PART I: PLENARY SESSIONS

(MONDAY-WEDNESDAY, DECEMBER 8-10, 1980)
FISHERIES AS A PART OF LIFE IN ALASKA
(MORNING SESSION, DECEMBER 8, 1980)

PARTICIPATION OF ALASKA NATIVES IN COMMERCIAL FISHERIES

Anthony Vaska
Nunam Kituitsiit
Box 267
Bethel, Alaska 99559

In my comments today I do not presume to represent all Alaska Natives. My perspective will be basically from that of my work. For the last 4 years I have been working with Nunam Kituitsiit, which is the environmental arm of the Association of Village Council Presidents which encompasses one-fourth of all the villages in the State of Alaska.

Participation of Alaska Natives in the commercial fisheries is very new. Ours is basically a subsistence life-style in rural Alaska, and for the most part our fishery is a subsistence fishery, but a lot of native people have been getting into commercial fishing. This is especially true in Bristol Bay, and presumably it is also true in the Aleutian Chain, Kodiak, Southeast Alaska, and Prince William Sound. If you were to go to the meetings of the North Pacific Fishery Management Council and the Alaska Board of Fisheries which are also being held this week, you would learn of the involvement of Alaska Natives in the regulatory mechanism set out by both of those groups.

Individually and collectively we have very definite needs from the State of Alaska in terms of managing and conserving the fishery resources, and we have very definite needs in terms of fisheries education.

At times we also have individual and differing views on the existing fisheries. I, for one, have specific ideas on what can only be called "wasteful fisheries." A prime example is fishing herring for sac roe. This is very wasteful. The carcasses are discarded. When you come from a lifetime of using pretty much the whole of a fish or any other resource, this type of fishery seems really strange.

However, we find ourselves becoming more and more involved in the wasteful fisheries because we do need the money. It has been a drastic change from the traditional way, of catching the fish when it is there, using it when it is fresh, or preserving it by drying it or smoking it, and, within the last 100 years, salting it. But, for the most part, the saltery has come in as an introduction by outsiders. The introduction of canneries also led to our participation in the commercial fisheries.

The fisheries of the Yukon and Kuskokwim rivers are very limited compared to, say, the fisheries of the high seas or Bristol Bay. The kind of fishery
is very different, and the price of the fish is very different. Last summer we were getting from 5 to 15 cents a pound for chum salmon.

We have individual problems that need to be addressed by the state, by the University of Alaska, by research. Biologists have very little information about a lot of the different kinds of fish that we use in our region. The Alaska Department of Fish and Game studies resources that produce cash income, so there are a lot of studies on salmon and herring. At this point I think they are inadequate, but at least studies are being done. Few or no studies are being done on whitefish, blackfish, great northern pike, trout, needlefish, lampreys, sheefish or inconnu, and burbot, to list but a few.

We need information about such species for several reasons. Big industry in the form of oil exploration and development is coming, and it will jeopardize a lot of things. It will jeopardize the fish and wildlife resources that surround us, and also the water supplies. Alaska is basically very dry. Yes, we do have 3 million lakes, but the annual precipitation is very low. So we do have potential water problems. We have to be really careful about these resources. We need more information on them.

Another problem is the complexity of the regulatory system we have to understand and work within. First we have the State of Alaska's local Fish and Game Advisory Committee. Then we have the state's Board of Fisheries, which revises its regulations twice a year. As you know, the State of Alaska has jurisdiction of all fisheries in the waters within 3 miles of the coast. For fishing beyond that limit, we also have to deal with the North Pacific Fishery Management Council, and if you think the Board of Fisheries is complicated, you should look at the council. We also deal somewhat with the International North Pacific Fisheries Commission, which deals with protocol concerning the salmon and herring fisheries of the high seas.

You have to remember that when we look at all this, most of us have to look at it from the perspective of the person in the village, where people don't speak English. Everything has to be explained in our language. That is one of the best things about our area. We use our native language for almost all everyday business. It takes a lot of bending and twisting and borrowing of words from English and other languages, but it works. I would like to see the State of Alaska, the University of Alaska system, try to work that out because I think it is important.

Nunam Kitlutsisti's goal has been to involve as many fishermen as possible, so it is involving people who have little knowledge about multi-national corporations that ship fish all over the world. I think it is government's responsibility to look at the really small fisherman. In our area we have fishermen with 18-foot skiffs who fish in the river for two 6-hour periods a week, and for the most part that is the source of their income for the rest of the year. It is a very small fishery. We have to deal with things like fish quality. Can we get a good enough product out of the Yukon-Kuskokwim drainage? Can we sell it?

The state and federal governments should both make commitments to looking at the small fisheries. It is difficult for us on several levels. The herring fleets, for example, can start out from San Francisco, complete with their
processors, and go up the coast following the fish as they migrate. They are better equipped, they have money backing them up, and they have a history of fishing commercially for herring. It is a different kind of fishery in a place like Goodnews Bay where most of the people do not speak English and most of the fishermen have only small skiffs. They are not prepared to fish herring on the same level. What kinds of protection are the state and federal governments going to give those citizens for fishing?

Even though it is so complicated, we have a lot of fishermen who are willing to look at the whole process and get into commercial fishing on a larger scale. It is a long, complicated process and I think we will need the help of big industry to get into it.
NATIONAL EFFORTS

Rod Moore,
Assistant in Fisheries
for Congressman Don Young
U.S. House of Representatives
1210 Longworth
Washington, D.C. 20515

We all recognize and agree, or we wouldn't be here, that commercial fishing is an important part of the Alaska life-style. We have two of the top three ports in the nation in terms of value landed, we have 35 percent of the nation's shoreline and 75 percent of the continental shelf, and all of the major fishing allocations occur within the 200-mile fisheries conservation zone off the coast of Alaska. Most of those allocations are still going to foreign nations, but we hope that is changing. The fishing industry is an important employer in this state. If you look at the fishing communities, the coastal communities like Petersburg or Kodiak, you see that it is the employer.

What are we going to do about it? Do we let the fishing industry continue going on as it has been, relying primarily on traditional species, doing a little bit of experimentation here and there with the so-called underutilized species--pollock, black cod, and so forth? Or do we make a major thrust at getting into some of these new fisheries? That is something the fishing community and you, as educators, are going to have to decide. I say, "you," because you have to supply the support for the efforts of fishermen and processors in Alaska as they get into these developing fisheries.

Regarding national efforts, I think one of the things that we have to learn to recognize is that Alaska has to compete in the world market--even though Alaska is a good distance away from the rest of the United States, even though we all sometimes think we are not getting equal treatment or we deserve special treatment, which is true in many cases, and even though people in other areas do not understand many aspects of life in Alaska. Alaska has to compete in the world market, and that market includes the rest of the nation. If we are going to compete, we had better start gearing up to learn exactly how to do it.

Look at fisheries development in Alaska now. Look at the boats, like the Arctic Trawler, or some of the new boats fishing for the joint ventures in the waters off Alaska, and you will find that a lot of these boats are coming out of Seattle. Why can't they come out of Alaska? There are some Alaskan boats participating, but for the most part they are sticking with the traditional fisheries. If we keep up with that approach, we are going to go right back to where we were before statehood, with everything being controlled out of Seattle. I do not think anybody wants that.
It is time to start using our imaginations a little bit. Tony Vaska was talking earlier about how folks in the bush, especially in Western Alaska, have relied on fishing for many years, primarily as a source of subsistence with some small-scale commercial fishing. I used to work in the lower Yukon area, so I am familiar with the fisheries there. In that area, essentially the same kind of fishing has been going on for years and years. With the exception of perhaps better boats, more powerful motors, and some nets that are put together a little bit better, not much has changed.

Recently we have noticed that some people are starting to look at changes. For example, Calista Corporation and Cook Inlet Region Incorporated are looking at a joint venture operation to see if they can develop some of the underutilized fisheries using small boats in their particular geographic area.

The need for imagination extends to the educational system. I graduated from the natural resource management program at the University of Alaska in Fairbanks, but the reason I did was that the fisheries program up there did not have the course work I needed to fulfill my interest, which was resource management with an emphasis on fisheries. The fisheries program up there was structured for traditional fisheries biologists. You learn everything you have to know about water pollution, ichthyology, zoology, anatomy, and so forth. This is fine if you need to deal only with fish, but you will also be dealing with fishermen, and with the environmental factors that affect them such as the economy and sociopolitical structures. Therefore, the fisheries education system you develop needs flexibility.

What type of fisheries education system should be developed: a traditional 4-year program in which the first couple of years are spent on English and chemistry, and so forth, and the next 2 years on a major subject; a community college program of 2 years spent in specialized courses; or short courses and workshops, where a fisherman can spend his limited amount of time in port gaining additional knowledge about his field? Whatever is decided, we must be flexible and innovative. We should not echo all of the ideas that are being pursued elsewhere, in other programs.

The first step in developing a fisheries education program is to identify your goals. Next, identify the problems that are preventing you from reaching those goals. Then organize in order to work at solving those problems and reaching those goals. Take, for example, the Bering Sea Fisherman's Association, which organized a year or so ago. The people in Western Alaska realized that if they were going to be able to compete in fisheries management in Alaska, they would have to organize. And that is what you must do, whether you are an educator looking for funding for education programs; or a fisherman who is worried about the price of fish or about new management regulations coming down from the National Marine Fisheries Service or the State of Alaska; or a processor who is worried that individual processors are being singled out and sucked under. You have to organize and do things together because this is the only way you are going to solve any problems. Once you organize you will find a lot of people are willing to help.

Congressman Young is very interested in the development of the fisheries in Alaska. He wants to see fishing continue as a major industry in Alaska, but
it is difficult to focus on specific problems. If we get fisherman A from Kodiak saying one thing, fisherman B from Petersburg saying something else, fisherman C from Wrangell saying a third thing, and fisherman D from Bethel saying yet a fourth thing, it would be the same situation as educators from the community college system or from the University of Alaska, say from Kodiak, Kuskokwim, and Prince William Sound community colleges, all identifying different problems. This is why you must organize and decide exactly what you want, and then we can work together to try to get it.

That is pretty much the focus of any national effort that is going to occur. We need to use our imaginations and be willing to use innovative approaches, whether it be in fishing, processing, or support systems such as education. We must learn to work together. This conference, which has gathered people from all over the United States and all over Alaska so they can sit down and identify these problems, is a tremendous start. If you take advantage of this opportunity, if everyone works together at goal identification and problem solving, both during and outside of the various workshops, it will be helpful for the future of the fishing industry in Alaska.
THE INTERNATIONAL PERSPECTIVE
(AFTERNOON SESSION, DECEMBER 8, 1980)

FISHERIES EDUCATION SYSTEM IN JAPAN

Yoshio Nasaka,
Fisheries Attaché
American Embassy
Tokyo, Japan

Zenko Suzuki. Perhaps some of you have heard this name. He is the current Prime Minister of Japan. The reason I mention the Japanese prime minister is that he is a graduate of a Japanese fisheries high school and a fisheries university. This fact alone will give you some idea of the Japanese fisheries education system, as I believe there has been no other president or prime minister in the world who was a graduate of a fisheries university.

The Japanese educational system as a whole starts with elementary school with six grades, and junior high school with three grades. Everybody must go to these schools. They are compulsory education in Japan. After graduating from junior high school, then you have a choice of going to either of the following four types of high schools, each with three grades: ordinary high school, fisheries high school, agriculture high school, and commerce high school. The academic year is from April to March, which is the same as the Japanese fiscal year.

With regard to fisheries education, there are 52 fisheries high schools and 18 fisheries universities in Japan at present. The fisheries high schools give exclusive fisheries education together with an English language curriculum, and they are run by prefectural governments. In other words, the Juneau Fisheries High School of the State of Alaska, if there was such a school, would be equivalent to one in Japan. About 18,000 students are enrolled in the Japanese fisheries high schools.

When I said that there are 52 fisheries high schools in Japan, this means some prefectures have more than one fisheries high school. This is because there are 48 prefectures or states in Japan, including Tokyo. For example, Japan's Hokkaido Prefecture has six fisheries high schools. So you will recognize the importance being attached to fisheries education by the prefectural governments out of taxpayers' money.

These high schools have their own training vessels so the students can learn how to catch fish. Sometimes these vessels are used in joint governmental research programs such as the United States-Japan Joint Salmon Research Project which has American scientists on board.

Above the high schools, there are 18 fisheries universities, each with four grades. Two of them are exclusive fisheries universities run by the
Japanese Government. One of these is located in Tokyo and the other in Shimonoseki, the southern part of Honshu. The remaining 16 universities, which are either governmental or private, have a fisheries department or faculty together with other departments. This resembles the University of Alaska system. The total number of students majoring in fisheries in Japan is about 6,000. The universities also have their own research or training vessels, each 200 to 300 gross tons. Right now, we can find many people who are graduates of the fisheries universities among leaders of the Japanese fishing industry.

The history of fisheries education in Japan goes back 100 years. In fact, Prime Minister Suzuki is a graduate of Japan's second oldest fisheries high school which was established in 1895. He is also a graduate of Japan's first national and exclusive fisheries university which was established in 1897, and which is now called the Tokyo University of Fisheries.

As an example of the fisheries curriculum at the university level in Japan, let us take the Tokyo University of Fisheries. It has the following seven faculties. Under the Faculties of Fisheries Science and Technology and Fisheries Science and Engineering, you learn fishing methods, fishing gear, navigation, oceanography, and population dynamics. Under the Faculties of Food Science and Technology and Food Technology and Engineering, you learn microbiology, biochemistry, food preservation, food processing, and refrigeration. Under the Faculties of Mariculture and Aquaculture, you learn fisheries biology, ichthyology, pathology, and fish culture. Finally, there is the Faculty of Marine Environmental Science and Technology. In addition, there is a course in Fisheries Management where you learn international relations in fisheries, fisheries policy and administration, and fisheries economics.

After 4 years of university studies, you can get the Bachelor (Gakushi) of Fisheries degree, although the definition of "Bachelor" may be slightly different from that of the United States or other countries. Further, there is a graduate school for the Master (Shushi) of Fisheries degree, which takes 2 years, and the Doctor of Fisheries degree, which takes 3 years.

Apart from a sister school arrangement between universities of the United States and Japan, there is a Japanese scholarship available to foreign students as long as they are under 35 years old. This is granted by the Japanese Ministry of Education to foreign students wishing to pursue the master's degree in Japan. However, even if you are a recipient of this scholarship, you are automatically enrolled in the Japanese Language Course of another university during the first 6 months or so, unless your knowledge of the Japanese language is considered to be sufficient for pursuing your studies at your desired fisheries university. For more details about this scholarship, the Japanese Consulate Office will be of assistance to you.

One more scholarship is available to foreign researchers who have a doctor's degree, and this is granted by the Japan Society for Promotion of Science under a government subsidy.

In the field of fisheries research, the Japan Fisheries Agency, which is equivalent to the National Marine Fisheries Service of the United States,
has a total of 9 research institutions and 12 research vessels. There are six Regional Fisheries Research Laboratories, plus the Far Seas Fisheries Research Institute, the National Research Institute of Fisheries Engineering, and the National Research Institute of Aquaculture.

In addition, the Japan Fisheries Agency has salmon hatcheries in Hokkaido and the Inland Sea Fish Farming Centers. The total number of employees including scientists working at these governmental research institutions is 800 and the budget totals $24 million (5,000 million yen), or 1.6 percent of the total agency budget of $1,457 million (306,000 million yen) for Japanese fiscal year 1980.

The prefectural governments also have their own fisheries experimental stations. There are 157 experimental stations, including branch stations, and these have 145 boats, 3,100 employees including scientists, and a combined budget of about $86 million (18,000 million yen).

Dissemination of knowledge and research findings to fishermen and others in the industry is important. The governmental and prefectural research institutions, as well as university scientists, are playing an important role in this regard. Their activities include basic research on stock assessment for improving conservation and management, fish diseases, new types of gear, vessels that will consume less fuel, aquaculture, fish processing, fish preservation, and other studies.

Furthermore, there is a fisheries extension service in Japan. This service may be similar to those being carried out by the University of Alaska or by other universities in the United States. The difference may be that there are 450 fisheries extension workers in Japan and that they are civil service employees of prefectural governments. They are scattered among 147 area offices throughout the country. Fisheries extension workers make their own knowledge of the fisheries, along with the scientists' research findings, available to coastal fishermen for the purpose of increasing productivity and improving management of the resource.

I would like to take this opportunity to express my appreciation to the University of Alaska, the Alaska Department of Education, the Office of the Governor, and those who assisted me in making travel arrangements, including the Alaska Asian Office in Tokyo.
THE NEWFOUNDLAND FISHERIES

Barnaby Perkins,
Department Head of Nautical Science
College of Fisheries, Navigation,
Marine Engineering, and Electronics
St. John's, Newfoundland
Canada A1C 5R3

Similarities between Newfoundland and Alaska that have resulted in similarities in the fisheries include weather, isolation, and oil. The formation of pack ice in northern areas and generally inclement conditions in ice-free regions constrain the nearshore and inshore fisheries to a seasonal basis. Communities are geographically isolated in both Newfoundland and Alaska, and this affects the fisheries. Oil and gas development is accelerating off both coasts, and wherever fishermen and oilmen exist together the "cod-crude syndrome," with all its associated environmental and social factors, will arise. There are other similarities, but these should suffice to create a backdrop for a general outline of the Newfoundland fisheries.

According to Canadian Federal Government figures recently obtained, there are 74,017 licensed commercial fishermen throughout Canada. This total breaks down as follows:

<table>
<thead>
<tr>
<th>Region</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Coast (B.C.)</td>
<td>15,500</td>
</tr>
<tr>
<td>Maritime Region</td>
<td>18,000</td>
</tr>
<tr>
<td>Quebec: Fresh water</td>
<td>588</td>
</tr>
<tr>
<td>Quebec: Salt water</td>
<td>4,929</td>
</tr>
<tr>
<td>Newfoundland Region</td>
<td>35,000</td>
</tr>
</tbody>
</table>

Nearly half of the commercial fishermen of Canada working in the Newfoundland region? Well, not exactly, because these figures could be somewhat misleading. Fishermen are bona fide, according to the Newfoundland fisherman's union, if they fish throughout the full season, derive the majority of their income from fishing, or both. As I mentioned, the inshore fishery of Newfoundland is seasonal, and many fishermen may only work in the industry on a part-time basis. Non bona fide, part-time fishermen account for perhaps 40 percent of the personal licenses issued.

It would be wrong to suggest that these part-timers always detract from the livelihood of the bona fide fishermen. In many cases they complement one another within the industry.

What this figure of 35,000 licenses really indicates is the interest of Newfoundlanders in the fisheries. Most Newfoundlanders have some contact, direct or indirect, with the fishing industry.

Newfoundland's offshore fishing fleet consists of 90 "wetfish trawlers." Most of these are modern stern trawlers, about 150 feet long. These vessels
are operated by three major fishing and processing companies, who also purchase from the midshore, nearshore, and inshore fleets. Quotas permitting, the stern trawlers operate on a year-round basis.

The nearshore and midshore fleet is made up of approximately 1,200 vessels of the 35- to 65-foot longliner type.

There are 17,682 registered fishing vessels under 35 feet in length. In my estimation some 7,000 to 10,000 of these are operated by full-time, or bona fide, inshore fishermen.

The 1979 landed catch for Newfoundland was 569,108 tons, with a landed value slightly over $156 million. Seventy percent of this landed catch was handled or processed by the three major fish companies. Little or no primary processing, other than gutting and icing, is carried out on board Newfoundland vessels.

The Alaskan herring roe fishery, with all its wastefulness, brings to mind another similarity. In Newfoundland the words "cod" and "fish" are synonymous. Until comparatively recently other species were often discarded. Mackerel, squid, and herring, for example, have all traditionally been used only for bait.

Because of world market demands, however, the traditional codfish of Newfoundland is only one of many species harvested. Squid, for example, is now exported to Japan in reasonable quantities. The 1979 landed value of squid was $19 million. Strict allowable catch quotas for cod stocks in areas within the 200-mile fisheries conservation zone have widened the scope of species being harvested and processed by the offshore sector. These now include redfish, turbot, flounder, plaice, and many other species.

The expanding longliner fleet is involved in a very diversified fishery, including both pelagic and demersal species. This is an area which many young, well-educated fishermen are seeking to enter.

The inshore fleet is still largely traditional. Despite predictions made in the early 1970's that the static gear (cod trap) fishery would decline, current indications are that it is still providing a living for many fishermen. Diversification of species harvested and advances in small vessel technology have ensured the survival of the inshore fleet.

Some of the problems that will have to be considered when developing a fisheries education program include the following:

1) The attitude of young people towards the fishing industry. The need for good high school, industrial arts, and prevocational programs.

2) Training for isolated communities. Computer links may be the way to accomplish this in the future.

3) Financial considerations, particularly the interruption of earning for learning. Training programs must be geared to the fisherman's requirements to improve his earnings as well as his learning.
However, the existence of these problems, and many others, should not prevent or detract from the development of fisheries education and training for the future.

Commercial fishermen are a pragmatic breed who through their own practicality are quite capable of learning and innovating within and without the scope of their profession.

The main roles of fisheries education and training can be: (1) to help new entrants to the industry, (2) to provide basic training in new areas of fishing technology, and (3) to provide upgrading and updating for practicing fishermen, particularly in the fields of gear technology and detection electronics.
FISHERIES EDUCATION IN DENMARK

Ehlhart Hauptmann
Jutland Technological Institute
Aarhus, Denmark

First of all, I would like to give you some background figures. Our total population in Denmark is about 5 million. The number of people in the productive years between 50 and 74 is 3,725,000. Of these, 2,675,000 are economically active people. Only 93,000, or 0.4 percent, of the active population are fishermen. For comparison, 6.4 percent work in agriculture, and 24.6 percent in manufacturing.

The total catch of saltwater fish in 1978, which is the most recent figure I could find, was 1.666 million metric tons. This is a low figure. Normally the catch is about 2 million metric tons but it is decreasing because of the common market regulations. You know that each country in the common market has a certain fishing quota for each species. Only about 300,000 metric tons of the total catch are for human consumption. The rest of it is waste fish used for industrial purposes.

There are 7,340 vessels with engines; 3,700 are below 5 register tons and 1,362 are 25 to 1,000 register tons (1977 data).

The Danish educational system (Figures 1 and 2) begins with elementary school, which is usually completed by 16 or 17 years of age. We have what we call the "unity school." The old division between primary and secondary schools no longer exists. All children have to go to school 10 years.

By 18 years of age all students have left primary or elementary school. About half go on to high school, which is the admission ticket to university education; vocational education; or secondary alternative schools. The other half leave the educational system by age 18. The vocational educational system in the old days was an apprentice system, but now it is based on technical college. Secondary alternative schools are something very specific for children who get tired of school after 9 years. They can go to the secondary alternative schools where things are much more interesting. For example, the curriculum includes 2 months of work in Morroco. We also have business schools.

Fish processing industry workers are trained in short courses which are open to students 17 or 18 or older. There is no fee, and you get 90 percent of the normal fishing industry wage while you attend.

The first course is a 2-week basic course for workers in fish processing. After that, the students specialize. They can take hand filleting of roundfish and flatfish (3 weeks); boning, trimming, and portioning of filleted fish (2 weeks); weighing and packing of fish fillets (1 week);
Figure 1.--Educational system in Denmark 1.
Figure 2.--Educational system in Denmark 2.
treatment of crayfish (2 weeks); and weighing and sorting of fish for auction (2 weeks).

Eighty percent of all participants take the hand filleting course and the boning and trimming course. The other courses are not held very often. Some of the courses are taught several times each year, resulting in about 60 to 70 courses a year and 600 to 700 participants.

Now let's look at the curricula for these short processing courses. Here is the breakdown on the basic course:

```
Basic Course for Workers in the Fish Processing Industry

- Processing of fish products: 6 hours to consumption
- Trade in fish products: 1 hour
- Treatment of fish: 2 hours
- Hygiene and bacteriology: 6 hours
- Labor relations: 10 hours
- Factory visits: 8 hours
- Trainee period (practice): 4 hours
- Program information: 3 hours
- Total program: 40 hours
```

After only 40 hours, however, you have not learned much about how to handle fish, so the course will be extended to 80 hours in 1981 and there will be more practical training. Each participant will have 20 to 40 kilos of whitefish to exercise on. You cannot do this at a technical school, because what would you do with the fish when you have treated it? So these courses are run out in industry, and fish which is not wasted or soiled during the exercises can be used.

The course on hand filleting of roundfish and flatfish contains the following elements:

```
Hand Filleting of Roundfish and Flatfish

- Raw product, final product: 6 hours
- Tools: 2 hours
- Arithmetic: 8 hours
- Labor relations: 4 hours
- Output and production control: 2 hours
- First aid: 2 hours
- Ergonomics: 2 hours
- Storage of final product: 2 hours
- Safety: 2 hours
- Trainee period (practice): 90 hours
- Total program: 120 hours
```
After this the participants are able to hand fillet round- and flatfish, but expertise comes later, with experience in the processing industry. In some programs we combine this course with a later period of on-the-job training. At the beginning of on-the-job training, the government pays half of the wage and the processing industry pays the other half. Then, as long as production increases, the subsidy goes down. After about 3 weeks they are considered experienced workers and the industry pays the entire wage.

Here is the curriculum for boning, trimming, and portioning of filleted fish:

<table>
<thead>
<tr>
<th></th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw product, final product</td>
<td>3</td>
</tr>
<tr>
<td>Tools</td>
<td>1</td>
</tr>
<tr>
<td>Arithmetic</td>
<td>8</td>
</tr>
<tr>
<td>Labor relations</td>
<td>2</td>
</tr>
<tr>
<td>Output and production control</td>
<td>1</td>
</tr>
<tr>
<td>First aid</td>
<td>2</td>
</tr>
<tr>
<td>Ergonomics</td>
<td>2</td>
</tr>
<tr>
<td>Safety</td>
<td>2</td>
</tr>
<tr>
<td>Trainee period (practice)</td>
<td>59</td>
</tr>
<tr>
<td><strong>Total program</strong></td>
<td><strong>80</strong></td>
</tr>
</tbody>
</table>

In these courses, training goes on for 8 hours each day because industry does not want people to be school-minded. This is not a school where students come at 8:00 in the morning and leave at 2:00 in the afternoon.

Now let's look at the programs for fishermen. There are two: one for what we call the "best man," or leading fisherman; and the other for ordinary fishermen. As is the case with the processing courses, everyone 17 or 18 or older is eligible.

Ordinary fisherman training is a 3-week program:

<table>
<thead>
<tr>
<th></th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mending of yarns and nets</td>
<td>24</td>
</tr>
<tr>
<td>Treatment of fish</td>
<td>20</td>
</tr>
<tr>
<td>Steering and navigation</td>
<td>34</td>
</tr>
<tr>
<td>Vessel knowledge, engine care,</td>
<td>14</td>
</tr>
<tr>
<td>and maintenance of winches</td>
<td></td>
</tr>
<tr>
<td>First aid</td>
<td>6</td>
</tr>
<tr>
<td>Fire protection</td>
<td>4</td>
</tr>
<tr>
<td>Safety on board</td>
<td>4</td>
</tr>
<tr>
<td>Ropes and wires</td>
<td>2</td>
</tr>
<tr>
<td>Emergency calls</td>
<td>2</td>
</tr>
<tr>
<td>Splicing</td>
<td>6</td>
</tr>
<tr>
<td>Program information</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total program</strong></td>
<td><strong>120</strong></td>
</tr>
</tbody>
</table>
To this is added 80 hours of practice on board a training vessel. Then one can go into the leading fisherman's program:

**Leading Fisherman Training Program**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mending, ropes, and wires</td>
<td>52</td>
</tr>
<tr>
<td>Treatment of fish</td>
<td>16</td>
</tr>
<tr>
<td>Engine care and fire protection</td>
<td>30</td>
</tr>
<tr>
<td>Steering and navigation</td>
<td>76</td>
</tr>
<tr>
<td>First aid</td>
<td>12</td>
</tr>
<tr>
<td>Safety on board</td>
<td>4</td>
</tr>
<tr>
<td>Ergonomics</td>
<td>2</td>
</tr>
<tr>
<td>Emergency calls</td>
<td>2</td>
</tr>
<tr>
<td>Helicopter rescue</td>
<td>2</td>
</tr>
<tr>
<td>Program information</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total program</strong></td>
<td><strong>200</strong></td>
</tr>
</tbody>
</table>

After completing these courses, a person has to work on board a vessel as an ordinary fisherman for at least a year before he can become a leading fisherman.

Every vessel which is larger than 20 register tons should have both a skipper and a leading fisherman on board. The leading fisherman, as you saw from the course breakdown, has some of the same training a skipper has, like steering and navigation, so he can take over from the skipper when necessary. The skipper has the certificate which allows him to navigate and steer a fishing vessel.

Any youngster may attend the skipper's program, which starts with a basic course of 1 to 5 months (Figure 3). There is no charge, but participants do not get a wage. Next is duty on board a fishing vessel for 19 to 23 months, after which a certificate of proficiency is awarded. From there, a person can go on to be a leading fisherman or first mate, but I don't know what the quality is when the title is achieved through this route. Or you can go on to the 5-month skipper school which culminates in skipper examination III. If you pass it, you are allowed to navigate a fishing vessel in certain waters of the North Sea. If you attend skipper school for another 6 months and pass skipper examination II, you can also fish in the Atlantic Ocean up to the Faroe Islands. If you pass examination I, you can fish anywhere in the world.
Here is the training which leads to each skipper level:

<table>
<thead>
<tr>
<th>Skipper I</th>
<th>Skipper II</th>
<th>Skipper III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Navigation</td>
<td>Navigation</td>
<td>Navigation</td>
</tr>
<tr>
<td>Ship handling</td>
<td>Ship handling</td>
<td>Ship handling</td>
</tr>
<tr>
<td>Sea law</td>
<td>Sea law</td>
<td>Sea law</td>
</tr>
<tr>
<td>Health care</td>
<td>Health care</td>
<td>Health care</td>
</tr>
<tr>
<td>English, Danish</td>
<td>Danish, English</td>
<td>Fish hunting</td>
</tr>
<tr>
<td>Fish biology and</td>
<td>Fish biology and</td>
<td>Fish treatment</td>
</tr>
<tr>
<td>oceanography</td>
<td>oceanography</td>
<td>meteorology</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Instrument</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Engine knowledge</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fire precautions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Administration</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fishing legislation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Safety at sea</td>
</tr>
</tbody>
</table>

Denmark also offers some academic education in fisheries, like fish biology, but we do not have any universities which concentrate on fish. People with academic educations in fish biology are not very popular with the fishermen. The two groups argue over how much fish should be caught.

I will finish by explaining how the Jutland Technological Institute produces training programs to suit specific industries (Figure 4). We start by determining what the industry will produce, how it is organized, the job structure, and the technical knowledge required. The other input is manpower: what is available and how people are recruited and selected for the specific industry. Then we make a list of tasks to be done. Some of these tasks are uncomplicated and require no special training. Others have to be analyzed. We prepare training modules for selected tasks, set up training programs, and then begin training.

Many people have asked me what a technological institute is. I don't think you have any in this part of the world. The main task is to supply industry with technological services in all kinds of fields. If you have some problem with a method or machinery, for example, you can ask how to approach it or treat it. You can also ask to have specialized training, tailored to the specific needs of an industry or company.

I have designed a five-step approach to training in fish processing which could be used to attack your training problems in Alaska:

1) Build or select a model whitefish processing plant suitable for combined production and training.

2) Recruit and select supervisors and key workers with sufficient professional and intellectual capability for training of others. They should be supervisors in the processing industry but they should also have the capability of training people.
Skipper exam II and I

Skipper school 6 months

Skipper exam III

Skipper school 5 months

Leading fisherman (1st mate)

Certificate of Proficiency

Duty on board fishing vessel 19-23 months

Basic course - 1-5 months

Figure 3.--Danish skipper school program.
Figure 4.--Production of training programs to suit specific industries by the Jutland Technological Institute.
3) Start production to determine methods, quality, and output for each job. This is what I call the "experienced worker's standards"—not the acrobatic worker who is able to work at a rate of 150 or 170. He is not the experienced worker. The experienced worker is the one who is able to work with the working rate of 100.

4) Analyze each worker's job and develop training programs.

5) Train supervisors and key workers as trainers and instructors.

The processing plant might also be a technological service unit, where the supervisors and the management give advice to other processing plants. This way you would obtain a snowball effect.
FISHERIES RESEARCH AND TRAINING PROGRAMS
OF THE WHITEFISH AUTHORITY, HULL, ENGLAND

Dennis Lodge,
Director
Fisherman's Training Program
Clatsop Community College
Astoria, Oregon 97103

We have the word "excellence" in the name of this program we are trying to
develop, which implies that we have some excellent knowledge to impart to
the students. However, this is one problem we have with fisheries training.
It is very difficult to get hold of excellent knowledge in fisheries, par-
ticularly advanced knowledge. Where are we going to get this knowledge?
Are we going to get it from the highline captains? Very difficult. Which
captain is going to tell you the secrets of his trade? It is like a gold
miner telling you where the mother lode is.

I was fortunate enough to spend the last 17 years working for the industrial
development unit of the Whitefish Authority in England. The overall brief
of the Whitefish Authority, which was set up about 20 years ago, was to look
at the industry and its many facets to determine where efficiency could be
improved. So in its early days the Authority carried out numerous vessel
trials. A team of about 15 engineers put in about 80 man years of sea time
on various-sized fishing vessels collecting complex data on everything from
navigational systems to fish processing, diesel engine development, and deck
gear development. We disseminated this vast amount of information to the
industry, which at the time was branching out into the new techniques of
midwater trawling. For example, we published pamphlets on such subjects as
vessel design, maneuvers of pelagic trawls, hauling nets by netdrum, and
installing tension meters on stern trawlers.

The situation of the Whitefish Authority at that time was very similar to
the Sea Grant Marine Advisory Program in the United States, which gives out
similar kinds of information to fishermen. But the Whitefish Authority was
also unique. It had no research vessel, and that is unusual. It did not
have a vessel because research was to be carried out on vessels chartered
for the purpose of working alongside commercial fishermen.

The Whitefish Authority was funded 50 percent by the industry and 50 percent
by the government. We had to prove to the industry that we were producing
results, because they were putting in the dollars. As a consequence, we
built up a very good rapport with industry. This makes the Authority unique
because other fishery development projects in Great Britain, Europe, and
other parts of this world often have difficulty in reaching the level of the
working fishermen, and often take a lot of derogatory comments from them.

However, we realized that the information we were collecting and dissemina-
ting was not getting through to the fishermen as well as it could, and we
concluded that education was not our business. In Great Britain there are six major fisheries colleges scattered around the coast and fisheries education is their business. We decided to give the colleges the information so they could spread it out to commercial fishermen, which would allow us to carry on with research and development.

We contacted the colleges, but very quickly realized that the instructors lacked the expertise to put forward these new techniques. The industry is developing so fast! Microcomputer techniques, for example, are now used in navigational systems, fish detection systems, net sounding systems, and more. Many of the computer techniques developed for the Apollo spaceships are now used on board fishing vessels. The technology is so complex that the average nautical college instructor cannot handle the information. The nautical college instructor does not have the time to spend at sea, or the necessary direct contact with manufacturers of equipment. New equipment is constantly coming out from Japan and Europe. At every fishing exhibition you go to, you see a frightening amount of new, complex equipment which is coming out to the market. To give that kind of equipment to a captain with a grade-school education is like putting a child at the controls of a spaceship, or in charge of a 747 jetliner.

The actual seagoing part of fishing is becoming relatively unimportant in the overall scheme of things. All European captains need what I sometimes like to think of as a license to get to the fishing grounds. British fishermen go through a qualifying program that is very similar to the one Dr. Hauptmann described for Danish fishermen. The resulting certification allows the fisherman to get to the fishing grounds, but the real complexity occurs when he gets there. There is satellite navigation, for example, to pinpoint a spot in the ocean, and complex hydraulics systems for handling the net. The net has to be spread correctly, because the vessel is going to be pulling it full of 50 to 100 tons of fish. The American No. 1, which came out of Seattle and is fishing off Alaska, is the most advanced fishing vessel on the west coast. It cost $7 million to build. In the wheelhouse the captain, a former student of mine, has a Norwegian Simrad fish detection system which cost a quarter of a million dollars, and he has literally dozens of other pieces of electronics.

This highly technological field does not bear much relation to the subsistence fishing which the earlier speakers talked about. But if we are going to catch vast quantities of fish and be super-efficient, I am afraid that high technology is the only way to go. It has already happened in Europe, Japan, and Russia. Most people working in the industry in Europe reckon that Alaska is about 10 years behind the times. If we really want to compete in the international groundfish fisheries, that's how much catching up we have to do.

An introduction to fisheries electronics would be one of the most important courses in any fisheries education program. It takes training to get the best out of the equipment. Many captains will spend $10,000 to $20,000 on a fish-finding sonar or echometer and not really understand its capability. I have known of many cases where an incorrect setting of the controls has hidden fish from the fisherman which he actually would have seen with a
simpler machine. The electronics have gotten so complex that if they are not set correctly, they can lose fish for you.

The Whitefish Authority was rather unique in its development and carrying out of 1-week advanced courses which attracted fishermen from all over the world: about 60 from the United States, but mostly from Great Britain, Australia, South Africa, and Mexico. Over the last 8 years, about 4,000 fishermen, all captains or alternate captains, have passed through these 1-week courses. Each course cost $400, but that is chicken feed compared to the overall cost. Participants from Seattle and Alaska were paying about $4,000 if you take into account hotel bills, air fares, and lost fishing time. Fortunately, none of them asked for their money back and most thought it was well worth the $4,000.

Probably the most dramatic part of the Whitefish Authority training program revolves around a net-testing tank, in this case a flume tank, which is 100 feet long, 15 feet wide, and 15 feet deep, and filled with 700 tons of water. The water is moved around this trough at speeds of up to 10 miles an hour by 600-horsepower impellers. A net is hung in the moving water to see the effects on different net shapes. The nets are about one-tenth the size of a full-sized net, and are very fine meshed.

It takes about 200 hours of intensely complex work to make a scale model of a full-sized net. On occasion, the model maker has dropped a stitch or a mesh and had to start over. That is the kind of exactness you must have when the world’s captains are looking through the glass windows of the tank at your model. If there is one mistake in it you can bet your life that some clever person will notice it and point it out.

About 80 models of the major trawl nets used throughout the world are now demonstrated in this flume tank. The tank can also be chartered for about $3,000 a day for net development purposes, and net manufacturers, as well as fishermen, from all over the world have used it.

The tank is not completely unique because others exist, in Japan and France, but they are smaller. A larger one is being built in Denmark, but at this time the largest net-testing facility is at the Whitefish Authority. A film of the system has been made by a British net company. [At this point, the film was shown.] You can see how useful a facility like that would be in a fisheries training program.

Handbooks are now prepared for each 1-week training course at the Whitefish Authority, so that the captains attending do not have to take a lot of notes. We have had a lot of feedback from the participants over the years, on what kinds of courses the average captain needs, for example, and we can tailor courses to fit, again for example, a certain fishing ground or type of vessel.

Barney Perkins brought up the problem Newfoundland has of getting information to remote areas, which is the same kind of problem you would have in Alaska. To get over that problem in Britain, we built a mobile classroom which consisted of a 30-foot-long bus containing a classroom and a movie screen, and a 30-foot-long trailer which contained a lot of electronics,
hydraulic equipment, and engine maintenance equipment. At various ports throughout the United Kingdom, over 3,500 fishermen passed through that bus. Recently the Whitefish Authority invested in a new mobile training unit which cost $80,000. This one is a custom-built unit with a tractor and a 50-foot-long trailer containing the same equipment as the old unit. So that is one answer to your problems of getting information to the outports: put it on wheels.

In any training system you will have the problem of finding instructors with the right kind of knowledge, with the right seafaring background. The Whitefish Authority policy was to delve into engineering research. Most of the problems in the industry, the inefficiencies, were engineering problems dealing with engine power, winch power, propellers, deck layouts, and so on. As a result, hardly any of the staff on the Authority are biologists. In fact, the leader of the unit, Bob Bennett, is an ex-helicopter designer. That is the main reason the Whitefish Authority has had such a good rapport with fishermen and has been so successful.

Other government departments in Great Britain carry out fisheries research. The Ministry of Agriculture and Fisheries, for instance, has research departments, but they tend to be staffed almost entirely by biologists, and they do not have that rapport. A fisherman once expressed the problem very succinctly to me. He said, "The job of a biologist is to conserve the stocks and my job is to wipe them out."
CONCLUDING REMARKS ON THE INTERNATIONAL PERSPECTIVE SESSION

Captain Geoff Motte,
Dean
Massachusetts Maritime Academy
145 Oakdale Road
North Kingstown, Rhode Island 02852

Most of your problems seem to have been solved by the preceding speakers, so I will just fill in the gaps. I have been involved in fisheries education for about 16 years, and if there is a mistake to be made, I've made it. I originally occupied Barney Perkins' position at the College of Fisheries in Newfoundland, from the time it was founded in 1964 through to 1967, and you can learn a lot from the mistakes we made there, because they were made in the same sort of environmental conditions as you have in Alaska. After that I was involved in the founding of the University of Rhode Island's fisheries education program.

We can learn a lot from some of the pitfalls that existed in Newfoundland, and still do exist there. At the College of Fisheries a particular tack was taken by the government which I believe was misdirected. A more technical level of education would have been far better than a low-level vocational education directly linked to a government handout program, and I objected to it at the time. I still believe I was right, but Barney can update you on that in his next presentation.

Dr. Hauptmann solved the problems in the processing area, but if you were to transpose those factors directly over to the catching area, it would be an absolute disaster.

The reason I think a number of fisheries education programs in this country have gone down the tubes, which they have in Florida, Maine, and quite a few other states, is the order of priorities was wrong. The knowledge of the people who were establishing those programs was deficient. It is very difficult for a person who has not been immediately involved in commercial fisheries to assess the job that is being done by the instructors working for him. He can believe that these people are doing a wonderful job but he doesn't really know. The time he knows is when the program folds.

The schedule for this conference mentioned that we should discuss the levels at which fisheries education is required. It is necessary at all levels: from elementary school to graduate school and extension courses. Why should this industry be different from any other industry? The United States has 253,000 registered commercial fishermen, 16,000 vessels over 5 tons, and about 4,000 marketers or processing companies. We export and import many tons of fish, a huge amount of money changes hands, and many external jobs are generated. This is a huge nationwide industry, but look at the educational backing for it. It is nonexistent or it is absolutely atrocious.
When I was chairman of the Department of Fisheries at the University of Rhode Island, across the hallway from my office was a department which was turning out turf management people for golf courses—golf course superintendents. They had a wonderful program, at both the undergraduate and graduate levels, with loads of money coming in. That wasn't the only one. There were similar programs at maybe 10 or 15 other universities, but programs for commercial fishermen, forget it!

You know how many marine biologists and oceanographers are let loose in this country. They have had the benefits of wonderful training and they can move pretty well whichever way they like, should the jobs be there, of course. In commercial fishing, the jobs are there but there aren't enough people with the expertise and confidence that a good technical program can provide. They say that education is expensive. Only one thing is more expensive, and that is ignorance. Basically that is the problem we are facing.

Four factors bear on the success of a fisheries education program. The first and most important is the instructors. No matter how much money they have, every program seems to look at the instructors last. First they look for academic credentials. That is bilge water. You have to take a man and look at him for his expertise, his experience, and his knowledge. You have to break all the rules and hire at least a couple of fishermen who have sufficient experience at sea, sufficient liking for the profession, and a real feeling that it is a good thing for somebody to be involved with, that it is a viable sort of profession. I had several instructors when I was chairman of that department, and the most valuable instructor was the least qualified academically. I don't think he even graduated from high school. He is now an assistant professor with tenure at the University of Rhode Island.

The second factor is political strength. I think you have it in Alaska. Enough people are concerned about it here to make it work. You have to have that for the funding. And you need the funding to provide for those illustrious instructors you are going to hire.

The third factor is highly motivated students, and you cannot get or keep them unless you have the first two factors. You cannot fool the students. Don't bring some amateur in to teach who has learned about the technical aspects of commercial fishing from some manuscripts or third-person contacts and expect him to indoctrinate the students at a professional level. The students can detect this in 2 or 3 weeks.

The fourth factor is a strong acceptance by the industry, which you won't get right off. It does not come easy. In the long run, it is the students who win the acceptance of the program. In the short run, it is your well-qualified instructors. Product is what you are judged on. The fishing industry is a hard-nosed industry. If one bad student goes out, you have to put six good ones out to make up for it.

A fisheries program at the university level does work. I know it works in this country because it has worked at the University of Rhode Island, and I will be telling you about that program tomorrow.