A Primer on Ballast Water and Aquatic Invasive Species Introductions

A major pathway for Aquatic Invasive Species (AIS) introduction is ballast water discharge (BWD) from vessels operating in U.S. waters or entering U.S. waters from foreign waters. Ballast water (BW) means water taken on by a vessel to increase the water draft, change the trim, regulate the stability, or maintain stress loads within acceptable vessel operational limits. BW is taken onboard through sea chests using ballast pumps, by flooding, or by gravity feed. Ballast capacities of ships range from hundreds to hundreds of thousands of metric tons (cubic meters), and rates of intake and discharge range from hundreds to tens of thousands of metric tons per hour. Ballasting reduces stress on the hull of the vessel, increases stability, aids propulsion, aids maneuverability, and compensates for weight loss from fuel and water consumption or cargo load changes. In port, vessels take on BW to increase vessel water draft, therefore decreasing the air draft to allow vessels to fit under bridges or cranes. Vessels also continuously deballast and reballast during cargo loading and unloading to maintain stability and structural integrity. Failure to properly manage BW to maintain trim, stability, and stresses can have catastrophic results. Ships have broken in two and/or capsized at sea and even at dock when ballasting has been conducted improperly for the operational circumstances.

Introductions of AIS through BWD are a global concern. In September 1995, the International Maritime Organization (IMO) identified the AIS threat as a major issue confronting the international maritime community. In 1997, the IMO adopted voluntary guidelines, "International Guidelines for Preventing the Introduction of Unwanted Aquatic Organisms and Pathogens from Ships' Ballast Water and Sediment Discharges." In February 2004, the IMO adopted the "International Convention for the Control and Management of Ships' Ballast Water and Sediments" (Convention), which establishes BW management (BWM) procedures and includes an international standard for BWD. The Convention does not enter into force until one year after ratification by 30 countries representing not less than 35

percent of the gross tonnage of the world's merchant shipping. As of October 2009, 18 countries, representing 15.36% of the gross tonnage, had signed the Convention. In the U.S., the U.S. Coast Guard (USCG) and the EPA are authorized to regulate BW discharges by vessels, under the Aquatic Nuisance Species Prevention and Control Act and the Clean Water Act, respectively. The USCG began regulating BW in the Great Lakes in 1993, and in the rest of the nation in 1998. Currently ships arriving to U.S. ports or places from outside the U.S. EEZ are required to conduct BWM to reduce the risk of introducing AIS. All ships arriving to U.S. ports or places are required to submit reports on amounts of BW discharged and methods of management. In August 2009, the USCG proposed a regulation that would establish a BW discharge standard and a procedure for approval of BW treatment systems.

While the likelihood is low that any given individual of a particular species might survive all of the challenges between uptake of BW and subsequent discharge and establishment in a new ecosystem, the likelihood that a vessel will release live organisms from ballast water is high, especially given the large volumes of ballast water discharged annually in U.S. ports. Domestically, approximately 200 million metric tons of BW are discharged into U.S. waters annually. Of this approximately 30% is of foreign origin (outside the U.S. EEZ), and 70% is from U.S. waters. More locally, approximately 4,000 – 5,000 vessels arrive to Chesapeake Bay each year, and discharge between 2 million and 5 million metric tons of foreign BW.