Species Import Data for Estimating the Risk of Introducing Live Aquatic Organisms by the Aquarium, Water Garden, and Seafood Trades in Canada

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Les numéros 1 à 25 de cette série ont été publiés à titre de Records statistiques, Service des pêches et de la mer. Les numéros 26-160 ont été publiés à titre de Rapports statistiques du Service des pêches et de la mer, ministère des Pêches et de l'Environnement. Le nom de la série a été modifié à partir du numéro 161.

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ABSTRACT

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Data on aquatic organisms imported into Canada were assembled as part of a Canadian Science Advisory Secretariat (CSAS) process to estimate the risk of introducing live organisms by the aquarium, water garden, and seafood pathways. Records of species imported into Canada between June and October 2018 were obtained from the Canada Border Services Agency (CBSA), including information on source country, port of entry, and distributor and vendor locations. Harmonized System (HS) codes were included, which classify imported goods into specific categories. Descriptions of goods and information on species imported, including species names and quantities (counts or weights) of individuals, were also included. Additional data were incorporated, such as CBSA office location information, geographic forward sortation area (FSA), species/taxa information, and pathway classification, and records were attributed to each of the three pathways. A separate dataset was obtained from the Canadian Food Inspection Agency (CFIA) on aquarium fishes imported to Canada between 2008 and 2018. Furthermore, a list of retailers across Canada that could potentially distribute live aquatic organisms in trade through the three pathways was compiled. Final counts of datasets included 8,192 species import records obtained from CBSA, along with 30,659 records from CFIA, and 3,625 records of retailers. Full datasets are stored by the Great Lakes Laboratory for Fisheries and Aquatic Sciences, Burlington, Ontario, while tables describing the fields in these datasets and summarizing their attributes are presented in this report. Together, these datasets contain information on the scope and scale of live aquatic organisms imported into Canada.

RÉSUMÉ

Brinklow, T.R., Chan, F.T., Drake, D.A.R., and Therriault, T.W. 2021. Species Import Data for Estimating the Risk of Introducing Live Aquatic Organisms by the Aquarium, Water Garden, and Seafood Trades in Canada. Can. Data Rep. Fish. Aquat. Sci. 1342: vi + 11 p.

Les données sur les organismes aquatiques importés au Canada ont été regroupées dans le cadre d'un processus du Secrétariat canadien des avis scientifiques (SCAS) pour estimer le risque d'introduire des organismes vivants par les voies d'introduction des aquariums, des jardins d'eau et des fruits de mer. Les dossiers sur les espèces importées au Canada entre juin et octobre 2018, y compris sur le pays d'origine, le port d'entrée et les emplacements du distributeur et du vendeur, ont été fournis par l'Agence des services frontaliers du Canada (ASFC). Les codes du Système harmonisé, qui classe les biens importés selon des catégories précises, ont été inclus. Les descriptions des biens et les renseignements sur les espèces importées, y compris les noms d'espèces et les quantités (nombre ou poids) d'individus, ont aussi été inclus. Des données supplémentaires ont été ajoutées, comme les renseignements sur l'emplacement du bureau de l'ASFC, la région de tri d'acheminement, les espèces/taxons et la classification de la voie d'introduction; des dossiers ont été assignés à chacune des trois voies d'introduction. L'Agence canadienne d'inspection des aliments (ACIA) a fourni un ensemble de données distinct sur les poissons d'aquarium importés au Canada entre 2008 et 2018. De plus, une liste des détaillants au Canada qui pourraient distribuer des organismes aquatiques vivants dans le commerce par l'une des trois voies d'introduction a été compilée. Finalement, les ensembles de données incluaient 8 192 dossiers sur les importations d'espèces fournies par l'ASFC, en plus de 30 659 dossiers de l'ACIA et 3 625 dossiers de détaillants. Les ensembles de données complets sont entreposés par le Laboratoire des Grands Lacs pour les pêches et les sciences aquatiques, situé à Burlington (Ontario). Les tableaux qui décrivent les champs de ces ensembles de données et résument leurs paramètres sont présentés dans ce rapport. Ensemble, ces ensembles de données renferment des renseignements sur la portée et l'ampleur de l'importation d'organismes aquatiques vivants au Canada.

INTRODUCTION

The trade of aquarium, water garden, and live food organisms poses a risk of introducing aquatic invasive species (AIS) into Canadian ecosystems because imported organisms may be intentionally or unintentionally released by end-users (i.e. consumers). Understanding the movement of aquatic organisms in trade into and within Canada from source countries globally, via ports of entry, distributors, and ultimately retailers within Canada is critical to gauge the invasion risk posed by these pathways.

Data contained in this report were assembled to support a Canadian Science Advisory Secretariat (CSAS) process aimed at evaluating the introduction risk posed by the trade of live aquatic organisms in Canada (Chan et al. 2021). Data on species imported through the aquarium, water garden, and live seafood pathways were collected (e.g., description of goods and quantity), along with data about import transactions (e.g., locations of origin, vendors, importer, and destination). This data report provides descriptions of the assembled data, which were used to inform the live trade CSAS Research Document (Chan et al. 2021).

METHODS

Species import records were obtained by contacting the Canada Border Services Agency (CBSA) and the Canadian Food Inspection Agency (CFIA). Retailer data were compiled by conducting Google web searches, reviewing published reports, and examining crowdsourced reviews on Yelp for retailers that did not have an online or social media presence.

PATHFINDER DATA

Electronic import records for aquarium, water garden, and live seafood organisms were obtained from the CBSA through the Single Window Initiative, Pathfinder datasets. These data included information solely on aquatic organisms, including marine, brackish water, and freshwater species. The original data file contained information on 19,094 transactions, including 112,134 records of goods imported into Canada from June 15th, 2018, to October 15th, 2018. Full descriptions of the analytical methods can be found in the related research document (Chan et al. 2021). Species import records from paper-based transactions, which account for approximately 50% of all transactions for aquarium, water garden and live seafood organisms, were not accessible via Pathfinder. Because a significant proportion of the import transactions were paper-based and not recorded by Pathfinder, this results in a limitation of potential missing import details in the dataset. This may result in taxonomic bias, as the proportion of missing transactions is likely greater for invertebrates than for fishes (H. Gerson, CBSA, pers. comm). A brief description of the methods is provided here in the context of understanding the resulting dataset and modifications to the data fields.

Multiple types of goods or species could be imported during a single event (transaction), resulting in multiple records within each import transaction. The dataset included a description of the goods (species identity and intended use, when provided), quantity (in number/pieces, dozens, millions, or kilograms), date of the transaction, release office (port of entry into Canada), country of origin, customs broker, vendor, importer, and/or distributor details (name, address, and contact information). Harmonized System (HS) codes were also given. The HS is a system developed by the World Customs Organization used internationally for the classification of products in international trade. Harmonized System codes consist of six digits, where the first two digits identify the chapter of the goods classification, the first four digits identify the headings within a chapter, and the last two digits provide additional information on the goods. For example, for the HS code 0301.11, the chapter (first two digits of the HS code)

03 designates fishes, crustaceans, molluscs, and other aquatic invertebrates, and the heading (displayed as the first two digits separated by a period from the next two digits) 03.01 designates live fishes; the final two digits 11 gives additional information that designates ornamental freshwater fishes. Thus, the HS code, presented as 0301.11, indicates live, freshwater ornamental fishes. Another example is the HS code 0301.19, which indicates live, other than freshwater (i.e., marine, brackish water) ornamental fishes.

HS codes were used, along with a description of the goods when provided, to document and extract relevant aquatic organisms and determine their intended use (e.g., as aquarium pets or food). A total of 9,432 records were extracted that were deemed relevant to the three pathways of interest (aquarium, water garden, and live seafood trades).

Further refinement of the dataset took place because certain records were excluded or corrected for errors. Missing import details where quantity was not included and species could not be identified (and thus quantity could not be calculated) were excluded. In certain records, the HS code did not differentiate live imported goods from those that were dead. Records were only included if the description of goods clearly indicated the specimens were alive at the time of import into Canada. Otherwise, the records were excluded if specimens were potentially dead (e.g., indicated as chilled, fresh, or frozen). Organisms that were imported for public aquariums and zoos, for scientific research, or for environmental testing were excluded from the dataset. Inconsistencies between HS codes and descriptions of goods, such as records of food fishes imported under ornamental fish HS codes, were corrected. The final dataset contained 8,192 records of live organisms imported into Canada over a four-month period.

Using the HS codes, description of goods, and information on vendors, importers and/or distributors, each record was assigned to the aquarium, water garden, and (or) live seafood pathway. Live ornamental fishes (HS codes 0301.11 for freshwater and 0301.19 for other than freshwater) were assigned to the aquarium pathway. A subset of ornamental fishes with HS code 0301.11 was also assigned to the water garden pathway after consulting records of aquatic organisms in trade from October 2004 to September 2005 from Fisheries and Oceans Canada (DFO) (Bradie et al. 2013 citing B. Cudmore and N. Mandrak, DFO, unpublished data), in which the reason for import was determined based on the species' temperature tolerance and known association with water gardens (B. Cudmore, DFO, pers. comm; see Chan et al. 2021 for further details of pathway assignments). Freshwater aquatic plants with HS code 0602.90 (live rooted greenhouse aquatic plants) with other government department (OGD) extension 2494 or with "aquarium plant" in the description of goods were assigned to the aquarium pathway. These plants were also assigned to the water garden pathway, except for Moss Ball (*Aegagropila linnaei*) and aquascape species. Terrestrial plants that were imported as aquatic or aquarium plants were assigned to the water garden pathway as well. No marine species were considered for the water garden pathway.

The quantity of aquatic organisms was estimated using the import counts or weights listed in the import record. Records that were listed by weight (88 taxa) were converted to a raw number of individuals using one of the following methods: 1) typical market weights advertised by online seafood retail outlets (used for 59 species); 2) the length-weight relationships from FishBase (17 species, Froese and Pauly 2019); 3) literature values (used for one species); 4) species-specific density or biomass estimates based on records with both quantity and weight (used for one species, see Bradie et al. 2013). Ten taxa had missing details about species-level information, and thus the density or biomass for those species could not be calculated. For those groups, abundance was estimated using average density across all species in the dataset belonging to the same taxonomic group.

Additional columns were added to the Pathfinder data to help with data analysis. A unique identifier was added in the first column of the spreadsheet to identify individual records ("Identifier") easily. Each line indicates an import record that contained a record of an aquatic organism (although occasionally more than one species was found in a single import record). Information on the release office (name, city, province, and coordinates) was added to supplement the given release office number provided in the original data. The identity (i.e. taxonomic identification) of the imported organisms was determined based on the description of goods. Both scientific and common names for species are given in the dataset. Although not exhaustive, species previously identified in trade by Rixon et al. (2005), Gertzen et al. (2008), and Mandrak et al. (2014) were identified in this dataset. If the individual species was found in these previous studies, it was identified as such in the dataset. The taxonomic nomenclature used in the dataset is consistent with FishBase, SeaLifeBase, AlgaeBase, Global Biodiversity Information Facility, and Encyclopedia of Life. The three pathways (aquarium, water garden, and live seafood) were identified using individual columns in a presence/absence format. Any errors or inconsistencies found in the data were also identified by adding the "Inconsistencies" column. Details of the columns, including names, descriptions, and examples, can be found in Table 1. This table also identifies which fields were raw data obtained from the CBSA and those created during analysis and refinement of the Pathfinder data by DFO. Columns were verified and edited when there were spelling errors or inconsistencies, including all fields that contained names or codes of cities, provinces/states, and countries, as well as release office names.

Finally, sensitive information that breaches the privacy of vendors or destination stores was removed, such as vendor or store names and addresses, along with the Release ID of the transaction that could be traced to personal information of the vendors or retailers. Cities, countries and Forward Sortation Areas (FSA), a column added based on the original six-digit postal code, of these vendors were preserved in the dataset to allow the end-point of the imported species to be described, without specifying exact locations.

CANADIAN FOOD INSPECTION AGENCY DATA

The CFIA data were compiled by the Automated Import Reference System (AIRS) for electronic import transactions and contained information on the HS code and OGD extension of the imported goods, along with HS description, quantity, calendar year, country of origin, province of the port of entry, and the destination province of goods imported into Canada. The temporal coverage of the CFIA data is broader than the Pathfinder data and ranges from 2008 to 2018. It was therefore utilized to ground truth the CBSA Pathfinder data in the CSAS Research Document (Chan et al. 2021) using import records for ornamental fishes (HS level 1 = 03, HS level 2 = 01, HS level 3 = 11 or 19). All data received from CFIA were not processed or altered. The CFIA data were included here for completeness as it was used in this format by Chan et al. (2021) to compare import records among similar time periods as a means of quality assurance.

RETAILER DATA

Retailer data were not available in the original Pathfinder dataset, but were compiled using publicly available information, such as reviewing published reports, conducting Google web searches and using reviewer websites of retail outlets that sell live aquatic organisms (Chan et al. 2021). Retailers were searched by province, using a search term and the province or territory name (e.g., "pet shop" + "British Columbia") to ensure comprehensive geographic coverage of all provinces and territories. Retailers that may not have web pages or social media presence were targeted using reviews on Yelp, a crowdsourced review forum. In contrast to the Pathfinder data, personal and business information such as addresses, names, and contact information were included in the dataset because these data were publicly available. Retailers

were defined as outlets with a physical location that sells live aquatic organisms to end-users for any of the three pathways (aquarium, water garden, or live seafood). This list does not include online stores or forums, which were beyond the scope of the assessment. Store types were assigned general categories based on the type of retail location and the goods sold. Categories for store types were: aquarium store, ethnic grocery, feed store, fish farm/hatchery, flower shop, garden centre, grocery, landscape supply, nursery, oyster farm, pet store, pond store, and seafood market. Any stores included in the aquarium pathway were also included in the water garden pathway, but not vice versa. Only stores that sold live aquatic organisms were considered for the live seafood pathway.

In addition to store name and pathway, data were gathered on the geographic location and the specific taxa (fishes, invertebrates, and/or plants) sold by the retailers. The retailers were contacted using various methods to confirm the information when possible. This dataset contains a summary of the information of retailers across all three pathways that were used to inform possible locations and spatial patterns of retailers involved in the aquarium, water garden, and live seafood trades in Canada. Information on these retailers was gathered on January 28, 2020, and was assumed accurate at that time (retailer information may have subsequently changed, especially due to the global pandemic). Full methods on how the retailer data were obtained can be found in the CSAS Research Document by Chan et al. (2021).

RESULTS

Because of the large size of the Pathfinder live trade data and retailer list, the data were not compiled in a tabular format within this document. However, these datasets are available elsewhere to interested parties by contacting the Great Lakes Laboratory for Fisheries and Aquatic Sciences in Burlington, Ontario. Brief summaries of the datasets are presented below in terms of the information that can be found in them, and various elements and variables are explained.

PATHFINDER DATA

The summarized Pathfinder data comprises 36 columns containing information on details of each import transaction, with 8,192 records (rows). A table displaying the names of the columns, their descriptions, and an example of a value found within that column is given in Table 1.

Exact dates for each record are not included in the summarized Pathfinder data, and only an estimate of the month is provided. The months listed span from July to October, although each month category contains the second half of the prior month (for example, “July” contains dates from June 15th, 2018 through July 15th, 2018; and so on).

The data contains information on release office (number, name, city, province, and coordinates), country of origin (using country code and state code if available), vendor information (country code, state code if available, and city), importer information (country code, state/province code, city, and FSA) and destination information (province code, city, and FSA) within Canada (Table 1).

CANADIAN FOOD INSPECTION AGENCY DATA

The CFIA dataset comprises 10 files with a combined total of 1,448,617 records of organisms imported into Canada between 2008 and 2018. Note that these records cover a large range of organisms and HS codes, not all of which are live aquatic organisms associated with the aquarium, water garden, and live seafood trades. Records for HS level 1 = 03 (fish and

crustaceans, molluscs and other aquatic invertebrates) are separated into two parts: part A (2008 – 2013) and part B (2014 – 2018). The HS level 2 for these data include 01 (live fish), 06 (crustaceans, live or not, fit for human consumption) and 07 (molluscs, live or not, fit for human consumption). Records for HS level 1 = 06 (live trees and other plants; bulbs, roots and the like; cut flowers and ornamental foliage) are separated into seven files by year (2008 – 2009, 2010, 2013, 2014, 2016, 2017, and 2018). The HS level 2 for these data can be any of the possible numbers for HS level 1 = 06, which are: 01, 02, 03, or 04 (see link below for the definitions of these specific HS code levels). Records for HS level 1 = 12 (oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit; industrial or medicinal plants; straw and fodder) are found in a single file (containing records for all years 2008 – 2018). For all of these data, HS level 2 = 12 (see the linked guide below for a detailed description of this specific HS code level). HS and OGD codes given in these data may not pair up completely with the Pathfinder data. Thus HS levels were mainly used for sorting organism categories. Further details on HS and OGD codes and classifications can be found using the CFIA guide on the Automated Import Reference System (AIRS).

These datasets contain information on the type of organisms that were imported (using the commercial description of goods) along with quantities in specified units. Finally, the dataset also contains information on the location of the port of entry (province), vendor (city, province/state, country), country of origin, and destination (province) (Table 2).

RETAILER DATA

The retailer data compiled from web searches contains 3,625 records of physical (brick and mortar) stores. This list consists of 1,163 aquarium stores, 1,284 water garden stores, and 2,341 live seafood stores. These categories are identified using columns labelled as “Aquarium”, “Water Garden” or “Live Seafood”, where the retailer assigned to each pathway is identified with a “1” (assigned) or “0” (not assigned; see Table 3 for an example). The search for retailers was national in scope but stratified by province. No retailers selling live aquatic organisms were found in Nunavut. The majority of retailers were found in Ontario (1,345 retailers) and Quebec (1,051 retailers) as shown in Table 4.

The retailer dataset contains information on the stores, including names and store type. Details on store location (address, city, province, and postal code) and contact (phone number, or source/website) are given as well, as this information is available through public web searches and review sites. Comments include details of specific organisms sold or details about the type of sales undertaken by the retailer.

Table 3 displays the names of the columns in the retailer data, their descriptions, and an example of the values found in the columns.

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REFERENCES

Bradie, J., Chivers, C., and Leung, B. 2013. Importing risk: quantifying the propagule pressure-establishment relationship at the pathway level. Divers. Distrib. 19(8): 1020–1030.

Chan, F.T., Drake, D.A.R, Therriault, T.W. 2021. The Risk of Introducing Live Organisms by the Aquarium, Water Garden, and Seafood Trades in Canada. DFO Can. Sci. Advis. Sec. Res. Doc. 2021/036. iv + 139 p.

Froese, R. and Pauly, D. 2019. FishBase [web application]. (accessed 15 January 2020).

Gertzen, E.L., Familiar, O., and Leung, B. 2008. Quantifying invasion pathways: fish introductions from the aquarium trade. Can. J. Fish. Aquat. Sci. 65(7): 1265–1273.

Mandrak, N.E., Gantz, C.A., Jones, L.A., Marson, D., and Cudmore, B.C. 2014. Evaluation of five freshwater fish screening-level risk assessment protocols and application to non-indigenous organisms in trade in Canada. DFO Can. Sci. Advis. Sec. Res. Doc. 2013/122. v + 125 p.

Rixon, C.A.M., Duggan, I.C., Bergeron, N.M.N., Ricciardi, A., and MacIsaac, H.J. 2005. Invasion risks posed by the aquarium trade and live fish markets on the Laurentian Great Lakes. Biodivers. Conserv. 14(6): 1365–1381.

TABLES

Table 1. *Explanation of the variables (column heading, description, and example data of first record) found in the Pathfinder datasheet. Column headings are shown exactly as they are indicated in the data, while the descriptions briefly describe the contents. Column headings and contents were obtained directly from CBSA unless otherwise stated as created by DFO (using * in the description, see note). All names and codes of countries, provinces, states, and cities, as well as release office names, were verified for inconsistencies and modified to the correct version when multiple records were found indicating the same location/code but with a different spelling. Note that record month is approximate and can be from the 15th of the month prior to the 15th of the stated month.*

Column heading	Description	Example of first record
Line_ID	Unique row identifier in the DFO database*	1
Rel_Release_Office	CBSA office ID	821
Office_Name	Name of CBSA office*	Vancouver - International Airport
Office_City	City of CBSA office*	Richmond
Office_Pro	Province of CBSA office*	BC
Office_Long	Longitude of CBSA office location (degrees)*	-123.178
Office_Lat	Latitude of CBSA office location (degrees)*	49.19548
month	Approximate month that the record was obtained*	July
year	Year that the record was obtained*	2018
Rel_Cntry_Of_Orig_Cde	Country code of origin	VN
Rel_Origin_State_Cde	State code of origin	NA**
Rel_Vndr_Cntry_Cde	Vendor country code	VN
Rel_Vndr_Prov_St_Cde	Vendor province or state code	VN
Rel_Vndr_City	Vendor city	HO CHI MINH CITY
Rel_Imp_City	Importer city	VANCOUVER
Rel_Imp_Cntry_Cde	Importer country code	CA
Rel_Imp_FSA	Importer FSA*	V5P
Rel_Imp_Prov_St_Cde	Importer province or state code	BC
Rel_Dest_City	Destination city	VANCOUVER
Rel_Dest_Prov_St_Cde	Destination province or state code	BC
Rel_Dest_FSA	Destination FSA*	V5P
Rel_HScode	Harmonized System (HS) code, unique code to identify the type of live goods	301110000
Rel_Airs_Cde	Automated Import Reference System codes	632876

Column heading	Description	Example of first record
Rel_Goods_Com_Desc	Description of the goods found in the record. This column was generated by user input, and was left unchanged, therefore may contain errors or inconsistencies. Species names (common and scientific) were generated in the following columns using this information.	LIVE MARBLE GOBY FISH
Updated_SpComName	Common name of the species*	Marble goby, Marbled sleeper
Updated_Standardized_SpSciName	Scientific name of the species, standardized*	*Oxyeleotris marmorata*
Taxa	General taxa of the organism (Fish, Invertebrate, Plant, Amphibian)*	Fish
Previous_Studies	Fish species that have been documented by previous studies (1 = Mandrak et al. 2014, 2 = Gertzen et al. 2008, and 3 = Rixon et al. 2005, 0 = none of these previous studies)*	1
Number_Individuals	Number of individuals of the indicated species in the record, converted from Rel_Qty_Gds from original units Rel_Qty_Gds_Uom*	350
Rel_Qty_Gds	Relative quantity of goods	126
Rel_Qty_Gds_Uom	Unit for Rel_Qty_Gds (DZN = dozen, KGM = kilograms, MIL = million, NMB = number, PCE = piece)	KGM
Inconsistency	Indication of any inconsistencies found with the record*	1
Aquarium	Indicates if organism could be found in aquarium pathway (1) or not (0)*	0
WaterGarden	Indicates if organism could be found in water garden pathway (1) or not (0)*	0
LiveSeafood	Indicates if organism could be found in live seafood pathway (1) or not (0)*	1
Other	Indicates if organism could be found in other pathway (1) or not (0)*	0

*indicates records that were created by DFO using information from CBSA or other sources

**some values for states/countries are not available and marked as NA

***Table 2**. Explanation of the variables (column heading, description, and example data using first record) found in the CFIA data. Column headings are shown exactly as they are indicated in the data, while descriptions briefly describe the variable content. All information obtained from this dataset was provided by CFIA and unaltered. CFIA data were separated into multiple files and covered three different HS level 1 codes (03, 06, and 12).*

Column heading	Descriptions	Example of first record
Calendar Year	Year of import	2014
Commercial Description	Description of the goods	Abalistes stellaris – TSN 646167 – Starry Triggerfish (ornamental, live)
HS and OGD Number	Number representing the HS code levels (first six digits), along with OGD extension (may not match with HS codes in Pathfinder data)*	030119000708
HS Level 1	First HS level code (first two digits of HS number)**	03
HS Level 2	Second HS level code (third and fourth digits of HS number)**	01
Quantity of Goods	Quantity of items (in specified units)	1
Quantity Qualifier	Unit describing the quantity of goods*	NMB
Port Province	Port province within Canada	ALBERTA
Vendor City	City of the vendor	EL Segundo
Vendor Province	Province/State of the vendor	CALIFORNIA
Vendor Country	Country of the vendor	UNITED STATES
Country of Origin	Country of origin	UNITED STATES
Destination Province	Destination province within Canada	ALBERTA

*See the CFIA Automated Import Reference System (AIRS) for more information on HS and OGS codes

**These columns are not found in the data files for HS level 1 = 06

Table 3. *Explanation of the variables found in the retailer data (column heading, description, example data using first record). Column headings are shown exactly as they are indicated in the data, while descriptions briefly describe the contents. An example is provided to show how the actual data will be displayed. Dashes indicate no data were available for that field in this example.*

Column heading	Descriptions	Example of first record
Line_ID	Unique row identifier	1
Parent_Company	Parent company name of the retailer. Not always indicated	-
Store_Company_Name	Name of the store or company	1 Fish 2 Fish Dartmouth Aquarium Supplies
Store_Type	General category of the store based on the type of goods offered	Aquarium store
Fishes	Indicates if the retailer offers fishes as a good (1) or not (0)	1
Invertebrates	Indicates if the retailer offers invertebrates as a good (1) or not (0)	1
Plants	Indicates if the retailer offers plants as a good (1) or not (0)	1
Aquarium	Indicates if retailer offerings may be destined for the aquarium pathway (1) or not (0)	1
WaterGarden	Indicates if retailer offerings may be destined for the water garden pathway (1) or not (0)	1
LiveSeafood	Indicates if retailer offerings may be destined for the live seafood pathway (1) or not (0)	0
Address	Address of the retailer	75 MacDonald Ave
City	City of the retailer	Dartmouth
Province	Province of the retailer	NS
Postal_Code	Postal code of the retailer	B3B1T8
Phone_Number	Phone number of the retailer	(902) 446-3474
Comments	Comments on species that are offered, or other comments given when contacted	Also distributor
Sources	Source used to find the retailer, such as search engine, reviewer website, or store website	-

Table 4. *Summary of the number of retailers documented in each province and categorized by pathway in the retailer dataset. Because aquarium retailers were also categorized as water garden retailers, the total number of retailers documented across aquarium, water garden, and live seafood pathways does not equal the total number of retailers.*

Province/territory code	Province/territory name	Number of aquarium retailers	Number of water garden retailers	Number of live seafood retailers	Total number of retailers
AB	Alberta	140	153	180	333
BC	British Columbia	177	200	174	376
MB	Manitoba	45	48	45	93
NB	New Brunswick	25	28	84	112
NL	Newfoundland and Labrador	14	16	40	56
NS	Nova Scotia	31	37	109	146
NT	Northwest Territories	1	1	2	3
NU	Nunavut	0	0	0	0
ON	Ontario	458	509	835	1345
PE	Prince Edward Island	6	7	36	43
QC	Quebec	233	257	794	1051
SK	Saskatchewan	32	35	40	75
YT	Yukon	2	2	2	4
Total	**-**	**1164**	**1293**	**2341**	**3637**