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MARINE OIL SPILLS

CANADIAN ENVIRONMENTAL SUSTAINABILITY INDICATORS



Canada 

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CANADIAN ENVIRONMENTAL SUSTAINABILITY INDICATORS

MARINE OIL SPILLS

March 2025

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Marine oil spills

Oil spills to the marine environment can have adverse and long-lasting effects on wildlife, habitats, local communities, and the economy. This indicator presents the number and location of oil spills across Canada's marine environments observed by the National Aerial Surveillance Program and oil spills impacting the marine environment that have been reported to the National Environmental Emergencies Centre. The data comes from 2 different ways to track, report and respond to marine oil spill incidents in Canada. As a result, it is possible that the 2 methodologies may capture the same incidents and that not all oil spills to the marine environment are accounted for in this indicator.

Number of marine oil spills

Key results

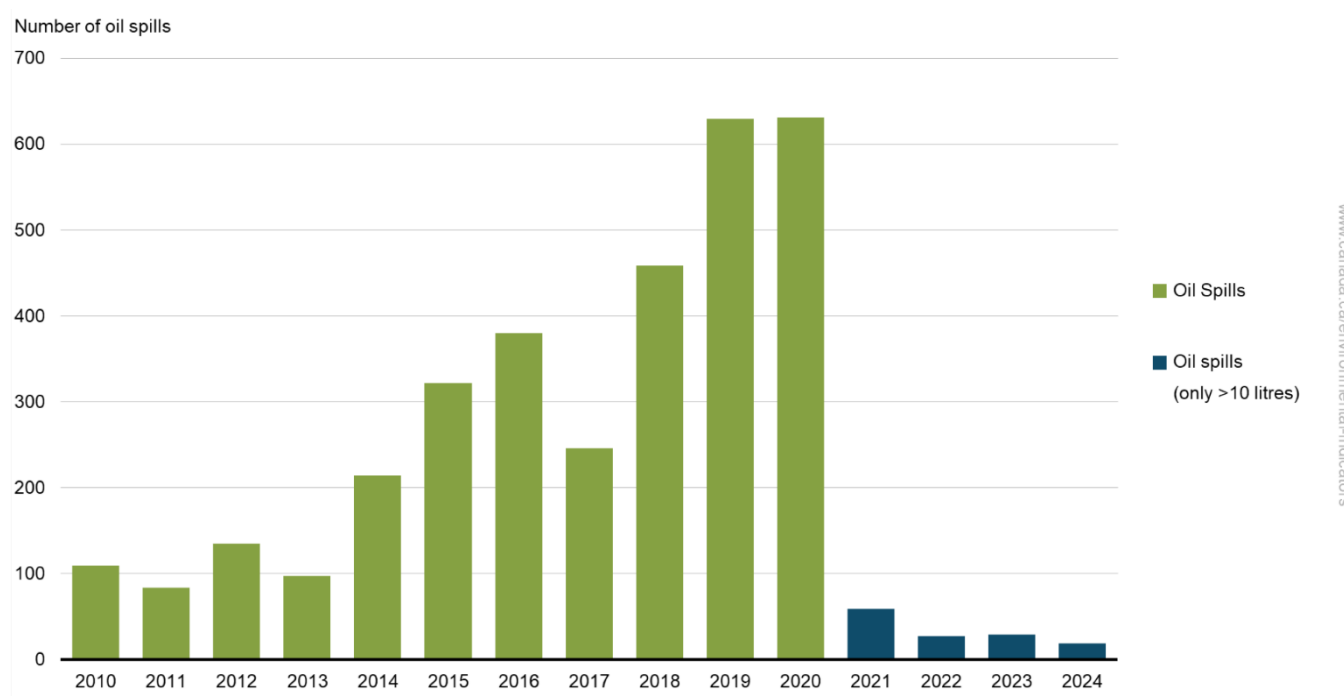
Canada experiences many small (less than 10 litres) marine oil spills incidents each year, most of which come from operating and maintaining personal watercraft or releases from sunken vessels. Large and catastrophic marine oil spills are responsible for substantially higher volumes of oil being released to the environment but occur much less frequently.

In 2024,¹

- Nineteen (19) marine oil spills with a volume of more than 10 litres were detected by the National Aerial Surveillance Program
- the National Environmental Emergencies Centre received 1 009 reports of marine oil spills across Canada, 212 of which had an estimated volume of less than 10 litres and 575 an unknown quantity or an estimated volume of less than 10 litres
- Four hundreds and twelve (412) , or 40.8%, of marine oil spills reported to the National Environmental Emergencies Centre were related to water transportation such as pleasure craft and fishing vessels

¹ Year refers to fiscal year, which runs from April 1 to March 31.

Figure 1. Number of marine oil spills detected by the National Aerial Surveillance Program, Canada, 2010 to 2024



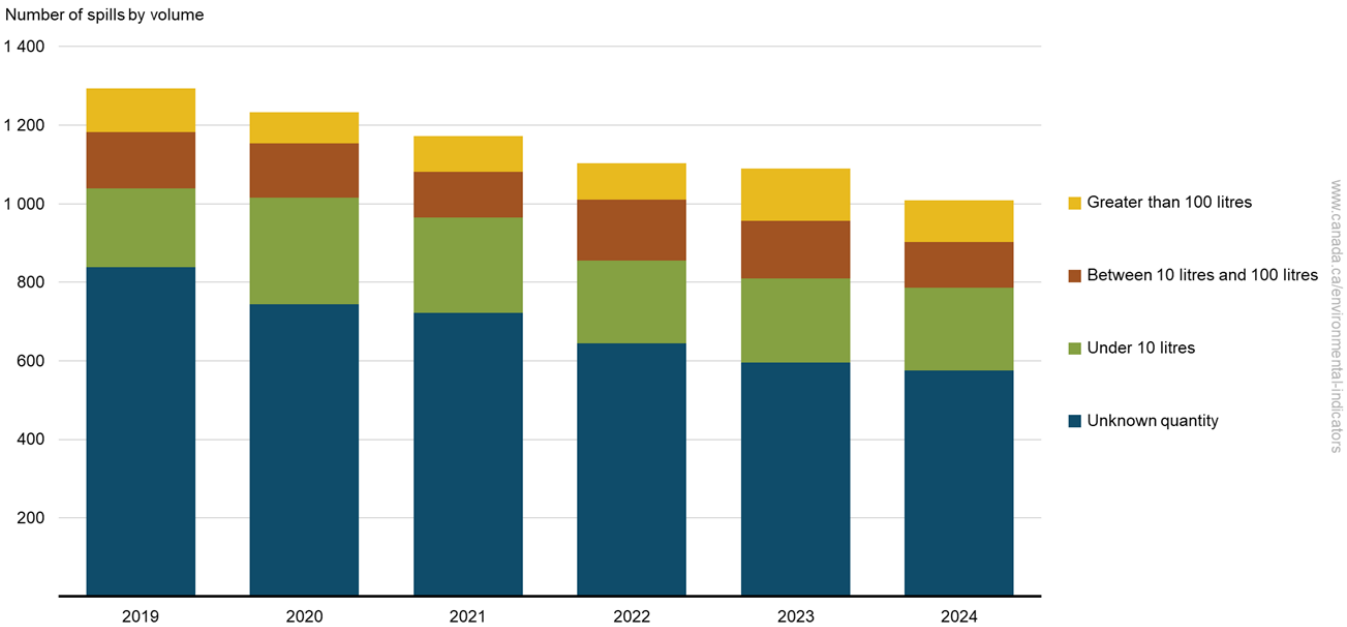
[Data for Figure 1](#)

Note: Beginning in 2021 the National Aerial Surveillance Program changed the way they report marine oil spills detected during their sorties such that the program only reports back on large spills above 10 litres. Year refers to fiscal year, which runs from April 1 to March 31. For example, the year 2024 therefore refers to April 1, 2023 to March 31, 2024.

Source: Transport Canada (2024) Marine Safety and Security Directorate.

In 2024, the sorties flown by the NASP observed and reported 19 marine oil spills of a volume greater than 10 litres, for a total estimated volume of 739 litres (see location in [Figure 4](#)). As a comparison, 10 litres is less than 1 24-pack of 500ml water bottles.

Figure 2. Number of marine oil spills by volume reported to the National Environmental Emergencies Centre, Canada, 2019 to 2024



[Data for Figure 2](#)

Note: Year refers to fiscal year, which runs from April 1 to March 31. For example, the year 2024 therefore refers to April 1, 2023 to March 31, 2024. The volume of spills reported to the National Environmental Emergencies Centre at Environment and Climate Change Canada are based on the subjective estimates made by the individual person or entity making the report.

Source: Environment and Climate Change Canada (2024) National Environmental Emergencies Centre.

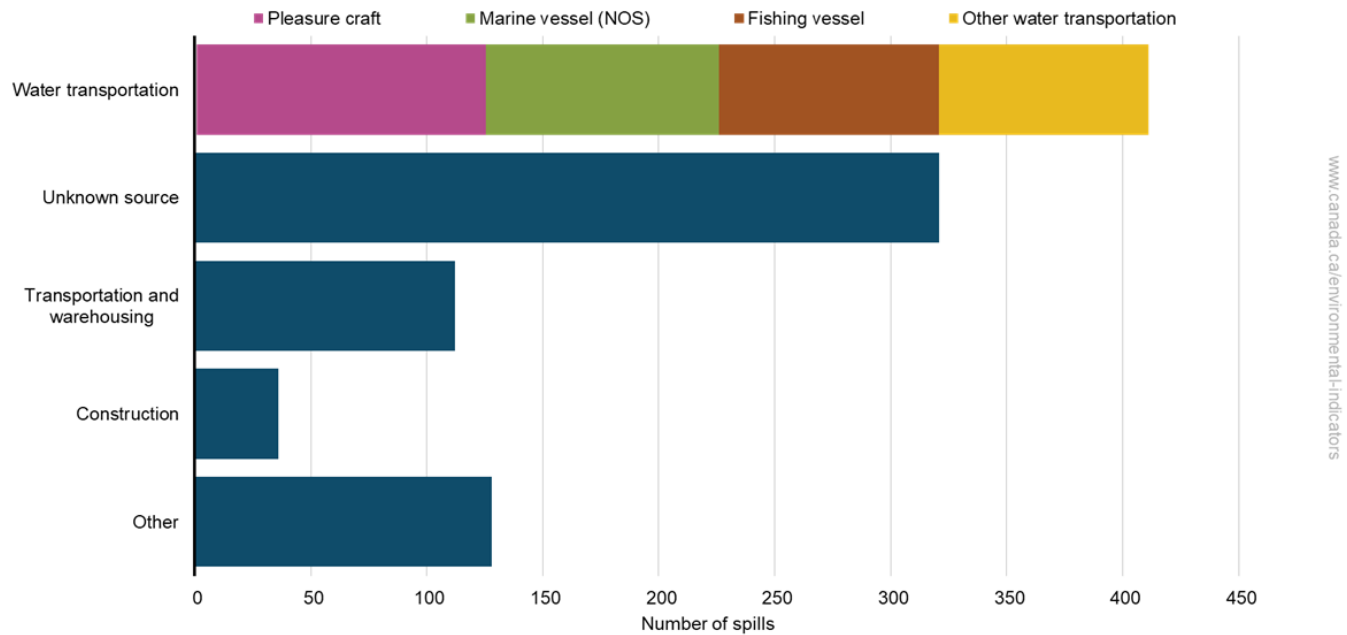
The National Environmental Emergencies Centre (NEEC) works directly with people in Canada, such as private citizens, enterprises, or community groups, as well as having partnership agreements with certain federal departments as well as provincial and territorial governments to capture and track pollutant releases across Canada. In 2024, the NEEC received nearly 10 500 reports of pollutants being released and impacting the environment, of which 1 009 were to the marine environment involving at least one type of oil product. The majority, 575, of incidents with reporter-estimated volumes had an unknown quantity, 212 were under 10 litres, 115 were between 10 and 100 litres, and 107 had volumes more than 100 litres.

The volumes reported to NEEC represent the estimated volume that has been or could potentially be released to the environment at the time of reporting. Based on the information provided in the report, if there is a significant threat to the health of Canadians or the environment from a spill or the potential of one, the incident is escalated to the emergency operations centre for action.

In 2024, 261 of the 1 009 incidents of potential oil-related spills impacting the marine environment were escalated for additional assessment and to ensure that all reasonable measures were being taken to protect the environment and human health. Fifty-four (54) incidents resulted in specific communication with senior management (Heads-up). 40 incidents resulted in services and scientific information being provided to the agency leading the response to inform decisions about appropriate response measures and operations (Advisory). These services and scientific information include sensitivity maps, dispersion, drift or trajectory models, special weather forecasts, and fate and behaviour science. Finally, 7 incidents resulted in on-site deployments of environmental emergency officers to support the agency leading the response to the incident.

While reporter-based volume estimations and characterisations may be subjective and not consistent, reporting and tracking incidents of oil spills to Canada's marine environment remains important.

Figure 3. Category of marine oil-spill incident as reported to the National Environmental Emergencies Centre, Canada, 2024



[Data for Figure 3](#)

Note: Year refers to fiscal year, which runs from April 1 to March 31. For example, the year 2024 therefore refers to April 1, 2023 to March 31, 2024. The categorisation of spills reported to the National Environmental Emergencies Centre at Environment and Climate Change Canada are based on the subjective rationale made by the individual person or entity making the report. “Other water transportation” consist of Port and harbour operations, Barge, Ferry, Bulk carrier, Cargo/Container, Marine cargo handling, Marine Tanker and Other water transportation. “Other” consist of Industrial facility, Residential/Private, Electric power generation, transmission and distribution, Other facilities/services, Manufacturing, Retail trade, Agriculture, forestry, fishing and hunting, Mining and quarrying (except oil and gas), Oil and gas extraction, Water, sewage and other systems, Waste management and remediation services, Arts, entertainment and recreation, Habitat disturbance/destruction, and Warehousing and storage (commercial) facilities. NOS refers to marine vessels transporting “Not Otherwise Specified” dangerous goods

Source: Environment and Climate Change Canada (2024) National Environmental Emergencies Centre.

Of the 1 009 spills reported to the NEEC in 2024, 412 (40.8%) were related to water transportation. Of the 412 water transportation incidents, pleasure crafts, marine vessel, and fishing vessels represented the largest portion (approximately 78%). Another approximately 6% of the spills were attributed to port and marina operations.

Location of marine oil spills

The majority of marine oil spill incidents occur in places where there are more boats – in Canada's coastal waters.

Key results

In 2024,²

- Ten (10) of the 19 spills detected by aerial surveillance were in British Columbia and 8 took place in the Atlantic provinces and Quebec.
- The majority, 96% (708 litres) of the total estimated volume was detected in coastal areas³, while the other 4% (31 litres) detected came from offshore oil spills

Figure 4. Location of marine oil spills of over 10 litres detected by the National Aerial Surveillance Program, Canada, 2024



[Data for Figure 4](#)

Note: Year refers to fiscal year, which runs from April 1 to March 31. For example, the year 2024 therefore refers to April 1, 2023 to March 31, 2024. At this level of zoom two spills overlap in the Burleigh Arm.

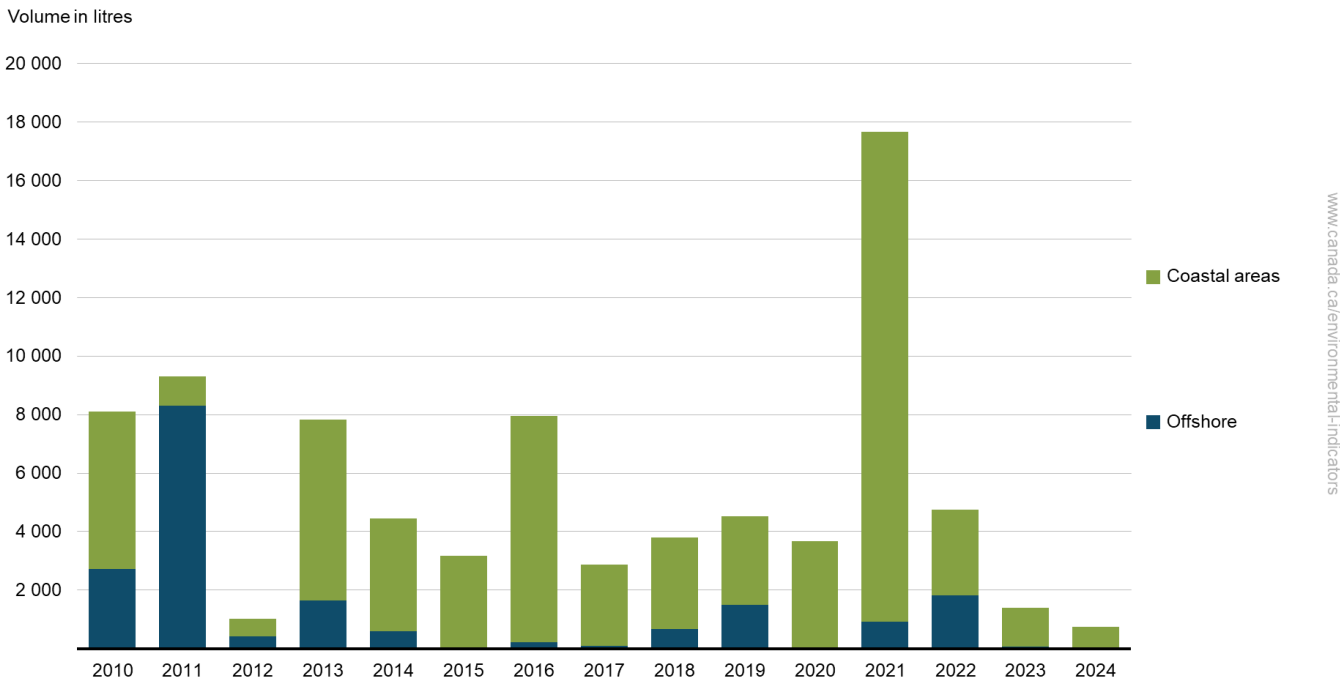
Source: Transport Canada (2024) Marine Safety and Security Directorate.

² Year refers to fiscal year, which runs from April 1 to March 31.

³ Coastal areas refer to areas extending 12 nautical miles (22.224 km) from coastal baselines and to the Great Lakes.

In 2024, the 19 marine oil spills reported by the National Aerial Surveillance Program totaled an estimated volume of 739 litres. Fifteen (15) of the spills were from unknown sources, which represents 88% of the total volume spilled that year. The other 4 spills were from suspected sources, which represent 12% of the total volume spilled. The suspected sources of these spills are from an oil platform and sunken vessels. The source of an oil spill is considered "suspected" when the spill can be linked or suspected of coming from a vessel at the time of observation. If not, the source is defined as unknown.

Figure 5. Volume of marine oil spills detected offshore and in coastal areas by the National Aerial Surveillance Program, Canada, 2010 to 2024



[Data for Figure 5](#)

Note: For the years 2021 and on, only spills over 10 litres are reported. Year refers to fiscal year, which runs from April 1 to March 31. For example, the year 2024 therefore refers to April 1, 2023 to March 31, 2024.
Source: Transport Canada (2024) Marine Safety and Security Directorate.

In 2024, 96% (708 litres) of the total estimated volume was detected in coastal areas, while the other 4% (31 litres) detected came from offshore oil spills. In 2021, just 3 separate spills amounted to 11 800 litres of oil spilled, which represents 67% of the total volume reported (17 651 litres) that year. Accidents involving large oil tankers make up most of the volume of oil spilled when they do occur. For example, in 2018, Cenovus Energy was responsible for an estimated 250 000 litres oil spill off the coast of Newfoundland and Labrador, the largest oil spill in the province's history.^{4, 5} It is estimated that a catastrophic marine oil spill of over 10 000 000 litres can be expected approximately every 242 years.^{6, 7}

Canadian crude oil is transported by pipeline, tanker, and rail. The use of tankers as a means of transporting oil is greater in the Atlantic provinces, and the largest marine oil spills in Canada's waters have occurred there. While

⁴ CBC News (2024) [Cenovus slapped with \\$2.5M fine for 2018 offshore oil spill](#). Retrieved on September 25, 2024.
⁵ This spill is not considered in the indicator because it had not been captured by aerial surveillance nor adequately reported to the National Environmental Emergencies Centre for director attribution in this publication.
⁶ WSP Canada Inc.(2014). [Risk Assessment for Marine Spills in Canadian Waters Phase 1, Oil Spills South of the 60th Parallel](#). (PDF; 21.7 MB). Retrieved on January 20, 2025.
⁷ Different jurisdictions and agencies classify the severity of marine oil spills on their own thresholds.

crude oil production and trade has increased, the proportion of oil transported by tanker in the 2016 to 2022 period has remained between 6% and 8%.⁸

About the indicator

What the indicator measures

The indicator reports the volume and frequency of reported or observed oil spills to Canada's marine environment from 2010 to 2024.

Why this indicator is important

Canada's coastline measures an estimated 243 042 km across the Pacific Ocean, Arctic Ocean, and Atlantic Ocean. It is made up of a diverse array of marine environments which include estuaries, rocky shores, salt marshes, kelp forests, mud flats, eelgrass meadows, and land-attached sea ice.

Oil spills can lead to the degradation and loss of coastal habitats and can inflict significant harm to wildlife populations. Sea birds are the animals most impacted by oil spills to the marine environment. These birds come in direct contact with oil spills and slicks as they move throughout their habitats and where they feed. When their outer feathers become contaminated with oil, these feathers lose their waterproofing and ability to help the birds regulate their temperature. As birds preen and feed after oil spills, they ingest the oil which can go on to have knock-on health effects. Surface oil following a spill can also impact cetaceans (whales and dolphins) and pinnipeds (sea lions) as they surface to breathe or feed, through ingestion or contamination that impairs temperature regulation, mobility, sight, or added stress due to being covered in oil.⁹

Oil spills also impact Canadian communities. Coastal communities touched by a spill can see many of their businesses and leisure grounds closed until a cleanup is completed. Local commercial and recreational fishing can be impacted through the damage to fish populations and environmental stress related to the spill. Marinas, harbours, and waterways can be shut down, as well as beaches and parks. Depending on the nature of the incident leading to the spill, lives and livelihoods may also be lost, with impacts on the broader communities hurt by the oil spill.

Negative effects can continue even after the initial incident of an oil spill; for example, sunken vessels can continue to impact marine environments years later. Each oil spill is different, and the unique factors of the situation will impact the severity of the spill and the required response to it.¹⁰

Related initiatives

For 30 years, the Ship-source Oil Pollution Fund (SOPF) has been mandated to compensate victims of oil pollution damage, including costs incurred for preventive measures, caused by ships and then take action to recover the costs from the polluters or other responsible parties. The fund provides compensation for oil pollution damage caused by any type of oil spill from any type of vessel, even when the cause of the spill is not known. Once a claim is assessed and paid, the Administrator of the fund is required to take all reasonable steps to recover compensation from the polluter. These recovered amounts go back into the fund's accounts and help make sure that industry-funded compensation is available in the event of future spills.¹¹

Liability and compensation for SOPF in Canada is based on international conventions developed by the [International Maritime Organization](#) which tries to make sure the polluter pays. The SOPF provides compensation for oil pollution damage caused by any type of oil spill from any type of vessel, even when the cause of the spill is not known.

In 2024, 41 claims for compensation were made worth a total of \$9,269,433. Most of these claims came from British Columbia. Quebec saw an increase in the number of claims in 2024 to 32% of total claims. The SOPF was able to recover funds from polluters in 9 files, recovering a total of \$291,145. 93% of the claims were submitted by

⁸ Canadian Energy Regulator (2024) [Crude Oil Export Summary](#). Retrieved on August 8, 2024.

⁹ Environment Canada (1996) [Fate and Effects of Marine Oil Spills](#) (PDF; 905 KB). Retrieved on September 11, 2024.

¹⁰ Environment and Climate Change Canada (2021) [A field guide to oil spill response on freshwater shorelines: chapter 4](#).

¹¹ Transport Canada (2024) [Marine liability and compensation: oil spills](#). Retrieved on September 25, 2024.

the Canadian Coast Guard to recoup the costs incurred for responding to and addressing oil-spill-related incidents¹².

Related indicators

The [Releases of harmful substances to water](#) indicator tracks facility-based releases to water of 3 substances that are defined as toxic under the *Canadian Environmental Protection Act, 1999*: mercury, lead and cadmium and their compounds. For each substance, data are provided at the national, regional (provincial and territorial) and facility level and by source.

Data sources and methods

Data sources

This indicator presents data from 2 sources within the Government of Canada, the Transport Canada's [National Aerial Surveillance Program](#) (NASP) and Environment and Climate Change Canada's [National Environmental Emergencies Centre](#) (NEEC).

The NASP patrols over waters under Canadian jurisdiction to detect pollution resulting from ship operations, intentional dumping and accidents. Evidence gathered by the program is used to enforce legislation applicable to illegal discharges from ships. The data are collected for enforcement and deterrence purposes and are focused on commercial vessels. As a result, not all marine pollution spills are accounted for in this indicator.

The NEEC is the Government of Canada's coordination hub for scientific support during environmental emergencies including bringing together scientific and technical advice for cleaning up hazardous material spills in all environments, organizing emergency preparedness and response activities to assist on-the-ground responders, and providing specialized services and information such as localized weather reports, spill modelling, clean-up advice.

More information

National Aerial Surveillance Program

The indicator includes data from 2010 to 2024. All data is compiled by fiscal years, therefore the year 2024 refers to April 1, 2023 to March 31, 2024. Data are gathered at the end of each month and analyzed by surveillance analysts at Transport Canada. Suspected source spills also include spills from oil rigs, sunken vessels and land-based incidents. Coastal areas refer to both areas which extend 12 nautical miles from coastal baselines and the Great Lakes.

Today's NASP fleet consists of four aircraft owned and operated by Transport Canada that are based strategically across Canada for effective monitoring and rapid response to incidents: one Dash 8 is based in Moncton, NB; one Dash 8 is based in Vancouver, BC; one Dash 8 to be based in Ottawa, ON; one Dash 7 is based in Ottawa – also used throughout Canada's north during the Arctic shipping season (July – November).

Aircraft contracted by other government departments are also used for surveillance. Through an agreement with Fisheries and Oceans Canada, Transport Canada uses Provincial Airlines Limited aircraft for pollution patrols over waters off Newfoundland and Labrador.

Transport Canada also uses satellite surveillance from Environment and Climate Change Canada's Integrated Satellite Tracking of Pollution program to detect illegal discharges at sea. It searches for oil-like signatures (anomalies) on the ocean's surface. This information helps direct the program's aircraft to locations of potential spills in near real time. The aircraft crew then examines anomalies to confirm if oil is present, identify the source if possible and gather evidence for prosecution. The source is considered "Suspected" when the spill can be linked or suspected of coming from a vessel at the time of observation. If not, the source is defined as "Unknown".

¹² Ship and Rail Compensation Canada (2024) [Annual Reports](#). Retrieved on November 19, 2024.

Surveillance data gathered by the program serve many additional purposes beyond marine pollution spills detection, including ice patrol, bird and whale surveys, marine security, environmental enforcement and awareness.

Transport Canada regulations and standards, under the [Canada Shipping Act, 2001](#) and the [Arctic Waters Pollution Prevention Act](#), combined with international conventions and standards established by the [International Maritime Organization](#), provide the framework for the department's comprehensive marine safety, pollution prevention, enforcement and oil spill preparedness and response programs.

National Environmental Emergencies Centre

This indicator presents a portion of the environmental emergency incident reports made between April 1st 2018 and March 31st 2024 by fiscal year. It uses specific subsets of the information related to impacts on Canada's waters. An environmental emergency is an uncontrolled or unexpected incident involving the actual or likely release of a polluting substance into the environment, for example, the accidental spill of a hazardous substance from a ship at sea or from a train on land. The information provided to NEEC is, for the most part, citizen reported. Based on the potential harm of the reported spills, the specific needs of the response are determined and implemented. These range from no intervention needed to a full containment and clean up is required.

Federal legislation requires that environmental emergencies be officially reported to responsible authorities under specific timeframes. Agreements and regulations among federal, provincial and territorial governments help provide a streamlined system and approach to notifying authorities when an environmental emergency happens. NEEC administer laws and regulations that organizations and individuals must comply with to protect the environment. For environmental emergencies, NEEC ensure all reasonable measures are taken to protect the environment as mandated by legislation including [Canadian Environmental Protection Act, 1999](#), [Fisheries Act](#), [Emergency Management Act](#), [Species at Risk Act](#), and the [Migratory Birds Convention Act, 1994](#). To reduce notification burden and duplication of effort, Notification Regulations allow the responsible party and the public to report environmental emergencies or environmental occurrences to the authorities in the province or territory where it occurred, who will in turn notify Environment and Climate Change Canada.

Methods

The National Aerial Surveillance Program (NASP) provides data on the number of spills observed annually as well as a spill counts and the corresponding estimated volumes for each spill. Spill volumes are estimated by multiplying the area of the slick by its varying thickness. An airborne maritime surveillance system (MSS6000) calculates the area of a slick (the film or layer of oil floating on water, specifically one that has leaked or been discharged from a ship) based on a polygon drawn manually by the surveillance officer around the oil observed on the remote sensed imagery of the ocean surface. Surveillance officers estimate the oil thickness by assessing the visual characteristics of the oil slick to determine the varying thicknesses in the slick and apply a formula to calculate the volume (see More information).

Data used from the National Environmental Emergencies Centre (NEEC) in this indicator has been selected from the database of reported incidents based on their categorization by the individual reporting the incident as having an impact of freshwater, saltwater, marine, or estuary. The database query was further refined to include of reported spills of hydrocarbons (see the list of reported hydrocarbons under more information).

More information

National Aerial Surveillance Program

There is a thickness appearance relationship of oil on the water that uses the visual characteristics of the oil to classify it into categories each with an associated thickness value. Spills are generally heterogeneous in terms of thickness. Surveillance officers determine the percentage of each oil category observed in the polygon. The volume for each oil category is calculated by the following formula:

Volume (oil category) = Total area covered in oil x Percentage of the total area covered by each category x Category Thickness Value

and

Total volume = Sum of the volumes for each oil category observed

Visual characteristics of oil are used to globally estimate volumes of thin films of oil on the ocean surface. The oil categories used in Canada are based on scientific studies that establish a direct relationship between slick thickness and visual characteristics that is valid for all oil types for films up to 3 microns (3 000 nanometres). For film thicknesses greater than 3 microns, the inherent color of the oil starts to dominate, and the thickness appearance relationship breaks down. In these cases, the oil film is likely many times greater than 3 microns but cannot be discerned from aerial surveillance. This is why, when dealing with thick oil, the volume estimations made by the program should be considered as conservative estimates. This practice has been adopted in Canada as the NASP's main mandate of monitoring for and enforcement of the pollution regulations. When a pollution case goes to court or a tribunal, NASP provides an estimated minimum quantity of oil observed on the surface.

National Environmental Emergencies Centre

The data range selected was April 1, 2018 to March 31, 2024 as that is longest time range available for NEEC data since the NEEC restructured its response model and implemented the National Environmental Emergencies Operation Centre (NEEOC) in 2018. The NEEOC is a framework modelled on the Incident Command System (ICS) to coordinate ECCC's response to environmental emergencies. The implementation of the NEEOC shifted the responsibility for managing environmental emergency responses from one single duty officer to a trained and skilled team. Importantly, the restructuring led to a more standardised and consistent data management strategy. The date/time used for incidents in this analysis are the time and date of notification and not the time/date of the incident.

To identify marine-based incidents, the NEEC data was filtered to extract "Salt water, marine or estuary" from the "Reported Impacts" field. This field was chosen as each incident notification has one recorded reported impact.

The list of oil-based substances¹³ was classified by a substance subject matter expert within the NEEC. The list of oil-type classified substances involved in NEEC marine environment incidents in this indicator is as follows:

- Asphalt
- Bilge water contaminated by petroleum products
- Bunker C
- Butane (E2)
- Castor oil
- Coal
- Coke
- Cooking grease
- Creosote
- Diesel (E2)
- Fuel oil, No. 4 (E2)
- Fuel oil, No. 6 (E2)
- Fuels, diesel (E2)
- Fuels, diesel, No. 2 (E2)
- Gasoline (E2)
- Heating oil (E2)
- Heavy oil (NOS)
- Hydraulic oil
- Hydrocarbon (NOS)
- Jet fuel
- Light oil (NOS)
- Liquefied natural gas (E2)
- Lubricant oil and mineral oil
- Mineral greases
- Natural gas
- Oil emulsion
- PCB contaminated oil
- Petroleum crude oil (E2)
- Propane (E2)
- Sludge of petroleum product
- Solvent (NOS)
- Styrene (E2)
- Tar

¹³ (E2) refers to [Schedule 1 substances subject to Environmental Emergency Regulations](#) made under the *Canadian Environmental Protection Act, 1999*. (NOS) means "Not Otherwise Specified" and describes dangerous goods that do not have a specific entry by name in [Schedule 1](#) of the *Transport of Dangerous Goods Regulations*.

- Transformer oil
- Unleaded gasoline (E2)
- Used oil
- Vegetable oil (NOS)
- Vehicle Fluids
- Xylenes (NOS)

The indicator presents the spills' volumes in litres (L). The substance volume data was standardised to a volume in litres unless the quantity was unknown in which case it is labeled "Unknown Quantity". For quantities originally reported as weights instead of volumes, [The Calculator Site](#) was used to convert units to litres (L). For spills with multiple substances reported, each substance was converted into litres and then totaled for that specific reported incident. When specific hydrocarbons are mentioned, for example: crude oil or gasoline, their specific densities have been used to facilitate unit conversion.

- Coal: 1.35 kg/L
- Coke: 1.75 kg/L
- Diesel: 0.85 kg/L
- Fuel oil No. 4: 0.904 kg/L
- Gasoline: 0.75 kg/L
- Heavy oil: 1 kg/L
- Hydrocarbon: 0.9 kg/L
- Jet fuel: 0.8025 kg/L
- Petroleum crude oil: 0.9 kg/L
- Propane: 0.49 kg/L
- Hydraulic oil: 0.86 kg/L

Recent changes

This version of the indicator adds data on oil spills to the marine environment from Environment and Climate Change Canada's National Environmental Emergencies Centre reported under the *Canadian Environmental Protection Act 1999* Schedule 1: List of Toxic Substances.

Caveats and limitations

The indicator provides the volume detected by the National Aerial Surveillance Program (NASP). The data are collected for enforcement and deterrence purposes and are focused on commercial vessels. As a result, not all marine oil spills are accounted for in this indicator. In addition, for the year 2021 and beyond, NASP reports only the spills exceeding a volume of 10 litres. The volume of spills detected was not corrected for surveillance effort, as there is no way to differentiate the chance of detecting a large or small spill in a given hour of surveillance. Major accidents can cause large variations in the volume of spills each year, making it difficult to detect annual trends.

The indicator also includes reported incidents of marine oil spills reported to the National Environmental Emergencies Centre. While NASP sorties and the reported incidents can potentially capture the same incidents, marine oil spills in Canadian waters, data presented in this indicator do not equate the methods used or link the reported incidents.

More information

National Aerial Surveillance Program

The volume of spills identified by NASP corresponds to the estimated volume at the time the spill is detected by NASP and does not necessarily capture the total volume of oil released to the marine environment during a spill event. In addition, considering the difficulty to accurately estimate the thickness of the slicks, estimated volumes provided are minimum quantities.

A number of additional factors may impact the volume estimate, including:

- Oil type, including whether it is persistent or non-persistent, and the speed at which it naturally disperses
- Environmental conditions such as wind speed, wave height, and visibility
- Delay between the oil release and the observation

- Observer experience

The volume of spills detected was not corrected for surveillance effort, as there is no way to differentiate the chance of detecting a large or small spill in a given hour of surveillance. Major accidents can cause large variations in the volume of spills each year, making it difficult to detect annual trends.

While it does not impact data presented in this indicator, in April 2024, the NASP switched to the Bonn Agreement Oil Appearance Code system for estimating the volume of oil spills.

Volume min (oil crude) = (Total area covered in oil) × (Percentage of the total area covered by each code) × (Minimum code thickness value)

Volume max (oil code) = (Total area covered in oil) × (Percentage of the total area covered by each code) × (Maximum code thickness value)

and

Total volume minimum = Sum of volume min for each oil code observed

Total volume maximum = Sum of volume max for each oil code observed

The Bonn Agreement Oil Appearance Code (BAOAC) is a vital tool for estimating oil volumes during marine pollution incidents by linking the visual appearance of oil on water to its approximate thickness and corresponding volume per square kilometer. The code spans five codes, from thin sheens to continuous areas of true colour oil, with minimum and maximum volume estimates for each.

For instance, the thinnest category, sheen, represents oil films less than 0.3 micrometer (µm) thick, with an estimated volume range of 0.04–0.3 cubic meters per square kilometer. At the other extreme, Continuous True Oil signifies layers thicker than 200 µm, with volumes exceeding 200 cubic meters per square kilometer.

The minimum estimated volume is recommended for use in enforcement and for public dissemination. The maximum estimated volume provides additional context for the possible scale of response required. By standardizing volume assessments, the BAOAC supports efficient response strategies and international collaboration under the Bonn Agreement.

National Environmental Emergencies Centre

The accuracy of the information about the incidents of marine oil spills is dependent on the reporter. The agreements and impacts can be edited by partners, and not all may be accounted for.

The type of notification has implications for the analysis of the data. The NEEC receives 3 types of notifications with impacts on analysing NEEC data:

- I. **One-Window Agencies**
Environment and Climate Change Canada (ECCC) has agreements with several provinces and territories under the *Canadian Environmental Protection Act* (CEPA) and the *Fisheries Act*. These agreements allow designated agencies to receive notifications on behalf of ECCC, reducing duplication where laws require reporting to multiple jurisdictions. However, differences in how these agencies report and categorize incidents can create inconsistencies in the reporting of incidents.
- II. **Other Authorities**
Notifications also come directly from other agencies like the Canadian Coast Guard (CCG) and Transport Canada which inform the NEEC of incidents within their jurisdiction. Since these organizations use varying reporting processes, there can be intra and inter agency variability in reporting.
- III. **Direct Notifications**
In Atlantic Canada and Quebec, ECCC directly receives reports of land-based spills. The regulated community and the public report incidents to the Notifications desk, which coordinates responses with federal, provincial, and territorial partners. While direct reporting improves clarity, regional variations in reporting standards may still affect the comparability of data.

Substances and Volumes

A large portion of notifications involves hydrocarbons labeled as "Not Otherwise Specified." This lack of clarity on specific substances involved in incidents is compounded with notifications where quantities are unknown, introducing significant uncertainty into statistics and complicating efforts to analyze environmental risk. In addition, volumes stored in the NEEC database may represent estimated, measured, or potential releases. This broad categorization reduces data specificity.

Resources and attention are not always focused on the substance and volume of release. Data is primarily logged to support response efforts and may not always accurately reflect actual environmental releases.

Activations and NEEC Involvement

Variability in activation criteria affects NEEC's involvement over time and introduces inconsistencies in data collection. Activations, which dictate NEEC's engagement, are triggered based on evolving criteria. Once activated, NEEC Duty Officers (DOs) gather additional intelligence on incidents, including substance types and volumes. Whereas, notifications that are not activated do not receive the same ongoing attention, as such non-activated notification incident data is largely information received in the initial notification.

Resources

References

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- WSP Canada Inc. (2014) [Risk Assessment for Marine Spills in Canadian Waters Phase 1, Oil Spills South of the 60th Parallel](#). (PDF; 21.7 MB). Retrieved on January 20, 2025.

Related information

[Environmental Response Systems](#)

[How Canada Responds to Ship-Source Oil Spills](#)

[International Convention for the Prevention of Pollution from Ships \(MARPOL\)](#)

[International Convention on Oil Pollution Preparedness, Response and Cooperation \(OPRC\)](#)

[National Aerial Surveillance Program](#)

[National Environmental Emergencies](#)

[National Oil Spill Preparedness and Response Regime](#)

[Pollution emergencies](#)

Annex A. Data tables for the figures presented in this document

Table A.1. Data for Figure 1. Number of marine oil spills detected by the National Aerial Surveillance Program, Canada, 2010 to 2024

Year	Number of oil spills (count)
2010	109
2011	84
2012	135
2013	97
2014	214
2015	322
2016	380
2017	246
2018	458
2019	629
2020	631
2021	59
2022	27
2023	29
2024	19

Note: For the years 2021 and on, only spills over 10 litres are reported. Year refers to fiscal year, which runs from April 1 to March 31. For example, the year 2024 therefore refers to April 1, 2023 to March 31, 2024.

Source: Transport Canada (2024) Marine Safety and Security Directorate.

Table A.2. Data for Figure 2. Number of marine oil spills by volume reported to the National Environmental Emergencies Centre, Canada, 2019 to 2024

Year	Unknown quantity	Under 10 litres	Between 10 litres and 100 litres	Greater than 100 litres
2019	839	200	144	111
2020	744	271	138	80
2021	723	242	116	91
2022	644	212	155	93
2023	595	215	147	133
2024	575	212	115	107

Note: Year refers to fiscal year, which runs from April 1 to March 31. For example, the year 2024 therefore refers to April 1, 2023 to March 31, 2024. The volume of spills reported to the National Environmental Emergencies Centre at Environment and Climate Change Canada are based on the subjective estimates made by the individual person or entity.

Source: Environment and Climate Change Canada (2024) National Environmental Emergencies Centre.

Table A.3. Data for Figure 3. Category of marine oil-spill incident as reported to the National Environmental Emergencies Centre, Canada, 2024

Category	Sub-category	Number of spills (count)
Water transportation	Total	412
Water transportation	Pleasure craft	125
Water transportation	Marine vessel (NOS)	101
Water transportation	Fishing vessel	95
Water transportation	Other water transportation	27
Water transportation	Port and harbour operations	24
Water transportation	Barge	17
Water transportation	Ferry	15
Water transportation	Bulk carrier	5
Water transportation	Cargo/Container	1
Water transportation	Marine cargo handling	1
Water transportation	Marine Tanker	1
Unknown source	n/a	321
Transportation and warehousing	n/a	112
Construction	n/a	36
Industrial facility	n/a	24
Residential/Private	n/a	20
Electric power generation, transmission and distribution	n/a	18
Other facilities/services	n/a	18
Manufacturing	n/a	13
Retail trade	n/a	10
Agriculture, forestry, fishing and hunting	n/a	9
Mining and quarrying (except oil and gas)	n/a	5
Oil and gas extraction	n/a	3
Water, sewage and other systems	n/a	3
Waste management and remediation services	n/a	2
Arts, entertainment and recreation	n/a	1

Note: n/a = not applicable. Year refers to fiscal year, which runs from April 1 to March 31. For example, the year 2024 therefore refers to April 1, 2023 to March 31, 2024. The volume of spills reported to the National Environmental Emergencies Centre at Environment and Climate Change Canada are based on the subjective estimates made by the individual person or entity. NOS refers to marine vessels transporting "Not Otherwise Specified" dangerous goods.

Source: Environment and Climate Change Canada (2024) National Environmental Emergencies Centre.

Table A.4. Data for Figure 4. Location of marine oil spills of over 10 litres detected by the National Aerial Surveillance Program, Canada, 2024

Location	Volume of spills detected (litres)	Source
Atlantic	29.1	Unknown
Atlantic	23.8	Unknown
Atlantic	19.6	Unknown
Atlantic	16.8	Suspected
Atlantic	15.0	Unknown
Atlantic	14.4	Suspected
Atlantic	10.8	Unknown
Atlantic	10.6	Unknown
Great Lakes	88.8	Unknown
Pacific	245.0	Unknown
Pacific	80.9	Unknown
Pacific	48.0	Unknown
Pacific	32.1	Suspected
Pacific	21.7	Suspected
Pacific	19.8	Unknown
Pacific	18.4	Unknown
Pacific	17.7	Unknown
Pacific	16.1	Unknown
Pacific	10.8	Unknown

Note: The source of an oil spill is considered "suspected" when the spill can be linked or suspected of coming from a vessel at the time of observation. If not, the source is defined as unknown.

Source: Transport Canada (2024) Marine Safety and Security Directorate.

Table A.5. Data for Figure 5. Volume of marine oil spills detected offshore and in coastal areas by the National Aerial Surveillance Program, Canada, 2010 to 2024

Year	Volume of spills detected in coastal areas (litres)	Volume of spills detected offshore (litres)	Total volume of spills detected (litres)
2010	5 396	2 714	8 110
2011	1 001	8 294	9 295
2012	597	417	1 014
2013	6 172	1 642	7 814
2014	3 857	596	4 453
2015	3 146	27	3 173
2016	7 731	211	7 942
2017	2 775	103	2 878
2018	3 120	676	3 796
2019	3 029	1 505	4 534
2020	3 617	53	3 670
2021	16 723	928	17 651
2022	2 913	1 826	4 739
2023	1 332	61	1 393
2024	708	31	739

Note: For the years 2021 and on, only spills over 10 litres are reported. Year refers to fiscal year, which runs from April 1 to March 31. For example, the year 2024 therefore refers to April 1, 2023 to March 31, 2024.

Source: Transport Canada (2024) Marine Safety and Security Directorate.

Additional information can be obtained at:

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