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Transition Discard Rate Methodology Summary

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A working paper in support of the Discard Estimation Methodology Review

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Transition Discard Rate Methodology Summary

The purpose of this summary is to describe the method to transition from the seed discard rate to the in-season discard rate methodology for estimating discards on unobserved trips under Amendment 16.

Terms

Seed rates are temporary discard rates initially used until there is at least one observed trip. For fishing year 2010 they will be assumed rates based on recent years' observed trips as described in Amendment 16.

Transition rates are temporary rates that are used while there is at least one observed trip but insufficient observed trips for the in-season methodology to be applied. They are a weighted average of the seed rate and the in-season discard rate as described below.

All rates are by stratum, i.e., by sector, stock, gear, and mesh size. Seed rates, transition rates, and observed discard rates are all calculated by stratum.

Transition Method

We will be using a hybrid exponential weighted average to transition from the seed rate to the in-season method. With no observed trips the seed rate is weighed at 100% and the transition discard rate is equal to the seed rate. As the observed trip count increases the seed rate will be weighed less and the transition rate will be increasingly weighed towards the discard rate on the observed trips. When the observed trip count is sufficient the in-season discard rate will replace the transition discard rate. The determination of sufficient observed trips directly affects the maximum number of observed trips used during the transition from the seed rate to the observed discard rate. This determination is discussed later.

The seed rate weight is alpha raised the power of the number of observed trips. This weight will decrease as more trips are observed and more discard rate data become available.

The trip discard rate for the observed trips is generated with a cumulative method, i.e. the sum of the observed discards divided by the sum of the kept-all. This discard rate is weighed by one minus the seed-rate weight, thereby weighing the individual observed trips equally in the transition resulting in a hybrid exponential weighting.

Mathematically this can be written as (by stratum):

$$TR_I = \alpha^I \cdot SR + (1 - \alpha^I) \cdot \frac{\sum_{i=0}^I d_i}{\sum_{i=0}^I kall_i}, I \text{ from } 1 \text{ to } I_{\max}$$

Where TR is the transition rate

I is the number of observed trips or subtrips within a stratum

α is the exponential weight

SR is the seed rate

i is an observed trip or subtrip within a stratum

d is the observed discard

kall is the observed kept-all

I_{\max} is the maximum number of trips under the transition method before implementing the in-season method fully using observed discard rate data for the current fishing year.

When I is greater than I_{\max} the cumulative method is applied, which is the in-season methodology fully using observed discard rates for fishing year 2010. Mathematically this transition method asymptotically approaches the cumulative method as the number of observed trips goes to infinity.

The maximum number of observed trips to be used in the transition rate will be one less than the sufficient number of trips desired to apply the in-season method. The sufficient trip count will be based on an analysis of variability of the discard/kall ratios as a function of number of trips. The count will be selected that reduces that variability to a reasonable or stable level and consistent with the need to apply the in-season method as soon as possible.

The alpha (α) weighting will be selected such that the final discard rate change from the transition method to the in-season method is small, under five or ten percentage points. This will be contrasted to need to minimize potential discard rate changes during the transition period. On this basis, the alpha value is primarily a function of the maximum number of observed trips used in the transition methodology.

Addendum to Discard Estimation Methodology Review Working Paper #5: Transition Discard Rate Methodology Summary

Tables

Table 1. Minimum level of observer coverage required to reduce the influence of the seed (assumed) rate on the end of the year discard estimate to < 0.01 (1%) for various stratum sizes under a variety of values of α . For example, a stratum of 10 trips would require that at least 3 trips be observed (30%) when an $\alpha = 0.1$.

Number of trips in stratum	α							
	0.1	0.2	0.3	0.5	0.8	0.9	1.0	
5	0.5	0.6	0.8	1.0	1.0	1.0	1.0	
10	0.3	0.3	0.4	0.7	1.0	1.0	1.0	
25	0.1	0.2	0.2	0.3	0.9	1.0	1.0	
50	0.1	0.1	0.1	0.2	0.5	0.9	1.0	
100	0.1	0.1	0.1	0.1	0.3	0.5	1.0	

Figures

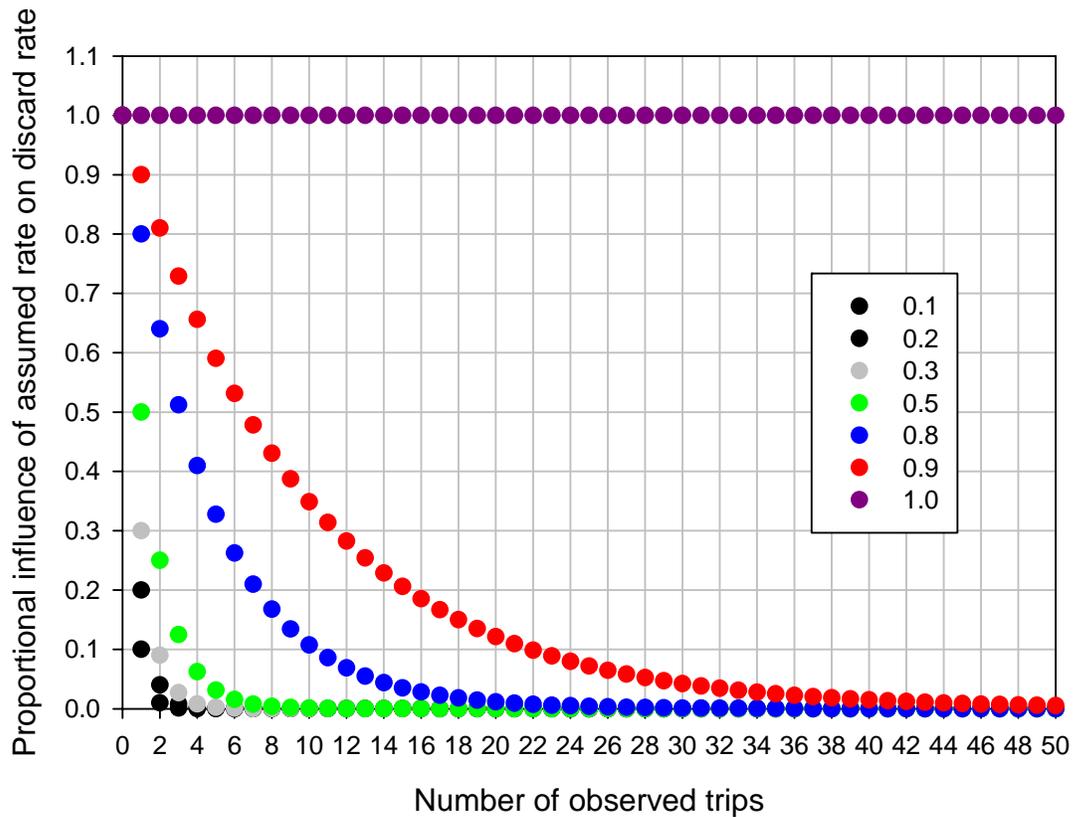


Figure 1. How the number of observed trips within a stratum (I) affects the influence of the seed (assumed) rate under a range of values of α . At influence values of 1 the seed rate is used as the actual discard rate. As influence values approach zero, the contribution of the in-season rate to the actual discard value increases.