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Migrations of adult beaked redfish *(Sebastes mentella)* in North Atlantic in 2007

By

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Abstract

One of major commercial objects of North Atlantic – beaked redfish *Sebastes mentella* - accomplishes the prolonged and extensive migrations from Northeastern to Northwestern Atlantic and back. These migrations were studied on movement of fishing ship, following after the redfish concentrations. Redfish coming in the Labrador Sea mainly comes from the Irminger Sea. In 2007 new information about possibility migration also from Canadian offshore waters was founded. Reductions of volume of migrations of perch to Northwest Atlantic from Northeast Atlantic are observed in last years.

Introduction

4 types of redfish dwell in North Atlantic: golden redfish *Sebastes marinus*, beaked redfish *Sebastes mentella*, Acadian redfish *Sebastes fasciatus* and Norvegian redfish *Sebastes viviparus.*

Beaked redfish (*Sebastes mentella*) is one of major commercial fish, dwellings both in North-Eastern and in North-Western Atlantic. Unlike other types of redfish, beaked redfish accomplishes the long and extensive migrations in North Atlantic, including migration from North-Eastern to North-Western Atlantic and back [Vaskov at al, 2002; Ratz and Shibanov, 2000; Junquera and Gonzales, 2001; Ratz and Stransky, 2001; Chepel, 2001; Alekseev, 2002]. Knowledge of migrations is needed for an effective management of fishing.

Redfish fishery is conducted practically from the beginning of XX century, and practically the always-basic commercial redfish was beaked redfish. At the beginning of 80th of the last century global fishery of beaked redfish began outside EEZ in the Irminger Sea (North-Eastern Atlantic - NEA), and at the end of 90th - in the Labrador Sea (North-Western Atlantic - NWA). For the last 30 years of XX century the total catch of redfish in NWA was about 2.5 million tons. [Chepel, 2001].

Historically fishery of redfish began on banks and shelf of Farer, Iceland and East Greenland. Further fishery was displaced in the open waters firstly Irminger Sea, and later Labrador Sea. Was there a question – is it separate stocks of redfish or part of single general stock? The hypothesis of 3 stocks was pulled out:

1. Deep-water stock (slopes of Iceland, Farer, to Greenland)
2. Ocean stock (open waters of ocean, depths less 500 m)
3. Deep-water ocean stock (open waters of ocean deeper 500 m) [Magnusson at all, 1995]

Some scientists are predisposed to the hypothesis of single stock [Saborido-Rey at al, 2001; Melnikov and al, 2001; Bakay and Melnikov, 2002; Melnikov and Bakay, 2002; Gonzales and Power, 2002]. In this case during a year there is a substantial redistribution of this single stock on areas of North Atlantic that is confirmed seasonal changeability

of redfish fishery. In behalf on the last hypothesis usually given circumstance that in none of areas of North Atlantic the complete life cycle of this kind is incorporated from impregnation to the adult individuals.

Melnikov and other [Melnikov and al, 2001] show that redfish are coupled in August-November, but sperm remains in females idle to February-March, when eggs impregnate spermatozoa. Larvae appear in April-May. Further follow period of feeding (June-middle August), again impregnation and wintering (December-March). Larvae thrown out near the western slope of Reykjanes Ridge, are carried westward by the Irminger current, achieve East Greenland, where settled. Other part of larvae continuing to drift with West Greenland Current within the subarctic gyre can achieve the banks of Western Greenland and, possibly, Baffin Island [Troyanovsky, 1992]. Growing up at shores of East Greenland individuals go back into the Irminger Sea. The return of growing up individuals is possible from other areas of North Atlantic [Alekseev, 2002].

The spatial distributing of redfish and his migrations substantially depends on oceanographic terms [Pedchenko, 2001].

Adult individuals accomplish alike, but more difficult migrations. Especially little information is about migrations in NWA. And this work is devoted to attempt to generalize datum about migration of adult beaked redfish.

Material and Methods

Author took part in the commercial trips of Latvian fishing vessel “Dorado” as NAFO observer and NEAFC scientific observer to North Atlantic from 2002 to 2007. Aboard a ship measurements of length and weight and biological analyses of redfish were executed.

The ways of migrations of redfish were estimated indirect a way, on displacement of fishing ship, following after the school of redfish. Except that weight and biological characteristic of catches were taken into account: middle length and weight, female/male correlations, stage of maturity of gonad, degree of extensiveness of infection by vermin. If the indicated parameters differentiated no more than on 10-15%, it was assumed that displacement of ship was corresponded the real migration of accumulations of redfish. On the pictures resulted below such displacements were marked a continuous line.

If one or a few parameters differentiated substantially, such displacement had been considered supposed and on pictures it is marked the dotted line. If an accumulation, proper on initial parameters to previous, was revealed in a few days, but not traced directly on displacement of ship because of different reasons (for example, unloading, bunkering), such displacement was also considered supposed.

The analysis of obvious and supposed migrations in combination with literary information allowed getting certain results and drawing some conclusions.

Results

The basic performances of previous results (2002-2006) were generalized in previous work of author [Paramonov, 2007] (fig. 1-5). In this work information is generalized for 2007.

Most essential features of 2007, possibly, not noticed in previous years, there was spatial differentiation of migrant fishes on sizes in NEA. Most eastern fish (going out near-by Reykjanes Ridge) is most large. After throwing out of larvae and minimum recovering forces, they begin to go back into the EEZ of Iceland already in the end of May - June. Fish of central area is medium-sized, after throwing out of larvae does not go back into the area of Iceland, but accomplishes the prolonged migrations in the NWA (sea of Labrador) on feeding, and only then goes back into the area of Iceland. Fish of western area (near to EEZ of East Greenland) is most small. Throwing out of larvae, fish goes on a southeast, mostly inside EEZ of Greenland. These accumulations are filled up with juvenile fish, growing up on the shelf of East Greenland [Chepel, 2001], which, possibly, returns with adult fish in the area of Iceland and further, as far as ripening, engages in migratory cycles.

Redfish can come to the EEZ of Iceland more east or to the west of place of exit. When entering back into EEZ large fish can meet with exiting out small or middle fish, there is a good fishery situation. Such terms are usually formed

from the end of May for beginning of July, depending on a current hydrometeorological situation. Large, small and middle fish can be differentiated by depth, and can be not (as it was observed in 2005 and, partly, in 2006).

Basis of concentration is made by females which males join in with. Accumulations in which males prevail obviously are unstable.

The long-term looking after the process of forming and disintegration of fishery schools near-by the border of Iceland EEZ allow to do supposition, that they are not concrete fish stocks, but only places, where, by virtue of while unknown to the end reasons, there is a delay of migrant stocks, but each time new ones. Large changeability of sizes and biological characteristics of the analyzed redfish confirms it, unlike, for example, from situation in NWA, where fish concentrations are presented by real stocks of perch. Possible reasons of delay and concentration of fish can be hydrological features (meanders, flows of waters, separate eddies, areas of upwelling and downwelling), and also anthropogenic influence of instruments of catch.

In North-Western Atlantic migrations of fish school were next (fig.6). In second and third ten-day period of July in 1F migrations were marked to east-south-east. In the third ten-day period of July in 2J perch migrated to west-south-west. In the first ten-day period of August in the same subdivision a perch migrated already to east. In the same ten-day period migrations of perch registered to northeast from 2J to 1F. And if migrations westward, probably, belong to redfish with origin from Northeast Atlantic, eastward migrations can be estimated both as redfish return to Northeast Atlantic and as exit of redfish from the EEZ of Canada to the opened part of Northwest Atlantic.

2007 year was very unusual. While average lengths in all divisions were 1.5-2 cm less, than in 2006, average weights were only 20-30 g less, and in 2J average weights were 10 g (males) and 30g (females) more. In 2J in 2007 females had smallest length and simultaneously largest weight for last 5 years! [Paramonov, 2008]

So in 2007 big changes of average length/weight of redfish had place. Maximum changes were on west – in 2J division. It is possible to suppose coming to NAFO region new population of redfish with different length/weight characteristics from west, i.e. from Canadian inshore waters.

Discussion and Conclusion

The reduction of migrations of perch marked in a previous year (and supposed yet before) from NEA to NWA was confirmed in current year. Redfish from NEA to NWA came yet less, than in 2006 that confirm both reduction of fishery period from 44 days in 2006 to 33 in 2007 and decline of catches on effort. Moreover, if in 2006 there were certain accumulations of perch inside EEZ of Greenland; in 2007 they almost were absent. At the same time fishery in Northeast Atlantic continued practically to the end of August and was enough successful. So, big quantities of redfish did not go to Northwest Atlantic and stayed in Irminger Sea.

Reasons of reduction of volume of migrations of perch to Northwest Atlantic are exactly unknown; possibly, they are related to the change of hydrological conditions in a region.

Obviously, in the nearest years fishery in Northwest Atlantic will be reduced up to the complete stopping because of low catches and, as a result, unprofitableness. Coming from other divisions redfish (as indicated higher, such, probably, is), as now already clear, will not provide enough good replacement of fish from Northeast Atlantic.

Multiplying migrations from Northeast Atlantic in the nearest years is not looked over; although in a further prospect it very likely.

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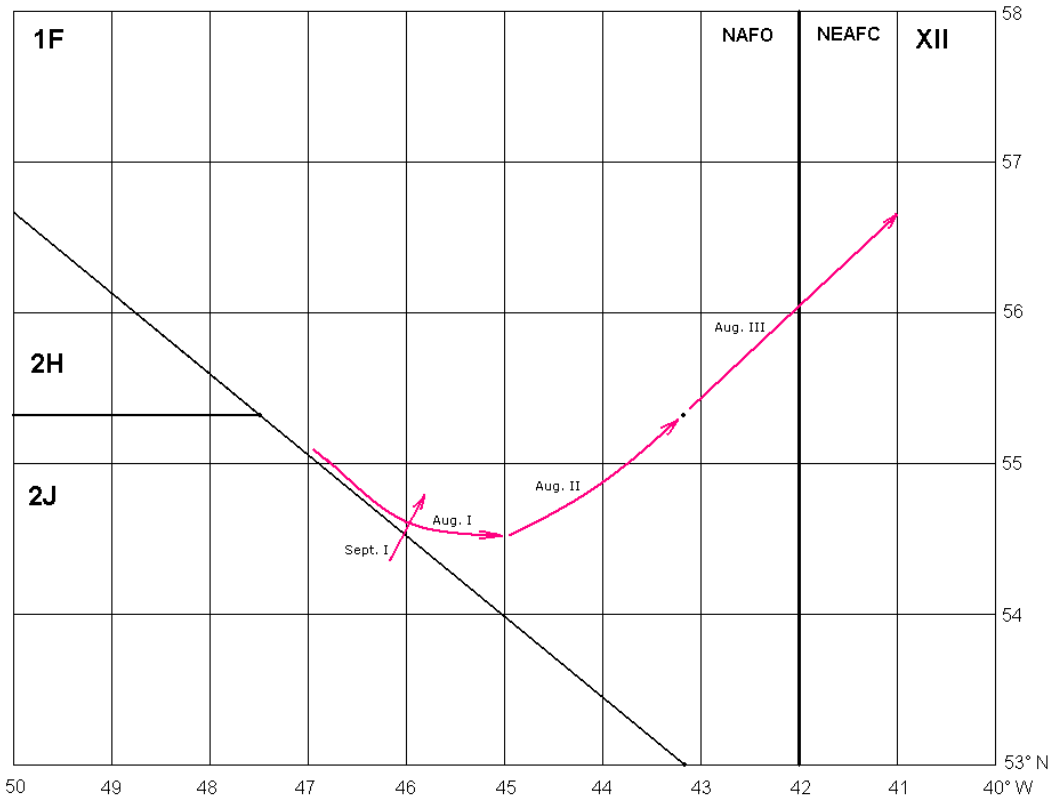

Fig. 1. Migration of adult Redfish in North-Western Atlantic in 2002

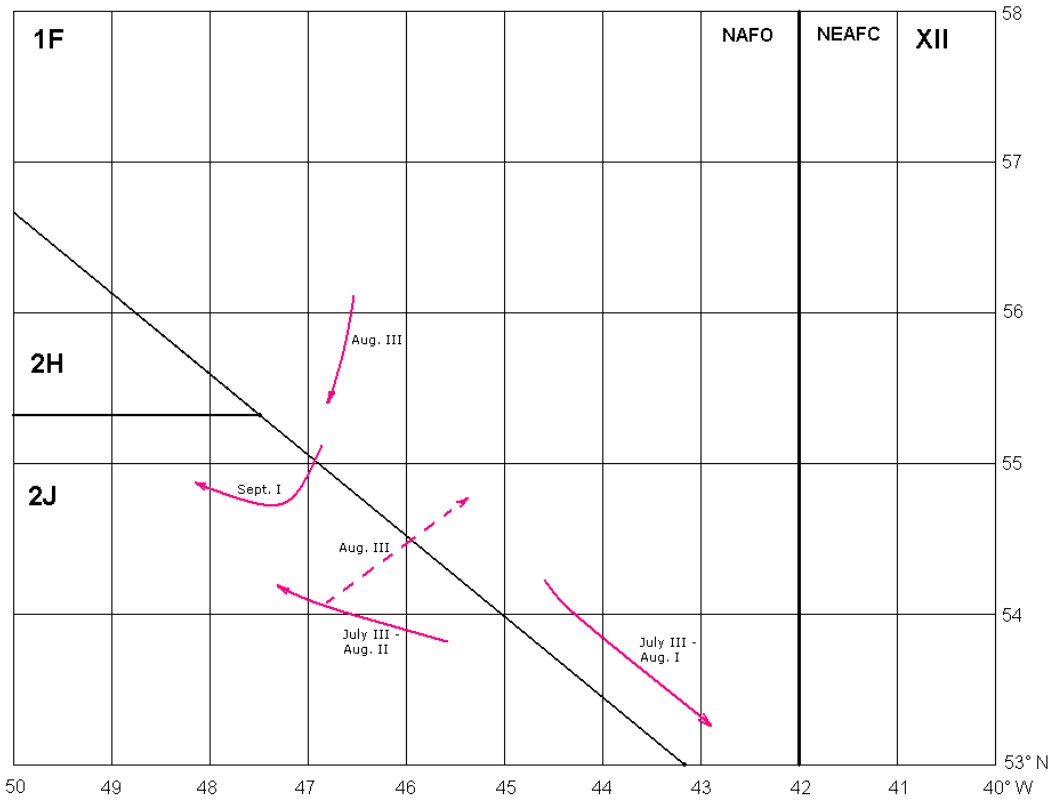

Fig. 2. Migration of adult Redfish in North-Western Atlantic in 2003

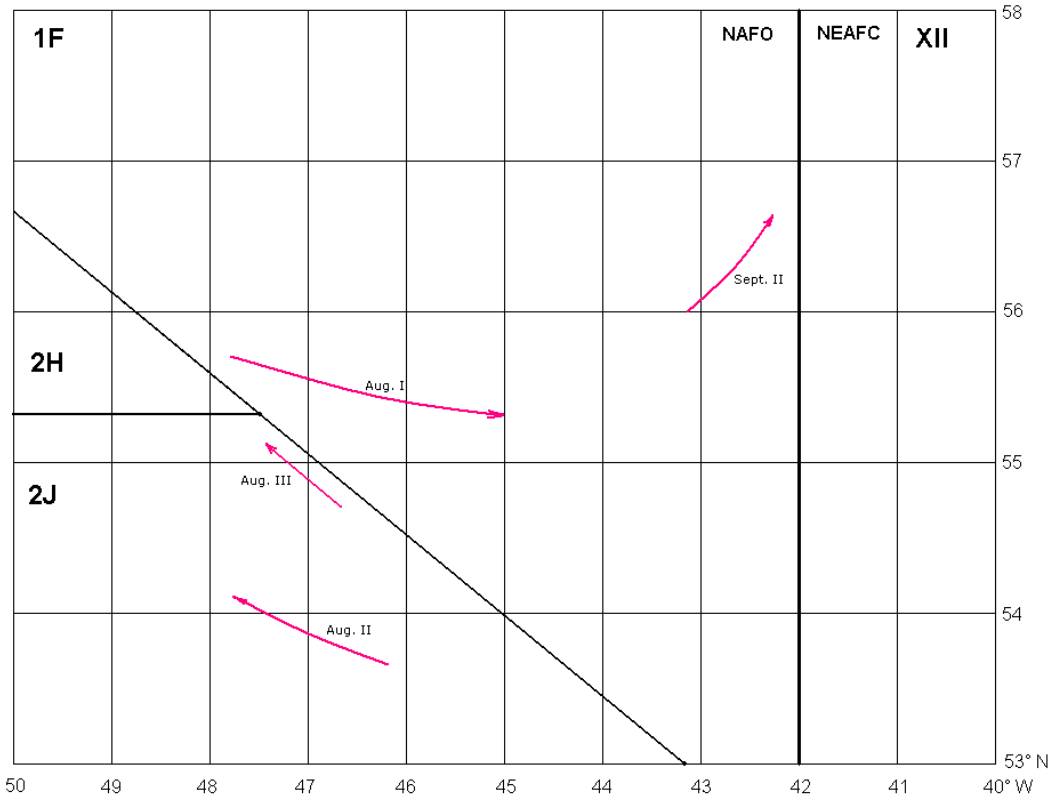

Fig. 3. Migration of adult Redfish in North-Western Atlantic in 2004

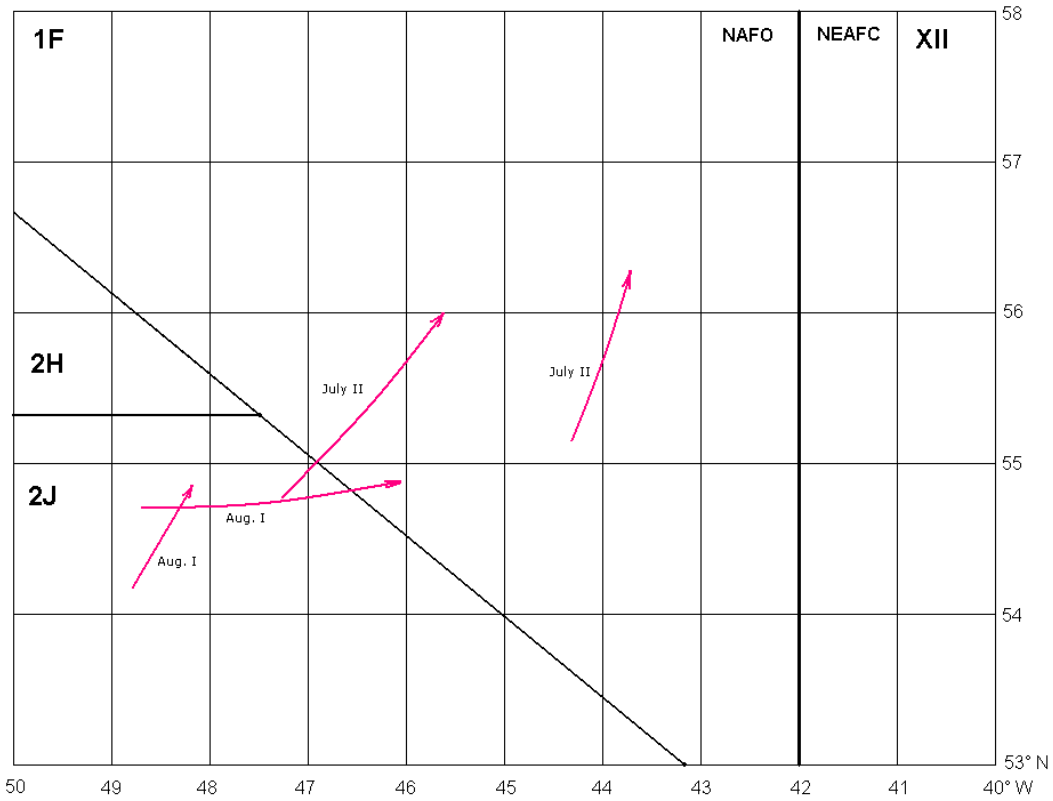

Fig. 4. Migration of adult Redfish in North-Western Atlantic in 2005

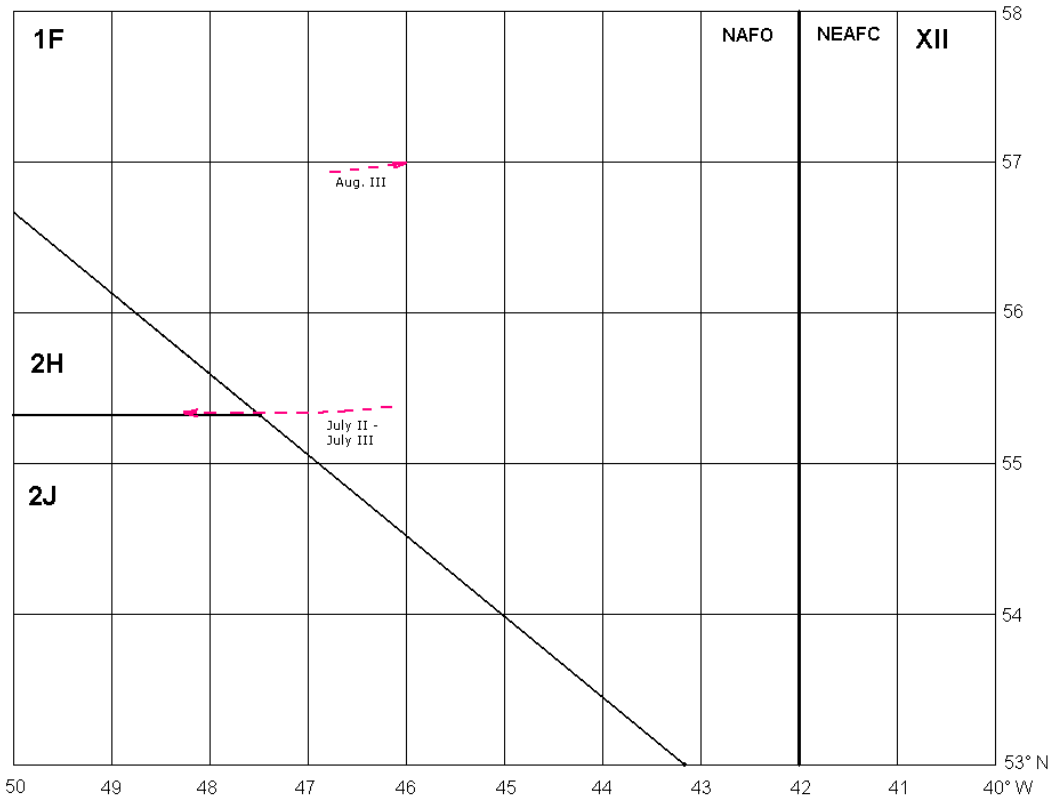

Fig. 5. Migration of adult Redfish in North-Western Atlantic in 2006

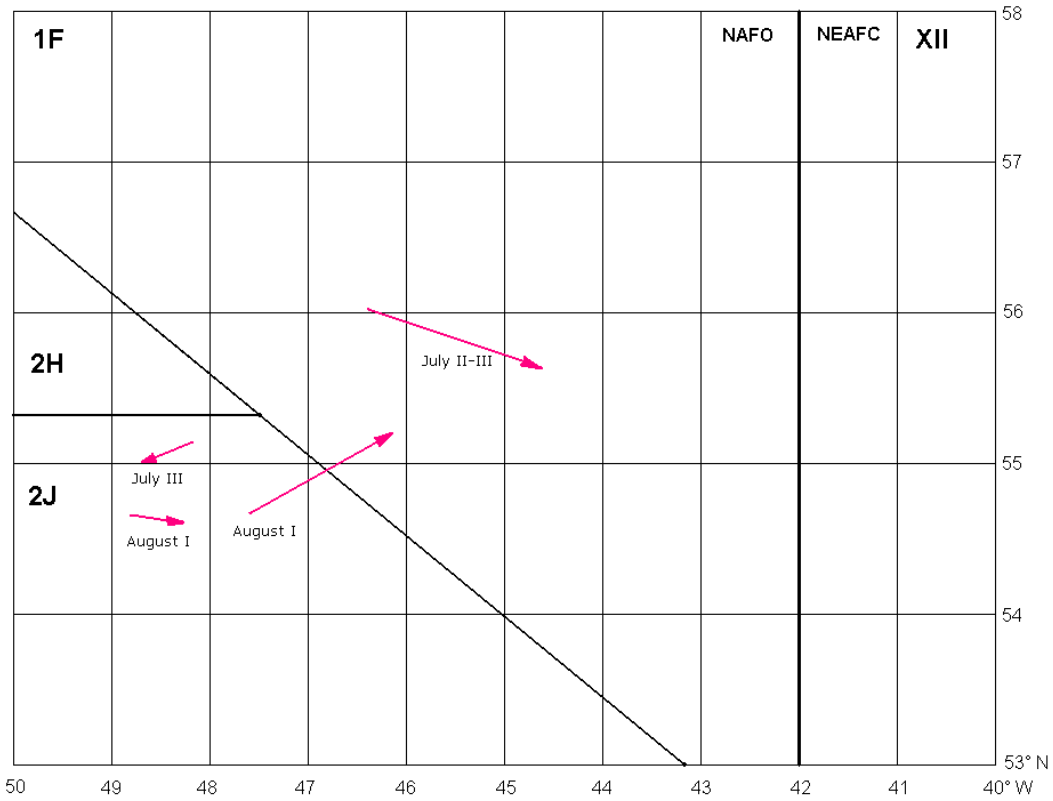

Fig. 6. Migration of adult Redfish in North-Western Atlantic in 2007