

# Office of Fisheries Development

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## By-Product Development

By-products from fish waste is an important development topic for the Alaska seafood industry. Alaska is one of the world's greatest producers of wild capture seafood. While there are a fair number of our fisheries that make use of fish waste through fishmeal plants or other processes, there are several notable areas and fisheries that are without any significant by-product recovery.

Salmon is one fishery that lacks alternative uses for most of its fish waste. This is a particular problem in certain areas of Alaska where fish waste accumulates to levels high enough enforcement actions by regulatory agencies. In the chum salmon fishery, where the main value is the roe, use of the carcasses, as required by the State's wanton waste law, creates difficulties for fishermen and processors. The roe is at its highest value when the fish are ready to spawn, but the quality of the flesh is much reduced at that point. Finding alternative uses for chum flesh, short of returning it back into the natural food chain, is an important challenge. Some progress has been made to date, but much remains to be done.

## Current Alaska Production

Nonetheless, there are a number of fishmeal and fish oil operations in Alaska. In 2001, 62 facilities reported fishmeal production. The wholesale value of these operations was over \$28 million. A significant portion of the fish meal production comes from groundfish operators, either at facilities in Dutch Harbor and Kodiak, or from at sea in factory trawlers. Compared to global production of fishmeal in 1999, Alaska's production of 41,700 metric tons (92 million pounds) was less than 1% of the entire world's supply. Alaska production of fish oil ranks similarly to relative to global fish oil production.

## Limitations

Our fisheries are geared for human consumption. Processing thus removes much of the nutrient value, leaving relatively low-nutrient waste. Therefore, achieving similar nutrient levels to those found in meal from whole fish reduction fisheries (sardines, anchovies, menhaden, herring, etc.) is difficult in Alaska waste-based fishmeal production.

### Fish Meal

Year	Reporting Producers	Pounds	Dollars
1990	56	106,136,799	\$ 17,766,838
1991	110	140,110,771	\$ 35,528,696
1992	112	141,443,842	\$ 33,530,240
1993	71	157,350,209	\$ 35,167,270
1994	98	111,240,335	\$ 24,529,793
1995	26	80,895,593	\$ 20,637,887
1996	27	74,037,476	\$ 22,425,897
1997	35	68,463,958	\$ 19,462,127
1998	19	44,097,201	\$ 16,926,717
1999	41	92,938,024	\$ 25,350,251
2000	32	111,580,751	\$ 29,880,170
2001	62	91,797,010	\$ 28,021,528

### Fish oil

Year	Reporting Producers	Pounds	Dollars
1990	23	7,352,691	\$ 507,341
1991	29	10,775,638	\$ 423,455
1992	17	5,792,675	\$ 704,865
1993	5	10,686,601	\$ 1,101,939
1994	20	19,252,660	\$ 2,638,373
1995	14	18,873,009	\$ 3,406,588
1996	15	16,959,980	\$ 2,948,234
1997	10	11,590,749	\$ 2,517,953
1998	10	9,161,437	\$ 2,273,522
1999	7	13,405,728	\$ 2,621,675
2000	9	11,257,216	\$ 1,633,520
2001	19	16,588,038	\$ 2,581,079

Alaska fishmeal and fish oil production.



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Global reduction fisheries (those fisheries devoted to fishmeal and fish oil) produced 30.4 million metric tons in 1999, while the entire Alaska fishery produced less than 7% of that amount. The potential volume of material available for meal and other by-product production (after removing portions for human consumption and processing losses) is therefore quite limited when compared to the global reduction fishery.

## Opportunities

Over the last ten years, production from the world's wild capture fisheries has leveled off, with 18 - 25% of all wild capture fisheries dedicated to reduction products. Meanwhile, aquaculture production has been significantly increasing. Assuming that most reduction fisheries are managed for sustainability, any increase in by-products availability must come from fish waste from seafood processed for human consumption.

Alaska may have some opportunities in this regard. Although the potential volume of fish waste byproducts from Alaska is small, it may nonetheless be possible for communities and industry to handle waste more efficiently, develop commercially viable products, and reduce environmental compliance costs.

Determining the economic potential of fish waste products, and the production technologies required is highly dependent on the volume and mix of species available. There are often many technologies to create essentially the same product. Choosing the appropriate process is essential to achieve profitability.

## Uses

Fish Meals: Fishmeal moves almost exclusively into livestock and aquaculture feeds. A significant, but shrinking portion of fishmeal goes into poultry production. With the increase in aquaculture production, it is expected that more fishmeal will go towards this growing segment.

Fish Oils - Fish oil use changed dramatically in recent years. In 1990, most fish oil went for human consumption. However, by 2000, a majority of fish oil production went towards aquaculture operations due to the growth in production of salmon that benefits from fish oil additives in feed. Trends suggest only a small fraction of the oil produced in the near future will go towards human consumption.

Bone meal - Bone meal is used for livestock feed. The use of bone meal from ruminants (sheep, cows, goats) in Europe was the cause of recent "mad cow" food scares. The European prohibition on using such bone meal in livestock feeds may be an opportunity for development of wild capture seafood bone meal.

Fuel - Fish waste may be converted to fish fuel that is comparable to diesel. Dutch Harbor reportedly produces 3.5 million gallons of fish oil. UniSea, a major processor in Dutch Harbor, worked with the Alaska Energy Authority on a pilot project to test the efficiency of using fish oil with diesel fuel for electrical generation. The results so far have been positive and await the results of long-term testing on the engines. A number of factory trawlers have been adding a fraction of fish oil to their fuel for years.

Bait - Longline and pot fisheries consume large volumes of bait. In Alaska we import thousands of tons of bait every year. Yet little effort has so far been expended to develop a bait market utilizing salmon heads, or carcasses from roe stripped fish that are unsuitable for food use.

Plant Fertilizers - There are a few manufacturers of fertilizer made from Alaska fish waste. This is a growing business segment, as fish based fertilizers such as hydrolysate often offer growers numerous advantages over other fertilizer types. Opportunities also exist to partner fish wastes with the availability of other natural resource waste such as timber

Human food - Human consumption of byproducts is an important consideration. Fish oil, fishmeal, and certain organs, all have uses in fulfilling dietary needs in markets throughout the world.

Pet food - Several pet food manufacturers are already using salmon by-products. With growing populations and great levels of pet ownership, the pet food market is certainly a growth segment. For more information on its market potential, read Trends in the U.S. Pet Food Industry: The Potential for Alaska Seafood Products

Health products - A number of seafood products are touted for their healthful attributes. Pharmaceutical and nutraceutical products have long been used to cure human ailments. Cod liver is a product long sought in the markets. Recent attention is turning towards Omega 3 oils, widely found in wild salmon

Stickwater process - The Kodiak Fishery Industrial Technology Center conducted studies on filtering all proteins out of fish waste in an attempt to boil down waste to become essentially water. This would ease dumping requirements in some areas.