# Title: Quantification of previous ports visiting number to help regulation of Invasive Species through Ballast Water by ship types

Problem Statement

Invasive Species (IS) are alien species whose introduction might cause economic or environmental harm or hurts on human health. (Executive Order 13112) IS is also said to be the second biodiversity threat after habitat loss by UNEP.
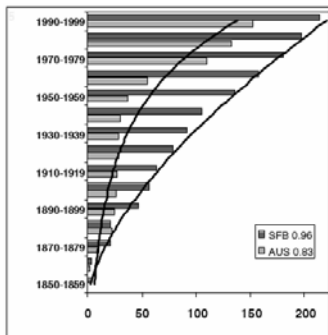
<Graph1> Cumulative number of invasive species in San Francisco Bay (SFB) and Australia (AUS) (Source: CSIRO Australia)

Graph 1 shows how rapidly marine invasion has increased in the 90's. And graph 2 also suggests the positive relationships between IS occurrence and marine transportation volume increase. Actually ballast water (BW) is said to be one of the main reasons to explain IS to new marine environment. This means IS problem will be more serious to society welfare loss when we consider the increased future world marine trade.
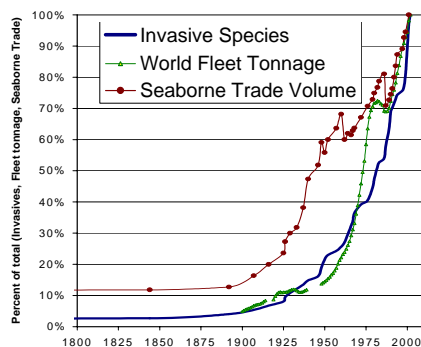
<Graph 2> Increasing world trade, increasing seaborne trade and increasing IS (source: J.J. Corbett, J.J. Winebrake and Firestone, working paper)

Policy Research objectives

One of the main characteristics of the current IS through BW research (ex, GEF/UNDP/IMO Global Ballast Water Management Program -GloBallast) is risk assessment.

These researches are focusing on the environmental compatibility between the destination port and the first previous port and invasibility based on the historical record. However, discharged water from the ballast tank does not contain only the previous port's water and organisms. The transpired water is the mixture of many prior ports before the BW discharged port. Consequently, it is important to integrate the information of many prior ports and biological information on the native species in the process of decision-making.

Tools and techniques

First, Coast Guard data on the ships that used American ports during the given period and its 5 previous ports will be analyzed to trace back each ship's journey for 2 years as accurately as possible. Next, the re-made data will be analyzed based on the ship types and destination ports. With this information, decision maker can get the insight whether they need to regulate based on the ship-types or based on the environmental compatibility between ports.

Proposed research and current results
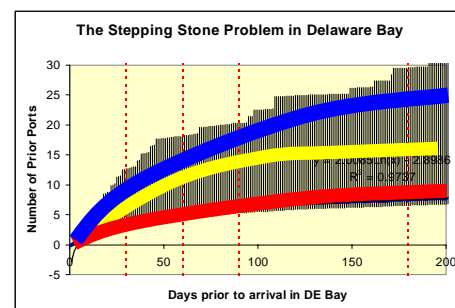
<Graph 3> average number of previous ports before using Delaware Bay ports by ship-type (distinguished by color)

Currently, I am trying to make a data base which shows you how many previous ports on average each ship had before using the Delaware Bay ports. 10 ship types are analyzed and displayed in graph 3. This suggests the policy should not only be based on environmental compatibility but also on the ship-types. However, more quantitative research is required in order to be able to continue he analysis.

For further information:

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