

Simulation Update

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October 2009

Purpose: Simulations from September 2009 demonstrated some consistent biases in the estimation of Total Fatalities and Percent Change in Fatalities. Although some types of consistent biases can cancel out when measuring Percent Change, the survey interval length is one source of bias that was not consistent between Baseline and current surveys. There are biases in the Percent Change between two periods of survey using different interval lengths. This follow-up simulation explores whether the bias would still exist if the interval lengths were equal.

% Change from "Period 1" to "Period 2"

Simulation summary

From last time...

	average estimate	bias	stderr	odds of overestimating reduction
perfect detection	-50%	0	8%	51:49
0.75 detection	-45%	5%	11%	33:67

Detection error can lead to tendency to *underestimate* reductions in fatalities (such as estimating a 45% reduction when actually a 50% reduction occurred)

Contributions to bias

- Uncertain adjustments (overestimates are greater than underestimates, on average)
- Detection error (adjustment factors do not account for carryover of carcasses missed once and detected later)
- Length of interval (frequent intervals in current survey create more opportunity for detection error bias compared to Baseline)

...for now just focus on length of interval...

% Bias and Odds of overestimation

(Period 1 using 30-90 d intervals, 0.75 detection)

	Period 1 (30-90 d)		Period 2 (25-50 d)	
	% bias	odds	% bias	odds
A1	1.4	54:46	9.7	75:25
A2	11.6	55:45	21.0	65:35
B1	1.8	54:46	9.7	72:28
B2	12.1	54:46	21.0	65:35
C1	1.8	54:46	9.7	72:28
C2	12.1	54:46	21.0	65:35

Note the greater rate of bias in Period 2 which had shorter intervals...

Fatalities and search dates

- “Period 1”
 - Fatality rate 383.25 per year *What if it had been 25 and 50 days?*
 - Search dates between ~~30 and 90 days~~

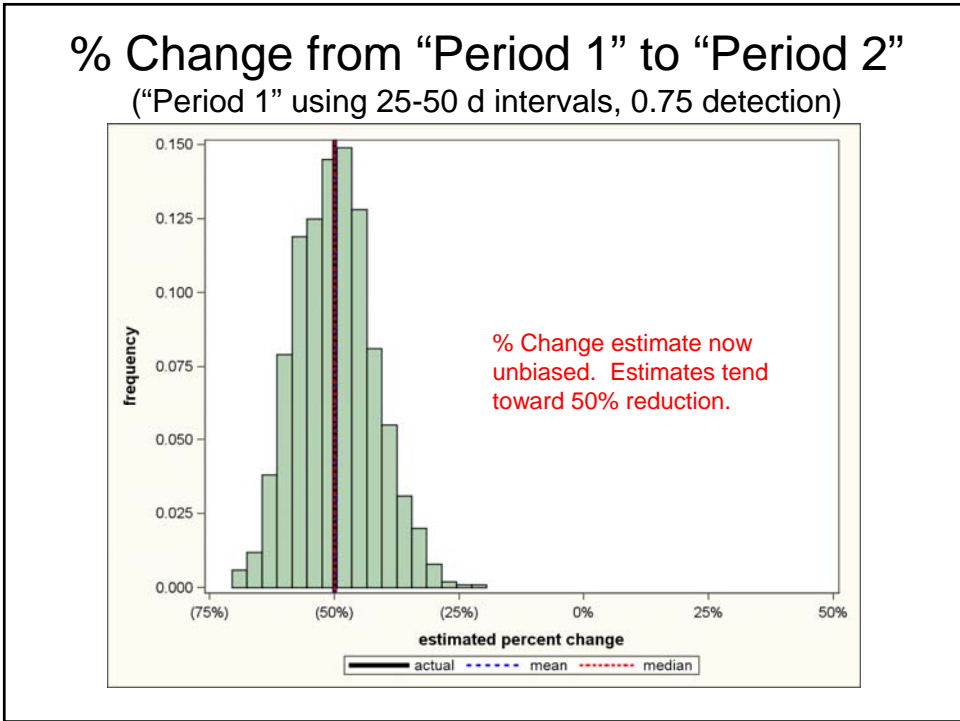
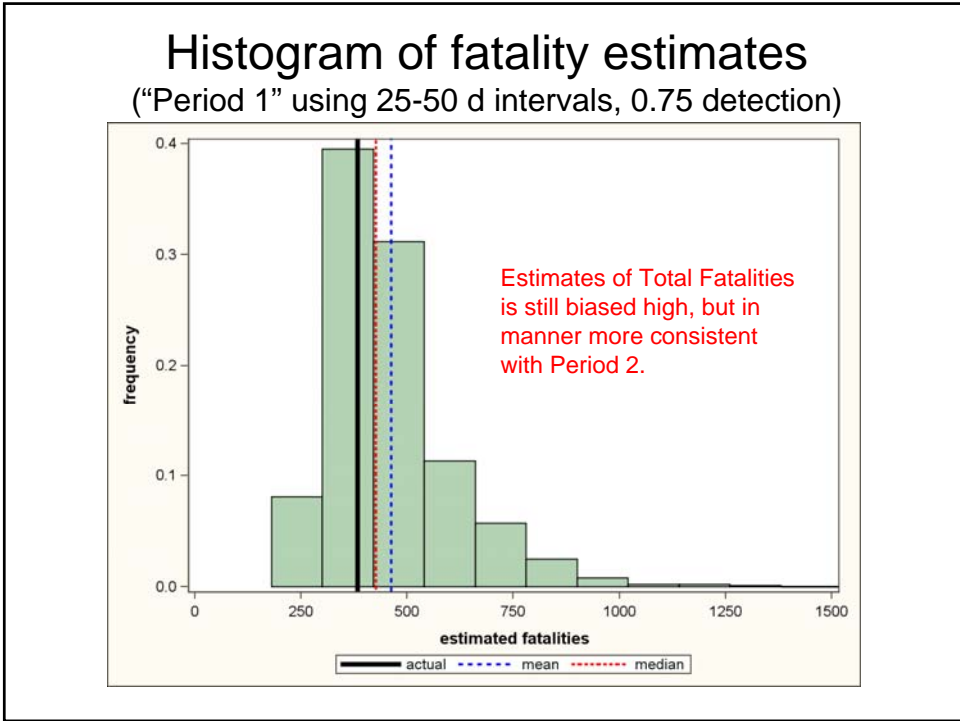
- “Period 2”
 - 50% reduction in fatality rate (191.625/yr)
 - Search dates between 25 and 50 days

% Bias and Odds of overestimation

(Period 1 using 25-50 d intervals, 0.75 detection)

	Period 1 (25-50 d)		Period 2 (25-50 d)	
	% bias	odds	% bias	odds
A1	9.6	83:17	9.7	75:25
A2	20.4	67:33	21.0	65:35
B1	9.8	80:20	9.7	72:28
B2	20.7	67:33	21.0	65:35
C1	9.8	80:20	9.7	72:28
C2	20.7	66:34	21.0	65:35

Note the % bias is similar between two periods, when interval lengths are similar...



Updated Simulation Results

Fatality estimates had

- no bias when sighting rate (β) precisely known
- positive bias (but similar odds of over or underestimation) when β estimated with error.
- extra positive bias when detection was imperfect.

Percent change estimates had

- no bias (and similar odds of over or underestimation) when detection was perfect, even if β estimated with error
- negatively biased reductions when detection imperfect ...but this can be alleviated by standardizing the interval lengths between both periods