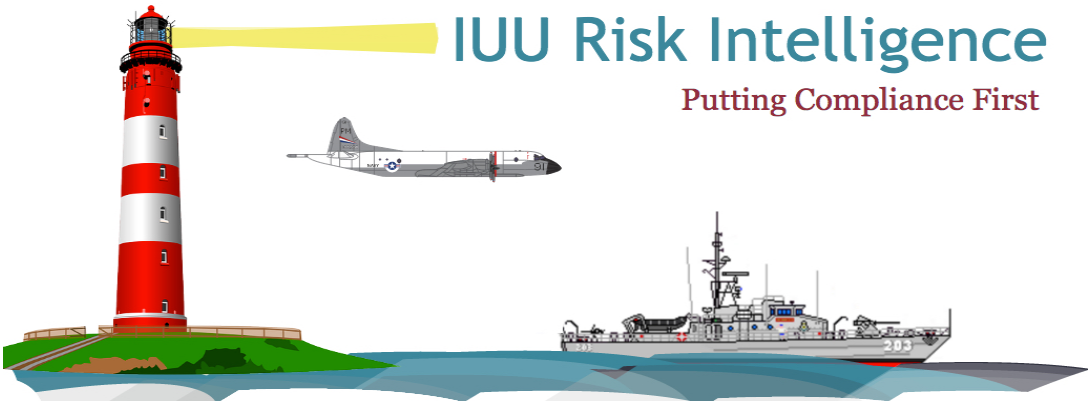


IUU Risk Intelligence

Putting Compliance First

FISHERIES MONITORING CONTROL AND SURVEILLANCE IN CANADA

PRAMOD GANAPATHIRAJU

POLICING THE OPEN SEAS

GLOBAL ASSESSMENT

OF

FISHERIES MONITORING CONTROL AND SURVEILLANCE:
Assessing Risk-Based Solutions

A baseline analysis of maritime enforcement in 84 countries

IUU RISK INTELLIGENCE

Policy Report - Volume 1 Number 1

APRIL 2023

SUMMARY

*This evaluation of Fisheries Monitoring Control and Surveillance report for **Canada** is one of 84 such country evaluations that covers nations landing 92% of world's fish catch. Using a wide range of interviews and in-country consultations with both military and civilian agencies, the report exemplifies the best attempt by the author(s) at evaluation of MCS compliance using 12 questions derived from international fisheries laws. The twelve questions are divided into two evaluation fields, (MCS Infrastructure and Inspections). Complete details of the methods and results of this global evaluation would be published shortly through IUU Risk Intelligence website. In total 9 interviews were conducted for the Canada Fisheries-MCS evaluation.*

Over a five-year period, this global assessment has been subjected to several cross-checks from both regional and global MCS experts familiar with compliance aspects in the country concerned. Uncertainty in assigning each score is depicted explicitly through score range. However, the author(s) are aware that gaps may remain for some aspects. The lead author remains open at any time to comments, and revisions will be made upon submission of evidence where necessary. Throughout the report, extreme precaution has been taken to maintain confidentiality of individuals who were willing to share information but expressed an inclination to remain anonymous out of concern for their job security, and information from such sources was cited as 'anonymous' throughout the report.

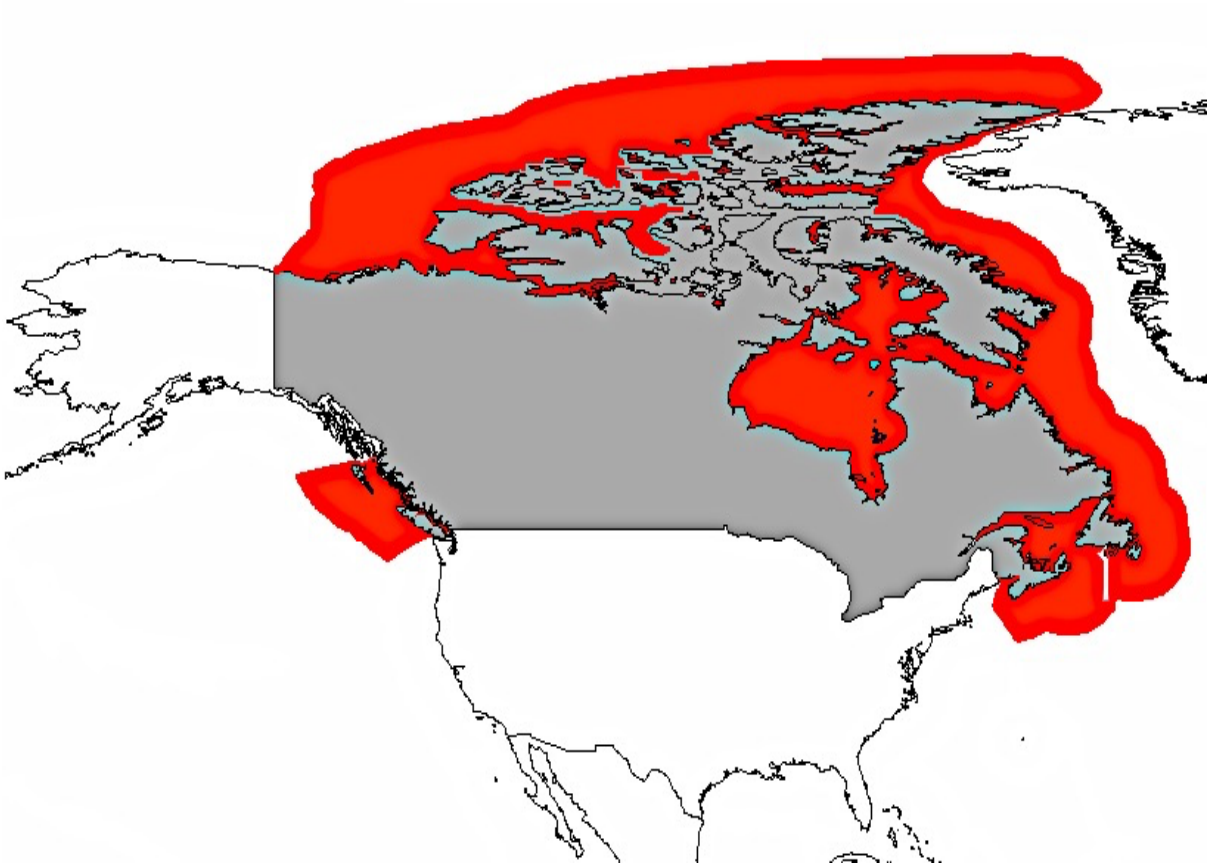
[redacted] - Access to redacted text & images is restricted to paid customers only.

Suggested citation:

Pramod, G. (2023) Fisheries Monitoring Control and Surveillance in Canada, Fisheries-MCS (F-MCS) Country Report, 25 pages, In: Policing the Open Seas: Global Assessment of Fisheries Monitoring Control and Surveillance – Assessing Risk-Based Solutions: A baseline analysis of maritime enforcement in 84 countries, *IUU Risk Intelligence - Policy Report Vol. 1, No. 1, Canada*, 1051 pages.

Fisheries Monitoring Control and Surveillance in Canada

Pramod Ganapathiraju

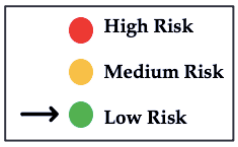


FAO landings (2013): 814,371 tonnes
Fisheries contribution to GDP: 0.3%
Law of the Sea (Ratification /accession): 7th November 2003
Coastline: 202,080 km
Patrolling agencies: Canadian Coast Guard, Fisheries and Oceans Canada
[redacted] Low – Incidents confined to EEZ waters only (Risk Rating: Green)
IUU Fishing Penalties: High - Penalties are deterrent to fisheries violations (Risk Rating: Green)
Species targeted by Illegal fishing vessels: [redacted]
Flag State Compliance: Excellent (Low IUU Risk)
F-MCS Index Score (2021): Risk-Rating - Green (0.712)

Rank	Priority for maritime security tasks
1.	Unauthorised Vessel Traffic
2.	Narcotics & Weapons Trafficking
3.	Illegal Fishing

SECTION 1: MCS INFRASTRUCTURE

1. **Does the country have adequate surveillance infrastructure (maritime patrol aircraft, inshore and offshore patrol vessels) to effectively patrol fisheries resources within its EEZ?**
   Score: 7
   Score Range: 6-7



Available infrastructure is adequate for monitoring major fishing regions effectively, but shortage of patrol vessels for offshore enforcement is reported (Choi 2022). Royal Canadian Air Force has 2 squadrons of P-3 Orion (*CP-140M Aurora aircraft*) for maritime patrols; Canadian Coast Guard has 56 patrol boats and 2 offshore patrol ships (*Leonard J Cowley*; *Sir Wilfred*) (Military Balance 2023). OAG-Canada (2022); Choi (2022); Barreto, and Santos (2021); Choi (2019); DFO (2011, 2014); Jane (2012); Millar (1995); CCG (2009) documents provide more information on this aspect.

Under the National Aerial Surveillance Program (NASP) two Dash 8 aircraft (*DeHavilland Canada*) and two Beechcraft Super King Air B200 aircraft are used for civilian and fisheries patrols. Transport Canada was also reported to use Dash 7 aircraft for fisheries patrols (CBC 2013). The Royal Canadian Air Force also uses CP-140 aircraft for Operation Driftnet patrols in the North Pacific; the operation also uses Canada's RADARSAT-2 satellite imaging technology to patrol the NPAFC area. Canada is planning to replace the ageing CP-140 Aurora aircraft with 16 P-8A Poseidon aircraft from Boeing in the USA (Reuters 2023). In May 2019, Canadian Government announced a $15.7-billion program to induct 18 new Canadian Coast Guard ships (Globe and Mail, 2019; Canadian Govt 2019). *Adjustment in score range for this indicator* - Delays in procuring offshore patrol vessels, low arctic surveillance, and ageing CCG ships (See OAG 2022a report for more information).

Canadian Coast Guard has 124 Patrol vessels for fisheries enforcement duties in the Pacific, Atlantic and Arctic coasts (CCG 2023). In the **Atlantic region** Canadian Coast Guard has four offshore patrol vessels (CCGS *Cape Roger*, CCGS *Cygnus*, CCGS *Leonard J. Cowley*, CCGS *Sir Wilfred Grenfell*), one mid-shore patrol vessel (CCGS *A. LeBlanc*) and three inshore patrol vessels (CCGS *Geliget*, CCGS *Pointe Caveau*, CCGS *Cape Light*). In the **Central and Arctic region,** the Canadian Coast Guard has 4 Mid-shore patrol vessels for maritime security and fisheries enforcement duties (CCGS *Caporal Kaeble V.C.*, CCGS *Constable Carrière*, CCGS *Louis M. Lauzier*, CCGS *Corporal Teather C.V.*) two small mid-shore patrol vessels

(CCGS *Cape Hurd*, CCGS *Caribou Isle*). In the **Western Region** Coast Guard has six Mid-shore patrol vessels (CCGS *Tanu*, CCGS *Gordon Reid*, CCGS *Kitimat II*, CCGS *Atlin Post*, CCGS *Sooke Post*, CCGS *Arrow Post*) (DFO 2013b,c.d). DFO plans to induct three new rigid-hull inflated surveillance vessels and four jet-patrol surveillance vessels by late 2016 for coastal patrols (Gunn 2015).

Canada's third-generation High Frequency Surface Wave Radar (HFSWR) system can improve maritime domain awareness as the new system can monitor vessels up to 320 km from the coastline (Anon 2012; Ponsford *et al*., 2017).

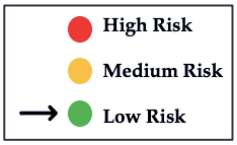
However, the High Freq Radar has no real practical application on east coast for federal fisheries enforcement – RADARSAT will likely be a better tool (esp. when 3 new satellites are launched) (Jenkins, *pers. comm*., 2013).

"…the Government of Canada has approved significant investments to support recapitalization of the CCG fleet through the National Shipbuilding Strategy (NSS). In addition to the five large vessels and various small vessels previously approved, new funding has been secured for the procurement of up to 26 new large ships, small vessels, as well as extensive interim measures to keep the existing fleet operational until the replacement vessels can be delivered" (DFO 2021).

The Canadian Coast Guard has enhanced its surveillance network for tracking marine traffic in the waters off southern British Columbia by installing six new radar installations: in the *South Grenville and South Douglas Channels, Lama Pass/Seaforth Channel, Queen Charlotte Sound, Queen Charlotte Strait, Seymour Narrows, and the North Strait of Georgia* (CCG 2018). Starting in 2019, the three-satellite RADARSAT Constellation Mission has improved ship detection and identification capabilities by combining radar imaging and Automatic Identification System (AIS) data (CSA 2020).

2. Does the country have adequately trained officers to conduct MCS operations?

Score: 7
Score Range: 7-8



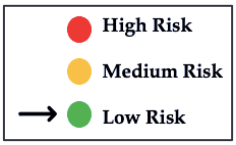
Yes, Canada has enough manpower to oversee industrial fisheries, but shortage is reported for monitoring some coastal recreational and subsistence fisheries. There are ~527 full-time equivalent fishery officers to monitor major Canadian fisheries in six regions (OAG 2022b). See Anon (2015); Baum and Fuller (2016); De Lisle and

Iris (2016); O'Neil (2017); DFO (2016); McDonald (2021); MacLean (2008) documents for more information.

National Fisheries Intelligence Service (NFIS) faces many challenges, as there are gaps between the current capacity and demands for enforcement through the program. In many coastal fisheries, Aboriginal Fishery Guardians (AFG) employed through respective First Nation/Aboriginal organization are involved in catch monitoring and reporting, which leads to systemic gaps in the compliance picture. DFO is increasingly relying on Electronic Monitoring (EM) and dockside monitoring program (DMP) to achieve compliance in commercial fisheries (Anon, *pers.comm.*, 2021).

3. **Does the country have adequate management plans to monitor their fishing vessels on the high seas?**

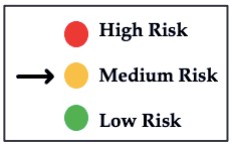
Score: 8
Score Range: 7-8



Yes, Canada is a signatory to the FAO Compliance Agreement. Canadian pelagic tuna longliners greater than 20m in length fishing in Atlantic Ocean need to be equipped with VMS transponders and report catches for each trip (ICCAT 2022b). Pursuant to paragraph 6 of Resolution C-14-02, this is a report on Canada's vessel monitoring system (VMS) in the eastern Pacific Ocean. All Canadian vessels longer than 24 meters must be outfitted with certified VMS satellite transponder systems to fish for tuna in IATTC waters off the Pacific coast (IATTC 2019). Tuna vessels operating in the Pacific Region targeting albacore tuna are licensed to operate in Canadian EEZ and the high seas. Canadian albacore tuna vessels operating in the Pacific are also allowed to transship catches to carrier vessels at sea. Vessels targeting tuna on the high seas can operate under licensing conditions authorized under Schedule II privileges. No violations are reported for Canadian flagged fishing vessels operating on the high seas and RFMO waters hence a good score is given here. See Trépanier (2015); Gilmore (2015); DFO (2005) reports for more information on Canadian fisheries surveillance capabilities on the high seas.

"*A variety of methods are used to monitor fishing activity on the high seas, including aerial surveillance, at-sea and port inspections, international observers, satellite (RADARSAT II) and vessel monitoring systems.*" (DFO 2020).

4. **What proportion of fishing vessels is equipped with vessel monitoring system (VMS) to monitor their movements on a continuous basis?**



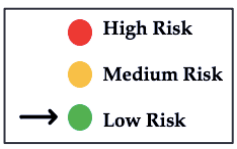
Score: 5
Score Range: 4-5

Moderate VMS coverage was reported for commercial fishing vessels operating along Canada's Pacific coast (Sporer 2007). According to DFO (2006) VMS has been implemented for over 2000 fishing vessels operating in Newfoundland and Labrador, Maritimes, Gulf and Quebec Regions. Some of the fisheries which have 100% VMS Coverage include Mackerel - Purse seine / Midwater Trawl fishery in Maritimes region, Mackerel – Purse seine fishery in Newfoundland, Herring & Mackerel – Purse Seine fleets in the Gulf Region (DFO 2008b). Vessels fishing for Northern Shrimp in the Shrimp Fishing Areas (SFAs) 0-7 and the Flemish Cap are also required to have VMS onboard during fishing trips (12-13 factory freezer trawlers – offshore) (DFO 2010a). VMS is also compulsory for scallop draggers operating in sub-area 16E, 16F and 18A (DFO 2010b); Sea Urchin - Fishing Areas 9, 10 and 11 (DFO 2010c).

Because Canada does not mandate the use of AIS for fishing vessels, a significant number of vessels operating in Canadian waters do not use it, and instead DFO uses logbooks, Electronic Monitoring System (for groundfish fisheries in the Pacific region), VMS (for some fisheries, primarily in the Atlantic region), and aerial surveillance to track fishing vessels at sea (Burke *et a*l., 2022; Iacarella, *et al*., 2023a; Serra-Sogas *et al*., 2021; Iacarella, *et al*., 2020).

AIS – largely applies to commercial vessels not fishing vessels (in Canada) – VMS applies to some fishing fleets/vessels, mostly east coast at this time for "active" VMS (some "passive" VMS in Pacific) – Generally in Atlantic Canada VMS largely on vessels greater than 35 feet in length – ideally all vessels over 35 feet will carry VMS over time (Jenkins, *pers. comm*., 2013).

5. **What percentage of fishing vessels (>20 m OAL) is monitored through onboard observers at sea (for major commercial fish stocks)?**



Score: 7
Score Range: 5-7

A recent federal audit has reported that observer program is failing to achieve its desired objectives "*In several regions, departmental officials did not have timely access to third-party data on bycatch and discarded fish. This meant the Department did not have a complete record of total catch for the year, which compromised its ability to make timely*

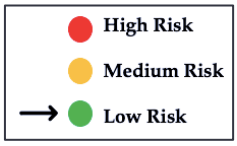
fisheries management decisions" (OAG 2016). The at-sea observer program covers up to 7000 fishing trips every year (MacLean 2008). See Thomson (2022); Beauchamp *et al.*, (2019); Baum and Fuller (2016); DFO (2013); Millar (1995); Anon (2000); Sporer (2007); Gislason (2007); Grinnell and Cox (2007) for more information on Canadian observer program. Seven at-sea observers have been implicated for misreporting of fishing vessels positions to DFO in snow crab and shrimp fisheries (Whiffen 2014). See Pynn (2013a,b) reports for more information. In Atlantic Canada, observers were frequently required to report discards of only commercial species while non-commercial discards were overlooked (Garvais *et al.*, 2010). Electronic monitoring using cameras is reported for fishing vessels operating in the Pacific region (DFO 2023). See Integrated Fishery Management Plan (IFMP) reports on the DFO website for observer coverage in different fisheries from coast to coast.

In ICCAT waters, "*Canadian longline vessels over 20 meters LOA targeting bigeye, yellowfin and/or skipjack have human observer coverage greater than 10%. From 2014 to 2020, the at sea observer coverage level averaged approximately seven point seven per cent (by sea days fished) on the pelagic longline fleet fishing for swordfish and other tunas.*"(ICCAT 2022b). In 2021 for the vessels operating in NAFO Regulatory Area waters, Canada reported 94% observer coverage (NAFO 2022).

Extrapolation of by-catch from observer program is difficult as the coverage varies seasonally and geographically and does not match the spatial distribution of fish stocks. There is very low observer coverage in salmon and crab fisheries especially off Northern British Columbia, where unreported subsistence catches and discards go unnoticed (salmon, herring, and rockfish fisheries) due to low observer coverage... A few years ago, Watershed Watch Society posted a video where illegal discard practices in the salmon seine fishery are shown; where DFO hires charter patrolman with no enforcement powers to monitor the salmon seine fishery. Similarly, there are other fisheries off northern BC and Atlantic coast where fishermen report that they never see DFO officers even during peak fishing seasons. Clearly, there are very few boots on the ground, which embolden fishermen to break regulations with ease (Anon, *pers.comm.*, 2015).

SECTION 2: INSPECTIONS

6. **How often fishing vessels are inspected at sea (Identification by sight and boarding for inspections)?**
   Score: 7
   Score Range: 6-8



Data deficient. Data on number of annual inspections at sea for monitoring commercial and inshore fisheries is not available for assessment from Fisheries and Oceans, Canada (See DFO 2022; CCG 2023 reports).

Twenty dedicated seagoing inspectors are stationed in the north Atlantic, and two dedicated patrol vessels are available for up to 600 sea days annually (*varies from year to year).* Radar satellite (RADARSAT 2) and Satellite Automatic Identification System (S-AIS) data are used in conjunction with airborne surveillance (*Operation High Seas Driftnet with Japan and the USA; Operation North Pacific Guard*) in the Pacific (Napier and Wheeler 2019).

Antle (2016) suggests that an internal DFO report obtained by CBS news showed that sea-based patrols and inspections of foreign fishing vessels have dropped significantly over the last decade. Patrols are reportedly low in coastal fisheries (*e.g., abalone, salmon, crab, rockfish, etc.*). Canadian officials conducted 241 at-sea inspections in 2005 compared to 158 in 2003 (Anon 2005). Since nineties, the Department of Fisheries and Oceans has further optimized patrolling efficiency at sea through boarding's by Fisheries Officers aboard Canadian Naval ships operating in Atlantic Canada (Hickey 2006).

See Choi (2022); CBC (2019a,b); OAG (2016); Q.5; Gilmore (2015); DFO (2022); DFO (2016); DFO (2013a); DFO (2011); Millar (1995); Sporer (2007); OECD (2012) documents for more information.

Table 1. *Integrated Fisheries Management Plans (IFMP) for key commercial species along Canada's coasts (Source: DFO (2013a) See more recent IFMPs on the DFO website for recent MCS developments in different fisheries from coast to coast.*

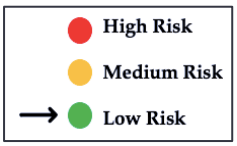
Name of the fishery	Observer scheme	Vessel monitoring system (VMS)	Other Notes
Central and Arctic Region			
Northern Shrimp – Newfoundland, Labrador, Davis Strait (IFMP effective since 2003)	100% observer coverage for Vessels over 100 feet; 10% coverage for inshore fleet	Yes	TAC in place; all offshore vessels must report their position and catch daily; Vessels should submit logbooks and purchase slips to DFO. *Aerial surveillance – Yes* *Sea based patrols – Yes* *Dockside monitoring – Yes*
Northern Shrimp – Shrimp Fishing Areas (SFAs) 0-7 and the Flemish Cap (IFMP effective since 2007)	100% observer coverage for offshore fleet (Approx. 2000 observer days annually); 10% coverage for inshore	Yes	TAC in place; Enterprise Allocation (EA) Program for the offshore fleet; Offshore vessels must report their position and catch daily. *Aerial surveillance – Yes* *Sea based patrols – Yes* *Dockside monitoring – Yes*

	fleet (Approx. 600 days annually)		
Gulf Region			
Atlantic Mackerel (IFMP effective since 2007)	Purse seine fishery has observer coverage	None reported	Atlantic-wide TAC in place; dockside monitoring, at-sea observers, hails of departures and arrivals, buyer hails and purchase slips, and submission of logbooks (Vessels >35' in length must complete and submit a fishing log). *Aerial surveillance – Yes* *Sea based patrols – Yes (Small vessel patrols and landing checks)* *Dockside monitoring – Yes*
Atlantic Bluefin Tuna (IFMP effective since 2008)	Observer coverage – Yes (Minimum 5% coverage)	None reported	TAC in place; 100% Logbook coverage required as condition of the license; Transshipments at-sea monitored through Over-flights, at-sea surveillance and boarding's, covert operations *Aerial surveillance – Yes* *Sea based patrols – Yes* *Dockside monitoring – Yes*
Atlantic Swordfish and other tunas (IFMP 2004-2006)	100% observer coverage for longline fleet	None reported	100% industry-funded dockside monitoring of all landings. Logbooks required for all fishing vessels *Aerial surveillance – Yes* *Sea based patrols – Yes* *Dockside monitoring – Yes*
Newfoundland and Labrador Region			
Northern Shrimp - Shrimp Fishing Areas (SFAs) 0-7 and the Flemish Cap (IFMP effective since 2007)	Offshore fleet has 100% observer coverage; Inshore fleet has 10% observer coverage.	All fishing vessels equipped with VMS devices and send catch and position reports daily.	TAC in place; Dockside Monitoring Program (DMP) is required for all landings from <100ft fishing vessels, but not required on shrimp landed from >100ft vessels; Logbooks required for all fishers.
Snow Crabs (IFMP in place since 2009-2011)	Yes – at-sea observer coverage.	VMS is mandatory for fishing vessels 40' and greater targeting snow crabs.	Fishery managed as an individual quota (IQ) of fishery; trip and weekly limits in place; 100% dockside monitoring; Transshipments from fishing vessels is not permitted; All vessels must complete and submit logbooks to DFO. *Aerial surveillance – Yes* *Sea based patrols – Yes* *Dockside monitoring – Yes*
Cod (*Gadus morhua*) (IFMP effective since 2009) 3Ps Cod fishery	Yes – at-sea observer coverage in place. Target of 5% observer coverage.	VMS in place.	TAC in place; log books (<35' Gillnetters and other fishing vessels sector; log books for (trawlers <35' sector); 100% dockside monitoring; Hail-in Hail-out requirements *Aerial surveillance – Yes* *Sea based patrols – Yes* *Dockside monitoring – Yes*
Pacific Region			
Salmon – North Coast and South Coast of British Columbia (IFMP 2013-2016)	Observer coverage for some salmon species.	None reported	Commercial Harvest Logs and Electronic Logbooks (E-Logs); 100% dockside validation of the catch at designated off-loading locations; Over flights and charter patrols in inshore waters.
Crabs by Trap (IFMP 2013-2014)	None reported	None reported	Daily fishing time restrictions and weekly haul limits; dockside monitoring for enforcement of size limits, soft-shell crab, female crab, and prompt completion of harvest logs as per the Conditions of License; Checks of transportation vehicles on route from off-loading sites to processors; Random checks at processing facilities. *Aerial surveillance – Yes*

			Sea based patrols – Yes *Dockside monitoring – Yes*
Shrimp trawl fishery (IFMP 2013-2014)	Yes – at-sea observer coverage is reported.	None reported	TAC in place; Notification and reporting measures (hails when fishing, hails of catch, logbooks, electronic data reporting). *Aerial surveillance – Yes* *Sea based patrols – Yes* *Dockside monitoring – Yes*
Groundfish fishery (IFMP effective Feb 21, 2013) include Groundfish trawl, Halibut, Sablefish, Inside Rockfish, Outside Rockfish, Lingcod, and Dogfish fisheries	Yes – observer coverage is reported.	None reported	TAC in place; Fishing log must be updated prior to landing or sale of groundfish for each fishing trip; Hail-out and Hail-in reports; Hook and line and trap groundfish species must be landed only at designated landing ports. *Aerial surveillance – Yes* *Sea based patrols – Yes* *Dockside monitoring – Yes*
Offshore Pacific Hake fishery (2011-2013 IFMP for Groundfish)	Yes – at-sea observer coverage is reported.	None reported	TAC in place; Fleet subjected to 100% at-sea monitoring either through at-sea observer or electronic monitoring; Shore side hake deliveries subject to 100% coverage through Dockside Monitoring Program (DMP); Hail-outs required at least 8 hours prior to undertaking any fishing trip.
Pacific Herring (IFMP 2012-2013)	Yes – at-sea and dockside observer coverage are reported.	None reported	Commercial fishers operate under a TAC; Fisher Identification Numbers (FIN) assigned to all commercial fishers; Harvest log must be kept onboard each licensed fishing vessels and catch information should be recorded by midnight each day; Hail-in and Hail-out requirements; All herring shall be delivered to a British Columbia port and must be offloaded within 18 hours of capture. A certified observer must validate the weight of all herring offloaded at designated ports. *Aerial surveillance – Yes* *Sea based patrols – Yes* *Dockside monitoring – Yes*
Pacific Sardine (IFMP 2012-2013)	Yes – at-sea and dockside observer coverage are reported.	None reported	Recreational fishers can harvest sardine with a BC Tidal Waters Sport Fishing license; TAC in place for commercial fishing vessels; logbooks, third party at-sea observer coverage and a 100% dockside validation program. *Aerial Surveillance – Yes (local air charters contracted on an as-needed basis)* *Sea based patrols – Yes* *Dockside monitoring – Yes*
Albacore tuna (IFMP 2013-2014)	None reported	Yes – VMS is required as per tuna RFMO regulations	Around 150 troll vessels fish in Canadian EEZ and 30 vessels operate on the high seas; Under the Canada/USA Pacific Albacore Tuna Treaty Canadian vessels are also allowed to fish in U.S. EEZ; Catches are monitored through logbooks and fish slips *At-sea monitoring – No* *Dockside monitoring – No* *Aerial Surveillance – Yes in co-operation with US Coast Guard for vessels operating in U.S. EEZ and high seas waters.*
Halibut fishery	Fisheries observers attend 100% of all landings and weigh-out inspections at landing locations.	None reported	Commercial vessels operate under a transferable Individual Vessel Quotas (IVQ); Commercial fishing vessels in the halibut fishery have an option to carry either a certified and designated on-

			board fishery Observer or an Electronic Monitoring (EM) system; In 2012, all 155 vessels made trips with the EM system; Hail-in and hail-out requirements; Recreational vessels have bag and size limits *At-sea monitoring – Yes* *Dockside monitoring – Yes*

7. How often fishing vessels are scrutinized through aerial patrols?



Score: 7
Score Range: 7-8

Under the Fisheries Aerial Surveillance and Enforcement (FASE) program fixed-wing aircraft are deployed for fisheries conservation and enforcement duties from coast to coast. Aerial surveillance data collected through maritime patrols is shared with the Marine Security Operations Centres (MSOCs) for identification of potential threats and interception of the same through sea-based patrol assets (PWGSC 2018; Gordon 2018). All FASE operations are based out of three bases (*CFB Comox, BC; Halifax, Nova Scotia; and St. John's, Newfoundland, and Labrador*). On 4 March 2019, the Government of Canada awarded five-year aerial surveillance contract to PAL Aerospace defence company. The company would include use of two King Air 200 and two Dash-8-100 maritime patrol aircraft (DFO 2019).

Under the Conservation & Protection (C&P) Program operational requirements a total of 4,300 flying hours annually is suggested with 1,000 flying hours on the west coast (Pacific Ocean), 3,000 flying hours on the east coast (Atlantic Ocean) and 300 hours in the Arctic.

The first of four new Dash-8-100 long-range maritime patrol aircraft started flying in 2021 from a base in Campbell River, British Columbia (DFO 2021b). Beechcraft 200 aircraft are used for 600 hours of dedicated aerial surveillance in the north Atlantic each year, while National Defence (*CP 140 Aurora aircraft*) allocations change every year (Napier and Wheeler 2019; Military Balance 2023). In 2022, as part of Operation North Pacific Guard, Canada flew Dash-8 aircraft for 29 patrols (*over 247 hours of flight time*) covering 44,200 nautical miles (DFO 2022b). Canada deployed surveillance aircraft in NAFO waters in the year 2021, and they flew 486 hours while sighting 401 vessels in the NAFO Regulatory Area (NAFO 2022).

Table 2. *Fixed-wing patrol statistics*. Source: [redacted] Details of operational statistics for the 2016-2017 fiscal year.

	Monthly Average	Annual Flying Hours		
C & P Region	**Patrol Hours**	**Patrol Hours**	**Number of Patrols**	**Average Flight Hours**
Pacific	85.5	1026.3	178	5.8
Central & Arctic	0.0	58.3	7	8.3
Quebec	37	115.4	51	8.7
Gulf	32.5	390.4	67	5.8
Maritimes	88.8	1066.1	220	4.8
NL	155.4	1864.8	439	4.2
Total	**399.2**	**4521.3**	**962**	**6.27**

Table 3. National Aerial Surveillance Program of Conservation & Protection, DFO for the fiscal year 2019-2020 (*Surveillance of fishing vessels. Total surveillance time and number of flyovers during the period April 2019 to March 2020 in the six DFO regions from coast to coast* (Source: [redacted]).

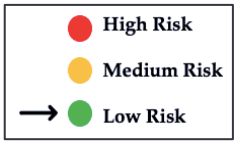
DFO Region	Surveillance Time (days)	Number of Flyovers
Pacific	44	191
Central & Arctic	4	19
Quebec	20	73
Newfoundland & Labrador	65	367
Gulf	21	90
Maritimes	45	210
Total	**199**	**950**

Surveillance aircraft are used for monitoring marine pollution, search and rescue, merchant traffic and fisheries patrols. If aerial reconnaissance data is filtered by various maritime security tasks, allocation to fisheries surveillance is hardly enough on both Pacific and Atlantic coasts. Although, there is more emphasis on use of aerial surveillance for high seas patrols in NPAFC and NATO waters; domestic fisheries patrols are rather subdued (Anon, *pers.comm*., 2016).

Although more recent data is not publicly available, data from 2009-2010 suggests Pacific Region received 1188 hours of aerial surveillance while the suggested minimum was around 1400-1500 hours, while in the 2007-2008 period Maritimes Region (Atlantic Ocean) received 1300 hours, Newfoundland/ Labrador received 2426 hours of aerial surveillance (DFO 2011). Off the west coast, 160 missions lasting 973 hours were undertaken under the C&P Aerial Surveillance Patrols from 1 Jan – 15 December 2015 (IPHC 2016). Monitoring of fishing vessels by air is undertaken on a regular basis, with aerial Surveillance of 5500 hours/year

(MacLean 2008). See OAG (2022a); DFO (2009b); DFO (2009c); DFO (2011) and Peterson et al., (2005) documents for information on Canadian enforcement vessels and aerial surveillance program. During 2007-08, a total of 5126 hours of fixed wing flying hours was recorded for aerial surveillance of the Canadian EEZ (DFO 2011).

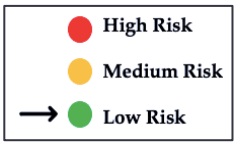
8. **How often are fishing vessels inspected at landing centers and docks for foreign and domestic vessels (Dockside monitoring)?**
Score: 7.5
Score Range: 7-9



Dockside Monitoring Program (DMP) exists for commercial fishing vessels using its domestic ports and for foreign vessels calling at designated major ports to comply with PSC inspections (MacLean 2008; OECD 2012; Beauchamp *et al.*, 2019). Hail-in and hail-out requirements further strengthen reporting requirements for the domestic fishing fleet to monitor quota compliance and accurately quantify catch reporting. The country is reported to undertake regular inspections of domestic and foreign fishing vessels calling at its ports. "*Percentage of inspection activities that have resulted in compliance actions*" is not available from DFO for detailed assessment of this indicator (See DFO 2022 report). See OAG (2016) report on conflict of interest for companies engaged in dockside monitoring.

On the Pacific coast, 100% of landings in the Hake trawl and Groundfish trawl fisheries are reportedly covered through random dockside inspections; regular dockside monitoring also exists for some aboriginal and recreational fisheries (Sporer 2007). See Stanley et al., (2014); DFO (2013a); DFO (2008b); DFO (2005) and DFO website for more information. In the NAFO Regulatory area in 2021 year, Canada reported 94% observer coverage and 100% of the vessels arriving at port were subjected to port state control inspections (NAFO 2022).

9. **Are there adequate plans to monitor catches in coastal areas through coastal patrols (beach patrols, small-scale fishing gear and catch inspections) on a regular basis?**
Score: 7
Score Range: 6-8



Yes, but a few incidents of under-reporting and illegal fishing are reported each year; Poaching has posed a persistent problem in salmon, abalone, rockfish, and crab fisheries along the Pacific coast. *It is important to note that DFO does not have a complete disclosure with respect to inspection records* (See Ecotrust Canada 2008; DFO

2022 reports) *as well as enforcement data for small-scale, commercial, or recreational sectors so it was difficult to get a complete picture for this issue in the current evaluation*. See Q.5; McDonald (2021); Beauchamp *et al*., (2019); O'Neil (2017); Lancaster *et al*., (2015); DFO (2013a); Millar (1995); Sporer (2007); Stevens *et al*., (2008); Condie *et al*., (2014); MSC (2012) and DFO (2011); Robb *et al*., (2011); Parsons (2010) documents for more information on extent of violations in coastal fisheries.

According to a recent scientific study employing AIS and flyover-based aerial surveillance techniques (Iacarella *et al*., 2023a; Iacarella *et al*., 2023b), *93% of active fishing vessels were operating in conservation areas without AIS*, and 22%–24% of that fishing activity was illegal.

DFO Region	2016	2017	2018	2019	2020	2021
Central & Arctic	146	128	147	113	60	46
Gulf	1381	1336	1889	1509	1234	649
HQ Ottawa	-	7	6	1	-	1
Maritimes	2041	1259	1240	1605	1497	709
Newfoundland & Labrador	1066	930	860	1187	793	488
Pacific	4230	3368	3738	3822	4288	2470
Quebec	874	909	814	759	755	464
TOTAL	**9738**	**7937**	**8694**	**8996**	**8627**	**4827**

Table 4. Canada - Fisheries violations by Region *(2016-2021 years* – Note: *2021-year data up to 13th October only*) Source: [redacted].

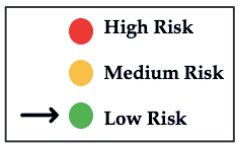
Reliance on DFO citations and violations data to understand compliance picture is bound to pose difficulties, as a range of fishing crimes identified by DFO officers is neither captured or published as far as detection of illegal fishing and under-reporting are concerned. Salmon, herring, crab, and rockfish charter/sport fishing boats are rarely inspected along the Pacific coast. DFO inspections are rare along British Columbia, Northwest Territories and Nunavut provinces. Only a few commercial fisheries receive inspections on the dockside; rest of the migratory stocks like salmon, herring, and crab fisheries in coastal bays receive very little enforcement. Inspections at sea are erratic even during peak fishing seasons off Labrador and Hudson Bay (Atlantic coast), Northern and central British Columbia, Haida Gwaii and Vancouver Island. The vast network of rivers, bays, inlets and estuarine habitats along Canada's extensive coastline make it difficult for proper scrutiny of landed catches. It is a common knowledge that under-reporting, unauthorized sale and bartering of salmon and other seafood is

prevalent in many sports fishing charter, subsistence & food fisheries, and often such catches are not reported to the Federal Government. Under-reporting in subsistence and coastal fisheries can reach as high as 25-40% in some coastal communities off western Canada. In many provinces, catch collection and decision-making processes are under the control of communities (First Nations) rather than DFO. The persistent culture of neglect and mistrust between these communities and DFO officers has meant that very little of the actual catches are actually reported. Further, because even catch quantification relies on reporting by First Nations, the Aboriginal food, social, and ceremonial (FSC) fisheries system has been subjected to rampant abuse. Putting the First Nations in-charge of monitoring their fishery equates to conflict of interest as they can exploit the reporting situation to their own advantage. Although, several First Nation bands legitimately use the FSC fishery, it is a common knowledge in several coastal communities that fish caught under Food fishery is openly sold or bartered with individuals from B.C. Licensed recreational salmon, Rockfish and crab fishers also do not comply with their daily trip limits leading to under-reporting of catches in coastal bays (Anon., *pers. comm.*, 2016).

10. Are all the catches that are caught in this jurisdiction at sea accounted for (i.e., unreported Trans-shipments at sea)?

Score: 7.5

Score Range: 7-9



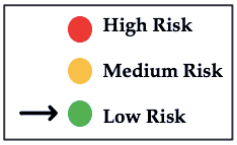
Yes, Canada is signatory to the UN Fish Stocks Agreement (Ratified on 3 August 1999). DFO and Canadian Coast Guard do not share data on exact number of transshipments monitored each year. *Nevertheless, no violations are reported for Canadian flagged fishing vessels for this aspect hence a good score is given here*. See DFO (2005); DFO (2013a); Homes (2014) reports for national measures implemented in this direction.

Transshipments at sea are relatively well patrolled in NAFO and NPAFC waters but the same cannot be said for Pacific coast and northern sections of the Canadian EEZ. Transshipments are rarely reported and under Canadian laws at-sea transshipments are illegal within the EEZ. Canadian Coast Guard allocates substantial aerial and maritime patrol time to prevent illegal transshipments in offshore waters; Maritimes Region (Atlantic provinces) receives substantial patrolling effort but except for halibut fisheries other fish stocks off British Columbia do not receive adequate enforcement (Anon, *pers.comm.*, 2016).

11. Are vessels required to undergo inspection of equipment and fishing gear for every fishing trip?

Score: 7.5

Score Range: 7-8



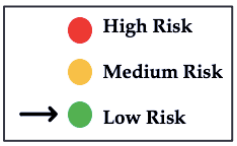
Data deficient. Scale of illegal gear usage or gear seizures is harder to estimate using existing DFO public records. Currently, there is no detailed annual gear seizures report from DFO with information on number of illegal gears seized versus number of licensed fishing gears authorized by various fleet types in artisanal and industrial sectors. Notably, implementation of gear regulations is an integral part of DFO's fisheries inspection regime for both dockside monitoring and at-sea inspections for all commercial fisheries in Canada. See Integrated Fishery Management Plans (*fishery-wise*); Sporer (2007); DFO (2013a); O'Neil (2017) reports for more information on this aspect.

Yes, there are routine inspections of gear and equipment on a regular basis in major commercial fisheries both at dockside and during boarding's at sea. However, there are regular reports of illegal fishing gear seizures in several coastal and recreational fisheries that deserve more attention in future (Anon, *pers.comm.*, 2016).

12. Has the country taken adequate measures to revise and implement national fisheries laws to curtail illegal fishing practices; and does it comply with national and international laws signed?

Score: 8

Score Range: 7-8



Yes, Canada has taken adequate measures to curtail IUU fishing, and it complies with all international laws (Napier and Wheeler 2019; Choi 2022; DFO 2016). In June 2019, '*Fisheries Act*' was amended through Bill C-68 that stipulate rebuilding plans for depleted stocks and new decision-making strategies that are based on science. The country has adopted NPOA on IUU Fishing. Canada has also ratified the FAO Compliance Agreement on 20 May 1994, UN Fish Stocks Agreement on 3 August 1999 and the UN Port State Measures Agreement on 20 June 2019.

DFO enforcement is confined to the dockside leaving it blindsided at sea. Patrolling infrastructure is old and obsolete with greater part of the Coast Guard fleet struck at docks for unplanned maintenance. Coast Guard needs new patrol ships to gain tactical advantage for inspections in offshore fisheries. The number of fisheries inspectors is also not proportional to the requirements on the ground

owing to budget cuts. Transport Canada (2016) (citing DFO (2014) report) states "*the Canadian Coast Guard fleet is aging, which has implications for maintenance as well as procurement. Given that 29 percent of the large vessels are more than 35 years old and close to 60 percent of small vessels are older than the design life of 20 years, it is not surprising that the number of major systems repairs required is increasing, vessel days are decreasing, and the number of ships out of service is increasing over time. Indeed, for such a critical piece of transportation infrastructure, the Canadian Coast Guard is not receiving the political attention, or the administrative and financial resources it requires*". However, it is important to state that Canada has a good record for management of its high seas fishing fleet (Anon, *pers.comm*., 2016).

See DFO (2022); Iacarella et al., (2023a,b); Beauchamp *et al*., (2019); McDonald (2019); O'Neil (2017); OAG (2016); Antle (2016); Baum and Fuller (2016); DFO (2016b); Brewster (2016); Gilmore (2015); Metuzals *et al*., (2008); Parsons (2010); Ecojustice (2011); VanderZwaag *et al*., (2012); Withers (2016); Brooks (2014); Pinkerton *et al*., (2014); Mageau *et al*., (2015); Lancaster *et al*., (2015); McDevitt-Irwin *et al*., (2015) documents for more information.

Flag of Convenience	No
Vessels on the RFMO – IUU vessel list	No

RFMO	Year of the assessment	Compliant	Partially Compliant	Not Compliant	Source
ICCAT	2021	Yes			ICCAT (2022a) ICCAT (2022b) ICCAT (2022c)
IATTC	2021	Yes			IATTC (2022)
NAFO	2021	Yes			NAFO (2022)
NPAFC[1]	2021	N/A	N/A	N/A	Not Available
WCPFC	2021	Yes			WCPFC (2022b)

Last update: 29 March 2023

[1] *NPAFC Committee on Enforcement (ENFO) meeting proceedings is shared with contracting parties and members only. MCS data from annual Enforcement Evaluation and Coordination Meeting (EECM) is also not available for scrutiny to evaluate compliance of member countries fishing vessels.*

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DFO (2013b)

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Note:

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