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Malcolm P. Francis[A,F], *Mark A. Morrison*[B], *John Leathwick*[C,D] *and Cameron Walsh*[B,E]

[A]National Institute of Water and Atmospheric Research Ltd, Private Bag 14 901, Wellington, New Zealand.

[B]National Institute of Water and Atmospheric Research Ltd, PO Box 109 695, Auckland, New Zealand.

[C]National Institute of Water and Atmospheric Research Ltd, PO Box 11 115, Hamilton, New Zealand.

[D]Present address: Department of Conservation, PO Box 112, Hamilton 3240, New Zealand.

[E]Present address: 16c Gatman Street, Auckland 0626, New Zealand.

[F]Corresponding author. Email: m.francis@niwa.co.nz

Table S1. Survey year, estuary type and area of the 69 harbours surveyed, number of sites beach seined in each harbour, and fish species richness (excluding rare species; see text for definition). EEC = Estuarine Environment Classification (see Hume *et al.* 2007).

Number	Harbour	Year	EEC Type	EEC code	Area (km^2)	No. of sites	Fish richness
1	Rangaunu Harbour	2001	Drowned valley	F	101.7	8	15
2	Mangonui Harbour	2003	Drowned valley	F	8.7	8	15
3	Whangaroa Harbour	2001	Drowned valley	F	25.4	8	14
4	Kerikeri Inlet	2001	Drowned valley	F	35.8	8	11
5	Opua Inlet	2001	Drowned valley	F	52.1	6	11
6	Whangaruru Harbour	2003	Drowned valley	F	11.7	8	13
7	Ngunguru River	2001	Drowned valley	F	5.1	8	11
8	Whangarei Harbour	2001	Drowned valley	F	103.6	16	15
9	Whangateau Harbour	2001	Drowned valley	F	7.5	8	10
10	Matakana River	2001	Drowned valley	F	4.2	8	14
11	Mahurangi Harbour	2001	Drowned valley	F	24.6	8	13
12	Waitemata Harbour	2001	Drowned valley	F	79.8	32	14
13	Mangemangeroa Estuary	2001	Coastal embayment	D	0.6	8	9
14	Firth of Thames	2001	Coastal embayment	D	729.1	5	8
15	Manaia Harbour	2003	Tidal lagoon	E	6.3	6	12
16	Coromandel Harbour	2001	Tidal lagoon	E	25.4	8	14
17	Kennedy Bay	2003	Tidal lagoon	E	4.9	6	10
18	Whangapoua Harbour	2001	Tidal lagoon	E	13.0	8	15
19	Whitianga Harbour	2001	Drowned valley	F	15.5	8	18
20	Tairua Harbour	2001	Drowned valley	F	6.0	8	13
21	Whangamata Harbour	2001	Tidal lagoon	E	4.4	8	16
22	Tauranga Harbour	2001	Drowned valley	F	200.4	24	18
23	Ohiwa Harbour	2001	Drowned valley	F	26.8	8	16
24	Maungawhio Lagoon	2007	Drowned valley	F	1.0	4	7
25	Wairoa River	2007	Drowned valley	F	2.5	8	11
26	Porangahau River	2007	Coastal lake	A	2.3	3	4
27	Owahanga River	2007	Tidal river	B	0.6	5	8
28	Lake Onoke	2007	Tidal river mouth	C	6.7	8	11
29	Wellington Harbour	2007	Deep basin	G	85.4	8	9

30	Big Lagoon	2006	Drowned valley	F	16.1	7	9
31	Avon-Heathcote River	2004	Drowned valley	F	7.5	8	13
32	Lyttelton Harbour	2004	Tidal lagoon	E	42.5	16	21
33	Akaroa Harbour	2004	Tidal lagoon	E	43.0	8	13
34	Blueskin Bay	2004	Tidal lagoon	E	6.2	9	9
35	Otago Harbour	2004	Tidal lagoon	E	47.9	16	11
36	Papanui Inlet	2004	Tidal lagoon	E	3.6	6	6
37	Hoopers Inlet	2004	Tidal lagoon	E	3.8	8	9
38	Catlins River	2004	Tidal lagoon	E	7.9	8	15
39	Tahakopa River	2004	Tidal river	B	0.9	8	11
40	Waikawa Harbour	2004	Tidal lagoon	E	6.4	8	11
41	Haldane Estuary	2004	Tidal lagoon	E	1.9	8	9
42	Toetoes Harbour	2004	Tidal river mouth	C	4.7	8	12
43	Bluff Harbour	2004	Drowned valley	F	54.6	13	13
44	New River Estuary	2004	Drowned valley	F	39.8	14	14
45	Riverton Estuary	2004	Drowned valley	F	6.7	8	9
46	Paterson Inlet	2004	Drowned valley	F	99.9	19	11
47	Port Adventure	2004	Tidal lagoon	E	6.9	8	9
48	Lords River	2004	Drowned valley	F	2.4	9	8
49	Port Pegasus	2004	Drowned valley	F	27.0	16	11
50	Okarito Lagoon	2006	Coastal lake	A	21.7	12	8
51	Okari Lagoon	2006	Tidal lagoon	E	1.4	8	8
52	Karamea River	2006	Tidal river mouth	C	4.0	8	7
53	Whanganui Inlet	2006	Drowned valley	F	25.1	8	15
54	Ruataniwha Inlet	2006	Tidal river mouth	C	6.6	6	12
55	Nelson Haven	2006	Tidal lagoon	E	12.6	8	12
56	Pelorus Sound	2006	Sound	H	434.7	8	8
57	Queen Charlotte Sound	2006	Sound	H	306.1	8	11
58	Port Underwood	2006	Tidal lagoon	E	24.5	8	13
59	Porirua Harbour	2007	Tidal lagoon	E	7.5	8	11
60	Manawatu River	2007	Tidal river	B	2.1	1	6
61	Wanganui River	2007	Tidal river	B	3.2	8	8
62	Kawhia Harbour	2001	Drowned valley	F	67.6	8	12
63	Aotea Harbour	2001	Tidal lagoon	E	31.9	8	14
64	Raglan Harbour	2003	Drowned valley	F	31.9	8	15
65	Waikato River	2001	Tidal river mouth	C	18.2	8	8
66	Manukau Harbour	2001	Drowned valley	F	365.6	30	16
67	Kaipara Harbour	2001	Drowned valley	F	743.1	40	21
68	Kaipara Harbour	2003	Drowned valley	F	743.1	7	14
69	Hokianga Harbour	2001	Drowned valley	F	106.5	16	21

Table S2. Contributions of the predictors in the best fit Harbour occurrence and richness Boosted Regression Tree models, expressed as the percentage of total model deviance. Model numbers are described in Table 2. TC1 = tree complexity 1 (no interactions); dash = variable not in best model; * does not include Richness. Bold values indicate predictor variable that explains most deviance; shaded cells indicate top three predictor variables.

Species	Model	Tide-flow	River-flow	Com-plexity	Area	Tide-range	Catch-temp	Inter-tidal	Catch-devel	No. stations	Type	Group Francis	Reg Nelson	Reg Shears	Reg MEC20
PLA	1c, TC1	1.7	**45.0**	1.5	11.5	0.4	1.0	35.5	3.4	0.0	-	-	-	-	-
FEX	2c, TC1	4.1	0.0	2.1	0.0	0.0	0.3	0.9	0.0	0.7	0.2	0.0	**91.7**	0.0	0.0
RLE	1c, TC1	9.0	12.8	3.8	4.5	15.6	16.4	**26.4**	11.6	0.0	-	-	-	-	-
NCE	1c, TC1	8.4	21.5	2.0	14.7	**32.6**	9.8	2.7	8.1	0.3	-	-	-	-	-
GCA	1c, TC1	2.6	16.8	9.2	16.6	1.8	**43.8**	5.6	2.5	1.1	-	-	-	-	-
EAU	1c, TC1	0.4	4.9	1.0	11.5	7.6	**67.9**	1.8	4.8	0.1	-	-	-	-	-
LMA	1c, TC1	20.7	6.4	1.7	6.3	11.2	**37.4**	9.1	7.1	0.0	-	-	-	-	-
FLE	1c, TC1	1.8	0.9	0.1	5.4	0.7	**62.8**	18.1	2.9	7.3	-	-	-	-	-
PAU	1c, TC1	8.2	4.6	0.2	11.6	1.1	**57.0**	15.1	1.3	0.9	-	-	-	-	-
MCE	1c, TC1	3.4	1.3	26.3	13.5	0.9	**51.8**	0.5	2.4	0.0	-	-	-	-	-
HIH	1c, TC1	13.7	8.9	1.0	**33.5**	3.3	5.1	27.3	0.6	6.4	-	-	-	-	-
GMO	1c, TC1	4.9	0.2	2.4	**41.4**	13.7	20.1	1.9	11.1	4.3	-	-	-	-	-
GMA	1c, TC1	7.9	13.5	0.7	0.7	0.4	**40.9**	32.7	3.1	0.0	-	-	-	-	-
PGE	1c, TC1	17.4	11.9	8.6	15.3	13.4	**26.5**	5.5	1.4	0.0	-	-	-	-	-
GCO	1c, TC1	16.0	**31.6**	3.7	10.5	6.7	19.2	9.0	3.1	0.2	-	-	-	-	-
GTR	1c, TC1	3.4	1.5	3.4	4.3	8.1	**60.8**	8.3	3.6	6.5	-	-	-	-	-
Richness	1a, TC1	3.5	5.8	1.5	**38.2**	3.8	8.8	18.1	0.2	20.1	-	-	-	-	-
Freq as top variable*		0	2	0	2	1	9	1	0	0	0	0	1	0	0
Freq in top 3 variables*		5	5	2	9	6	12	7	0	1	0	0	1	0	0

Table S3. Contributions of the predictors in the best fit Site occurrence and richness Boosted Regression Tree models, expressed as the percentage of total model deviance. Model numbers are described in Table 2. TC1 = tree complexity 1 (no interactions); TC2 = tree complexity 2 (first-order interactions); dash = variable not in best model; * does not include functional groups or Richness. Bold values indicate predictor variable that explains most deviance; shaded cells indicate top three predictor variables.

Species	Model	Sub-stratum	Vege-tation	Depth	Salin ity	Clari ty	Temp-erature	Dist-percent	Tow dist	Time	Tide-flow	River-flow	Com-plexity	Area	Tide-range	Catch-temp	Inter-tidal	Catch-devel	Ty pe	Group-Francis	Reg-Nelson	Reg-Shears	Reg-MEC20
AFO	3e, TC1	0.0	1.6	4.5	4.3	5.5	9.4	2.0	1.5	2.0	2.1	4.9	1.0	3.0	1.8	**34.3**	0.4	21.7	-	-	-	-	-
RPL	3e, TC1	0.1	1.5	4.0	10.7	4.7	0.3	14.4	**36.7**	3.5	2.8	1.5	2.9	2.0	0.3	10.6	0.7	3.3	-	-	-	-	-
PLA	3e, TC1	0.0	1.0	1.8	**15.3**	4.6	2.4	6.2	4.5	5.4	2.6	9.1	3.7	7.0	7.2	4.8	10.8	13.6	-	-	-	-	-
RRE	3e, TC1	6.0	0.5	1.0	13.1	5.8	1.8	15.7	0.4	1.6	0.5	4.0	5.6	2.5	8.5	**17.5**	10.7	4.8	-	-	-	-	-
GNI	3e, TC1	5.2	0.3	0.2	1.8	4.8	14.7	7.2	0.0	1.6	1.0	3.4	9.9	7.2	15.0	5.1	5.4	**16.9**	-	-	-	-	-
FEX	3e, TC1	5.7	0.0	1.1	1.0	2.0	5.8	4.7	0.5	0.3	0.9	0.8	10.4	0.5	0.5	**60.1**	5.2	0.5	-	-	-	-	-
RLE	3e, TC1	9.8	0.4	1.3	14.3	**17.0**	13.7	5.2	4.1	2.6	2.1	13.9	4.2	1.6	2.4	2.2	1.9	3.4	-	-	-	-	-
NCE	3e, TC2	1.8	5.7	4.4	11.1	5.7	4.8	7.3	2.6	3.9	2.2	6.6	2.5	5.6	**20.2**	0.3	8.8	6.6	-	-	-	-	-
GCA	3e, TC1	0.4	11.4	1.7	4.8	2.0	**24.9**	7.0	1.4	7.4	3.5	6.2	2.3	3.5	3.6	17.3	1.8	0.9	-	-	-	-	-
EAU	3e, TC1	2.9	1.2	4.0	3.4	13.1	12.9	5.1	3.1	2.2	1.0	0.1	8.1	2.0	8.3	**31.5**	0.3	0.7	-	-	-	-	-
LMA	3e, TC1	1.0	0.7	1.6	1.4	1.9	7.3	1.5	0.6	9.0	2.1	15.5	5.3	3.5	2.5	**38.5**	5.7	1.7	-	-	-	-	-
FLE	3e, TC1	0.7	2.0	3.9	1.3	3.8	8.9	1.2	1.6	2.4	1.1	0.1	0.4	5.3	6.2	**34.1**	24.8	2.1	-	-	-	-	-
PAU	3e, TC2	4.6	1.7	5.6	12.2	5.4	**16.4**	4.9	0.7	5.1	5.7	2.8	3.0	1.8	5.3	**16.4**	7.3	1.3	-	-	-	-	-
MCE	3e, TC1	0.1	0.0	0.1	4.6	2.4	5.3	0.8	0.0	5.5	4.2	0.8	**64.4**	0.3	0.3	10.7	0.0	0.4	-	-	-	-	-
HIH	3e, TC1	3.4	2.9	1.7	1.3	1.8	10.7	8.2	8.5	0.6	6.1	10.0	2.5	8.8	**19.6**	0.0	13.6	0.3	-	-	-	-	-
GMO	3e, TC1	0.3	1.1	0.7	3.4	8.6	**22.2**	9.8	0.2	4.8	2.4	0.1	1.7	3.5	18.0	7.2	0.1	16.1	-	-	-	-	-
GMA	3e, TC1	0.2	0.0	0.5	**43.1**	1.8	1.6	11.9	1.0	6.5	1.8	3.2	0.0	3.4	0.0	4.3	5.2	15.4	-	-	-	-	-
PGE	3e, TC1	5.0	0.2	3.4	7.4	0.8	**15.1**	1.9	2.1	10.2	6.0	7.8	11.3	5.6	5.9	4.5	11.8	1.2	-	-	-	-	-
GCO	3e, TC1	1.0	0.0	0.5	**39.4**	0.1	1.5	1.7	1.1	1.6	23.0	12.2	0.0	10.4	1.0	0.4	1.5	4.5	-	-	-	-	-
ATR	3e, TC1	0.0	0.3	3.3	1.7	0.7	3.4	**32.6**	0.0	3.5	1.8	3.6	0.9	2.4	28.3	6.3	11.4	0.0	-	-	-	-	-
CKU	3e, TC1	1.5	0.0	0.2	2.0	5.0	**17.2**	9.7	1.5	15.1	9.6	13.7	8.5	10.8	4.3	0.0	0.5	0.4	-	-	-	-	-
SMU	3e, TC1	4.7	0.2	0.6	3.9	4.2	6.9	4.6	3.2	1.7	1.7	22.4	0.8	0.8	4.6	**25.1**	2.9	11.8	-	-	-	-	-
GTR	4e, TC1	0.1	14.7	2.0	1.3	1.1	13.6	2.8	1.1	2.9	0.0	0.5	0.1	4.2	3.6	14.2	0.1	1.2	0.2	**36.5**	0.0	0.0	0.0
detritivore	3e, TC1	0.1	0.0	0.1	5.1	2.4	5.5	0.9	0.0	5.9	4.5	0.7	**62.2**	0.8	0.4	10.9	0.0	0.6	-	-	-	-	-
omnivore	3e, TC1	0.0	0.7	4.3	4.3	2.8	8.5	1.6	2.0	1.0	1.7	3.9	1.0	1.5	2.4	**37.1**	0.7	26.4	-	-	-	-	-
opportunist	3e, TC1	0.0	0.1	0.0	4.6	0.3	**38.1**	3.7	0.0	0.4	1.2	20.8	7.5	0.0	2.5	14.3	0.4	5.9	-	-	-	-	-
zooplanktivore	3e, TC1	5.2	0.0	1.4	4.6	6.8	10.5	**18.7**	2.0	3.7	3.4	5.2	2.3	1.4	17.1	4.8	10.4	2.4	-	-	-	-	-
estuarine	3e, TC1	8.4	0.1	1.6	2.2	3.4	2.3	7.7	0.4	2.2	1.6	4.5	**25.8**	2.4	4.3	20.9	4.1	7.9	-	-	-	-	-
straggler	3e, TC1	1.5	3.6	5.8	8.0	4.0	**22.4**	2.1	1.9	6.6	4.8	4.7	9.6	8.7	3.5	8.2	1.1	3.4	-	-	-	-	-
anadromous	3e, TC1	5.3	0.3	1.6	12.0	6.4	3.0	14.8	0.6	2.0	0.9	5.0	6.0	2.4	8.6	**15.8**	10.8	4.7	-	-	-	-	-
catadromus	3e, TC1	0.0	0.0	0.7	**44.5**	0.9	1.9	4.4	1.5	6.0	3.1	3.5	0.0	7.3	0.2	1.2	11.7	13.1	-	-	-	-	-

Richness	3a, TC1	12.0	1.1	2.5	3.5	**19.0**	8.6	9.6	8.6	5.7	5.7	5.8	2.7	4.0	5.7	2.3	0.8	2.4	-	-	-	-	-
Freq as top variable*		0	0	0	3	1	5	1	1	0	0	0	1	0	2	8	0	1	0	1	0	0	0
Freq in top 3 variables*		0	2	0	8	2	11	4	1	3	1	5	3	0	5	11	6	6	0	1	0	0	0

Table S4. Contributions of the predictors in the best fit Site abundance Boosted Regression Tree models, expressed as the percentage of total model deviance. Model numbers are described in Table 2. TC1 = tree complexity 1 (no interactions); TC2 = tree complexity 2 (first-order interactions); * does not include functional groups. Bold values indicate predictor variable that explains most deviance; shaded cells indicate top three predictor variables.

Species	Model	Sub-stratum	Vege-tation	Depth	Salinity	Clarity	Temp-erature	Dist-percent	Towdist	Time	Tide-flow	River-flow	Com-plexity	Area	Tide-range	Catch-temp	Inter-tidal	Catch-devel
RPL	3d, TC1	4.4	0.7	3.2	0.6	9.6	13.8	11.8	**21.8**	2.4	6.5	11.6	0.2	1.8	0.4	1.0	8.8	1.6
PLA	3d, TC2	13.6	0.0	4.2	5.4	**15.3**	9.5	10.8	6.8	4.1	0.6	1.2	7.2	6.5	0.8	10.5	0.8	2.7
GNI	3d, TC1	3.5	0.0	4.6	1.2	4.9	9.8	5.1	**18.7**	1.7	3.0	4.2	0.6	1.1	2.4	11.9	10.3	17.0
FEX	3d, TC1	2.6	0.0	0.3	5.7	4.9	1.0	2.7	0.1	13.4	0.0	0.1	**38.4**	28.6	0.0	2.0	0.3	0.0
RLE	3d, TC1	20.9	0.3	0.4	**21.1**	3.6	3.4	17.6	5.8	11.5	0.4	4.5	1.7	0.4	1.1	3.5	0.8	3.0
LMA	3d, TC1	0.0	0.0	0.2	8.7	0.5	14.4	8.2	3.6	3.1	0.0	9.9	0.5	0.2	1.5	**47.1**	2.0	0.1
FLE	3d, TC1	0.1	10.8	2.5	1.1	14.1	**23.5**	1.3	0.6	0.2	0.0	0.0	0.0	6.9	2.0	22.3	14.4	0.1
GMA	3d, TC1	6.2	0.0	0.0	**49.3**	0.0	0.1	7.3	0.0	0.2	11.9	0.0	0.0	0.4	0.0	0.0	0.0	24.6
GCO	3d, TC1	0.3	0.0	0.0	19.5	0.0	0.0	0.0	0.1	0.8	**75.3**	0.1	0.0	2.0	1.5	0.2	0.0	0.0
ATR	3d, TC1	0.0	0.0	0.0	0.0	0.0	0.0	25.9	0.0	3.1	0.0	**71.0**	0.0	0.0	0.0	0.0	0.0	0.0
opportunist	3d, TC2	3.0	0.1	0.8	15.9	2.1	5.0	8.1	1.0	8.3	**37.2**	8.9	1.1	0.4	3.3	4.3	0.2	0.4
zoobenthivore	3d, TC2	4.6	1.2	1.8	4.8	2.4	**25.9**	11.7	11.7	5.7	1.5	1.6	7.7	9.3	1.3	3.6	2.2	2.8
estuarine	3d, TC2	1.4	0.5	3.2	5.0	4.6	**18.7**	14.7	14.2	6.1	1.1	0.7	6.7	13.1	0.8	5.0	1.0	3.3
catadromus	3d, TC1	2.6	0.0	0.0	35.4	0.0	0.1	2.2	0.0	0.2	**47.2**	0.0	0.0	2.1	0.0	0.0	0.0	10.2
Freq as top variable*		0	0	0	2	1	1	0	2	0	1	1	1	0	0	1	0	0
Freq in top 3 variables*		2	0	0	3	1	3	4	2	2	2	2	1	2	0	3	1	2