CORRECTION

Correction to: Commodity Consistent Meta-Analysis of Wetland Values: An Illustration for Coastal Marsh Habitat

Hermine Vedogbeton[1] · Robert J. Johnston[1,2]

Correction to: Environmental and Resource Economics (2020) 75:835–865
https://doi.org/10.1007/s10640-020-00409-0

In the original article, the code used to estimate the meta-regression models (of WTP for coastal marsh habitat changes) erroneously included the natural log of nominal rather than real income as an independent variable. The models should have included income with all values standardized to 2016 USD. Instead, the code included the natural log of nominal income prior to adjustment into constant 2016 USD.

This error had only a minor effect on results presented in the original article. Not surprisingly, the primary effect was a change in the parameter estimate on the time-trend variable, *yearindex*, which was also included in the model. That is, because the difference between nominal and real income has a time trend, the effect of this error was largely captured by the parameter on the time-trend variable. Statistical significance levels and/or relative magnitudes change for a few parameters in the alternative, less commodity consistent "habitat and area" meta-regression model (e.g., *riparian_marsh*, *habitat_fish*, *habitat_multiple*, *dichotomous*). Where these changes occur, estimated significance levels typically improve (*p*-values decrease). These changes are not material to the primary hypotheses considered by the article.

Correcting the error leads to slight improvements in model fit and benefit transfer accuracy. None of the key conclusions of the article change.

Results of the corrected data and analysis are provided in Tables 1, 2, 3, 4, 5 and 6 (corrected). These correspond to Tables 1–6 in the original article. We have updated the summary statistics in Tables 1 and 2 to reflect only the observations included in the unrestricted meta-regression models (N = 133 and 151). With these updates, there is

---

✉ Robert J. Johnston
  rjohnston@clarku.edu

  Hermine Vedogbeton
  hvedogbeton@clarku.edu

[1] Department of Economics, Clark University, Worcester, MA 01610, USA

[2] George Perkins Marsh Institute, Clark University, 950 Main St, Worcester, MA 01610, USA

Table 1 Primary studies in the metadata (corrected)

References	State	Coastal marsh type(s)	Valued commodity	# of obs. in meta-regressions	Mean WTP per hh in $2016	Min. WTP per hh in $2016	Max. WTP per hh in $2016
Bauer et al. (2004)	RI	Salt or estuarine marsh	Habitat and area	2	19.33	0.73	37.94
Bergstrom et al. (1990)	LA	Combined salt marsh and freshwater complex	Habitat	3	0.44	0.21	0.56
Eastern Research Group (2016)	NJ	Salt or estuarine marsh	Area	2	9.03	8.94	9.12
Hanemann et al. (1991)	CA	Combined salt marsh and freshwater complex	Habitat	8	463.81	291.02	589.7
He et al. (2017)	Canada	Riparian or forested wetland	Habitat	4	1.82	1.51	2.09
Hoehn and Loomis (1993)	CA	Combined salt marsh and freshwater complex	Habitat	8	254.57	188.97	352.29
Hwang et al. (2014)	LA	Coastal marsh and other habitat	Habitat	2	127.85	82.38	173.31
Interis and Petrolia (2014)	LA	Coastal marsh and other habitat	Habitat	12	238.75	74.89	565.94
Interis and Petrolia (2016)	LA/AL	Salt or estuarine marsh/other coastal wetlands	Habitat	20	52.78	5.18	126.39
Johnston and Abdulrahman (2017)	CT	Salt or estuarine marsh	Area	3	5.80	4.96	7.09
Johnston et al. (2001b)	NY	Coastal marsh and other habitat	Habitat	3	0.15	0.12	0.19
Johnston et al. (2002a)	RI	Salt or estuarine marsh	Habitat and area	4	22.79	9.56	30.36
Johnston et al. (2002b)	NY	Coastal marsh and other habitat	Habitat	6	0.12	0.06	0.17
Johnston et al. (2005)	RI	Salt or estuarine marsh	Habitat and area	12	21.80	1.67	36.95
Johnston et al. (2015)	ME	Riparian or forested wetland	Habitat	2	1.26	1.19	1.33
Johnston et al. (2016a)	ME	Riparian or forested wetland	Habitat	4	0.82	0.71	0.95
Johnston et al. (2018)	CT	Salt or estuarine marsh	Area	2	8.12	6.46	9.78
Kaoru (1993)	MA	Coastal marsh and other habitat	Habitat	3	167.03	101.67	250.87
Loomis (1991)	CA	Combined salt marsh and freshwater complex	Habitat	8	458.31	291.02	689.26
Makriyannis et al. (2018)	CT	Salt or estuarine marsh	Area	2	5.62	4.49	6.76
Milon and Scrogin (2006)	FL	Everglades	Habitat	2	33.72	25.79	41.64

Table 1 (continued)

References	State	Coastal marsh type(s)	Valued commodity	# of obs. in meta-regressions	Mean WTP per hh in $2016	Min. WTP per hh in $2016	Max. WTP per hh in $2016
Milon et al. (1999)	FL	Everglades	Habitat	2	26.43	13.64	39.22
Newell and Swallow (2013)	RI	Riparian or forested wetland	Habitat and area	8	0.99	0.84	1.10
Petrolia et al. (2014)	LA	Salt or estuarine marsh	Habitat	8	173.98	98.42	253.55
Seeteram (2014)	FL	Everglades	Habitat	18	0.22	0.07	0.32
Udziela and Bennett (1997)	CT	Salt or estuarine marsh	Habitat	1	93.48	93.48	93.48
Whitehead (1993)	NC	Coastal marsh and other habitat	Habitat	2	22.52	19.22	25.81

Table 2 Meta-analysis variables and summary statistics (corrected)

Variable	Definition	Habitat metadata Mean (SD)	Habitat and area metadata Mean (SD)
ln_wtp	Natural log of willingness to pay (WTP) per household, adjusted to 2016 US dollars. Range in habitat metadata: −2.81 to 6.54	2.74 (2.94)	2.57 (2.81)
$ln\_absolute\_change$	Natural log of percentage point habitat commodity change, if measured in absolute terms—change on external 0–100 scale—(zero otherwise). Range in habitat metadata: 0–4.61	0.88 (1.44)	0.78 (1.38)
$ln\_relative\_change$	Natural log of percentage point habitat commodity change, if measured in relative terms—change as a proportion of baseline—(zero otherwise). Range in habitat metadata: −5.56 to 4.70	1.06 (2.40)	1.05 (2.28)
$ln\_affected\_area$	Natural log of the size of the resource (or marsh) area affected by the change. Unit: acres. Range in habitat metadata: 1.59–16.65	10.31 (4.31)	9.67 (4.50)
ln_income	Natural log of median household income of the US places sampled by the stated preference study (e.g., states, counties, etc.), based on the historical U.S Census data. Where the sample covers multiple US places for which an aggregate median income is not provided by the Census (e.g., multiple counties), population-weighted averages over these places are used. All values adjusted to 2016 US dollars. Range in habitat metadata: 10.59–11.48	10.93 (0.18)	10.94 (0.19)
$ln\_sampled\_area$	Natural log of the area in which respondents for each study were sampled (the sampled market area). Unit: acres. Range: 9.39–21.56	16.71 (3.33)	16.11 (3.61)
$peer\_review$	Binary variable indicating that the study is from a peer reviewed source, and zero otherwise (1 = peer reviewed source). Range: 0 or 1	0.83 (0.37)	0.84 (0.37)
$annual\_wtp$	Binary variable indicating that the WTP payment would be paid annually, and zero otherwise (1 = annual payment). Range: 0 or 1	0.68 (0.47)	0.72 (0.45)
$yearindex$	Variable indicating the year in which the survey was conducted (converted to an index by subtracting 1985). Range: 2–28	18.49 (10.06)	18.93 (9.83)
$dichotomous$	Binary variable indicating that the type of WTP elicitation method is dichotomous choice, and zero otherwise. (1 = dichotomous elicitation method). Range: 0 or 1	0.31 (0.46)	0.27 (0.45)
$habitat\_fish$	Binary variable indicating that the survey scenario addressed fish habitat or services of these habitats (1 = fish habitat; 0 = habitat for multiple species, shellfish, bird, wildlife, or endangered species). Range: 0 or 1	0.17 (0.38)	0.15 (0.36)
$habitat\_multiple$	Binary variable indicating that the survey scenario addressed combined fish, shellfish and wildlife habitats or services of these habitats (1 = multiple species habitat; 0 = habitat for fish, shellfish, bird, wildlife, or endangered species). Range: 0 or 1	0.58 (0.50)	0.51 (0.50)

Table 2 (continued)

Variable	Definition	Habitat metadata Mean (SD)	Habitat and area metadata Mean (SD)
salt_other_habitat	Binary variable indicating that the type of marsh described in the survey is a combination of salt marsh and other habitat (1 = combined salt marsh and other habitat; 0 = all other coastal marsh types, see Table 1). Range: 0 or 1	0.37 (0.48)	0.32 (0.47)
riparian_marsh	Binary variable indicating that the type of marsh described in the survey is riparian or forested coastal marsh (1 = riparian or forested coastal marsh; 0 = all other coastal marsh types, see Table 1). Range: 0 or 1	0.11 (0.31)	0.12 (0.33)
change_harvest	Binary variable indicating that the valued commodity is a change in harvest or harvest potential (1 = change in harvest; 0 = all other types of change, see main text). Range: 0 or 1	0.20 (0.40)	0.18 (0.38)
change_population	Binary variable indicating that the valued commodity is a change in marsh species population size (1 = change in population size; 0 = all other types of change, see main text). Range: 0 or 1	0.20 (0.40)	0.17 (0.38)
change_survival	Binary variable indicating that the valued commodity is a change in population or survival for threatened or endangered species (1 = change in survival probability or population for threatened/endangered species; 0 = all other types of change, see main text). Range: 0 or 1	0.13 (0.34)	0.11 (0.32)
change_size	Binary variable identifying observations for which the valued commodity is defined as a raw change in wetland area or size rather than a change in a specified wetland service or commodity. (1 = change in area; 0 = change in specific habitat or habitat service). Range: 0 or 1	–	0.12 (0.33)

Table 3 MRM estimation results—cluster robust OLS (corrected)

	Unrestricted model: habitat	Restricted model: habitat	Unrestricted model: habitat and area
ln_absolute_change	0.787***	0.691 ***	0.816***
	(0.099)	(0.142)	(0.080)
ln_relative_change	1.207***	0.960 ***	1.217***
	(0.087)	(0.119)	(0.062)
ln_sampled_area	−0.193**	0.0705	−0.221***
	(0.0809)	(0.124)	(0.059)
ln_income	4.980***	4.181***	5.485***
	(1.043)	(1.004)	(0.753)
ln_affected_area	0.157**	−0.073	0.174***
	(0.057)	(0.061)	(0.051)
change_harvest	−1.309***		−1.263***
	(0.310)		(0.289)
change_population	−1.200***		−1.321***
	(0.272)		(0.271)
change_survival	−0.627*		−0.791**
	(0.327)		(0.331)
riparian_marsh	−1.093**		−0.772***
	(0.403)		(0.267)
annual_wtp	−2.590***	−2.263***	−2.925***
	(0.558)	(0.448)	(0.500)
habitat_fish	−0.319		−0.485**
	(0.240)		(0.234)
habitat_multiple	−1.514***		−1.678***
	(0.258)		(0.240)
dichotomous	−0.262		−0.075
	(0.171)		(0.274)
peer_review	0.704		0.363
	(0.626)		(0.440)
yearindex	−0.032	−0.073***	−0.032
	(0.031)	(0.023)	(0.019)
salt_other_habitat	−0.187		−0.199
	(0.301)		(0.309)
change_size			−2.193***
			(0.386)
intercept	−48.50***	−42.12***	−53.18***
	(11.21)	(10.33)	(7.85)
N	133	133	151
R-sq	0.958	0.912	0.951
Adj. R-sq	0.952	0.907	0.945
RMSE	0.641	0.897	0.659

*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$

Table 4 Convergent validity results: absolute value percentage transfer errors (corrected)

	Mean absolute percent WTP error (%)	Mean absolute percent WTP error (5% trimmed) (%)	Median absolute percent WTP error (%)
Unrestricted mode 1: habitat (N = 133)	66.51	50.66	41.49
Unrestricted model: habitat and area (N = 151)	71.59	50.77	44.65

Table 5 MRM estimation results—cluster robust WLS with publication bias test using inverse root sample size $\left(1/\sqrt{n}\right)$ (corrected)

	Unrestricted model: habitat
$1/\sqrt{n}$	7.353
	(15.930)
ln_absolute_change	0.655***
	(0.160)
ln_relative_change	1.149***
	(0.114)
ln_sampled_area	−0.126
	(0.140)
ln_income	4.419***
	(1.372)
ln_affected_area	0.094
	(0.091)
change_harvest	−1.702***
	(0.267)
change_population	−1.174***
	(0.274)
change_survival	−0.510
	(0.383)
riparian_marsh	−0.873*
	(0.423)
annual_wtp	−2.933***
	(0.444)
habitat_fish	−0.130
	(0.262)
habitat_multiple	−1.298***
	(0.303)
dichotomous	−0.284*
	(0.148)
peer_review	0.489
	(0.689)
yearindex	−0.046
	(0.029)
salt_other_habitat	−0.052
	(0.260)
intercept	−42.40***
	(13.79)
N	133
R-sq	0.954
RMSE	0.616

Observations are weighted by sample size (*n*)

*p < 0.10; **p < 0.05; ***p < 0.01

Table 6 MRM2 estimation results—dependent variable defined as the natural log of WTP per percentage point habitat change (corrected)

	Unrestricted model: habitat
ln_absolute_change	−0.213**
	(0.099)
ln_relative_change	0.207**
	(0.087)
ln_sampled_area	−0.193**
	(0.081)
ln_income	4.980***
	(1.043)
ln_affected_area	0.157**
	(0.057)
change_harvest	−1.309***
	(0.310)
change_population	−1.200***
	(0.272)
change_survival	−0.627*
	(0.327)
riparian_marsh	−1.093**
	(0.403)
annual_wtp	−2.590***
	(0.558)
habitat_fish	−0.319
	(0.240)
habitat_multiple	−1.514***
	(0.258)
dichotomous	−0.262
	(0.171)
peer_review	0.704
	(0.626)
yearindex	−0.032
	(0.031)
salt_other_habitat	−0.187
	(0.301)
intercept	−48.50***
	(11.21)
N	133
R-sq	0.858
RMSE	0.641

*$p<0.10$; **$p<0.05$; ***$p<0.01$

now a precise match between the observations included in the meta-regression models (Tables 3, 4, 5, 6) and those used for data summary statistics (Tables 1 and 2).

This correction stands to correct the original article.