

Lobster and Crab Fisheries Division  
Maine Department of Marine Resources

Current Trends In Cull Rates Of Lobsters  
Along The Maine Coast

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## Introduction

Lobsters with one or both claws which are missing and/or regenerated (half of normal size or less) are known to the lobster market as "culls". Culls represent some financial loss to the industry due to the lower value of these lobsters at the retail level. Wholesale lobster dealers in some locations along the Maine coast are also now paying lobstermen a separate, lower price for culls. According to dealers surveyed by the Lobster and Crab Fisheries Division of the Maine Department of Marine Resources (DMR) in 1990 the cull price was \$0.50-\$0.75 per pound lower than the regular price. This cull price was 23-35% less than the average ex-vessel price of \$2.15 per pound in 1990.

Recently, there has been some concern in the Maine lobster industry that the cull rate in the commercial lobster catch has been increasing. Given the negative economic effects an increase in culls would have on the industry, as well as the biological effects this would represent in terms of physical damage to the lobster resource, there is a need to examine this situation objectively as well as scientifically.

The purpose of this analysis, therefore, is to determine whether the rate of culls has increased significantly in recent years. A further objective of the analysis is to determine whether the increase in minimum legal size of lobsters since 1988 has had any effect on cull rate. Since the legal escape vent size for lobster traps was not modified to correspond with the new minimum legal size it has been felt by some that the number of culls may be greater until the vent size is changed.

Some other factors which are thought to influence cull rates will be analyzed and discussed in this report. Two of the possible factors most widely spoken of by industry members are the increased use of wire traps and the impacts of dragging by scallopers and other fishing vessels. Cull rates observed in different areas along the coast will be compared with geographic trends in dragger effort and wire trap usage in order to determine if there is, in fact, any apparent relation between these factors and cull percentage.

Data on cull rates are available from two primary sources of the Lobster and Crab Fisheries Division. One is the lobster port sampling program from which complete information on cull rates in commercial lobster catches coastwide is available since 1972. During the port sampling process, which takes place at 10 different lobster dealers per month during April through December, a sample of 10 lobsters from each fisherman's catch is examined for length, weight, sex and cull status. In this way data from the catches of many different fishermen from all areas of the coast are obtained. The other major source of cull information is data from total lobster catches sampled aboard lobster boats at Cape Porpoise, Boothbay Harbor and Tenants Harbor since 1985 (sea sampling).

### Port Sampling Findings

Data from port sampling indicated there were not statistically significant differences in the percentage of legal lobsters with claws absent between the two time periods 1972-80 and 1981-90 (Figure 1). The data were grouped into these two time periods in order to compare earlier years of the sampling survey with more recent years and to have approximately equal numbers of observations in each data set. This grouping also serves as a basis of comparison between the time periods before and after the escape vent law was implemented in Maine in 1979. The cull data were compiled from sampling the catches of 5,547 lobster boats at dealers from all areas of the coast over the 19-year period. The mean percentage of lobsters with missing claws in 1972-80 was 5.89% compared with 5.85% in 1981-90. However when the regenerative claw category was included the cull percentage was increased to 9.89% in 1972-80 and 11.04% in 1981-90 (Figure 2). A statistically significant difference in cull rate between the two time periods could only be demonstrated when the regenerative category was included. However, given the subjectivity of classifying a regenerative claw as a cull (determination of claw status depends on judgement of observer in the field) it was felt that cull estimates based only on missing claws were more reliable.

Similarly I did not find statistical differences in the rate of lobsters with missing claws between 1981-87 and 1988-90 (Figure 1). These two time periods were examined in order to

detect any difference in cull incidence since the 1988-89 changes in minimum legal size. The mean cull rates (missing claws only) were 5.86% and 5.81% in 1981-87 and 1988-90, respectively, indicating no increase has occurred during the last three years. When the regenerative claw category was included the cull percentages were 10.14% in 1981-87 and 13.01% in 1988-90 (Figure 2), which represented a statistically significant increase.

There were quite large and rather consistent geographic differences in the cull percentages of commercial lobster catches observed from port sampling. York County had the highest cull rate for both 1972-80 and 1981-90, and an increase was noted between these two time periods in this county (Figure 3). Hancock County had one of the lowest cull rates during 1972-80 and had the lowest of all coastal counties during 1981-90.

Comparing 1981-87 to 1988-90, York County again had the highest proportion of culls in both time periods, with the exception that Sagadahoc County was slightly higher in the missing claw only category in 1988-90 (Figure 4). York County actually showed a decrease in the missing claw only category between 1981-87 and 1988-90. Cull rates in all counties showed significant increases between 1981-87 and 1988-90 when the regenerative category was included.

### Sea Sampling Findings

Data collected from sampling at sea aboard commercial lobster boats during 1985-90 indicated differences in cull rates between geographic areas. However there was no indication from sea-sampling of a significant increase in the cull rate of legal-sized lobsters during 1985-90 (Figure 5). Cape Porpoise had the highest cull rate (missing and/or regenerated), averaging 20.65% in the legal catch during this period while Boothbay Harbor and Tenants Harbor rates were 15.47% and 9.26%, respectively. In the catch of sublegals ("shorts"), cull rates were significantly higher than for legals and followed the same trend by fishing area. Sublegal cull rate during 1985-90 for Cape Porpoise was 31.37%, followed by 23.77% at Boothbay Harbor and 11.41% at Tenants Harbor. Cape Porpoise sublegal cull rate increased during 1988-90 (Figure 5) but no significant change was observed in the other two locations.

### Commercial Trawling Effect

The geographic pattern in cull percentage is not consistent with the claim that draggers are responsible for high cull rates. Dragging effort data for coastal Maine made available by the U.S. Department of Commerce, National Marine Fisheries Service (NMFS), Portland, ME, were compared to lobster cull rates determined from DMR port sampling. NMFS effort data were obtained for otter

trawls (used by both shrimp and groundfish fishermen) and scallop drags during the period 1982-85. The category of effort used for this analysis was total time (days) nets were on the bottom for vessels categorized by county in which catches were landed.

According to the NMFS data, a large proportion of the inshore dragger (0-12 miles) effort was by scallop draggers in Washington and Hancock Counties. There was also a significant amount of inshore effort by shrimp and otter trawl vessels landing their catches in Cumberland and Lincoln Counties. Counties with the highest combined (scallop, shrimp and groundfish trawl) mean annual effort were, in order: 1) Cumberland, 2) Hancock and 3) Washington. Highest mean annual scalloper effort (in order) by county was: 1) Hancock, 2) Washington and 3) Cumberland. The largest mean annual otter trawl effort (in order) was in: 1) Cumberland, 2) Lincoln and 3) Sagadahoc Counties.

These data show no apparent correlation between dragger effort and cull incidence by county (Figure 6). York County, which as has been noted leads in cull percentage, had only minimal dragger activity. Scallop dragger effort was most highly concentrated in Hancock and Washington Counties where cull incidence was lower than in any two counties on the coast during 1981-90. It should be noted there are other forms of dragger activity for which quantitative information were not available. This includes mussel dragging, primarily in the Penobscot Bay, Mt. Desert Island and Casco Bay areas, quahog dragging, mainly in

Washington County, and the surf clam fishery which is primarily in southern Maine areas such as Old Orchard Beach.

The lack of any relation between cull rate and amount of scallop dragger effort by county is consistent with the study of Jamieson and Campbell (1985) who found that damage to lobsters from scallop drags in the Gulf of St. Lawrence was minimal. In this area sea bed was generally smooth and lobsters were able to avoid the scallop gear. As for otter trawl impact, however, a Rhode Island study reported that nearly 11% of lobsters caught by otter trawl sustained injuries and nearly 4% became culls as a result of trawl capture (Ganz 1980). Over 90% of the lobsters examined in the Rhode Island study were sublegal and would therefore be returned to the sea. Repeated trawl capture of the sublegal lobsters would compound the incidence of trawl-related damage to the lobster resource. In all probability most lobsters which are caught by trawls in Maine, however, are illegally kept. Therefore trawling should have only a negligible effect on the cull rate of trap-caught lobsters in Maine.

#### **Wire Trap Effect**

Many industry members also believe that wire traps are responsible for an increase in culls. The use of wire traps in the Maine lobster fishery has increased sharply in recent years. In the period between 1983-85 and 1988-90 lobstermen in all coastal counties except one (Cumberland) had changed over to using mainly wire traps (Table 1). York and Sagadahoc Counties,

in particular, have had very high increases in numbers of wire traps during this period. There appears to be no clear cause and effect relation, however, between the increased use of wire traps and the proportion of culls in the catch (Figure 7). The cull rate in York County, as noted previously, actually decreased between 1981-87 and 1988-90 (Figure 4), while wire traps were increasing sharply in that area. Cumberland County, which had only 6.8% wire traps in 1983-85 and rose to 30.3% in this category in 1988-90, experienced virtually no increase in cull percentage (missing claws only) during this time. In Sagadahoc County, however, there was an increase in cull rate (missing claws only) from 6.41% in 1981-87 to 9.16% in 1988-90. The main result here may be, however, that there is no evidence of a significant change in the coastwide cull rate (missing claws only) during the period since the mid-1970's when wire traps began appearing along the coast in appreciable numbers.

### Conclusion

The fact that cull percentage has not shown a significant increase coastwide is good news for both the resource and the lobster industry. It may have appeared that there has been an increase due to the larger numbers of lobsters caught in recent years. Maine experienced a record lobster harvest in 1990. This period of higher abundance has very likely seen greater numbers of culls but, based on these results, not a greater percentage. An increase in cull rates would not be unexpected during a period

of high abundance. Higher lobster density in both traps and the natural environment could lead to more competition and fighting and hence claw loss. Furthermore the increase in fishing pressure as evidenced by ever increasing trap numbers in the Maine fishery will make more lobsters, particularly sublegals, vulnerable to claw loss as a result of increased handling and time spent in traps. More lobsters may be losing claws as sublegals due to higher abundance, more traps being fished, longer set-over time and greater retention capability of double-parlor traps now in widespread use. As these greater numbers of sublegal culls become legal, their claws are regenerating but have not yet attained full size which may account for the significant increase which was observed in the regenerative claw category in recent years.

**References cited:**

Ganz, A. 1980. Otter trawl induced lobster damage evaluation. Final Report, Project No. 3-279-R and 3-320-R, U.S. Department of Commerce, National Marine Fisheries Service, Federal Aid Branch, 26 p.

Jamieson, G.S., and A. Campbell. 1985. Sea scallop fishing impact on American lobsters in the Gulf of St. Lawrence. Fishery Bulletin 83(4): 575-586.

Table 1. Percentage of wire traps in use in Maine, by county, during 1983-85 and 1988-90 as estimated from lobster port sampling program, Maine DMR.

<u>County</u>	<u>1983-85</u>	<u>1988-90</u>
York	29.3	91.2
Cumberland	6.8	30.3
Sagadahoc	30.7	90.0
Lincoln	62.1	91.6
Knox	75.5	85.9
Hancock	32.6	64.4
Washington	45.1	82.8

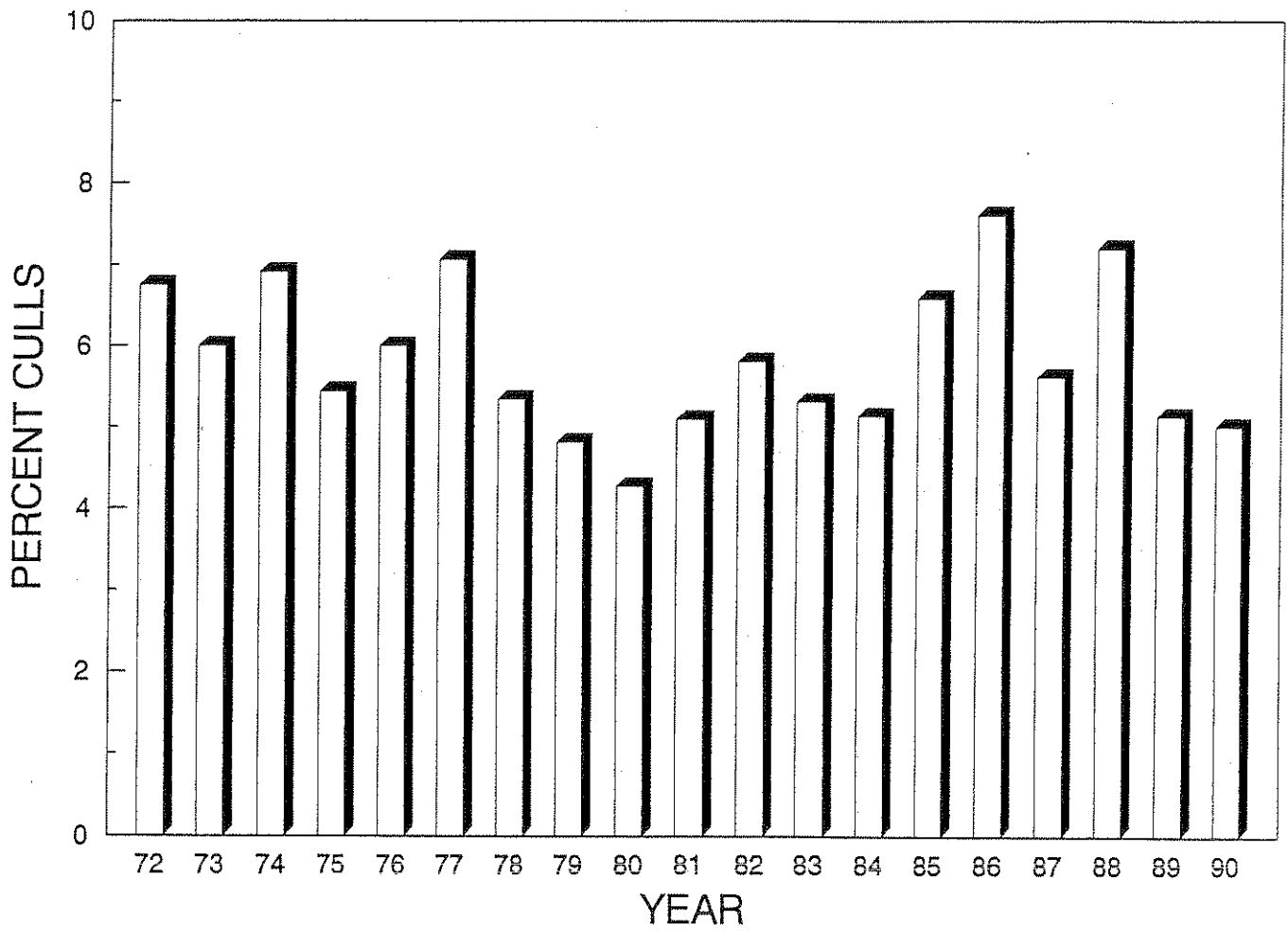


Figure 1. Percentage of legal-sized lobsters with missing claws in the Maine commercial lobster catch, 1972-90.

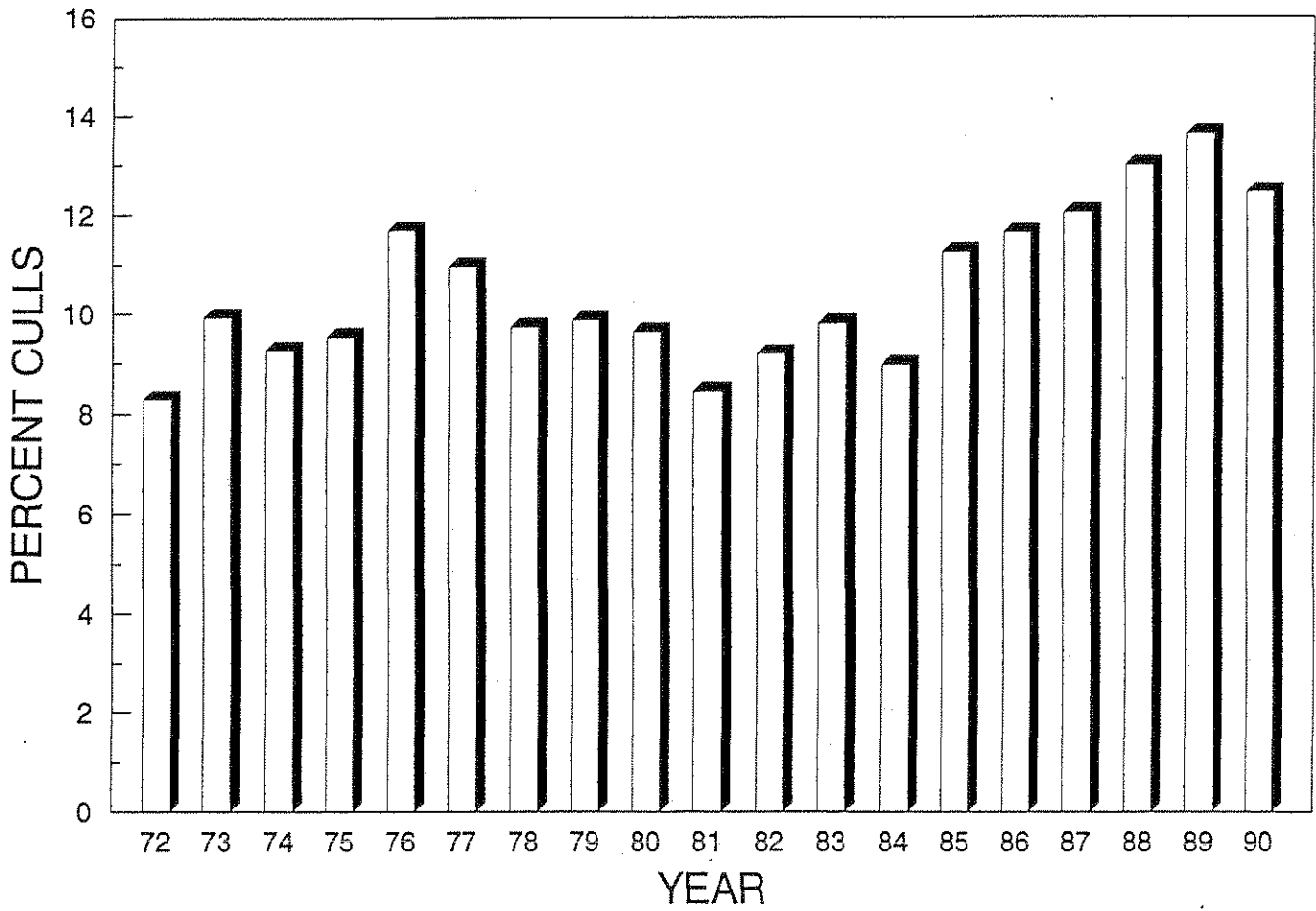
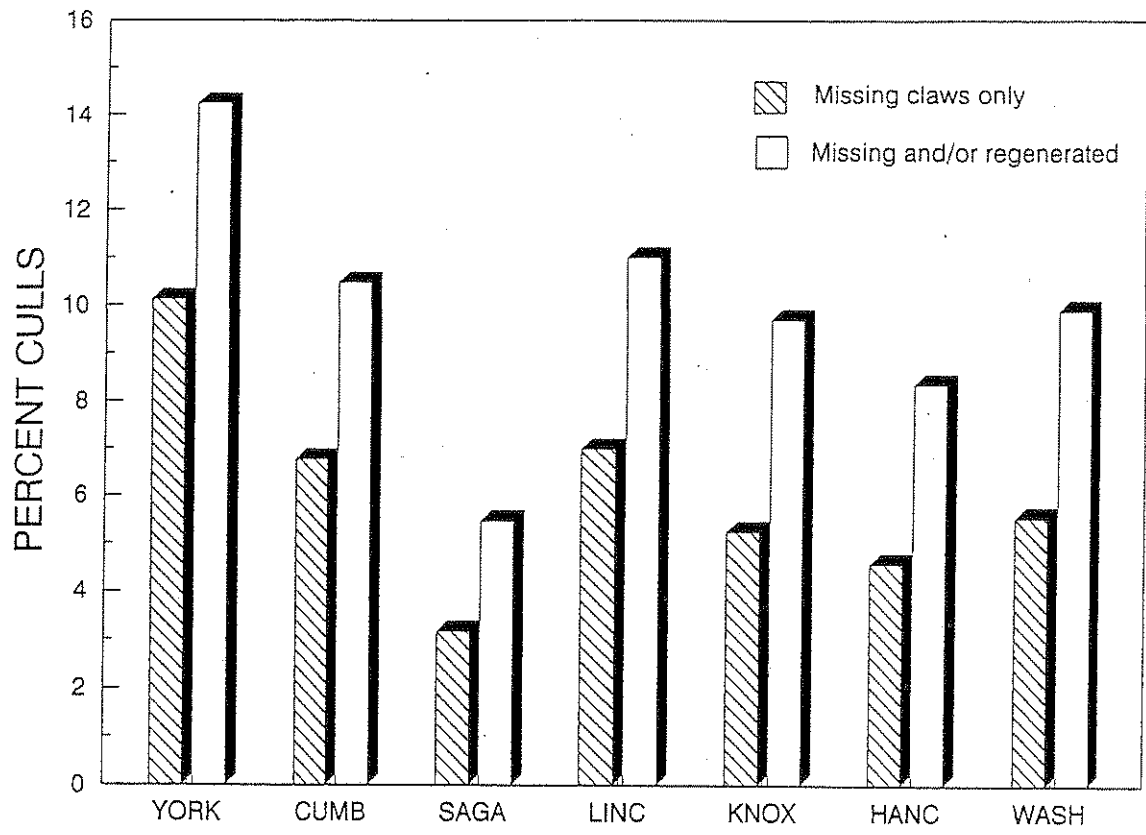


Figure 2. Percentage of legal-sized lobsters with missing and/or regenerative claws in the Maine commercial lobster catch, 1972-90.



1981-90

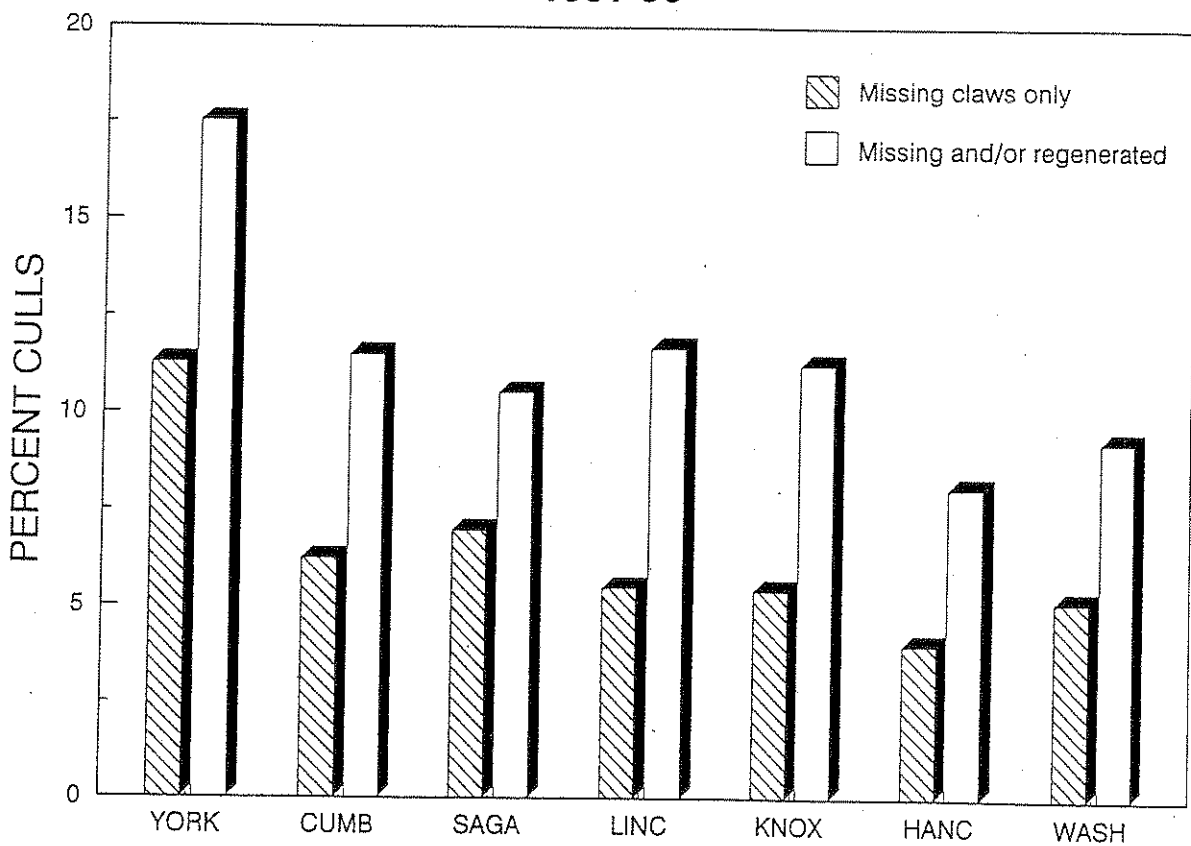
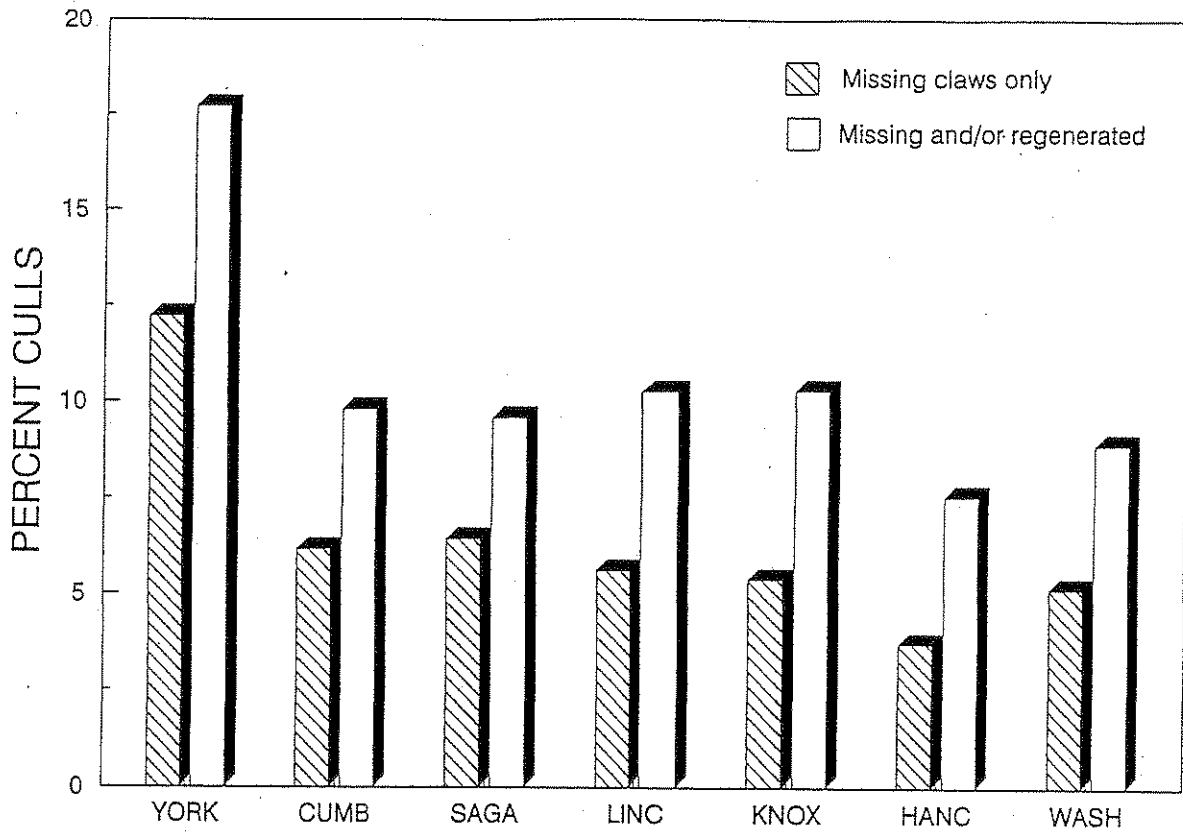


Figure 3. Percentage of culls in Maine commercial lobster catches during 1972-80 and 1981-90, by county.

1981-87



1988-90

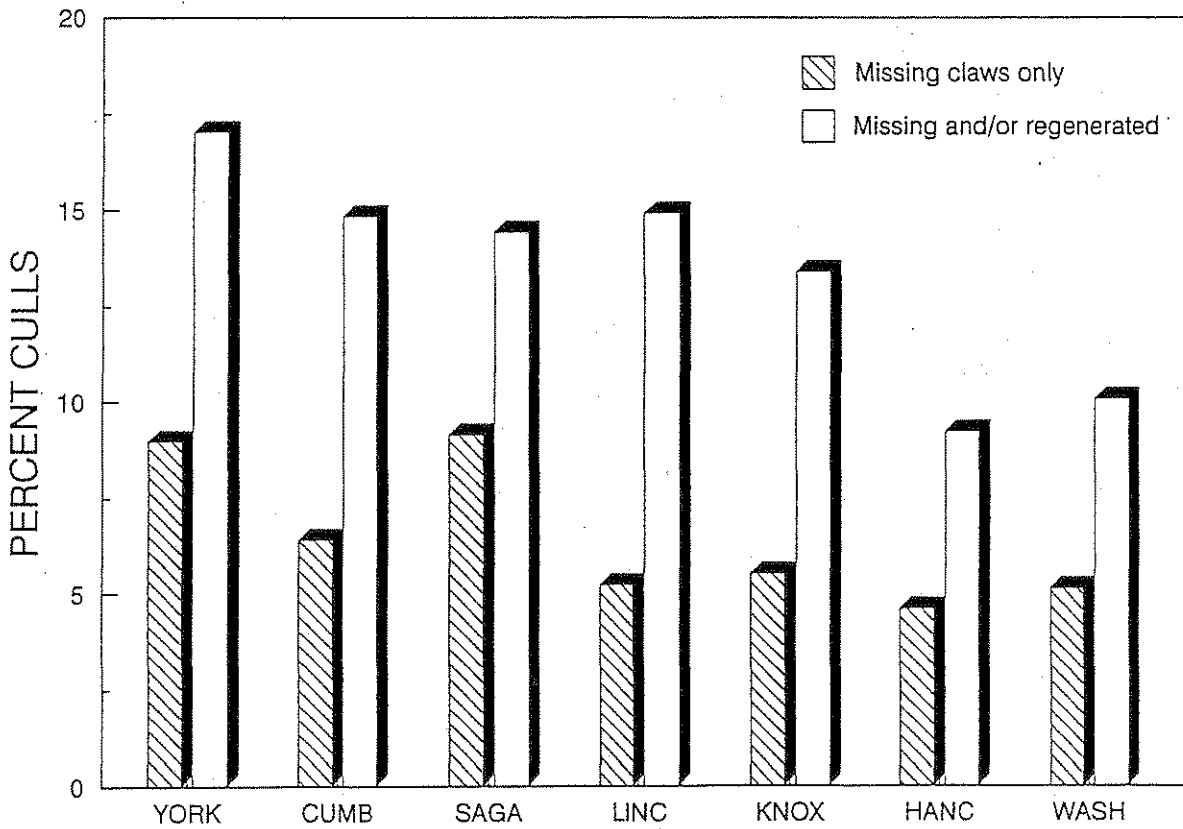


Figure 4. Percentage of culls in Maine commercial lobster catches during 1981-87 and 1988-90, by county.

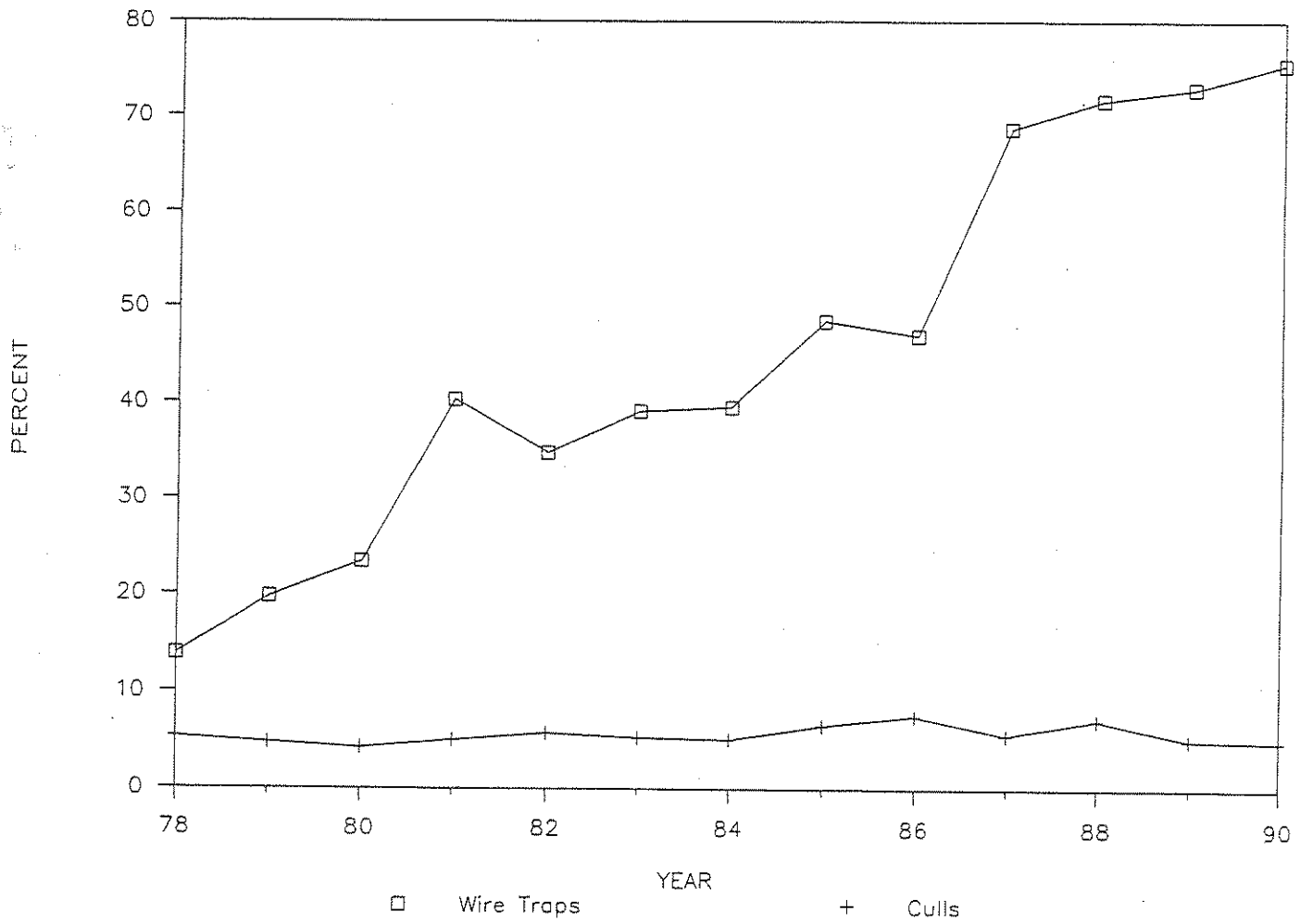
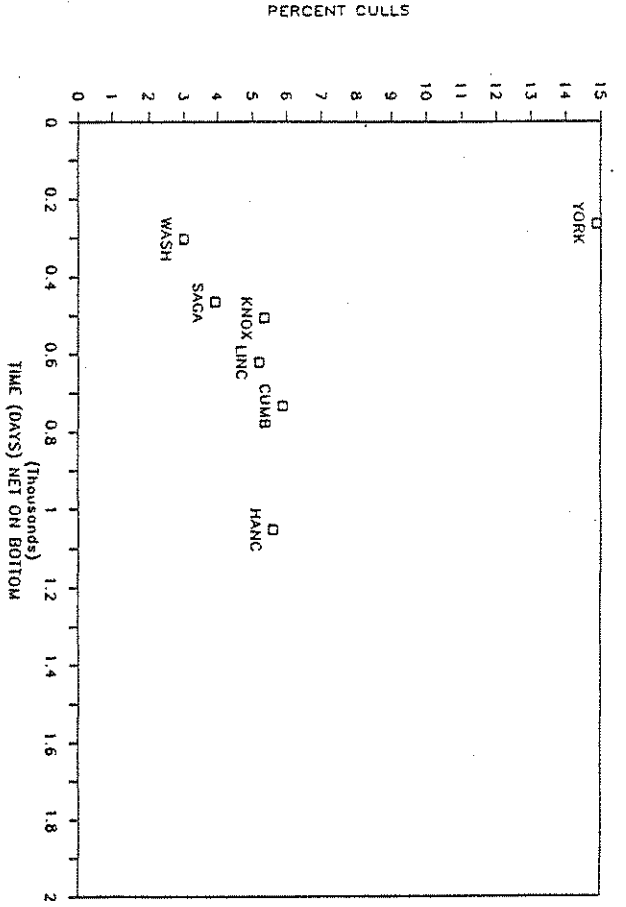
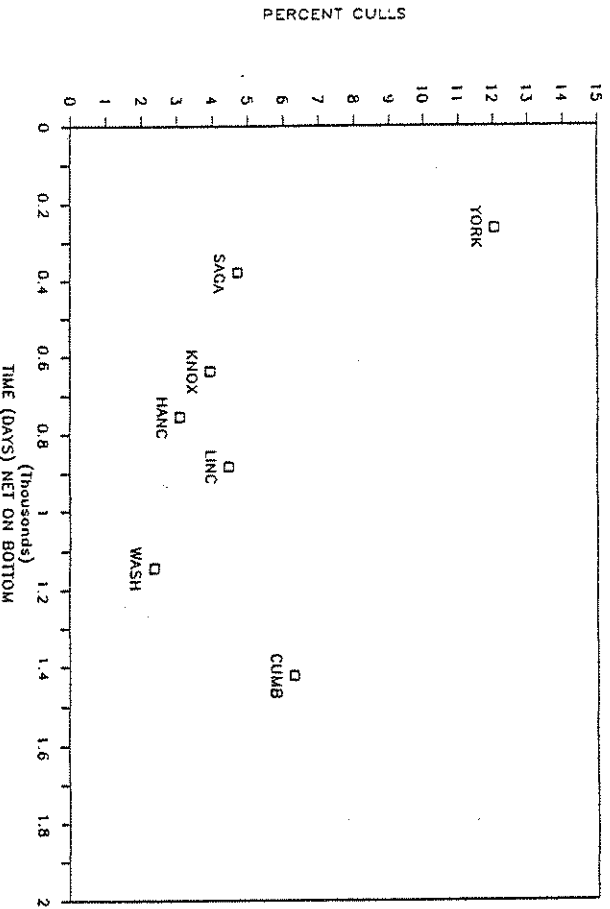


Figure 7. Percentage of wire traps in use and percentage of lobsters with missing claws in the Maine commercial catch, 1978-90.

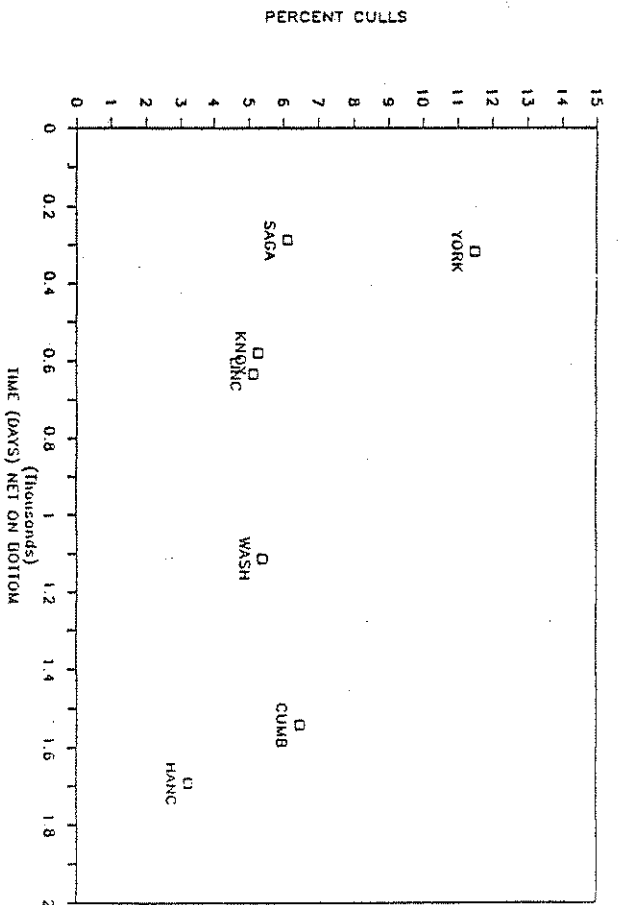
1982



1984



1983



1985

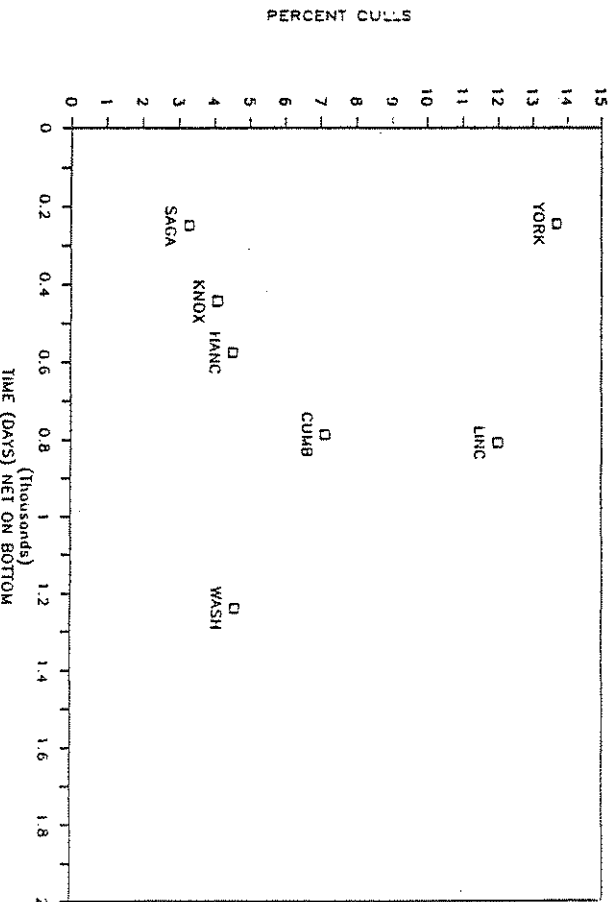


Figure 6. Percentage of lobstermen with missing claws in the Maine commercial lobster catch in relation to the amount of trawling effort by scallop drags and other trawls (time net was on bottom) by county,

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