Estimation of weight composition for Japanese small scale fisheries in Tsugaru Strait: Fleet 14 (Other fisheries)

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Summary

Hand line and small-scaled longline assigned to Fleet 14 (Other fisheries) in stock assessment model for Pacific bluefin tuna are major gears for coastal fisheries in Tsugaru Strait and its adjacent waters. In the 2014 stock assessment, catch-at-size data for Fleet 14 were weight frequencies made through simple aggregation of number of fish by weight bin using individual body weight. This paper provided newly estimated catch-at-size calculated with a modified estimation procedure where the weight frequencies by gear were raised according to annual catch in number by gear.

Introduction

Tsugaru Strait, waters between the north end of Honsyu Island and the south end of Hokkaido, and its adjacent waters are one of main fishing grounds for Pacific bluefin tuna (PBF) in Japan. Various coastal fisheries for PBF by powered fishing boats are operated in these areas, such as hand line (angling) and small-scaled longline. These two fishing gears account for majority of catch yielded by the coastal fisheries in these waters.

In the stock assessment model on PBF, hand line and longline in Tsugaru Strait are classified into Fleet 14 (Other fisheries). In the 2014 stock assessment, catch-at-size data applied for Fleet 14 were weight frequencies made through simple aggregation of number of fish by weight bin using individual body weight (Abe et al. 2012; PBFWG 2012). This paper provided the catch-at-size calculated with a modified estimation procedure where the weight frequencies by gear were raised according to annual catch in number by gear.

Materials and methods

Catch information and body weight of individual PBF unloaded at landing ports in Tsugaru Strait and its adjacent areas have been collected through the Research Project on Japanese bluefin tuna (RJB) since 1994 (Fig. 1). The catch information are derived from sales slip where all of landing in weight are recoded, although landing in number are not always recorded. Body weight were measured by 0.1 kg. Body weight of gilled and gutted fish were converted into round weight with multiplied by 1.15.

Annual catch number was calculated with sales slip data for each of hand line and longline. Weight frequency at 2 kg interval was calculated by year and by gear with the body weight data. Annual coverage rate of total number of fish weighed for the annual catch number was calculated for

each gear. The catch-at-size for each gear was estimated with multiplying number of fish at weight bin by the corresponding coverage rate. The catch-at-size for Fleet 14 was obtained by summing those for two gears.

Results and discussion

The annual coverage rate of number of fish weighed by gear exceeded 70% in most of years since 1994 (Table 1). Because not all sales slips record catch number, the coverage rates were above 100% in several years.

PBF landings consisted of fish at weight classes of 100 kg or less, where two or three peaks of weight continuously occurred during the period since 1994 (Fig 2). This result suggests that hand line and small-sized longline in Tsugaru Strait are characterized as the fisheries catching PBF smaller than 100 kg, although fish over 200 kg are also caught. Size composition of PBF catch might be affected by size selectivity of gear itself but also availability by growth stage of PBF in these waters. Proportion of fish caught by longline were increased after 2003. There were not significant differences in the catch-at-size between hand line and longline.

As shown in Table 1, there were some years when the coverage rates of number of fish weighed by gear were under 50%. In order to ensure representativeness of the catch-at-size data, it might be a reasonable way to use the catch-at-size data with coverage rates by gear above a certain level (e.g. 70%).

References cited

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Table 1 Number of fish landed and number of fish weight by year and by gear. Coverage rate means proportion of number of fish weighted for number of fish landed.

Year	No. of fish landed			No. of fish weighed			Coverage rate		
	Hand line	Longline	Combined	Hand line	Longline	Combined	Hand line	Longline	Combined
1994	3,275	61	3,336	1,677	0	1,677	51%	0%	50%
1995	6,721	0	6,721	935	0	935	14%		14%
1996	10,905	429	11,334	1,452	10	1,462	13%	2%	13%
1997	2,972	684	3,656	2,298	0	2,298	77%	0%	63%
1998	4,319	583	4,902	1,306	79	1,385	30%	14%	28%
1999	3,525	560	4,085	3,430	562	3,992	97%	100%	98%
2000	4,781	1,344	6,125	3,579	1,344	4,923	75%	100%	80%
2001	5,618	1,575	7,193	5,487	1,578	7,065	98%	100%	98%
2002	5,435	1,539	6,974	4,534	1,539	6,073	83%	100%	87%
2003	6,727	4,963	11,690	6,303	5,420	11,723	94%	109%	100%
2004	4,455	8,969	13,424	4,516	8,964	13,480	101%	100%	100%
2005	6,854	16,929	23,783	6,851	16,835	23,686	100%	99%	100%
2006	5,217	9,692	14,909	5,215	9,683	14,898	100%	100%	100%
2007	5,395	9,052	14,447	3,492	8,030	11,522	65%	89%	80%
2008	4,680	12,345	17,025	4,675	10,354	15,029	100%	84%	88%
2009	5,529	9,875	15,404	4,946	9,795	14,741	89%	99%	96%
2010	4,141	7,452	11,593	3,052	7,173	10,225	74%	96%	88%
2011	2,040	7,231	9,271	1,053	4,772	5,825	52%	66%	63%
2012	3,145	14,666	17,811	4,155	11,974	16,129	132%	82%	91%
2013	7,077	11,586	18,663	6,738	6,457	13,195	95%	56%	71%
2014	5,842	10,152	15,994	5,000	7,014	12,014	86%	69%	75%

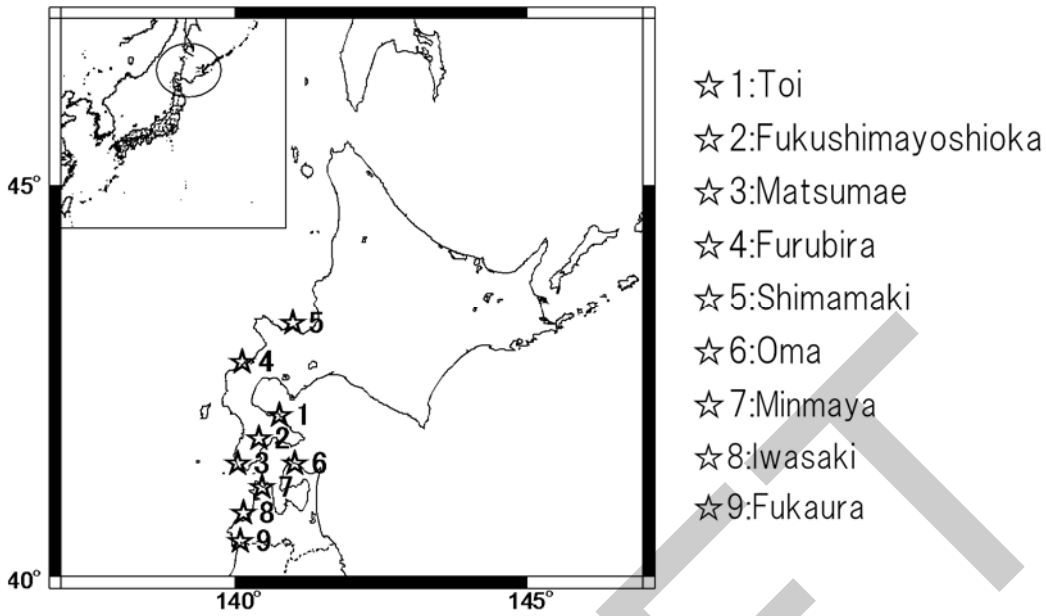


Fig. 1 Location of landing port in Tsugaru Strait and its adjacent areas.

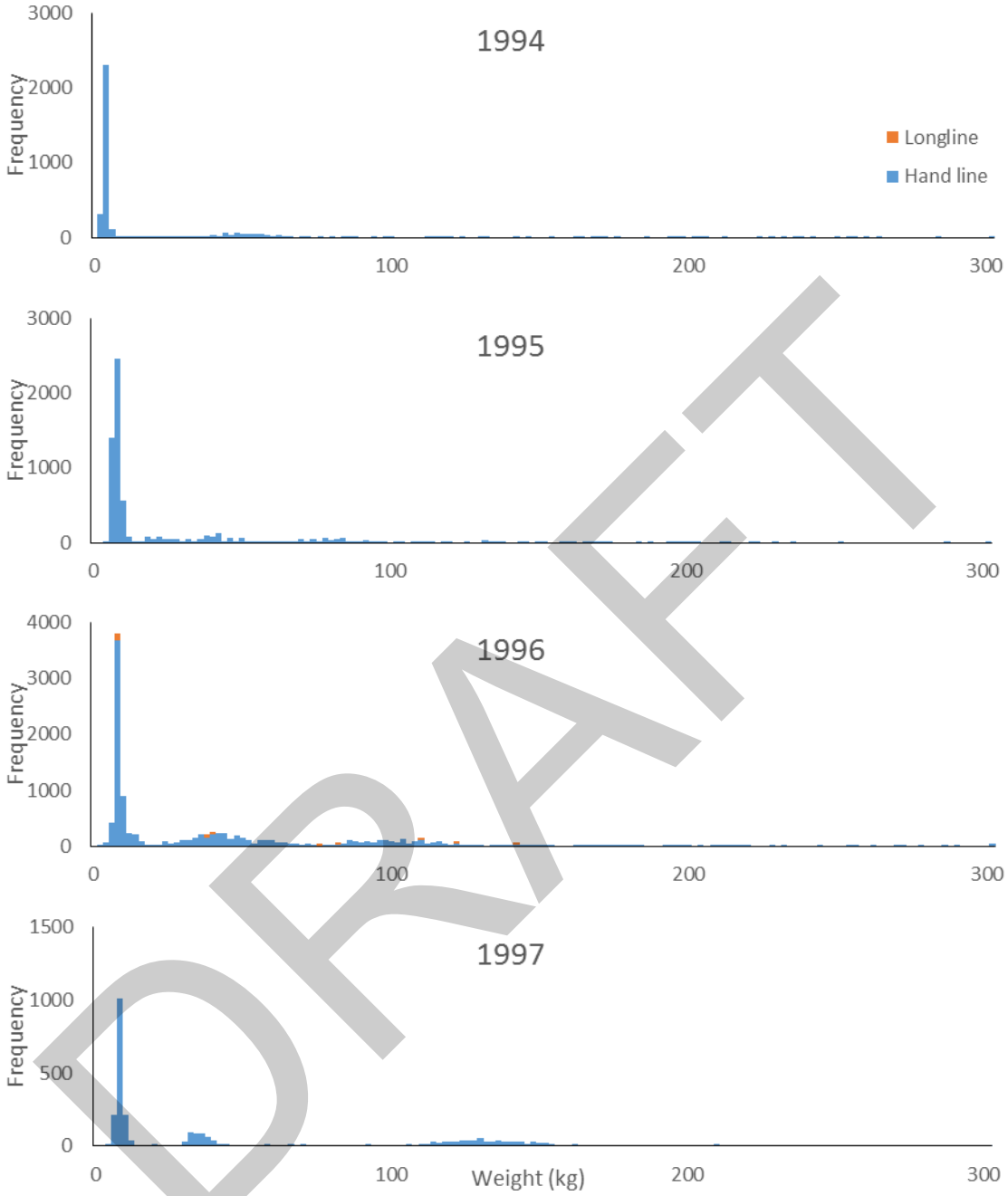
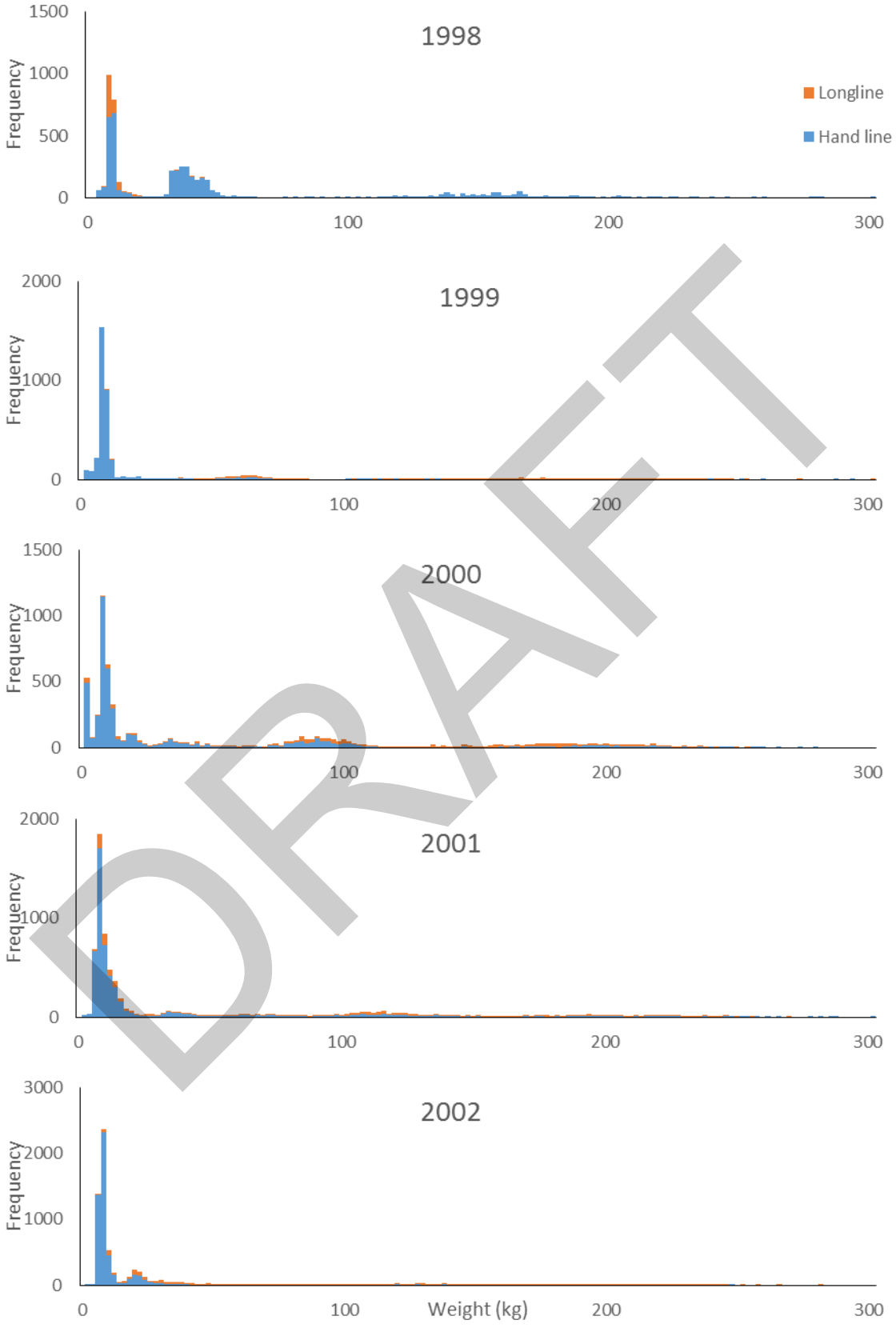


Fig. 2 Annual catch-at-size in weight by gear from 1994 to 2014. Histograms colored blue and orange indicates the catch-at-size for hand line and longline, respectively.



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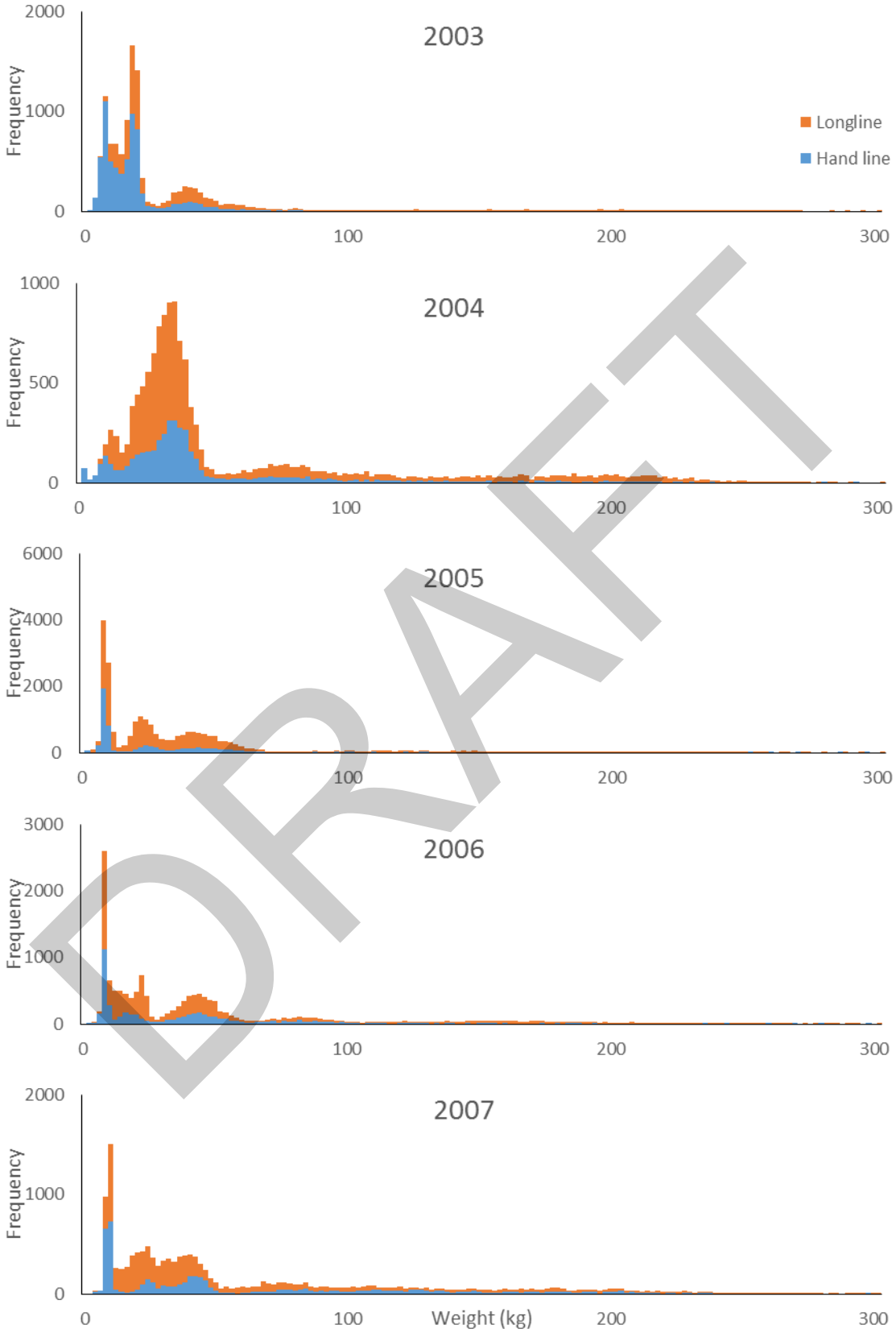

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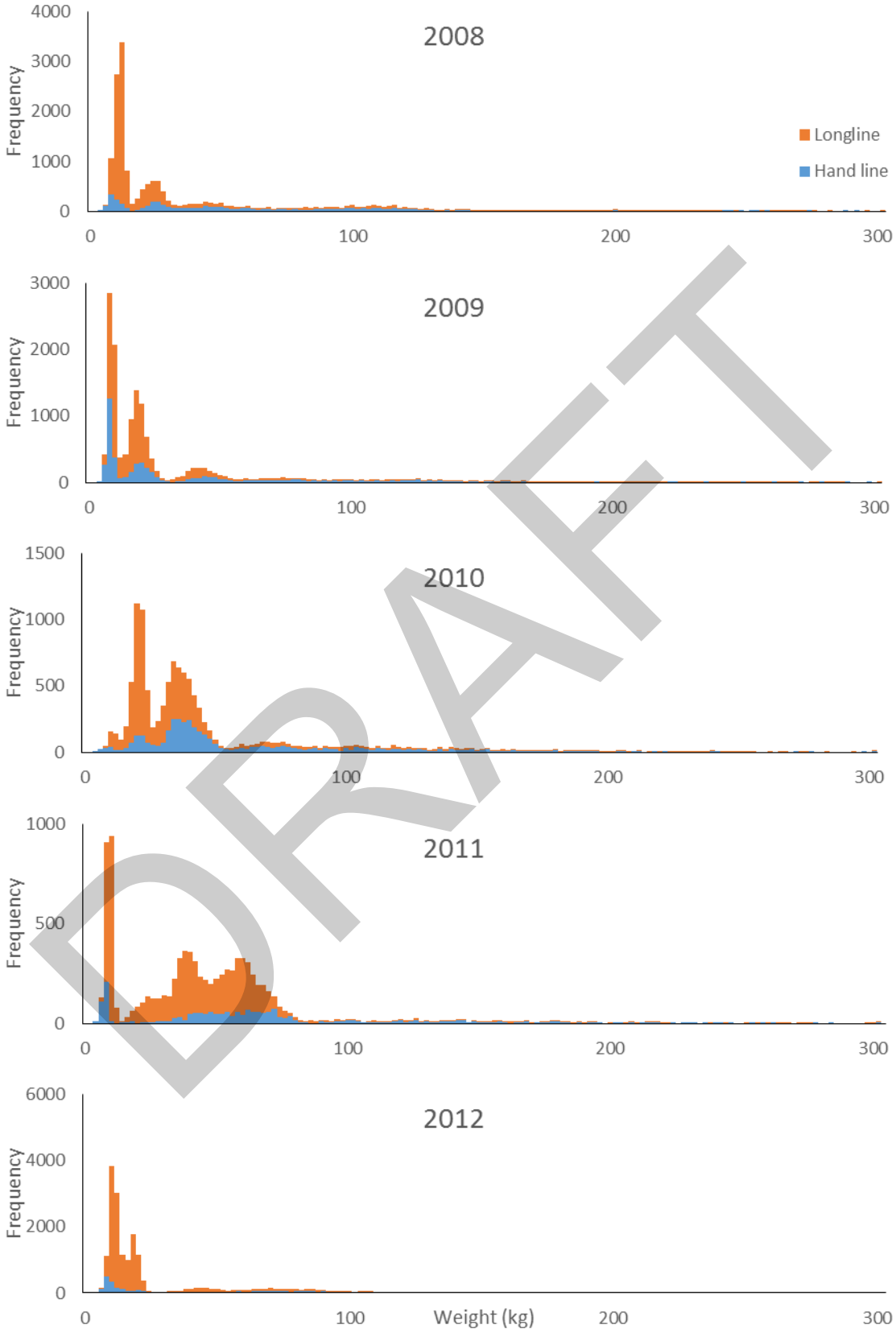

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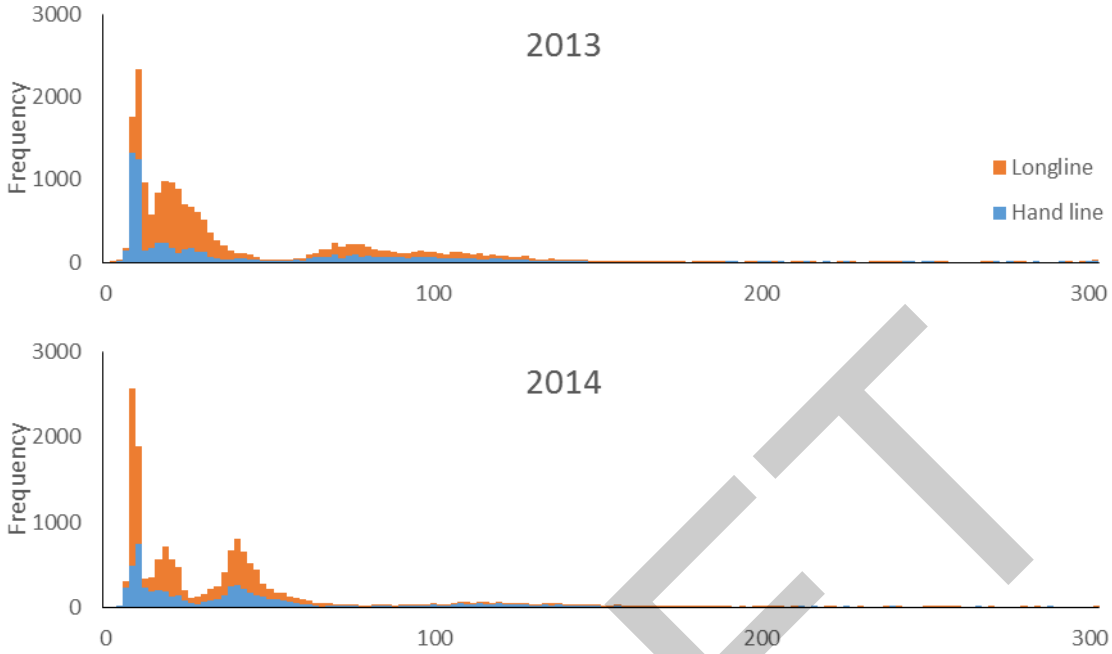

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