

Observed Hook Variety in the Deep-Set Fishery and Involvement in False Killer Whale Interactions

Two analyses characterizing hooks in the deep-set fishery are presented in the sections below.

1. Observer data on current hook use in the deep-set fishery

We examined observer data from deep-set trips from the time the TRP gear regulations went into effect and the observer program started recording hook wire diameter (early March 2013) to the present (mid-April 2015). This is an update on the previous summary, sent to the TRT via email on June 23, 2014, that included data only through mid-June 2014.

We defined the universe of observed “hook types” as all unique combinations of hook size, cross-sectional shape, and wire diameter. To preserve confidentiality, we removed data from hook types that were observed on fewer vessels than three vessels, which accounted for 3.4% of the hooks in the total dataset. We also considered hooks observed in each year (March-December 2013, 2014, and January-mid-April 2015). To preserve confidentiality in individual-year analyses, we removed data from hook types that were observed on fewer than three vessels in that year, which accounted for 2.5% of the hooks in 2013, 2.8% of the hooks in 2014, and 25.5% of the hooks in 2015 (because of the small sample size of trips so far in 2015). For the remaining unique “hook types,” we calculated the frequency of their use by:

1. Estimating the number of hooks of a given hook type on a given trip. For each trip, we multiplied the total number of hooks by the estimated proportion of hooks of that type. For example, if there were 40,000 hooks set on a trip and the vessel’s hooks were 100% hook type X, that counted as 40,000 of hook type X. If the vessel used a mix of two hook types on a trip, and the observer estimated 75% hook type X and 25% hook type Y, that counted as 30,000 hook type X and 10,000 hook type Y.
2. Summing the number of hooks of that type across all trips.
3. Calculating the percentage of the overall total number of hooks that each hook type represented.

The results are presented in the tables and figures below. We also present a summary of each hook type over time, to indicate how observed usage of individual hook types changed by year.

Caveats: First, observer coverage is a random sample and may over- or under-represent certain vessels in the dataset. Second, the unique hook types presented here may not actually be unique; measurements may have been affected by inter-observer or equipment differences, or observer or equipment error. Third, hooks within an identified type may not actually be the same hook (e.g., may have different manufacturer, material, or other characteristics not recorded by the observer program). However, this summary provides a general idea of the variety and frequency of different hook types used by the vessels.

Observed Hook Types

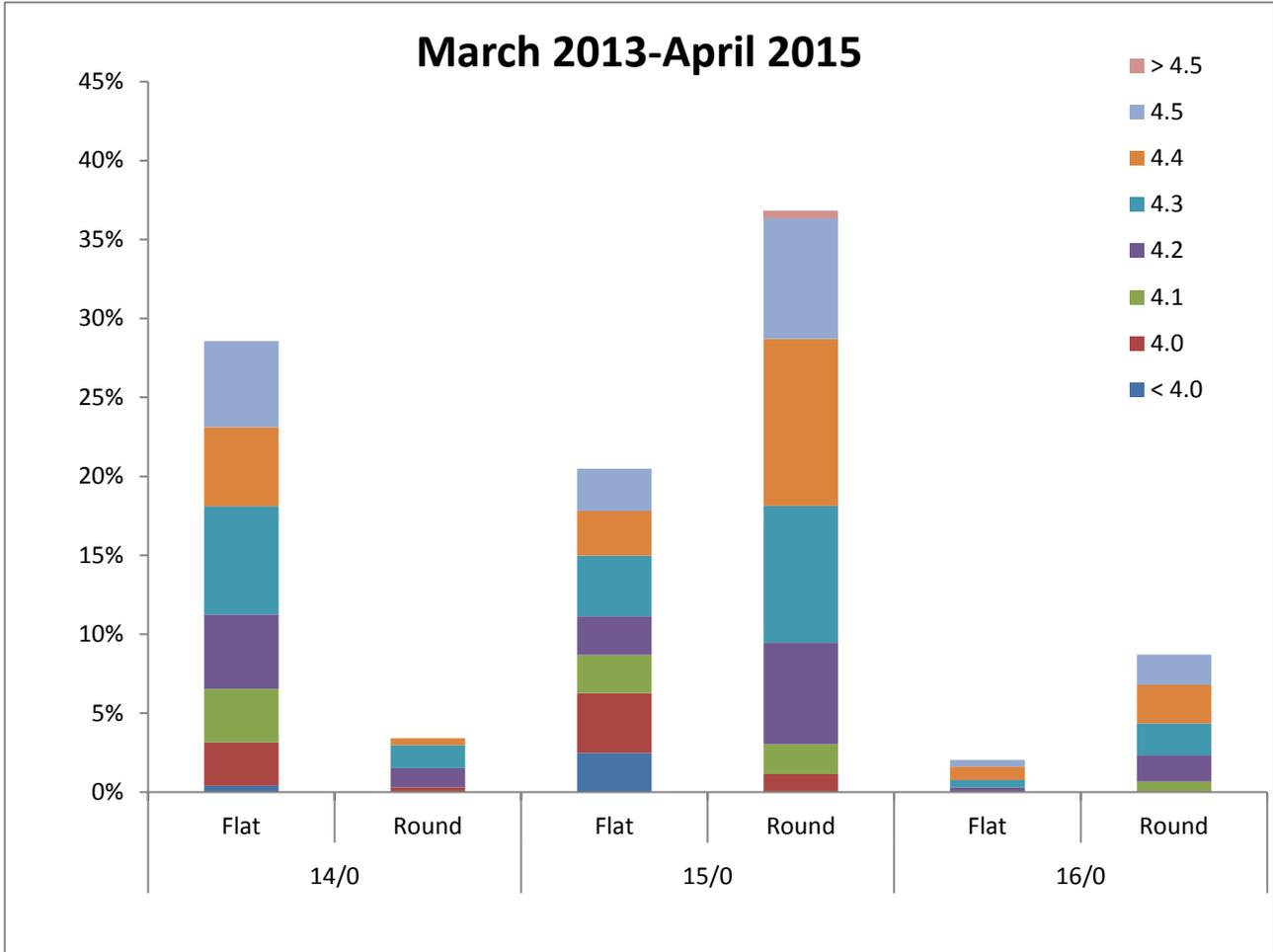
March 2013-April 2015									
		Wire diameter (mm)							
Size	Cross-sectional shape	< 4.0	4.0	4.1	4.2	4.3	4.4	4.5	> 4.5
14/0	Flat	0.4%	2.7%	3.4%	4.7%	6.9%	5.0%	5.4%	-
	Round	-	0.3%	-	1.2%	1.5%	0.4%	-	-
15/0	Flat	2.5%	3.8%	2.4%	2.4%	3.9%	2.8%	2.7%	-
	Round	-	1.1%	1.9%	6.4%	8.7%	10.6%	7.6%	0.4%
16/0	Flat	-	-	-	0.3%	0.5%	0.8%	0.4%	-
	Round	-	-	0.7%	1.7%	2.0%	2.4%	1.9%	-

March-December 2013									
		Wire diameter (mm)							
Size	Cross-sectional shape	< 4.0	4.0	4.1	4.2	4.3	4.4	4.5	> 4.5
14/0	Flat	-	2.0%	3.7%	5.3%	8.3%	4.0%	7.4%	-
	Round	-	0.6%	-	1.7%	1.0%	-	-	-
15/0	Flat	2.3%	3.6%	-	2.1%	4.0%	2.8%	3.7%	-
	Round	-	1.4%	1.5%	7.6%	9.2%	9.6%	9.1%	1.1%
16/0	Flat	-	-	-	-	0.8%	-	-	-
	Round	-	-	-	2.6%	1.6%	2.2%	0.8%	-

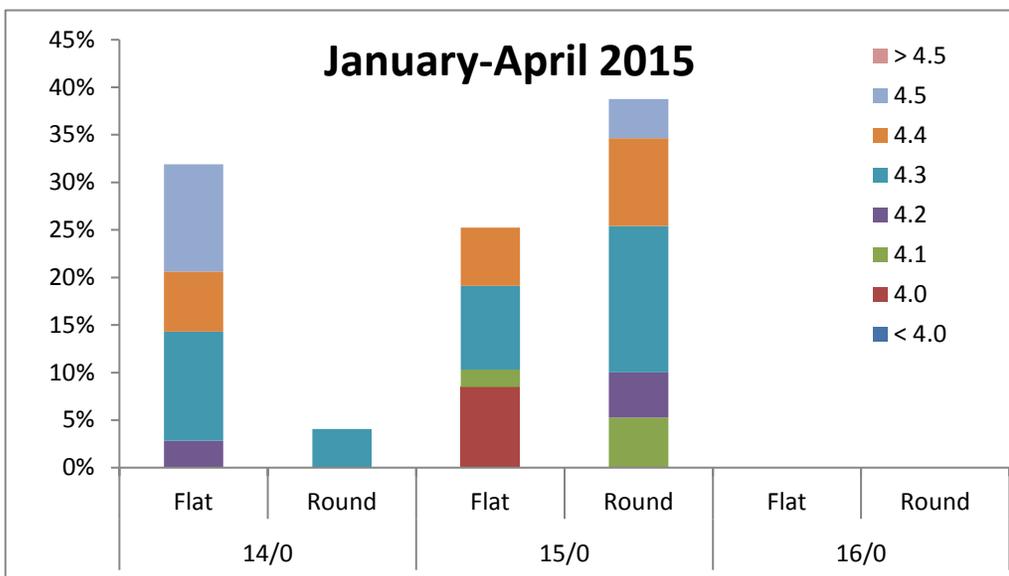
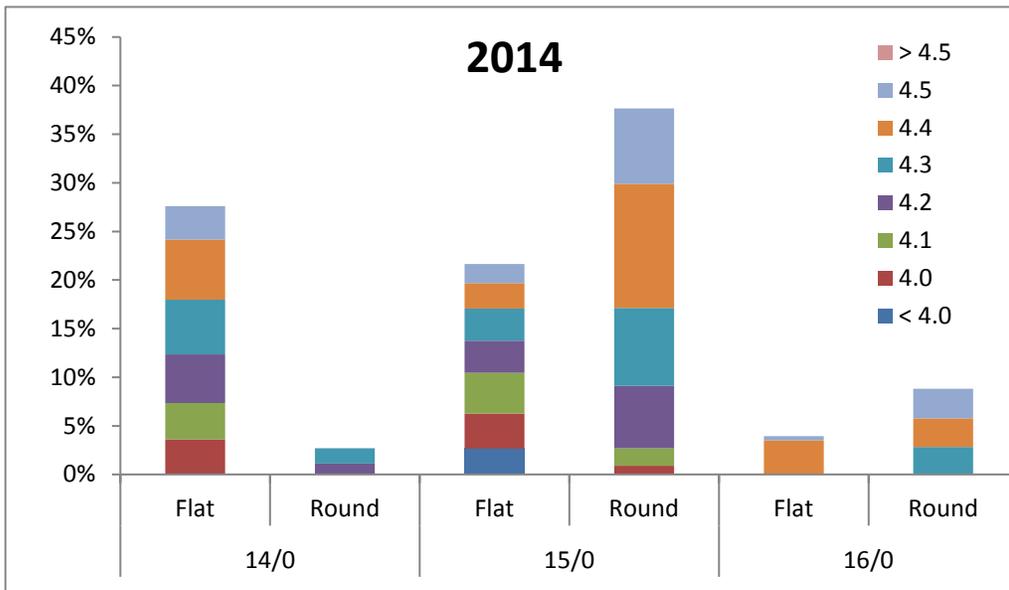
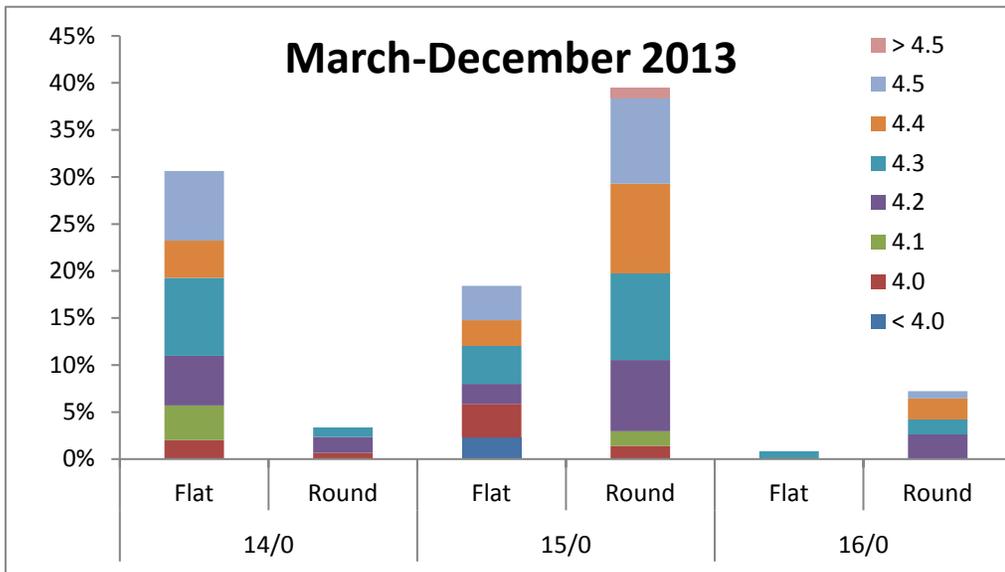
2014									
		Wire diameter (mm)							
Size	Cross-sectional shape	< 4.0	4.0	4.1	4.2	4.3	4.4	4.5	> 4.5
14/0	Flat	-	3.6%	3.7%	5.0%	5.6%	6.2%	3.4%	-
	Round	-	-	-	1.1%	1.6%	-	-	-
15/0	Flat	2.7%	3.6%	4.2%	3.3%	3.3%	2.6%	1.9%	-
	Round	-	0.9%	1.8%	6.4%	8.0%	12.8%	7.8%	-
16/0	Flat	-	-	-	-	-	3.5%	0.4%	-
	Round	-	-	-	-	2.8%	2.9%	3.1%	-

January-April 2015									
		Wire diameter (mm)							
Size	Cross-sectional shape	< 4.0	4.0	4.1	4.2	4.3	4.4	4.5	> 4.5
14/0	Flat	-	-	-	2.8%	11.5%	6.3%	11.3%	-
	Round	-	-	-	-	4.1%	-	-	-
15/0	Flat	-	8.5%	1.8%	-	8.8%	6.1%	-	-
	Round	-	-	5.3%	4.8%	15.4%	9.3%	4.1%	-
16/0	Flat	-	-	-	-	-	-	-	-
	Round	-	-	-	-	-	-	-	-

Observed Hook Types



Observed Hook Types



Observed Hook Types Over Time

Size	Cross-sectional shape	Wire diam	Mar-Dec 2013	2014	Jan-Apr 2015	Mar 2013-Apr 2015
14	Flat	< 4.0	-	-	-	0.4%
14	Flat	4.0	2.0%	3.6%	-	2.7%
14	Flat	4.1	3.7%	3.7%	-	3.4%
14	Flat	4.2	5.3%	5.0%	2.8%	4.7%
14	Flat	4.3	8.3%	5.6%	11.5%	6.9%
14	Flat	4.4	4.0%	6.2%	6.3%	5.0%
14	Flat	4.5	7.4%	3.4%	11.3%	5.4%
14	Round	4.0	0.6%	-	-	0.3%
14	Round	4.2	1.7%	1.1%	-	1.2%
14	Round	4.3	1.0%	1.6%	4.1%	1.5%
14	Round	4.4	-	-	-	0.4%
15	Flat	< 4.0	2.3%	2.7%	-	2.5%
15	Flat	4.0	3.6%	3.6%	8.5%	3.8%
15	Flat	4.1	-	4.2%	1.8%	2.4%
15	Flat	4.2	2.1%	3.3%	-	2.4%
15	Flat	4.3	4.0%	3.3%	8.8%	3.9%
15	Flat	4.4	2.8%	2.6%	6.1%	2.8%
15	Flat	4.5	3.7%	1.9%	-	2.7%
15	Round	4.0	1.4%	0.9%	-	1.1%
15	Round	4.1	1.5%	1.8%	5.3%	1.9%
15	Round	4.2	7.6%	6.4%	4.8%	6.4%
15	Round	4.3	9.2%	8.0%	15.4%	8.7%
15	Round	4.4	9.6%	12.8%	9.3%	10.6%
15	Round	4.5	9.1%	7.8%	4.1%	7.6%
15	Round	> 4.5	1.1%	-	-	0.4%
16	Flat	4.2	-	-	-	0.3%
16	Flat	4.3	0.8%	-	-	0.5%
16	Flat	4.4	-	3.5%	-	0.8%
16	Flat	4.5	-	0.4%	-	0.4%
16	Round	4.1	-	-	-	0.7%
16	Round	4.2	2.6%	-	-	1.7%
16	Round	4.3	1.6%	2.8%	-	2.0%
16	Round	4.4	2.2%	2.9%	-	2.4%
16	Round	4.5	0.8%	3.1%	-	1.9%

2. Hooks involved in deep-set false killer whale hookings

Thirteen false killer whale hookings were observed in the deep-set fishery since the TRP gear regulations went into effect and the observer program changed its data forms (March 2013) through mid-April 2015. Three additional false killer whales were observed in early 2013 before the observer program changed its data forms, and are not included in the analysis below.

The tables below shows the unique hook types (non-confidential data only) “ranked” from most to least frequently observed, overall and by year, based on data from the previous tables. They also indicates which hook types were confirmed or possibly involved in a false killer whale hooking. Orange highlighting indicates that the hook type was confirmed to be involved in a false killer whale hooking, and blue indicates that the hook type was possibly involved in a false killer whale hooking (i.e., the hook could not be identified because the hook was not recovered and the vessel used more than one hook type). Please note that two hook types were possibly involved in a false killer whale hooking in 2015, but both were considered confidential for the purposes of the 2015 analysis described in section #1 above, and are not shown in the 2015 table below.

Hooks Involved in Observed False Killer Whale Interactions in the Deep-Set Longline Fishery

March 2013-April 2015					
"Rank" (from obs %)	Size	Cross-sectional shape	Wire diam	Obs %	Observed false killer whale interactions
1	15	Round	4.4	10.6%	
2	15	Round	4.3	8.7%	False killer whale (2/3/2014)
					False killer whale (7/11/2014)
					False killer whale (7/11/2014)
					Possibly involved in false killer whale hooking (9/30/2014, 30% of hooks)
3	15	Round	4.5	7.6%	Possibly involved in false killer whale hooking (3/1/2014; 20% of hooks)
					Possibly involved in false killer whale hooking (3/1/2014; 20% of hooks)
4	14	Flat	4.3	6.9%	False killer whale (9/29/2014)
5	15	Round	4.2	6.4%	
6	14	Flat	4.5	5.4%	
7	14	Flat	4.4	5.0%	
8	14	Flat	4.2	4.7%	False killer whale (6/21/2014)
9	15	Flat	4.3	3.9%	False killer whale (4/20/2013)
					Possibly involved in false killer whale hooking (10/2/2014, 40% of hooks)
10	15	Flat	4.0	3.8%	Possibly involved in false killer whale hooking (3/1/2014; 80% of hooks)
					Possibly involved in false killer whale hooking (3/1/2014; 80% of hooks)
11	14	Flat	4.1	3.4%	
12	15	Flat	4.4	2.8%	Possibly involved in false killer whale hooking (9/30/2014; 70% of hooks)
13	14	Flat	4.0	2.7%	
14	15	Flat	4.5	2.7%	
15	15	Flat	< 4.0	2.5%	Possibly involved in false killer whale hooking (3/30/2015; 55% of hooks)
16	15	Flat	4.2	2.4%	
17	16	Round	4.4	2.4%	False killer whale (9/14/2014)
18	15	Flat	4.1	2.4%	
19	16	Round	4.3	2.0%	
20	16	Round	4.5	1.9%	
21	15	Round	4.1	1.9%	
22	16	Round	4.2	1.7%	
23	14	Round	4.3	1.5%	Possibly involved in false killer whale hooking (10/2/2014; 60% of hooks)
24	14	Round	4.2	1.2%	
25	15	Round	4.0	1.1%	Possibly involved in false killer whale hooking (3/30/2015; 45% of hooks)
26	16	Flat	4.4	0.8%	False killer whale (6/19/2014)
27	16	Round	4.1	0.7%	
28	16	Flat	4.3	0.5%	
29	15	Round	> 4.5	0.4%	
30	14	Round	4.4	0.4%	
31	16	Flat	4.5	0.4%	
32	14	Flat	< 4.0	0.4%	
33	14	Round	4.0	0.3%	
34	16	Flat	4.2	0.3%	

Hooks Involved in Observed False Killer Whale Interactions in the Deep-Set Longline Fishery

March-December 2013					
"Rank" (from obs %)	Size	Cross-sectional shape	Wire diam	Obs %	Observed false killer whale interactions
1	15	Round	4.4	9.56%	
2	15	Round	4.3	9.20%	
3	15	Round	4.5	9.11%	
4	14	Flat	4.3	8.28%	
5	15	Round	4.2	7.58%	
6	14	Flat	4.5	7.42%	
7	14	Flat	4.2	5.29%	
8	15	Flat	4.3	4.01%	False killer whale (4/20/2013)
9	14	Flat	4.4	3.97%	
10	15	Flat	4.5	3.66%	
11	14	Flat	4.1	3.66%	
12	15	Flat	4	3.58%	
13	15	Flat	4.4	2.75%	
14	16	Round	4.2	2.6%	
15	15	Flat	< 4.0	2.29%	
16	16	Round	4.4	2.2%	
17	15	Flat	4.2	2.14%	
18	14	Flat	4	2.03%	
19	14	Round	4.2	1.72%	
20	16	Round	4.3	1.6%	
21	15	Round	4.1	1.55%	
22	15	Round	4	1.40%	
23	15	Round	> 4.5	1.12%	
24	14	Round	4.3	1.0%	
25	16	Flat	4.3	0.8%	
26	16	Round	4.5	0.8%	
27	14	Round	4	0.65%	

Hooks Involved in Observed False Killer Whale Interactions in the Deep-Set Longline Fishery

2014					
"Rank" (from obs %)	Size	Cross-sectional shape	Wire diam	Obs %	Observed false killer whale interactions
1	15	Round	4.4	12.78%	
2	15	Round	4.3	8.01%	False killer whale (2/3/2014)
					False killer whale (7/11/2014)
					False killer whale (7/11/2014)
					Possibly involved in false killer whale hooking (9/30/2014, 30% of hooks)
3	15	Round	4.5	7.76%	Possibly involved in false killer whale hooking (3/1/2014; 20% of hooks)
					Possibly involved in false killer whale hooking (3/1/2014; 20% of hooks)
4	15	Round	4.2	6.42%	
5	14	Flat	4.4	6.21%	
6	14	Flat	4.3	5.64%	False killer whale (9/29/2014)
7	14	Flat	4.2	5.01%	False killer whale (6/21/2014)
8	15	Flat	4.1	4.2%	
9	14	Flat	4.1	3.71%	
10	14	Flat	4	3.63%	
11	15	Flat	4	3.59%	Possibly involved in false killer whale hooking (3/1/2014; 80% of hooks)
					Possibly involved in false killer whale hooking (3/1/2014; 80% of hooks)
12	16	Flat	4.4	3.5%	False killer whale (6/19/2014)
13	14	Flat	4.5	3.42%	
14	15	Flat	4.3	3.33%	Possibly involved in false killer whale hooking (10/2/2014, 40% of hooks)
15	15	Flat	4.2	3.29%	
16	16	Round	4.5	3.1%	
17	16	Round	4.4	2.9%	False killer whale (9/14/2014)
18	16	Round	4.3	2.8%	
19	15	Flat	< 4.0	2.66%	
20	15	Flat	4.4	2.62%	Possibly involved in false killer whale hooking (9/30/2014; 70% of hooks)
21	15	Flat	4.5	1.95%	
22	15	Round	4.1	1.81%	
23	14	Round	4.3	1.6%	Possibly involved in false killer whale hooking (10/2/2014; 60% of hooks)
24	14	Round	4.2	1.11%	
25	15	Round	4	0.88%	
26	16	Flat	4.5	0.4%	

January-April 2015					
"Rank" (from obs %)	Size	Cross-sectional shape	Wire diam	Obs %	Observed false killer whale interactions
1	15	Round	4.3	15.4%	
2	14	Flat	4.3	11.5%	
3	14	Flat	4.5	11.3%	
4	15	Round	4.4	9.3%	
5	15	Flat	4.3	8.8%	
6	15	Flat	4.0	8.5%	
7	14	Flat	4.4	6.3%	
8	15	Flat	4.4	6.1%	
9	15	Round	4.1	5.3%	
10	15	Round	4.2	4.8%	
11	15	Round	4.5	4.1%	
12	14	Round	4.3	4.1%	
13	14	Flat	4.2	2.8%	
14	15	Flat	4.1	1.8%	

*Data for both possible hook types from 3/30/2015 interaction cannot be shown in 2015 alone because they are confidential