

A study on recreational boating in Atlantic Canada as a potential vector for the introduction and spread of non-native biofouling species

Cynthia H. McKenzie (1), Nathalie Simard (2), Terri Wells (1), Jennifer Martin (3), Andrea Locke (4), Renee Bernier(4)

(1) Fisheries and Oceans Canada, Northwest Atlantic Fisheries Centre, St. John's, NL, Canada; (2) Fisheries and Oceans Canada, Institute Maurice-Lamontagne, Mont Joli, QC, Canada; (3) Fisheries and Oceans Canada, St. Andrews Biological Station, St. Andrews, NB, Canada; (4) Fisheries and Oceans Canada, Gulf Fisheries Centre, Moncton, NB, Canada. Presenter contact details: cynthia.mckenzie@dfo-mpo.gc.ca Phone (709) 772 6984

Summary

Information on the role of recreational boating in the introduction and spread of non-native biofouling species was a critical knowledge gap identified during a recent Canadian national risk assessment on ship-mediated introductions of non-native species. To provide information on this vector, a study was conducted by Fisheries and Oceans Canada (DFO) in Atlantic coastal waters to provide information on recreational boat usage, maintenance and movement. In addition to surveys of boaters, selected high risk harbours were surveyed using a combination of underwater video, SCUBA divers and settling plates to determine the biofouling and presence of non-native species on manmade structures and boat hulls. This information is then augmented by the (DFO) biofouling monitoring program data in Atlantic Canada to provide a broader view of the introduction and spread of invasive biofouling organisms in the region over time. Information obtained from this study will be used to determine best practices for recreational boat management and to aid in the prevention of the spread of biofouling non-native species on man-made harbour infrastructures by recreational boating vessels.

Introduction

Recreational boating as a potential vector for the introduction and spread of non-native marine biofouling species has been an increasing concern in Canada (Darbyson et al. 2009). Two studies, one conducted on the Pacific coast (Clarke Murray et al. 2011) and the other in Nova Scotia on the Atlantic Coast (Lacoursiere-Roussel et al. 2012) highlighted the risk of this unregulated vector. A national risk assessment for introduction of non-indigenous species to Canada through international and domestic shipping vectors was conducted (2011-2014). The focus of the national risk assessment was ballast water, however during the course of the investigation hull biofouling was highlighted as a critical knowledge gap in the risk of introduction and spread of invasive marine organisms (DFO 2014). A national aquatic invasive species risk assessment on recreational boating was requested by Federal and Provincial governments. An Atlantic Canada recreational boating study was conducted in Quebec, Newfoundland, New Brunswick and Prince Edward Island (2011-2014) to determine vessel usage, maintenance and movement. The Canadian government initiated a monitoring program in 2006 to detect invasive tunicates at high risk harbours and aquaculture sites. Information from this monitoring program will be used to compare AIS biofouling at harbours with hull surveys and manager and boater questionnaires similar to the comparison by Clarke Murray et al. (2014) on the Pacific coast.

Materials and Methods

Two separate surveys were modified from questionnaires used in a recreational boating study (Lacoursiere-Roussel et al. 2012) conducted in Nova Scotia, Canada. The surveys were completed through direct contact with participants, usually on site. The harbour manager's survey included general questions related to activity at ports, or marinas. The boater's survey was much more specific, with

questions geared toward the individual boater. The intent of the boater's survey was to document vessel maintenance and movement.

Wharf and hull inspections were performed at active ports where boater's surveys were completed. The inspection was performed using a Micro Video™ color underwater camera with built in LED illumination. The camera was attached to a telescopic rod which allowed field staff to submerge the camera from the surface. The camera was directed along a vertical transect for permanent structures (such as wharf pilings), and along a horizontal transect for floating structures (floating docks and boats). In Quebec and Newfoundland SCUBA dive surveys and transects were conducted along boat hulls and wharves (Sargent et al.2013) to determine presence and cover by biofouling organisms of concern.

Biofouling collector plates (3 plates PVC 10 cm x 10cm) were suspended 1 m below the surface at docks and wharves as part of the DFO monitoring program. Plates were collected, photographed and microscopically examined for the presence of invasive tunicates including percent cover (Martin et al. 2011).

Results and Discussion

The study has resulted in over 700 manager and boater surveys completed and over 300 videos and SCUBA surveys of vessels and high risk harbours. Monitoring data collected since 2006 in the study area will assist in the analysis of the spread of AIS in the region. Information obtained from the surveys highlight the changing practices in Atlantic Canada regarding the use of antifouling paint and the removal of vessels from the water during the winter. Traditionally vessels and docks were removed, particularly in Newfoundland, due to ice cover during the winter. Warmer winters have led to increased time in the water for both vessels and floating docks and this may have a significant effect on the spread of non-indigenous biofouling species.

The data collected from the current investigation and the previous recreational boating studies will be used to conduct the national risk assessment and recommend best practices for the prevention of introduction and spread of marine non-indigenous biofouling species through recreational boating.

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