FUEL CONSERVATION WORKSHOP FOR COMMERCIAL FISHERMEN

by

Raymond Rhodes
and
David Smith

South Carolina Marine Resources Center
Educational Report 11

January, 1981

South Carolina Wildlife and Marine Resources Department

FUEL CONSERVATION WORKSHOP FOR COMMERCIAL FISHERMEN AGENDA

March 20, 1980

9:00 Welcome & Opening Remarks
David Cupka, South Carolina Wildlife and Marine Resources Division

9:20 Rising Fuel Cost & Future Shortages

Effects of Rising Energy Costs on Commercial Shrimping
Ray Rhodes, South Carolina Wildlife and Marine Resources Division

Energy Prospectives: 1980
Paul Burke, U.S. Department of Energy

Dealing With Diesel Fuel Shortages: The South Carolina Experience - Gene Maples, South Carolina Division of Energy Resources

National Marine Fisheries Service & the Energy Crunch
Ed Loughlin, National Marine Fisheries Services

10:30 BREAK

10:45 Increasing Fishing Vessel & Gear Efficiencies
David Smith, South Carolina Sea Grant Marine Advisory Program

Kort Nozzles: An Answer for the Shrimper?
Tony Buczek, Michigan Wheel

12:00 LUNCH

1:00 Fishing Vessel & Gear Session (Continued)

Beam Trawls, Wingless Wonders: Nets for Increased Fuel Economy - Herrick Johnson, Ymuiden Stores

Onboard Fuel Management - Johnny Johnston, J. Enterprises

3:00 Concluding Remarks and Adjourn

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South Carolina Marine Resources Center
Charleston, South Carolina

Raymond Rhodes, S.C. Marine Resources Division
David Smith, S.C. Sea Grant Marine Advisory Program

Sponsors

S.C. Marine Resources Division
S.C. Sea Grant Marine Advisory Program
and
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SUMMARIES OF WORKSHOP TOPICS

INTRODUCTORY COMMENTS - David Cupka

FUEL AND THE SOUTHERN SHRIMPER - Raymond Rhodes

IMPROVING FUEL USE EFFICIENCY: GEAR AND VESSEL MODIFICATIONS - David Smith

THE GOVERNOR'S DIVISION OF ENERGY RESOURCES: ASSISTANCE FOR THE SEAFOOD INDUSTRY
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INTRODUCTORY COMMENTS

by

David M. Cupka
Assistant Director
Office of Conservation, Management and Marketing
Marine Resources Division
South Carolina Wildlife and Marine Resources Department
Charleston, S.C.

On behalf of Dr. Edwin B. Joseph, Director of the Marine Resources Division of the South Carolina Wildlife and Marine Resources Department, I want to welcome you to this Fuel Conservation Workshop. Before we get into the program this morning, I would like to take just a few minutes to acknowledge some individuals and organizations that were responsible for this workshop. First of all, I want to mention that the workshop is a cooperative effort involving the South Carolina Wildlife and Marine Resources Department, the South Carolina Sea Grant Advisory Program and the Coastal Plains Regional Commission. The funds for the workshop were provided by the Coastal Plains Center for Marine Development Services, which is an activity of the Coastal Plains Regional Commission. The Center is located in Wilmington, N.C. and we are fortunate to have the Center's Director, Colonel Beverly Snow, with us here today in the audience. We certainly appreciate all the assistance and support that Colonel Snow and the Coastal Plains Regional Commission have given us with this workshop. This is just the latest in a series of workshops that we have been able to hold with the support of the Coastal Plains Regional Commission. I would also like to acknowledge the work and effort that Ray Rhodes, with our Marine Resources Division, and David Smith, who is Acting Coordinator of the Sea Grant Marine Advisory Service Program, have put into planning and coordinating this workshop on fuel conservation. We certainly hope that you will find this workshop informative as well as interesting.

All of us are painfully aware of the current fuel situation in this country and certain segments of the commercial fishing industry, such as the shrimp fishery for example, have been economically impacted to a great degree as a result of the current energy situation. The shrimp fishery in our region is finding itself more and more in a "cost-price squeeze" situation. The price of shrimp has gotten to the point now where this product is beginning to experience some consumer resistence. Meanwhile, operating costs, especially fuel costs continue to

increase rapidly. We are fortunate in this region that the shrimpers do not have as far to travel to the shrimping grounds as some of the segments of the United States shrimping industry do in the northern Gulf of Mexico. But nevertheless, shrimp trawling is a relatively energy intensive type of fishery. In fact, as the cost of fuel continues to increase, we feel that certain passive types of fishing gear, such as stationary nets, will enjoy cost operating advantages compared to trawls because their utilization are less fuel intensive.

One major area that is going to be impacted by rising energy costs is fisheries management itself. In the past, when fuel was fairly inexpensive and plentiful, energy considerations did not receive much attention when it came to the formulation of fisheries management plans and regimes. In 1976, however, Congress passed the Fishery Conservation and Management Act which created eight Regional Fishery Management Councils. These Councils have been given the responsibility for developing fishery management plans within the fisheries conservation zone which extends from three miles to 200 miles offshore. Embodied within this legislation are seven national standards or guidelines which must be applied to each fishery management plan which "...promote efficiency in the utilization of fishery resources...". In my opinion, fuel efficiency is a valid component of this overall efficiency requirement. Therefore, I believe that future fisheries management decisions will increasingly consider energy issues.

We are all aware that energy issues are going to become more important in the future and that our lifestyles and activities are going to be affected by these issues. Certainly the area of fisheries will be impacted significantly in the decades to come as a result of developments in energy utilization. Hopefully, workshops such as this fuel conservation workshop being held today will begin to address some of the energy related problems and issues which are now affecting fisheries and which will affect commercial and recreational fisheries in the future.

FUEL AND THE SOUTHERN SHRIMPER

by
Raymond Rhodes

Office of Conservation, Management and Marketing
Marine Resources Division
South Carolina Wildlife and Marine Resources Department
Charleston, S.C.

"We are all continually faced with a series of great opportunities brilliantly disguised as insoluble problems." John W. Gardner.

HARVESTING

In general, the United States food production systems have become heavily reliant on fossil fuels because in previous decades such fuels have been characterized by low costs and plentiful supplies relative to other production resources. The OPEC oil embargo during 1973 and the decline of U.S. oil imports due to the Iranian situation in 1979 have obviously emphasized the U.S. food producers' dependency on diesel and gasoline fuel. In U.S. fisheries, the commercial harvesting sector has moved toward larger vessels with greater diesel horsepower. The result has been increased demands for diesel fuel in the last two decades by this sector of the industry.

As in other industries, improved energy efficiencies can, and will, be achieved in the U.S. seafood industry. Unlike most other industries, both fisheries and agriculture must synchronize production with biological processes. Consequently, energy policymaking must insure that harvesting and associated marketing mechanisms are not damaged. Any serious disruption in the availability of required fuels will probably produce adverse effects on the seafood industry and subsequently on consumers which will last far beyond the initial interruption.

Time considerations are especially relevant when the species being harvested is a single year class species as is the case with southern shrimp. In essence, if the shrimp harvest is severely restricted by a fuel shortage, that year's shrimp stocks will not be available in the following year. This amplifies the dependency of the southern shrimp fishery on stable fuel supplies.

Unfortunately, research on shrimp trawling indicates it is more energy intensive than certain other types of fishing activities. For example, it has been estimated that harvesting shrimp requires 598 kilocalorie (kcal) per gram of protein compared to 81 kcal per gram for tuna. Also, from the seafood demand

side, consumption of shrimp products has been susceptible to decline when the restaurant trade suffers from gasoline shortages or high fuel prices.

The apparent high sensitivity shrimp demand to gasoline shortages, the significance of fuel in harvesting costs, and the logistics of harvesting shrimp stocks are all factors which can and are having serious impact on the U.S. shrimp industry's productivity.

FUEL SHORTAGES AND PRICES: The South Carolina Experience.

Fuel Shortages: The South Carolina fishing industry has not suffered from prolonged (two months or longer) periods of reduced fishing effort due to fuel shortages. In 1973, spot fuel shortages for fisheries were reported principally in the Gulf of Mexico area. Preparations were made for a mandatory fuel allocation program in 1974 but significant shortages did not develop during the 1974 season.

In 1979, local spot fuel shortages did develop during July and August in South Carolina. A shortage of approximately 15% occurred for fuel docks supplying commercial shrimping operations during July as compared to the usual fuel consumption by the industry during a normal shrimp season (e.g. 1976). With assistance from the S.C. Division of Energy Resources, no apparent large decline in the industry's productivity was observed in the 1979 season.

Fuel Prices: In South Carolina. No.2 diesel fuel prices paid by commercial shrimpers have risen dramatically since 1972. It is not uncommon for a medium size shrimp trawler to use about 20,000 gallons during a shrimp season. In 1976, this amount of fuel would have cost about $8,600. During 1979, the fuel bill would have been around $15,000 for 20,000 gallons of diesel fuel. Obviously, if the captain can reduce his operating fuel consumption without reducing his vessel's catch, a real savings can occur. For example, if a vessel's fuel consumption was reduced by 15% (17,000 gallons instead of 20,000 gallons), there would

be a savings around $3,300 at a price of $1.10 per gallon.

WHAT CAN BE DONE

Shrimpers can lower their operating costs relative to fuel consumption by: (1) modifying current fishing practices; (2) purchasing more efficient gear and vessels and (3) shifting toward other fisheries which aren't as sensitive to rising energy costs. The most immediate results can obviously come from re-examining and questioning current fishing practices. For example, can trips to trawling areas be consolidated? How fast do you need to get to where you are going? Obviously, innovators will be rewarded by lower fuel costs and others will follow.

The seafood producer may also have some partial hedges against fuel supply disruption if they consider cooperative efforts. For example, about 37% of agricultural petroleum requirements are provided by cooperatives, which give priority to farm users in their fuel distribution. Perhaps this approach requires additional attention by seafood producers as a hedge against future fuel disruptions.

In addition to individual and cooperative actions by producers, government allocation and management measures must continue to give high priority to fuels for agricultural production including seafood. As mentioned previously, seafood production depends on biological processes which are influenced by uncontrollable environmental conditions. Short-term disruptions of vital fuels can result in seafood supply shortages due to lost production. This, in turn, can have serious consequences for the entire seafood industry, from the harvester to the consumer. Seafood and agricultural operations must receive high priority consideration so that disruptions of fuel supplies can be avoided in the future.

IMPROVING FUEL USE EFFICIENCY: GEAR AND VESSEL MODIFICATIONS

by
David Smith

South Carolina Marine Advisory Program
South Carolina Sea Grant Consortium
Charleston, S.C.

INTRODUCTION

There are two ways to immediately improve fuel efficiency - (1) modify your behavior, (2) and/or modify your gear. We will focus on gear modification by looking at changes that can be made from the standpoint of modifying your current fishing operation. In the long run, you can modify the vessel itself like sail assisted vessels. Also, naval architects are examining different types of hull forms to replace traditional designs.

Perhaps, there are some less radical things we can do by looking at the actual fishing gear like the traditional beam trawl. Beam trawls may not be the answer for the shrimp fishermen, but it is something we need to look at.

I believe fishermen must carefully examine their fishing operation's needs with respect to their propulsion system. At present, horsepower modifications which may help, could include the kort nozzles, and perhaps controllable pitch propellers. Whether these modifications are immediate, practical solutions will depend upon many factors, but if fuel prices keep going up, a critical evaluation of existing technology will be necessary by all fishermen.

Kort Nozzles: The kort nozzle is a special steel cylinder that fits around the boat's propeller, designed to increase prop thrust without modifying the engine. With an appropriate design, a vessel can generate the same towing power with less fuel or greater power from the same quantity of fuel.

It has two major drawbacks. The kort nozzle generally results in poorer steering in reverse. This could require enlarging the rudder. Another problem is that at high running speeds, the nozzle's own drag can produce an additional drag that retards the vessel. This can be important to fishing vessels which must travel long distances rapidly.

Beam Trawls: In a beam trawl, the bag mouth is kept open by a heavy horizontal transverse spar or beam. It is through the beam that the net is kept

open in a horizontal direction. Two lateral frames mounted on a sled runner (shoe) and attached to each side of the bag mouth keep the net open vertically.

Since the beam trawl does not use doors to spread the net, it requires less power to achieve the same effective spread as an otter trawl. Consequently, beam trawls when used correctly, may be more fuel efficient compared to otter trawls on sand or muddy grounds. There are other possible advantages of the beam trawl: (1) the length of wrap out has much less influence on the beam trawl than on the otter trawl, (2) the gear configuration (i.e. vertical and horizontal spread) remains stable when being towed, and (3) the opening does not change during course alterations.

A major disadvantage of the double-rig beam trawl is that vessel stability can be seriously altered when one of the trawls become hung-up by a bottom obstruction. The forces applied to the outriggers can become so great that the vessel may capsize. Obviously, a stable vessel with a safety release system is necessary to guarantee stability. In addition, the beam trawls catching efficiency in rocky areas is questionable. Also, its ability to catch white shrimp, which tend to swim off the bottom, may be limited due to the relatively low vertical profile of the beam trawl.

Fuel Monitoring: The ability to determine actual fuel consumption during your fishing operation can be beneficial to achieving the optimal spread and preventing engine damage like those caused by excess fuel burn. For example, you can adjust fuel consumption by reducing the throttle until true cruising speed over the ground begins to drop. Just before true speed drops, you will achieve maximum efficiency for the fuel burned. This assumes that sea conditions, vessel load and other factors remain constant. This approach also requires accurate determination of hull speed, which might be done by running a measured distance (e.g. two or three miles) at different throttle setting or using an

accurate hull speed meter. Fuel burn rate information could also be useful for evaluating the optimal trawl towing speed for different conditions (e.g. net size, door position, fishing depth, etc.).

Monitoring fuel consumption during various phases of your fishing operation may also provide insight on reducing fuel consumption. Regardless, fuel monitoring provides information for you to modify your fishing operation, but it will not automatically save you fuel dollars like the kort nozzle. You must be ready to change your own behavior, like reducing rpms.

There are microcomputers available on the market which can be mounted in the wheelhouse and provide a digital readout of fuel burn and the amount of fuel left. Manufacturers claim that their fuel monitoring equipment will not only lower operating costs but aid in the prevention of engine damage by detecting minor engine problems before they develop into a serious problem.

The decision to purchase a fuel monitoring microcomputer for your boat will depend upon the potential fuel savings you expect compared to the equipment cost. For a large vessel, which needs to travel a long distance to reach its fishing grounds, a fuel monitoring system might be valuable in determining the optimal cruising rpm and closely monitoring fuel consumption for other purposes. In contrast, a vessel used in a seasonal operation for inshore fishing might not be able to create enough fuel savings to even pay for the monitoring equipment over its useful lifetime.

THE GOVERNOR'S DIVISION OF ENERGY RESOURCES: ASSISTANCE FOR THE SEAFOOD INDUSTRY

by
Eugene Maples

Office of The Governor
Division of Energy Resources
Columbia, S.C.

BACKGROUND

During the early spring of 1979, middle distillate inventories in the U.S. had been reduced to an unusually low level, 115 million barrels in April. This tight supply situation, according to the U.S. Department of Energy was the result of several factors. First, from the supply side, crude oil imports to the U.S. were approximately 70,000 barrels daily less than required to maintain optimal petroleum stock levels, due largely to the interruption of Iranian crude oil exports in the first quarter of 1979. From the demand side, distillate fuel use increased dramatically during the winter months due to extremely cold weather conditions. The U.S. Department of Energy felt that this situation would create a serious hardship on midwest farmers due to spring planting operation needs after sustained unfavorable weather conditions reduced the planting season to a few weeks.

On May 10, 1979, the DOE's Economic Regulatory Administration (ERA) adopted Special Rule No.9 (44FR 28606 May 15, 1979) which permitted consumers engaged in agricultural production, including commercial fishing, to receive 100% of current needs. These amendments were adopted on an emergency basis from May 25 through July 31, 1970.

It should be emphasized that diesel is currently decontrolled in regard to mandatory allocation or price control except for the above two months period during 1979 under Special Rule No.9. This rule was only temporarily used to recontrol diesel fuel for agriculture and once it served its original purpose of providing "...enough fuel for planting of the Nation's crop..." it was eliminated.

THE SOUTH CAROLINA FUEL SHORTAGE

In June 1979, we asked the South Carolina Division of Marine Resources to survey major diesel fuel jobbers serving the commercial fishing industry. They found there was no immediate concern about shortages.

On June 21, 1979, Special Rule No.9, as it applied to commercial fishing and agricultural production, was eliminated; consequently, commercial fishing activities became subject to voluntary allocation fractions imposed by jobber and their respective fuel suppliers.

We became concerned because July middle distillate supplies in South Carolina had decreased approximately 45% compared to July 1978. We felt this shortage was due not only to a decline in crude oil available to U.S. refineries, but also the national priority to stockpile heating oil for the 1979-80 winter. The transition period by the fishing industry was accelerated also by the opening of the South Carolina commercial shrimp season on June 19.

The effects of the DOE rule change took only a few days to tighten supplies. By the week of June 25, several shrimp dealers maintaining fuel marinas were receiving notices from their jobbers that fuel purchases would be significantly less than previous purchases compared to the 1978 base period (e.g. 46% of 1978 volume).

The rest is history. With the assistance of S.C. Division of Marine Resources we began to implement the State-set aside system for diesel fuel. In S.C. and other states, the Governor's Division of Energy Resources is empowered to allocate up from the State-set aside four percent of the total available monthly diesel supply within the state. This approach requires that a real hardship or emergency exists. If we feel that a hardship does exist, we can direct regular suppliers to provide needed fuels to applicants on a short-term or one time basis. Consequently, I must emphasize that this approach does not constitute a regular source of fuel.

In regard to hardship in the shrimping industry, the important thing I learned during the past year, was the availability of shrimp doesn't necessarily coincide with the availability of diesel especially when indexing the DOE base allocation year that was established in 1978. Fortunately, last summer and fall,

the Governor's Division of Energy Resources was able to assist you with additional fuel from the State set-aside program. Additionally, we were able to supply you some product from outside the State and from industry response it seems our assistance was sufficient to maintain the industry productivity in 1979. Certainly, much of the credit for the assistance that was provided must go to the U.S. Department of Energy in Washington and the Hess Corporation, who supplied substantial additional amounts of diesel fuel for the shrimping and the tobacco curing industries here in South Carolina. Without their help, conditions in these two industries would have been quite dismal.

This year (1980), your fuel problems should be minimal. And you will receive enough fuel through your monthly base allocations. Currently, there appears to be sufficient supplies of diesel to see you through the season and the end of next fall. Obviously, your immediate problems will be the continuing increase in the cost of diesel. And this will be due primarily to the increase costs of importing crude oil. We feel there will be sufficient supplies, of diesel and motor gasoline this summer, but we would also stress the importance of continued conservation of all petroleum use. It is a national policy that we reduce our demands on petroleum based energy by voluntary conservation and thereby reduce our dependency on foreign imported products. This policy of conservation also makes good business sense. That is reducing your energy costs without reducing your output. It is good for the U.S. balance of payments and foreign trade. Crude oil imports last year alone cost this country over $60 billion. Energy conservation is good for our country with inflation running so high.

I am sure that most of you have heard S.C. Governor Riley time and time again urging continued energy conservation by consumers and industry. Hopefully, each of you will support his voluntary effort and continue to conserve energy as you have in the past. With supplies continuing to improve, especially middle

distillates, we are hopeful that your fuel supply will not present a problem in the coming months; however, I want to assure each of you that Governor's Division of Energy Resources will assist you with your fuel problems. We feel that your industry is most vital to this State's coastal economy and we will do our best to see that your industry does not unduly suffer economically because of fuel shortages. I want you to feel free to call upon our Division if you do have a fuel supply problem. We are there to serve you and to help you if we possibly can.

As you know, manufacturing, tourism and agriculture, which includes seafood harvesting are the high revenue producers and the employment generators for South Carolina. They are the economic life blood of this State; and consequently, we want to help those industries with their fuel problems as they arise.