Supporting information

Table S1 – Arrival location main vessel types

Table S 1: Annotated list of nodes that occur throughout New Zealand's seascape that received commercial vessels during the study period. For each node or port, the source of vessel traffic – international or domestic – is listed based on the previous port-of-call for vessels arriving at those nodes (✓ = present, – = absent). A description of each node's context and setting for maritime activity is also provided, along with the main commercial maritime activities known to occur (✓ = present, – = negligible or absent).

Node (port) name	Type of vessel traffic received at each node		Descriptive context and setting for maritime activity at each node	Main commercial maritime activities at each node						
	international	domestic		Commercial cargo	Ferry terminal	Aquaculture industry	Commercial fishing	Regional tourist vessels	Cruise ship tender port	Cruise ship docking
Akaroa	–	✓	Small wharf; tender port for cruise ships	–	–	✓	✓	✓	✓	–
Auckland	✓	✓	Large cargo port	✓	✓	✓	✓	✓	–	✓
Bay of Islands	–	✓	Small wharves; tender port for cruise ships	–	✓	✓	✓	✓	✓	–
Bayswater	–	✓	Ferry terminal and marina setting	–	✓	–	–	–	–	–
Bluff	✓	✓	Large cargo port	✓	–	✓	✓	✓	–	✓
Chelsea	✓	✓	Single use terminal; sugar plant	✓	–	–	–	–	–	–
Devonport	✓	✓	Military base; ferries; tourism	–	✓	–	–	✓	–	–
Dunedin	✓	✓	Large cargo port	✓	–	–	–	✓	–	✓
Gisborne	✓	✓	Large cargo port	✓	–	–	✓	–	–	✓
Greymouth	–	✓	Fishing port; historical regional cargo hub	–	–	–	✓	–	–	–
Gulf Harbour	–	✓	Ferry terminal and marina setting	–	✓	–	–	✓	–	–
Half Moon Bay	✓	✓	Ferry terminal and marina setting	–	✓	–	–	✓	–	–
Havelock	–	✓	Aquaculture hub; marina setting with commercial wharves	–	–	✓	✓	✓	–	–
Kaikoura	–	✓	Fishing and tourism hub; small wharves	–	–	–	✓	✓	✓	–
Kaiteriteri	–	✓	Regional tourist vessel hub; no wharves	–	–	–	–	✓	–	–
Kawau	–	✓	Single use terminal; ferry	–	✓	–	–	✓	–	–
Kawhia	–	✓	Small wharves; fishing	–	–	–	✓	–	–	–
Lyttelton	✓	✓	Large cargo port	✓	–	✓	✓	✓	–	✓
Mangonui	–	✓	Small wharves; fishing	–	–	–	✓	–	–	–
Marsden Point	✓	✓	Large cargo port	✓	–	–	–	–	–	✓

Node (port) name	Type of vessel traffic received at each node		Descriptive context and setting for maritime activity at each node	Main commercial maritime activities at each node						
	international	domestic		Commercial cargo	Ferry terminal	Aquaculture industry	Commercial fishing	Regional tourist vessels	Cruise ship tender port	Cruise ship docking
Milford	–	✓	Tourism hub; tender port for cruise ships	–	–	–	✓	✓	✓	–
Moeraki	–	✓	Small wharves; fishing	–	–	–	✓	–	–	–
Napier	✓	✓	Large cargo port	✓	–	–	✓	–	–	✓
Nelson	✓	✓	Large cargo port	✓	–	✓	✓	–	–	✓
New Plymouth	✓	✓	Large cargo port	✓	–	–	✓	–	–	✓
Okiato	–	✓	Single use terminal; ferry	–	✓	–	–	–	–	–
Onehunga	–	✓	Small wharves; fishing	–	–	–	✓	–	–	–
Opua	–	✓	Ferry; marina with regional tourism and aquaculture	–	✓	✓	✓	✓	–	–
Orakei	–	✓	Marina setting; tourism	–	–	–	–	✓	–	–
Paihia	–	✓	Ferry terminal; tender port for cruise ships	–	✓	–	–	✓	✓	–
Picton	✓	✓	Large cargo port; major ferry hub	✓	✓	✓	✓	✓	–	✓
Porirua	–	✓	Marina setting; fishing	–	–	–	✓	✓	–	–
Port Chalmers	✓	✓	Large cargo port	✓	–	–	✓	✓	–	✓
Port Fitzroy	–	✓	Single use terminal; ferry	–	✓	–	✓	✓	–	–
Ravensbourne	✓	✓	Single use terminal; fertilizer plant	✓	–	–	–	–	–	–
Riverton	–	✓	Small wharves; fishing	–	–	–	✓	–	–	–
Russell	✓	✓	Ferry; marina with regional tourism and aquaculture	–	✓	✓	✓	✓	–	–
Ship Cove	–	✓	Small wharves; regional tourist vessels	–	–	–	–	✓	–	–
Snares	✓	✓	Island tourist vessel destination; no wharves	–	–	–	–	✓	✓	–
Stewart Island	–	✓	Aquaculture & tourism hub; tender port for cruise ships; commercial fishing	–	✓	✓	✓	✓	✓	–
Tairua	–	✓	Small wharves; regional tourist vessels	–	–	–	–	✓	–	–
Tamaki	–	✓	Small wharves; regional tourist vessels	–	–	–	–	✓	–	–
Tarakohe	–	✓	Aquaculture hub; commercial fishing and marina setting	–	–	✓	✓	–	–	–
Tauranga	✓	✓	Large cargo port	✓	–	✓	✓	✓	–	✓
Timaru	✓	✓	Large cargo port	✓	–	–	✓	–	–	✓

Node (port) name	Type of vessel traffic received at each node		Descriptive context and setting for maritime activity at each node	Main commercial maritime activities at each node						
	international	domestic		Commercial cargo	Ferry terminal	Aquaculture industry	Commercial fishing	Regional tourist vessels	Cruise ship tender port	Cruise ship docking
Tolaga Bay	–	✓	Small wharf; historic cargo	–	–	–	–	✓	–	–
Tryphena	–	✓	Single use terminal; ferry	–	✓	–	–	–	–	–
Waiheke Car Ferry	–	✓	Single use terminal; ferry	–	✓	–	–	–	–	–
Waiheke Island	–	✓	Ferry terminal; small wharves and tourist vessels	–	✓	–	–	✓	–	–
Waikawa	–	✓	Marina setting; aquaculture and tourism vessels	–	–	✓	–	✓	–	–
Whanganui	–	✓	Regional cargo port; fishing	✓	–	–	✓	–	–	–
Wellington	✓	✓	Large cargo port; major ferry hub	✓	✓	–	✓	✓	–	✓
West Harbour	–	✓	Single use terminal; ferry	–	–	–	–	✓	–	–
Westhaven	✓	✓	Ferry terminal and marina setting	–	–	–	–	✓	–	–
Westport	–	✓	Fishing port	–	–	–	✓	✓	–	–
Whakatane	–	✓	Small wharves; regional tourist vessels and aquaculture	–	–	✓	–	✓	–	–
Whangarei	✓	✓	Small wharves; maritime services, tourism, fishing	–	–	–	✓	✓	–	–
Whangaroa	–	✓	Aquaculture harbour; marina and small wharves	–	–	✓	✓	✓	–	–
White Island	–	✓	Small wharves; regional tourist vessels	–	–	–	–	✓	–	–
Whitianga	✓	✓	Marina setting; tourism vessels and fishing	–	–	–	✓	✓	–	–

Total wetted surface area calculations

We began by estimating the Denny-Mumford wetted surface area (WSA) of each individual vessel via Equation 1 (Moser et al., 2016):

$$WSA = aDWT^b \quad 1$$

Where DWT stands for the individual vessel's deadweight tonnage, and a and b represent the vessel-type specific coefficient and exponent, respectively, developed

by Moser et al. (2016). We re-assigned our 49 unique vessel types into the 10 parent vessel types developed by Moser et al. (2016) based on similarities in hull characteristics and form (see Table S1 3).

Deadweight tonnage was not available for all vessels, so we fitted linear models (estimated using OLS) with DWT as the response variable, using vessel type, length, width, width plus poly term, and gross registered tonnage (GRT) as potential predictors. Length, width and GRT were correlated ($r > 0.7$ and so could not be used together in the same model). We used forward stepwise selection to identify the most parsimonious model, using Aikake Information Criteria (AIC) (Symonds & Moussalli, 2011) (see Table S1 1). Parameters were considered significant when p values were below 0.05, and the explanatory value of the model was evaluated using the R^2 value (Mac Nally et al., 2018).

Table S1 1: Candidate models considered to predict deadweight tonnage for vessels where that information was missing.

candidate	formula	df	AIC	deltaAIC
PolyWidthMd	sqrt(DWT) ~ poly(width, 2) + VesTypeNew	12	16150.3	NA
WidthMd	sqrt(DWT) ~ width + VesTypeNew	11	16218.8	68.48
LengthMd	sqrt(DWT) ~ Length + VesTypeNew	11	16500.2	281.43
GRTMd	sqrt(DWT) ~ GRT + VesTypeNew	11	16723.2	223.04
NullMd	sqrt(DWT) ~ 1	2	20550.3	3827.07

The selected model explains a statistically significant and substantial proportion of variance ($R2 = 0.92$, $F(10, 1768) = 1944.05$, $p < .001$, adj. $R2 = 0.92$). Significant predictors are illustrated in Table S1 2.

Table S1 2: Selected model significant predictors (r < 0.05), intercept and R^2

R2	0.92
Intercept	210.1
Intercept p value	2.00E-16
Width (first degree)	+
Width (second degree)	+
Vessel type: BLK	+
Vessel type: CON	+
Vessel type: FSN	+
Vessel type: GEN	+
Vessel type: OIL	
Vessel type: PSS	+
Vessel type: RORO	+
Vessel type: TNK	+
Vessel type: VEH	+

The selected model was then used to predict DWT values for all vessels for which it was missing.

The final TWSA value for each vessel was calculated via Equation 2 (Ceballos-Osuna et al., 2021):

$$TWSA = WSA(1 + N_p) \quad 2$$

Where WSA represents the wetted surface area calculated by Equation 1, and N_p refers to a vessel type-specific value representing the fraction of the vessel's underwater surface made up of complex niche areas (Ceballos-Osuna et al., 2021; Moser et al., 2017).

Table S1 3: Table of raw vessel types provided in the Marine Traffic data, and the pooled data type used to model DWT from length

Raw vessel type	**Aggregated vessel type**
Bulk Carrier	BLK
Cement Carrier	BLK
Timber Carrier	BLK
Wood Chips Carrier	BLK
Ore Carrier	BLK
Heavy Load Carrier	BLK
Container Ship	CON

Raw vessel type	Aggregated vessel type
Heavy Lift Vessel	CON
Reefer/Containership	CON
Fishing	FSN
Fishing Vessel	FSN
Trawler	FSN
Factory Trawler	FSN
Fishery Support Vessel	FSN
Fishery Patrol Vessel	FSN
Fish Factory	FSN
Fish Carrier	FSN
General Cargo	GEN
Reefer	GEN
Cargo	GEN
Cargo/Containership	GEN
Cargo - Hazard A (Major)	GEN
Oil/Chemical Tanker	OIL
Crude Oil Tanker	OIL
Oil Products Tanker	OIL
Lpg Tanker	OIL
Lng Tanker	OIL
Unknown	Other
Other	Other
Inland, Unknown	Other
Landing Craft	Other
Unspecified	Other
Platform	Other
Drilling Rig	Other
Training Ship	Other
Passenger	PSS
Passengers Ship	PSS
Passenger Ship	PSS
High Speed Craft	PSS
Ro-Ro/Passenger Ship	PSS
Ro-Ro Cargo	RORO
Ro-Ro/Container Carrier	RORO
Chemical Tanker	TNK
Tanker - Hazard D (Recognizable)	TNK
Asphalt/Bitumen Tanker	TNK
Tanker	TNK
Inland, Motor Tanker	TNK
Vehicles Carrier	VEH
Rail/Vehicles Carrier	VEH

Table S2 – international, moderate seasonality

Table S1 4: Arrival locations with a moderate difference (p < 0.05, CV < median) in international seasonal average daily incursion risk

Arrival location	Vessel type	Seasonal CV
Nelson_NZ	FSN	27.040
New Plymouth_NZ	OIL	12.698
Port Chalmers_NZ	CON	32.679
Timaru_NZ	FSN	25.302

Table S3 – international, no seasonality

Table S1 5: Arrival locations with no identified difference (p > 0.05) in international seasonal average daily incursion risk

Arrival location	Vessel type	Seasonal CV
Auckland_NZ	PSS	0.914805417
Bluff_NZ	BLK	6.753890763
Chelsea_NZ	PSS	14.4866759
Devonport_NZ	PSS	39.01068511
Dunedin_NZ	OIL	33.2446481
Gisborne_NZ	BLK	15.22430781
Lyttelton_NZ	CON	4.885427102
Marsden Point_NZ	OIL	2.052660368
Napier_NZ	CON	19.57548329
Picton_NZ	PSS	41.02254507
Ravensbourne_NZ	BLK	157.499678
Russell_NZ	PSS	173.6606019
Snares_NZ	PSS	172.3990434
Tauranga_NZ	CON	1.817214651
Wellington_NZ	PSS	8.723238091
Whangarei_NZ	PSS	172.3990434

Table S4 – domestic, strong seasonality

Table S1 6: Arrival locations with a strong difference (p < 0.05, CV > median) in domestic seasonal average daily incursion risk

Arrival location	Vessel type	Seasonal CV
Akaroa_NZ	PSS	89.46757441
Bay of Islands_NZ	PSS	89.98404402
Bayswater_NZ	PSS	173.6606019
Gulf Harbour_NZ	PSS	39.48110599
Havelock_NZ	Other	108.344035
Kaikoura_NZ	PSS	127.5168249
Milford_NZ	PSS	82.90923576
Onehunga_NZ	FSN	47.23799877
Ravensbourne_NZ	BLK	45.16672972
Ship Cove_NZ	PSS	118.1233628
Stewart Island_NZ	PSS	119.0229136
Waikawa_NZ	GEN	103.9664505
West Harbour_NZ	GEN	147.8308465
Westport_NZ	BLK	75.64213885
Whangarei_NZ	PSS	67.917805

Table S5 – domestic, moderate seasonality

Table S1 7: Arrival locations with a moderate difference (p < 0.05, CV < median) in domestic seasonal average daily incursion risk

Arrival location	Vessel type	Seasonal CV
Auckland_NZ	PSS	16.17730864
Bluff_NZ	BLK	23.59836907
Devonport_NZ	PSS	10.67737772
Dunedin_NZ	OIL	17.78530316
Half Moon Bay_NZ	PSS	5.222607112
Napier_NZ	CON	16.106703
Okiato_NZ	PSS	23.68219764
Opua_NZ	PSS	23.67939936
Picton_NZ	PSS	7.463399923
Port Chalmers_NZ	CON	15.93114284
Port Fitzroy_NZ	PSS	29.48656686
Tauranga_NZ	CON	10.3373005
Tryphena_NZ	PSS	24.1123267
Waiheke Car Ferry_NZ	PSS	14.03389614
Waiheke Island_NZ	PSS	12.56593689
Wellington_NZ	PSS	7.026487595
Westhaven_NZ	PSS	38.95345634

Table S6 – domestic, no seasonality

Table S1 8: Arrival locations with no identified difference (p > 0.05) in domestic seasonal average daily incursion risk

Arrival location	Vessel type	Seasonal CV
Chelsea_NZ	PSS	15.05205605
Gisborne_NZ	BLK	7.565150844
Greymouth_NZ	GEN	98.88022648
Kaiteriteri_NZ	PSS	174.6189698
Kawau_NZ	PSS	63.52025884
Lyttelton_NZ	CON	3.41289541
Mangonui_NZ	PSS	172.3990434
Marsden Point_NZ	OIL	1.843751313
Moeraki_NZ	PSS	174.6189698
Nelson_NZ	FSN	4.278766587
New Plymouth_NZ	OIL	14.79232893
Orakei_NZ	PSS	58.99880502
Paihia_NZ	PSS	174.6189698
Riverton_NZ	PSS	174.6189698
Russell_NZ	PSS	172.3990434
Snares_NZ	PSS	103.8032404
Tairua_NZ	PSS	174.6189698
Tamaki_NZ	PSS	172.3990434
Tarakohe_NZ	GEN	34.00974109
Timaru_NZ	FSN	6.007930944
Tolaga Bay_NZ	PSS	174.6189698
Wanganui_NZ	GEN	67.14923533
Whakatane_NZ	PSS	172.3990434
Whangaroa_NZ	PSS	174.6189698
White Island_NZ	PSS	68.97576842
Whitianga_NZ	PSS	174.6189698

Figure S1 – boxplots of daily incoming TWSA from international sources in locations with moderate seasonality

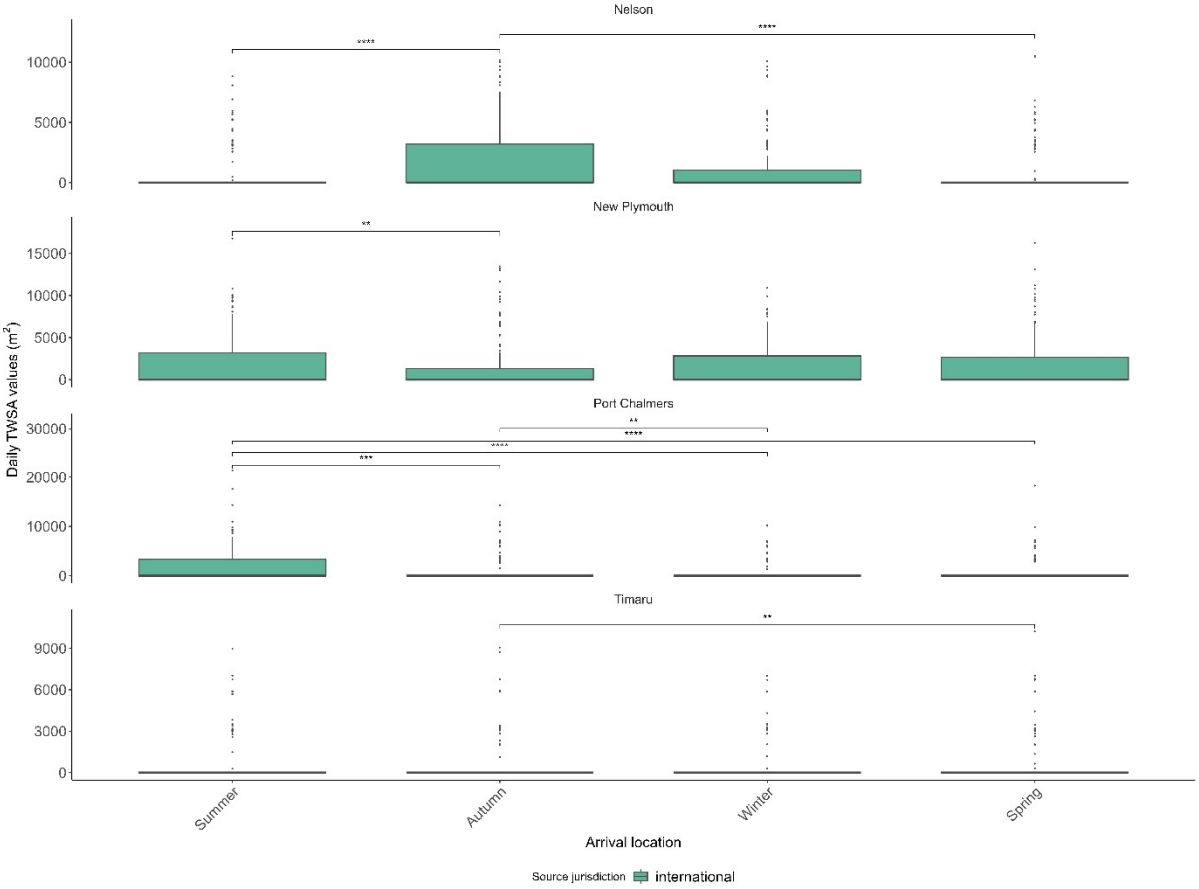

*Figure S 1: The distribution of daily incoming TWSA values for each arrival location. Includes only those locations found to have **moderate** differences in **international** daily TWSA between seasons.*

Figure S2 – boxplots of daily incoming TWSA from international sources in locations with no seasonality

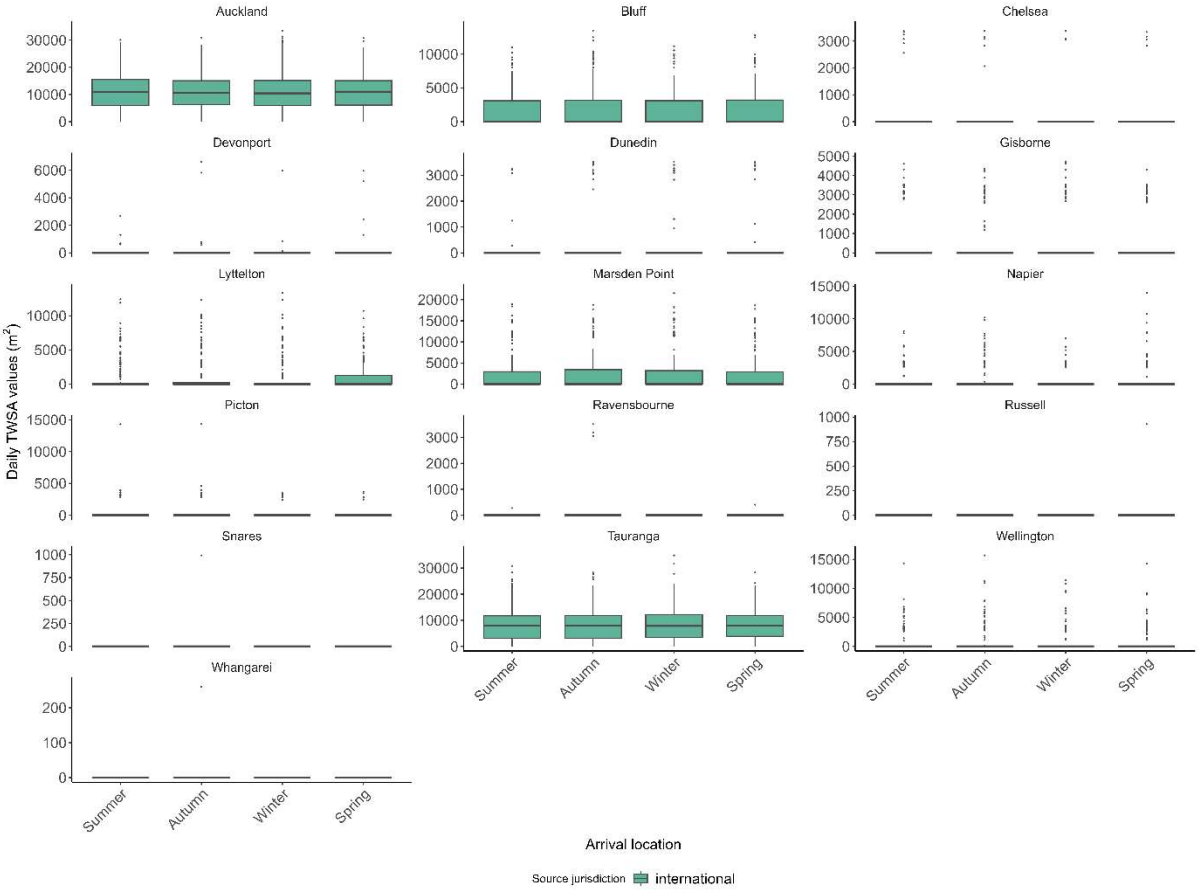

*Figure S 2: The distribution of daily incoming TWSA values for each arrival location. Includes only those locations found to have **no** predictable differences in **international** daily TWSA between seasons.*

Figure S3 – boxplots of daily incoming TWSA from domestic sources in locations with strong seasonality

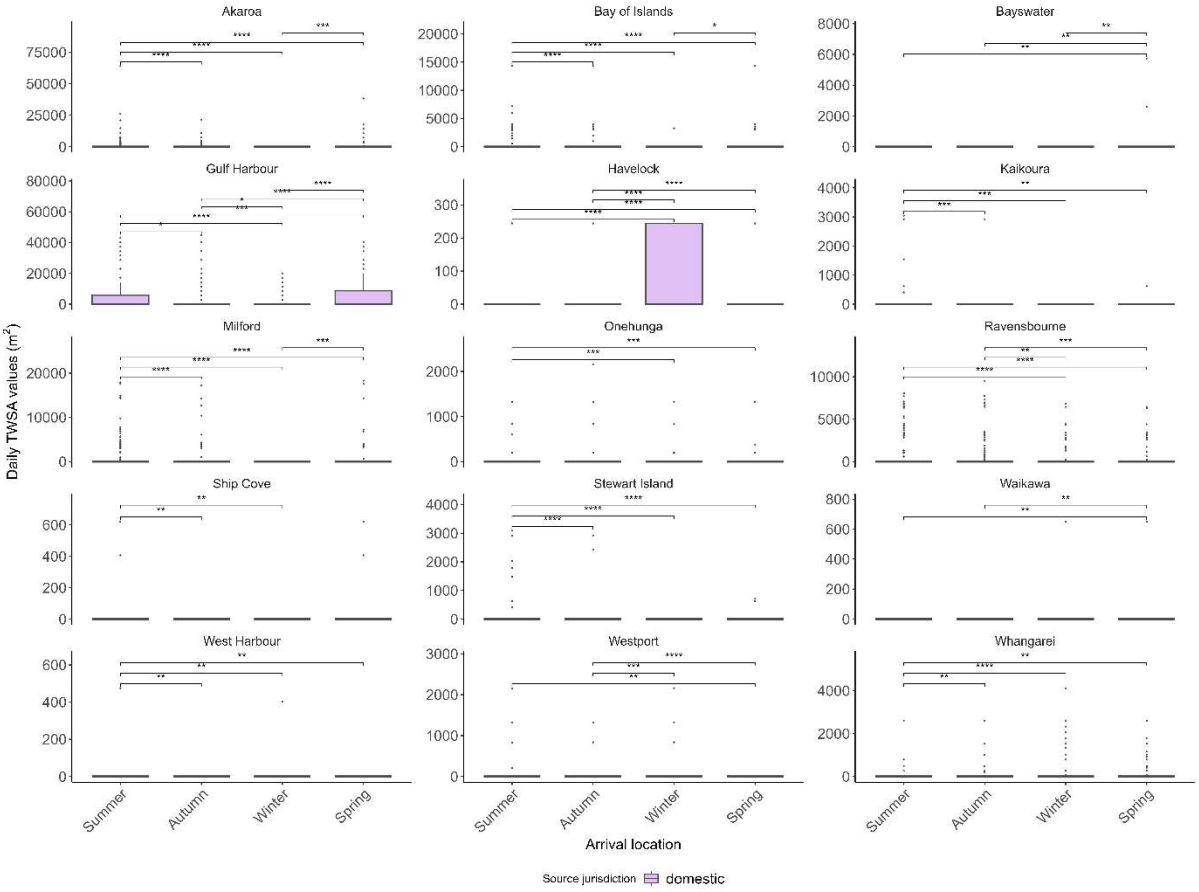

*Figure S 3: The distribution of daily incoming TWSA values for each arrival location. Includes only those locations found to have **strong** differences in domestic daily TWSA between seasons.*

Figure S4 – boxplots of daily incoming TWSA from domestic sources in locations with no seasonality

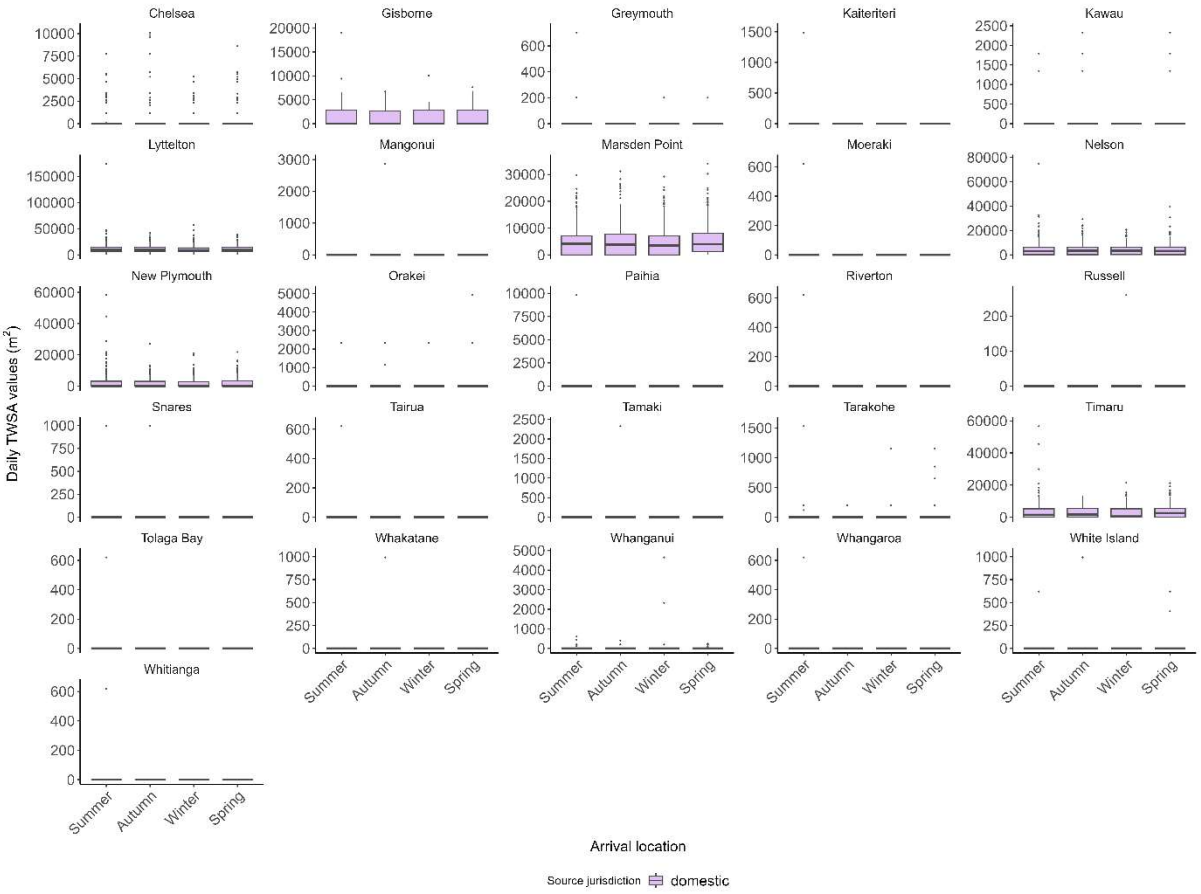

*Figure S 4: The distribution of daily incoming TWSA values for each arrival location. Includes only those locations found to have **no** predictable differences in **domestic** daily TWSA between seasons.*

Figure S5 – boxplots of daily incoming TWSA from domestic sources in locations with moderate seasonality

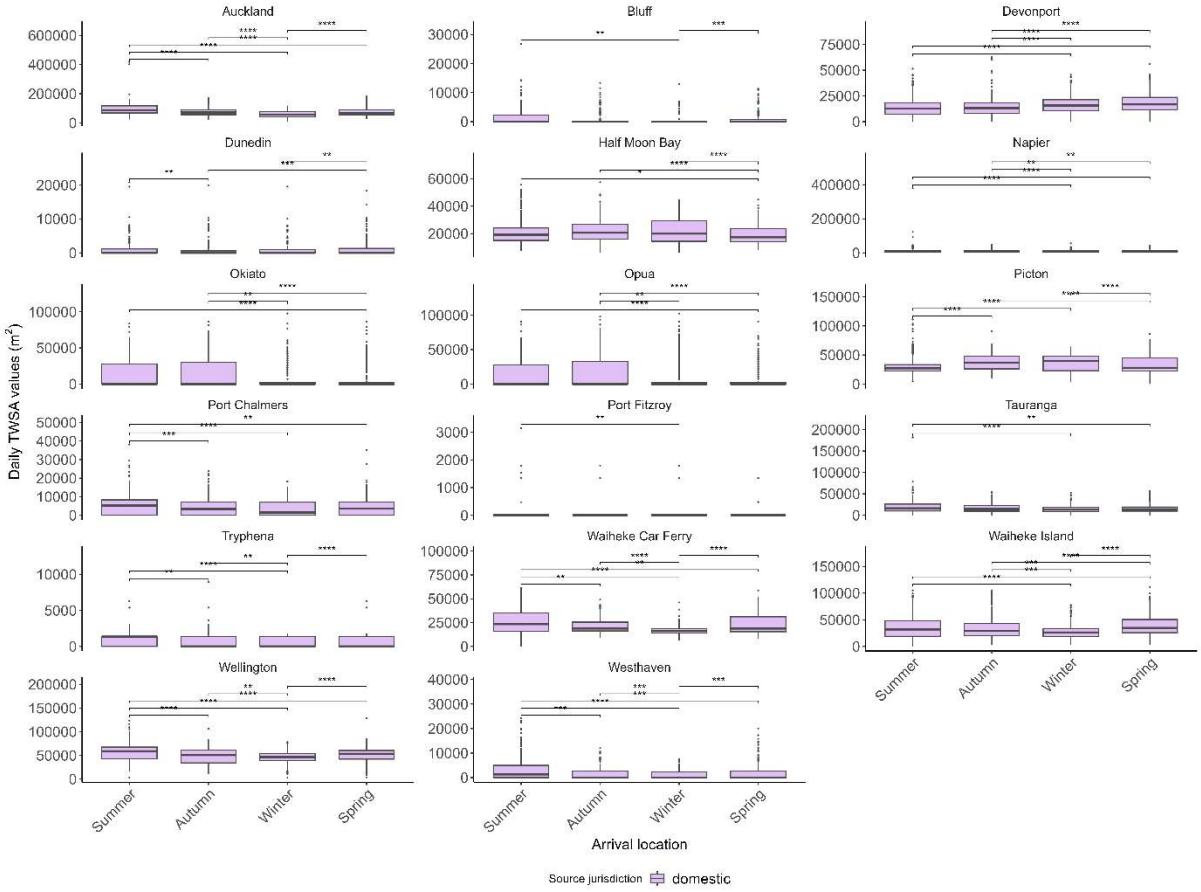

*Figure S 5: The distribution of daily incoming TWSA values for each arrival location. Includes only those locations found to have **moderate** differences in **domestic** daily TWSA between seasons.*

Table S7 – international risk, spring spawning

Table S 2: Realised risk (overlap between incoming TWSA and spawning period) for arrival locations with identified seasonality, from spring spawners arriving from international sources (in order of total realised incursion risk or TWSA)

Arrival location	Incoming TWSA during spawning	Proportion of yearly TWSA risk	Spawning period
New Plymouth_NZ	135192.4309	0.241517815	Spring (sep:nov)
Port Chalmers_NZ	90319.26184	0.194673716	Spring (sep:nov)
Nelson_NZ	71131.60678	0.184729742	Spring (sep:nov)
Timaru_NZ	56691.49641	0.339883138	Spring (sep:nov)

Table S8 – international risk, spring-summer spawning

Table S1 9: Realised risk (overlap between incoming TWSA and spawning period) for arrival locations with identified seasonality, from protracted spring/summer spawners arriving from international sources (in order of total realised incursion risk or TWSA)

Arrival location	Incoming TWSA during spawning	Proportion of yearly TWSA risk	Spawning period
New Plymouth_NZ	364538.9205	0.651239446	Spring/Summer (sep:feb)
Nelson_NZ	298829.3237	0.776063782	Spring/Summer (sep:feb)
Port Chalmers_NZ	275517.8612	0.593849915	Spring/Summer (sep:feb)
Timaru_NZ	95594.53882	0.573118966	Spring/Summer (sep:feb)

Table S9 – international risk, winter spawning

Table S1 10: Realised risk (overlap between incoming TWSA and spawning period) for arrival locations with identified seasonality, from winter spawners arriving from international sources (in order of total realised incursion risk or TWSA)

Arrival location	Incoming TWSA during spawning	Proportion of yearly TWSA risk	Spawning period
New Plymouth_NZ	135743.9772	0.242503139	Winter (jun:aug)
Nelson_NZ	102938.6655	0.267333102	Winter (jun:aug)
Port Chalmers_NZ	77328.89868	0.166674348	Winter (jun:aug)
Timaru_NZ	34976.72547	0.209696338	Winter (jun:aug)

Table S10 – domestic risk, spring spawning

Table S1 11: Realised risk (overlap between incoming TWSA and spawning period) for arrival locations with identified seasonality, from spring spawners arriving from domestic sources (in order of total realised incursion risk or TWSA)

Arrival location	Incoming TWSA during spawning	Proportion of yearly TWSA risk	Spawning period
Auckland_NZ	6659129.051	0.242660828	Spring (sep:nov)
Wellington_NZ	4566731.968	0.252197801	Spring (sep:nov)
Waiheke Island_NZ	3628763.841	0.290600886	Spring (sep:nov)
Picton_NZ	3003955.274	0.237012053	Spring (sep:nov)
Waiheke Car Ferry_NZ	2099179.663	0.26638619	Spring (sep:nov)
Half Moon Bay_NZ	1791716.641	0.227191564	Spring (sep:nov)
Devonport_NZ	1664775.049	0.28574083	Spring (sep:nov)
Tauranga_NZ	1431774.767	0.239624316	Spring (sep:nov)
Napier_NZ	788035.49	0.21991241	Spring (sep:nov)
Okiato_NZ	746663.7941	0.184232429	Spring (sep:nov)
Opua_NZ	746277.1385	0.173006579	Spring (sep:nov)
Gulf Harbour_NZ	588628.1357	0.363939424	Spring (sep:nov)
Port Chalmers_NZ	408972.6941	0.245843564	Spring (sep:nov)
Westhaven_NZ	202923.193	0.264402296	Spring (sep:nov)
Dunedin_NZ	119343.8513	0.299780233	Spring (sep:nov)
Bluff_NZ	103004.2867	0.26793289	Spring (sep:nov)
Tryphena_NZ	62974.16896	0.262678149	Spring (sep:nov)
Akaroa_NZ	42944.90928	0.278199071	Spring (sep:nov)
Milford_NZ	33242.8637	0.239261655	Spring (sep:nov)
Bay of Islands_NZ	19109.00825	0.230123452	Spring (sep:nov)
Ravensbourne_NZ	15847.14937	0.133938944	Spring (sep:nov)
Port Fitzroy_NZ	10595.73268	0.236211926	Spring (sep:nov)
Whangarei_NZ	6372.902333	0.313220589	Spring (sep:nov)
Bayswater_NZ	3396.391462	1	Spring (sep:nov)
Havelock_NZ	1891.962051	0.348314607	Spring (sep:nov)
Onehunga_NZ	1383.177965	0.103735562	Spring (sep:nov)
Waikawa_NZ	987.9210485	0.6	Spring (sep:nov)
Stewart Island_NZ	489.1337122	0.049162222	Spring (sep:nov)
Ship Cove_NZ	411.9746748	0.285180727	Spring (sep:nov)
Kaikoura_NZ	310.3298787	0.062742667	Spring (sep:nov)
West Harbour_NZ	0	0	Spring (sep:nov)
Westport_NZ	0	0	Spring (sep:nov)

Table S11 – domestic risk, spring/summer spawning

Table S1 12: Realised risk (overlap between incoming TWSA and spawning period) for arrival locations with identified seasonality, from protracted spring/summer spawners arriving from domestic sources (in order of total realised incursion risk or TWSA)

Arrival location	Incoming TWSA during spawning	Proportion of yearly TWSA risk	Spawning period
Auckland_NZ	16962116.55	0.618105044	Spring/Summer (sep:feb)
Wellington_NZ	11580578.72	0.639537531	Spring/Summer (sep:feb)
Picton_NZ	8905865.403	0.702672725	Spring/Summer (sep:feb)
Waiheke Island_NZ	7598188.493	0.608482778	Spring/Summer (sep:feb)
Half Moon Bay_NZ	5484363.611	0.695423103	Spring/Summer (sep:feb)
Waiheke Car Ferry_NZ	4725726.078	0.599695294	Spring/Summer (sep:feb)
Devonport_NZ	3859126.425	0.662377773	Spring/Summer (sep:feb)
Tauranga_NZ	3813733.436	0.638273064	Spring/Summer (sep:feb)
Opua_NZ	3049493.248	0.706952373	Spring/Summer (sep:feb)
Okiato_NZ	2862115.741	0.706200756	Spring/Summer (sep:feb)
Napier_NZ	2314352.956	0.64585281	Spring/Summer (sep:feb)
Port Chalmers_NZ	1032310.681	0.620547387	Spring/Summer (sep:feb)
Gulf Harbour_NZ	820068.9419	0.507035597	Spring/Summer (sep:feb)
Westhaven_NZ	378321.967	0.492941173	Spring/Summer (sep:feb)
Bluff_NZ	228413.1324	0.594144113	Spring/Summer (sep:feb)
Dunedin_NZ	221910.3552	0.557417389	Spring/Summer (sep:feb)
Tryphena_NZ	134150.8818	0.559570787	Spring/Summer (sep:feb)
Ravensbourne_NZ	71377.23723	0.603275171	Spring/Summer (sep:feb)
Akaroa_NZ	64047.65316	0.414903604	Spring/Summer (sep:feb)
Milford_NZ	48334.20511	0.347879834	Spring/Summer (sep:feb)

Arrival location	Incoming TWSA during spawning	Proportion of yearly TWSA risk	Spawning period
Bay of Islands_NZ	29213.48793	0.351808351	Spring/Summer (sep:feb)
Port Fitzroy_NZ	28593.7152	0.637443086	Spring/Summer (sep:feb)
Whangarei_NZ	15501.85996	0.761898027	Spring/Summer (sep:feb)
Onehunga_NZ	9645.732629	0.72341052	Spring/Summer (sep:feb)
Westport_NZ	8899.076265	0.851817553	Spring/Summer (sep:feb)
Stewart Island_NZ	5051.049077	0.507674673	Spring/Summer (sep:feb)
Havelock_NZ	4577.327544	0.842696629	Spring/Summer (sep:feb)
Kaikoura_NZ	2157.928044	0.436291091	Spring/Summer (sep:feb)
Waikawa_NZ	658.6140323	0.4	Spring/Summer (sep:feb)
Ship Cove_NZ	310.3298787	0.214819273	Spring/Summer (sep:feb)
West Harbour_NZ	221.3499143	0.267659153	Spring/Summer (sep:feb)
Bayswater_NZ	0	0	Spring/Summer (sep:feb)

Table S12 – domestic risk, winter spawning

Table S1 13: Realised risk (overlap between incoming TWSA and spawning period) for arrival locations from winter spawners arriving from domestic sources (in order of total realised incursion risk or TWSA)

Arrival location	Incoming TWSA during spawning	Proportion of yearly TWSA risk	Spawning period
Auckland_NZ	5433837.149	0.198010793	Winter (jun:aug)
Wellington_NZ	4133583.061	0.22827715	Winter (jun:aug)
Picton_NZ	3375623.108	0.266336642	Winter (jun:aug)
Waiheke Island_NZ	2531570.903	0.20273481	Winter (jun:aug)
Half Moon Bay_NZ	2041146.982	0.258819595	Winter (jun:aug)
Devonport_NZ	1538007.603	0.263982554	Winter (jun:aug)
Waiheke Car Ferry_NZ	1512427.665	0.19192728	Winter (jun:aug)
Tauranga_NZ	1305091.406	0.218422369	Winter (jun:aug)
Opua_NZ	928310.2288	0.215206615	Winter (jun:aug)
Okiato_NZ	814040.8526	0.200857099	Winter (jun:aug)
Napier_NZ	765925.3215	0.213742256	Winter (jun:aug)
Port Chalmers_NZ	352544.6535	0.211923278	Winter (jun:aug)
Gulf Harbour_NZ	164067.4999	0.101440328	Winter (jun:aug)
Westhaven_NZ	98576.74158	0.128442276	Winter (jun:aug)
Dunedin_NZ	90701.47244	0.227833342	Winter (jun:aug)
Bluff_NZ	68777.74028	0.178903415	Winter (jun:aug)
Tryphena_NZ	38742.19986	0.161601646	Winter (jun:aug)
Ravensbourne_NZ	18492.67101	0.156298698	Winter (jun:aug)
Whangarei_NZ	10110.68079	0.496927966	Winter (jun:aug)
Port Fitzroy_NZ	6591.853919	0.146952982	Winter (jun:aug)
Havelock_NZ	3417.737899	0.629213483	Winter (jun:aug)
Onehunga_NZ	2186.563737	0.163987876	Winter (jun:aug)
Westport_NZ	1497.684785	0.143358046	Winter (jun:aug)
Bay of Islands_NZ	818.9875873	0.009862796	Winter (jun:aug)
Waikawa_NZ	658.6140323	0.4	Winter (jun:aug)
West Harbour_NZ	100.2230393	0.121190983	Winter (jun:aug)
Akaroa_NZ	0	0	Winter (jun:aug)
Bayswater_NZ	0	0	Winter (jun:aug)
Kaikoura_NZ	0	0	Winter (jun:aug)
Milford_NZ	0	0	Winter (jun:aug)
Ship Cove_NZ	0	0	Winter (jun:aug)

Literature cited

Ceballos-Osuna, L., Scianni, C., Falkner, M., Nedelcheva, R., & Miller, W. (2021). Proxy-based model to assess the relative contribution of ballast water and biofouling's potential propagule pressure and prioritize vessel inspections. *PLOS ONE*, *16*(7), e0247538. https://doi.org/10.1371/journal.pone.0247538

Mac Nally, R., Duncan, R. P., Thomson, J. R., & Yen, J. D. (2018). Model selection using information criteria, but is the "best" model any good? *Journal of Applied Ecology*, *55*(3), 1441-1444.

Moser, C. S., Wier, T. P., First, M. R., Grant, J. F., Riley, S. C., Robbins-Wamsley, S. H., Tamburri, M. N., Ruiz, G. M., Miller, A. W., & Drake, L. A. (2017). Quantifying the extent of niche areas in the global fleet of commercial ships: the potential for "super-hot spots" of biofouling. *Biological Invasions*, *19*(6), 1745-1759. https://doi.org/10.1007/s10530-017-1386-4

Moser, C. S., Wier, T. P., Grant, J. F., First, M. R., Tamburri, M. N., Ruiz, G. M., Miller, A. W., & Drake, L. A. (2016). Quantifying the total wetted surface area of the world fleet: a first step in determining the potential extent of ships' biofouling. *Biological Invasions*, *18*(1), 265-277. https://doi.org/10.1007/s10530-015-1007-z

Symonds, M. R. E., & Moussalli, A. (2011). A brief guide to model selection, multimodel inference and model averaging in behavioural ecology using Akaike's information criterion. *Behavioral Ecology and Sociobiology*, *65*(1), 13-21. https://doi.org/10.1007/s00265-010-1037-6