

Appendix to the 'River Otter Beaver Trial' Science & Evidence Report: Engagement Events and Attitudinal Change

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EXECUTIVE SUMMARY

- The 'River Otter Beaver Trial' is an unfenced Eurasian beaver (*Castor fiber*) reintroduction Trial in South West England. Within the Trial, Devon Wildlife Trust have undertaken a number of engagement events with various public and stakeholder groups.
 - Identical 'Pre-' and 'Post-Event' questionnaires were issued at 18 engagement activities led by Devon Wildlife Trust. In this report, the results of these questionnaires are presented.
 - In four different areas, the results show different responses 'Pre-' and 'Post-Event' which indicate attitudinal shifts between the completion of each survey. The differences between groups (at the 18 events) are also examined.
 - It is not possible to ascertain whether the attitudinal shifts persisted after the events concluded, thus more understanding of the nature and longevity of the attitudinal change would be required, yet this provides a useful snapshot in time for the eighteen events seen here.
 - The results indicate that the role of evidence-based engagement activities in beaver reintroduction can influence attitudes. It is possible that this could lead to different behaviours, the impacts of which could influence the level of potential for conflict alleviation.
 - Further, a subset of results from a nationwide questionnaire in 2017 are presented which look at the respondents' perceptions of the impacts of beavers on 'Education'. Some respondents highlighted that the role of beavers in education could be dependent upon educator bias, or that education could be used to lobby for a particular viewpoint. These factors will need to be considered so as not to lead to the potential escalation of possible conflict issues. This could be helped somewhat by the use of evidence in engagement events.
 - The role of engagement and education in beaver reintroduction will be important. However, it is recognised that the level of engagement activity could be limited by the level of resource made available for it.
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1. Introduction

The 'River Otter Beaver Trial' is an unfenced Eurasian beaver (*Castor fiber*) reintroduction Trial in South West England. The Trial is licensed from 2015 until 2020. Within the Trial, Devon Wildlife Trust have undertaken a number of engagement events with various public and stakeholder groups.

In order to examine attitudinal change resulting from these engagement events, an identical questionnaire was issued to attendees 'Pre-' and 'Post-Event' at 18 engagement activities led by Devon Wildlife Trust. In this report, the results of these questionnaires are presented, including statistical examinations of the results between groups and comparing between the 'Pre- and 'Post-Event' results.

Also presented are a subset of results from a nationwide questionnaire looking at the perceptions of respondents of the impacts of beavers on 'Education'.

2. Questionnaires

Participants were asked to complete a short questionnaire prior to an engagement event ('Pre-Event'). Respondents were then asked to complete an identical questionnaire after an engagement event ('Post-Event'). The results could then be compared to test whether attitudes were different after the event had taken place.

The questions consisted of four Likert-scale questions. The scale was devised so that it would indicate a view between two opposing statements. A score of 2 would indicate strong agreement with one statement, and a score of -2 would indicate strong agreement with the opposing statement. A score of 0 (in the middle) would indicate that the respondent had no opinion or was undecided.

The questions were designed to cover for main areas within beaver reintroduction and the statements read as stated in Table 1.

Table 1. QUESTIONS ASKED IN EVENT QUESTIONNAIRES		
Question	STATEMENT <i>(Strong agreement = Score 2)</i>	OPPOSITE STATEMENT <i>(Strong agreement = Score -2)</i>
1	Beavers are beneficial for wildlife.	Beavers are not beneficial for wildlife.
2	Beavers and farming can easily coexist.	Beavers cause irreconcilable problems with farming.
3	Beavers could reduce flooding problems.	Beavers will make flooding worse.
4	I would like to see beavers back in England	I would not like to see beavers back in England.

3. Engagement Events

The questions were issued to a number of different groups between summer 2017 and spring 2019. A description of the event groups is provided in Table 2. The events consisted of an evidence-based presentation by *Devon Wildlife Trust*. There were minimal differences in content between events.

Group Number.	Group Key Interest or Background
1	Wildlife
2	Birds
3	Forestry
4	Wildlife
5	Philanthropy
6	Retirees
7	Nature
8	Women's Community
9	Events
10	Career Professional Development
11	Retirees
12	Events for the Retired
13	Science, Technology, Engineering and Mathematics
14	Wildlife
15	Biodiversity
16	Architecture, Landscape, Natural Environment and Local History
17	Badgers
18	College Students

The number of respondents in each group is specified in Table 3. (For each analysis described in Section 4, participants were excluded if they did not answer a question both 'Pre-' and 'Post-Event').

Group	Question 1	Question 2	Question 3	Question 4	Total n
1	39	39	39	39	40
2	13	13	13	13	13
3	13	13	13	13	13
4	20	20	20	20	25
5	11	11	11	11	13
6	21	20	21	21	22
7	22	23	22	23	23
8	24	24	24	25	27
9	30	30	29	30	31
10	48	49	49	49	49
11	23	23	23	23	24
12	55	56	56	55	58
13	14	14	14	14	14
14	72	73	73	73	73
15	88	88	88	88	92
16	65	64	65	65	65
17	29	29	29	29	29
18	29	28	28	28	30
Total	616	617	617	619	641

4. Notes on Statistics

The analyses here tested for differences in and amongst the respondents who took part in the questionnaires. The following statistical tests were conducted for each question in the questionnaire, with the results reported upon in each relevant section of this report:

- A one-way ANOVA was conducted to examine whether the 'Pre-Event' scores differed between the interest groups. If a significant difference was identified, a post-hoc Tukey test was conducted to explore the results in greater detail.
 - A Wilcoxon Signed Rank Test was conducted to test the difference between overall 'Pre-' and 'Post-Event' scores as the data was non-parametric and paired. The Pratt method was used to incorporate the data in which no change was observed.
 - A one-way ANOVA was conducted to examine whether the shift in scores between 'Pre-' and 'Post-Event' questionnaires differed between the interest groups. If a significant difference was identified, a post-hoc Tukey test was conducted to further explore the results.
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5. Results

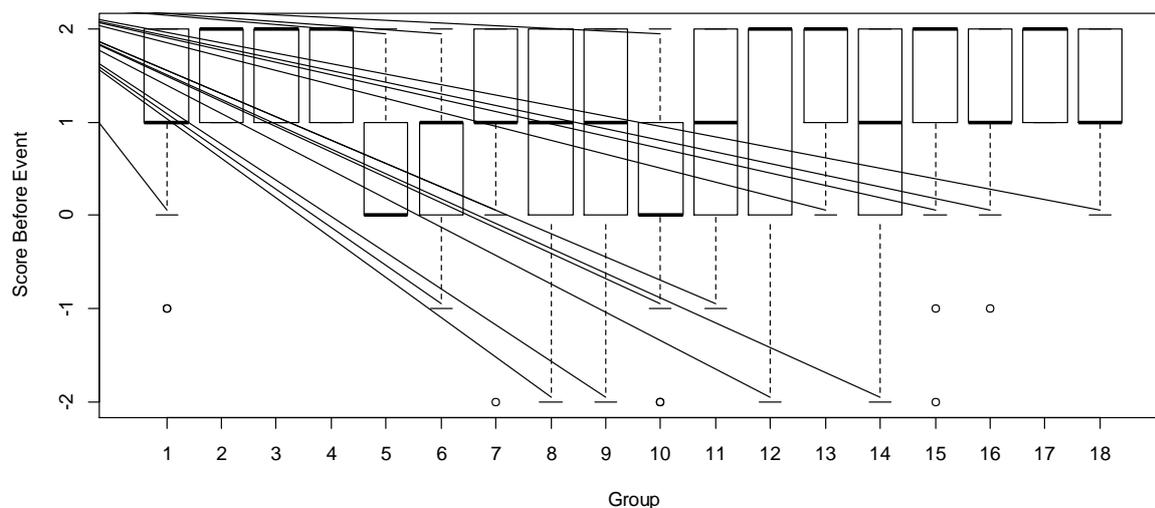
5.1. Question 1

Beavers are beneficial for wildlife. <-> Beavers are not beneficial for wildlife.

5.1.1. Differences in 'Pre-Event' Scores

There was found to be a significant difference in pre-event scores between the different groups ($F_{17,598}=6.229, n=616, p<0.001$). The scores pre-event are demonstrated in Figure 1.

Figure 1. Question 1 'Pre-Event' Scores between Groups



In a Post-Hoc Tukey test, the statistically significant differences between groups were further examined. Those differences are presented here in Table 4.

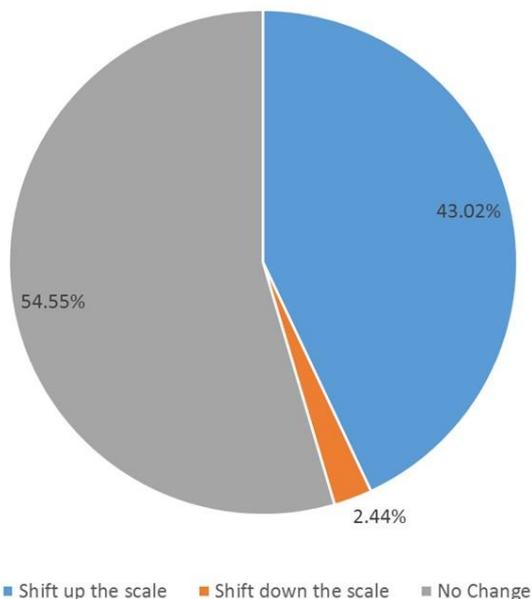
Table 4. STATISTICAL DIFFERENCES BETWEEN GROUPS IN QUESTION 1 PRE-EVENT SCORES		
Group A	Group B	Significance Level
6	4	p<0.05
9	4	p<0.05
10	1	p<0.001
10	2	p<0.001
10	3	p<0.001
10	4	p<0.001
10	7	p<0.05
12	10	p<0.05
13	10	p<0.001
14	10	p<0.01
15	6	p<0.05
15	10	p<0.001
16	10	p<0.001
17	6	p<0.01
17	9	p<0.05
17	10	p<0.001
18	10	p<0.001

5.1.2. Comparison between 'Pre-' and 'Post-Event' Scores

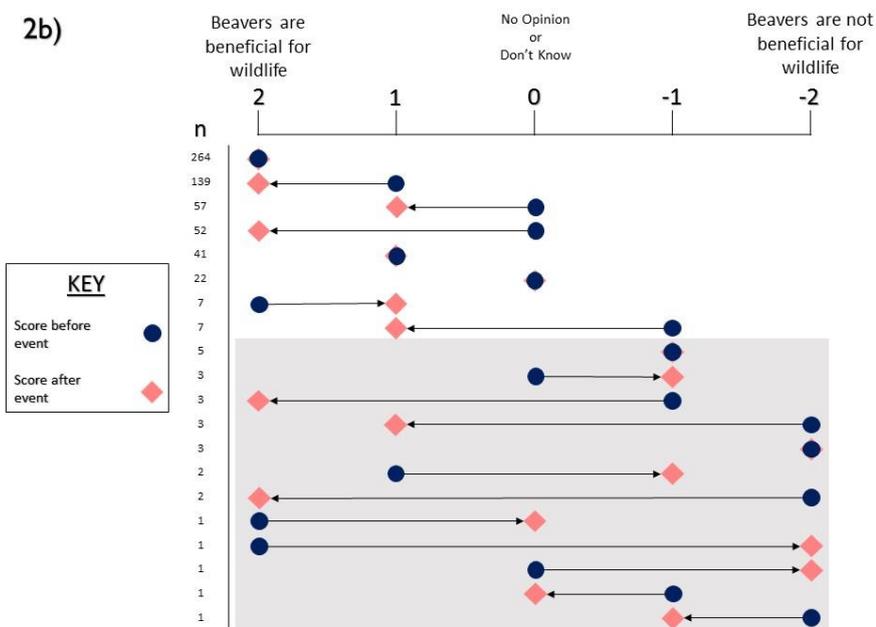
There was found to be a significant difference in scores between 'pre-' and 'post-event' questionnaires (V=2399, n=616, p<0.001). The patterns of shift are identified in Figures 2a and 2b.

Figures 2a and 2b. Question 1 Patterns of Shift in 'Pre-' and 'Post-Event' Scores. In Figure 5b, the shift patterns are ordered top to bottom with the most frequently observed pattern at the top. The grey area indicates shift patterns which were observed in <1% of the respondent pool.

2a)

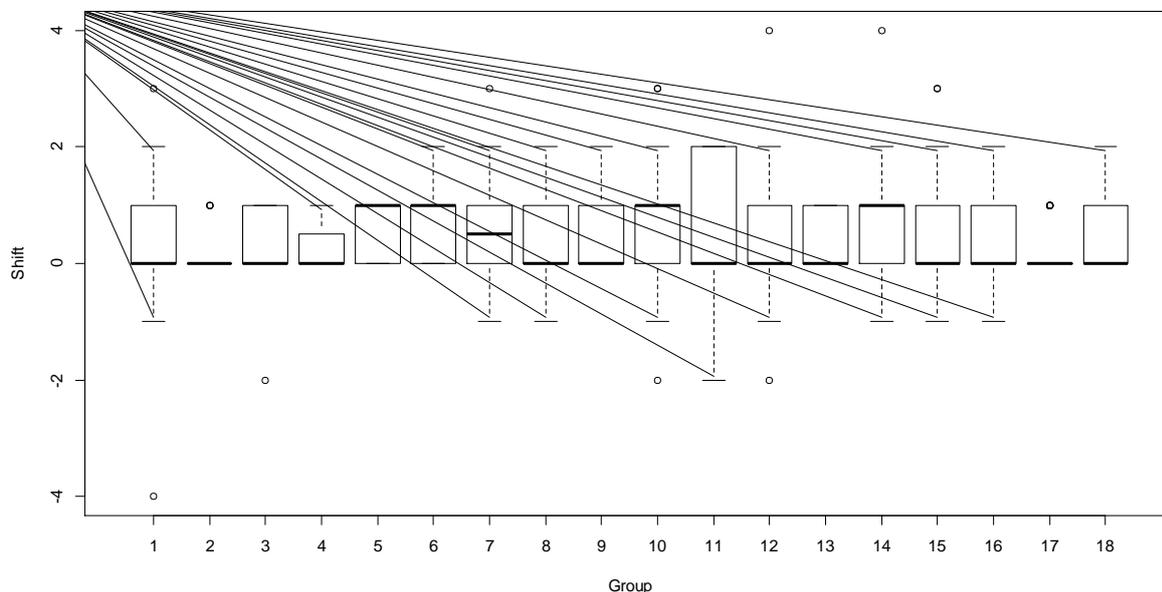


2b)



A statistically significant difference was identified in the pattern of shift between groups ($F_{17,598}=1.689$, $n=616$, $p<0.05$). The differences in scores (the shift) are identified in Figure 3.

Figure 3. Differences in 'Pre-' and 'Post-Event' Scores between Groups.



In a Post-Hoc Tukey test, the statistically significant differences between groups were further examined. Those differences are presented here in Table 5.

Table 5. STATISTICAL DIFFERENCES BETWEEN GROUPS IN QUESTION 1 SHIFT PATTERNS		
Group A	Group B	Significance Level
4	2	$p<0.05$
7	5	$p<0.05$
8	4	$p<0.05$
9	1	$p<0.05$
11	5	$p<0.05$
11	7	$p<0.05$
12	1	$p<0.05$
12	9	$p<0.01$
13	4	$p<0.05$
13	8	$p<0.01$
14	5	$p<0.05$
14	7	$p<0.05$
14	11	$p<0.01$
17	2	$p<0.05$
17	4	$p<0.01$
17	13	$p<0.05$
18	12	$p<0.05$
18	16	$p<0.05$

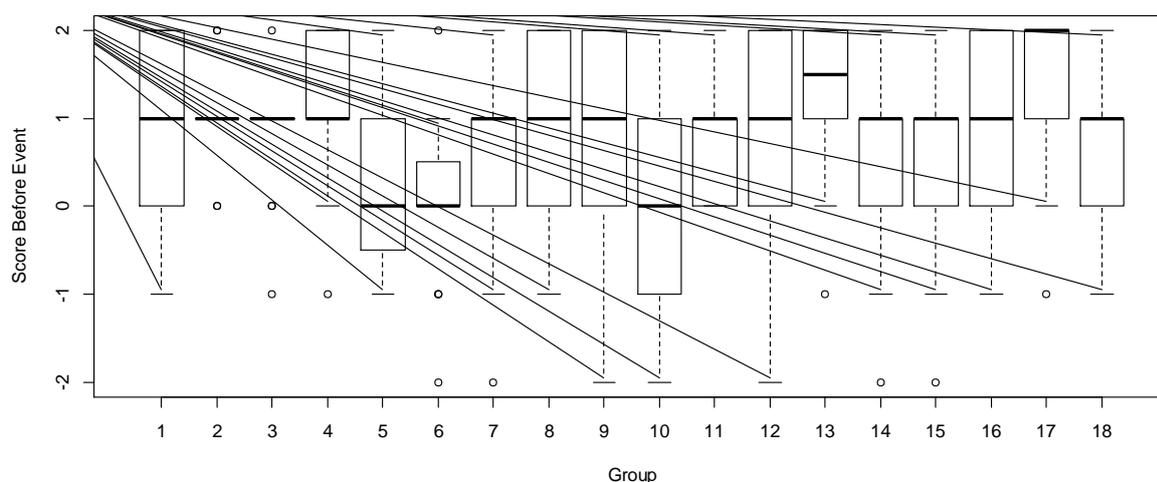
5.2. Question 2

Beavers and farming can easily coexist. <-> Beavers cause irreconcilable problems with farming.

5.2.1. Differences in 'Pre-Event' Scores

There was found to be a significant difference in pre-event scores between the different groups ($F_{17,598}=3.806, n=617, p<0.001$). The scores pre-event are demonstrated in Figure 4.

Figure 4. Question 2 'Pre-Event' Scores between Groups



In a Post-Hoc Tukey test, the statistically significant differences between groups were further examined. Those differences are presented here in Table 6.

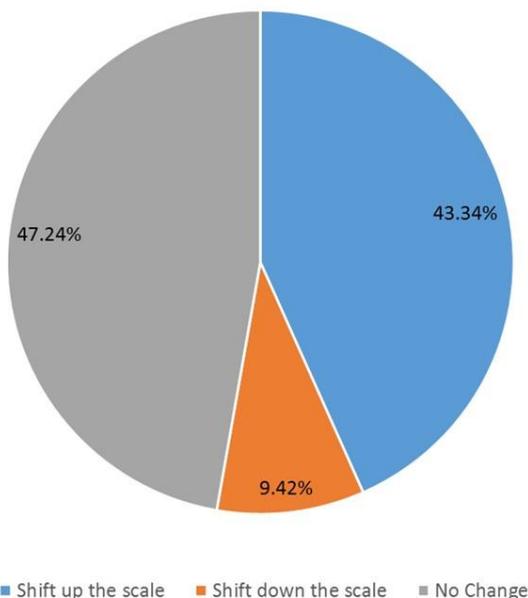
Table 6. STATISTICAL DIFFERENCES BETWEEN GROUPS IN QUESTION 2 PRE-EVENT SCORES		
Group A	Group B	Significance Level
10	1	p<0.01
10	4	p<0.01
17	6	p<0.001
12	10	p<0.05
13	10	p<0.01
15	10	p<0.05
16	10	p<0.001
17	10	p<0.001
17	14	p<0.05

5.2.2. Comparison between 'Pre-' and 'Post-Event' Scores

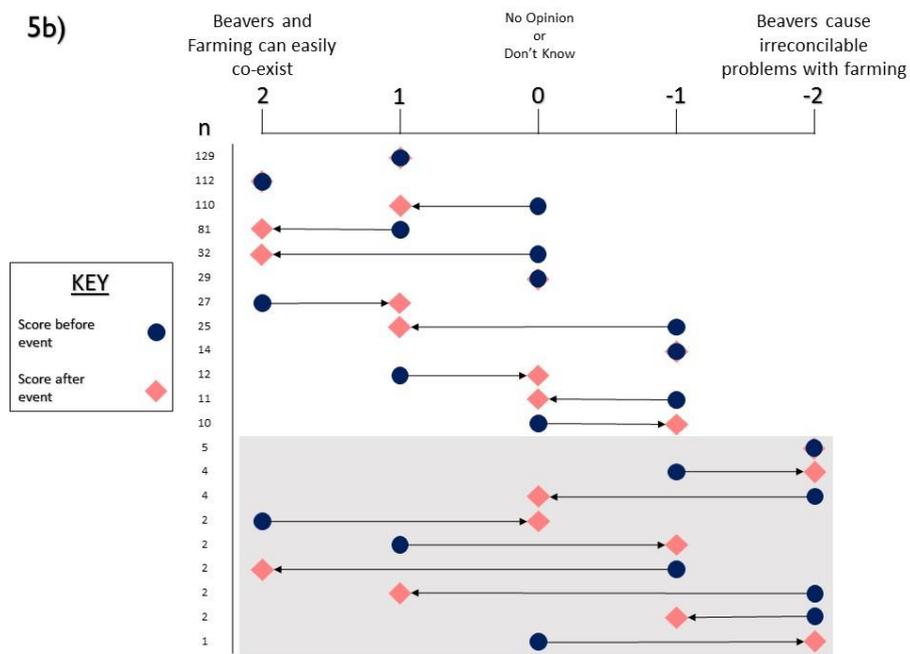
There was found to be a significant difference in scores between 'pre-' and 'post-event' questionnaires ($V=8289.5, n=617, p<0.001$). The patterns of shift are identified in Figures 5a and 5b.

Figures 5a and 5b. Question 2 Patterns of Shift in 'Pre-' and 'Post-Event' Scores.
 In Figure 5b, the shift patterns are ordered top to bottom with the most frequently observed pattern at the top. The grey area indicates shift patterns which were observed in <1% of the respondent pool.

5a)



5b)



There was not a statistically significant difference identified in the pattern of shift between groups ($F_{17,598}=1.578, n=617, p=0.065$).

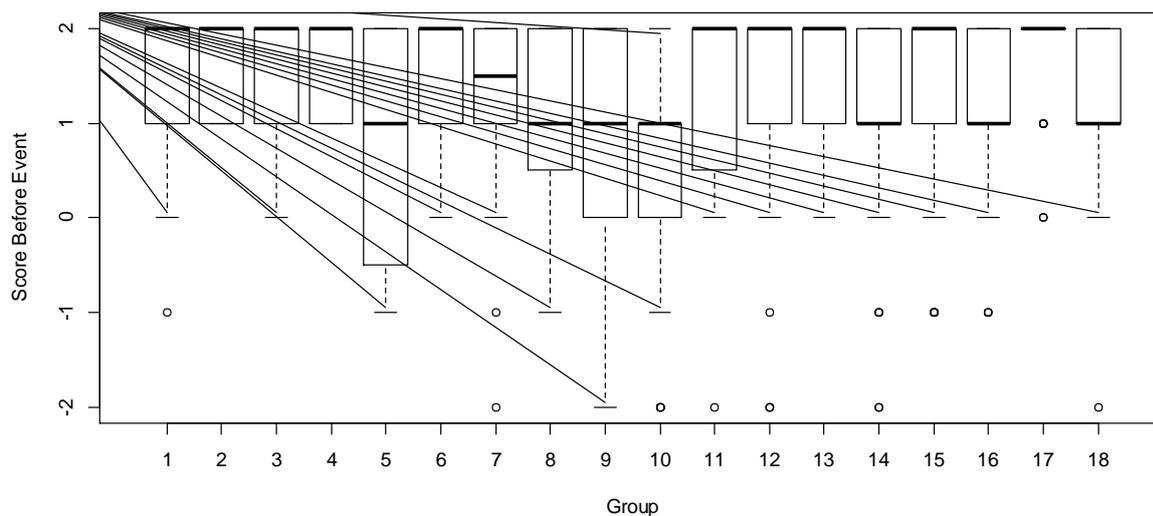
5.3. Question 3

Beavers could reduce flooding problems. <-> Beavers will make flooding worse.

5.3.1. Differences in 'Pre-Event' Scores

There was found to be a significant difference in pre-event scores between the different groups ($F_{17,599}=2.938$, $n=617$, $p<0.001$). The scores pre-event are demonstrated in Figure 6.

Figure 6. Question 3 'Pre-Event' Scores between Groups



In a Post-Hoc Tukey test, the statistically significant differences between groups were further examined. Those differences are presented here in Table 7.

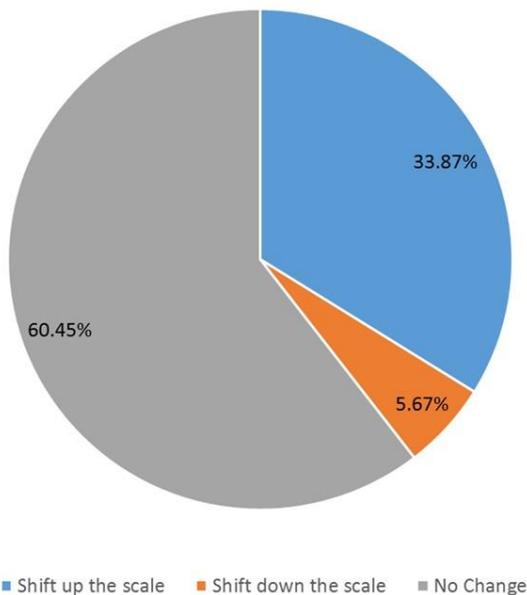
Table 7. STATISTICAL DIFFERENCES BETWEEN GROUPS IN QUESTION 3 PRE-EVENT SCORES		
Group A	Group B	Significance Level
10	1	$p<0.05$
10	2	$p<0.05$
10	4	$p<0.01$
12	10	$p<0.01$
16	10	$p<0.05$
17	10	$p<0.001$

5.3.2. Comparison between 'Pre-' and 'Post-Event' Scores

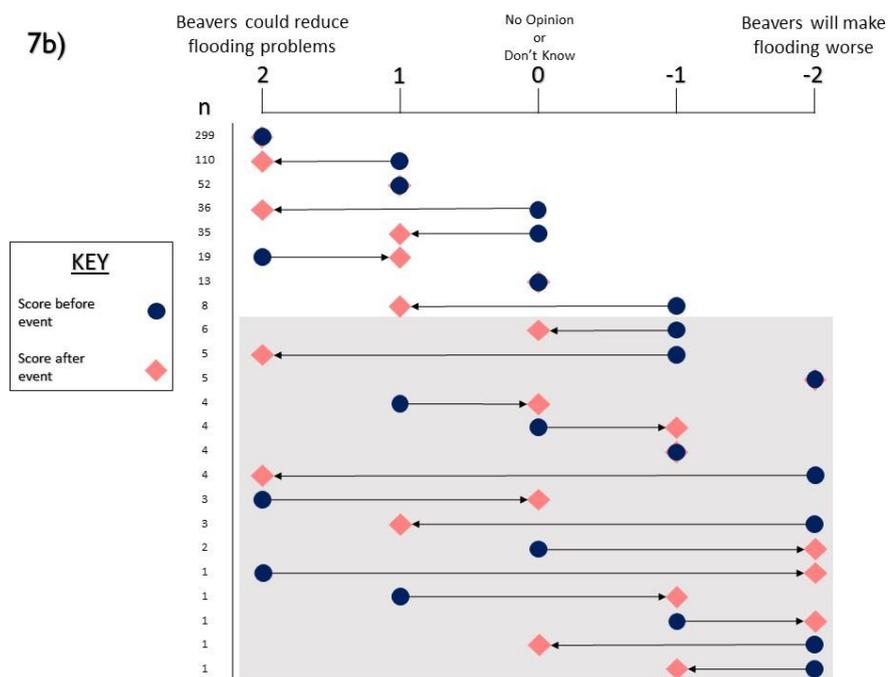
There was found to be a significant difference in scores between 'pre-' and 'post-event' questionnaires ($V=4012$, $n=617$, $p<0.001$). The patterns of shift are identified in Figures 7a and 7b.

Figures 7a and 7b. Question 3 Patterns of Shift in 'Pre-' and 'Post-Event' Scores.
 In Figure 7b, the shift patterns are ordered top to bottom with the most frequently observed pattern at the top. The grey area indicates shift patterns which were observed in <1% of the respondent pool.

7a)



7b)



There was not a statistically significant difference identified in the pattern of shift between groups ($F_{17,599}=0.929$, $n=617$, $p=0.54$).

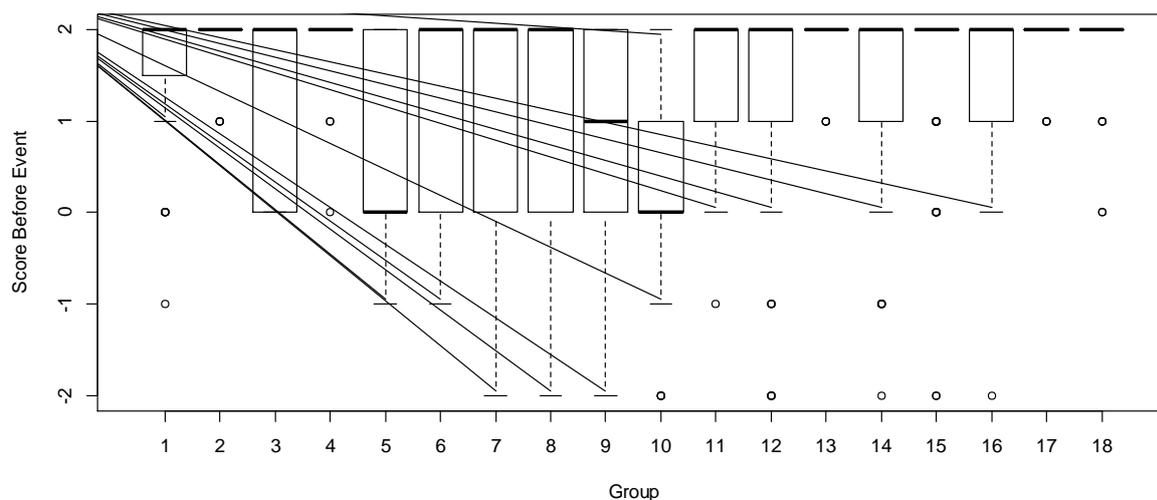
5.4. Question 4

I would like to see beavers back in England. <-> I would not like to see beavers back in England.

5.4.1. Differences in 'Pre-Event' Scores

There was found to be a significant difference in pre-event scores between the different groups ($F_{17,601}=6.402, n=619, p<0.001$). The scores pre-event are demonstrated in Figure 8.

Figure 8. Question 4 'Pre-Event' Scores between Groups



In a Post-Hoc Tukey test, the statistically significant differences between groups were further examined. Those differences are presented here in Table 8.

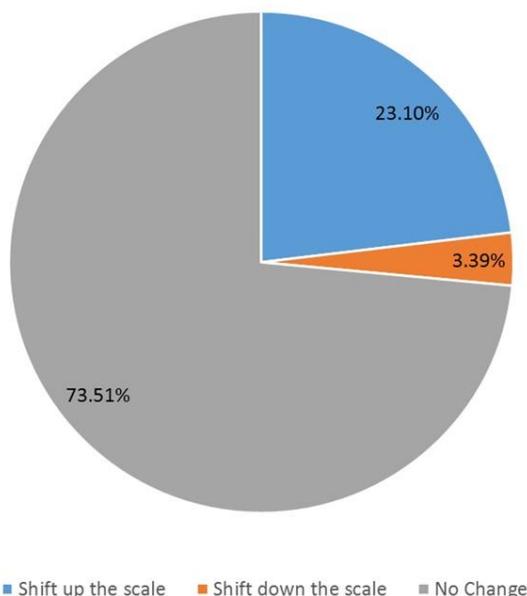
Table 8. STATISTICAL DIFFERENCES BETWEEN GROUPS IN QUESTION 4 PRE-EVENT SCORES		
Group A	Group B	Significance Level
10	1	p<0.001
10	2	p<0.001
10	4	p<0.001
10	6	p<0.05
11	10	p<0.01
12	10	p<0.001
13	10	p<0.001
14	10	p<0.001
15	10	p<0.001
16	10	p<0.001
17	5	p<0.05
17	9	p<0.05
17	10	p<0.001
18	10	p<0.001

5.4.2. Comparison between 'Pre-' and 'Post-Event' Scores

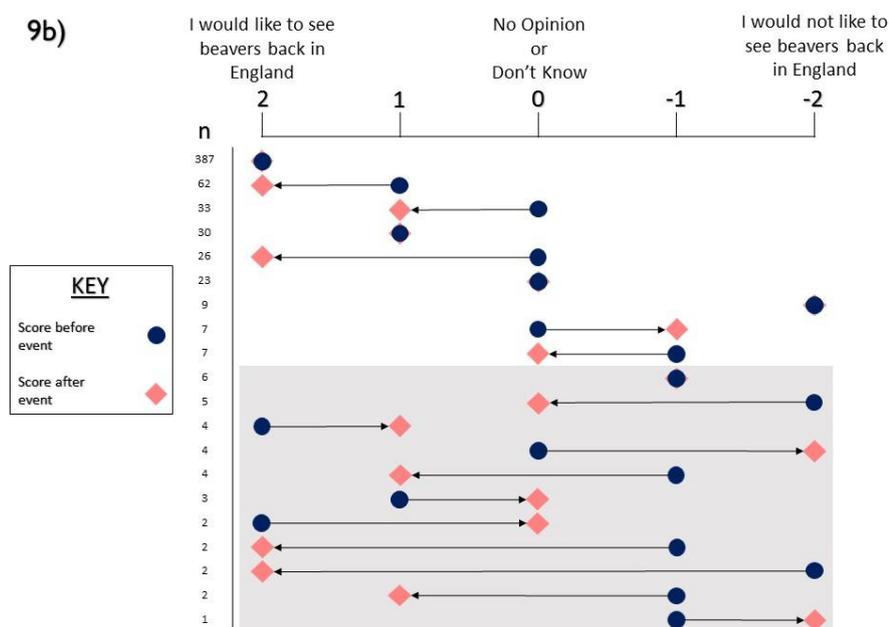
There was found to be a significant difference in scores between 'pre-' and 'post-event' questionnaires ($N=1713$, $n=619$, $p<0.001$). The patterns of shift are identified in Figures 9a and 9b.

Figures 9a and 9b. Question 4 Patterns of Shift in 'Pre-' and 'Post-Event' Scores. In Figure 9b, the shift patterns are ordered top to bottom with the most frequently observed pattern at the top. The grey area indicates shift patterns which were observed in <1% of the respondent pool.

9a)



9b)



There was not a statistically significant difference identified in the pattern of shift between groups ($F_{17,601}=1.583$, $n=619$, $p=0.063$).

6. Additional Results of a Nationwide Questionnaire - Beavers and Education

In Auster *et al.*, 2019 a nationwide questionnaire is described. In the questionnaire, which took place in 2017, respondents were asked whether they believed beavers would have a positive or negative impact in 'Education'. Respondents were then asked to explain their answer. The reasons given were analysed with a content analysis, the results of which are presented here in Table 9. (Further details pertaining to this table are available in the Appendix detailing reasons for respondents' answers to the 2017 nationwide survey).

Table 9. CONTENT ANALYSIS OF REASONS GIVEN FOR A RESPONDENTS' VIEW ON THE IMPACTS OF BEAVERS ON EDUCATION FROM A NATIONWIDE QUESTIONNAIRE		
<i>(N=Number of comments given. n=Number of reasons given within comments.)</i>		
VIEW	REASON	% of n
Positive <i>N=1908*</i> <i>n=2174</i>	Gateway to learn about broader topics [examples given: ecology, conservation, land use, environmental policy, Ecosystem Services, agricultural/environmental policy]	48.16
	Beneficial for children/schools	13.57
	Learn about beavers specifically	6.49
	Beavers are interesting and inspiring [generally stated]	5.89
	Get people outdoors/provides practical learning opportunity	5.29
	Generally positive view	4.42
	Benefit for all ages and levels	4.00
	Wildlife education is important [broadly stated]	3.08
	Beavers are a native species	2.99
	Something new to learn about	2.48
	Demonstrate reintroduction [as a viable conservation technique]	1.10
	Context dependent upon... [examples given: teaching choices, media, level of interest, legalities of a release trade-off with other impacts, level of damage, cost of activities]	0.69
	Misinformation can be addressed	0.64
	"I don't know"	0.60
	Understanding beavers [in the UK] will increase tolerance and reduce conflict	0.41
	Don't understand the question	0.14
Education will need to be handled carefully	0.05	
Negative <i>N=50**</i> <i>n=53</i>	Limited knowledge will be gained	18.87
	Could be used to lobby for a particular viewpoint	16.98
	Educational benefit at high risk of negative impacts	16.98
	Will only learn of negatives	11.32
	No benefit	7.55
	There is not enough education on the subject	5.66
	Beavers don't teach or need education	5.66
	May disturb beavers or local people	3.77
	Education needs to be balanced and not detract from wider ecology	3.77
	The wrong information is being used in education	3.77
	Beavers are only active at dawn and dusk	1.89
	Potential to lose educational resources elsewhere	1.89
	Benefit only from the effort put into education, not from the beavers themselves	1.89
Neutral <i>N=314</i> <i>n=314</i>	"I don't know" or "No view"	29.94
	Little or no impacts	24.84
	Presented both a positive and negative reason [reflected above as appropriate, see note below]	17.52
	Don't understand the question	9.87
	Context dependent upon... [examples given: interest level, how beavers are used in education amount of funding/resource, accessibility, educator bias, audience]	8.60
	Wildlife education is currently poor	5.10
	Too soon to know	2.23
	Only of interest to limited groups	0.96
	Activity at dawn/dusk limits use in education	0.64
	Respondent not interested in education	0.32

NOTE

*including 45 positive reasons given by a 'Neutral' respondent

**including 8 negative reasons given by a 'Neutral' respondent

7. Findings

- This report finds that 'Pre-' and 'Post-Event' scores given by respondents consistently shifted in the results for four different questions which represented different subject areas related to beaver reintroduction.
- The level of shift differed between the different groups at the engagement events in response to one of the four questions but not in the remaining three, despite the differences in 'Pre-Event' scores given by the respondents.
- It is not possible to ascertain whether this attitudinal shift persisted after the engagement events concluded and the 'Post-Event' questionnaire was submitted, yet this provides a useful snapshot in time for the eighteen sampled events.
- The results indicate that the role of evidence-based engagement activities in beaver reintroduction, and perhaps therefore in wider reintroductions, can indeed impact upon attitudes. It is currently unknown whether stated attitudinal changes would lead to changes in behaviour, but it is possible this could have an influence in addressing potential conflict issues.
- It should be noted that these engagement events were delivered by a 'pro-beaver' organisation with vested interests in beaver reintroduction as the licence-holders for the 'River Otter Beaver Trial'. In Table 9 (the results from a nationwide questionnaire), some respondents cited that the role of beavers in education could be context dependent upon educator bias, or that education could be used to lobby for a particular viewpoint. These factors will need to be considered so as not to lead to the escalation of potential conflicts. The use of evidence in educational events could help to address this issue.
- The role of engagement and education in beaver reintroduction will be important. However, it is recognised that the level of education and engagement activities could be limited by the level of funding or resources that are made available for it.