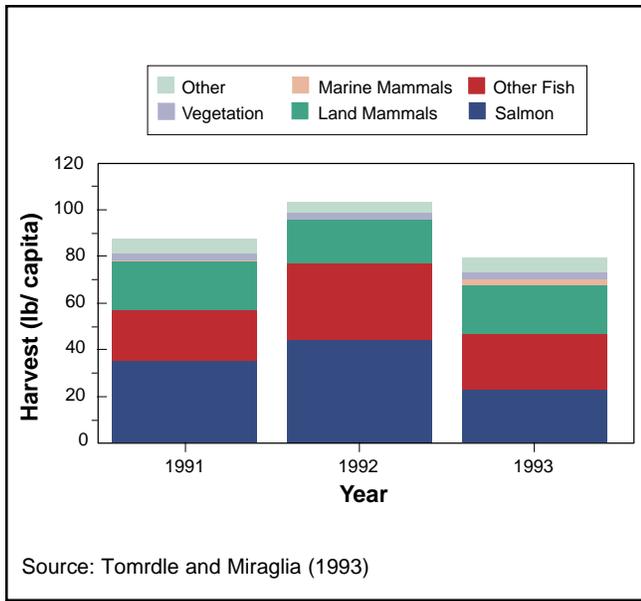


Figure 3.3-28. Per-capita harvests of wild resources by resource category, Valdez.

participate in the Nelchina caribou hunt. Under the 1999 state regulations, all residents qualified for subsistence use of fish and game on state lands.

The ADF&G Subsistence Division, under contract to the U.S. Forest Service, conducted the only systematic survey of Valdez harvest patterns in 1991 and 1993 (Figure 3.3-28). Measured in pounds of usable weight, the wild resource harvests in Valdez in 1991 and 1992 were similar to the other road-accessible and mostly non-Alaska-Native communities of Kenai and Homer (Tomrdle and Miraglia, 1993). Compared to the Alaska Native villages of Chenega Bay and Tatitlek, harvests at Valdez were much lower. Use of fish and wildlife is widespread in Valdez. For some households, it is very important economically and socially. Nevertheless, for most households, wild-resource harvesting is peripheral to cash employment and regarded mainly as an opportunity for recreation and enjoying the natural environment.

Tatitlek. As Stratton noted (Stratton and Chisum, 1986), household participation in subsistence during the 1980s was “virtually universal” in Tatitlek. The average household used roughly 20 different kinds of wild resources. Marine mammals (sea lions and harbor seals) and fish (including salmon, halibut, rockfish and herring spawn) made up a significant portion of the harvest. Salmon generally are harvested from commercial catches using gill nets or purse seines, from subsistence nets, and from rod and reel. The primary harvest areas are the waters near the village, including Tatitlek Narrows, Port Fidalgo, and Valdez Arm, as well as the Copper River flats (Stratton, 1990). Herring and

herring-roe availability and locations fluctuate annually. Other fish, including halibut, black cod and others, are taken commercially, and some are used for subsistence purposes. Marine invertebrates are also harvested locally and during commercial fishing. Marine mammals have traditionally been taken in PWS, but recent population fluctuations have been evident in the variability of the harvest. Deer, with some moose, goat, and black bear, are the primary terrestrial mammals harvested in the region. The northern part of PWS and Montague Island were the primary deer-hunting locations.

Subsistence is an essential aspect of life in Tatitlek, with most residents involved in harvesting, using, and sharing wild resources. Figure 3.3-29 shows trends in per-capita harvests of wild resources (Fall and Utermohle, 1999). Since the decline right after EVOS, resource harvests have rebounded; however, local concerns remain about continued restoration of some resources and cultural values.

Cordova. The first published study of Cordova-area subsistence (McNeary, 1978) summarized harvest activities by drawing a distinction between local hunters and nonresident hunters. This study found few families practicing a total subsistence lifestyle; however, it noted that the majority of residents hunt and fish to supplement their income. The study found that 10 to 20 percent of the population lived a combined subsistence and cash economy.

Equal consideration of subsistence use of coastal resources was noted as one of the objectives in the Cordova Coastal Management Plan (Alaska Coastal Management Program, 1986), indicating the value people place on this aspect of resource use.

In 1999, according to ADF&G household subsistence surveys in Cordova, harvests of wild foods are at “substantial levels” and the range of wild foods is also notable (Stratton, 1992). Marine resources predominate the harvest, with salmon and other fish the largest categories by weight. Terrestrial mammals and shellfish are also substantial, reflecting Cordova’s location adjacent to both marine and terrestrial ecosystems. The range of resources used has stayed relatively constant since the late 1980s (Fall and Utermohle, 1999), as shown in Figure 3.3-30.

Chenega Bay. Subsistence harvests in Chenega Bay have been diverse, including roughly 18 to 23 different wild resources per household. The data ADF&G has systematically collected for management purposes and for spill impact studies indicate a trend away from marine mammals toward salmon and other fish. Not including 1989-90 and 1990-91, which were disrupted by EVOS and cleanup, per-capita harvests since resettlement have ranged well above the 222 pounds per person of meat, fish, and poultry that



the average American family purchases annually, reaching a high of 577 in the 1997-98 study year.

The modern infrastructure of electricity, telephone, and improved mail service at the new Chenega Bay village has had major effects on hunting and fishing. Electric freezers have enabled villagers to store and preserve wild resources

and store-bought groceries. Although the costs for fresh and frozen meat and groceries via mail order are high, telephone and mail-plane service to the new village makes that an option which was not available in the old village (Stratton and Chisum, 1986). The new airstrip has enhanced this process, and the dock (with water, showers, and

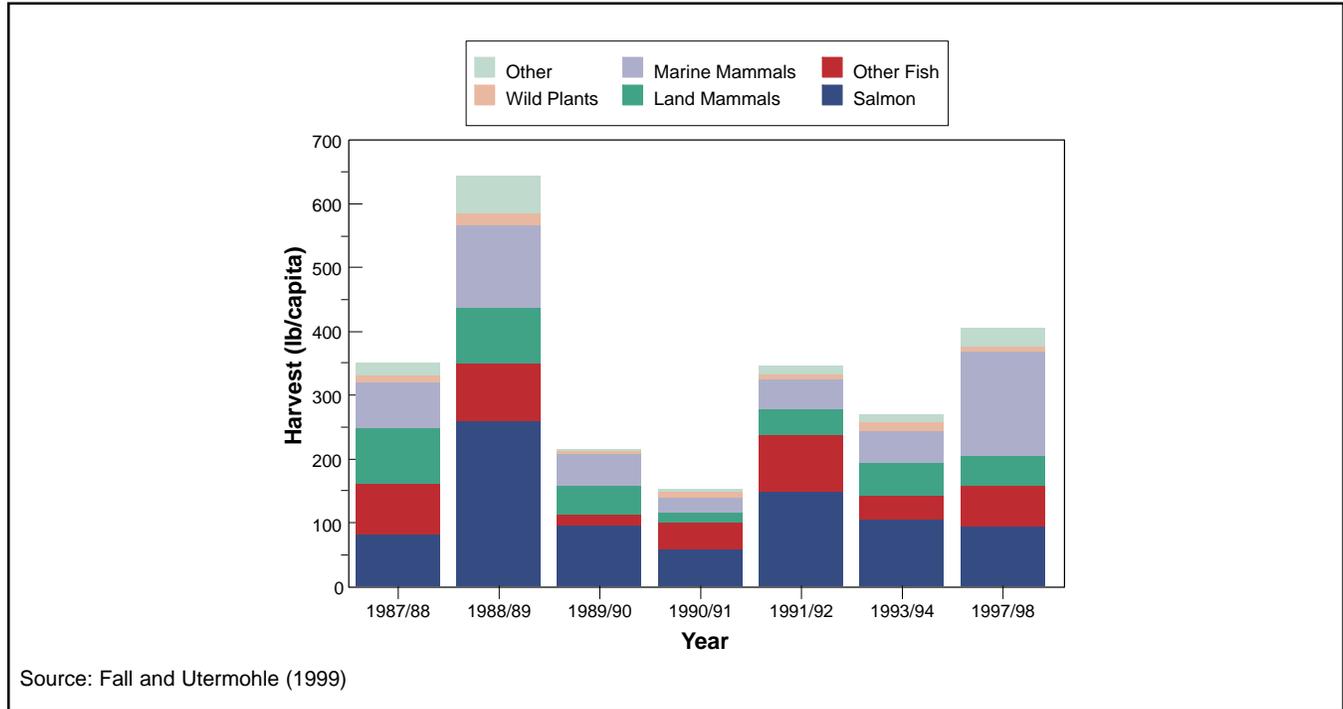


Figure 3.3-29. Per-capita harvests of wild resources by resource category, Tatitlek.

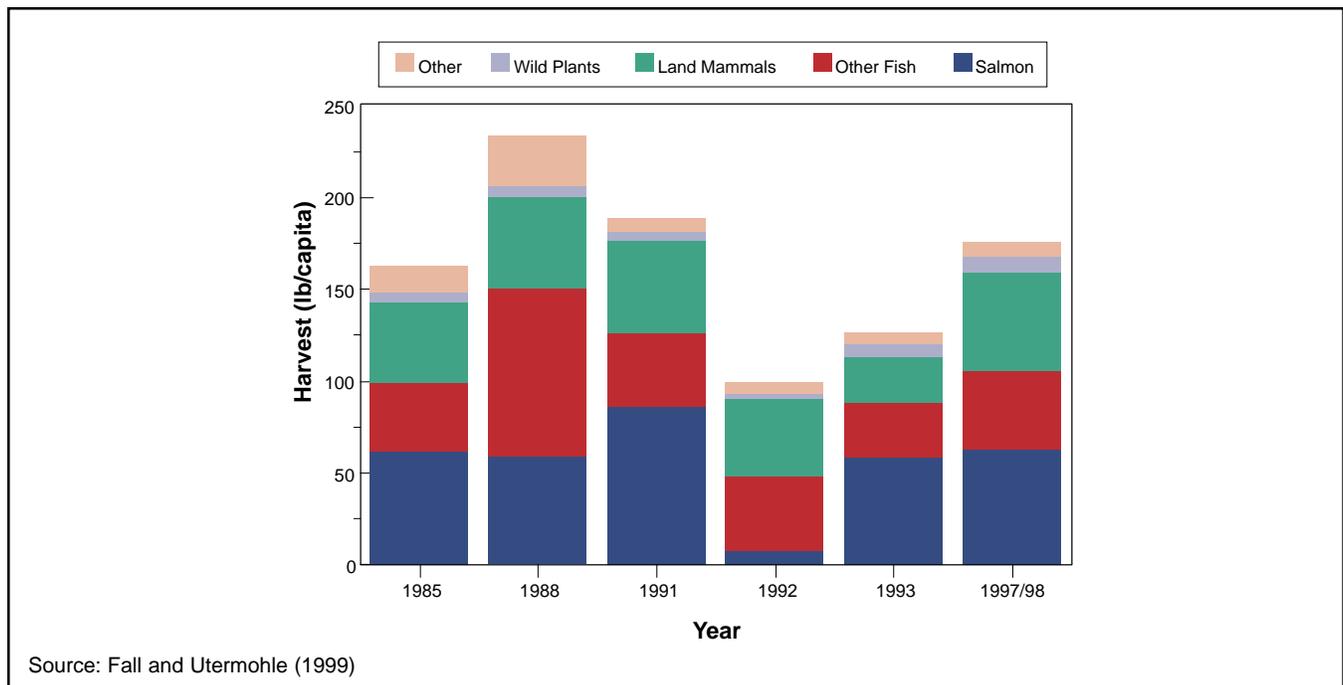


Figure 3.3-30. Per-capita harvests of wild resources by category, Cordova.



a store) at the new village facilitates fish, shrimp, and crab sales and exchanges with commercial fishermen.

According to Fall and Utermohle (1999), most Chenega Bay households report that natural-resource populations have not recovered from EVOS. Particular concerns remain for populations of marine mammals and herring. Other concerns and issues affecting resource availability that have been raised in Chenega Bay include ocean pollution, cli-

mate change, over-fishing, and competition with other user groups. A majority of Chenega Bay households said their use of subsistence resources in 1997-98 was higher than before the spill.

Figure 3.3-31 shows trends in per-capita harvest in Chenega Bay (ADF&G, 1999f), and Figure 3.3-32 summarizes responses to a questionnaire (Tomrdle and Miraglia, 1993) regarding consumption of wild resources in four

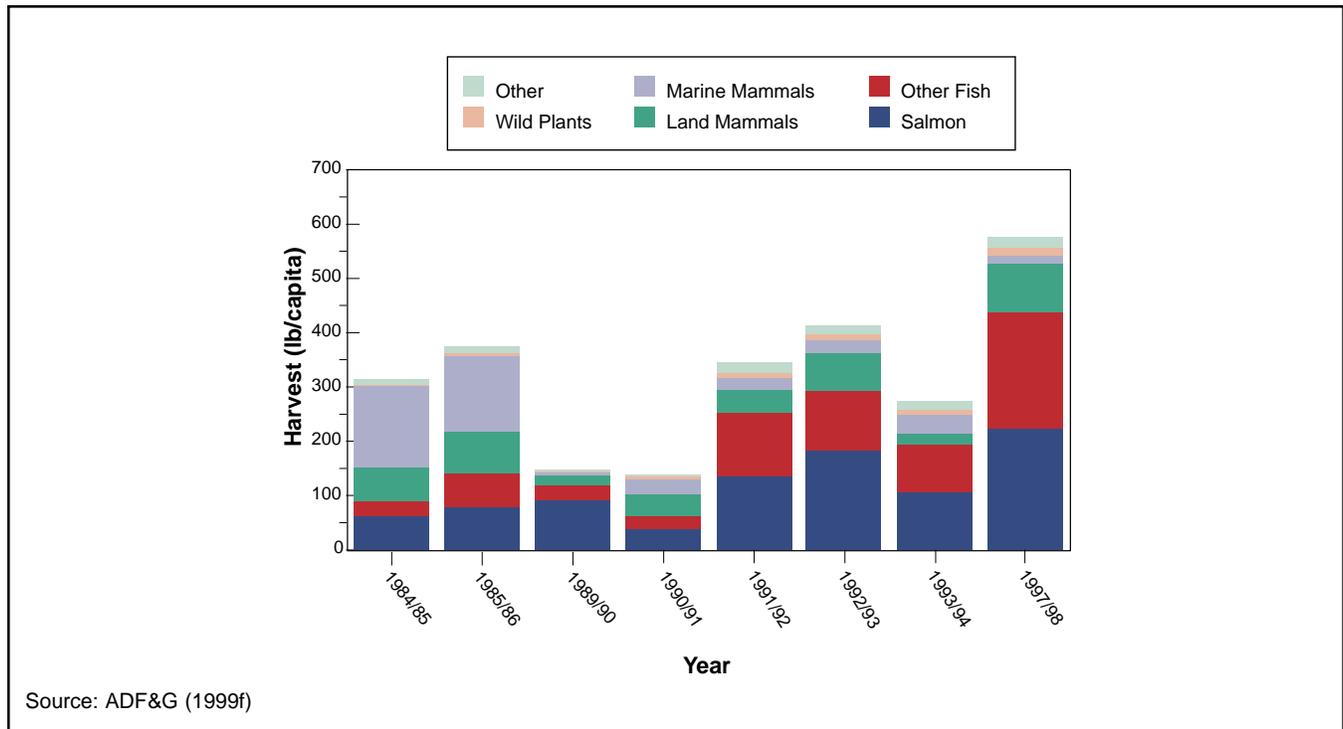


Figure 3.3-31. Per-capita harvests of wild resources by category, Chenega Bay.

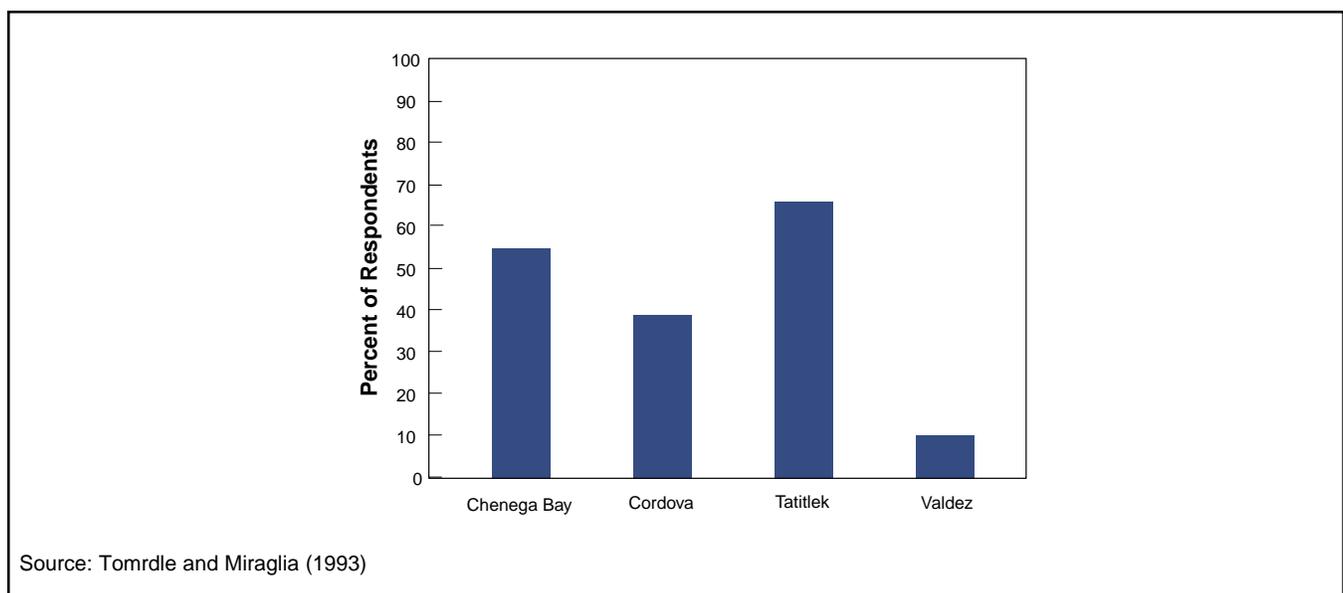


Figure 3.3-32. Percent of respondents reporting eating any wild foods the day before, PWS communities, 1992.



PWS communities. There are substantial differences in the fraction of respondents that consumed wild foods. By this measure, Tatitlek and Chenega Bay are quite similar and report significantly higher use of wild resources than Cordova or Valdez. The same conclusion is reached by comparing the per-capita harvest data presented in Figures 3.3-28 to 3.3-31; Tatitlek and Chenega Bay have a greater average per-capita harvest than Valdez and Cordova.

3.3.3.5 Access to Subsistence Resources

North Slope Communities

Historical subsistence access routes for the mid-Beaufort Sea area have been documented in BLM and MMS (1998). Other sources (IAI, 1990a, b) also discuss such routes for Kaktovik and Nuiqsut. Topographic features such as river valleys, shorelines, large lakes, the coastline, and geological formations such as pingos are crucial to the Iñupiat for navigating routes during trips on the land. For coastal villages, the coastline and navigable rivers are especially significant. Subsistence sites also commonly have a cultural resource or historical component, as part of the settlement pattern of the past (often a very mobile pattern), and are often in turn used as landmarks or navigational aids.

The Iñupiat also incorporate new technologies into their subsistence activities where advantageous. This process was evident at contact and continues through the present. Once snowmachines became reliable and affordable, they quickly replaced dog teams. Shallow-draft boats with engines enabled subsistence users to travel waters that before were barriers. Global positioning system (GPS) units allowed for route-finding without reference to landmarks. During whaling, each village has a standard set of named waypoints for local traditional landmarks that are entered into every crew's GPS unit.

Access to subsistence resources is predominately by

boat when there is open water and snowmachine when there is not. Four-wheel all-terrain vehicles can provide access in either season under the proper conditions, but are generally not used for long trips. Travel between communities can be by boat or snowmachine, but is more commonly through commercial air carriers. Occasionally, subsistence hunters will charter a plane for transportation for hunting caribou or sheep, although the expense makes this the exception rather than the rule.

Management and regulatory practices are a relatively new aspect of access to subsistence resources on the North Slope. These practices include restrictions or limited access on certain federal land: ANWR for Kaktovik subsistence users, Gates of the Arctic National Park for Anaktuvuk Pass (NPS, 1992), explicit or perceived exclusion of subsistence users from developed oil fields (Hopson, 1976), and the potential displacement of subsistence resources and/or subsistence users themselves by features of oil-field development such as elevated roads and pipelines (IAI, 1990b; Haynes and Pedersen, 1989).

Central TAPS Study Area

The type of access to subsistence-use and harvest areas is similar for all communities in this study area. Although regional differences exist from south to north in seasonal preferences for certain resources, methods of transportation to and from hunting areas, technologies used in the pursuit of fish and game, and techniques of procurement are similar. There are idiosyncratic and cultural differences in individual and group approaches, and each rural community has its own issues on access to subsistence-harvest areas by resident and nonresident alike. However, all Interior subsistence users are governed by the same federal and state regulations, and all use in one way or another the same means and methods to and from hunting and fishing areas. Moreover, rural Interior Alaskan subsistence users are generally subject to the same pressures from increased road access (e.g., the Dalton Highway) to traditional use areas by non-resident hunters from urban and suburban areas. For example, the state will continue to maintain the Dalton Highway, which will remain open regardless of the status of TAPS. The impact of TAPS on access to traditional subsistence-use areas occurred with construction and with development of the attendant transportation grid. Current impacts, such as a significant increase in nonlocal and non-resident hunters, result from increased use of the road system, rather than directly from pipeline operations.

Subsistence users throughout the Interior continue to incorporate new technologies in their hunting and fishing activities, typically in ways consistent with traditional cus-



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Photo 3.3-23. Snowmachine and baleen in Nuiqsut.



toms, practices, and patterns of land use. Access to hunting areas is most often by road vehicle such as trucks and cars, by all-terrain vehicle (ATV), and/or by snowmachine. Snowmachines are now used along trail networks that may have been in existence for hundreds of years. ATVs are used in much the same way, with the exception being a more intensive use during summer and fall when there is little or no snow on the ground. Motorized boats are used in conjunction with nets and fish wheels throughout Interior Alaska, although preferred fishing sites are typically in areas of traditional significance. In a few villages, particularly in the northern part of the TAPS route, dog teams are still maintained and used. Section 811 of Title VIII of ANILCA guarantees access to federal lands through the protection of the right to use motorized vehicles on such lands. Many urban Alaskans are opposed to use of motorized vehicles for a traditional and customary subsistence hunt. Nonetheless, federal statute protects this right of access. As is true for the rest of Alaska, rural communities and areas are linked by commercial and private air carriers.

Valdez/Prince William Sound

The primary means of access for subsistence resources in PWS is by boat, including commercial fishing boats and skiffs. A large portion of the subsistence harvest is taken from commercial nets. Fishing boats and skiffs are used to catch bottomfish and marine mammals, and are used to access deer and goat hunting areas. Some Cordova and Valdez residents use small airplanes to travel to hunting and clamming areas in PWS and along the Gulf of Alaska coast. Some Valdez residents use the highway system to hunt caribou near Glennallen in GMU 13 and moose along the Richardson Highway, and some use snowmachines to hunt ptarmigan. Some area residents harvest intertidal resources and berries on foot within walking distance of the villages of Tatitlek and Chenega Bay, although skiffs and four-wheel-drive vehicles are also used.

3.3.4 Cultural Resources

By P. Bowers, B. Potter, C. Gerlach, and C. Wooley

3.3.4.1 Introduction

This section describes the cultural resources and cultural history along the TAPS ROW. The study area is divided on the basis of shared cultural traditions and similar environments into the North Slope, Interior or Central (Brooks Range divide to Pacific Coastal Mountains divide), and Valdez/Prince William Sound (PWS) study areas. These

units of analysis are roughly equivalent to the historic territories of the Iñupiat (Eskimo), Athabascan (Indian), and Alutiiq (Pacific Eskimo) cultural areas.

Cultural resources are sites, districts, structures, buildings and objects that can provide information on prehistory or history. Under the guidelines of the National Historic Preservation Act (36 CFR 800), prehistoric or historic sites (“historic properties”) are those that are listed in, or are eligible for inclusion in, the National Register of Historic Places (NRHP). For a site to be considered “historic,” it must be more than 50 years old, unless it has exceptional national, state, or local significance. Specific locations may also hold significance for contemporary Alaska Natives as sacred sites (see Executive Order 13007, 1996) and traditional cultural properties.

Alaska’s prehistory is still poorly understood, but research during the past three decades along the TAPS route, in North Slope oil and gas exploration and development areas, and in PWS has made significant contributions (e.g., Cook, 1970, 1971, 1977; Hall and Gal, 1988; Haggarty et al., 1991; Lobdell, 1986). In the TAPS study area, cultural resources of widespread ages are found in varied environmental settings and are represented by a remarkable diversity of site types. To provide some idea of the number and density of sites an area within 5 miles of either side of the pipeline or a haul road would include approximately 950 sites of potential historical interest. (The word potential is used because not all sites in this area have been evaluated in terms of criteria for listing in or eligible for inclusion in the NRHP.) Approximately 39 percent of the (950) sites are reportedly located within 0.5 miles of the pipeline centerline, 54 percent within 1 mile, 72 percent within 2 miles, and 94 percent within 4 miles.

Of the sites that are assignable to age, 61 percent are prehistoric or have prehistoric components, and 34 percent are historic; the remaining sites are categorized in various ways (e.g., historic Cold War, prehistoric/historic, protohistoric/historic). Sites are geographically concentrated in a number of areas reflecting both the intensity of research and the distribution of natural resources. Some of these 950 sites are Native historic and cemetery sites on native owned or selected land; there may be other Native sites not listed in state files.

Cultural sites are found in a wide variety of environmental settings. Among sites for which data are available on the environmental setting, approximately 49 percent in upland spruce forest, 23 percent in alpine tundra, 17 percent in moist tundra, and 17 percent in bottomland spruce forest (total adds up to more than 100 percent because a site may be listed in more than one category). Approximately 52 per-



C. Holmes OHA

Photo 3.3-24. Broken Mammoth Site, one of the oldest documented sites in Alaska.

cent of sites are located near rivers and 7 percent near lakes.

Prehistoric sites in the TAPS study area include lithic chipping stations, hunting lookouts, campsites, villages, house pits and tent rings, caches, a caribou drive fence, quarry sites, a pictograph, and a rock shelter. Within 1.3 miles of the pipeline lies the Broken Mammoth site (Photo 3.3-24), one of the oldest documented sites in Alaska and, for that matter, in the New World. Multi-component and/or stratified sites are relatively uncommon. Most of the sites are surficial or shallowly buried because environmental factors do not permit burial through the accumulation of sediment over extended periods of time. Historic sites include the Prudhoe Bay discovery well (located north and east of PS-1) recently nominated to the NRHP, Alaska Native traditional land-use sites, roadhouses, cabins, homesteads, telegraph line stations, trading posts, grave sites and cemeteries, a shipwrecked steamboat, military sites, historic trails, gold rush towns, gold mining sites, gold dredges and associated ditches, railroad-related features, aircraft wreckage, and historically significant structures such as bridges.

TAPS cultural resources vary with respect to legal status. One site, the Gallagher Flint Station (Photo 3.3-25), is a National Historic Landmark. Six properties are listed on the NRHP, and another 16 are listed NRHP sites within the bounds of larger districts. There are three archaeological districts and three historic districts eligible for inclusion in the NRHP, and 13 are listed sites within the boundary of a property that has been determined eligible. At least 40 sites have been evaluated and determined not to be eligible for inclusion on the NRHP.



Peter M. Bowers

Photo 3.3-25. Excavation of the Gallagher Flint Station archaeological site during TAPS construction. This important prehistoric site has multiple occupations spanning the Holocene (Dixon, 1975; Ferguson, 1997). This site is located 0.4 miles from the pipeline centerline on the North Slope.

3.3.4.2 Cultural History of the TAPS Route

North Slope

The oldest (8,800 to 11,800 years ago) well-documented sites in northern Alaska are part of what some archaeologists refer to as the Paleoindian tradition (Figure 3.3-33). The oldest site on the North Slope, the Mesa Site, was discovered as a result of oil and gas exploration activities in 1978 (Kunz and Reanier, 1994; Reanier, 1995). Information from this site, along with other discoveries along TAPS, provides evidence of temporal and cultural connections with similar sites in more temperate latitudes. The Putu and Bedwell sites, overlooking the Sagavanirktok River, figure prominently in northern prehistory.

In 1970 and 1973, Alexander (1987) excavated the Putu Site — the first in Alaska said to have produced fluted projectile points (Figure 3.3-34) — and an associated radiocarbon date (11,500 years old). This suggested arctic fluted points were as old as those from the Clovis and Folsom cultures of mid-continental North America, and greatly influenced Alaskan archaeological thinking during the 1970s and 1980s. Although the Putu fluted points likely were not associated with the 11,500-year-old radiocarbon date, the Putu site suggests that lanceolate points similar to those from the Mesa site (Figure 3.3-34) may have persisted until 8,800 years ago in the Brooks Range (Reanier, 1995).

The nearby Bedwell site, which also contained lanceolate projectile points, has been dated to 10,500 years ago (Alexander, 1974; Reanier, 1995). The Hilltop site, located

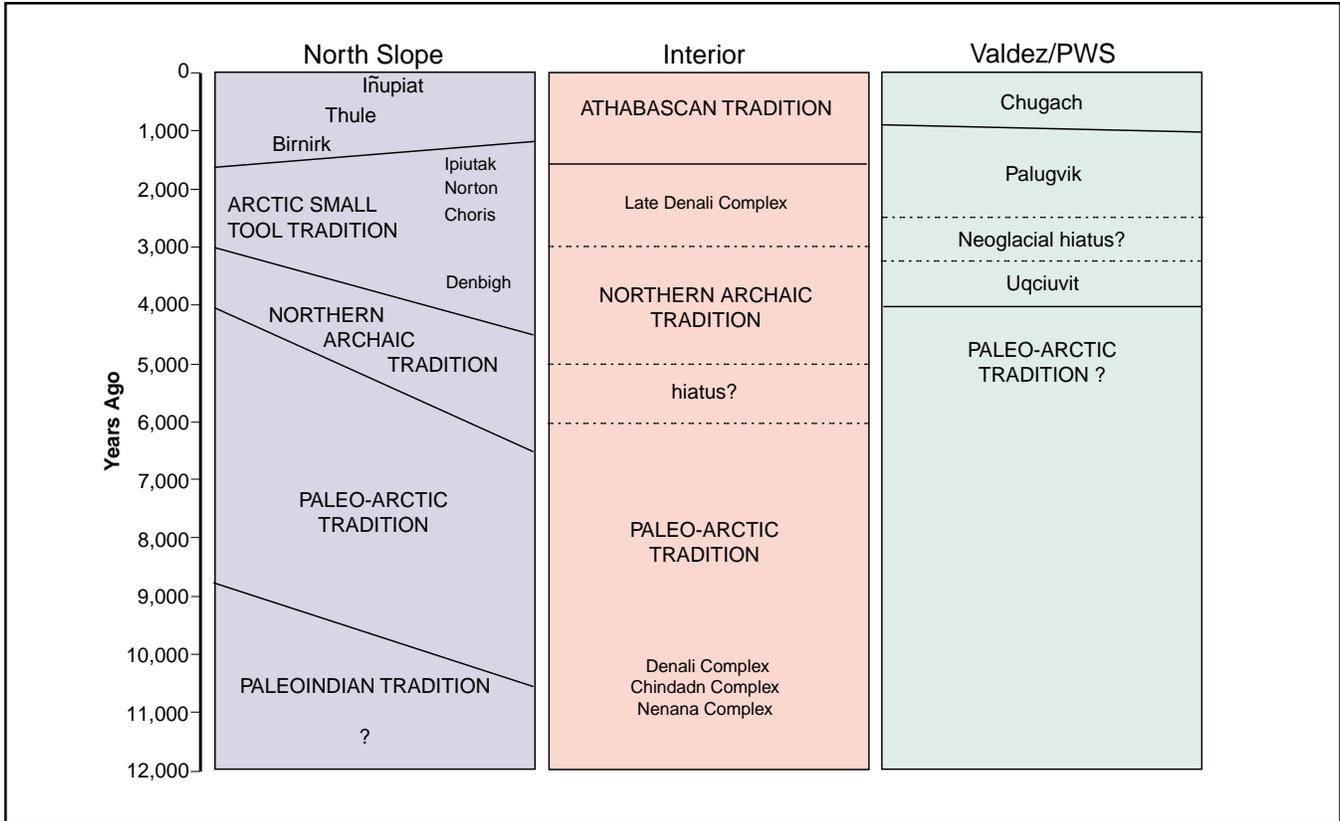


Figure 3.3-33. Cultural chronology of the TAPS study area. This chart is provisional, because the categories evolve with new discoveries. Here, the term culture refers to discrete episodes of technological and environmental change that archaeologists can identify in sites. Archaeological “cultures” are theoretical constructs used to label the changing technologies and environmental adaptations seen in the archaeological record. The wider use of the term culture involves complex systems of behavior and beliefs usually not evident in the archaeological record.

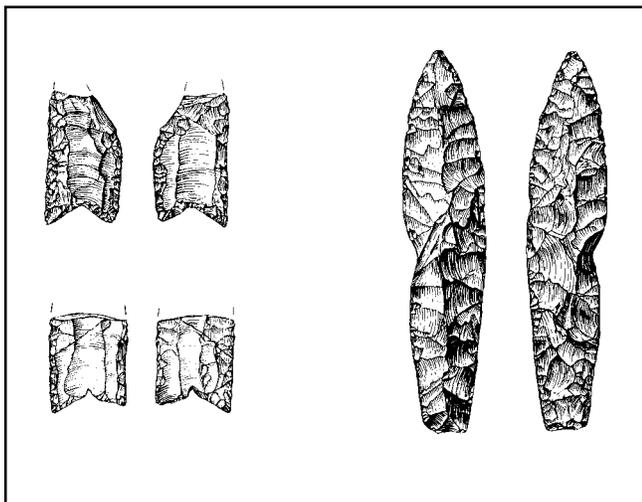


Figure 3.3-34. Fluted projectile points (left) and lanceolate points (right).

on a bedrock knoll above the Atigun River, was also discovered during TAPS construction. The site contained lanceolate points and other Paleoindian tools similar to those from the Mesa Site, and was recently dated to 10,400 years ago (Reanier, 1995). Putu, Bedwell, and Hilltop each afford

impressive views of the surrounding landscape and appear to have functioned as hunting lookouts and weapon repair stations. The Mesa Site and these three sites from along the pipeline route have shaped our knowledge of North Slope cultures at the end of the last Ice Age.

The American Paleoarctic Tradition (Anderson, 1970), a possible contemporary of the Paleoindian Tradition, is generally thought to date in the Arctic between 7,000 and 10,500 years ago; although recent evidence suggests it persisted to Mid Holocene times (Bowers, 1999; Ferguson, 1997). Certain stone tool types found in American Paleoarctic sites are remarkably similar to stone technologies from Northeast Eurasia. Paleoarctic sites from the North Slope include the Gallagher Flint Station (Dixon, 1975; Bowers, 1983; Ferguson, 1997) and the Lisburne Site (Bowers, 1982, 1999). The Gallagher Flint Station located between the pipeline and the Dalton Highway, was discovered and partially excavated by E.J. Dixon as part of the TAPS cultural resources mitigation program in 1970, 1971, and 1974 (Cook 1970, 1971; Dixon 1972, 1975). Bowers (1983) and Ferguson (1995, 1997) conducted later investigations. The site occupies more than 4,400 square meters



(m²) of a large glacial kame, and is composed of 13 spatially-separated areas of past human occupation dated by 20 radiocarbon determinations. Materials recovered were mainly stone, although some wood, pottery, and bone was also recovered.

The site attracted international attention due to an old radiocarbon date of 10,500 years ago (Dixon, 1975) and stood for a number of years as the oldest evidence of people in Arctic Alaska. The date was reportedly associated with a core and blade industry thought to relate to Pleistocene Siberian cultures. A re-analysis of the dating and technology from Locality I of the Gallagher Flint Station suggests it dates instead to 7,000 years ago and is more closely related to the Mesolithic Sumnagin industries of Northeast Asia (Ferguson 1997, p. 26). In addition to the question of early human occupations of the North Slope, the site adds important though yet unpublished data on the cultural history of Northern Alaska, particularly on aspects of inland subsistence and settlement patterns, lithic technology, and hunting strategies. The site contains evidence of the American Paleoafrican, Northern Archaic, and Arctic Small Tool Traditions, spanning most of the Holocene Epoch.

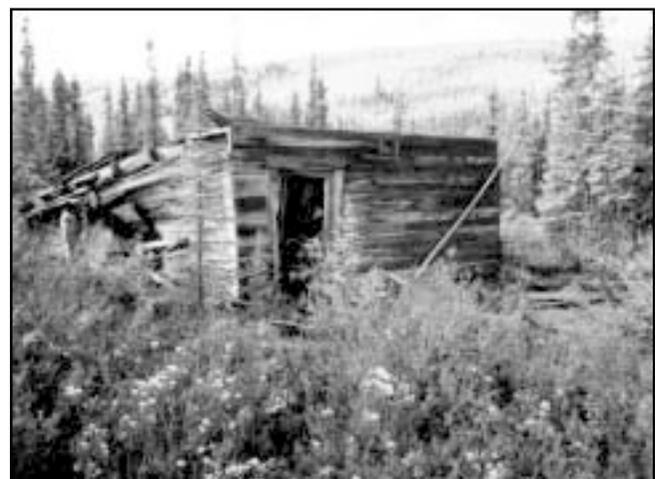
More recent sites (appearing 6,500 to 6,000 years ago) include side-notched projectile point forms, a hallmark of the so-called Northern Archaic Tradition (Anderson, 1968). The broad occurrence of this point type throughout Interior and northern Alaska and the Yukon may represent the spread of a new boreal-forest-oriented cultural tradition (Anderson, 1984). The Northern Archaic is represented as well on the North Slope at sites such as Kugaruk Pingo (Lobdell, 1986).

Following the Northern Archaic Tradition, beginning roughly 4,500 years ago is a prehistoric culture referred to as the Arctic Small Tool Tradition (Irving, 1964), known for its tiny, finely flaked stone tools, and the oldest coastal sites. This dramatic change in stone-tool technology may mark the introduction of the bow and arrow and probably represents the origins of Eskimo culture on the North Slope. The original definition of the Arctic Small Tool Tradition has been expanded to include later cultures such as Choris, Norton, and Ipiutak, extending in time until about A.D. 900. Arctic Small Tool sites along the Arctic Coast include the Putuligayuk River Delta Overlook Site (Lobdell, 1981) and the Arctic Foothills Mosquito Lake Site, located next to TAPS (Cook, 1977).

The Mosquito Lake site lies adjacent to, and now partly beneath, the pipeline near the entrance to the Atigun Gorge. The site was discovered in 1966 by Herbert L. Alexander and was excavated in 1971, 1974, and 1975 during TAPS construction by Michael L. Kunz and others (Cook, 1977).

Mosquito Lake is a large site with 17 occupation areas spread across a hillside above the Atigun River — 13 of the occupation areas were assigned to the Denbigh Flint Complex. The site provided important new data on the age of the Denbigh Flint Complex because in addition to a radiocarbon date of 3,500 years ago, it also yielded five dates between 2,000 and 2,700 years ago that suggested Denbigh persisted in the Brooks Range much later than previously thought. A recent study of Arctic Small Tool Tradition lithic technology analyzed artifacts from the Mosquito Lake Site (Wenzel, 1998).

Beginning in the first millennium of the Christian era, prehistoric inhabitants of the North Slope increased their reliance on hunting marine resources. The Birnirk culture, identified from the type site near Barrow (Ford, 1959; Stanford, 1976), suggests that marine-mammal hunting from strategic promontories may have become a preferred subsistence strategy. At the same time, however, terrestrial-mammal hunting, especially for caribou, remained important (e.g., Gerlach and Hall, 1988; Cook, 1977). Later, the Birnirk culture developed into the Thule culture, a ubiquitous arctic culture clearly ancestral to the present-day Iñupiat people. Subsistence was broad-based, with exploitation of both Interior and coastal resources. The historic Iñupiat people interacted with non-Native explorers, whalers, traders, and missionaries to form the rich cultural milieu known today on the North Slope. Aniganigaruk, a small historic winter village located near TAPS in the Atigun River valley, is an example of a site that has greatly expanded our knowledge of Nunamiut Iñupiat (inland Eskimo) origins and lifeways. James Corbin investigated the Aniganigaruk site in 1970-71 during TAPS construction



NLR photo # TN08-3-29

Photo 3.3-26. Photo of historical site (LIV-299), a building associated with a mine operating from the 1930s to the 1940s in Vault Creek valley (Higgs, 1998). This site is located 0.6 miles from the pipeline centerline.



(Corbin 1971, 1975). The site, dating to about 1880-90, consisted of at least 11 structures, 5 of which were excavated. This important site was the first arctic excavation which systematically documented the Nunamiut Iñupiat's primary house types, the *icelik* (skin tent) and *ivrulik* (winter moss house) (Corbin, 1975). Data from this early historic period site were also used to characterize the caribou antler industry of the inland Iñupiat.

Central TAPS Study Area

In the Interior, the late Pleistocene-early Holocene American Paleoarctic Tradition is represented at numerous sites, with its regional variant, the Denali Complex (West, 1967). The tradition appears to date slightly older in the Interior than on the North Slope (Holmes, 1998; West, 1996), although neither region is adequately studied. In the Tanana River drainage, “Chindadn” triangular points, which may predate the Paleoarctic microblade industries, have been found at the Healy Lake sites (Cook, 1969, 1975; Holmes and Cook, 1999), Broken Mammoth (Yesner, 1994), Swan Point (Holmes et al., 1996), and Chugwater (Maitland, 1986; Lively, 1988). These bifacially worked points are dated to 10,000 to 11,000 years ago at both the Broken Mammoth and Swan Point sites. The only clearly dated organic tools from this early period come from the lowest artifact levels at the Broken Mammoth Site. Three worked mammoth-ivory pieces suggest that these points were in use from 11,200 to 11,800 years ago (Holmes, 1996). Both the Broken Mammoth and Swan Point sites have addressed important issues relating to human subsistence and technology in the Late Pleistocene and Early Holocene (12,000 to 9,000 years ago) in Interior Alaska (Holmes, 1996; Holmes et al., 1996). Hearth dates associated with unequivocal artifacts from the lowest components at both sites yield estimates of almost 11,800 years ago — among the earliest in the Americas. The substantial preservation and diversity of faunal remains at Broken Mammoth, including bison, elk, caribou, small mammals, waterfowl, and salmonid fish elements, enable archaeologists to reconstruct past subsistence patterns (Yesner, 1996; Yesner et al., 1992). Swan Point contains the oldest microblade technology in Alaska (Figure 3.3-35) and supports the hypothesis that the earliest human migrants to Alaska used microblades (Holmes, 1998), in contrast with earlier interpretations based on data from the Nenana Valley (Hoffecker et al., 1993; Powers and Hoffecker, 1989).

Another site in the Interior that raises questions about the age of Alaskan fluted points is the Girls' Hill site. Girls' Hill was situated on the south side of the Brooks Range along the top of a bedrock knoll overlooking the Jim River

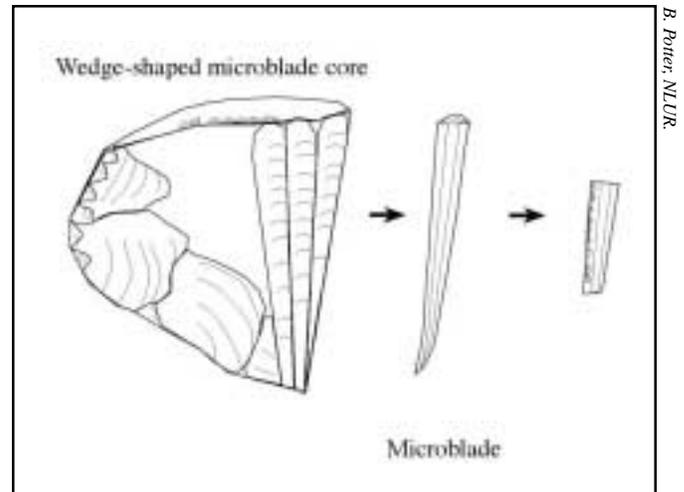


Figure 3.3-35. Artist's conception of microblade and core.

near Pump Station 5. The site was excavated before the knoll was used as a material source for TAPS construction (Gal, 1976). Girls' Hill was a rich site, with more than 7,000 microblades and numerous other artifact types, and radiocarbon dates that ranged from 1,900 to 4,500 years ago. Among the artifacts found at Girls' Hill were four fluted points, one of which was found within 50 cm (20 inches) of the sample which produced the 4,500 year-old date (Gal, 1976). The site figures prominently in the controversy over the age of Alaskan fluted points because Girls' Hill is the only site with fluted points associated with radiocarbon dates. The archaeological community remains divided over the age of these points, and Girls' Hill provides evidence for those who argue Alaskan fluted points are much younger than their southern counterparts in the Clovis and Folsom cultures.

The Northern Archaic Tradition is well-represented in Interior Alaska and along TAPS localities where notched points are found, including the mid-Holocene level at the Swan Point Site (Holmes et al., 1996) the Chugwater Site, and several sites found by Alyeska archaeologists in the Tolovana River area near Livengood (Derry, 1976). Use of microblade core and burin technologies appears to continue into or side by side with the Northern Archaic Tradition, as evidenced at Broken Mammoth, Swan Point, Gerstle River, Campus, and Delta River Overlook (Bowers, 1999; Mobley, 1991; Holmes et al., 1996). The so-called “Late Denali Complex” is poorly understood at this stage of research in Interior Alaska (e.g., Dixon, 1985), including sites such as Campus, Broken Mammoth, Swan Point, and Dixthada. The upper component of the Broken Mammoth site falls in a time range of 2,200 to 3,000 years ago (Holmes, 1996).

The Athabaskan Tradition is a prehistoric-historic cul-



ture attributed to the northern Athabascan Indians of Alaska and northern Canada. These sites date from about A.D. 500 to A.D. 1880. Protohistoric (or late prehistoric) Athabascan sites include artifact assemblages predominately characterized by Native-made items (with an increased occurrence of organic and copper tools) and a smaller amount of non-Native trade goods such as iron and glass beads obtained through trade with Hudson's Bay Company and the Russian American Company (A.D. 1741-1850). Historic Athabascan sites (post-1850) generally have a mixture of log cabin and house pit dwellings affiliated with a larger percentage of Euroamerican artifacts. Several important Athabascan Tradition sites include Dixthada, and Swan Point (Holmes et al., 1996), Paxson Lake sites (Ketz, 1983), Dakah De'nin's village (Shinkwin, 1979), Taral (VanStone, 1955), and the Ringling Site (Workman, 1976; Arndt, 1977; Hanson, 1999).

The Ringling site is a late prehistoric Athabascan site located adjacent to a gravel quarry near the modern village of Gulkana. The TAPS-related archeological excavations at this site provided new information regarding the prehistory of the ancestors of the modern-day Ahtna people in the Copper River valley (Workman, 1976). Workman's extensive 1975 and 1976 excavations documented human use and occupation of the area during the first half of the second millennium A.D., including intriguing evidence of local copper artifact trade. The Ringling site, with its copper and obsidian artifacts and extensive history of use, provides important data for understanding the human history of the Copper River valley (Hanson, 1999).

At the time of direct Euroamerican contact in the nineteenth century, the study area was primarily used by several bands of Gwich'in, Koyukon, Tanana, and Ahtna Athabascans (McKenna, 1981; Andrews, 1977; Mishler, 1986). The basic historic Athabascan social structure included a group of families whose subsistence activities centered on procurement of both anadromous and freshwater fish and terrestrial game animals (Andrews, 1975; McKenna, 1981).

The Yukon and Copper river drainages have a documented Euroamerican history of less than 220 years, and during that time, the area experienced significant changes. Contact between the Ahtna and the Russians occurred in the eighteenth century, with trading forays into the Copper River Basin from PWS (VanStone, 1955). A trade monopoly was established that existed off and on until the sale of Alaska to the U.S. in 1867. Interior-Alaskan Euroamerican history began with an exploration phase followed by development of trading posts, roadhouses, and missions. Prospecting and small-scale gold mining occurred

in the Koyukuk River area from the early 1880s, and small trading posts were established along the Koyukuk in the 1890s.

Coldfoot, an historic mining town adjacent to the pipeline, was founded in 1899 during the second gold stampede to the Middle Fork of the Koyukuk River. During its heyday in 1902-04, it consisted of stores, a post office, a gambling establishment, roadhouses, saloons, brothels, offices of lawyers and doctors, the Koyukuk Mining District Commissioner's office and the U.S. Marshall's office. Robin Mills excavated the site in 1994-95 and analyzed more than 18,700 historic artifacts from structural ruins, trash pits, and a privy. In addition to providing new detailed information relative to the material culture and commodity flows during the gold rush in Alaska, Coldfoot was used by Mills (1998) in the development of abandonment and settlement system dependency models in relation to early Placer gold mining in Alaska. The data gathered from Coldfoot largely corroborated expectations related to these models (Mills, 1998, p. 331-341).

The Klondike gold rush of 1898 to 1899 brought an influx of Euroamericans to the Alaskan Interior. The more successful posts eventually developed into settlements sustained by mineral-resource extraction, building a commercial center for Interior Alaska. Gold mining, especially in the Fairbanks mining district, provided impetus for development and settlement of the Interior. The growth of Fairbanks led to the development of a trail connecting Fairbanks to Alaska's southern coast. The historic Valdez-Fairbanks Trail, established in 1905, served as an overland link between the Pacific port of Valdez and Interior Alaska (U.S. Army, 1969). This route, which TAPS generally parallels, would not have been feasible without roadhouses and other facilities built to assist the freighters, mail contractors, miners, hunters, and other travelers.

The Valdez Trail lost its significance as the main terrestrial route to Fairbanks after completion of the Alaska Railroad in 1923. Sections of the original Valdez Trail were abandoned after construction of the Richardson Highway. With the onset of World War II, the Alaska, or Alcan, Highway provided the first direct overland route between the contiguous 48 states and Interior Alaska. Military bases built during World War II near the TAPS route include Eielson Air Force Base and Fort Greely. The wartime facilities eventually became part of the Cold War military buildup, training ground, and cold regions testing laboratory.

Valdez/Prince William Sound

The pre-European history of the PWS region is not well



understood because of the scarcity of systematic archaeological survey data and limited testing and excavation results. The Palugvik and Uqciuvit sites have been the focus of detailed analysis, although others have been tested recently (Yarborough, 1997). The earliest known occupation, the Uqciuvit phase, is thought to date between 4,400 and 3,300 years ago and includes evidence of marine-mammal hunting (Yarborough and Yarborough, 1996). A possible hiatus in the occupation of portions of PWS corresponding with the Neoglacial period (3200 to 2500 years ago) has been proposed (Yarborough, 1997) based on an occupational gap at Uqciuvit during the Neoglacial. Subsequent occupations between roughly B.C. 400 and A.D. 1100, identified as the Palugvik phase (de Laguna, 1956), and between A.D. 1000 and roughly A.D. 1700, identified as the Chugach phase, characterize the currently known regional prehistory. Splitting adzes (Photo 3.3-27) and stone lamps are associated with both the Palugvik and Chugach phase sites in Prince William Sound. No coastal sites were documented during TAPS construction in the Valdez area.

Detailed archaeological reconstructions of Chugach Alutiiq, Eyak, and Tlingit social life in the PWS/Copper River Delta area just before Euroamerican contact are also incomplete. Walker (1982) noted both semi-subterranean and above-ground plank houses in a village in the Tatitlek area in the 1780s, perhaps indicating both winter and summer structures at one site or possible cultural amalgamation of groups with two different house styles. Intergroup trade was a feature of life in the region during the 1700s, as Native Ahtna and Chugach Alutiiq people used a trail from Valdez over Thompson Pass into the Copper River Basin as a trade route. Intergroup warfare was also common, with the remains of numerous defensive locations present on elevated islets (de Laguna, 1956). The impact of industrial activity in the PWS region is evident in historic ruins near area shorelines including cabins, canneries, fox farms, copper mines, railroads, and oil and coal exploration sites, but only reconnaissance-level cultural-resource inventories have been conducted at these sites (Stern and Gibson, 1982; Buzzell, 1995; Haggarty et al., 1991; Haggarty and Wooley, 1992).

3.3.5 Land Ownership and Land Uses

By ClearWater Environmental, Inc. staff

3.3.5.1 Introduction

TAPS and its associated facilities are located primarily on public lands. Forty-seven percent of the TAPS ROW is on federal lands, and 43 percent of the TAPS ROW is on



C. Wooley

Photo 3.3-27. Splitting adze from the PWS region.

State of Alaska lands and State of Alaska lands which have been conveyed to municipalities and boroughs, reserving the TAPS ROW in the conveyancing documents.

Private ownership consists of Alaska Native Corporation holdings (under ANCSA), Alaska Native Allotment parcels, and privately owned parcels in the Fairbanks, Delta Junction, Copper River Basin, and Valdez areas. With minor exceptions, valid rights-of-way for construction and operation of TAPS exist on all parcels, public or private. Refer to the land status maps in Appendix C for changes in land ownership trends adjacent to the TAPS ROW from 1972 to 1999.

3.3.5.2 Land Ownership

As of November 1999, the federal government (primarily the BLM) owned 47 percent of the lands within the TAPS ROW and the state government (including trust lands and municipalities) owned 43 percent. The remaining lands (10 percent) affecting the right-of-way are owned by ANCSA Native Corporations, Alaska Native Allotees, and other private landowners including the TAPS Owners, who acquired fee property at Pump Station 1, Pump Station 8, Pump Station 9, the Nordale Yard, the North Pole Metering Station, both sides of the Tanana River crossing, the Valdez Marine Terminal, approximately 2 miles in the Fox area including Engineer Creek, and five other small parcels.

Since acquisition of the TAPS ROW by the TAPS Owners, some parcels have been conveyed to private individuals and to other entities and/or subdivided into smaller plots and homesites. As a result, the number of individual private parcels underlying the ROW has increased from the original 196 in 1972 to 419 parcels in 1999 (the original 196 included 91 unpatented federal mining claims in the Middle Fork of the Koyukuk River area, the Treasure Creek area, and the Delta River-Phelan Creek area). With minor exceptions, all privately owned parcels are subject to perpetual right-of-way agreements acquired from persons in title when the TAPS ROW was acquired.

Table 3.3-12 provides a summary comparison of land



Table 3.3-12. Summary comparison of land ownership of TAPS ROW from 1972 to 1999.

	February 2, 1972			November 1, 1999		
	Feet	Miles	Percent	Feet	Miles	Percent
Federal	3,476,485 (a,c)	659	82%	1,984,104 (b)	376	47%
State	598,767	113	14%	1,815,869	344	43%
Municipality/Borough	547	0	0	547	0	0
Private (including Native ownership)	149,582	28	4%	424,861	80	10%
Total	4,225,381	800	100%	4,225,381	800	100%

Source: TAPS construction record drawings (G-100, Rev. 4, 12/95); Land Field Services, Inc. records.

(a) A significant amount of lands underlying the TAPS route transferred from federal to state ownership between 1972 and 1974, when the Federal Grant and State Lease were signed.

(b) This footage is exclusive of the right-of-way (8.7 miles) retained covering the replacement of TAPS pipe at Atigun Pass in 1990-91.

(c) Approximately 8 miles of federal lands underlying the TAPS route were encumbered by federal mining claim locations.

ownership of the TAPS ROW before construction (1972) and on November 1, 1999. Figure 3.3-36 is a sample of the maps contained in Appendix C showing land ownership.

Section 17(c) of ANCSA originally precluded the selection of any federal lands within the utility corridor withdrawal (PLO 5150, as amended) by the ANCSA Native Corporations. However, subsequent actions by the U.S. Congress and the Secretary of the Interior have authorized conveyances of TAPS corridor lands to the following Native regional corporations: Ahtna (38 miles), Chugach Alaska (11 miles), and Cook Inlet Region Incorporated (CIRI, 2 miles). These conveyances were made subject to the TAPS ROW.

In addition to lands obtained by these regional corporations, nine Alaska Native Allotments lying within the TAPS ROW have been conveyed to individual owners under the provisions of the Alaska Native Allotment Act. With one exception presently under negotiation, easements for the TAPS ROW have been acquired across all these parcels.

3.3.5.3 Land Use

The boundaries of the TAPS ROW from Prudhoe Bay to Valdez, as designed and acquired by Alyeska and the Owner Companies and approved by the federal and state regulatory agencies, are sufficient for the construction and operation of the pipeline, attendant facilities, construction and operation of the pump stations, the river training structures, the communication sites, and the fuel gas line. Other state and federal authorizations included airstrips, construction camps, access roads, material sites, pipe storage yards, disposal sites, and other specific-use sites. The TAPS ROW on public lands is a non-exclusive use, but other uses must be compatible. (See Section 11.C of the Federal Grant and Sections 17.c and 17.e. of the State Lease.)

Federal Lands

Major changes in both federal land ownership and land use designations have occurred in lands along the TAPS ROW, including special restrictions on use of lands within 5 miles of the Dalton Highway north of the Yukon River.

The most sweeping changes in land use designation occurred on federal lands adjacent to the federal utility corridor withdrawal (PLO 5150, as amended) as a result of the passage of the Alaska National Interest Lands Conservation Act (Public Law 96-4897) of December 2, 1980, commonly referred to as ANILCA. ANILCA provided for the disposition of lands as required by Section 17(d)(2)(A) of ANCSA. These are commonly referred to as the “d-2 lands.” This Act placed approximately 97 million acres into new and/or expanded parks and refuges and reclassified 25 Alaska rivers as wild and scenic (ANILCA Title VI).

Figure 3.3-37 indicates the location of current refuges, wilderness area, and parks in the TAPS vicinity. With the exception of the wild and scenic rivers (Delta and Gulkana rivers) which are subject to valid existing rights, there are no conflicting land uses on these federal park and refuge lands which affect the TAPS ROW. As a result, there should be no direct impact on these federal lands arising from ROW renewal.

The Delta and Gulkana Rivers Wild and Scenic River Management Plan recognize PLO 5150 (the utility corridor withdrawal) as amended.

State Lands

Concerning State of Alaska lands, there has been significant conveyancing activity from the State of Alaska affecting lands adjacent to TAPS since 1972. This activity falls into four major categories.

First, under Alaska statute AS 29.65, boroughs, unified municipalities, and cities are eligible to select state lands.

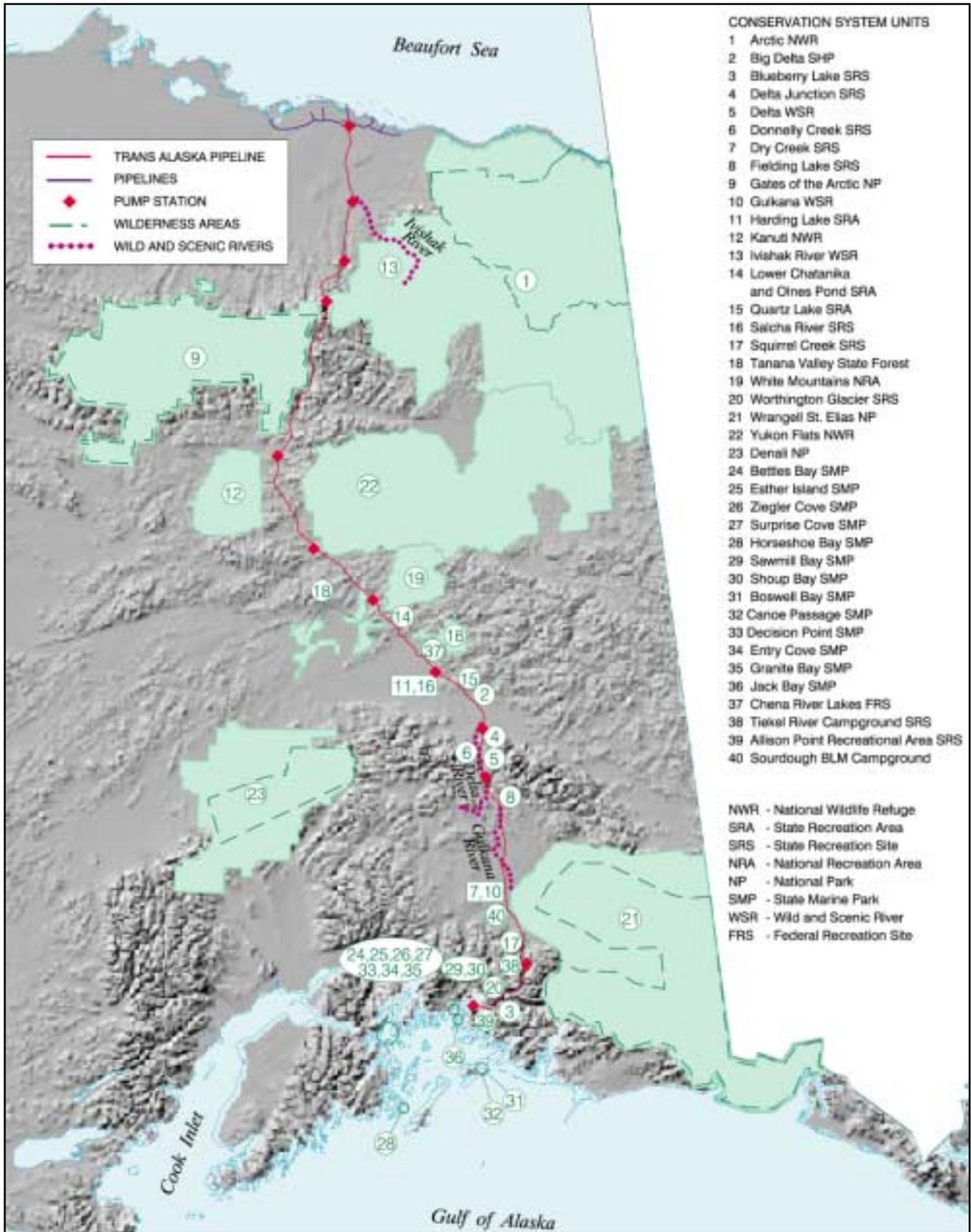


Figure 3.3-37. Conservation system units in the vicinity of TAPS.



Such selections have been made and include the North Slope Borough, the Fairbanks North Star Borough, the City of Delta Junction, and the City of Valdez.

Second, the University of Alaska has received title to several tracts of land from the State of Alaska adjacent to TAPS, and these lands are administered by the University of Alaska, Office of Statewide Land Management.

Third, the State of Alaska, Mental Health Trust Authority, has, through the auspices of the Mental Health Trust Land Office, taken title and administration of Mental Health selected lands adjacent to TAPS.

Fourth, there have been developed, by the Alaska Department of Natural Resources, several state subdivisions in the vicinity of TAPS, and these subdivisions have been partially or totally conveyed to private individuals for residential and recreational purposes. These subdivisions include:

- Donnelly Subdivision in Township 14 South, Range 10 East, Fairbanks Meridian, located along the Delta River, from which private lots have been sold to 12 individuals;
- Tazlina Northwest Subdivision in Township 3 North, Range 1 West, Copper River Meridian, located south of the Tazlina River, which includes sales to 7 private individuals;
- Alaska State Land Survey 79-42 located in Township 3 North, Range 1 West, Copper River Meridian, southeasterly of Tazlina Northwest Subdivision, which includes sales to 10 private individuals;
- Tazlina Southwest Subdivision located in Township 3 North, Range 1 West, Copper River Meridian, in the Yetna Creek area, which includes sales to 1 private individual;
- Copper Heights Subdivision located in Township 1 North, Range 1 East, Copper River Meridian, between Klutina River and Willow Lake, which includes sales to 3 private individuals;
- Willowcrest Subdivision located southeasterly of Copper Heights Subdivision in Township 1 North, Range 1 East, Copper River Meridian, which includes sales to 19 private individuals;
- Heiden View Subdivision located in Township 9 South, Range 3 West, Copper River Meridian, at the base of Thompson Pass and easterly from Sheep Creek, which includes sales to 18 private individuals; and
- Lowe River Alaska Subdivision located in Township 9 South, Range 5 West, Copper River Meridian, southerly of the Lowe River, which includes sales to 62 private individuals.

These aforementioned conveyancing activities indicate

a significant growth in the use and occupancy of the State of Alaska lands in the period from 1972 through 1999.

Private Land

In 1972 there were 196 parcels of privately owned land interests underlying or adjacent to the TAPS ROW. This number included 78 federal unpatented placer mining claims in the Middle Fork of the Koyukuk mining area, five federal unpatented placer mining claims in the Treasure Creek area, and eight federal unpatented placer mining claims at the Delta River-Phelan Creek confluence. Later, because of federal judicial action and failure of the claimants to follow federal mining regulations, the number was reduced to two valid unpatented federal mining claims in the Middle Fork of the Koyukuk River mining area and 13 additional unpatented federal mining claims in other areas crossed by the TAPS ROW.

There were originally eight Alaska Native Allotments crossed by the TAPS route, the most northerly being on the Middle Fork of the Koyukuk River north of the Hammond River confluence, and the most southerly being along the Tiekel River approximately 50 miles north of the Valdez Marine Terminal.

Of the original 97 privately owned parcels (excluding mining claims and Native Allotments):

- 58 of them were in the greater Fairbanks area (from Old Murphy Dome Road on the north to Johnson Road on the south). These 58 parcels included the lots in the Gurth Subdivision, the only subdivision then crossed by the TAPS ROW.
- Twenty-three of the privately owned parcels were in the Big Delta-Delta Junction area.
- Twelve of the privately owned parcels were in the Copper River Basin.
- Three of the privately owned parcels were in Valdez.
- The other three privately owned parcels were at locations more remote from these centers of population.

By the end of 1999, the urban growth and public desire for remote recreational and residential property resulted in a significant land-use increase along and adjacent to TAPS. With this growth, coupled with the commercial and industrial growth in the Valdez area, there were 419 parcels of privately owned land interests underlying or adjacent to TAPS:

- In the greater Fairbanks area, there are 162 parcels underlying or adjacent to TAPS, including lots in 16 subdivisions — Gilmore Estates, Vienna Woods, Vienna Woods First Addition, Fitz Down Subdivision, South Slope Subdivision, Polar Heights Subdivision, Gurth Subdivision, McNeal Estates Subdivi-



sion, Whispering Pines Subdivision, Cornucopia Farm Subdivision, Woodsmoke Subdivision, Tombur Subdivision, Seavy Subdivision, Diamond Willow Subdivision, Diamond Willow First Addition Subdivision, and Alice Ann Subdivision. This total of 162 parcels takes into account the private parcels lost by the development of the Chena River Lakes Flood Control Project.

- Fifteen of the 419 parcels are mining claims, two of them being in the Middle Fork of the Koyukuk mining area, five in the Treasure Creek area, and eight in the area of the Delta River-Phelan Creek confluence.
- There are now nine Alaska Native Allotments crossed by the TAPS ROW, the increase being the result of the BLM-approved relocation of one Allotment in the Kanuti Flats area.
- Thirty-six of the privately owned parcels are in the Big Delta-Delta Junction area, including parcels in the Big Delta Estates Subdivision, the Stewart Parcelization, and the Malay Parcelization.
- Thirty-nine are in the Copper River Basin.
- Twenty are in the City of Valdez, including lots within the Valdez Industrial Park Subdivision.
- This number also includes the properties owned by Ahtna, Inc., Chugach Alaska Corporation, and CIRL, which properties are counted as one parcel per ANCSA Native Corporation.
- The other three privately owned parcels are more remote from the centers of population.

These 419 privately owned parcels do not include the parcels acquired in fee by the TAPS Owners (these parcels are mentioned in Section 3.3.5.2). These parcels include the 132 lots in the State of Alaska subdivisions mentioned above which have been sold by the State into private ownership.

3.3.6 Recreation and Visual Resources

By ClearWater Environmental, Inc. staff

3.3.6.1 Introduction

TAPS traverses a broad range of climates, landforms, and ecosystems, each with numerous recreation and visual resources. These resources are accessible from public roads within the TAPS study area. As a by-product of its construction in support of TAPS, the Dalton Highway has enhanced access to recreational areas for the northern 400-mile section of the study area. After construction of TAPS, there was a steady increase in use of these recreation and visual



Photo 3.3-28. TAPS visitor site at pipeline visitors center near Fairbanks.

resources, and that increase continues through today (Moseby, 1999, pers. comm.).

3.3.6.2 Recreation

The principal recreation issues are associated with improved access to outdoor recreation areas (parks, refuges, Native holdings, and undeveloped lands) caused by public roads and airstrips lying within the TAPS study area. This primarily involves the 400-mile Dalton Highway. All other roads pre-date the pipeline system, except for the realignment and construction of the Elliott Highway at Livengood and the construction of the Tanana Loop Road between Big Delta and Jack Warren Road, as well as new visitor waysides along the Richardson, Steese, and Elliott highways.

Recreational use of the TAPS ROW for such activities as hiking, jogging, mountain biking, and snowmachining generally is compatible with safe pipeline operations and is accommodated under Alyeska's access policy, which is summarized below:

- The rights of the landowners, both public and private, owning the property under the TAPS rights-of-way must be respected.
- Perpendicular pipeline crossings with vehicles under 1,500 pounds gross vehicle weight or with non-vehicular, low-impact modes of transportation may proceed without Alyeska permission.
- Linear use via any transportation mode of small portions (generally under 1 mile) of the pipeline workpad or of the numerous TAPS access roads can proceed after obtaining a letter of non-objection from Alyeska and permission from the pertinent landowner.
- Depending on TAPS work activities and seasonal conditions, the workpad is closed at times to all traffic, including Alyeska and its contractors. Blocking Alyeska access roads is not allowed under any cir-



cumstances.

- Hunting, trapping, or shooting across, from, or on the pipeline right-of-way is not allowed.

Tourism and recreation opportunities available on the North Slope have been enhanced since the opening of the Dalton Highway to the public in 1995 (BLM, 1998). The Dalton Highway has been integrated into tour packages offered by the major sightseeing companies. Recreationists can access Gates of the Arctic National Park via an abandoned road to an unused material site located along the Dietrich River. Gravel pads that were used during construction of TAPS for temporary housing and other facilities are commonly used as unimproved campgrounds. While BLM or ADNOR do not maintain visitor statistics, use of the Dalton Highway as access to the national parks and wildlife refuges has become increasingly popular. Backpackers, skiers, and dog mushers use the Dalton Highway as a starting or ending point for traverses of the Gates of the Arctic National Park and the bordering wildlife refuges. Traveling rivers north of the Arctic Circle for recreational purposes became increasingly popular in the 1990s (Moseby, 1999, pers. comm.), some of which increase is attributable to the cheaper access provided by the Dalton Highway. Most recreation areas accessible from the Dalton Highway are capable of supporting increased use.

Since completion of pipeline construction in 1977, recreational opportunities in the TAPS study area between Livengood and Valdez have been enhanced by construction of the Olnes Pond Recreation Area, the Chena River Lakes Recreation Area, the Big Delta State Historical Site (Rika Wallens), and the Tielke River Campground. Recreational activities in this portion of the study area include wildlife viewing, nature photography, hunting, sport fishing, mountaineering, backpacking, camping, biking, river running, cross-country skiing, snowmachining, dog mushing, and berry picking. Improvement of public and private recreation facilities which existed before construction of TAPS and the improvement of access infrastructure have enhanced recreational interests, especially near the population centers of Fairbanks, Glennallen, Copper Center, and Valdez.

Impediments to recreational access include the distance to some recreational areas and difficulty of accessing some. Primitive wilderness experiences are much more limited than in the northern half of the pipeline, but can still be found in Wrangell-St. Elias National Park.

The Ivishak, Delta, and Gulkana rivers within or adjacent to the TAPS study area are designated as wild and scenic rivers (WSR) under the Wild and Scenic Rivers Preservation Act of 1968. The Ivishak is designated as a

WSR where it flows through ANWR and then joins the Sagavanirktok River at TAPS MP 55 near Pump Station 2. The Delta River was named because of its outstanding scenery and natural and cultural values. Recreational opportunities along the Delta include rafting, kayaking and canoeing, fishing, hunting, wildlife viewing, and photography. The Delta WSR boundary overlies the TAPS ROW between MP 577 and MP 602, where TAPS exits the boundary of the Delta River WSR. The Gulkana River was named a WSR because of its primitive character, abundant fish and wildlife, and geologic, cultural and recreational values. The Gulkana is an excellent resource for wildlife viewing and offers a variety of white-water challenges, solitude, great fishing, and easy road access at both the boating put-in and take-out points. The Gulkana WSR boundary overlies the TAPS ROW between MP 653 and 655.

Recreational opportunities in and around the City of Valdez include viewing of marine and terrestrial wildlife, ocean cruises, sea kayaking, nature photography, hunting, sport fishing, mountaineering, backpacking, camping, river running, power boating, back-country skiing, snowmachining, glacier viewing and travel, and berry picking. Valdez is famous for its opportunities for marine boating, wildlife viewing, and extreme skiing experiences.

Also, TAPS facilities are a major tourist attraction in Alaska. In 1996, approximately 200,000 persons visited established Alyeska visitor sites such as visitor centers, pump stations, and the VMT (APSC, 1999c). According to data from the McDowell Group (1993),⁸ TAPS ranked ninth in terms of the number of visitors to various Alaska attractions. In 1993, approximately one of four persons estimated to have visited any of the major Alaska tourist attractions visited some portion of TAPS. Nine viewing stations readily accessible from the Alaska highway system were established along TAPS.⁹ These provide information on the history and engineering of the pipeline. The two viewing stations with the highest visitor counts are the Steese Highway site near Fox, and Pump Station 12, at Milepost 64 of the Richardson Highway.

3.3.6.3 Visual Resources

Visual resources are defined as the land, water, vegetation, animals, and structures that are visible on the land. The TAPS ROW passes through areas containing outstand-

⁸This is the latest year for which these data are available.

⁹The visitor counts reported by Alyeska (APSC, 1999c) do not include an estimate of the number of visitors that may stop at the viewing stations to read the descriptive information and/or take photographs.



ing visual resources (Table 3.3-13). Dominant features include TAPS and its associated facilities; the vast treeless tundra of the Arctic Coastal Plain; the mountains of the Brooks Range and Alaska Range; the cities of Fairbanks, North Pole, Delta Junction; the communities of Glennallen and Copper Center; the city of Valdez; and the coastal region of PWS. Alyeska (APSC, 1993) inventoried outstanding visual resources along TAPS. A discussion of visual resources is relevant to TAPS ROW renewal decision because (1) continued operation of the pipeline retains present pipeline-related impacts, including the presence of TAPS and associated facilities and the possibility that oil spills could temporarily affect visual resources, and (2) the no-action alternative could create visual impacts associated with dismantling, removal, and restoration (DR&R) of TAPS.

The TAPS ROW covers approximately 16.3 square miles (APSC, 1999c), less than 1/34,992 of Alaska's land area of 570,374 square miles (DOC, 1992). The potential visual impacts of TAPS were considered in the design, and stipulations were included in both the federal and state ROW agreements. For example, federal Stipulation 2.10.1 states that "Permittees shall consider aesthetic values in planning, construction and operation of the Pipeline System. Where the Right-of-Way crosses a State highway in forested terrain, the straight length of the Pipeline Right-of-Way visible from the highway shall not exceed six hundred (600) feet in length, unless otherwise approved in writing by the Authorized Officer. The Authorized Officer may impose such other requirements as he deems necessary to protect aesthetic values."

With minor wording changes ("Lessees" rather than "Permittees" and "Pipeline Coordinator" rather than "Authorized Officer"), the same stipulation is included in the State lease. Other stipulations that address visual impacts are those related to buffer strips and vegetative screens.

3.3.7 Wilderness

By ClearWater Environmental, Inc. staff

3.3.7.1 Federal- or State-Designated Wilderness

The passage of ANILCA (Public Law 96-487) on December 2, 1980, provided for the establishment or expansion of the following designated wilderness areas:

- Section 303: Expansion of the Arctic National Wildlife Refuge, which boundary now lies approximately 1 mile east of the Utility Corridor near the headwaters

Table 3.3-13. Visual resources along TAPS (APSC, 1993).

Pipeline MP	Description
5	Former Dalton Highway checkpoint to Prudhoe Bay; Prudhoe facilities visible on the horizon
15-36	Franklin Bluffs
64	Overlook of the Coastal Plain
73	Overlook of Sagwon Bluffs
106	View of highway, gas line, and PS 3 to the north
112	View of highway, gas line, and PS 3 to the north
118	Overlook of Slope Mountain
125	Special big game crossing of the pipeline
129	Potential BLM overlook of Toolik Lake
136-144	Views of Atigun R., Gailbraith L., PS 4, and pipeline
139-175	Galbraith L., overlooks of Atigun and Chandalar valleys
152	Potential BLM overlook
176	Potential BLM overlook of the Chandalar Shelf
197	Potential BLM overlook of A/Loon ponds
207-211	Sukapak Mountain
246	Panoramic view of the Middle Fork Koyukuk R. Valley
247	BLM Cathedral Lake overlook
253	Overlook of Chapman Lake
262	Grayling Lake
278	Gobblers Knob; view of Prospect Cr./Jim R. drainage, and PS 5
306	Potential BLM Olson's Lake overlook
311	Wayside and Overlook facility
312	Finger Rock
319	Viewpoint of pipeline
323	Potential BLM overlook of Yukon Flats
339	Overlook of Ray River and Ray Mountains
347	Overlook of Dalton Hwy, pipeline, Yukon, and PS 6
353-354	View of the pipeline crossing of Yukon River
388	Overlook of Erickson Creek and pipeline
417	Globe Creek and Grapefruit Rocks viewpoint
420	Pipeline viewpoint
448	Pipeline viewpoint
531	Viewpoint of pipeline crossing Tanana R.
550	Viewpoint of PS 9
562	Viewpoint of pipeline and the Alaska Range
578	View of Black Rapids Glacier and Delta R.
584	Viewpoint of PS 10
588	Viewpoint of special designs for fault crossings
599	Photo point of pipeline
607	View of Gulkana Glacier and summit of Isabel Pass
614	Viewpoint of Summit Lake and pipeline
625	Overlook of Paxson Lake
642-645	Overlooks from highway on Hogan Hill west and south
687	Overlook of Copper R. and Wrangell Mountains
711	Overlook of pipeline, Alyeska interpretation signs
770	Photo site for Worthington Glacier National Natural Landmark
774-776	Thompson Pass
780-785	Keystone Canyon, historic railroad tunnel, Bridal Veil Falls, and Horsetail Falls



of the Sagavanirktok;

- Section 201: Establishment of the Gates of the Arctic National Park, which lies west of the Utility Corridor in the Brooks Range;
- Section 302: Establishment of the Kanuti National Wildlife Refuge, which lies west of the Utility Corridor in the Yukon Flats area between the Brooks Range and the Yukon River;
- Section 403: Establishment of the White Mountains National Recreation Area, which lies east of the Utility Corridor in the Wickersham Dome area between Livengood and Fox;
- Section 201: Establishment of the Wrangell-St. Elias National Park, which lies east of the Copper River, several miles east of TAPS in the Copper River Basin.

While there had long been road access alongside these newly defined wilderness tracts, TAPS and the Dalton Highway created new access points for the northern wild and primitive areas from the Yukon to the Arctic Ocean. This access was gained not from the road itself, but the airstrips built to service pipeline construction came to provide staging and jump-off points for recreationists, hunters and fishermen, and subsistence users. Therefore, the wilderness areas absorbed a growth of human entry and use at the moment they were reclassified.

3.3.7.2 Description of Wilderness Character of Remaining Areas

Although not specifically classified by law as wilderness areas, most of the federal (BLM-managed), State of Alaska, and private landholdings (primarily Native corporation and Native allotment tracts) that have not been penetrated by roads or dotted by remote airstrips are classed as undeveloped lands to be managed by their respective agencies in a fashion that preserves wilderness values to the maximum extent possible. Since hunting and fishing, back-country hiking, canoeing, and even in most cases, travel by all-terrain motorized vehicles are regarded as consonant with the preservation of primitive-area values, the managing authorities (BLM, ADNR, National Park Service, FWS, U.S. Forest Service, and Native corporations) allow and encourage such uses in accordance with the appropriate management regulations imposed by agencies such as ADF&G. More permanent developments such as lodges, guiding camps, airstrips, and the like would also be possible in these primitive/undeveloped areas, whereas they would be prohibited in designated wilderness. It is unlikely that mining, oil and gas exploration and development, timber harvesting, and commercial fishing will be allowed in presently designated

wilderness areas, but such development is judged on a case-by-case basis for these otherwise undeveloped areas.

3.3.8 Transportation

By ClearWater Environmental, Inc. staff

3.3.8.1 Introduction and History

By the late 1960s, Alaska's transportation systems had evolved on four fronts that grew directly from the historical patterns associated with natural resource extraction, customary uses by its indigenous and settler populations, and the creation of links to and between military installations (Gruening, 1968). Waterborne networks remained critical to the commercial fishing, timber, and mining industries, including the shipments of petroleum products from the oil fields of the Kenai Peninsula and Cook Inlet areas (Gruening, 1968). Road networks were concentrated almost entirely in the southeast quadrant of the state and were linked to the outside by the Alcan (Alaska) Highway constructed in the early 1940s as the military supply lifeline (Gruening, 1968). Built in the 1920s, the Alaska Railroad served primarily as an enhancement to the existing road and trail system of Southcentral Alaska. Apart from the extensive network of trails that for centuries had served as the travel arteries for Alaska's Native inhabitants and subsequently for the miners and trappers, by the late 1960s the airplane had become the key transportation element to knit Alaska together. Although there had long been plans to extend the road and railroad systems to northern and western parts of the state, air travel and freight movement appeared both more efficient and less costly in a place where both people and resources were so widely dispersed.

Fairbanks, which is situated for seasonal shipping along the Yukon and Tanana rivers, is a convergence point of the Alaska transportation system. It is the terminus of both the railroad and the Alaska Highway. Its civil and military airfields are at the strategic center for the rural connecting system. However, the Prudhoe Bay oil discoveries helped make Fairbanks a new hub for land-based transportation. The construction of the Dalton Highway (Haul Road) and TAPS fundamentally reoriented the inland and seaborne transportation system from one that served only a quarter of that area to a north-south artery. The transportation system became capable of conveying massive amounts of material necessary to construct and operate the Prudhoe Bay oil field, and to transport oil south to market.

One of the reasons the Prudhoe to Valdez route was selected for TAPS was to ensure that the pipeline would be



wholly on U.S. soil (BLM, 1972). In addition, the route had the advantage of using the existing transportation infrastructure — especially the roads — already in place from Fairbanks south. TAPS roughly parallels the Alaska Highway from Fairbanks to Delta Junction and the Richardson Highway from that point to Valdez. The required enhancements included construction of a new 400-mile north-south road link from Prudhoe Bay to Livengood, creation of adequate airstrips between Fairbanks and Prudhoe, expansion of the major ports at Anchorage and Seward for material shipments on the railroad, and construction of the tanker terminal at Valdez.

3.3.8.2 Transportation Systems

This subsection includes a description of transportation systems that support TAPS (Figure 3.3-38).

Aviation

Aviation is a key element of Alaska's transportation system,¹⁰ as evidenced by the following statistics:

- In 1996, Alaska had 546 airports, including those for fixed wing aircraft, heliports, etc. (FAA, 1997). Normalized by the state's population, this is equivalent to 90 airports per 100,000 residents — greatest among all 50 states and nearly 9 times greater than the average for the rest of the U.S. Besides these designated landing fields, aircraft use a large number of unprepared fields, lakes, glaciers, etc., to a degree unequaled elsewhere.
- There were 88.5 general aviation aircraft registered in Alaska per 10,000 residents in 1996 (calculated from data contained in FAA, 1997). This was the highest ratio among all 50 states and nearly 10 times greater than the average for the rest of the U.S. Figure 3.3-39 shows the top 10 states ranked in descending order.
- In 1996, there were 14.5 Federal Aviation Administration-licensed pilots in Alaska per 1,000 residents (calculated from data contained in FAA, 1997). This was the highest among all 50 states and 5.9 times greater than the average for the rest of the U.S. Figure 3.3-40 shows the top 10 states by this measure ranked in descending order.

The large distance between cities and relative lack of highway and railroad infrastructure in Alaska provided the economic impetus to continually advance and upgrade

aviation systems in the state. Anchorage provides the primary hub for cargo and passenger transport for central Alaska — followed by Fairbanks. Several major domestic airlines provide daily service to the contiguous 48 states and to international destinations. Anchorage and Fairbanks have both become important air-cargo transfer centers for goods to and from Asia. Additionally, several Alaska-based airlines serve internal routes, and many charter/air taxi operations exist.

Aviation support facilities were integral to development of TAPS. Before construction, six public airstrips existed along the ROW: Deadhorse, Sagwon, Fairbanks, Delta Junction, Gulkana, and Valdez. Deadhorse and Sagwon were both established to support oil exploration north of Atigun Pass. Fairbanks and Delta Junction were established aviation hubs that supported military installations and mining operations, and were important staging points for transportation to villages, outposts, and camps. The Gulkana and Valdez airports were small airstrips to service their communities. Aviation support to any destination between these established airstrips was restricted to helicopters or to small fixed-wing aircraft able to land on a gravel bar or lake. Construction of TAPS required additional aviation support for personnel, material, and supplies.

Between 1971 and 1972, 12 improved gravel airstrips were built for TAPS construction. Each supported C-130 Hercules aircraft and DC-3 tankers. Four of these airstrips were later reclaimed and are no longer serviceable as air support facilities. Other airstrips remain under state or private maintenance, and some are used by general aviation but are no longer listed on current FAA sectional charts.

Aircraft transport personnel and supplies to some TAPS-related facilities¹¹ and to North Slope oil exploration and production facilities. Information on use of aircraft associated with these operations can be found in several sources (e.g., USACE, 1999; MMS, 1998).

The Deadhorse Airport, which is owned and operated by

¹¹Alyeska also uses air links to transport employees and contractors to several sites along the pipeline. Workers at Pump Station 1 fly to Deadhorse (and are included in passenger totals shown above); those at Pump Stations 3 and 4 fly to the airport at Galbraith Lake on ERA Aviation; those at Pump Station 5 fly to Prospect airport on ERA or Frontier Airlines; and workers at Pump Station 12 fly to Gulkana Airport on ERA Airlines. Workers at Pump Station 9 live in Delta and environs, and those at Pump Station 7 are able to commute from Fairbanks. The other pump stations have been placed in standby status. Routine deliveries of materials and supplies are made by truck. Air cargo is used only for time-critical parts and supplies. In the proposed action, Pump Stations 7 and 12 will be placed in standby status in the upcoming years, eliminating the need for air travel for workers to Gulkana. For the no-action alternative, air travel to Galbraith and Prospect will no longer be required.

¹⁰Since at least the 1930s, air transportation has been important in Alaska. Coates (1993) states: "According to figures quoted for 1938 there was a higher per-capita rate of airplane use in Alaska than anywhere else in the world besides Arctic Canada and Russia."

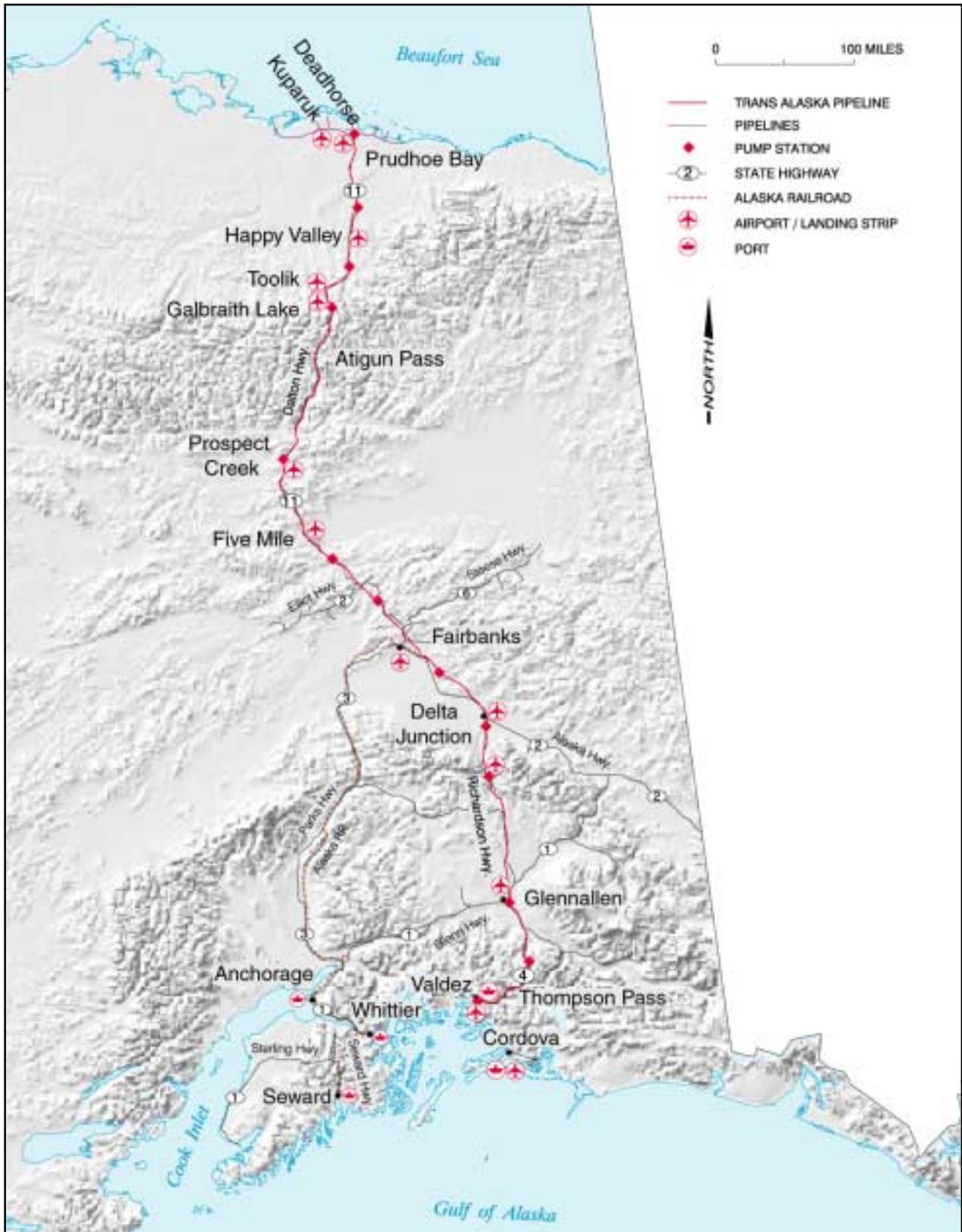


Figure 3.3-38. Transportation assets of Alaska.

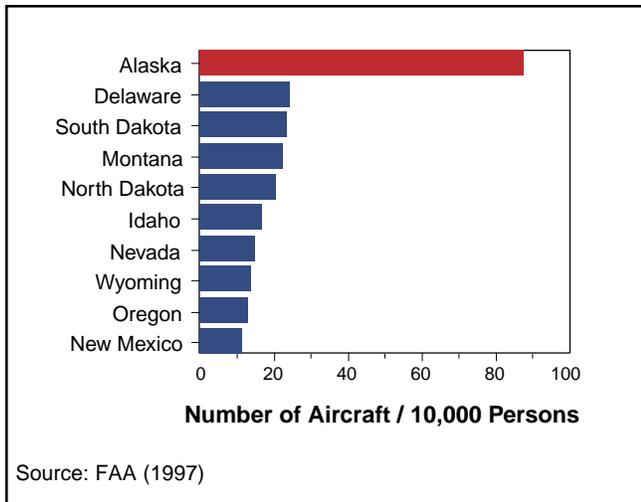


Figure 3.3-39. Number of general aviation aircraft per 10,000 residents, top 10 states ranked in descending order.

the State of Alaska, is served by Alaska Airlines and oil industry charters. Each provides daily service to Deadhorse from Anchorage and/or Fairbanks, with an estimated 200,000 passengers transported to and from Deadhorse annually. Annual freight transport to Deadhorse is estimated at approximately 648 tons (USACE, 1999). The Kuparuk oil field also has its own private airstrip. No evidence exists of traffic-related congestion and/or delays associated with these flights.

Rail Systems

The history of the Alaska Railroad extends back over 80 years, and the railroad is responsible for the creation of Anchorage (ARRC, 1999). In 1912, the Alaska Railroad Commission was created by an act of Congress to "...connect one or more of the open Pacific Ocean harbors on the southern coast of Alaska with the navigable waters in the interior of Alaska...for the transportation of passengers and property." Construction of the rail line from Seward to Fairbanks began in 1915, and soon after, the city of Anchorage was created as the base of operations. The original rail lines between Seward, Anchorage, and Fairbanks were completed in 1923. The rail line was to be operated by the Alaska Railroad, which was established as an agency of DOI. In 1941, construction began on an additional rail line to the port of Whittier, which was a fuel repository necessary to the war effort. Service to Whittier began in 1944 (BLM, 1956). For the next 41 years, the Alaska Railroad remained an agency of the federal government, passing from the DOI to the U.S. Department of Transportation in 1967. In 1987, the Alaska Railroad became property of the State of Alaska, and the newly created Alaska Railroad Corporation was charged with overseeing its operation (ARRC,

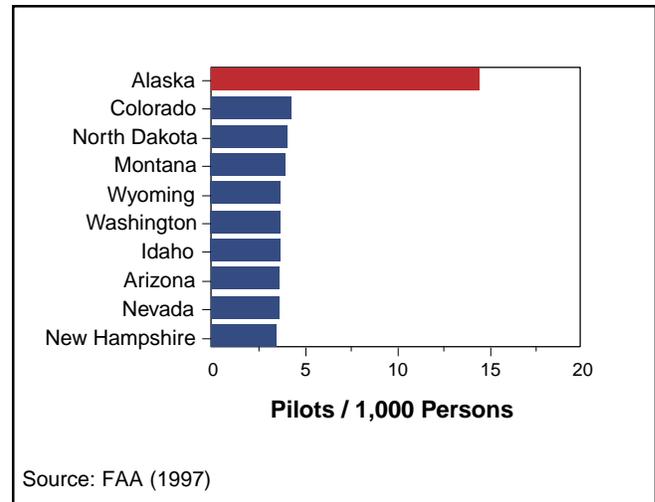


Figure 3.3-40. Number of licensed pilots per 1,000 persons, top 10 states ranked in descending order.

1999).

In 1999, the Alaska Railroad provided passenger service to over 676,000 people and moved an estimated 6.5 million tons of freight, transporting cargo to and from the Interior. The Alaska Railroad is an important link for exporting coal and manufactured goods (Carr, 1999, pers. comm.). There is twice-daily freight service between Anchorage and Fairbanks and once daily service between Fairbanks and Seward in summer. Deliveries of coal occur from Healy to Seward two to three times a week in summer (Johnson, 1999, pers. comm.). The railroad also transports petroleum from the Williams Refinery in North Pole to Anchorage, Seward, and Whittier for use at Alaska's airports and military bases and for export overseas (Silverstein, 1999, pers. comm.).

Road Systems

The public road infrastructure is not well-developed in Alaska — one of the factors that helps explain the importance of aviation. In 1996, according to data from the Federal Highway Administration's publication *Highway Statistics* (FHWA, 1996), there were 13,255 miles of public road in Alaska, including both rural and urban and roads under federal, state, and local control. Among all the states, only Rhode Island (6,001 miles), Delaware (5,715 miles), and Hawaii (4,142 miles) have fewer miles of public roads. More relevant is a comparison of the miles of road to land area of the state. Figure 3.3-41 shows states ranked in descending order of the ratio of the state's area to the length of its public roads. Alaska is in a class by itself by this measure.

Roads and highways that provide access to and support TAPS include the Dalton, Elliott, Steese, Alaska,

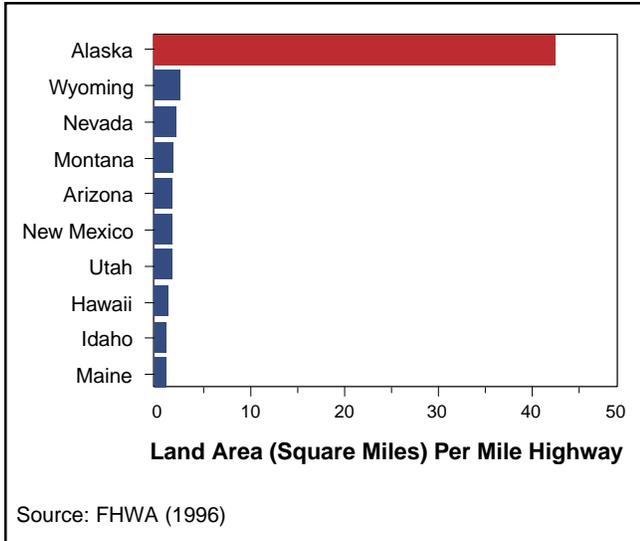


Figure 3.3-41. Top 10 states ranked in descending order of land areas per mile of road.

Richardson, and Glenn highways, and Chena Hot Springs and Dayville roads. Additionally, there are approximately 225 secondary roads that provide private access to the pipeline, pump stations, and airstrips. Roads are now used to carry supplies to the North Slope and to various pipeline-related facilities, and roads would be used to haul dismantled sections of the pipeline if the ROW were not renewed.

The Dalton Highway is a 28-foot-wide crushed-gravel road that extends 416 miles from the town of Livengood to the industrial complex of Deadhorse. Construction of what is now known as the Dalton Highway began in the winter of 1969-70 when the TAPS Owners built a 55-mile road from Livengood to the Yukon River. Construction began on the remainder of the highway on April 29, 1974. This 358-mile road from the Yukon River to Deadhorse required 3 million hours of labor, 32 million cubic yards of gravel, and \$125 million dollars before being completed on September 29, 1974. Previously known only as “the Haul Road,” it was officially dedicated as the Dalton Highway in 1981 after James B. Dalton, a pioneer independent mining engineer and one of the first to haul equipment and supplies overland from Interior Alaska to the Arctic. The Dalton Highway was built to provide an overland route between Fairbanks and Prudhoe Bay for construction of TAPS. Originally, use of the highway was restricted to authorized commercial traffic. The Dalton was opened to the public in 1995 and now provides unrestricted overland access to the northern half of Alaska.

The majority of traffic on the Dalton Highway is commercial freight vehicles associated with oil-field activities,

although privately owned vehicles and commercial tour operators also use the highway (MMS, 1998; USACE, 1999). Annual loaded and return truck traffic in 1996 was reported at 45,236 (MMS, 1998), equivalent to a daily average of 124. Traffic counts along this highway fall off rapidly with distance north and are higher in summer than winter.

The TAPS segment from the Yukon River to Delta Junction includes the Elliott, Steese, and Richardson highways and Chena Hot Springs Road and connects to the Alaska Highway. The Elliott Highway extends 152 miles from the town of Fox through Livengood to the community of Manley Hot Springs (Graef, 1999).

The Alaska Highway runs from Dawson Creek, British Columbia, 1,390 miles to Delta Junction, Alaska. Construction of the highway began on March 9, 1942. While an overland route from the contiguous 48 states had been studied as early as 1930, it was not until the assault on Pearl Harbor in 1941 showed Americans how vulnerable Alaska was to attack that construction of the Alaska Highway was deemed a military necessity (Graef, 1999). A network of preexisting airfields known as the Northwest Staging Route determined the general route of the highway. In addition, routing of the highway was planned to incorporate existing winter roads and old Indian trails as much as possible (Graef, 1999). The Alaska Highway is not part of the TAPS study area, except at Delta Junction; however, it provided an important all-season route for overland transportation of material during TAPS construction.

The TAPS segment from Delta Junction to Valdez parallels the Richardson Highway, which begins in Valdez and extends north 368 miles through Glennallen and Delta Junction to Fairbanks. The Richardson was Alaska’s first highway. In 1920, the road was improved to automobile



H. Walker for Alyeska Pipeline Service Company

Photo 3.3-29. Dalton Highway.



standards and finally paved in 1957 (Graef, 1999).

In 1866, Congress enacted RS2477 (43 U.S.C. 932) allowing the general public to obtain road rights-of-way on unreserved federal land. The federal law was repealed in 1976, but the rights-of-way it created remain in effect. The Alaska Legislature enacted AS 19.30.400-420 in 1998 and nominated 602 routes believed to meet RS2477 qualifications. Many of these public-trail easements were accommodated in the design and construction of TAPS.

Inland Waterways

The use of inland waterways for transportation dates before recorded history in Alaska. Traditionally, Alaska Natives used rivers as a main source of transportation. Beginning in the eighteenth century, Russian fur traders established trading posts on the banks of rivers for storing and moving supplies and for transporting furs to sea for eventual shipment to Russia. Alaskan rivers became even more vital to transportation after the discovery of gold in the mid-1800s (Stern, 1982). Since then, Alaska's inland waterways have continued to be a vital means of transporting supplies from ports and harbors to the Alaskan Interior and exporting natural resources to oceangoing vessels. Only the Yukon and Tanana rivers have been used by barges to transport materials related to construction or operation of the TAPS. Yutana Barge Lines hauled portions of the E.L. Patton bridge during TAPS construction. Currently, materials associated with TAPS operation are not transported via inland waterways. Refined petroleum products and building and construction supplies are still transported on the Yukon and Tanana for purposes unrelated to TAPS.

Marine

North Slope crude oil is shipped by tanker from the Valdez terminal to refineries primarily on the U.S. West Coast (see Section 2.2.2). Other shipping traffic that occurs in PWS and Valdez involves movement of refined oil products from the Petro-Star refinery by smaller tankers and barges to other Alaska ports, as well as general and military cargo traffic to and from other piers in Valdez. Commercial fishing and processing vessels form a significant waterborne industry in PWS. Sport, tour boat, and cruise ship operations are important during summer. The Alaska State Ferry System has regular sailings through PWS (Whittier to Valdez; Valdez to Cordova, Seward, Kodiak, and Homer). The waters of PWS are used extensively by sea kayakers and recreational boaters.

Pipeline Systems

TAPS is a 48-inch-diameter common carrier pipeline system beginning at Pump Station 1 in Prudhoe Bay and extending 800 miles to the tanker-loading terminal in Valdez. A 149-mile-long fuel gas line operated by Alyeska provides natural gas for fuel to the TAPS pump stations north of the Brooks Range. Crude oil is transported from the North Slope gathering centers/processing facilities to TAPS at Pump Station 1 through common carrier pipelines (Figure 3.3-42). In addition, two pipeline systems transfer crude oil from TAPS to Alaska refineries: Williams (formerly MAPCO) and Petro-Star in North Pole, Alaska, and Petro-Star in Valdez.



Figure 3.3-42. Common-carrier pipelines on the Alaskan North Slope.