

Columbia River Basin AIS Team

Moss Ball Incident Action Report

Recommendations and Key Findings



Prepared by the Pacific States
Marine Fisheries Commission,
Invasive Species Action Network
and the U.S. Fish and Wildlife
Service.
7-27-2021



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Executive Summary

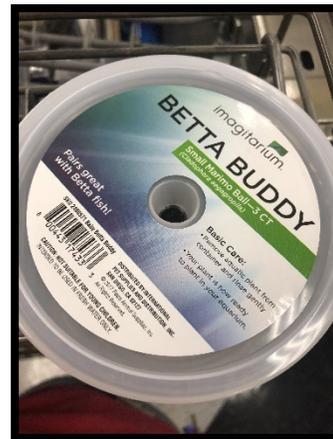
A national invasive dreissenid mussel incident associated with moss balls occurred in early March 2021 that brought the pet/aquaria industry as a pathway of dreissenid and other invasive species introduction into the spotlight. The Columbia River Basin Interagency Invasive Species Response Plan (CRB Plan) entities were able to make use of processes and planning from previous rapid response trainings to navigate this incident. While a swift response was taken to address the sale and import of moss balls by a full suite of federal, state, provincial, and partner entities across North America and within the Columbia River Basin, many regulatory and management issues were identified in this process that could improve future response.

Scenario

In February 2021, a Petco employee in Seattle, Washington reported via the US Geological Survey (USGS) Non-Indigenous Aquatic Species (NAS) Database (<https://nas.er.usgs.gov/>) reporting system a suspicious material/possible aquatic invasive species in moss ball products found at the store. The USGS verified the report and confirmed that zebra mussels (*Dreissena polymorpha*) were associated with the product. This confirmed finding was announced via the USGS national alert system. The Washington Department of Fish and Wildlife (WDFW) and Washington Invasive Species Council (WISC) immediately activated a response team using incident command. At the request of WDFW, the CRB Plan was activated with a meeting of the standing members of the CRB Multi-Agency Coordination (MAC) Group (see Appendix A) to serve in a coordination capacity, to help share information and provide consistency in response. The CRB MAC Group invited the participation of other Pacific region participants including Wyoming Game and Fish, California Department of Fish and Wildlife, and California Department of Food and Agriculture.



Imagitarium “Betta Buddy” brand Marimo moss ball products were initially identified as the primary contaminated product. The product distributor to the Seattle Petco was traced back to a distributor in California. The product, originating from this distributor, is harvested and sourced directly from the Ukraine where dreissenid mussels (both zebra and quagga mussels) are native. Since the initial confirmed report, 46 states and 9 Canadian provinces have identified multiple contaminated products in national chain pet stores, Petco and Pet Smart, and independent pet stores. See Appendix B for Petco and PetSmart products that have been withdrawn and which ones are still for sale as they are either not from contaminated sources, and not the same species of algae involved with this incident.



Marimo moss ball products (a green algae, *Aegagropila linnaei* that is formed into a ball) have been a popular aquarium item for many years. Following the initial report of Marimo moss balls contaminated with zebra mussels, it was not clear whether this product had been contaminated for a long timeframe or if the new discovery points to a shorter window of possible distribution of contaminated products. The U.S. Fish and Wildlife Service (USFWS) has stated that 90% the moss balls are being imported through New York (JFK), Florida (Miami) and California (LAX), but prior to the response, they are also coming through New Jersey. The USFWS has also stated that prior to March of 2021 approximately 100,000 Marimo moss balls were being imported and distributed every two weeks.

Timeline

Columbia River Basin – Marimo algae “moss balls” contaminated with zebra mussels – incident response timeline starting March 2, 2021 through May 6, 2021. All times are Pacific.

(03-02-2021; ~ 12:30 PM) – USGS NAS email (auto-generated national alert – see Appendix C) sent stating *Dreissena polymorpha* (zebra mussel) was found in a new State, County, Drainage in King County (Washington); “presume the introduction has failed” – zebra mussels on Marimo moss ball (hitchhiker on pet store plants); <https://nas.er.usgs.gov/queries/specimenviewer.aspx?SpecimenID=1656916>

- The map showing the location of the collection showed a location of a store in Crown Hill, north of Seattle, WA in Puget Sound (HUC8);
- Photos taken of contaminated moss balls on February 9, 2021; the NAS database report was filed on February 25, 2021; The NAS staff followed up with the person who filed the online report for photos for verification on March 2, 2021; the report noted contaminated Marimo moss ball shipments were observed for approximately 2 months (potentially December 2020, January 2021 and February 2021);
- Note: this automated email was received by many state AIS coordinators, USFWS staff and others who had these auto alerts set for zebra mussels.

(03-02-2021; 12:30 – 3:30 PM) – WDFW/WISC Actions:

- 12:32 PM: WDFW AIS Prevention and Enforcement and WISC began investigation and determined location was a Seattle Petco store and that the distributor to that store was in California.
- 12:35 PM: WDFW began receiving calls from other states on the incident and coordinating on response actions.
- 3:00 PM: WDFW Enforcement arrived at Seattle Petco, verified mussels in Imaginarium brand Marimo moss balls for sale and confiscated 26 containers. WDFW requested that CRB Plan be activated.
- 5:00 PM: WDFW AIS Prevention staff received confiscated moss balls and confirmed 12 zebra mussel shells present. Photos of specimens were then sent to independent experts on contract with WDFW for external confirmation. Water samples were collected for eDNA analysis through WDFW genetics lab.

Multi-agency coordination regarding the Seattle, WA detection was initiated; coordination across agencies in the Columbia River Basin including WDFW, WISC, Pacific States Marine Fisheries Commission (PSMFC), Columbia River Inter-tribal Fish Commission (CRITFI), Oregon Department of Fish and Wildlife (ODFW), Oregon State Marine Board (OSMB), Idaho Department of Agriculture (IDA), USFWS, U.S. Department of Agriculture –Animal Plant Health Inspection Service (USDA-APHIS), others (See Appendix A).

(03-03-2021; 6:00 AM) – USFWS Fish and Aquatic Conservation (FAC) Program - HQ Don MacLean sent USGS alert with additional photos through State AIS Coordinators and State AIS contact lists that contaminated moss balls may be distributed across the United States. The Aquatic Nuisance Species Task Force (ANSTF) was notified.

(03-03-2021; 7:58 AM - 8:45 AM)

- 8:00 AM An email about the USGS report goes out nationally via the ANS Task Force’s Western Regional Panel on ANS list serve (By Elizabeth Brown NAISMA).
- 8:30 AM: WDFW contacts California Department of Fish and Wildlife (CDFW) and advised of the situation, and to request follow up by CDFW enforcement to investigate/gather additional information on California moss ball distributor. CDFW Enforcement staff responded, inspected the facility, ordered shipments stopped, collected mussel specimens and water, and shipped the specimens to CDFW’s Bodega Marine Laboratory for analysis.
- 8:45 AM: WDFW contacted Petco regional management and briefed them on the situation. They advised us that they were aware of situation and an emergency corporate level meeting would occur later that morning. Petco was proactive on the situation and requested WDFW continue to advise them on response.

(03-03-2021; 9:52 AM) – Oregon Department of Fish and Wildlife (ODFW) received email about presence of zebra mussels in Marimo moss balls.

(03-03-2021; 10:33 AM) – ODFW Inspected Petco and PetSmart in Salem, OR area. ANS Task Force issues national alert on situation.

(03-03-2021; 10:45 AM) – Alerted by Montana, Idaho and Oregon that zebra mussel-infested moss balls are also at Petco stores in their states.

(03-03-2021; 11:08 AM) – Dr. Catherine de Rivera (Portland State University) forwarded Don MacLean’s message along with an update from Capt. Eric Anderson to the Oregon Invasive Species Council.

(03-03-2021 11:35 AM) – Petco advised WDFW they were pulling and quarantining moss balls nationwide and that they had contacted the distributor and are stopping/suspending shipments of all moss balls at this time.

(03-03-2021; 12:15 PM) – ODFW confirmed identification of zebra mussels in Marimo moss ball product. Additional aquatic species were associated with the moss ball product, but species identification was not confirmed at the time.

(03-03-2021; 1:00 PM) – Montana Fish, Wildlife & Parks (MFWP) confirms identification of zebra mussels in Marimo moss ball products at pet stores in Missoula, Great Falls, Butte, Billings and Kalispell.

(03-03-2021; 1:30 PM) – **CRB MAC Group** – Coordination Call #1

WDFW provided a detailed timeline of response since 03/02/2021; Coordination was occurring with California partners since the distributor from the product in Seattle, WA was based in California. Petco Regional Manager was alerted it was a regional issue, but as of 03/03/2021 this was a nationwide incident (finds in Montana, Oregon, Idaho, New York and Iowa). Petco and PetSmart stores at national level aware of situation and pulling product nationwide and stopping shipments from the distributor; WDFW also working with Petco Regional Territory Manager to help navigate distribution of product to Canada, and to determine extent of distribution of this product; USFWS Office of Law Enforcement working with CA Dept. of Fish and Wildlife at port of entry to contact distributor(s)/importer(s).

(03-03-2021; 3:00 PM) – WDFW was contacted by CDFW Enforcement and advised of the inspection/contact with the distributor. The distributor was aware of the situation from Petco and took immediately steps to stop all incoming shipments and place a hold/quarantine on the moss balls that they had on hand. Have been advised that the distributor has been shipping out approximately 100,000 moss balls every two weeks.

(03-03-2021; 3:30 PM) – WDFW met with Petco corporate response team to discuss findings and actions. Informed that PetSmart was also receiving the Marimo moss balls from this distributor and was also marketing them nationally.

(03-03-2021; 4:00 PM) – WDFW began engaging with PetSmart on situation.

(03-03-2021; 4:11 PM) – Update from Dr. Wesley Daniel at U.S. Geological Survey, that zebra mussels have been identified on moss ball products found in Montana (Missoula, Kalispell, Bozeman, Great Falls, Butte, Billings), and in pet stores in WA, OR, and Utah.

(03-03-2021; 5:04 PM) – ODFW issued a news release alerting pet and aquarium stores and consumers about aquarium products contaminated with zebra mussels and provided guidance to consumers on what to do. (https://www.dfw.state.or.us/news/2021/03_Mar/030321.asp)

(03-04-2021; 8:00 AM) – WDFW is contacted by USFWS and advised to conducted a joint investigation of the distributor with CDFW Enforcement and CA Dept. of Agriculture. Appears that the moss balls are wild harvested in Ukraine and that there are two additional distributors in Florida.

(03-04-2021; 8:11 AM) – Nicholas Zurfluh, IDA, clarified concerns via online and e-commerce / contacted social media groups focused on aquatic plant sources for aquaria.

(03-04-2021; 8:20 AM) – Dr. Samuel Chan (Oregon State University & Oregon Sea Grant) sent email to the Oregon Invasive Species Council (OISC) alerting that moss balls purchased/ordered through Amazon through aquacarts.com contained what looked like zebra mussels. The moss balls were sold as “Marimo moss balls” and concern was raised as to who was working with Amazon in addition to other distributors including brick and mortar stores and online retailers.

(03-04-2021; 8:30 AM) – CDFW reports that federal agencies have issued a “hold order” based upon the US Tariff code on this product and will be stopping all shipments into the US.

(03-04-2021; 9:00 AM) – **CRB MAC Group** – Coordination Call #2

Updates were shared by state partners, provincial Partners in British Columbia, and from the USFWS (including Office of Law Enforcement (OLE)) and the ANSTF. Outreach including decontamination protocols were discussed. Clarification was provided about what products had been found with zebra mussel contamination so far. At a national level, the USFWS began working with tariff codes to hold shipments in quarantine. Additional distributors identified.

(03-04-2021; 10:00 AM) – WDFW met with PetSmart and they were pulling the moss balls from their shelves nationwide and stopping sales and began working with us on joint decontamination and disposal protocols.

(03-04-2021; 10:21 AM) – Zebra mussels were detected on “Betta Buddy” Marimo Ball products at a Petco store in Idaho Falls, Idaho. This information was shared through email contacts and shared from the State AIS Coordinator in Idaho. This expanded the products found with zebra mussel contamination.

(03-04-2021; 11:26 AM) – MFWP issued a news release describing the situation, what actions MFWP is taking, what consumers should do, and how to contact the Montana Aquatic Invasive Species hotline (<https://fwp.mt.gov/homepage/news/2021/march/0304-invasive-mussels-moss-balls>).

(03-04-2021; 12:22 PM) – Martina Beck, British Columbia Ministry of Environment and Climate Change Strategy, provided an update that staff had contacted PetSmart headquarters in Canada and were working to obtain supplier information for PetSmart locations in British Columbia, Alberta, Saskatchewan, and Manitoba. PetSmart headquarters in Canada has received direction from the US head veterinarian to stop selling moss balls until they determine next steps. They began the process of getting the messaging out to all their stores to pull them from the shelves.

(03-04-2021; 1:27 PM) – Idaho Department of Agriculture issued a news release and photos about invasive zebra mussels being detected in aquarium moss ball products. Staff were working with stores in the state to remove product from stores for disposal. Guidance was provided to aquarium owners on methods to dispose of contaminated material.

(03-04-2021; 1:52 PM) – Oregon Public Broadcasting, Bradley W. Parks, wrote an online news article summarizing the issue and ongoing work by OR and WA wildlife agencies. The article encourages anyone who find evidence of zebra mussels like shell fragments on moss ball products should and report findings to ODFW. <https://www.opb.org/article/2021/03/04/zebra-mussels-marimo-moss-balls-oregon/>

(03-04-2021; 2:00 PM) - WDFW, WISC, Petco and PetSmart put out a joint press release on recommended decontamination and disposal protocols.
<https://invasivespecies.wa.gov/2021/03/04/state-asks-public-to-inspect-aquarium-moss-and-prevent-movement-of-invasive-mussels/> and <https://wdfw.wa.gov/news/state-asks-public-inspect-aquarium-moss-and-prevent-movement-invasive-mussels>.

(03-04-2021; 2:43 PM) – Western Invasives Network sent an alert on the issue including a brochure with supplemental guidance for “end-user” hobbyists, caretakers, owners of fish tanks, aquariums, and ponds, as well as K-12 teachers who may have classroom aquariums. Links to ODFW and MFWP press releases, and an Oregon Public Broadcast online article.

(03-05-2021; 1:00 PM) – WDFW held a live media briefing on March 5, 2021 (1:00pm PST) on the zebra mussel detections. View the media briefing here: <https://www.tvw.org/watch/?eventID=2021031221>

(03-05-2021; 3:00 PM) – **CRB MAC Group** – Coordination Call #3
Updates were shared by state partners, provincial partners in British Columbia, and from USFWS and from the ANSTF. Outreach including decontamination protocols was discussed. Clarification was provided about what products had been found with zebra mussel contamination (so far Mini Marimo Moss Balls SKU # 5292944 and Marimo Moss Ball SKU # 5164031).

(03/05/2021; 3:36 PM) – Updated decontamination instructions from the USFWS were compiled and sent through the ANSTF member lists and to Regional Panels (also forwarded to Western Regional Panel on ANS); it was communicated that protocols will be updated as new information becomes available.

(03/05/2021); Petco issued a recall of moss ball products
(https://www.Petco.com/content/Petco/PetcoStore/en_US/pet-services/help/recalls.html#marimo-moss-ball-recall) – the recall was nationwide following information provided by USFWS-FAC-HQ.

(03/05/2021; 4:00 PM); OISC hold special meeting on the ongoing incident. The purpose of the meeting was to hold an informal call to share information about the current invasive zebra mussel threat from aquarium moss balls, including what kind of outreach was being provided regarding disinfection and disposal for consumers and pet shops. OISC was interested in how they could help address this pathway of introduction through outreach messages to the public, and future opportunities with certification courses, webinars, and potential research opportunities with Oregon Sea Grant and Portland State University.

(03/06/2021); PetSmart issued a press release withdrawing several moss ball products
(<https://www.petsmartcorporate.com/product-notices/voluntary-product-withdrawal-marimo-moss-balls>)

(03-06-2021); USFWS-FAC-OLE issued guidance; As part of the PetSmart recall, significant customer contact (and contact tracing) has taken place to remove contaminated products that were sold, as well as stop the sale of contaminated products that were distributed within the U.S. and Canada. Guidance to pet stores from the Pet Industry Joint Advisory Council (PIJAC) was released. In addition, significant work has gone into stopping the importation of contaminated moss balls into the US from multiple agencies, including USFWS and USDA-APHIS.

(03-08-2021; 6:50 AM); The USFWS developed a website (<https://www.fws.gov/fisheries/ANS/zebra-mussel-disposal.html>) to provide information on invasive zebra mussels found in moss balls, updated the decontamination protocols to provide saltwater options, and sent out a question / answer statement to the states on response details. Information was also sent through the ANSTF weekly news and announcements.

(03-08-2021; 10:54 AM); Information was shared through ANSTF and the Western Invasive Species Coordinating Effort, about the status of the incident, including updated decontamination guidance from USFWS and Petco. A summary of news articles and state press releases was compiled. An updated list of products known to have zebra mussel contamination was also included.

(03-08-2021); ODFW produced and released a “how-to-video” on how to decontaminate your home aquarium safely. (<https://www.youtube.com/watch?v=DeLXmPDW23s>)

(03-09-2021): ODFW issued an updated press release describing the actions taken to date including work with pet and aquarium supply stores to remove contaminated product from store shelves. ODFW provided information that zebra mussels have been found on moss balls in Idaho, Montana, and North Dakota. (https://www.dfw.state.or.us/news/2021/03_Mar/030321.asp)

(03-11-2021): IDA media release includes a summary of the activities through activation of the Columbia River Basin Rapid Response Plan, coordination with the USFWS, recommendations for treatment and disposal of moss balls, IDA investigation of distributors in Idaho, and how to contact the Idaho Invasive Species Program hotline and find updated program information about the ongoing incident.

(03-12-2021) – **CRB MAC Group** – Coordination Call #4

Updates were shared by state partners, Provincial Partners in British Columbia, and from USFWS and from the ANSTF.

(03-15-2021); ANSTF News and Announcements – weekly updates included updated information related to the incident.

(03-30-2021; 2:00 PM) – **CRB MAC Group** – Coordination Call #5

Updates were shared by state partners, provincial partners in British Columbia, and from USFWS and from the ANSTF.

(04-12-2021) – **CRB MAC Group** – Coordination Call #6

Updates were shared by state partners, provincial partners in British Columbia, and from UUSFWS and from the ANSTF.

(04-12-2021) – Oregon Department of Agriculture issued an emergency temporary Administrative Rule that prohibits the sale of moss ball product in the state of Oregon.

(04-16-21) – WDFW and WISC decontamination and disposal video is released.

<https://wdfw.wa.gov/species-habitats/invasive/dreissena-polymorpha/moss#disposal>.

(04-17-2021) – ODFW issued news release in the Medford, OR area including guidance on how to safely dispose of contaminated products.

(04-19-2021) – ODA and ODFW issued a Joint News Release about the emergency quarantine rule issued on 04-12-2021. WDFW and WISC issued a joint news release promoting awareness and prevention through a Marimo moss ball, Don't Let It Loose themed art contest:
<https://invasivespecies.wa.gov/2021/04/19/invasive-species-art-contest-2021/> [results at <https://invasivespecies.wa.gov/campaigns/dont-let-it-loose/2021-invasive-species-art-contest/>].

(04-23-2021) – **CRB MAC Group** – Coordination Call #7

Updates were shared by state partners, provincial partners in British Columbia, and from USFWS and from the ANSTF. PIJAC issues water garden decontamination protocols.

(04-26-2021) – USFWS/USDA-APHIS-PPQ/CBP issue second round of Q&A's through the ANSTF, states and other processes.

(04-30-2021) – Briefing to state fish chiefs by USFWS, organized through Association of Fish and Wildlife Agencies.

(05-06-2021) – **CRB MAC Group** – Coordination Call #8 – summary of talking points shared with the state fish chiefs, and E-commerce letter (USDA).

Agency and Organization Roles and Responsibilities

Various entities in the Columbia River Basin play a role in invasive species regulation and management and take on responsibilities associated with the following: importation and the review of products into the US, ability to prevent importation into the US, ability to remove invasive species from the marketplace, and to provide effective information to stakeholders within the marketplace.

Federal Agencies

U.S. Department of Agriculture Animal and Plant Health Inspection Service (APHIS) is responsible for ensuring the free flow of agricultural trade by keeping US agricultural industries free from pests and pathogens of plants and certifying that the millions of US agricultural and food products shipped to markets abroad meet the importing countries' entry requirements. APHIS' Plant Protection and Quarantine (PPQ) regulates the importation of plants and plant products under the authority of the Plant Protection Act. APHIS-PPQ conducts phytosanitary review of importations.

U.S. Fish and Wildlife Service (USFWS) is responsible for enforcement of all US, international and foreign laws concerning the importation and exportation of live wildlife and wildlife products. Import/Export licenses are issued by the USFWS to entities (companies or individuals) before they can commercially import into or export from the United States shipments containing wildlife. All importations must be marked, labeled, or tagged to plainly indicate the name and address of the shipper and consignee, and the number and nature of contents. Wildlife in any form, including pets, imported into or exported from the United States must be declared and cleared on a FWS form 3-177 (Declaration for Importation or Exportation of Fish or Wildlife) by the USFWS prior to release by U.S. Customs and Border Protection.

APHIS, the National Marine Fisheries Service, and the USFWS administer the Lacey Act which allows these agencies to prohibit the importation and some shipment of wildlife species that are officially designated under the injurious wildlife provision of the Lacey Act (18 U.S.C. 42). APHIS is responsible for

collecting declarations for imported plants and plant products and defining the scope of plant materials that require a declaration. The USFWS has the authority to prohibit the importation and some transport of certain types of wildlife through the Federal regulatory process. Because the moss ball product was labeled as a plant for importation APHIS provides phytosanitary review and approval for regulated pests and pathogens of plants under the Plant Protection Act. However, if non-pests and pathogens of plants are found during PPQ inspection, shipments are referred to USFWS as the primary regulator of wildlife imports.

Columbia River Basin Plan States, and Provinces

Idaho Department of Agriculture has the authority to enter upon and inspect any public or private premises, lands, bodies of water, or means of conveyance, or article of any person within this state, for the purpose of inspecting, surveying, treating, controlling, collecting samples, or destroying any invasive species.

Montana Fish, Wildlife & Parks has the authority to seize listed prohibited species such as zebra mussels. Montana Department of Agriculture has the authority to stop sale nursery stock and plant products that contain listed prohibited species.

Oregon Department of Fish and Game has the authority to seize zebra or quagga mussels as prohibited species. Oregon Dept. of Agriculture has the authority to stop the sale of nursery stock and plant products and has issued a temporary ban on the sale of Marimo Moss Ball product in Oregon.

Washington Department of Fish and Wildlife authorities:

- RCW 77.135.020(1) The department is the lead agency for managing invasive species of the animal kingdom statewide.
- RCW 77.135.060(1) The department may implement rapid response management actions where a prohibited level 1 species is detected in or on a water body or property. Rapid response management actions may: Include expedited actions to contain, control, or eradicate the prohibited species; and, if applicable, be implemented in conjunction with a quarantine declaration.
- RCW 77.135.811(1) A person is guilty of unlawful use of invasive species in the first degree if the person: (a) Traffics or introduces on or into a water body or property a prohibited level 1 or level 2 species without department authorization, a permit, or as otherwise provided by rule.

Zebra mussels (*Dreissena polymorpha*) are classified as a Prohibited Level 1 Species in Washington State and as an Injurious Species under the federal Lacey Act.

British Columbia Ministry of Environment and Climate Change Strategy has the authority enforce prohibited species listed under the Controlled Alien Species Regulation (https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/94_2009) under the BC Wildlife Act. This includes prohibitions to possess, breed, ship or transport zebra and quagga mussels in BC.

Partners and Business

Pacific States Marine Fisheries Commission (PSMFC), established in 1947 by consent of Congress, is an interstate compact agency that helps resource agencies and the fishing industry sustainably manage our valuable Pacific Ocean resources in a five-state region. Member states include California, Oregon,

Washington, Idaho, and Alaska. In 1999, in response to the significant environmental threats posed by AIS, PSMFC established the AIS Prevention Program.

Invasive Species Action Network (ISAN), a non-profit, manages the national Don't let it Loose program that promotes responsible pet ownership and rehoming of unwanted pets to prevent the introduction and spread of invasive species. ISAN has direct communication contacts with independent pet stores in 13 states.

Various entities play more of an information or coordination role in the incident. Pet industry entities including Petco, Pet Smart, and the PIJAC issued voluntary product recalls and recommendations for aquarium cleaning and product disposal.

Summary of Primary Responses and Resources

Entity	Response	Primary Web Resource
Washington Department of Fish and Wildlife	Enacted incident command system; press conference; press releases; pet store visits to remove product.	https://wdfw.wa.gov/species-habitats/invasive/dreissena-polymorpha/moss
Oregon Department of Fish and Wildlife	Press releases; pet store visits to remove product.	https://www.youtube.com/watch?v=DeLxmPDW23s
Oregon Department of Agriculture	Declared quarantine on moss balls.	https://odanews.wpengine.com/oda-issues-emergency-quarantine-on-aquatic-nursery-stock-with-the-intent-of-stopping-zebra-mussels-from-establishing-in-oregon/
Idaho Department of Agriculture	Press releases; pet store visits to remove product.	https://idfg.idaho.gov/press/idaho-discovers-invasive-mussels-aquarium-products
Montana Fish Wildlife & Parks	Press releases; pet store visits to remove product.	https://fwp.mt.gov/homepage/news/2021/march/0304-invasive-mussels-moss-balls
British Columbia Ministry of Environment and Climate Change Strategy	Enacted incident command system; press releases; pet store visits to remove product.	https://www2.gov.bc.ca/gov/content/invasive-mussels/moss-balls-disposal
U.S. Fish and Wildlife Service – Pacific and Mountain Regions	Communication with U.S. FWS HQ and regional partners; disseminate recommendations on disposal and cleaning.	https://www.fws.gov/fisheries/ans/zebra-mussel-disposal.html
U.S. Fish and Wildlife Service Enforcement and Fish and Aquatic Conservation	Investigation of importation and distribution in US. Maintain moss ball response website and decontamination protocols. Wildlife inspections and	https://www.fws.gov/fisheries/ans/zebra-mussel-disposal.html

	importation coordination between USDA, CBP, and USFWS. Implement new inspection process using eDNA technology for moss ball shipments referred to USFWS.	
USDA Animal Plant Health and Inspection Service	Inspect product at Plant Inspection Stations.	
US Customs and Border Patrol	Refer all moss ball shipments to PPQ's Plant Inspection Stations for inspection.	
Pacific States Marine Fisheries Commission	Enacted the Columbia River Basin Multi-Agency Coordination group.	
Invasive Species Action Network	Outreach to all independent pet stores in DLIL program.	https://www.dontletitloose.com/news/
Pet Industry Joint Advisory Council	FAQ for business on tank decontamination, as well as water garden decontamination. Advised moss ball suppliers to place a moratorium on the importation, purchase, and sale of all product until a method of testing and treatment can be established to ensure clean trade.	https://pijac.org/sites/default/files/pdfs/PIJACNeed2Know_UpdatedZebraMusselGuidance.pdf https://pijac.org/sites/default/files/pdfs/InstructionsforMossBallAquaticPlants.pdf
Petco	Voluntary product refund.	https://www.Petco.com/content/Petco/PetcoStore/en_US/pet-services/help/recalls.html#marimo-moss-ball-recall
PetSmart	Voluntary product recall.	https://www.petsmartcorporate.com/product-notices/voluntary-product-withdrawal-marimo-moss-balls/
AmericanHort	Advised horticulture retail to not sell moss balls until clean trade was established. Urged industry to safely destroy moss balls and safely decontaminate.	https://t.e2ma.net/message/5skxcd/tnwtdk

Planning and Operations: Actions

The discovery of zebra mussels in an aquatic plant product showed that the invasive species management community was able to respond swiftly to halt importation, sale and proper disposal; however, this incident certainly surprised many as this particular vector had not been previously

recognized within the pet industry and natural resource agencies as an issue for dreissenid introduction or spread. The responses and actions ultimately taken were not without deliberation and in some cases prompting confusion on appropriate roles and responsibilities at various levels of administration.

Specific actions and suggested recommendations are provided here to give context and strive to improve responses in the future. See the timeline for specific dates on various actions.

Federal and State Incident Communications and Coordination

In general, the incident followed several lines of communication including: USGS NAS issued a national alert; WDFW and WISC initiated a state incident response process; the CRB MAC was implemented (which includes federal agencies, state agencies, tribal representation and Canada); and the ANSTF member agencies and Regional Panels were alerted. As this incident evolved from an individual state response into an international issue, the USFWS eventually took the national lead on communications, although status updates from the national level to states were not consistent. Coordination of actions have been fairly good in the Pacific region with activation of the CRB Plan and coordination by the Pacific States Marine Fisheries Commission. National coordination of actions has been confusing due to multi-agency authority overlap and no incident command structure implemented. Communication and coordination by state agencies varied, and often duplicated efforts and excluded action agencies and partners.

Recommendations:

- A national infrastructure/incident command system would allow for timely coordination and communication between and within federal-state-tribal-partner entities when responding to a similar national AIS issue.
- Establish communication protocols between USGS and the affected state(s) to ensure managers are notified directly in the event of a dreissenid detection prior to releasing nationally. Ensure USGS verifies detection with the state.
- Establish communication protocols between industry partners, state managers and federal managers for more consistent messaging internally and externally to the public.

Product Importation into the US and Canada

The USFWS together with the USDA APHIS were able to halt all importation of moss ball products as of March 2021. Moss ball products are not labeled to contain dreissenid mussels; but, zebra mussels are considered injurious under the Lacey Act. However, the Lacey Act authorities only apply to injurious species being imported into the US, but no longer applies to most interstate transport of injurious species between states within the continental United States, as a result of the 2017 D.C. Circuit upholding of a lower court ruling.

https://www.fws.gov/injuriouswildlife/pdf_files/USARK_ruling_talking_points_and_Q_A_final.pdf

A port interception working group consisting of Washington and Oregon state and federal agencies have begun to explore practices/regulations to prohibit contaminated products entering the country. The USFWS-OLE will begin using eDNA LAMP hand-held devices to scan importations as of June/July 2021.

This method will play an important role in verifying clean trade should industry reinstate importation of moss balls.

Recommendations:

- Clarify the practices/regulations to prohibit contaminated products from entering the country, whether on moss ball products or any other plant product, that could be contaminated with an invasive species.
- Point-of-use eDNA LAMP technology could be applied to scan other importations for other high-risk AIS, not just limited to dreissenid mussels.
- Congress should reinstate the Lacey Act authority to regulate inter-state movement of injurious species.
- Work with industry partners to develop and implement standard best practices and industry certifications for live plant products that are free of non-target species.
- Incentivize industry trainings to prevent and identify invasive species, and implement measures to prevent unintentional spread of non-target species as part of live species trade.

Product Distribution from Retailers

All states and provinces in the CRB responded immediately with in-person visits to pet store businesses in their respective areas to physically remove dreissenid-contaminated product from shelves, request voluntary surrender of moss ball product to state or federal authorities or request voluntary proper disposal by the store. In some cases, the USFWS OLE assisted with store visits and product removal. The round-up of product was effective with few examples of push back from pet stores that would not relinquish product. State and federal personnel worked together to identify potential affected distributors and retailers. As new contaminated products were found, this information was shared to help remove contaminated products for sale. Federal and state agencies worked to address online distribution and retail of contaminated product. Within the CRB, work by the Invasive Species Action Network as part of the “Don’t Let It Loose” program had previously identified independent pet stores in some CRB states which was useful in contacting small retail stores.

Recommendation:

- Encourage contact with retailers to provide timely information on invasive species when needed. Entities that may provide information could be states, provincial, federal and other partners.
- Enhance relationships with industry associations, such as PIJAC and AmericanHort, so communication processes are in place when emergencies for organisms-in-trade supply chains.
- Maintain programs that interface with retailers, such as Don’t Let it Loose and Habitattitude.

Assessing Future Product Safe for Retail

Determining if the product is safe for distribution or sale in retail stores has been a primary discussion point. There are no processes in place for new importations of the product to be determined as “certified” mussel-free (i.e., scanned for the presence of mussel without detection). Also, there are no processes in place to determine if these products are now safe for sale where a pet store owner may have retained products and stated they would monitor their tanks for unusual growth.

Recommendation:

- Identify a national protocol to determine if products are safe for distribution and sale. Determine the primary entities that create, implement and enforce such protocols.

Early Detection and Monitoring

Columbia River Basin Team members currently coordinate on dreissenid mussel monitoring within the basin. Ongoing discussions at scheduled CRB AIS Team meetings will cover any additional monitoring recommendations / coordination with CRB zebra mussel monitoring for the FY21 monitoring season and beyond.

University of Michigan is currently conducting DNA analysis on dreissenids in moss ball products to allow for potential origin tracing of new detections of dreissenids in natural locations. Any genetic information from this project could be utilized for tracing purposes elsewhere, including in the Columbia River Basin.

Recommendation:

- Pending.

Best Management Practices and Protocols for Disposal and Cleaning

There are multiple audiences that need information in order to prevent the spread of dreissenids, including home aquarium owners, commercial aquarium businesses, university demonstration tanks, and outdoor water features. At the onset of the incident, there was considerable discussion on desire to have consistent protocols to provide publicly on disposal and cleaning. The obvious connection of previous recommendations and language to the public on dreissenid cleaning associated with boats was considered. Various homeowner situations were also discussed as in many cases, to simply pour aquarium water in a “safe” location outside could vary based on urban or rural aquarium owner situations.

Providing consistent and effective information on proper disposal of the product and decontamination of sales tanks or home tanks was a primary focus for outreach (see Summary of Primary Responses and Resources table above). All states and provinces in the CRB issued multiple press releases and announcements on web sites. Industry announcements were also made within trade and association publications on proper disposal and product recall.

The USFWS provided information for proper disposal contaminated moss ball product:

<https://www.fws.gov/fisheries/ANS/zebra-mussel-disposal.html>

Large established aquarium tanks were identified as problematic to be completely drained and cleaned. Discussion was focused on monitoring aquariums for unusual growth instead. For effluent water changing, tank cleaning and decontamination PIJAC provided recommendations from industry experts.

Recommendations:

- Maintaining communication lines with the aquarium industry (i.e., PIJAC) will be important for any additional protocols that may be developed, and to share information rapidly within the industry.
- Explore requirements for importers or primary distributors to require aquarium monitoring or cleaning. Further understanding of phytosanitary requirements at all levels of pet product delivery to identify possible contamination is needed.

Outreach

The immediate outreach to alert aquarium owners of possible contaminated product was accomplished with mainstream media and agency websites, press releases, videos, blogs, and other resources. Additional outreach through horticulture industry was pursued through industry newsletters. However, there is a continuing need to educate aquarists, pet stores, horticulturalists, and industry on possible dreissenid issues (or other AIS) associated with this pathway.

Recommendations:

- Industry communication will be needed for direct contact with pet industry on other moss ball products, and “certified” products should certification come from the industry.
- Simple materials (such as rack cards) could be displayed at aquarium trade shows, aquarium swap meetings and other aquarist gatherings.
- The national outreach program *Don't Let it Loose* should continue to provide information to participating pet stores in various formats. As any additional partnerships develop Don't Let it Loose information should be shared accordingly.
- Industry leaders PIJAC, North American Pet Products Association and others such as NAISMA should continue to provide repetition of information and as new details emerge.
 - Outreach to the pet and horticulture industry to encourage reporting of contaminated products and associated species.
 - Foster customer service to prevent undesirable species movement and introduction.
- *Habitatititude* is a national outreach campaign administered by PIJAC with support from USFWS. This platform could also provide more timely release of information and prominent participation in AIS issues such as this.
- There may be other appropriate audiences such as the horticulture enthusiasts and others that may be appropriate for disseminating information.

Research

Multiple species in addition to dreissenid mussels were found within the moss balls. Some states have recorded the presence of these species. At this time, no further exploration of the taxonomic identification of species found with moss balls is taking place. However, this does correlate to the prevention net of inspecting imported plant products prior to distribution and points to possible gaps with inspections focusing on pest and pathogens of plants at Plant Inspection Stations.

Recommendations:

- Update risk evaluations. Risk evaluation can help managers identify possible areas or species of concern. However, because this particular dreissenid pathway had not been previously identified, it may be valuable to re-examine pathways and other factors (such as procedures in importation product evaluations) to minimize blind spots for possible invasive species introduction.
 - This concept could be applied to basin wide evaluations based on various trade routes and habitat match analysis.
 - Understand the risk of introduction of zebra mussels through aquarium pathway and ways to mitigate risk. It is possible that the risk is low for introduction through this pathway, however if aquarium contents are released into the wild this could be an introduction mechanism that results in likely establishment.

- Understand the risk of introduction of other AIS in aquarium products. Other species besides dreissenids could be introduced.
- The QZAP Research Priorities Workshop will take place this summer and correlating possible areas of research that target the pathway of aquarium products is recommended.
- It will be critical for managers to have tools to decipher source populations of a new dreissenid introduction to a waterbody. Historically, it would have been interpreted as introduced via watercraft or other infrastructure. However, new introduced populations may now be linked to moss ball aquarium product release. Characterizing the source population will help managers understand the magnitude needed to address aquarium release as an introduction method.
- Montana's AIS Lab has verified a dreissenid veliger in water taken from one of the moss ball containers. The lab also identified live worms, ostracods and copepods in the moss material. Ensuring that there are well-trained taxonomists readily available to identify contaminated products will continue to be a need for early detection and monitoring in the future.

Summary of Key Issues and Suggestions

Harmonize and clarify state-tribal-federal relationships to better foster incident command system adoption and implementation for aquatic invasive species incident response.

Need for AIS response organizations to continue adoption and training in the incident command system promoting harmonization with standardized system terminology, processes, and activities. Promoting position-specific and functional activity trainings and workshops to improve readiness and capabilities.

Identify and address gaps in federal regulations and authorities on the importation of all aquarium and aquaculture products and the associated permits as well as the federal, interstate, and state movement of Lacey Act listed species across state lines.

Distributors or products may need certification to offer for sale. Federal guidance on certifying product as “safe” or “certified” for sale is appropriate. Consider partnering with the pet and horticulture industry as the mechanism for certification process development.

US Customs and Border Protection product inspections may not have mechanisms to identify AIS or stop specific species. Scanning of plant imports may be too focused on specific products (e.g., scanning only moss balls) which leads to gaps in prevention mechanism at points of importation.

Not every state wildlife agency has the authority to declare a state quarantine on plant product. Recommend state wildlife agencies consult with agricultural agencies and their attorney generals to review authorities and explore partnerships, and enhance communications on emerging noxious and invasive species, pests, and pathogens.

Some difficulty in a state wildlife agency quarantine of moss ball product shows that some existing dreissenid authorities do not apply to contaminated plant or algae products. Recommend state wildlife agencies strengthen authorities to address vectors such as products in pet trade, and live plant sales.

Encourage dialog between the law enforcement committee / AIS committee of the Association of Fish and Wildlife Agencies to provide continuity and strength to all enforcement responses on invasive species detections regardless of situation.

Consider improvement of public reporting systems to allow for a straightforward and simple process regardless of knowledge or technological capabilities. Explore functionality of reporting systems at federal, state and provincial scale.

Conclusion

The moss ball incident is a multi-faceted issue that spans from an individual making a public report, to federal-state-provincial-partner-industry response. This incident points out areas where AIS regulation and management can make improvements to protect our natural resources. The issue of dreissenid-contaminated moss balls highlights the value of collaborative relationships and open communication lines. Being able to share information efficiently and make the accurate contacts was shown to be critical. There will be opportunities to further discuss needs and best practices using venues like the CRB AIS Team, WISCE and others, including industry-specific venues. The concept of “building consensus” is a valuable tool to help make responses fluid and consistent across the Columbia River Basin, the western US, and across US and Canada. The recommendations and suggestions provided in this document are a starting point for further improvement in AIS prevention, regulation and management.

Appendix A – Columbia River Basin Plan Multi-Agency Coordination Group Participants

Columbia River Basin Plan – Multi-Agency Coordination Group standing members in Moss Ball Incident

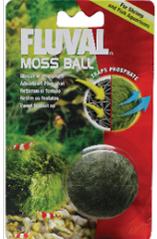
Organization/Agency	Participants
Washington Department of Fish and Wildlife	Capt. Eric Anderson Allen Pleus
Washington Invasive Species Council	Justin Bush
Oregon Department of Fish and Game	Rick Boatner
Columbia River Intertribal Fish Commission	Blaine Parker
Idaho Department of Agriculture	Lloyd Knight Nic Zurfluh
Montana Fish, Wildlife & Parks	Tom Woolf
British Columbia Ministry of Environment	Martina Beck
Pacific States Marine Fisheries Commission	Stephen Phillips
U.S. Fish and Wildlife Service	Theresa Thom
Invasive Species Action Network	Leah Elwell

CRB Plan invited MAC group participants in Moss Ball Incident

Organization/Agency	Participants
U.S. Fish and Wildlife Service	Joanne Grady Cesar Blanco
U.S. Fish and Wildlife Service Office of Law Enforcement	Eric Merek Jim Ashburner
Wyoming Game and Fish	Josh Leonard
California Department of Fish and Wildlife	Martha Volkoff
California Department of Food and Agriculture	David Pegos

Appendix B – Moss Ball Product Information

Zebra-Contaminated or Withdrawn Moss Ball Products									
Brand	Product	Listed Species	SKU	UPC	Stores	Official Withdrawal	Photo #		
None	Plant-Ball-Japanese-Marimo	Cladophora aegagrophila	1234250 Plant-Ball-Japanses-Marimo	None	Petco	Yes	1		
Imagitarium	Betta Buddy Marimo Ball	Cladophora aegagrophila	2410847 Marimo Ball*	44399761	Petco	Yes	2		
Imagitarium	Betta Buddy Small Marimo Ball	Cladophora aegagrophila	2480571 Baby Betta Buddy*	44317433	Petco	Yes	3		
Imagitarium	(Moss-Asst) Shrimp Buddies	Cladophora aegagrophila	2894790 Moss-Asst-Shrimp Buddies	443330166	Petco	Yes	4		
Top Fin	Marimo Moss Ball Plant (bulk aquarium)	Aegagropila linnaei	5152450	40051524501	PetSmart	Yes	5		
Top Fin	Marimo Moss Ball Plant Grab N Go	Aegagropila linnaei	5164031	73725728340	PetSmart	Yes	6		
Top Fin	Mini Marimo Moss Balls	Aegagropila linnaei	5292944	89444600028	PetSmart	Yes	7		
			*SKU# has different name than on package.						
Petco Note:	The only other moss ball products that Petco sells are listed below which are constructed of <i>Vesicularia dubyana</i> (Java moss) algae and were not subject to our voluntary withdrawal from market. These are man-made and non-harvested moss balls made from different types of moss.								
PetSmart Note:	The brand is Top Fin, but there is no branding on the products so they are unbranded from a customer facing perspective. The two that have photos are examples of how they are sold as they are placed in a betta fish cup and a lid with the pictured sku placed on it, but the lid could be a variety of colors. The one product I didn't provide a photo of is in our fish system and purchased out of the tank so there is no packaging to provide a photo of. All our stores in the US and Canada have been directed to have pulled all product from the shelves/tanks and to freeze them. We haven't directed them to dispose of them from the freezer at this time. The products have been removed from our website also.								
Other Moss Ball Products									
Brand	Product	Species	SKU	UPC	Stores	Official Withdrawal	Photo #		
No Brand	Moss Ball with Sword (bulk aquarium)	Vesicularia dubyana (Java moss) with an assortment of Sword plants	2964997	None	Petco	No	8		
No Brand	Aquatic Moss Ball (bulk aquarium)	Vesicularia dubyana (Java moss)	1054708	None	Petco	No	9		
ARTIFICIAL Moss Ball Products - No Risk									
Brand	Product	URL			Stores	Official Withdrawal	Photo #		
Fluval	Fluval Moss Ball	https://www.petsmart.com/fish/decor-gravel-and-substrate/artificial-plants/fluval-aquarium-moss-ball-54990.html			PetSmart	No	10		
		https://www.petco.com/shop/en/petcostore/product/fluval-moss-ball-ornament?irgwc=1&irclickid=zfA2vaUWHxylTjVxTSQPxVT4UkEVzjR63X7GQ00&cm_mmc=AF_F_-IMP_-CCY_-CCO_-PM_-AQU_-NA_-PM_AFF_FY21_eCommerceGen_Evergreen_-2003851_-657755			Petco	No			
Exo Terra	Moss Ball	https://www.petsmart.com/reptile/cleaning-and-water-care/deodorizers/exo-terra-reptile-moss-ball-18193.html			PetSmart	No	11		
		https://www.petco.com/shop/en/petcostore/product/exo-terra-moss-ball-1416413?cm_mmc=PSH_-CNX_-CCY_-PME_-PET_-AQU_-0_-CONNEXITYSHOPPING_-Product_Listing_Ads_-0&cnxclid=538f94c461a61128d65cf48ea6ecebaf			Petco	No			

Company	Petco	Petco	Petco	Petco	PetSmart	PetSmart	PetSmart
Product		Betta Buddy Marimo Ball	Betta Buddy Small/Baby Marimo Ball		Marimo Moss Balls (Bulk)	Marimo Moss Ball (Grab N Go)	Mini Marimo Moss Balls
Photo #	1	2	3	4	5	6	7
	N/A						
Company	Petco	Petco	PetSmart & Petco	PetSmart & Petco			
Product	Moss Ball with Sword	Aquatic Moss Ball	Fluval Moss Ball	Fluval Moss Ball			
Photo #	8	9	10	11			
							

Appendix C – Example USGS NAS Database Alert from Incident

Original USGS NAS database Alert to Washington State. Other individuals may have received this alert at a different time due to difference in server processing rates.

The screenshot shows an email client window titled "NAS Species Alert - Dreissena polymorpha (WA) - Message (HTML)". The interface includes a top menu bar with "File", "Message", "Help", and "Acrobat". Below the menu is a toolbar with various icons for actions like "Delete", "Archive", "Reply", "Reply All", "Forward", "Move", "Tags", "Editing", "Speech", and "Zoom".

The email content is as follows:

NAS Species Alert - Dreissena polymorpha (WA)

NAS_Alerts@usgs.gov
To: Pleus, Allen E (DFW)
Tue 3/2/2021 12:26 PM

This item will expire in 7 days. To keep this item longer apply a different Retention Policy.

External Email

An alert has been generated that matched your criteria from the [Nonindigenous Aquatic Species database](#):

***Dreissena polymorpha* (zebra mussel) was found in a new State, County, Drainage**

Details:
State: WA
County: King
Drainage: Puget Sound (17110019)
Location: [Hitchhiker on pet store plants]

NAS ARM map was not generated because we presume the introduction has failed.

Zebra mussels have been found in shipments of Marimo moss balls (an aquarium plant) that are sold at pet stores.

More information on this specimen can be found:
<https://nas.er.usgs.gov/queries/specimenviewer.aspx?SpecimenID=1656916>

More information on this species can be found:
<https://nas.er.usgs.gov/queries/SpResults.aspx?SpeciesID=5>

This is an auto-generated e-mail from the US Geological Survey - Nonindigenous Aquatic Species database
If you no longer wish to receive alerts, please visit: <https://nas.er.usgs.gov/AlertSystem/Unregister.aspx>