

Redfish in Division 30**Advice June 2022 for 2023-2025****Recommendation for 2023-25**

The stock is below an interim survey-based proxy for B_{MSY} but above the limit reference point ($B_{lim} = 0.3 B_{MSY}$ -proxy) with a probability >99%. There is insufficient information on which to base predictions of annual yield potential. Catches have averaged about 9 000 t over the period used for the MSY proxy calculation (1991 -2021). Scientific Council is unable to advise on an appropriate TAC for 2023, 2024 and 2025.

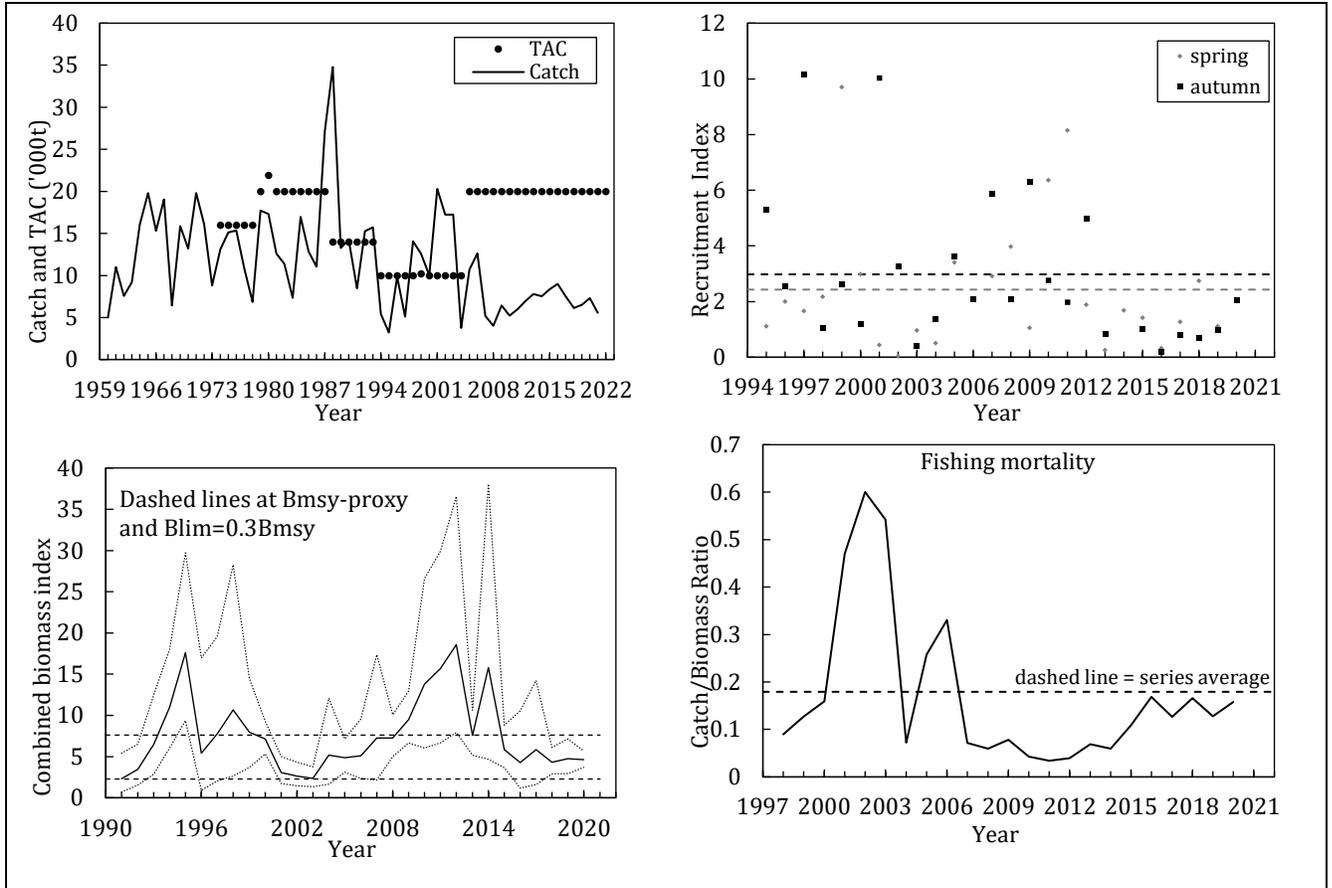
Management objectives

No explicit management plan or management objectives have been defined by the Commission. Convention General Principles are applied (NAFO GC Doc. 07-04).

<i>.Convention General Principles</i>	<i>Status</i>	<i>Comment/consideration</i>		
Restore to or maintain at B_{MSY}		Stock is below an interim survey-based proxy for B_{MSY} .		OK
Eliminate overfishing		Fishing mortality is near average		Intermediate
Apply Precautionary Approach		Interim B_{lim} defined at 0.3 B_{MSY} - proxy		Not accomplished
Minimise harmful impacts on living marine resources and ecosystems		VME closures in effect, low bycatch reported		Unknown
Preserve marine biodiversity		Cannot be evaluated		

Management unit

The management unit is confined to NAFO Div. 30.



Stock status

Stock is below an interim survey-based proxy for B_{MSY} . Biomass in 2020 was above the limit reference point ($B_{lim} = 0.3 B_{MSY}$ proxy) with a high probability [$P(B_{2020} > B_{lim}) = >0.99$]. Biomass relative to the reference point cannot be determined in 2021 as Canadian Spring and Autumn surveys did not occur in Div. 30. However, given the slow growth of redfish and interpretation of year-over-year index fluctuations, stock status in 2021 is assumed to be similar to 2020.

Recruitment indices since 2012 have generally been at or below series averages.

Reference points

A survey-based proxy for B_{MSY} is defined as the time series average (since 1991) of a combined Biomass index from both CAN-Spring and CAN-Autumn surveys. An interim B_{lim} is defined at $0.3 B_{MSY}$ -proxy. As survey indices can show unrealistic fluctuations year over year, a single year above or below B_{lim} is insufficient to indicate a change in stock status.

Projections

Quantitative assessment of risk at various catch options is not available for this stock at this time.

Assessment

This assessment is based upon an evaluation of survey biomass, and recruitment indices and a fishing mortality proxy. Biomass indices show similar trends across the time series across Canadian Spring, Canadian Autumn, and EU-Spain surveys in Div. 30. The assessment is considered data-limited and as such, associated with relatively high uncertainty. Input data are research survey indices and fishery data.

The next full assessment of this stock will be in 2025.



Human impact

Mainly fishery-related mortality has been documented. Other sources (e.g. pollution, shipping, oil-industry) are undocumented.

Biological and environmental interactions

Redfish are slow growing and bear live young. Genetic analyses linked strong year-classes of juvenile *S. fasciatus* sampled from the Gulf of St. Lawrence with adults collected in NAFO Divs. 3LNO and southern 3Ps. Local plus distant dispersal of young fish makes the influences of physical and environmental processes on stock dynamics difficult to interpret.

The Grand Bank (3LNO) EPU continues to experience low overall productivity conditions, and total biomass remains well below pre-collapse levels. However, recent warming, earlier phytoplankton spring bloom, and an increase in the proportion of energy-rich copepod species may have positive effects on total ecosystem production in the coming years.

Fishery

Redfish are caught primarily in bottom trawl fisheries, but in the past, some landings were reported from mid-water trawl fisheries. In directed redfish fisheries, Atlantic cod, American plaice, witch flounder and other species are landed as bycatch. In turn, redfish are also caught as bycatch in fisheries directing for other species. The fishery in NAFO division 30 is regulated by minimal mesh size and quota.

Recent catch estimates and TACs ('000 tonnes) are:

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
TAC	20	20	20	20	20	20	20	20	20	20
STATLANT 21	7.8	7.5	7.9	8.6	7.3	4.3	6.5	7.3	5.4	
STACFIS	7.8	7.5	8.4	9.0	7.5	6.1	6.5	7.3	5.6	

Effects of the fishery on the ecosystem

The impact of bottom fishing activities on major VMEs in the NRA was last assessed in 2021. The risk of Significant Adverse Impacts (SAIs) on sponge and large gorgonian VMEs was assessed to be low, while this risk for sea pen VMEs has been assessed as intermediate. The risks of SAIs on small gorgonian, black coral, bryozoan and sea squirt VMEs were assessed as high. This assessment of impacts of bottom fishing activities on VMEs does not include waters within coastal states jurisdictions. Within the Grand Bank (3LNO) EPU areas in Div. 30 and 3L have been closed to fishing to protect corals.

Special comments

Reference points defined in the 2022 assessment are considered interim and will be reviewed at the 2028 assessment, or earlier if there are considerable advances in an analytical approach for this stock, or a significant change in available data or the understanding of stock dynamics.

Special comments

Redfish are known to have variable and episodic recruitment, with potentially large periods of time between recruitment pulses and no strong relationships between stock size and recruitment. Impacts of delineations of stock boundaries and synchronicity between adjacent stocks are unknown.

Sources of information

SCR Doc. 22/05, 07, 044; SCS Doc. 22/06, 07, 09, 13.