

PEALGIC FISH (NORTHERN) COMMITTEE

by Alan Saville

1973

Belgium

(P. Hovart)

Herring

Research Vessel Surveys

| Area                  | Season                          | Objective   |
|-----------------------|---------------------------------|---|
| Belgian Coast<br>(12) | Whole year<br>Monthly intervals | Recording densities of<br>immature sprat <i>swarm</i> |

Sprat

Research Vessel Surveys

| Area                  | Season                          | Objective  |
|-----------------------|---------------------------------|--|
| Belgian Coast<br>(12) | Whole year<br>Monthly intervals | Recording densities of<br>immature herring <i>just</i> |

Canada

(J.S. Scott & G.H. Winters)

Herring

Preliminary figures indicate that total Canadian landings of herring in 1973 were about 220,000 metric tons, 20% less than in 1972 and about half of peak catches in the late 1960's. Reduced landings reflect inadequate recruitment and attrition of accumulated biomass. The decrease was due mainly to reduced mobile fleet landings in Newfoundland, down 40% to about 30,000 tons, New Brunswick, down 37% to 44,000 tons, and southwest Nova Scotia and Chedabucto Bay-Cape Breton, each down 10% to 50,000 and 22,000 tons respectively. Quota regulations were placed on nearly all mobile fleet landings from Canadian coastal waters to ensure rational yield levels. Special research studies continued on larval distribution and ecology, and stock discrimination, fecundity and feeding.

Mackerel

Canadian landings increased from 1972 level by 25% to about 18,000 tons mainly from the developing fishery in the Gulf of St. Lawrence. Studies were

initiated to investigate biological parameters including growth, age at sexual maturity, and recruitment to adult stock. Particularly important is recruitment of the so-called "northern" population of mackerel to the intensive mackerel fisheries off the New England coast during the fall-winter period. Tagging studies have been initiated to investigate the stock interrelationships of the "northern" and "southern" contingents of mackerel. Returns from the New England coast of mackerel tagged in Canadian waters indicate migration between the two areas and intermingling of the contingents.

Autoxidation of lipid in frozen mackerel held for reasonable periods (3-6 months) and kinetic changes in lipids and tocopherols associated with off-quality oxidative deterioration are being investigated.

### Capelin

Landings of capelin in the Northwest Atlantic area increased substantially from less than 7,000 metric tons in 1971 to an estimated 260,000 metric tons in 1973. The fishery is based mainly on spawning concentrations of capelin on the southeast shoal area of Grand Bank in June-July and on prerecruits in the Hamilton Inlet Bank area during the Oct-Dec period. As a result of the rapid expansion of the capelin fishery, research studies on capelin were reactivated in 1973 after a lapse of several years and intensive sampling of commercial and research vessel catches was conducted. Special emphasis has been placed on the possible interactive effects of a capelin fishery on fisheries for its major predators and preliminary estimates of the annual consumption of capelin by its predators have been determined.

The similarity to herring oil in fatty acid composition indicates that Canadian capelin oils could be used interchangeably with herring oil as is done in Europe.

### Sand Lance

Studies on the ecology and life history of sand lances continued as material became available.

Sampling:

| Area                       | Type of Fish | No. of Samples |            | No. of Fish |       |
|----------------------------|--------------|----------------|------------|-------------|-------|
|                            |              | Research       | Commercial | Measured    | Aged  |
| <u>Mackerel</u>            |              |                |            |             |       |
| Eastern Nfld               | Adults       | -              | 11         | 550         | 550   |
| Southeast Nfld             | Adults       | 10             | 13         | 1 350       | 1 150 |
| Western Nfld               | Adults       | -              | 2          | 100         | 100   |
| Northern Nfld              | Adults       | -              | 9          | 450         | 450   |
| Gulf of St Lawrence        | Adults       | -              | 50         | 6 100       | 1 978 |
| Chedabucto Bay             | Adults       |                | 61         | 9 031       | 1 744 |
| Southwest Nova Scotia      | Mixed*       |                | 43         | 4 698       | 661   |
| Bay of Fundy-Gulf of Maine | Mixed*       |                | 3          | 341         | 95    |
| <u>Herring</u>             |              |                |            |             |       |
| Eastern Nfld               | Adults       | 3              | 21         | 2 000       | 1 200 |
| Southeast Nfld             | Adults       | 5              | 58         | 4 250       | 3 150 |
| Southwest Nfld             | Adults       | 3              | 134        | 8 350       | 6 850 |
| Western Nfld               | Adults       | 4              | 52         | 4 008       | 2 506 |
| Northern Nfld              | Adults       | 3              | 48         | 3 250       | 2 550 |
| Gulf of St Lawrence        | Adults       | -              | 134        | 13 692      | 4 603 |
| Chedabucto Bay             | Mixed*       | 3              | 127        | 17 197      | 3 118 |
| Southwest Nova Scotia      | Mixed        | -              | 116        | 19 704      | 3 667 |
| Bay of Fundy-Gulf of Maine | Mixed        | -              | 344        | 49 187      | 8 834 |
| <u>Capelin</u>             |              |                |            |             |       |
| Offshore Banks (Nfld)      | Adults       | 26             | 82         | 13 797      | 5 400 |
| Inshore (Nfld)             | Adults       | 46             | 25         | 4 652       | 3 550 |

\*A proportion of these fish were  $\leq$  2 years old.

Tagging:

| Date and Area     |                                  | Tag type | No. Tagged | No. Recovered |
|-------------------|----------------------------------|----------|------------|---------------|
| <u>Herring</u>    |                                  |          |            |               |
| Mar 23-24         | Placentia Bay                    | Dart     | 5 250      | 76            |
|                   |                                  | Anchor   | 5 250      | 109           |
|                   |                                  | Internal | 900        | None          |
| Aug 7-8           | Quirpon (Northern Nfld)          | Dart     | 1 100      | None          |
| Aug 25            | Green Bay (Eastern Nfld)         | Dart     | 175        | None          |
| Oct 27-<br>Nov 1  | La Scie (Northern Nfld)          | Dart     | 8 500      | 1             |
| Nov 21-<br>Dec 14 | Grand Manan, N.B. (Bay of Fundy) | Anchor   | 12 147     | None          |
| <u>Mackerel</u>   |                                  |          |            |               |
| Sep 5-6           | Trinity Bay (Eastern Nfld)       | Dart     | 7 000      | 40            |
|                   |                                  | Anchor   | 2 000      | 15            |
| Oct 3             | Prince Edward Island             | Anchor   | 196        | None          |
| Oct 23-26         | St Margaret's Bay, N.S.          | Anchor   | 1 765      | 94            |

Research Vessel Cruises:

| Vessel         | Area                       | Season           | Objectives                      |
|----------------|----------------------------|------------------|---------------------------------|
| Marinus        | Southwest Nfld             | Winter (Jan)     | Herring tagging                 |
| Marinus        | Southwest Nfld             | Winter (Feb)     | Herring survey                  |
| Marinus        | Southeast Nfld             | Winter (Mar)     | Herring tagging                 |
| Marinus        | Southeast Nfld             | Spring (Apr)     | Herring tagging                 |
| Marinus        | Southeast Nfld             | Autumn (Sep-Oct) | Herring and mackerel survey     |
| Marinus        | Northern Nfld              | Autumn (Oct-Nov) | Herring tagging                 |
| Marinus        | Southeast Nfld             | Autumn (Dec)     | Hydrographic and herring survey |
| E. E. Prince   | Northern Nfld and Labrador | Spring (May)     | Herring and capelin survey      |
| Silver Dolphin | Northern Nfld and Labrador | Summer (Jul-Aug) | Herring and mackerel survey     |
| E. E. Prince   | Bay of Fundy-Gulf of Maine | Winter (Mar)     | Herring larval survey           |
| Harengus       | Gulf of St Lawrence        | Spring (Apr)     | Mackerel survey                 |
| E. E. Prince   | Chedabucto Bay-Cape Breton | Summer (Jun)     | Herring larval survey           |
| E. E. Prince   | St Margaret's Bay, N.S.    | Summer (Aug)     | Mackerel tagging                |
| E. E. Prince   | Bay of Fundy               | Autumn (Oct)     | Herring larval survey           |
| Harengus       | Chedabucto Bay             | Autumn (Oct-Nov) | Herring larval survey           |
| E. E. Prince   | Bay of Fundy-Gulf of Maine | Autumn (Nov)     | Herring larval survey           |
| E. E. Prince   | Bay of Fundy-Gulf of Maine | Winter (Dec)     | Herring larval survey           |

Denmark

(K. Popp Madsen)

RV "Dana" participated in the international young herring surveys in February 1973.

No tagging experiments or special investigations were carried out.

Herring:

| Area                   | Season            | Type of Fish | No. of Samples |        | No. of Fish |        |                   |     |
|------------------------|-------------------|--------------|----------------|--------|-------------|--------|-------------------|-----|
|                        |                   |              | Research       | Market | Measured    | Aged   | Examined racially |     |
| West of Shetland (02)  | Apr-Jun           | immat.       |                | 1      | 28          | 28     |                   |     |
|                        |                   | adults       |                | 2      | 257         | 257    | 257               |     |
|                        | Jul-Sep           | immat.       |                | 1      | 6           | 6      |                   |     |
|                        |                   | adults       |                | 1      | 120         | 120    | 120               |     |
| Oct-Dec                | immat.            |              | 1              | 27     | 27          |        |                   |     |
|                        | adults            |              | 3              | 448    | 448         | 448    |                   |     |
| NW North Sea (03)      | Jan-Mar           | immat.       | 3              | 3      | 109         | 101    |                   |     |
|                        | adults            |              |                | 1      | 135         | 135    | 135               |     |
|                        | Apr-Jun           |              |                | 2      | 57          | 57     |                   |     |
|                        | NE North Sea (04) | Jan-Mar      | immat.         |        | 2           | 47     | 47                |     |
| adults                 |                   |              |                | 2      | 240         | 240    | 240               |     |
| Jul-Sep                |                   | adults       |                | 1      | 100         | 100    | 100               |     |
| Oct-Dec                |                   | immat.       |                | 1      | 1           | 1      |                   |     |
|                        | adults            |              | 1              | 100    | 100         | 100    |                   |     |
| Skagerak (05)          | Jan-Mar           | immat.       | 2              | 27     | 652         | 609    |                   |     |
|                        | Apr-Jun           | immat.       |                | 11     | 355         | 355    |                   |     |
|                        |                   | adults       |                |        | 1           | 113    | 113               | 113 |
|                        | Jul-Sep           | immat.       |                |        | 20          | 570    | 570               |     |
|                        |                   | adults       |                |        | 1           | 125    | 125               | 125 |
| Oct-Dec                | immat.            |              | 15             | 198    | 198         |        |                   |     |
| Central North Sea (09) | Jan-Mar           | immat.       | 21             | 50     | 6 421       | 4 381  | 1 582             |     |
|                        | Apr-Jun           | immat.       |                | 19     | 607         | 607    |                   |     |
|                        | Jul-Sep           | immat.       |                |        | 59          | 1 768  | 1 768             |     |
|                        |                   | adults       |                |        | 2           | 241    | 241               | 241 |
|                        | Oct-Dec           | immat.       |                |        | 27          | 651    | 651               |     |
|                        |                   | adults       |                |        | 1           | 199    | 199               | 199 |
| Kattegat               | Jan-Mar           | immat.       |                | 28     | 1 299       | 1 299  |                   |     |
|                        | Apr-Jun           | immat.       |                | 10     | 524         | 524    |                   |     |
|                        | Jul-Sep           | immat.       |                | 2      | 66          | 66     |                   |     |
|                        | Oct-Dec           | immat.       |                | 19     | 480         | 480    |                   |     |
| Baltic                 | Jan-Mar           | immat.       |                | 6      | 590         | 590    |                   |     |
|                        | Apr-Jun           | immat.       |                | 2      | 206         | 206    |                   |     |
|                        | Oct-Dec           | immat.       |                | 1      | 42          | 42     |                   |     |
| Σ                      |                   |              | 26             | 323    | 16 782      | 14 691 | 3 660             |     |

Sprat:

| Area                      | Season  | Type of Fish | No. of Samples |        | No. of Fish |      |                   |
|---------------------------|---------|--------------|----------------|--------|-------------|------|-------------------|
|                           |         |              | Research       | Market | Measured    | Aged | Examined racially |
| NW North Sea<br>(03)      | Jan-Mar | immat.       | 3              | 1      | 248         |      |                   |
|                           | Oct-Dec | immat.       |                | 1      | 6           |      |                   |
| NE North Sea<br>(04)      | Jan-Mar | immat.       | 1              | 2      | 11          |      |                   |
|                           | Oct-Dec | immat.       |                | 2      | 7           |      |                   |
| Skagerak<br>(05)          | Jan-Mar | immat.       | 2              | 15     | 106         |      |                   |
|                           | Apr-Jun | immat.       |                | 11     | 1 239       |      |                   |
| South Buchan<br>(08)      | Jan-Mar | immat.       |                | 1      | 5           |      |                   |
| Central North Sea<br>(09) | Jan-Mar | immat.       | 20             | 43     | 3 105       | 246  | 246               |
|                           | Apr-Jun | immat.       |                | 22     | 1 945       |      |                   |
|                           | Jul-Sep | immat.       |                | 52     | 5 002       |      |                   |
|                           | Oct-Dec | immat.       |                | 29     | 3 732       |      |                   |
| Kattegat                  | Jan-Mar | immat.       |                | 25     | 1 276       |      |                   |
|                           | Apr-Jun | immat.       |                | 9      | 658         |      |                   |
|                           | Jul-Sep | immat.       |                | 1      | 106         |      |                   |
|                           | Oct-Dec | immat.       |                | 8      | 488         |      |                   |
| Baltic                    | Jan-Mar | immat.       |                | 4      | 85          |      |                   |
|                           | Apr-Jun | immat.       |                | 2      | 153         |      |                   |
|                           | Oct-Dec | immat.       |                | 1      | 57          |      |                   |

Mackerel:

|                           |         |        |   |    |     |  |  |
|---------------------------|---------|--------|---|----|-----|--|--|
| West of Shetland<br>(02)  | Jul-Sep | adults |   | 1  | 7   |  |  |
| NW North Sea<br>(03)      | Jun-Mar | adults | 1 |    | 1   |  |  |
|                           | Apr-Jun | adults |   | 1  | 1   |  |  |
| Skagerak<br>(05)          | Apr-Jun | adults |   | 2  | 2   |  |  |
|                           | Jul-Sep | adults |   | 1  | 1   |  |  |
| Central North Sea<br>(09) | Jan-Mar | adults | 2 | 4  | 220 |  |  |
|                           | Apr-Jun | adults |   | 8  | 39  |  |  |
|                           | Jul-Sep | adults |   | 12 | 18  |  |  |
| Kattegat                  | Jan-May | adults |   | 1  | 1   |  |  |
|                           | Apr-Jun | adults |   | 1  | 1   |  |  |

Federal Republic of Germany

(K. Schubert)

Herring

Sampling:

| Area                         | Season | Type of Fish*) | No. of Samples  |        | No. of Fish |      |                   |
|------------------------------|--------|----------------|-----------------|--------|-------------|------|-------------------|
|                              |        |                | Research Vessel | Market | Measured    | Aged | Examined racially |
| NW North Sea<br>(03)         | I      | 1,2,4,5,8      | 2               | -      | 303         | 110  | 110               |
|                              | III    | 2,3,4,5,8      | 2               | -      | 520         | 200  | 200               |
| NE North Sea<br>(04)         | IV     | 1,2,5,8        | 3               | -      | 48          | 48   | 48                |
| Skagerak<br>(05)             | IV     | 1,2,3,8        | 3               | -      | 295         | 171  | 179               |
| South Buchan<br>(08)         | I      | 1,2,4          | 2               | -      | 121         | 112  | 112               |
|                              | III    | 2,3,4,5        | 3               | -      | 590         | 300  | 300               |
|                              | IV     | 1,2,3          | 4               | -      | 28          | 27   | 27                |
| Central North<br>Sea<br>(09) | I      | 1,2,5,8        | 12              | -      | 3 544       | 919  | 919               |
|                              | III    | 2,3,4,5        | 1               | -      | 833         | 100  | 100               |
|                              | IV     | 1,2,3,4,8      | 7               | -      | 217         | 134  | 134               |
| W of Shetland<br>(02)        | III    | 1,2,3,4,5,7,8  | 9               | 2      | 2 483       | 888  | 888               |
| Hebrides<br>(01)             | II     | 2,3,4,8        | -               | 1      | 100         | 100  | 100               |
|                              | III    | 2,3,4,5,8      | 4               | -      | 716         | 396  | 396               |
| NW of Ireland<br>(06)        | III    | 2,3,4,5,8      | 6               | 1      | 1 746       | 586  | 586               |
|                              | IV     | 2,3,4,7,8      | -               | 2      | 259         | 200  | 200               |
| W Baltic<br>(22)             | I      | 1,2,3-5,6      | -               | 1      | 1 042       | 487  | -                 |
|                              | II     | 1,2,3-5,6      | -               | 1      | 565         | 250  | -                 |
|                              | III    | 1,2,3-5,6      | -               | 1      | 748         | 297  | -                 |
|                              | IV     | 1,2,3-5,6      | -               | 1      | 792         | 335  | -                 |

\*) Stages of maturity.

Research Vessel Surveys:

| Area  | Season         | Objectives    |
|---|----------------|---------------|
| NW North Sea (03)<br>NE North Sea (04)<br>Skagerak (05)<br>S Buchan (08)<br>Central North Sea (09)                        | 8-21.2.73      | Young herring |
| NW North Sea (03)<br>W of Shetland (02)<br>Hebrides (01)<br>NW of Ireland (06)<br>S Buchan (08)<br>Central North Sea (09) | 5-28.7.73      | Adult herring |
| Central North Sea (09)<br>Skagerak (05)<br>NE North Sea (04)<br>NW North Sea (03)<br>S Buchan (08)                        | 29.11-18.12.73 | Adult herring |

Mackerel

No work was done on mackerel in 1973.

Finland

(V. Sjöblom)

Sampling

Baltic herring:

| Area            | Season  | Type of Fish | No. of Samples  |        | No. of Fish |      |                   |
|-----------------|---------|--------------|-----------------|--------|-------------|------|-------------------|
|                 |         |              | Research Vessel | Market | Measured    | Aged | Examined racially |
| Gulf of Finland | Jun     | spawning     |                 | 3      | 552         | 552  |                   |
|                 | Jul     | spawning     |                 | 1      | 154         | 154  |                   |
|                 | Sep     | feeding      |                 | 2      | 351         | 351  |                   |
|                 | Oct-Nov | feeding      |                 | 4      | 541         | 541  |                   |
| Archipelago Sea | Jun     | spawning     |                 | 1      | 149         | 149  |                   |
|                 | Nov     | feeding      |                 | 2      | 354         | 354  |                   |
| Bothnian Sea    | Jun     | spawning     |                 | 1      | 154         | 154  |                   |
|                 | Sep     | feeding      |                 | 1      | 159         | 159  |                   |
|                 | Oct-Nov | feeding      |                 | 2      | 230         | 230  |                   |
| Bothnian Bay    | Jun     | spawning     |                 | 1      | 160         | 160  |                   |
|                 | Jul     | feeding      |                 | 1      | 189         | 189  |                   |
|                 | Nov     | feeding      |                 | 2      | 231         | 231  |                   |



Sprat:

| Area            | Season  | Type of Fish | No. of Samples  |        | No. of Fish |      |                   |
|-----------------|---------|--------------|-----------------|--------|-------------|------|-------------------|
|                 |         |              | Research Vessel | Market | Measured    | Aged | Examined racially |
| Gulf of Finland | Sep     | adults       |                 | 1      | 200         | 200  |                   |
| Åland Sea       | Oct-Dec | adults       |                 | 5      | 934         | 934  |                   |
|                 | Nov-Dec | adults       |                 | 2      | 384         | 384  |                   |

Research Vessel Surveys

| Area            | Date         | Objectives            |
|-----------------|--------------|-----------------------|
| Gulf of Finland | 17.7-27.8.73 | Baltic herring larvae |
| Archipelago Sea | 8-22.8.73    | Baltic herring larvae |
| Bothnian Sea    | 8-27.8.73    | Baltic herring larvae |
| Bothnian Bay    | 8-16.8.73    | Baltic herring larvae |

France

(Alain Maucorps)

EchantillonnageHareng:

| Région                  | Saison   | Genre de Poisson  | Nb échantillons     |        | Nb de Poissons |                    |                      |
|-------------------------|----------|-------------------|---------------------|--------|----------------|--------------------|----------------------|
|                         |          |                   | Bateau de recherche | Marché | mesurés        | dont âge déterminé | classés suivant race |
| Central North Sea (09)  | Juil-Sep | adultes matures   | -                   | 2      | 352            | 192                | -                    |
|                         |          | adultes géniteurs | -                   | 1      | 100            | 98                 | -                    |
| Hébrides (01)           | Oct-Dec  | adultes matures   | -                   | 2      | 264            | 194                | -                    |
|                         |          | adultes matures   | -                   | 1      | 151            | 98                 | -                    |
|                         |          | adultes (spent)   | -                   | 2      | 379            | 195                | -                    |
| Southern North Sea (12) | Oct-Dec  | adultes matures   | -                   | 1      | 257            | 95                 | -                    |
|                         |          | adultes géniteurs | -                   | 8      | 2 161          | 675                | -                    |

Maquereau:

|                       |          |         |   |   |       |   |   |
|-----------------------|----------|---------|---|---|-------|---|---|
| W Channel (15)        | Jan-Mar  | adultes | - | 2 | 415   | - | - |
|                       | Oct-Dec  | adultes | - | 2 | 132   | - | - |
| Bristol Channel (14)  | Jan-Mar  | adultes | - | 5 | 1 128 | - | - |
|                       | Avr-Juin | adultes | - | 1 | 144   | - | - |
| South of Ireland (13) | Oct-Dec  | adultes | - | 1 | 85    | - | - |
|                       | Oct-Dec  | adultes | - | 2 | 136   | - | - |

Pas de recherches spécifiques faites en mer à bord des navires océanographiques ou des chalutiers commerciaux.

Iceland  
(J. Jakobsson)

Blue Whiting

Sampling:

| Area          | Season  | Type of Fish | No. of Samples  |        | No. of Fish |      |                   |
|---------------|---------|--------------|-----------------|--------|-------------|------|-------------------|
|               |         |              | Research Vessel | Market | Measured    | Aged | Examined racially |
| S Iceland     | Apr-Jun |              | 1               |        | 100         | 100  |                   |
| "             | Jul-Sep |              | 1               |        | 100         | 100  |                   |
| "             | Oct-Dec |              | 1               |        | 100         | 100  |                   |
| Norwegian Sea | Apr-Jun |              | 8               |        | 800         | 800  |                   |
| Faroes        | Apr-Jun |              | 2               |        | 200         | 200  |                   |

Research Vessel Surveys:

| Area                     | Season  | Objectives                            |
|--------------------------|---------|---------------------------------------|
| Faroes and Norwegian Sea | May-Jun | Environmental and blue whiting survey |

Capelin

Sampling:

| Area    | Season | Type of Fish | No. of Samples  |                | No. of Fish |       |                   |
|---------|--------|--------------|-----------------|----------------|-------------|-------|-------------------|
|         |        |              | Research Vessel | Fishing Vessel | Measured    | Aged  | Examined racially |
| Iceland | winter |              | 20              | 43             | 6 300       | 6 220 |                   |
| "       | autumn |              | 5               | 4              | 900         | 890   |                   |

Tagging:

| Area      | Season | Type of Tags | No. Tagged | Type of Fish | Recoveries |
|-----------|--------|--------------|------------|--------------|------------|
| E Iceland | winter | internal     | 3 600      | adult        |            |

Research Vessel Surveys:

| Area            | Season          | Objectives     |
|-----------------|-----------------|----------------|
| E Iceland       | 2 - 26 Jan      | Capelin survey |
| E and S Iceland | 31 Jan - 23 Feb | Capelin survey |
| "               | 28 Feb - 17 Mar | " "            |
| "               | 21 Mar - 20 Apr | " "            |

Herring (Icelandic Waters)

Sampling:

| Area                 | Season  | Type of Fish | No. of Samples  |                | No. of Fish |       |                   |
|----------------------|---------|--------------|-----------------|----------------|-------------|-------|-------------------|
|                      |         |              | Research Vessel | Fishing Vessel | Measured    | Aged  | Examined racially |
| Iceland, South Coast | Jan-Mar |              | 1               | 5              | 374         | 370   | 370               |
|                      | Jul-Sep |              | 2               | 9              | 704         | 700   | 700               |
|                      | Oct-Dec |              | 6               | 5              | 1 050       | 1 020 | 1 020             |

Research Vessel Surveys:

| Area      | Season         | Objectives                                      |
|-----------|----------------|---|
| S Iceland | 25 Jul - 8 Aug | Herring larval survey                           |
| "         | 15 - 29 Nov    | Herring survey and absolute abundance estimates |

Herring (North Sea and Adjacent Waters)

Sampling:

| Area        | Season  | Type of Fish | No. of Samples  |                | No. of Fish |      |                   |
|-------------|---------|--------------|-----------------|----------------|-------------|------|-------------------|
|             |         |              | Research Vessel | Fishing Vessel | Measured    | Aged | Examined racially |
| 02-W off 4° | Jul     |              | 2               | 2              | 200         | 200  | 200               |
| 02-E off 4° | Jul-Sep |              |                 | 3              | 447         | 447  | 447               |
| "           | Oct-Dec |              |                 | 4              | 350         | 349  | 349               |
| 03          | Oct-Dec |              |                 | 3              | 300         | 299  | 299               |
| 05          | Jul     |              |                 | 2              | 177         | 175  | 175               |

Research Vessel Surveys:

| Area                     | Season               | Objectives            |
|--------------------------|----------------------|-----------------------|
| Shetland-Orkney Hebrides | 25 Jun-30 Jul<br>Oct | Herring survey<br>" " |

Ireland  
(J. Molloy)

Herring

Sampling

Sampling was continued on herring stocks along all coasts of Ireland during 1973, along the same lines as in previous years. Details are given in the table below. Some ovaries from the north-west coast were retained for fecundity studies.

| Area                  | Season              | Type of Fish  | No. of Samples  |        | No. of Fish |       |                   |
|-----------------------|---------------------|---------------|-----------------|--------|-------------|-------|-------------------|
|                       |                     |               | Research Vessel | Market | Measured    | Aged  | Examined racially |
| NW Ireland (06)       | Jan-Dec             | adult         |                 | 21     | 8 746       | 2 208 | 2 208             |
| W and SW Ireland (10) | Jan-Dec             | adult         |                 | 7      | 4 600       | 699   | 699               |
| S Ireland (13)        | Jan-Feb,<br>Nov-Dec | adult         |                 | 17     | 3 191       | 1 373 | 1 373             |
| Irish Sea (11)        | Mar-Oct             | adult & immat |                 | 20     | 1 922       | 404   | 1 000             |

Research Vessel Surveys

The research vessel Cú Feasa took part in a survey for young herring during the summer of 1973.

| Area       | Season            | Objectives           |
|------------|-------------------|----------------------|
| S Ireland  | Jun - Jul         | Young herring survey |
| Irish Sea  | Jun - Jul,<br>Oct | " " "                |
| NW Ireland | Jul - Aug         | " " "                |
| W Ireland  | Jul - Aug         | " " "                |

Sprat

Some samples of sprat from the east and south coasts were measured.

Smelt (*Osmerus eperlanus*)

Research is in progress on the spawning, age, growth and food of smelt in the Shannon, the only Irish locality in which this species is known to occur.

Netherlands

(A. Corten)

Herring

Sampling:

| Area<br>(ICES) 27.3.01.00)   | Quarter<br>of Year     | Type of<br>Fish | No. of Samples     |          | No. of Fish |                    |                      |            |
|------------------------------|------------------------|-----------------|--------------------|----------|-------------|--------------------|----------------------|------------|
|                              |                        |                 | Research<br>Vessel | Market   | Measured    | Aged               | Examined<br>racially |            |
| (01) Hebrides                | 3                      | adults          | -                  | 9        | 1 258       | 450                | 250                  |            |
| (01) Hebrides                | 4                      | adults          | -                  | 3        | 459         | 150                | 100                  |            |
| (02) W of Shetland           | 3                      | adults          | -                  | 1        | 145         | 50                 | 50                   |            |
| (03) NW North Sea            | 1                      | adults          | -                  | 2        | 288         | 100                | -                    |            |
| (03) NW North Sea            | 2                      | adults          | -                  | 3        | 575         | 150                | -                    |            |
| (03) NW North Sea            | 3                      | adults          | -                  | 2        | 335         | 100                | -                    |            |
| (04) NE North Sea            | 2                      | adults          | -                  | 1        | 147         | 50                 | -                    |            |
| (06) NW of Ireland           | 2                      | adults          | -                  | 5        | 879         | 250                | 150                  |            |
| (06) NW of Ireland           | 3                      | adults          | -                  | 6        | 776         | 300                | 150                  |            |
| (06) NW of Ireland           | 4                      | adults          | -                  | 4        | 714         | 200                | 100                  |            |
| (08) South Buchan            | 2                      | adults          | -                  | 2        | 415         | 100                | -                    |            |
| (09) Central N Sea           | 3                      | adults          | -                  | 14       | 2 160       | 700                | -                    |            |
| (09) Central N Sea           | 3                      | spawners        | -                  | 22       | 3 210       | 1 100              | 1 100                |            |
| (09) Central N Sea           | 4                      | adults          | -                  | 2        | 451         | 100                | -                    |            |
| (09) Central N Sea           | 4                      | spawners        | -                  | 4        | 707         | 200                | 200                  |            |
| (12) S North Sea             | 1                      | adults          | -                  | 7        | 1 194       | 350                | -                    |            |
| (12) S North Sea             | 4                      | adults          | -                  | 6        | 1 148       | 300                | -                    |            |
| (12) S North Sea             | 4                      | spawners        | -                  | 13       | 2 344       | 650                | 550                  |            |
| (13) S of Ireland            | 1                      | spawners        | -                  | 4        | 517         | 200                | -                    |            |
| (13) S of Ireland            | 2                      | adults          | -                  | 3        | 452         | 150                | 50                   |            |
| (13) S of Ireland            | 3                      | adults          | -                  | 2        | 343         | 100                | 50                   |            |
| (13) S of Ireland            | 4                      | adults          | -                  | 4        | 619         | 200                | 100                  |            |
| (14) Bristol Chnl            | 1                      | adults          | -                  | 1        | 97          | 50                 | 50                   |            |
| (14) Bristol Chnl            | 1                      | spawners        | -                  | 1        | 74          | 50                 | 50                   |            |
| Intern. Young Herring Survey | North Sea<br>Irish Sea | Feb<br>Jun      | immat.<br>immat.   | 13<br>14 | -<br>-      | ca 2600<br>ca 2800 | 627<br>700           | 627<br>700 |
| Total                        |                        |                 |                    | 27       | 121         | ca 19300           | 7 377                | 4 277      |

Research Vessel Surveys:

| Area               | Date            | Objectives           |
|--------------------|-----------------|----------------------|
| Southern North Sea | 1 - 20 Jan      | Herring larvae       |
| North Sea          | 29 Jan - 17 Feb | Young herring survey |
| Dutch coast        | 19 - 24 Mar     | Herring larvae       |
| Waddensea          | 19 - 24 Mar     | Herring larvae       |
| Dutch coast        | 16 - 21 Apr     | Herring larvae       |
| Waddensea          | 16 - 21 Apr     | Herring larvae       |
| Dutch coast        | 14 - 19 May     | Herring larvae       |
| Waddensea          | 14 - 19 May     | Herring larvae       |
| Irish Sea          | 12 - 30 May     | Young herring survey |
| Central North Sea  | 3 - 15 Sep      | Herring larvae       |
| Central North Sea  | 17 - 29 Sep     | Herring larvae       |
| Central North Sea  | 15 - 27 Oct     | Herring larvae       |
| Southern North Sea | 10 - 22 Dec     | Herring larvae       |

Mackerel

Sampling:

| Area<br>(Bull. Stat.<br>subdivision) | Quarter<br>of Year | Type<br>of<br>Fish | Nb. of Samples     |        | No. of Fish |       |                      |
|--------------------------------------|--------------------|--------------------|--------------------|--------|-------------|-------|----------------------|
|                                      |                    |                    | Research<br>Vessel | Market | Measured    | Aged  | Examined<br>racially |
| IVa N North Sea                      | 2                  | adults             | -                  | 3      | 700         | 150   | -                    |
| IVa N North Sea                      | 3                  | adults             | -                  | 1      | 250         | 50    | -                    |
| IVa N North Sea                      | 4                  | adults             | -                  | 3      | 550         | 150   | -                    |
| IVb Central N Sea                    | 4                  | adults             | -                  | 1      | 200         | 50    | -                    |
| IVe S North Sea                      | 2                  | adults             | -                  | 3      | 700         | 150   | -                    |
| IVc S North Sea                      | 3                  | adults             | -                  | 3      | 750         | 150   | -                    |
| IVc S North Sea                      | 4                  | adults             | -                  | 1      | 200         | 50    | -                    |
| VIIg,<br>h,j,k South Ireland         | 2                  | adults             | -                  | 3      | 700         | 150   | -                    |
| VIIg,<br>h,j,k South Ireland         | 3                  | adults             | -                  | 1      | 250         | 50    | -                    |
| VIIg,<br>h,j,k South Ireland         | 4                  | adults             | -                  | 3      | 550         | 150   | -                    |
| VIa NW of Ireland                    | 2                  | adults             | -                  | 3      | 700         | 150   | -                    |
| VIa NW of Ireland                    | 4                  | adults             | -                  | 1      | 200         | 50    | -                    |
| Total                                |                    |                    |                    | 29     | 6 500       | 1 450 |                      |

Tagging:

| Area        | Season | Type of<br>Tags | No. Tagged | Type of<br>Fish | Recoveries |
|-------------|--------|-----------------|------------|-----------------|------------|
| Dutch coast | August | internal        | 2 342      | adults          | 0          |
| Dutch coast | August | spaghetti       | 800        | adults          | 1          |
| Dutch coast | August | Floy            | 619        | adults          | 0          |

Research Vessel Cruises:

| Area            | Date           | Objectives           |
|-----------------|----------------|----------------------|
| English Channel | 21 May - 9 Jun | Serological research |
| Dutch coast     | 6 Aug - 1 Sep  | Tagging              |

Norway  
(O. J. Ostvedt)

Herring (Norwegian Coast)

Sampling:

| Area                     | Season            | Type of Fish | No. of Samples  |        | No. of Fish |       |                   |
|--------------------------|-------------------|--------------|-----------------|--------|-------------|-------|-------------------|
|                          |                   |              | Research Vessel | Market | Measured    | Aged  | Examined racially |
| Norwegian west coast     | winter            | spawners     | 23              | 4      | 2 046       | 1 995 | 183               |
| Northern Norway          | summer/<br>autumn | adults       | 2               | 9      | 1 051       | 1 000 | 157               |
| Møre/<br>Helgeland coast | summer/<br>autumn | immat.       | 3               | 7      | 724         | 711   | 119               |

Research Vessel Surveys:

| Area                        | Season    | Objectives                                  |
|-----------------------------|-----------|---|
| Norwegian west coast        | Jan - Mar | Spawning migration of the Norwegian herring |
| Norwegian west coast        | Apr       | Larval survey                               |
| Barents Sea - W Spitsbergen | Aug - Sep | 0-group fish survey                         |

Herring (North Sea)

Sampling:

| Area                   | Season Quarters | Type of Fish | No. of Samples  |        | No. of Fish |      |                   |
|------------------------|-----------------|--------------|-----------------|--------|-------------|------|-------------------|
|                        |                 |              | Research Vessel | Market | Measured    | Aged | Examined racially |
| Skagerak/<br>North Sea |                 |              |                 |        |             |      |                   |
| 02                     | 1               | adults       |                 | 3      | 300         | 300  | 200               |
| 05                     | 1               | spawners     |                 | 1      | 95          | 95   |                   |
| 09                     | 1               | immat.       |                 | 1      | 50          | 50   |                   |
| 01                     | 2               | adults       |                 | 1      | 95          |      |                   |
| 01/02                  | 2               | adults       |                 | 63     | 3 709       |      |                   |
| 02/03                  | 2               | adults       |                 | 28     | 2 186       |      |                   |
| 03                     | 2               | adults       |                 | 3      | 300         | 300  |                   |
| 05                     | 2               | immat.       |                 | 1      | 100         | 100  |                   |
| 09                     | 2               | immat.       | 4               |        | 300         | 300  |                   |
| 09                     | 2               | adults       | 2               | 8      | 935         | 300  |                   |
| 01                     | 3               | adults       |                 | 7      | 707         |      |                   |
| 01/02                  | 3               | adults       |                 | 77     | 5 864       |      |                   |
| 02                     | 3               | adults       |                 | 6      | 619         | 619  | 200               |
| 02/03                  | 3               | adults       |                 | 181    | 13 210      |      |                   |
| 03                     | 3               | adults       |                 | 3      | 300         | 300  | 100               |
| 09                     | 3               | im./ad.      |                 | 181    | 21 169      | 100  |                   |
| 01/02                  | 4               | adults       |                 | 1      | 57          |      |                   |
| 02/03                  | 4               | adults       |                 | 3      | 242         |      |                   |
| 03                     | 4               | adults       |                 | 1      | 100         | 100  |                   |

Research Vessel Surveys:

| Area               | Season    | Objectives  |
|--------------------|-----------|-------------|
| North Sea/Skagerak | Apr - May | Fish survey |
| "                  | May - Jun | "           |
| "                  | Oct - Nov | "           |



Mackerel (Scomber scombrus)

Sampling:

| Area                   | Season  | Type of Fish | No. of Samples  |         | No. of Fish |           |                   |
|------------------------|---------|--------------|-----------------|---------|-------------|-----------|-------------------|
|                        |         |              | Research Vessel | Market* | Measured    | Aged      | Examined racially |
| Shetland/<br>North Sea | Jul/Oct | adult        |                 | 1 674   | 90 855      |           |                   |
| Shetland**             | Mar/Apr | adult        |                 | 2       | 135         | 135       |                   |
| "                      | Jul/Aug | adult        |                 | 7       | 658         | 658       |                   |
| North Sea              | May/Oct | adult        |                 | 17      | 1 717       | 1 717     |                   |
| South of<br>Ireland    | Jun     | all          | 3               |         | 217         | (not yet) |                   |

\*) Samples obtained from Fish Co-operative and meal and oil factories.

\*\* ) Shetland, here defined as localities north of latitude 60°N.

Tagging:

| Area                    | Season  | Type of Tag | No. Tagged | Type of Fish | Recoveries |
|-------------------------|---------|-------------|------------|--------------|------------|
| SSW and W<br>of Ireland | Jun     | internal    | 8 215      | adult        | 25         |
| North Sea/<br>Skagerak  | Jul/Aug | internal    | 7 304      | adult        | 441        |

Research Vessel Surveys:

| Area   | Season    | Objectives  |
|--|-----------|---|
| North Sea,<br>Western Skagerak   | Apr - May | Echo survey of mackerel.<br>Hydrography.                  |
| Shetland Banks, North Sea<br>between 56°N and 61°N,<br>Skagerak  | May - Jun | Plankton, egg-larvae<br>survey.<br>Hydrography.           |
| South and West of Ireland,<br>off the Hebrides, the Faroes,<br>southern Norwegian Sea, and<br>northern Norwegian Channel | Jun - Jul | Mackerel tagging, blue<br>whiting survey.<br>Hydrography. |
| North Sea, Skagerak  | Jul - Aug | Mackerel tagging.   |

Capelin

Sampling:

| Area                      | Season Quarters | Type of Fish | No. of Samples  |        | No. of Fish |       |                   |
|---------------------------|-----------------|--------------|-----------------|--------|-------------|-------|-------------------|
|                           |                 |              | Research Vessel | Market | Measured    | Aged  | Examined racially |
| Barents Sea               | 1               | mixed        | 52              | 2 223  | 9 232*)     | 2 685 | 0                 |
| " "                       | 2               | "            | 40              | 1      | 5 797       | 2 216 | 0                 |
| Grand Banks, Newfoundland | 2               | spawners     |                 | 43     | 6 012       | 460   | 0                 |
| Barents Sea               | 3               | mixed**)     | 162             | 540    | 93 391      | 2 763 | 0                 |
| Grand Banks, Newfoundland | 3               | spawners     |                 | 10     | 1 336       | 54    | 0                 |
| Barents Sea               | 4               | mixed        | 57              | 2      | 8 978       | 1 558 | 0                 |

\*) Research vessel samples only, market samples come in addition.  
 \*\*) 0-group included.

Tagging:

| Area        | Season Quarters | Type of Tag | No. Tagged | Type of Fish | Recoveries |
|-------------|-----------------|-------------|------------|--------------|------------|
| Barents Sea | 1               | internal    | 8 500      | spawners     | 367        |

Research Vessel Surveys:

| Area                          | Season            | Objectives  |
|-------------------------------|-------------------|---|
| Barents Sea                   | 3 Jan - 21 Feb    | Distribution and migration, tagging.                  |
| " "                           | 6 Jan - 24 Feb    | Distribution and migration.                           |
| " "                           | 10 Jan - 17 Feb   | Distribution and migration.                           |
| " "                           | 13 Feb - 26 Feb   | Distribution and migration.                           |
| Finmark Coast                 | 27 Feb - 14 Apr   | Spawning and spawning localities, spawning behaviour. |
| Finmark Coast and Barents Sea | 1 May - 15 Jun    | Distribution of larvae.                               |
| Barents Sea                   | 22 May - 30 Jun   | Distribution and abundance.                           |
| " "                           | 28 Aug - 11 Sep*) | 0-group survey.                                       |
| " "                           | 14 Sep - 15 Oct*) | Distribution and abundance.                           |
| " "                           | 15 Nov - 15 Dec   | Distribution and abundance.                           |

\*) Two vessels.

Polar Cod

Sampling:

| Area        | Season Quarters | Type of Fish | No. of Samples  |        | No. of Fish |      |                   |
|-------------|-----------------|--------------|-----------------|--------|-------------|------|-------------------|
|             |                 |              | Research Vessel | Market | Measured    | Aged | Examined racially |
| Barents Sea | 1               | mixed        | 6               |        | 558         | 377  | 0                 |
| " "         | 2               | mixed        | 8               | 1      | 1 378       | 300  | 0                 |
| " "         | 3               | mixed        | 7               | 1      | 1 126       | 120  | 0                 |
| " "         | 3               | 0-group      | 16              |        | 778         |      | 0                 |
| " "         | 4               | mixed        | 18              |        | 1 476       | 100  | 0                 |

Research Vessel Surveys:

| Area        | Season          | Objectives  |
|-------------|-----------------|---|
| Barents Sea | 10 Jan - 17 Feb | Capelin, distribution and migration.                |
| " "         | 13 Feb - 26 Feb | Capelin, distribution and migration.                |
| " "         | 22 May - 30 Jun | Distribution and abundance (capelin).               |
| " "         | 28 Aug - 11 Sep | International 0-group survey.                       |
| " "         | 14 Sep - 15 Oct | Distribution and abundance (capelin and polar cod). |
| " "         | 26 Sep - 25 Oct | Distribution and abundance (polar cod).             |
| " "         | 15 Nov - 15 Dec | Distribution and abundance (capelin and polar cod). |

Poland  
(J. Popiel)

Herring

Sampling:

| Area                                   | Season Quarters | Type of Fish | No. of Samples  |        | No. of Fish |       |                   |
|--|-----------------|--------------|-----------------|--------|-------------|-------|-------------------|
|  |                 |              | Research Vessel | Market | Measured    | Aged  | Examined racially |
| NW North Sea (03)                      | 2               | adults       | 9               | -      | 4 674       | 900   |                   |
|  | 3               | adults       | 3               | -      | 1 545       | 300   |                   |
| South Buchan (08)                      | 2               | adults       | 4               | -      | 1 753       | 400   |                   |
|  | 1               | adults       | 1               | -      | 100         | 100   |                   |
| Central North Sea (09)<br>W of 03°00'E | 2               | adults       | 4               | -      | 936         | 400   |                   |
|  | 3               | adults       | 12              | -      | 6 329       | 1 200 |                   |
| Central North Sea (09)<br>E of 03°00'E | 2               | immature     | 3               | -      | 1 587       | 300   |                   |
|  | 3               | immature     | 1               | -      | 491         | 100   |                   |
| W of Shetland (02)                     | 2               | adults       | 2               | -      | 802         | 200   |                   |
|  | 3               | adults       | 1               | -      | 351         | 100   |                   |
| Hebrides (01)                          | 2               | adults       | 5               | -      | 2 343       | 500   |                   |
|  | 3               | adults       | 3               | -      | 811         | 300   |                   |
|  | 4               | adults       | 1               | -      | 547         | 100   |                   |
| NW of Ireland (06)                     | 2               | adults       | 6               | -      | 3 231       | 600   |                   |
|  | 3               | adults       | 3               | -      | 1 512       | 300   |                   |
|  | 4               | adults       | 1               | -      | 1 728       | 100   |                   |
| S of Ireland (13)                      | 1               | adults       | 2               | -      | 765         | 200   |                   |
|  | 3               | adults       | 2               | -      | 1 272       | 200   |                   |
| Baltic                                 | (26)            | immature     | -               | 5      | 1 317       | 250   |                   |
|  | (25)            | immature     | -               | 3      | 1 717       | 150   |                   |
|  | (24)            | spawning     | -               | 3      | 959         | 250   |                   |
|  | (26)            | spawning     | -               | 10     | 3 325       | 1 000 |                   |
|  | (26)            | spawning     | -               | 3      | 2 046       | 300   |                   |
|  | (24)            | spawning     | -               | 1      | 458         | 100   |                   |
|  | (25)            | adults       | -               | 11     | 11 406      | 1 100 |                   |
|  | (26)            | adults       | -               | 5      | 6 466       | 500   |                   |
|  | (25)            | adults       | -               | 7      | 4 881       | 700   |                   |
|  | (26)            | adults       | -               | 7      | 4 578       | 700   |                   |

Research Vessel Surveys:

| Area  | Season       | Objectives   |
|---|--------------|--|
| North Sea (03, 04, 08, 09, 12)<br>Hebrides (01, 02, 06)<br>South of Ireland (10, 13)<br>m/t "Wieczno" | 7 Jun-26 Jul | Herring, Mackerel,<br>Cod, Haddock, Saithe,<br>Whiting, Norway Pout,<br>Horse Mackerel, Blue<br>Whiting. |
| North Sea (08, 09)<br>m/t "Birkut"  | 9 Sep-19 Oct | Herring larvae,<br>hydrography   |

Portugal

No report received.

Spain

No report received.

Sweden  
(G. Otterlind)

Herring

Sampling:

| Area           | Season | Type of Fish | No. of Samples  |        | No. of Fish |      |                    |
|----------------|--------|--------------|-----------------|--------|-------------|------|--------------------|
|                |        |              | Research Vessel | Market | Measured    | Aged | Examined racially* |
| Kattegat       | I-II   | imm.         | 9               |        | 2 036       | 652  | 652                |
|                | I      | ad./imm.     |                 | 2      | 648         | 184  | 184                |
|                | II     | "            |                 | 1      | 336         | 75   | 75                 |
|                | III    | "            |                 | 4      | 1 947       | 315  | 315                |
|                | IV     | "            |                 | 4      | 901         | 270  | 270                |
|                | VIII   | "            |                 | 2      | 407         | 175  | 175                |
|                | IX     | "            |                 | 3      | 625         | 277  | 277                |
|                | X      | imm.         | 3               |        | 465         | 188  | 188                |
|                | X      | ad./imm.     |                 | 4      | 775         | 402  | 402                |
|                | XI     | imm.         | 2               |        | 419         | 178  | 178                |
| Skagerak       | II     | imm.         | 7               |        | 1 049       | 370  | 370                |
|                | II     | spawners     |                 | 1      | 335         | 100  | 100                |
|                | III    | imm.         | 1               |        | 227         | 55   | 55                 |
|                | III    | spawners     |                 | 1      | 185         | 75   | 75                 |
|                | VIII   | ad./imm.     |                 | 4      | 925         | 400  | 400                |
|                | IX     | "            |                 | 2      | 1 003       | 258  | 258                |
|                | X      | "            |                 | 1      | 226         | 100  | 100                |
| Inner Skagerak | I      | ad./imm.     | 2               |        | 835         | 160  | 160                |
|                | II     | "            |                 | 1      | 240         | 100  | 100                |
|                | II     | ad./imm.     | 1               |        | 902         | 150  | 150                |
|                | II     | spawners     |                 | 5      | 1 053       | 302  | 302                |
|                | III    | spawners     |                 | 3      | 476         | 276  | 276                |
|                | X      | ad.          |                 | 1      | 152         | 100  | 100                |
|                | XI     | ad./imm.     |                 | 3      | 674         | 257  | 257                |
|                | XII    | "            | 2               |        | 517         | 101  | 101                |

\*) Approximate figures.

Research Vessel Surveys:

| Area                     | Season | Objectives               |
|--------------------------|--------|--------------------------|
| Kattegat                 | I-II   | Investigations on -      |
| "                        | X      | young herring (trawling) |
| Skagerak, Inner Skagerak | III-IV | herring larvae "         |
| "                        | II     | eel larvae "             |
| "                        | VI     | young herring "          |
| "                        |        | herring larvae "         |

Baltic Herring

Sampling:

| Area                             | Season   | Type of Fish      | No. of Samples  |        | No. of Fish |       |                    |
|----------------------------------|----------|-------------------|-----------------|--------|-------------|-------|--------------------|
|                                  |          |                   | Research Vessel | Market | Measured    | Aged  | Examined racially* |
| Bothnian Bay                     | I-IV     | ad.,imm.          | 2               | 2      | 3 120       | 560   | 560                |
|                                  | X        | "                 |                 | 3      | 2 766       | 600   | 600                |
| Bothnian Sea                     | II-VI    | ad.,imm. spawners | 11              | 8      | 16 499      | 3 742 | 3 742              |
|                                  | VIII-XII | ad.,imm.          | -               | 6      | 6 037       | 1 215 | 1 215              |
| Åland Sea                        | VI       | spawners          | 2               | -      | 2 544       | 400   | 400                |
| Northern & Central Baltic proper | I-VI     | ad.,imm. spawners | 4               | 12     | 9 349       | 2 629 | 2 629              |
|                                  | VIII-XII | ad.,imm.          | -               | 11     | 15 049      | 2 415 | 2 415              |
| Southern Baltic proper           | II-VI    | ad.,imm. spawners | 8               | 5      | 6 385       | 2 149 | 2 149              |
|                                  | VIII-XII | ad.,imm.          | 1               | 5      | 4 932       | 1 065 | 1 065              |

\*) Approximate figures.

Tagging:

| Area                  | Season    | Type of Tags | No. Tagged | Type of Fish | Recoveries |
|-----------------------|-----------|--------------|------------|--------------|------------|
| Southern Bothnian Sea | 21.5-25.5 | Lea          | 1 600      | spawners     | 47         |
| Åland Sea             | 29.5      | Lea          | 500        | spawners     | 21         |
| Central Baltic proper | 15.5-16.5 | Lea          | 700        | spawners     | 58         |

Sprat

Sampling:

| Area           | Season | Type of Fish | No. of Samples  |        | No. of Fish |       |                   |
|----------------|--------|--------------|-----------------|--------|-------------|-------|-------------------|
|                |        |              | Research Vessel | Market | Measured    | Aged  | Examined racially |
| Inner Skagerak | I-III  | adults       | 5               | 3      | 5 311       | 1 198 | -                 |
|                | IX-XII | "            | 3               | 15     | 8 604       | 2 440 | -                 |
| Skagerak       | I-III  | "            | -               | 1      | 295         | 150   | -                 |
| Kattegat       | I-III  | "            | 5               | 5      | 3 676       | 1 482 | -                 |
|                | IX-XII | "            | 5               | 10     | 7 869       | 2 367 | -                 |
| Baltic         | I-III  | "            | -               | 7      | 2 565       | 624   | -                 |
|                | IX-XII | "            | -               | 7      | 1 772       | 620   | -                 |

Mackerel

Sampling:

| Area           | Season  | Type of Fish | No. of Samples  |        | No. of Fish |      |                   |
|----------------|---------|--------------|-----------------|--------|-------------|------|-------------------|
|                |         |              | Research Vessel | Market | Measured    | Aged | Examined racially |
| Inner Skagerak | Jun-Jul | spawners     | 2               | -      | 3           | 2    | -                 |
| Skagerak       | "       | "            | 11              | -      | 96          | 94   | -                 |
| Kattegat       | "       | "            | 24              | -      | 825         | 815  | -                 |

Research Vessel Surveys:

| Area                                  | Season  | Objectives                                 |
|---------------------------------------|---------|--|
| Inner Skagerak                        | Jun-Jul | Investigations on - sprat stock (trawling) |
| Inner Skagerak, Skagerak and Kattegat | Jan-Feb | mackerel stock (trolling)                  |



United Kingdom

1. England and Wales

(A. C. Burd)

Herring

Sampling:

| Area                                     | Season  | Type of Fish   | No. of Samples  |        | No. of Fish |      |                   |
|--|---------|----------------|-----------------|--------|-------------|------|-------------------|
|  |         |                | Research Vessel | Market | Measured    | Aged | Examined racially |
| Irish Sea<br>(11)                        | Jan-Mar | adults         | -               | 2      | 288         | 200  | 200               |
|  | Jul-Sep | immat & adults | -               | 9      | 1 079       | 785  | 621               |
|  | Oct-Dec | adults         | -               | 3      | 1 088       | 221  | 221               |
| West Channel<br>(15)                     | Jan-Mar | adults         | -               | 3      | 371         | 247  | 247               |
|  | Apr-Jun | adults         | -               | 1      | 75          | 75   | 75                |
| West of Scotland<br>(07)                 | Jul-Sep | immat & adults | -               | 2      | 252         | 200  | 200               |
| Central North Sea<br>(09)                | Jan-Mar | immat & adults | 11              | 1      | 1 622       | 509  | 509               |
|  | Jul-Sep | adults         | -               | 5      | 903         | 603  | 603               |
| Northern North Sea<br>(03)               | Jan-Mar | immat & adults | 1               | -      | 15          | 14   | 14                |
| Southern North Sea<br>(12)               | Jan-Mar | immat & adults | 2               | 1      | 505         | 224  | 224               |
|  | Oct-Dec | adults         | -               | 2      | 334         | 267  | 267               |
| Southern North Sea<br>(River Blackwater) | Jan-Mar | adults         | -               | 2      | 408         | 200  | 200               |
|  | Oct-Dec | adults         | -               | 1      | 203         | 100  | 100               |

Research Vessel Surveys:

| Area                           | Month | Objectives                 |
|--------------------------------|-------|----------------------------|
| Southern North Sea and Channel | Jan   | ICES herring larval survey |
| North Sea                      | Feb   | ICES young herring survey  |
| East coast of England          | Aug   | 0-group herring survey     |
| Irish Sea                      | Jul   | 0-group herring survey     |
| Northern North Sea             | Sep   | ICES herring larval survey |
| Central North Sea              | Oct   | ICES herring larval survey |

Other Research Activities: A total of 213 fish were examined for fat and moisture content.

Mackerel

Sampling:

| Area                       | Season  | Type of Fish   | No. of Samples  |        | No. of Fish |      |                   |
|----------------------------|---------|----------------|-----------------|--------|-------------|------|-------------------|
|                            |         |                | Research Vessel | Market | Measured    | Aged | Examined racially |
| West Channel<br>(15)       | Jan-Mar | immat & adults | 3               | 10     | 1 210       | 850  | 850               |
|                            | Apr-Jun | immat & adults | -               | 6      | 782         | 382  | 382               |
|                            | Jul-Sep | immat & adults | -               | 6      | 757         | 523  | 523               |
|                            | Oct-Dec | immat & adults | -               | 6      | 617         | 482  | 482               |
| Southern North Sea<br>(12) | Apr-Jun | immat & adults | -               | 2      | 85          | 59   | 59                |
| Central North Sea<br>(09)  | Apr-Jun | adults         | 1               | -      | 38          | 38   | 38                |
| Irish Sea<br>(11)          | Jul-Sep | immat & adults | -               | 2      | 115         | 115  | 115               |

Tagging:

| Area         | Month | Type of Tag          | No. Tagged | Type of Fish | Recoveries |
|--------------|-------|----------------------|------------|--------------|------------|
| West Channel | Feb   | Bolster hydro-static | 1 732      | adults       | 16         |

Other Research Activities: A total of 381 fish were examined for fat and moisture content.

Sprat

Sampling:

| Area                   | Season  | Type of Fish   | No. of Samples  |        | No. of Fish |      |                   |
|------------------------|---------|----------------|-----------------|--------|-------------|------|-------------------|
|                        |         |                | Research Vessel | Market | Measured    | Aged | Examined racially |
| Central North Sea (09) | Jan-Mar | immat & adults | 16              | 39     | 10 244      | 795  | 186               |
|                        | Apr-Jun | immat & adults | -               | 2      | 500         | 94   | -                 |
|                        | Jul-Sep | immat & adults | 30              | 1      | 2 861       | 441  | -                 |
| West Channel (15)      | Jan-Mar | adults         | 3               | 29     | 6 748       | 795  | 477               |
|                        | Apr-Jun | mainly adults  | 5               | -      | 1 048       | 238  | -                 |
|                        | Jul-Sep | mainly adults  | -               | 4      | 659         | 100  | 58                |
|                        | Oct-Dec | mainly adults  | -               | 19     | 3 366       | 452  | 361               |
| Irish Sea (11)         | Jul-Sep | immat & adults | 7               | -      | 783         | 223  | -                 |

Research Vessel Surveys:

| Area               | Month | Objective            |
|--------------------|-------|----------------------|
| Southern North Sea | Jan   | Inshore sprat survey |

Other Research Activities: A total of 157 separate sprat samples were analysed for moisture content.

United Kingdom

2. Scotland

(R. S. Bailey)

Herring

Sampling

Statistics collection and sampling of catches from the Scottish herring fisheries continued in 1973 (Table 1). Immature herring were examined for the parasites Renicola and Lacistorhynchus, and all types of herring for the presence of Anisakis.

Tagging

Tagging of herring from research vessel catches during 1973 is summarised in Table 2. Tagging took place to the west of Orkney and Shetland in July and on the west coast of Scotland in December. There were 169 further recoveries from tagging carried out in 1972 in the area between Shetland and North Rona. For half of the returns no definite position was given; 34 were recaptured in the area of tagging, 33 on the west coast of Scotland and 16 in the north-eastern North Sea.

Research Vessel Surveys

The surveys carried out by Scottish research vessels are shown in Table 3.

Other Research Activities

Experimental studies continued on the development, growth and survival of herring eggs and larvae in water varying in the intensity of contamination by industrial pollutants.

Sprat

Sampling

Collection of commercial statistics and sampling of catches of the Scottish sprat fisheries continued in 1973 (Table 4). Weight and maturity data were collected on a routine basis.

Research Vessel Surveys

Egg and larval surveys were carried out in the Moray Firth and along the east coast of Scotland in June and August (see Table 5). An echosounder and midwater trawling survey was also carried out in the same area in August, but a proposed survey of the Moray Firth in December was seriously hampered by bad weather.

### Other Research Activities

Stomach contents of sprats were collected from the east of Scotland in 1973 to compare with those of small herring, in an investigation of interspecific competition.

### Mackerel

#### Sampling

Sampling of Scottish commercial mackerel catches and research vessel catches continued in 1973 (Table 6).

#### Other Research Activities

Biological sampling was carried out to investigate the reproductive cycle and growth of mackerel.

### Blue Whiting

#### Sampling

Research vessel catches made to the west of Scotland were sampled in 1973 (Table 7).

#### Research Vessel Surveys

Two exploratory midwater trawling surveys were carried out to the west of Scotland in 1973 (Table 8).

#### Other Research Activities

Biological sampling of blue whiting was carried out to investigate the fecundity and process of maturation in this species.

Table 1

## Herring

## Sampling:

| Area                          | Season  | Type of Fish     | No. of Samples  |        | No. of Fish |       |                   |
|-------------------------------|---------|------------------|-----------------|--------|-------------|-------|-------------------|
|                               |         |                  | Research Vessel | Market | Measured    | Aged  | Examined racially |
| <u>IVa Northern North Sea</u> |         |                  |                 |        |             |       |                   |
| 02. W Shetland                | Jan-Mar | imm              | 2               | 0      | 10          | 9     | 0                 |
|                               | Apr-Jun | adult            | 2               | 15     | 690         | 689   | 689               |
|                               | Jul-Sep | adult            | 10              | 38     | 2 679       | 2 007 | 1 882             |
|                               | Oct-Dec | adult            | 0               | 2      | 98          | 98    | 98                |
| 03. NW North Sea              | Jan-Mar | imm              | 17              | 13     | 1 823       | 492   | 384               |
|                               | Apr-Jun | imm/ad           | 18              | 10     | 1 672       | 551   | 551               |
|                               | Jul-Sep | adult            | 0               | 27     | 1 076       | 1 076 | 1 076             |
|                               | Oct-Dec | imm              | 0               | 16     | 629         | 184   | 0                 |
| "                             | adult   | 0                | 5               | 234    | 234         | 234   |                   |
| 04. NE North Sea              | Apr-Jun | adult            | 3               | 0      | 5           | 0     | 0                 |
| <u>IVb Central North Sea</u>  |         |                  |                 |        |             |       |                   |
| 08. S Buchan                  | Jan-Mar | imm              | 9               | 0      | 575         | 174   | 119               |
|                               | Apr-Jun | adult            | 3               | 0      | 29          | 24    | 24                |
|                               | Oct-Dec | imm              | 0               | 4      | 119         | 4     | 0                 |
| 09. Central North Sea         | Jan-Mar | imm              | 12              | 0      | 1 718       | 298   | 272               |
|                               | Jul-Sep | spawners         | 0               | 2      | 127         | 100   | 100               |
| <u>VIa W of Britain</u>       |         |                  |                 |        |             |       |                   |
| 01. Hebrides                  | Jan-Mar | adult            | 0               | 4      | 196         | 196   | 196               |
|                               | Apr-Jun | adult            | 0               | 3      | 150         | 150   | 150               |
|                               | Jul-Sep | adult            | 13              | 3      | 529         | 527   | 527               |
|                               | Oct-Dec | adult            | 0               | 2      | 100         | 100   | 100               |
| 06. NW Ireland                | Jan-Mar | adult            | 0               | 1      | 50          | 50    | 50                |
|                               | Apr-Jun | adult            | 0               | 10     | 457         | 457   | 457               |
|                               | Jul-Sep | adult            | 11              | 3      | 1 098       | 569   | 569               |
| 07. W Scotland                | Jan-Mar | imm              | 0               | 2      | 5           | 5     | 0                 |
|                               | "       | adult & spawners | 0               | 120    | 16410       | 4 581 | 4 154             |
|                               | Apr-Jun | adult            | 0               | 59     | 12 225      | 860   | 560               |
|                               | Jul-Sep | adult            | 3               | 74     | 9 979       | 2 041 | 1 492             |
|                               | Oct-Dec | adult            | 0               | 122    | 11 977      | 4 556 | 2 957             |

Table 2

Herring

Tagging:

| Area                   | Season | Type of Tags              | No. Tagged | Type of Fish | Recoveries |
|------------------------|--------|---------------------------|------------|--------------|------------|
| W of Shetland          | Jul    | Scottish comb<br>internal | 3 176      | adult        | 8          |
|                        |        |                           | 2 030      |              | 22         |
| W of Orkney            | Jul    | Scottish comb<br>internal | 2 151      | adult        | 6          |
|                        |        |                           | 1 300      |              | 13         |
| Scottish West<br>Coast | Dec    | Scottish comb<br>internal | 1 007      | adult        | 2          |
|                        |        |                           | 960        |              | 1          |

Table 3

Herring

Research Vessel Surveys:

| Area       | Season  | Objectives                         |
|------------|---------|------------------------------------|
| North Sea  | Jan-Feb | International young herring survey |
| West Coast | Aug     | Exploratory trawling survey        |
| North Sea  | Sep     | Larval survey                      |
| West Coast | Sep-Oct | Larval survey                      |

Table 4

Sprat

Sampling:

| Area                    | Season  | Type of Fish | No. of Samples  |        | No. of Fish |      |                   |
|-------------------------|---------|--------------|-----------------|--------|-------------|------|-------------------|
|                         |         |              | Research Vessel | Market | Measured    | Aged | Examined racially |
| IVa Northern North Sea  | Jan-Mar |              | 10              | 32     | 6 240       | 427  | -                 |
|                         | Apr-Jun |              | 9               | -      | 472         | 209  | -                 |
|                         | Jul-Sep |              | 5               | -      | 103         | 103  | -                 |
|                         | Oct-Dec |              | 2               | 20     | 3 217       | 510  | -                 |
| IVb Central North Sea   | Jan-Mar |              | 13              | -      | 2 311       | 452  | -                 |
|                         | Jul-Sep |              | 1               | -      | 29          | 20   | -                 |
|                         | Oct-Dec |              | -               | 5      | 598         | 69   | -                 |
| VIa Scottish West Coast | Jan-Mar |              | -               | 4      | 678         | 136  | -                 |
|                         | Oct-Dec |              | -               | 5      | 598         | 133  | -                 |

Table 5

Sprat

Research Vessel Surveys:

| Area                                | Month | Objectives  |
|-------------------------------------|-------|---|
| East Coast Scotland                 | Jun   | Egg and larval survey   |
| Moray Firth and East Coast Scotland | Aug   | Egg and larval survey, echosounder and midwater trawling survey |
| [ Moray Firth                       | Dec   | Echosounder and midwater trawling survey ]                      |



Table 6

## Mackerel

## Sampling:

| Area                           | Season  | Type of Fish | No. of Samples  |        | No. of Fish |      |                   |
|--------------------------------|---------|--------------|-----------------|--------|-------------|------|-------------------|
|                                |         |              | Research Vessel | Market | Measured    | Aged | Examined racially |
| IVa Northern North Sea         | Apr-Jun | adult        | 28              | 7      | 4 203       | 138  | -                 |
|                                | Jul-Sep | adult        | 6               | 6      | 1 296       | 282  | -                 |
|                                | Oct-Dec | adult        | -               | 6      | 661         | 73   | -                 |
| IVb Central North Sea          | Jul-Sep | adult        | -               | 2      | 155         | 38   | -                 |
| VIa West Coast excluding Clyde | Apr-Jun | adult        | -               | 3      | 693         | 77   | -                 |
|                                | Jul-Sep | adult        | 21              | 3      | 1 532       | 300  | -                 |
|                                | Oct-Dec | adult        | -               | 14     | 1 219       | 106  | -                 |
| Clyde                          | Apr-Jun | adult        | -               | 4      | 538         | 126  | -                 |
|                                | Jul-Sep | adult        | -               | 3      | 384         | 172  | -                 |
|                                | Oct-Dec | adult        | -               | 3      | 204         | 67   | -                 |

Table 7

## Blue Whiting

## Sampling:

| Area                     | Season  | Type of Fish | No. of Samples  |        | No. of Fish |      |                   |
|--------------------------|---------|--------------|-----------------|--------|-------------|------|-------------------|
|                          |         |              | Research Vessel | Market | Measured    | Aged | Examined racially |
| VIa West of Scotland and | Jan-Mar |              | 8               | -      | 1 723       | 240  | -                 |
| VIb Rockall              | Jul-Sep |              | 25              | -      | 3 598       | 655  | -                 |

Table 8

## Blue Whiting

## Research Vessel Surveys:

| Area                         | Month | Objectives   |
|------------------------------|-------|--|
| West of Scotland and Rockall | Mar   | Echo-integrator and midwater trawling survey                         |
| West of Scotland             | Aug   | Echo-integrator and midwater trawling survey (combined with herring) |

U.S.S.R.  
(S. S. Fedorov)

In 1973 the PINRO Laboratory of Pelagic Fishes continued investigations on the biology of herring inhabiting the Norwegian, Barents and White Seas; polar cod in the Barents Sea; capelin in the Great Newfoundland Bank and Southern Labrador areas; and Atlantic saury and snipefish inhabiting the area west of Iberian Peninsula and north of the Azores. We also started investigations of sand eels in the Great Newfoundland Bank area.

Regularities of the dynamics of stock abundance, causes of changes in the migration routes and areas of distribution, conditions and factors favouring the formation of dense fish concentrations were studied on the basis of biostatistical data, results of observations on pelagic fish behaviour, and the distribution of hydroacoustic and photogrammetric surveys obtained by the research vessels "Akademik Knipovich", "Fridtjof Nansen", "Poisk", "Gemma", "Alaid" from their areas of operation.

In June, scientists of the laboratory participated in the complex oceanographic survey in the Norwegian and Greenland Seas together with their Icelandic colleagues. In July-August, they participated in the O-group fish survey off the area of Iceland together with the Icelandic scientists, in August-September in the O-group fish survey in the Barents and eastern Norwegian Seas together with the scientists of Norway and England, in November-December they carried out investigations to determine peculiarities of autumn-winter distribution of capelin in the Barents Sea together with Norwegian scientists.

All the investigations undertaken in 1973 will be continued in 1974.

Sampling Data

| Area                | Season | Type of Fish | No. of Samples  |        | No. of Fish |       |                   |
|---------------------|--------|--------------|-----------------|--------|-------------|-------|-------------------|
|                     |        |              | Research Vessel | Market | Measured    | Aged  | Examined racially |
| <u>Herring</u>      |        |              |                 |        |             |       |                   |
| Norwegian Sea       | I      |              | 4               | -      | 923         | 356   |                   |
|                     | II     |              |                 |        | 1 464       |       |                   |
|                     | III    |              | 3               |        | 4 622       | 10    |                   |
|                     | IV     |              | 23              |        | 24 600      | 2 080 |                   |
|                     | Total  |              | 30              |        | 31 609      | 2 446 |                   |
| <u>Blue Whiting</u> |        |              |                 |        |             |       |                   |
| Norwegian Sea       | I      |              | 18              |        | 217         | 1 020 |                   |
|                     | II     |              | 9               |        | 824         | 351   |                   |
|                     | III    |              | 33              |        | 7 278       | 1 102 |                   |
|                     | IV     |              | 10              |        | 741         | 523   |                   |
|                     | Total  |              | 70              |        | 9 060       | 2 996 |                   |
| Barents Sea         | I      |              |                 |        | 109         |       |                   |
|                     | II     |              |                 |        | -           |       |                   |
|                     | III    |              | 3               |        | 6 549       | 102   |                   |
|                     | IV     |              |                 |        | 2 584       |       |                   |
|                     | Total  |              | 3               |        | 9 242       | 102   |                   |
| <u>Capelin</u>      |        |              |                 |        |             |       |                   |
| Barents Sea         | I      |              | 36              |        | 31 955      | 3 427 | 200               |
|                     | II     |              | 2               |        | 1 085       | 200   |                   |
|                     | III    |              | 16              |        | 10 176      | 1 363 |                   |
|                     | IV     |              | 18              |        | 10 260      | 1 380 |                   |
|                     | Total  |              | 72              |        | 53 476      | 6 370 |                   |
| <u>Polar Cod</u>    |        |              |                 |        |             |       |                   |
| Barents Sea         | I      |              | 23              |        | 23 862      | 1 349 |                   |
|                     | II     |              | 5               |        | 8 612       | 500   |                   |
|                     | III    |              | 16              |        | 11 970      | 1 379 |                   |
|                     | IV     |              | 13              |        | 13 009      | 1 095 |                   |
|                     | Total  |              | 57              |        | 57 453      | 4 323 |                   |

In 1973, investigations were continued in the North Sea and west of the British Isles.

Control surveys of herring and sprat were made in the Northern North Sea. Collection of material was conducted from June to November.

AtlantNIRO took part in the international trawl survey in the North Sea on counting of young herring. Accumulation of data on horsemackerel and mackerel biology, as well as their treatment was continued.

Data on the biology and environment conditions of horsemackerel, mackerel and of a gadoid fish were collected west of the British Isles and in the Bay of Biscay.

In 1974, investigations will be continued on the same programme.

Material collected and treated in 1973

| Area                         | Mass Fish Measurement<br>(specimens) |         | Age Sample<br>(specimens) | Bioanalysis<br>(specimens) | Tagging<br>(specimens) |
|------------------------------|--------------------------------------|---------|---------------------------|----------------------------|------------------------|
|                              | Collected                            | Treated |                           |                            |                        |
| <u>Horsemackerel</u>         |                                      |         |                           |                            |                        |
| West of the<br>British Isles | 116 241                              | 116 241 | 4 650                     | 21 891                     | 2 000                  |
| North Sea                    | 28 593                               | 28 593  | 500                       | 2 000                      | -                      |
| Total                        | 144 844                              | 144 844 | 5 150                     | 23 891                     | 2 000                  |
| <u>Mackerel</u>              |                                      |         |                           |                            |                        |
| West of the<br>British Isles | 45 035                               | 45 035  | 2 550                     | 6 700                      | -                      |
| North Sea                    | 20 000                               | -       | 500                       | 2 800                      | -                      |
| Total                        | 65 035                               | 45 035  | 3 050                     | 9 500                      | -                      |
| <u>Sprat</u>                 |                                      |         |                           |                            |                        |
| North Sea                    | 10 000                               | 2 600   | 2 000                     | 2 000                      | -                      |
| <u>Herring</u>               |                                      |         |                           |                            |                        |
| North Sea                    | 7 230                                | 4 230   | 2 000                     | 2 000                      | -                      |

Baltic Herring and Sprat

Reproductive conditions, distribution, and ecology of the larvae and of the juvenile stages of herring and sprat in the north-eastern and southern parts of the Baltic Sea, as well as in the Gulfs of Riga and Finland were studied. Distribution, population dynamics, population composition, growth, maturing, feeding of herring and sprat depending on environmental conditions were investigated.

Collection of material for its further analysis, taking into account the effect of the fishery on the stocks, was conducted, the methods of studying stock condition were perfected as well as those allowing a realistic forecast of possible catches of these species.

