

Appendix D: Power Analysis Results for the Non-zero Count Model

Caption for figures:

Power curves (top panel) show the estimated power to detect a hotspot/coldspot of various effect sizes for each sample size (number of transect segments with sightings) from 1 to 200. Red solid, dashed, and dotted lines represent the estimated power to detect a hotspot of 3, 10, and 20 times the reference mean, respectively. Blue solid, dashed, and dotted lines represent the estimated power to detect a coldspot of $\frac{1}{3}$, $\frac{1}{10}$, and $\frac{1}{20}$ times the reference mean, respectively. Blue lines that are absent indicate that the estimated power to detect a coldspot was undefined because the effect size times the reference mean was less than or equal to one. Boxplots (bottom panel) show the distribution of estimated power to detect a hotspot/coldspot of various effect sizes based on the number of transect segments with sightings within each grid cell for each spatial resolution. The number of grid cells with sightings of the given species and the percentage of grid cells that achieve 80% power to detect a hotspot/coldspot are shown below the horizontal axis.

Citation for main document:

Leirness JB, Kinlan BP. 2018. Additional statistical analyses to support guidelines for marine avian sampling. Sterling (VA): US Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2018-063. iii+43 p.

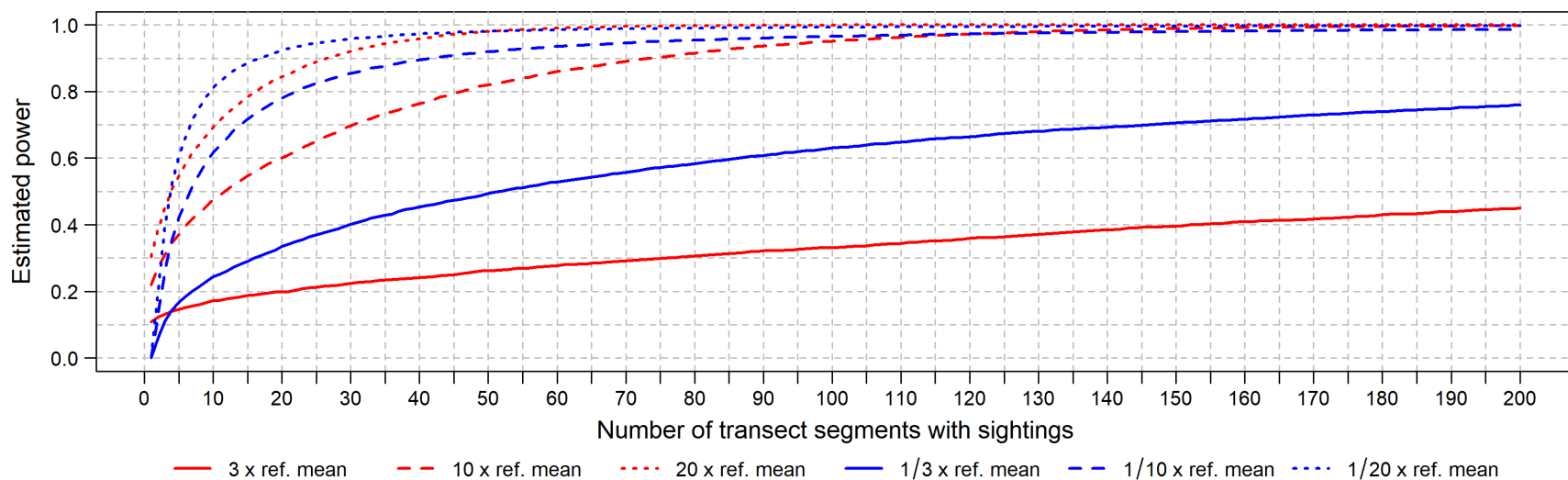
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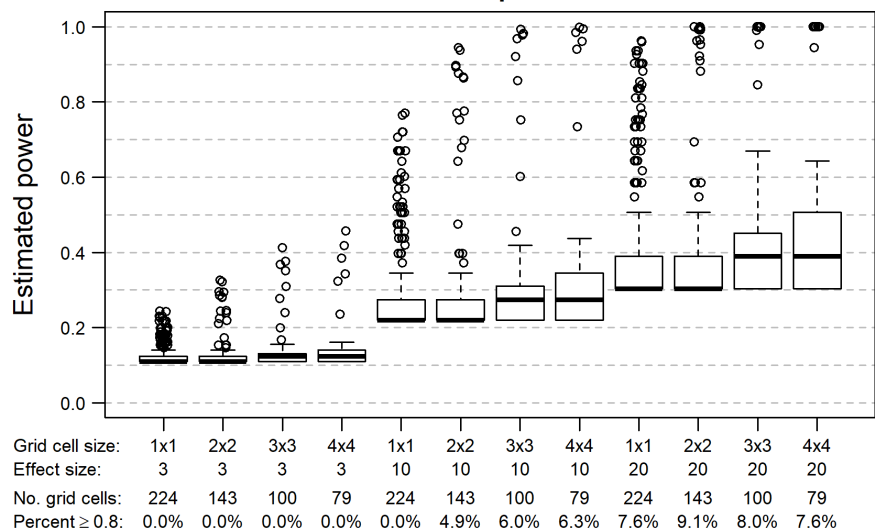
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Common Eider: spring



Hotspot



Coldspot

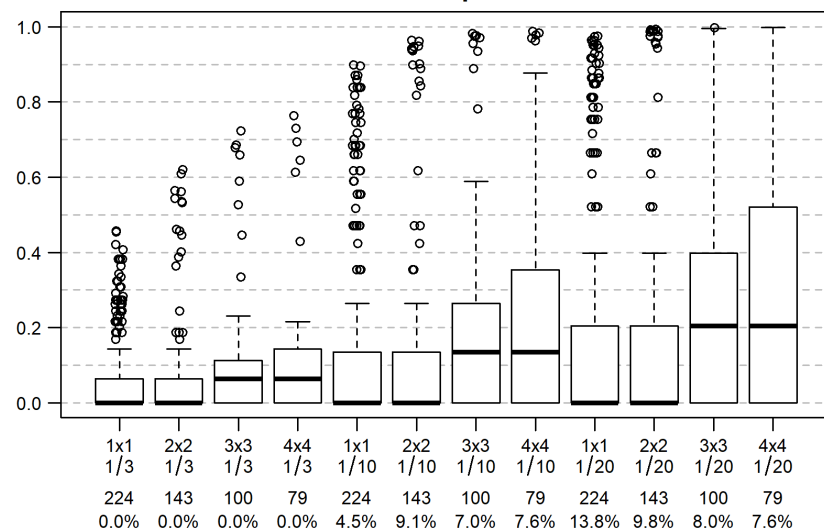
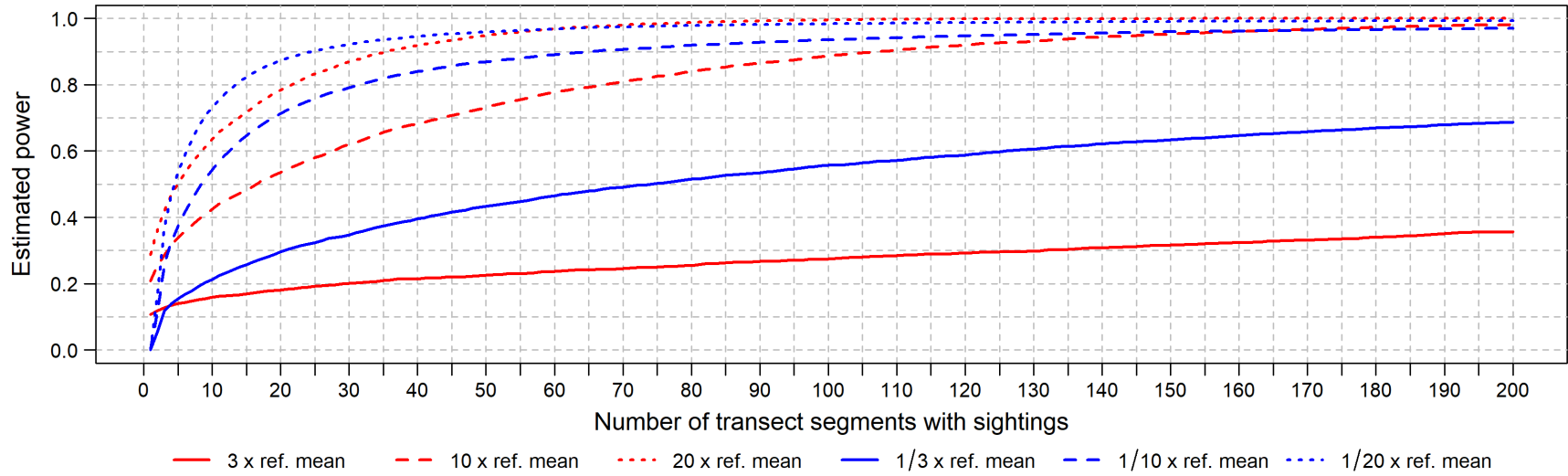
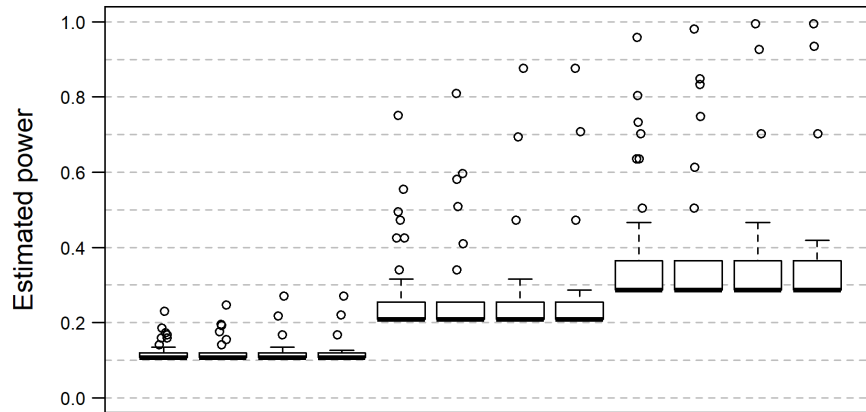


Figure D1. Power analysis results for Common Eider during spring based on the non-zero count model (type I error rate = 0.05)

Common Eider: summer

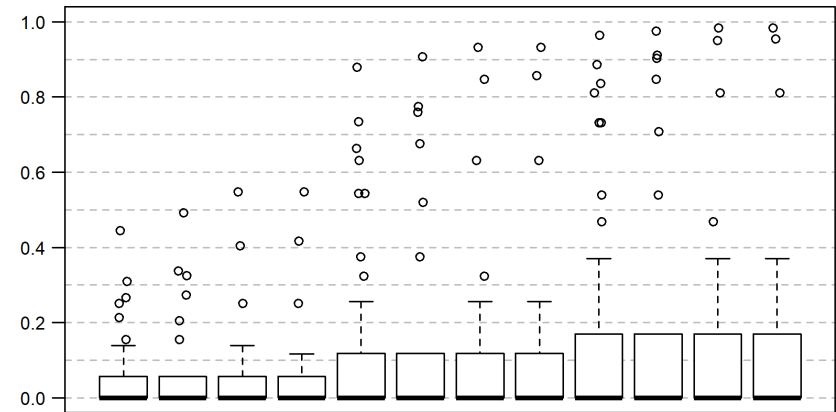


Hotspot



Grid cell size:	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
Effect size:	3	3	3	3	10	10	10	10	20	20	20	20
No. grid cells:	49	37	31	28	49	37	31	28	49	37	31	28
Percent ≥ 0.8:	0.0%	0.0%	0.0%	0.0%	0.0%	2.7%	3.2%	3.6%	4.1%	8.1%	6.5%	7.1%

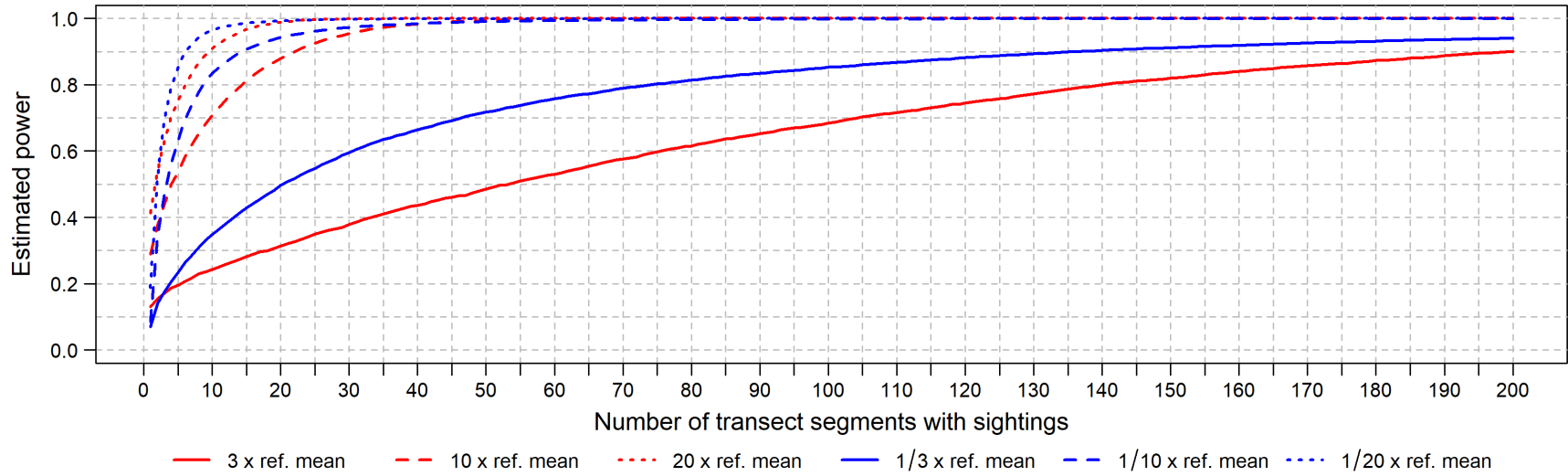
Coldspot



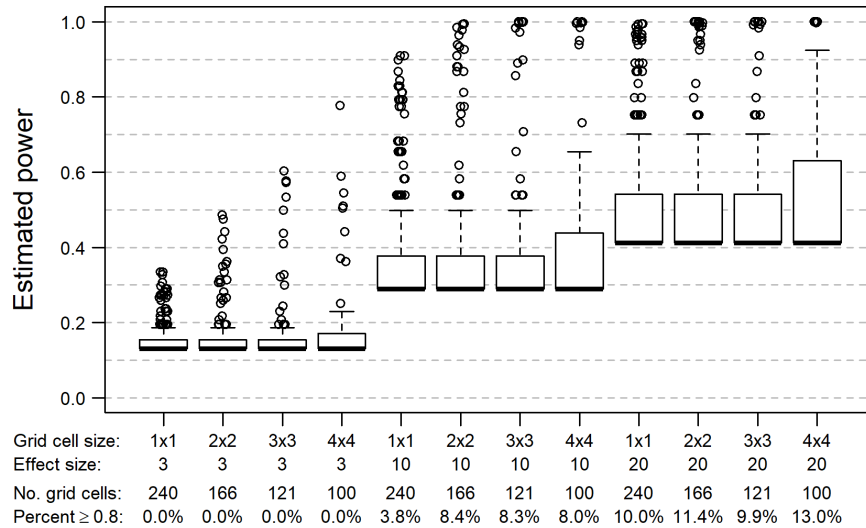
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Effect size:	1/3	1/3	1/3	1/3	1/10	1/10	1/10	1/10	1/20	1/20	1/20	1/20
No. grid cells:	49	37	31	28	49	37	31	28	49	37	31	28
Percent ≥ 0.8:	0.0%	0.0%	0.0%	0.0%	2.0%	2.7%	6.5%	7.1%	8.2%	10.8%	9.7%	10.7%

Figure D2. Power analysis results for Common Eider during summer based on the non-zero count model (type I error rate = 0.05)

Common Eider: fall



Hotspot



Coldspot

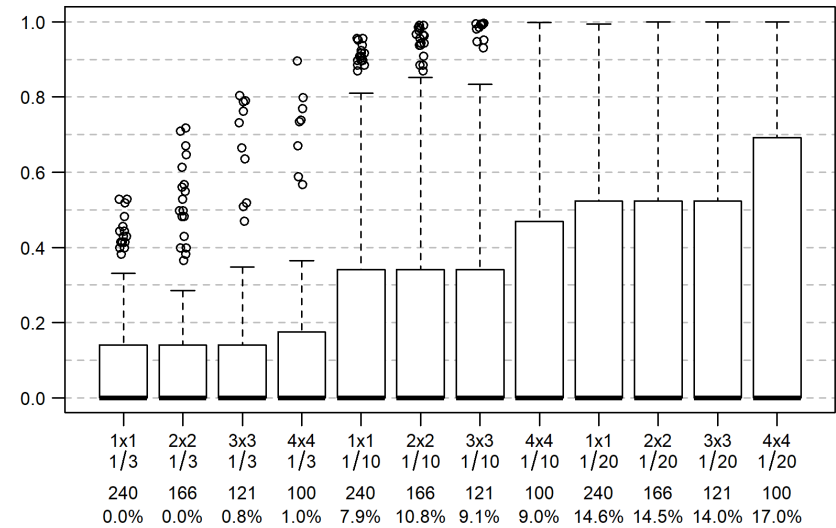
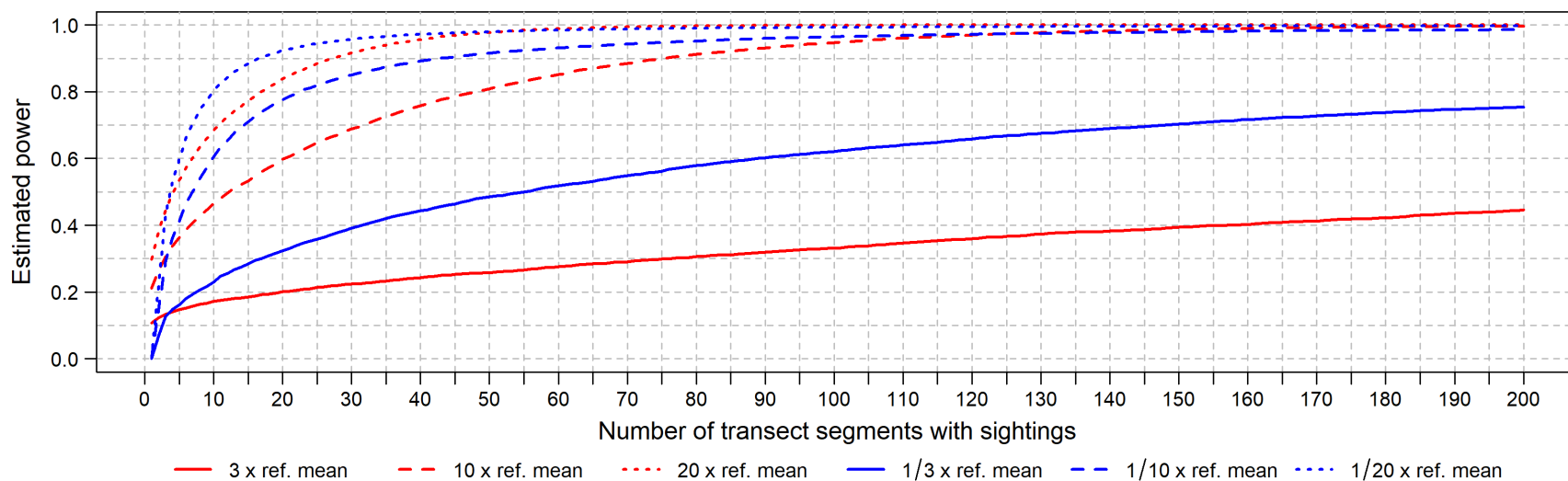
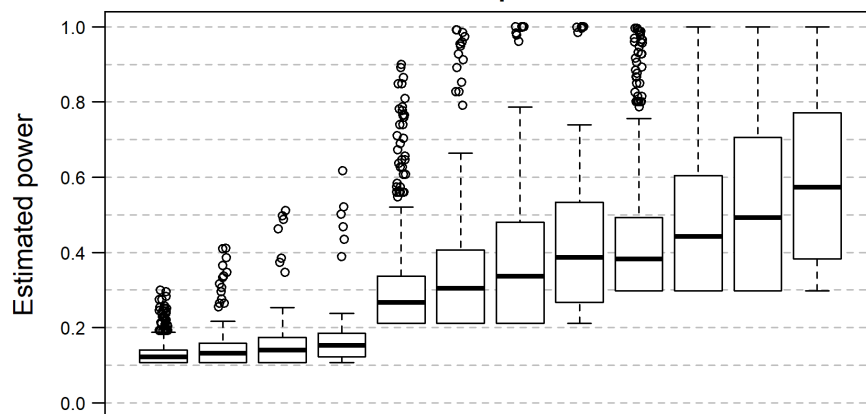


Figure D3. Power analysis results for Common Eider during fall based on the non-zero count model (type I error rate = 0.05)

Common Eider: winter

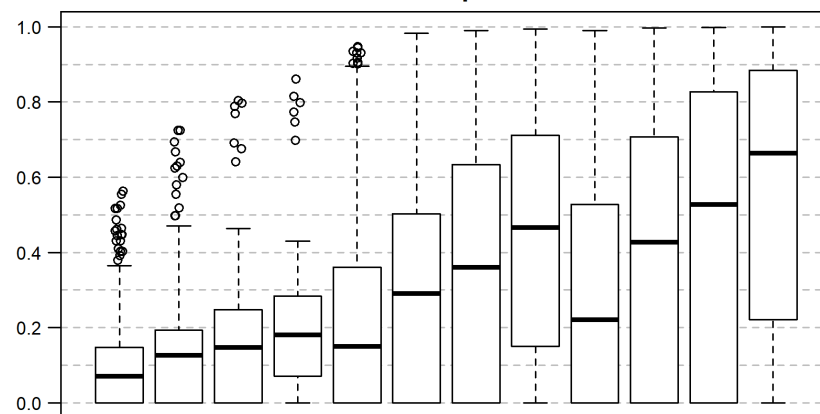


Hotspot



Grid cell size:	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
Effect size:	3	3	3	3	10	10	10	10	20	20	20	20
No. grid cells:	449	238	151	103	449	238	151	103	449	238	151	103
Percent ≥ 0.8 :	0.0%	0.0%	0.0%	0.0%	1.3%	5.5%	4.6%	5.8%	8.0%	9.2%	13.9%	23.3%

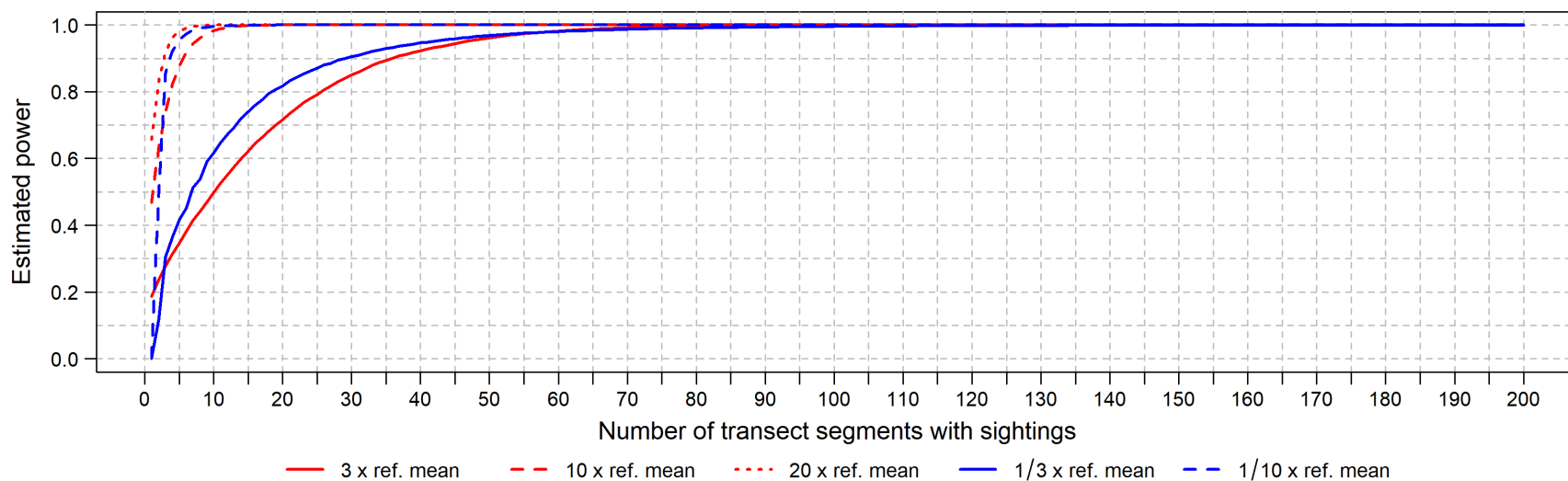
Coldspot



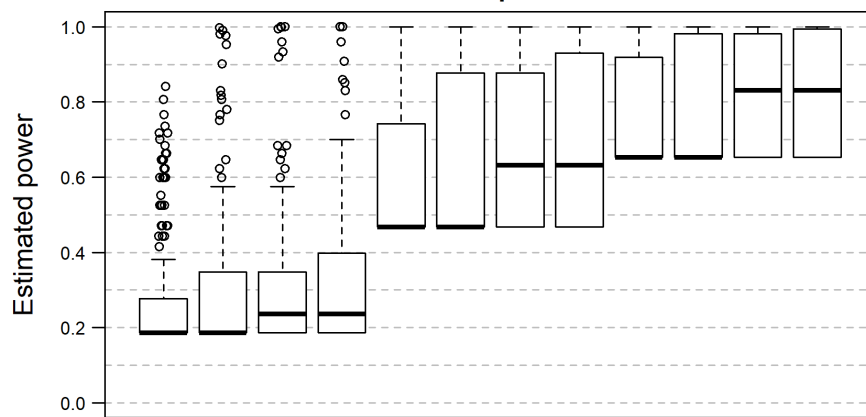
Grid cell size:	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
Effect size:	1/3	1/3	1/3	1/3	1/10	1/10	1/10	1/10	1/20	1/20	1/20	1/20
No. grid cells:	449	238	151	103	449	238	151	103	449	238	151	103
Percent ≥ 0.8 :	0.0%	0.0%	0.7%	1.9%	5.6%	6.3%	10.6%	18.4%	10.9%	15.5%	27.2%	38.8%

Figure D4. Power analysis results for Common Eider during winter based on the non-zero count model (type I error rate = 0.05)

Surf Scoter: spring

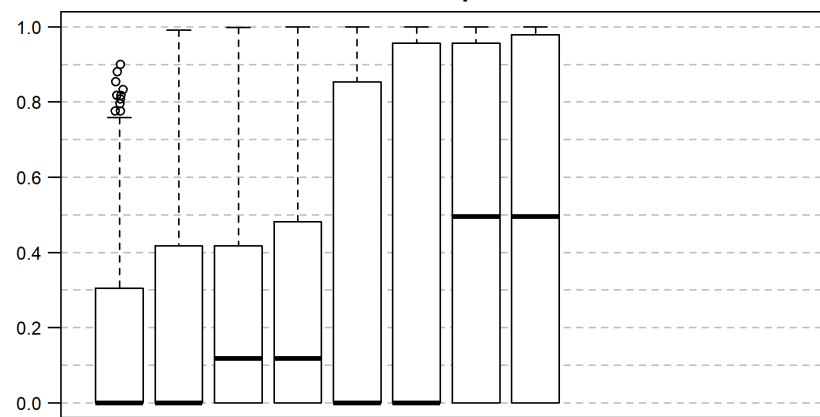


Hotspot



Grid cell size:	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
Effect size:	3	3	3	3	10	10	10	10	20	20	20	20
No. grid cells:	237	135	95	79	237	135	95	79	237	135	95	79
Percent ≥ 0.8 :	0.8%	6.7%	7.4%	8.9%	21.9%	30.4%	30.5%	38.0%	40.5%	47.4%	55.8%	55.7%

Coldspot

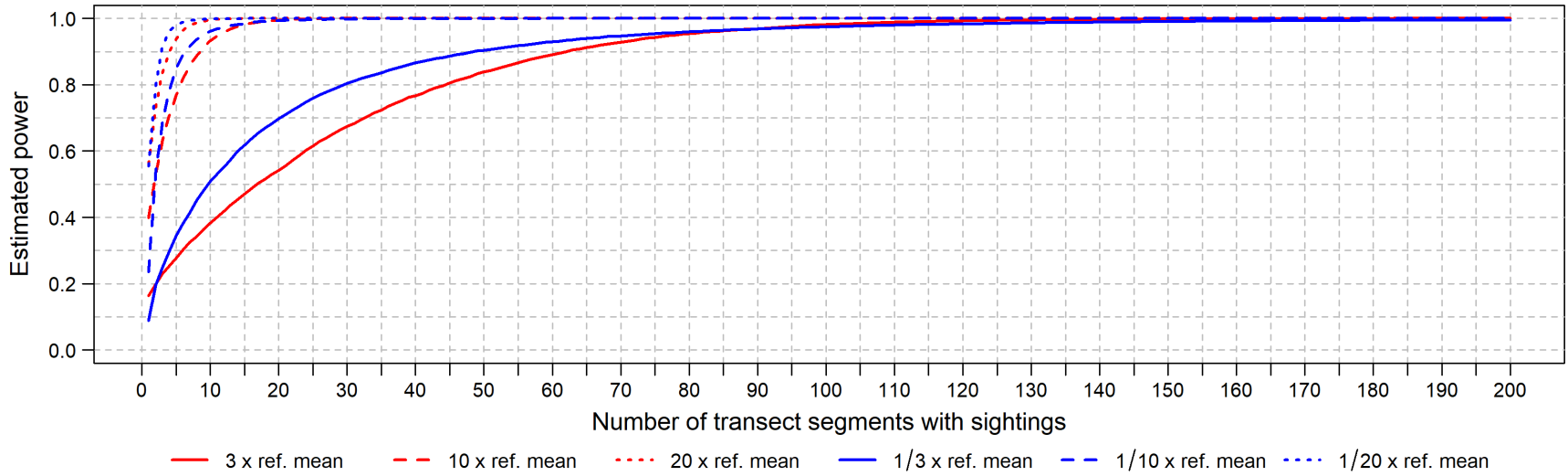


Grid cell size:	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
Effect size:	1/3	1/3	1/3	1/3	1/10	1/10	1/10	1/10	1/20	1/20	1/20	1/20
No. grid cells:	237	135	95	79	237	135	95	79	237	135	95	79
Percent ≥ 0.8 :	3.0%	8.9%	7.4%	11.4%	27.4%	36.3%	40.0%	46.8%	0.0%	0.0%	0.0%	0.0%

D-9

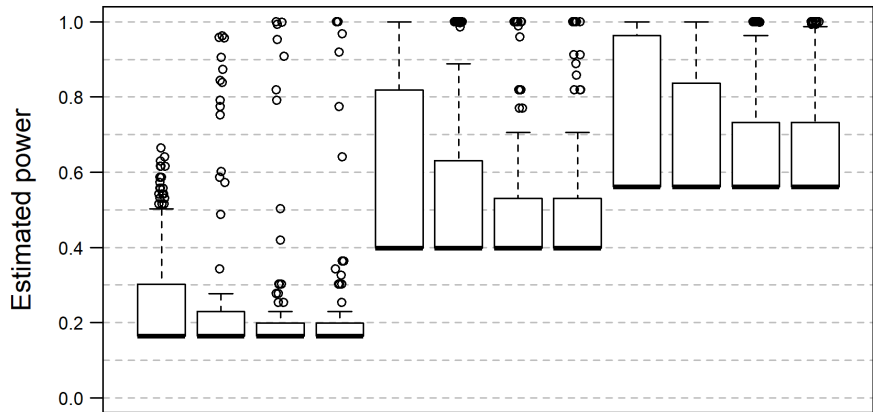
Figure D5. Power analysis results for Surf Scoter during spring based on the non-zero count model (type I error rate = 0.05)

Surf Scoter: fall

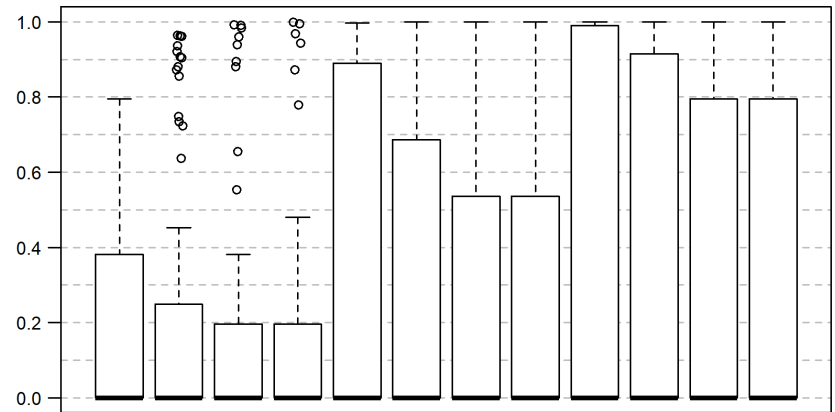


D-10

Hotspot



Coldspot

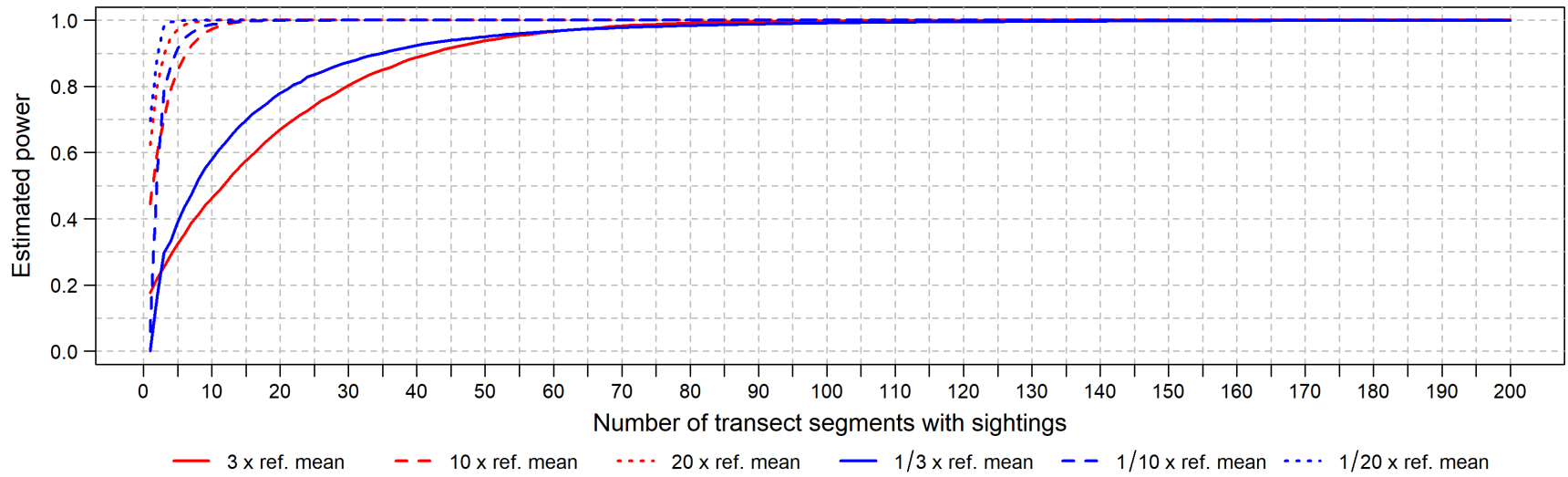


Grid cell size:	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
Effect size:	3	3	3	3	10	10	10	10	20	20	20	20
No. grid cells:	161	105	87	73	161	105	87	73	161	105	87	73
Percent ≥ 0.8 :	0.0%	6.7%	6.9%	5.5%	25.5%	14.3%	14.9%	17.8%	32.9%	26.7%	24.1%	23.3%

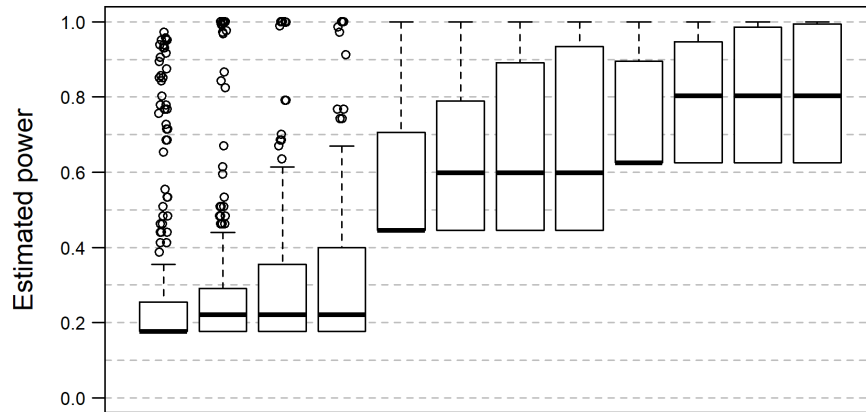
Grid cell size:	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
Effect size:	1/3	1/3	1/3	1/3	1/10	1/10	1/10	1/10	1/20	1/20	1/20	1/20
No. grid cells:	161	105	87	73	161	105	87	73	161	105	87	73
Percent ≥ 0.8 :	0.0%	9.5%	8.0%	6.8%	26.1%	15.2%	17.2%	17.8%	32.9%	26.7%	24.1%	23.3%

Figure D6. Power analysis results for Surf Scoter during fall based on the non-zero count model (type I error rate = 0.05)

Surf Scoter: winter

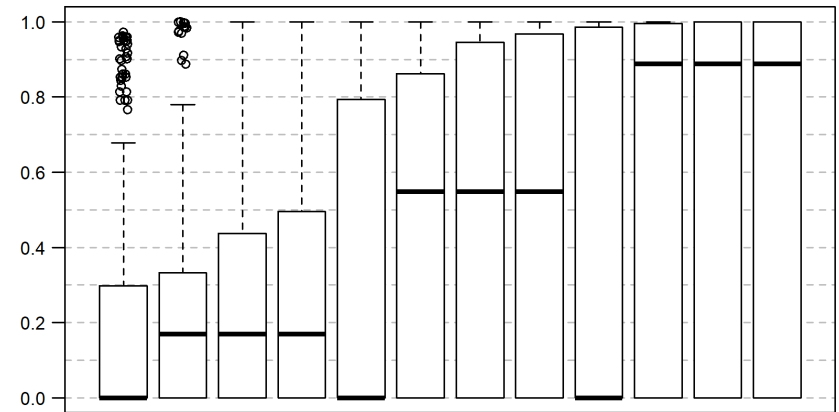


Hotspot



Grid cell size:	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
Effect size:	3	3	3	3	10	10	10	10	20	20	20	20
No. grid cells:	400	225	150	123	400	225	150	123	400	225	150	123
Percent ≥ 0.8 :	5.0%	6.2%	4.7%	5.7%	17.0%	24.0%	31.3%	35.8%	47.0%	57.8%	65.3%	61.0%

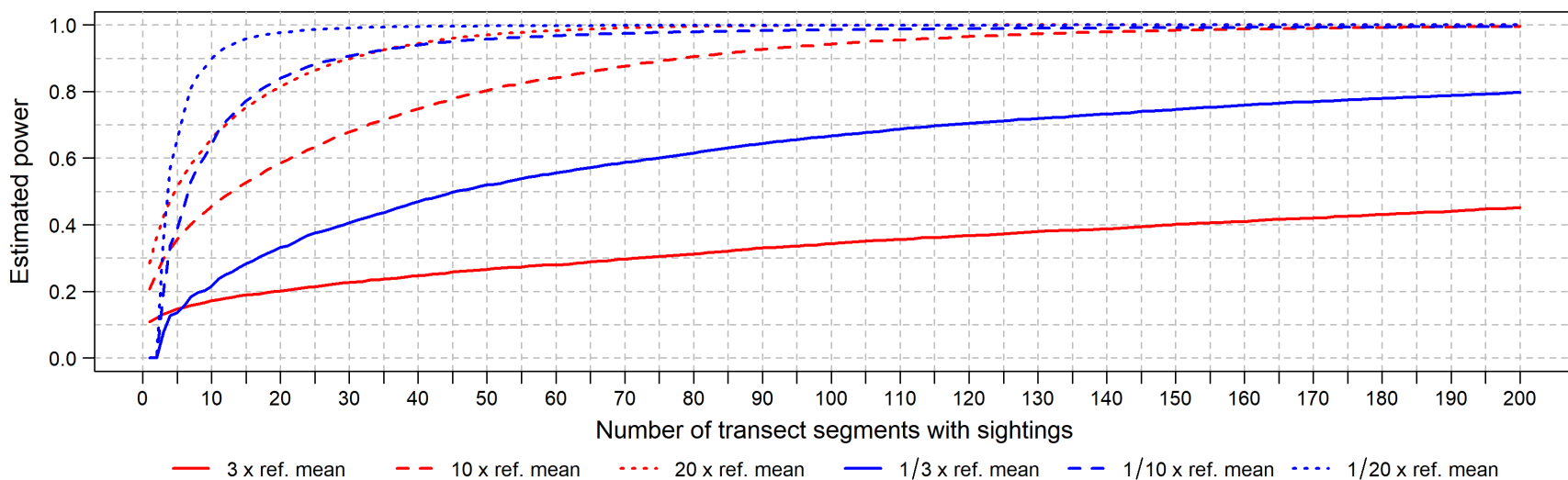
Coldspot



Grid cell size:	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
Effect size:	1/3	1/3	1/3	1/3	1/10	1/10	1/10	1/10	1/20	1/20	1/20	1/20
No. grid cells:	400	225	150	123	400	225	150	123	400	225	150	123
Percent ≥ 0.8 :	7.2%	6.2%	6.7%	8.9%	23.0%	32.4%	35.3%	40.7%	47.0%	57.8%	65.3%	61.0%

Figure D7. Power analysis results for Surf Scoter during winter based on the non-zero count model (type I error rate = 0.05)

White-winged Scoter: spring



D-12

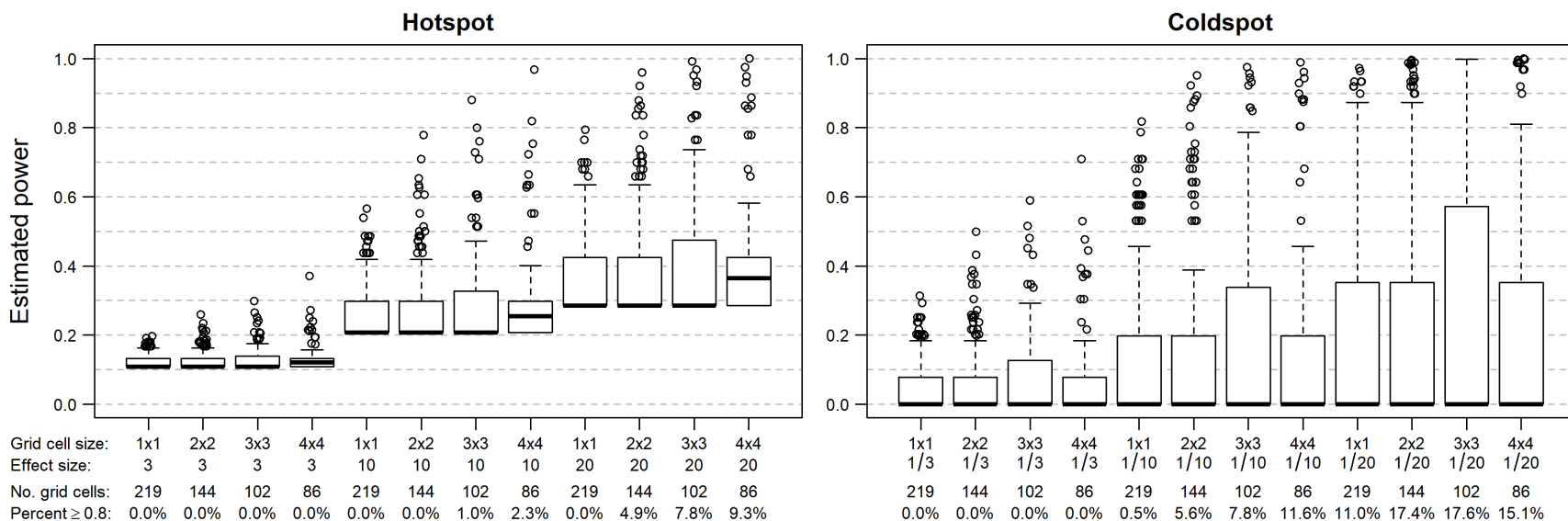
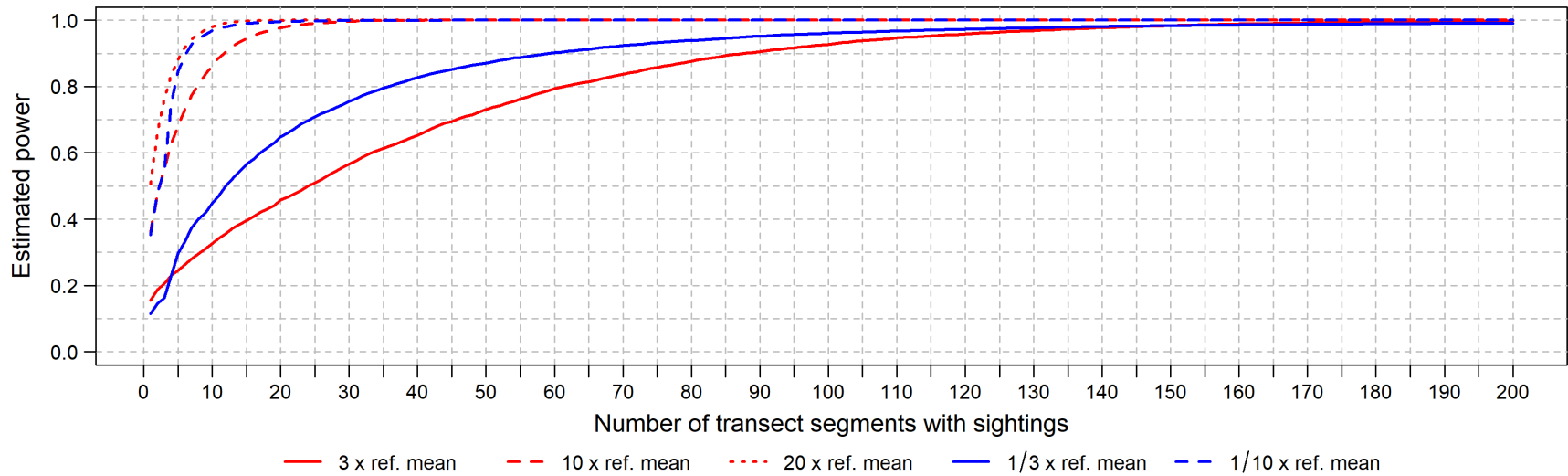


Figure D8. Power analysis results for White-winged Scoter during spring based on the non-zero count model (type I error rate = 0.05)

White-winged Scoter: fall



D-13

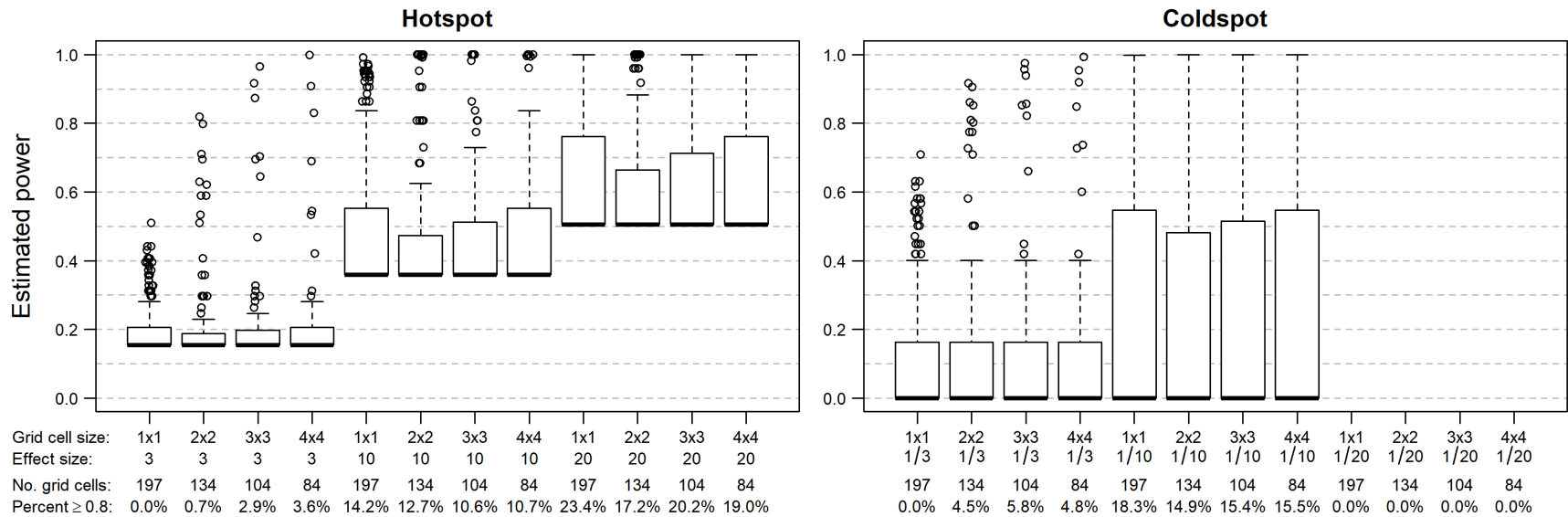
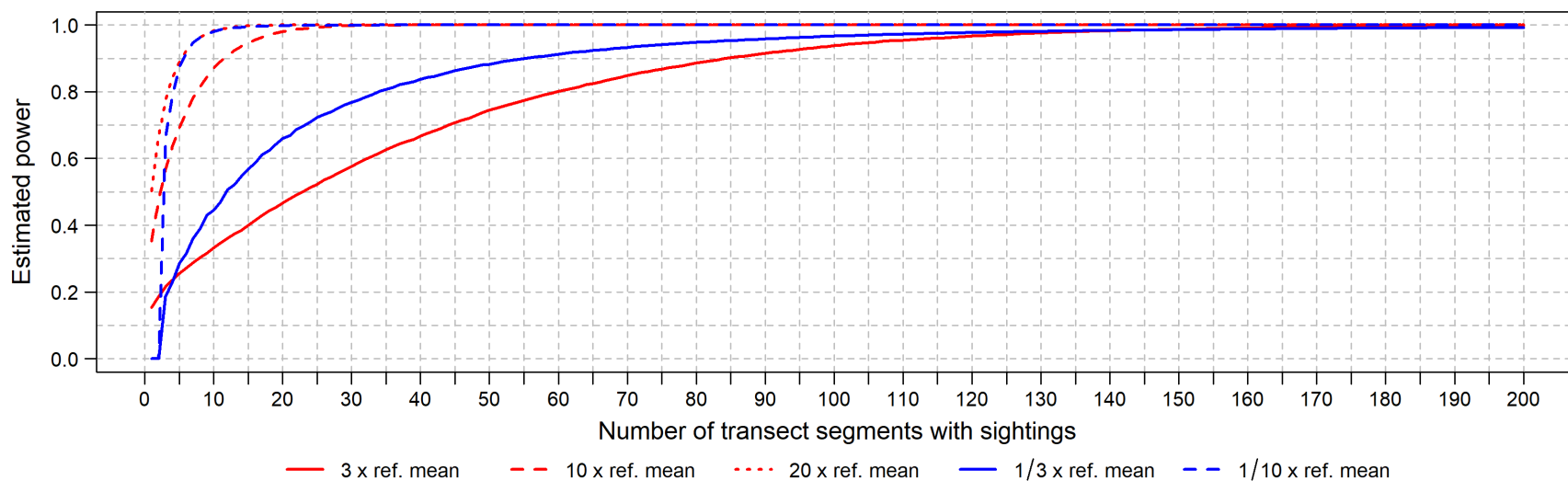


Figure D9. Power analysis results for White-winged Scoter during fall based on the non-zero count model (type I error rate = 0.05)

White-winged Scoter: winter



D-14

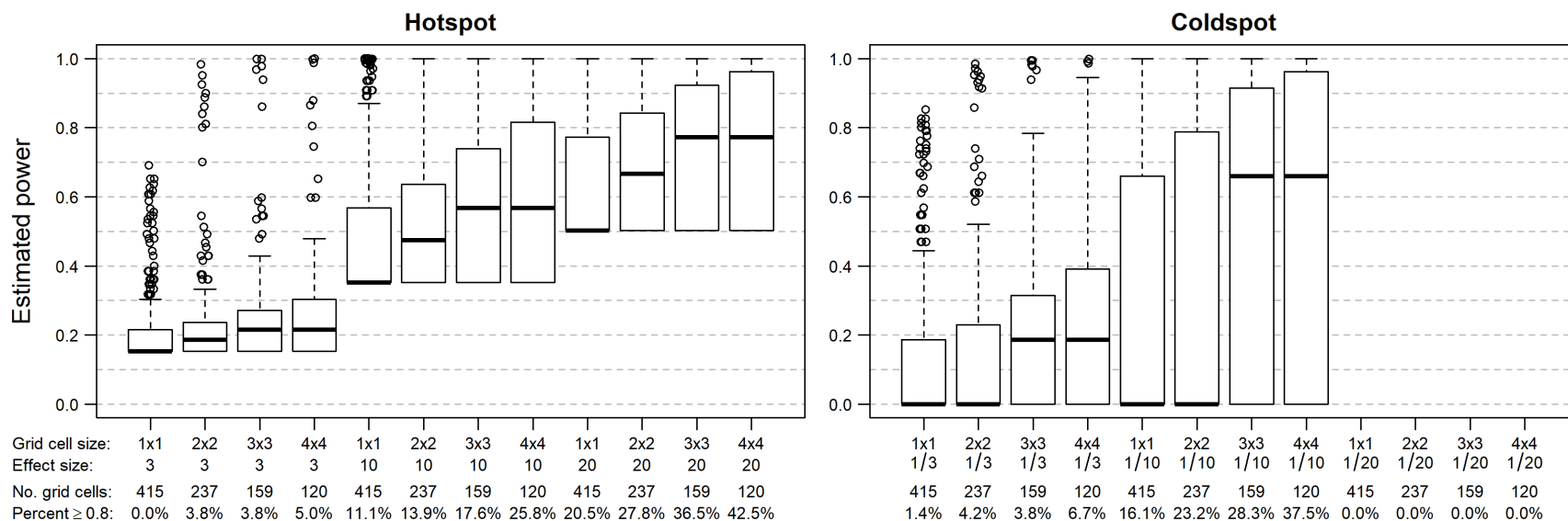
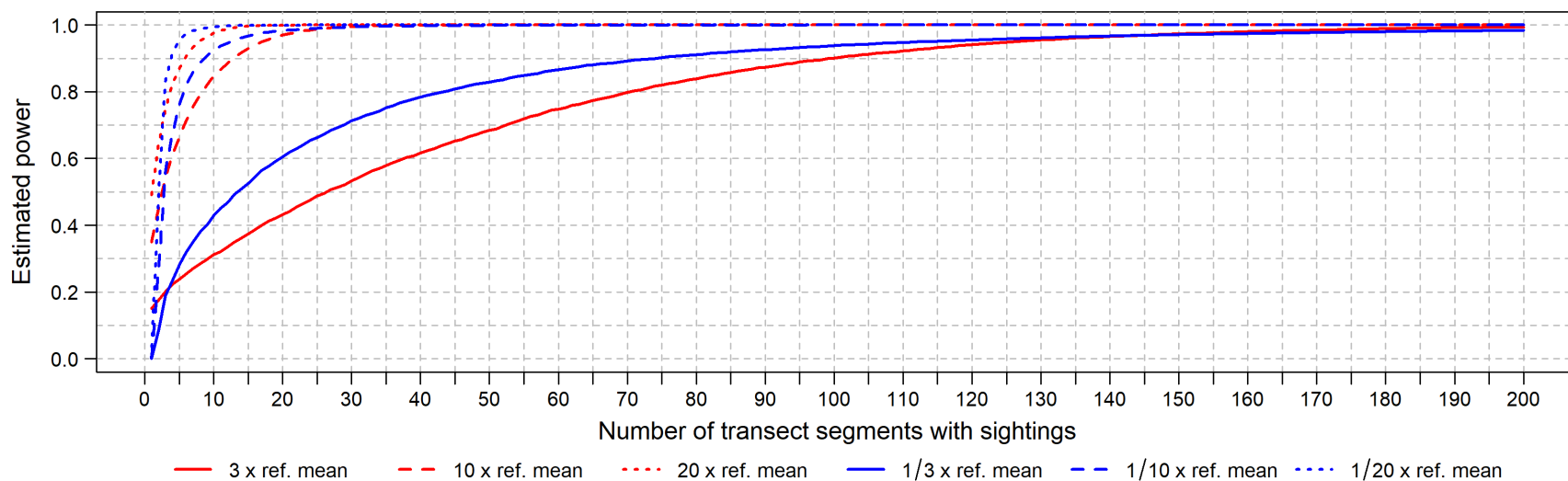


Figure D10. Power analysis results for White-winged Scoter during winter based on the non-zero count model (type I error rate = 0.05)

Long-tailed Duck: spring



D-15

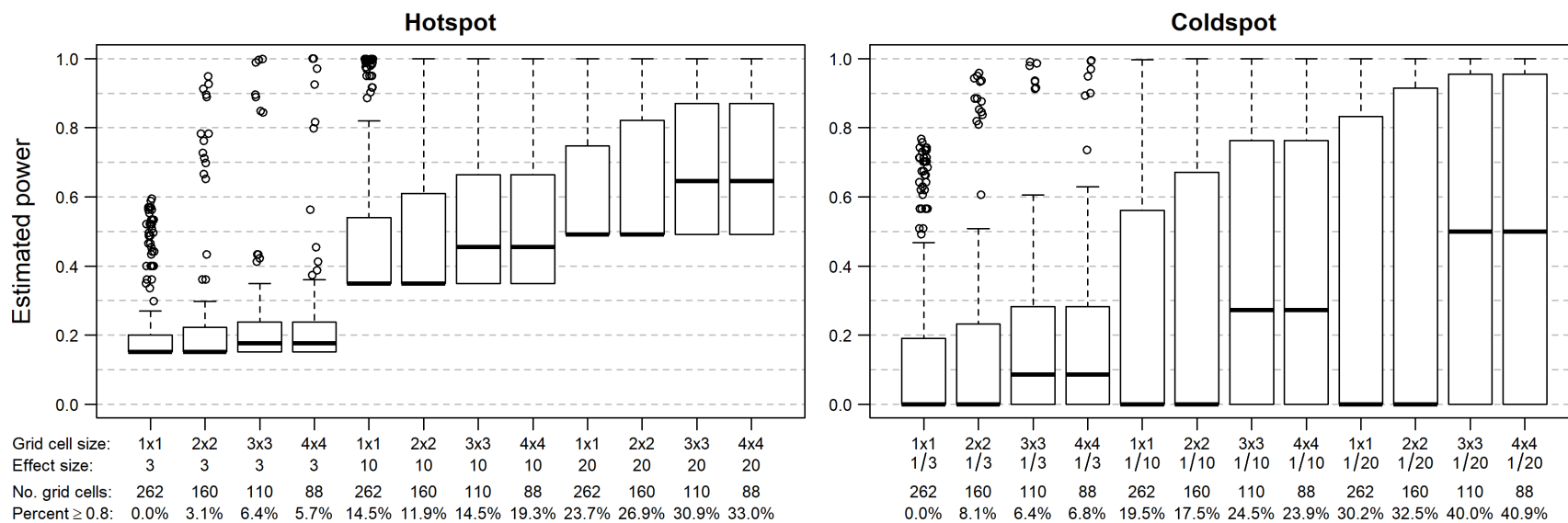
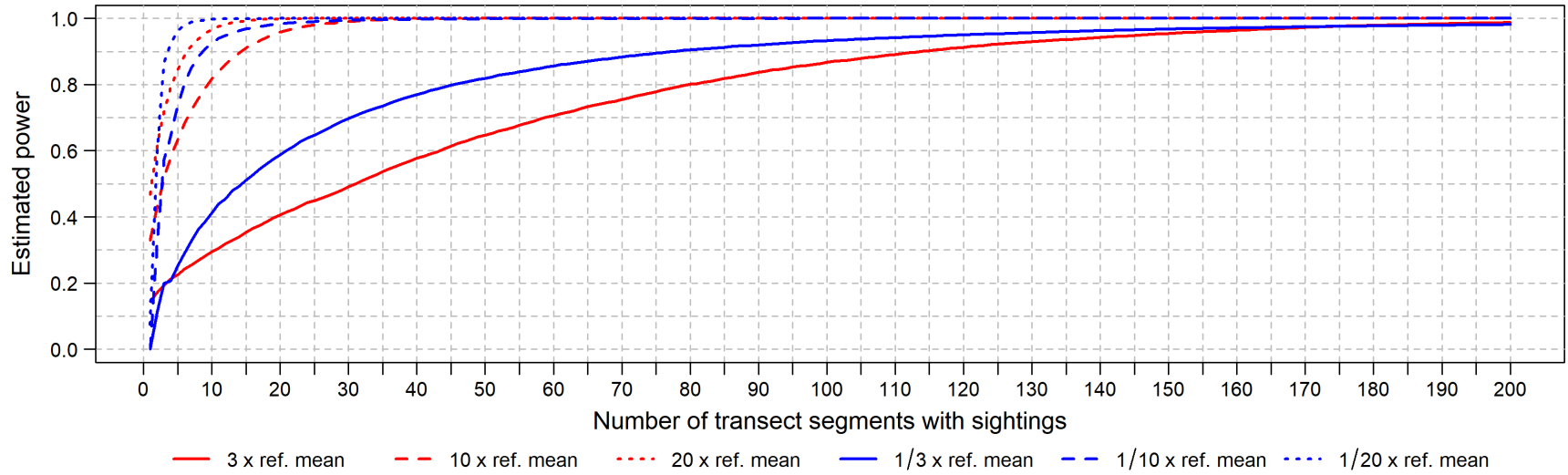


Figure D11. Power analysis results for Long-tailed Duck during spring based on the non-zero count model (type I error rate = 0.05)

Long-tailed Duck: fall



D-16

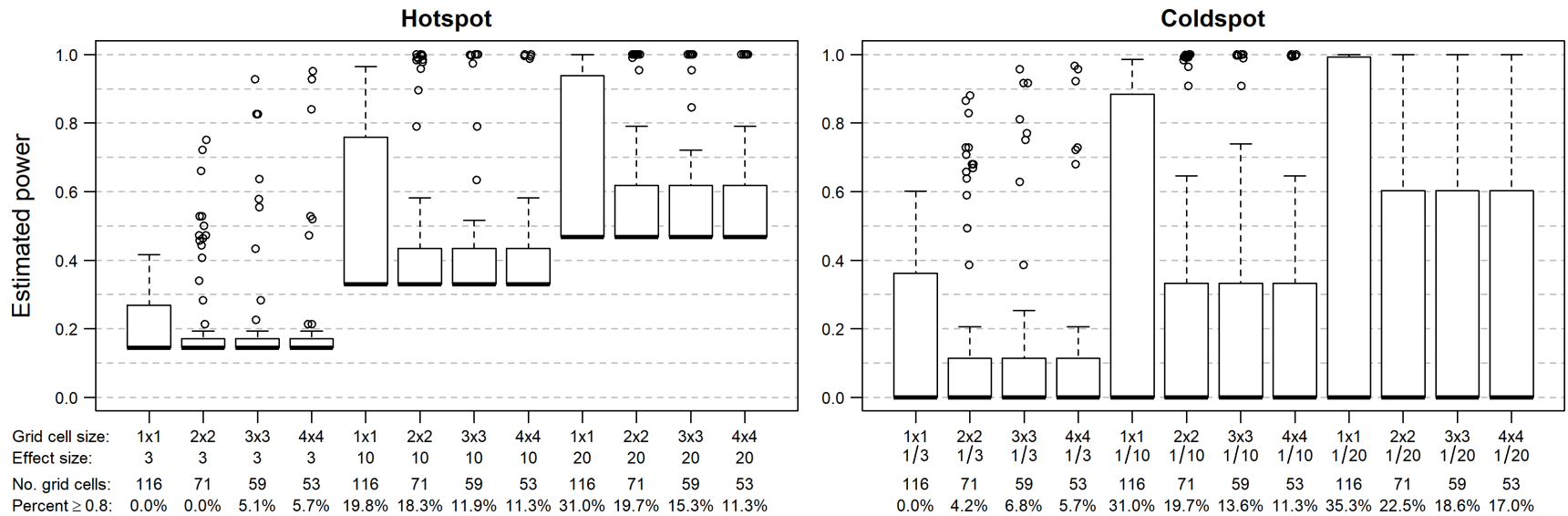


Figure D12. Power analysis results for Long-tailed Duck during fall based on the non-zero count model (type I error rate = 0.05)

Long-tailed Duck: winter

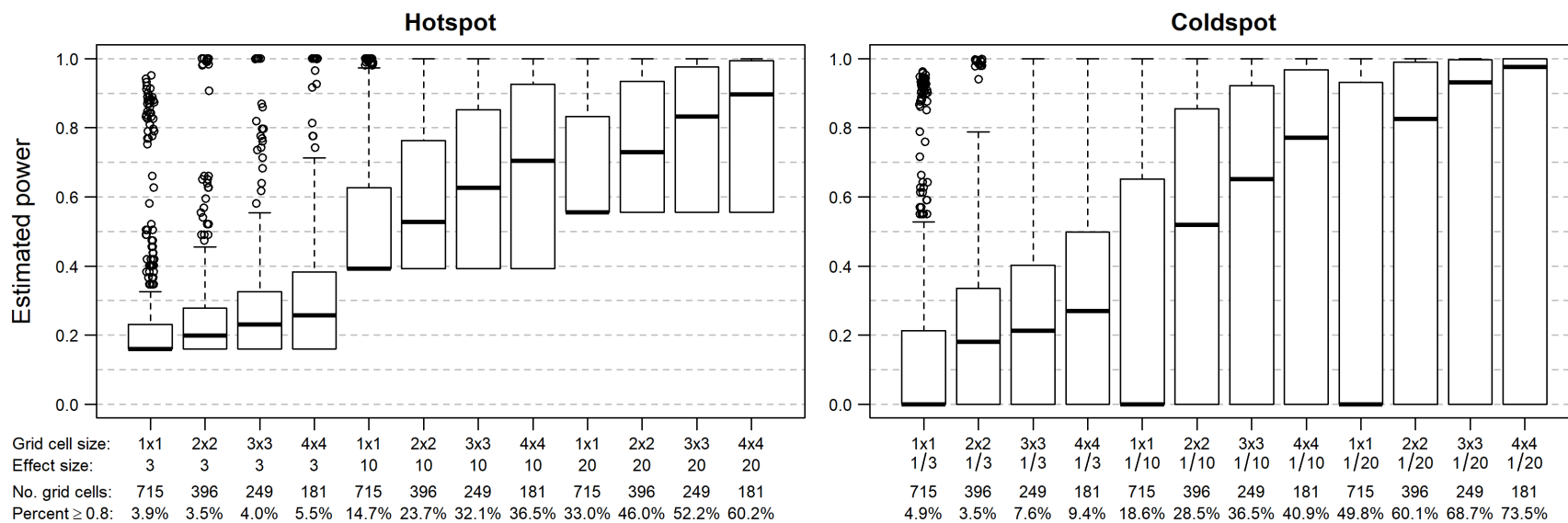
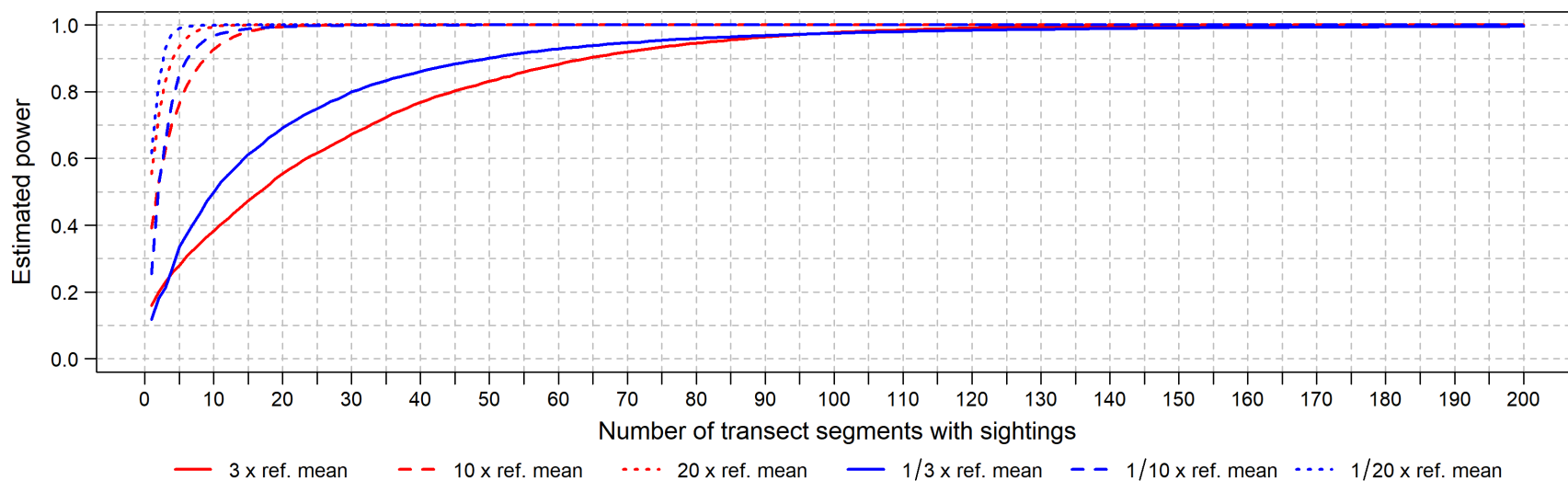
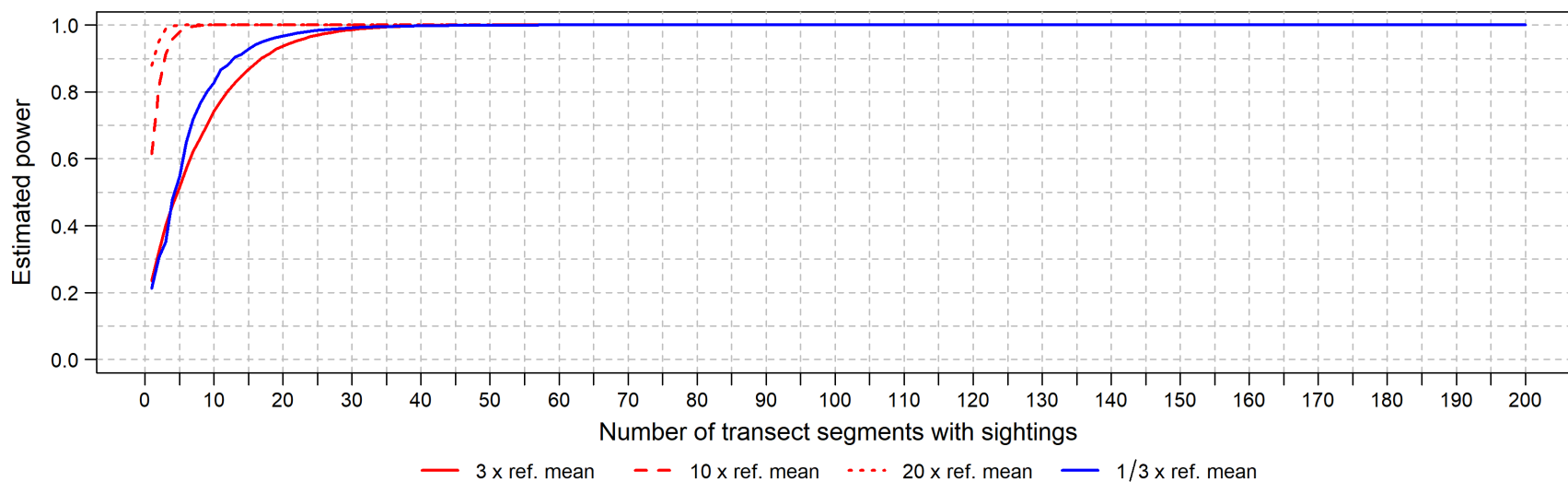


Figure D13. Power analysis results for Long-tailed Duck during winter based on the non-zero count model (type I error rate = 0.05)

Razorbill: spring



D-18

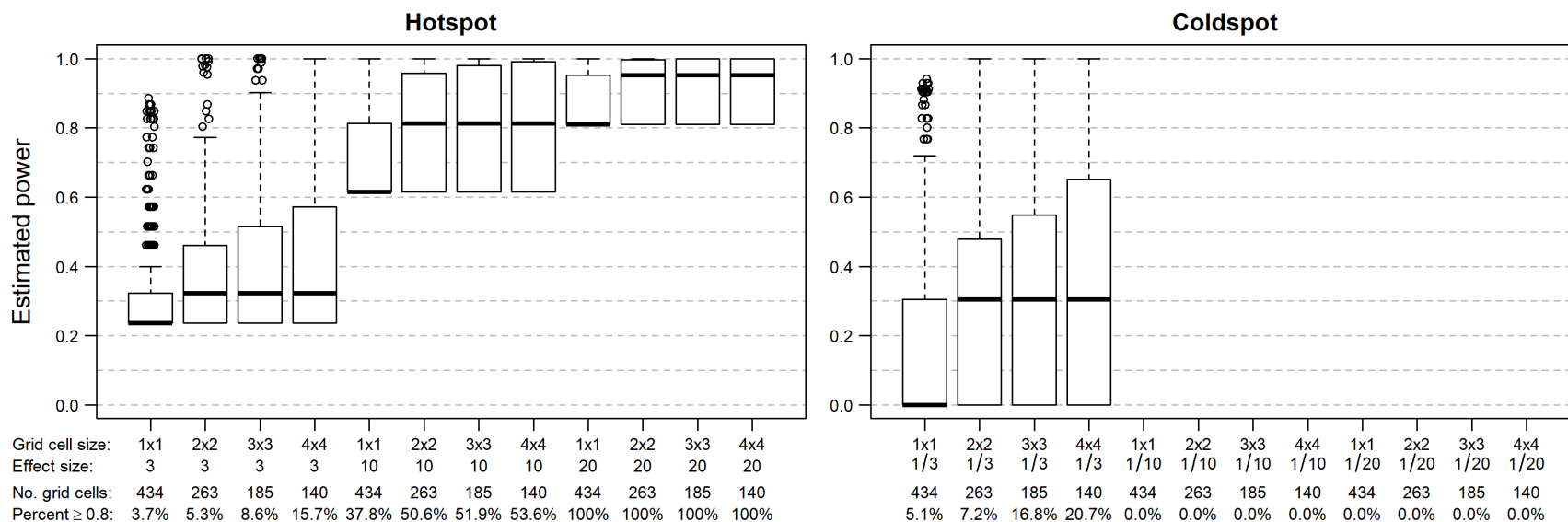
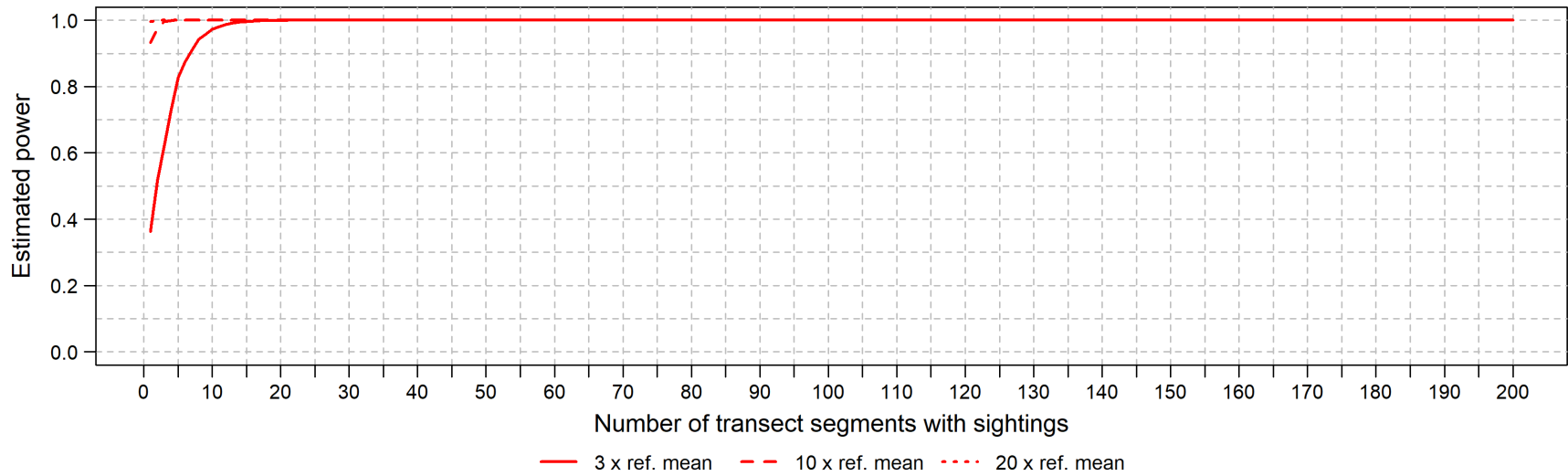


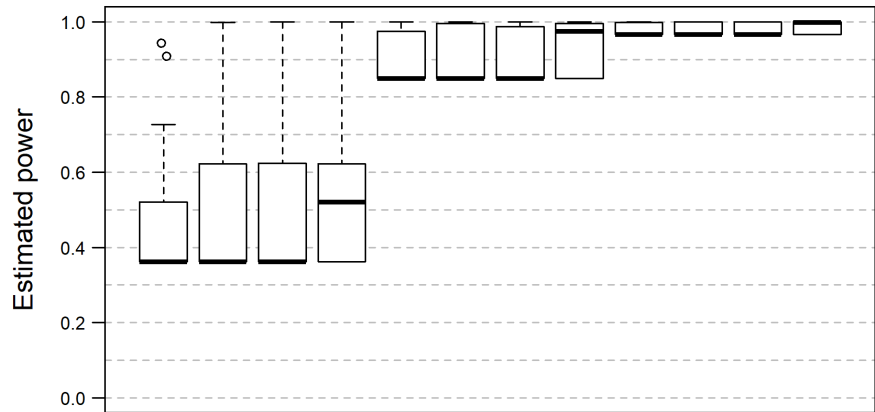
Figure D14. Power analysis results for Razorbill during spring based on the non-zero count model (type I error rate = 0.05)

Razorbill: summer

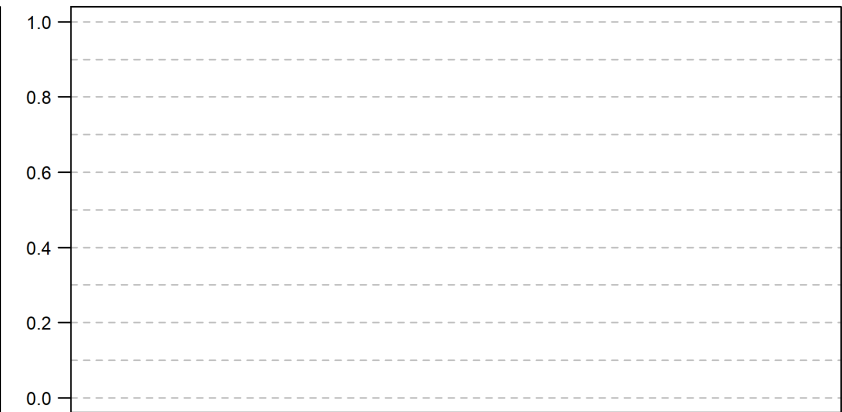


D-19

Hotspot



Coldspot

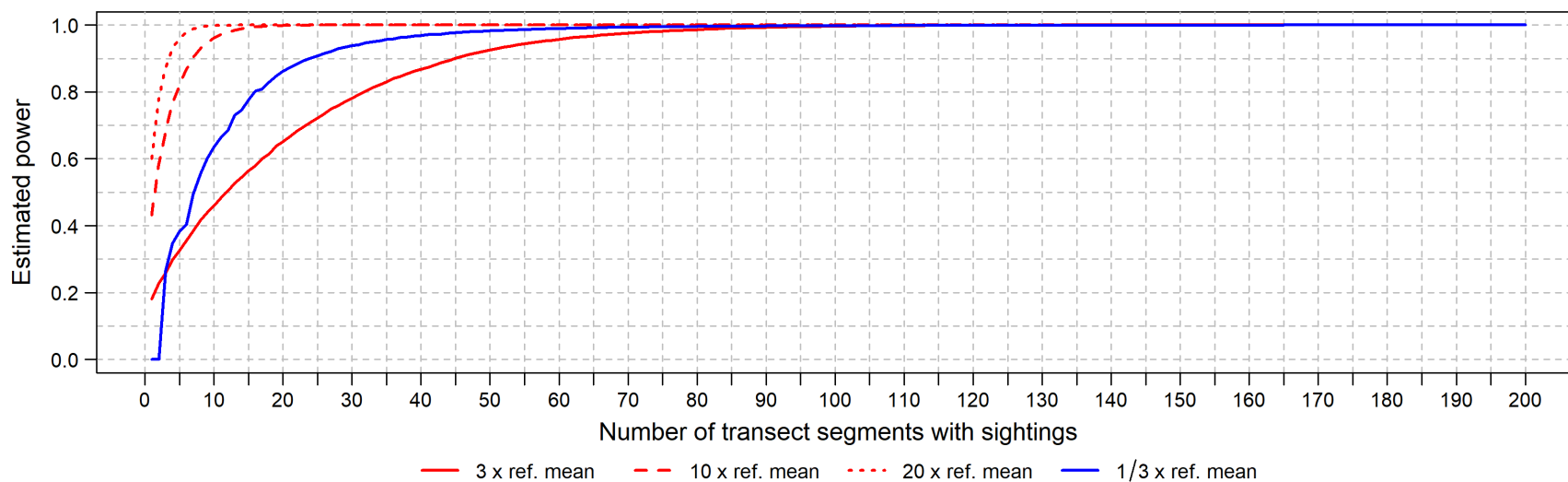


Grid cell size:	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
Effect size:	3	3	3	3	10	10	10	10	20	20	20	20
No. grid cells:	46	29	23	19	46	29	23	19	46	29	23	19
Percent ≥ 0.8 :	4.3%	13.8%	21.7%	15.8%	100%	100%	100%	100%	100%	100%	100%	100%

1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
1/3	1/3	1/3	1/3	1/10	1/10	1/10	1/10	1/20	1/20	1/20	1/20
46	29	23	19	46	29	23	19	46	29	23	19
0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Figure D15. Power analysis results for Razorbill during summer based on the non-zero count model (type I error rate = 0.05)

Razorbill: fall



D-20

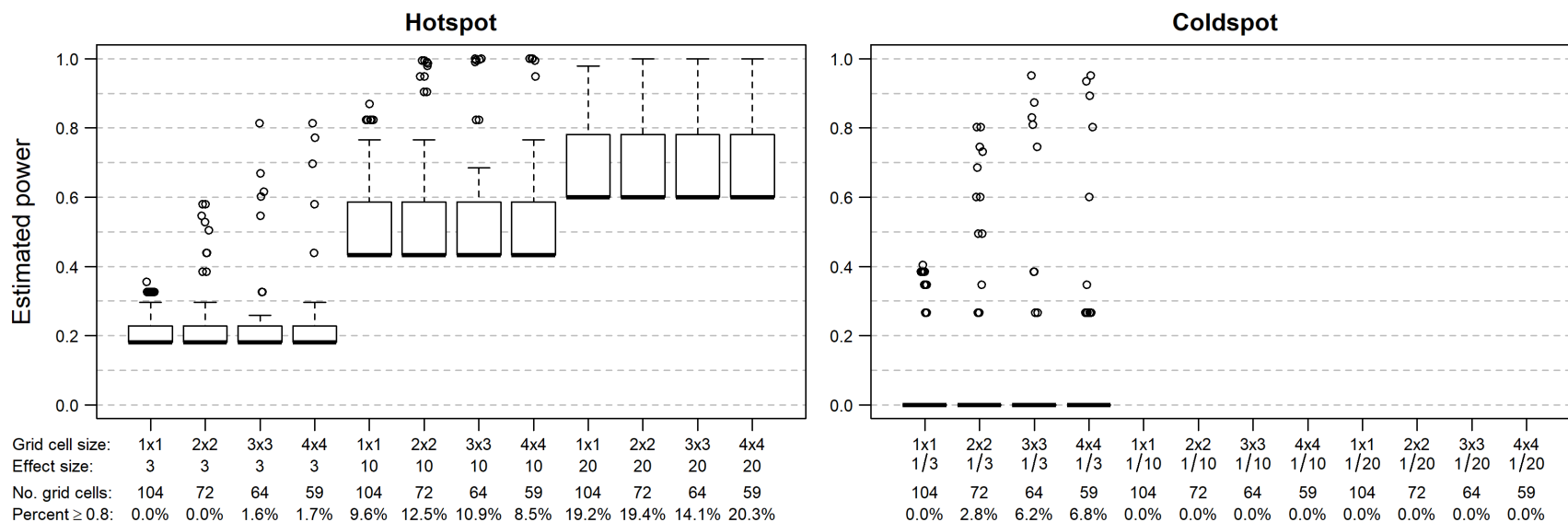
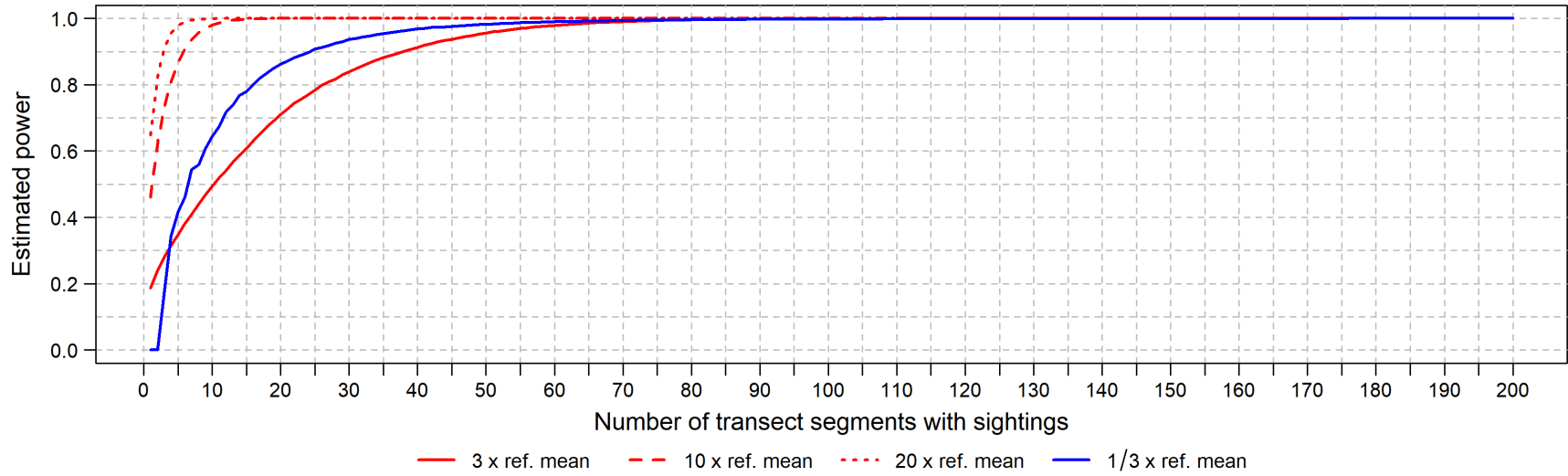


Figure D16. Power analysis results for Razorbill during fall based on the non-zero count model (type I error rate = 0.05)

Razorbill: winter



D-21

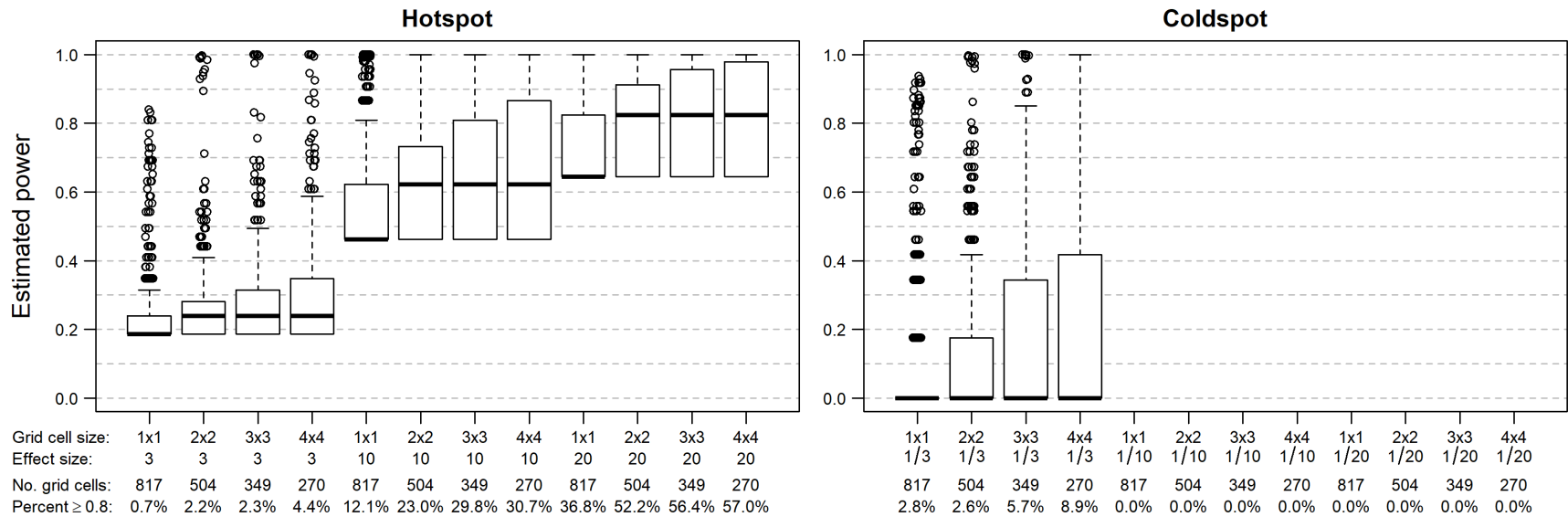
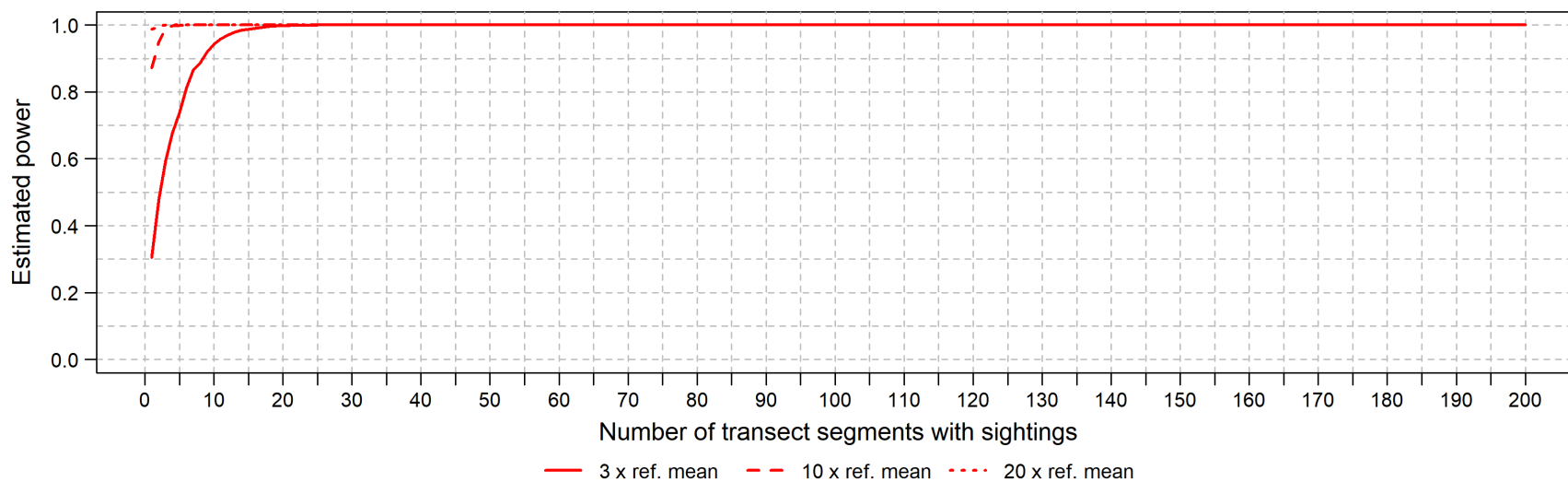


Figure D17. Power analysis results for Razorbill during winter based on the non-zero count model (type I error rate = 0.05)

Atlantic Puffin: spring



D-22

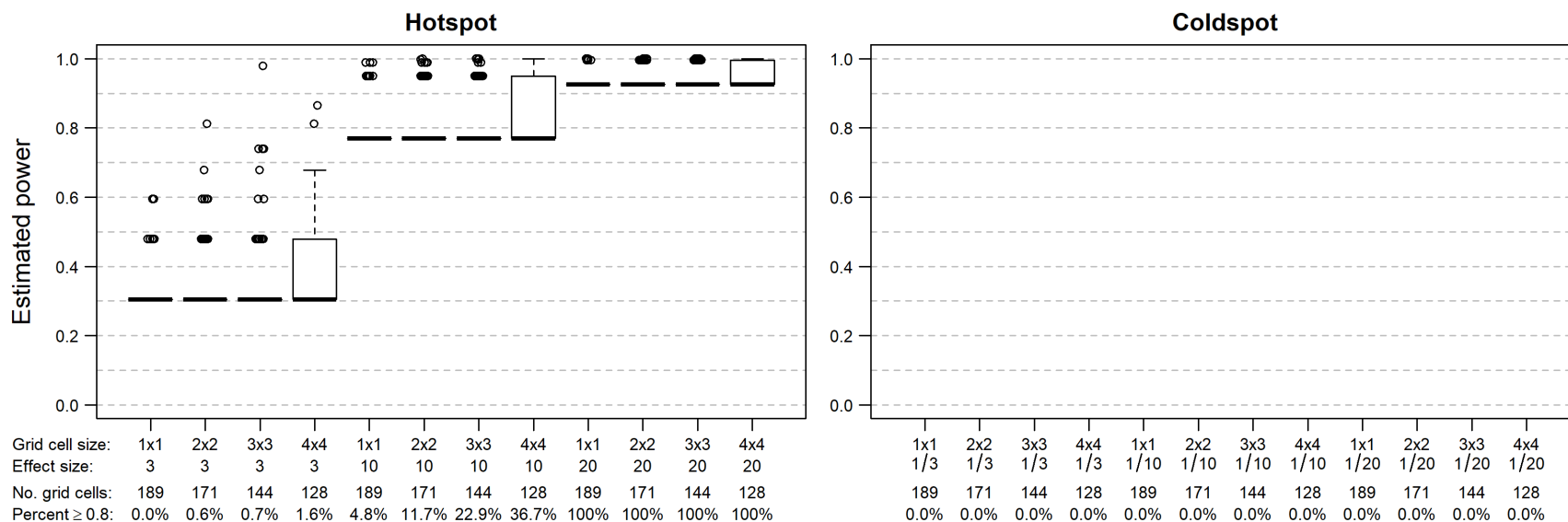
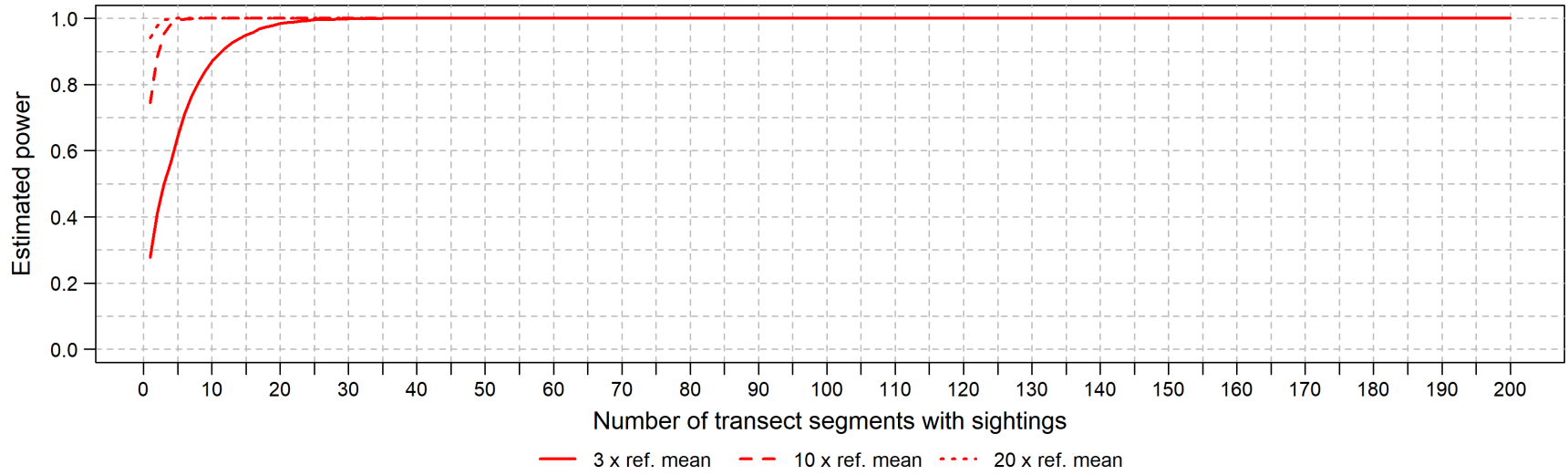


Figure D18. Power analysis results for Atlantic Puffin during spring based on the non-zero count model (type I error rate = 0.05)

Atlantic Puffin: summer



D-23

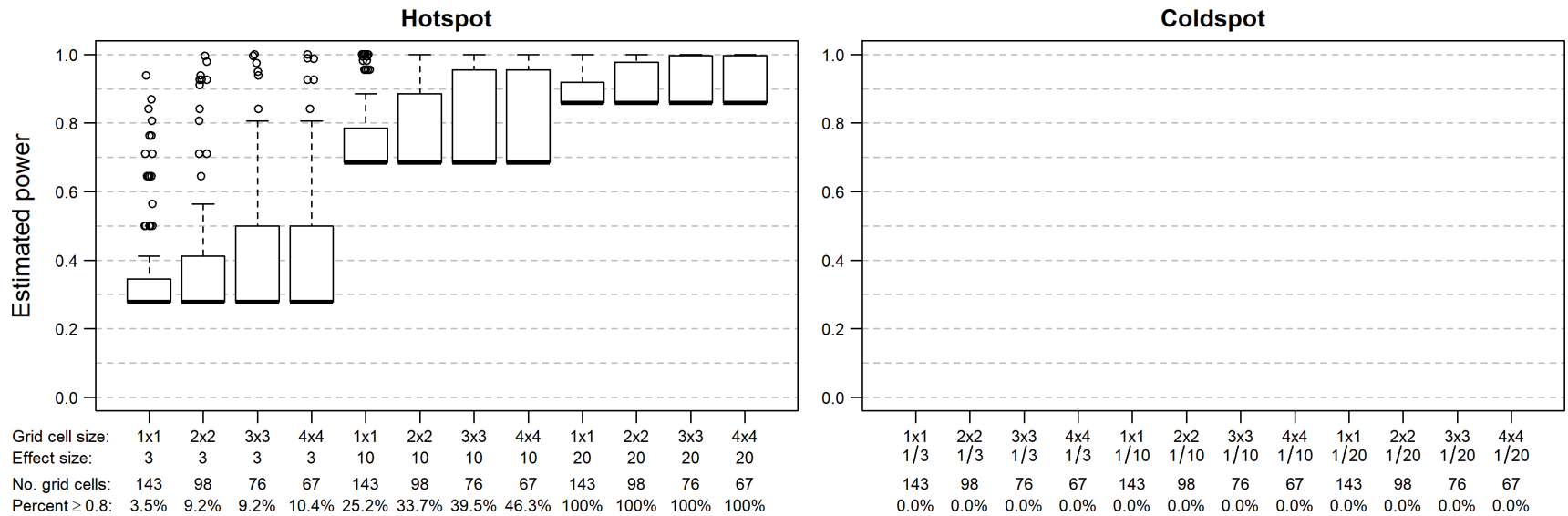
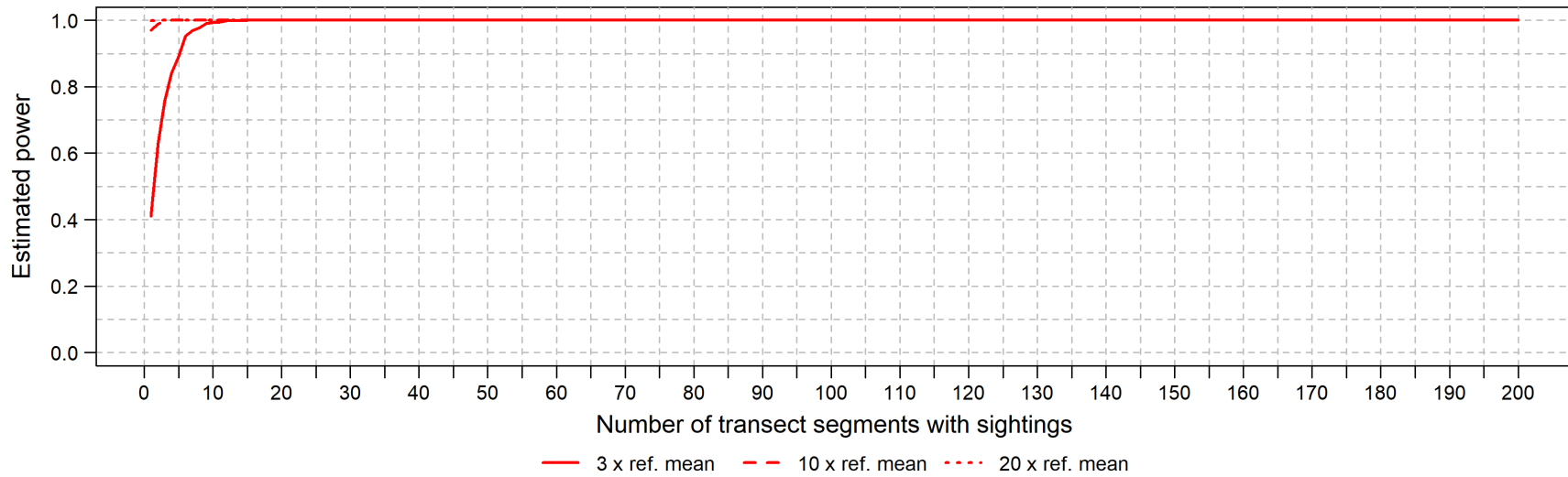


Figure D19. Power analysis results for Atlantic Puffin during summer based on the non-zero count model (type I error rate = 0.05)

Atlantic Puffin: fall



D-24

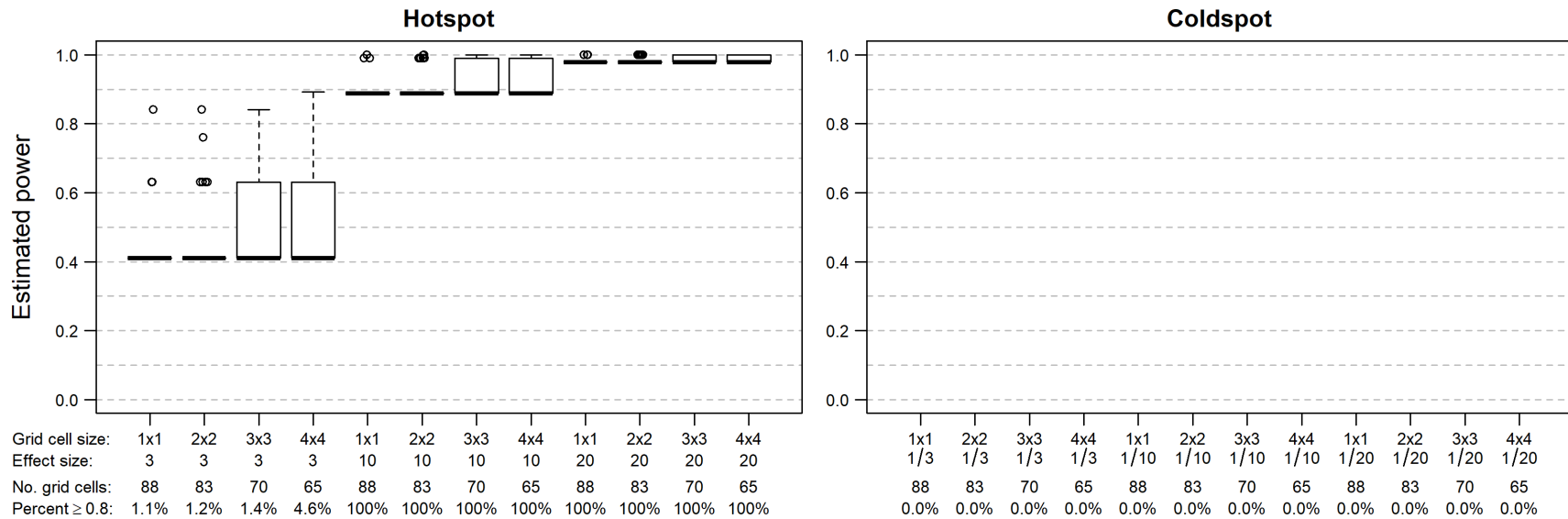
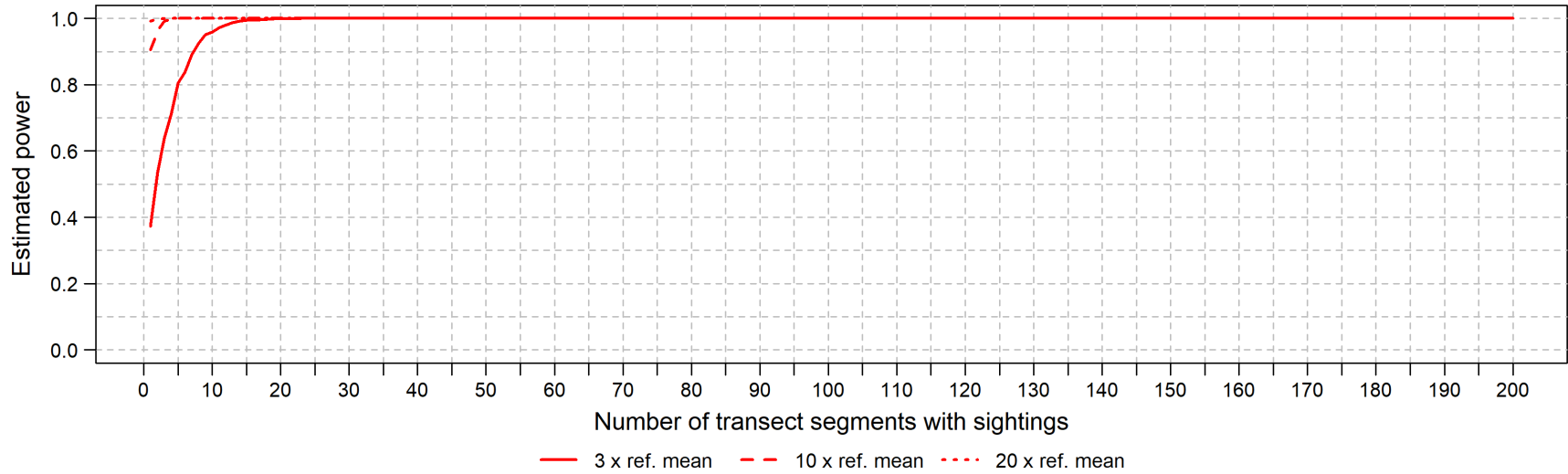


Figure D20. Power analysis results for Atlantic Puffin during fall based on the non-zero count model (type I error rate = 0.05)

Atlantic Puffin: winter



D-25

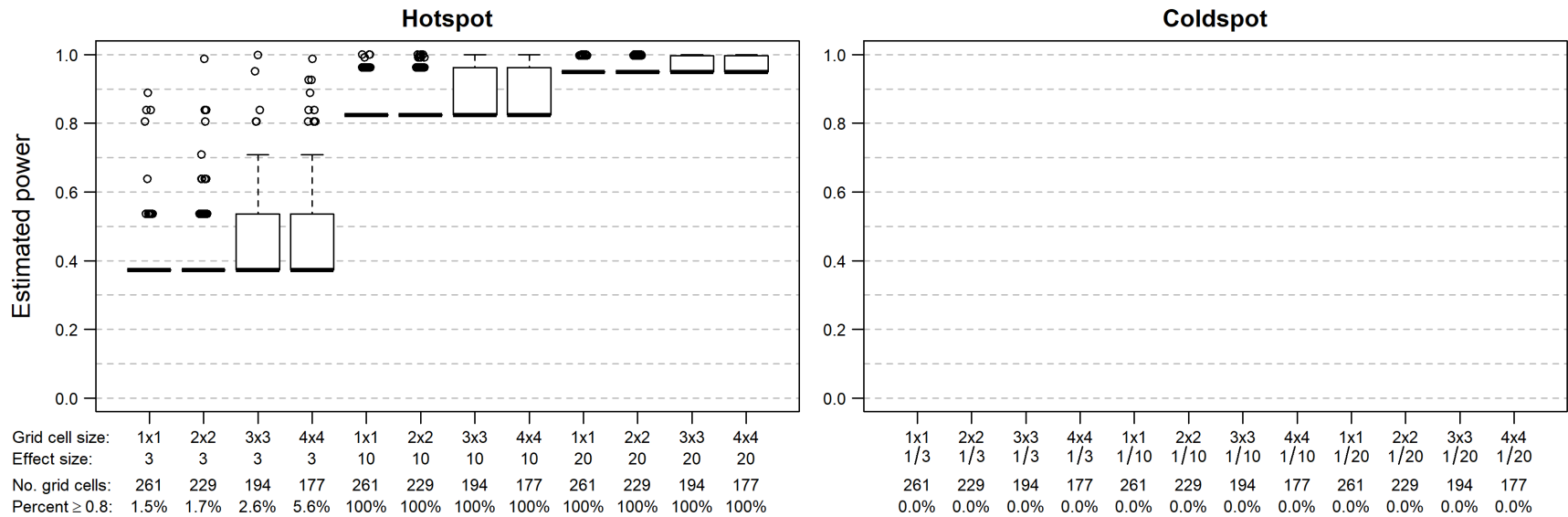
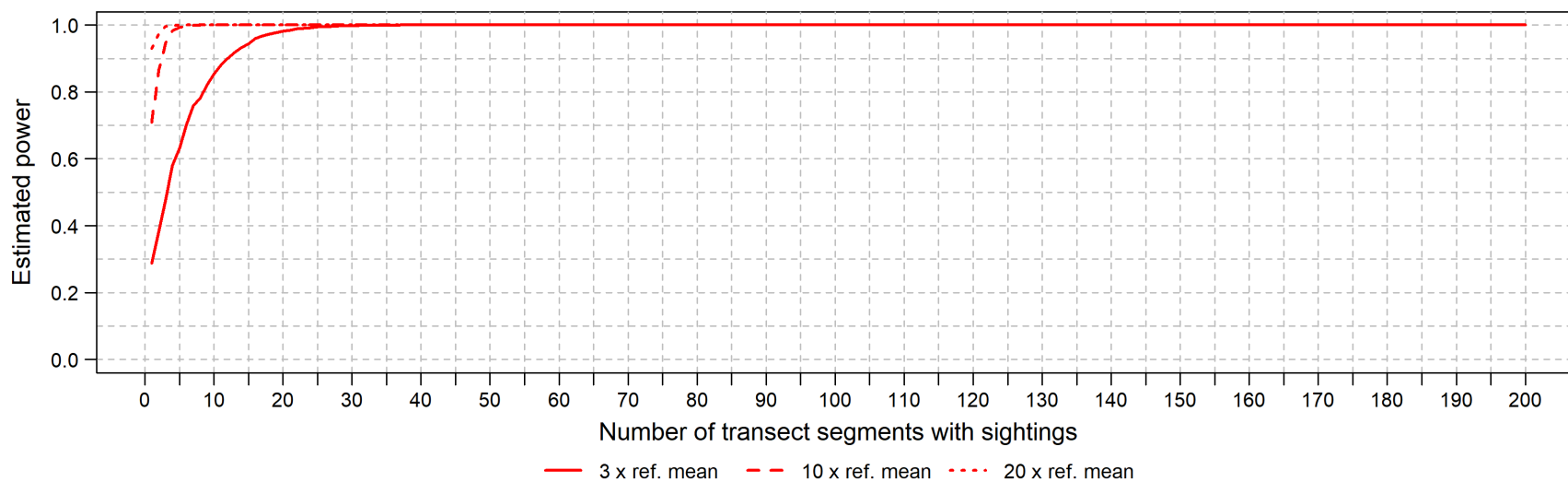


Figure D21. Power analysis results for Atlantic Puffin during winter based on the non-zero count model (type I error rate = 0.05)

Laughing Gull: spring



D-26

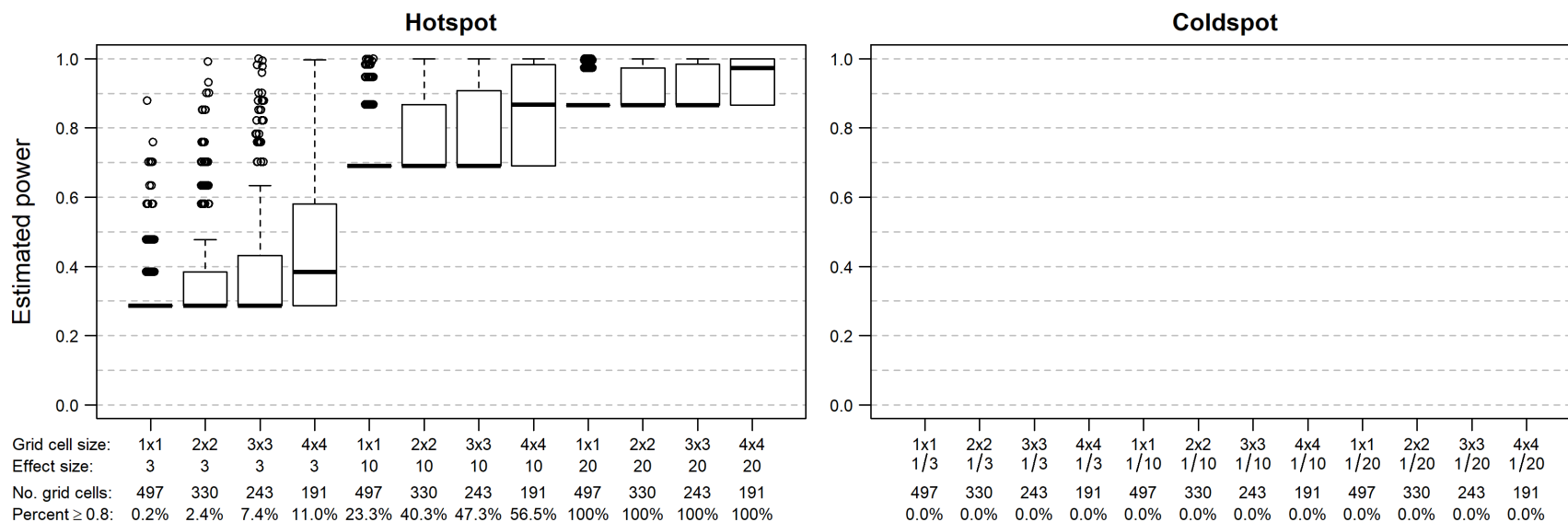
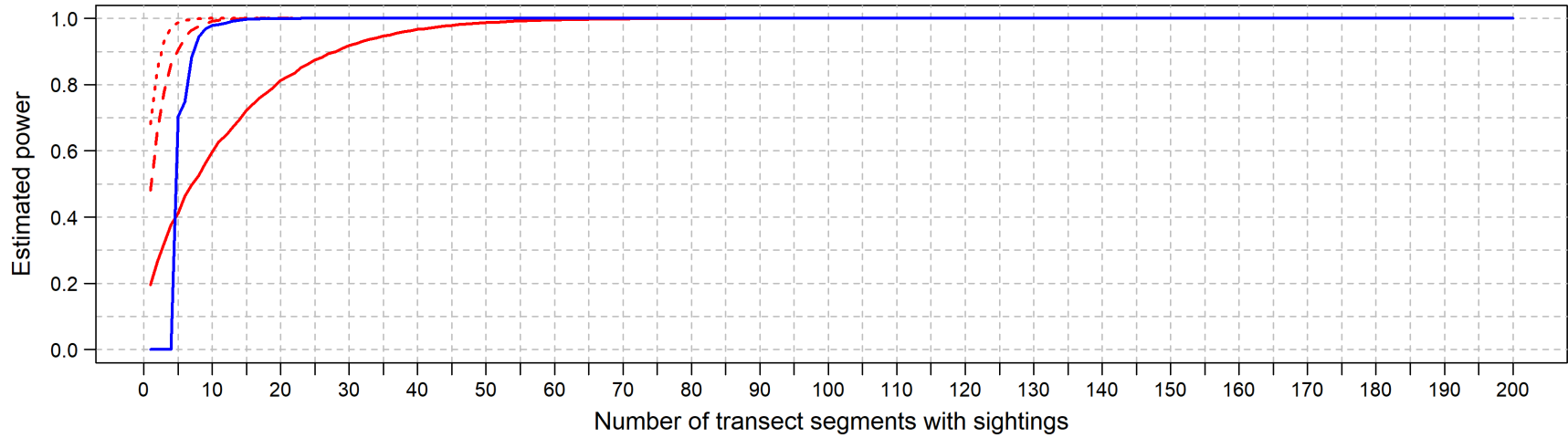


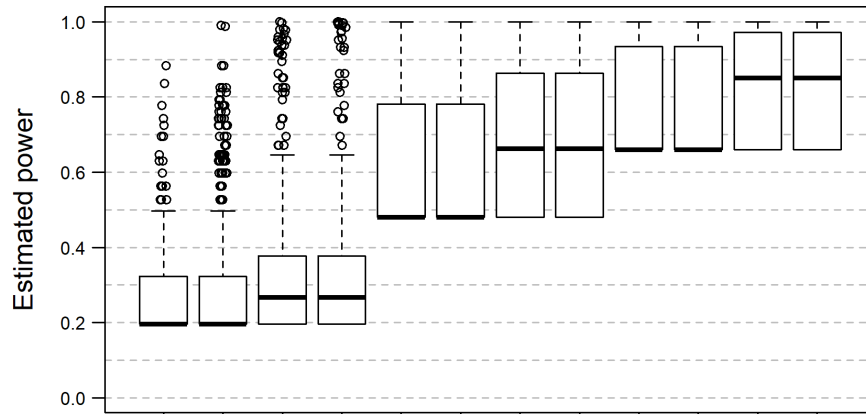
Figure D22. Power analysis results for Laughing Gull during spring based on the non-zero count model (type I error rate = 0.05)

Laughing Gull: summer

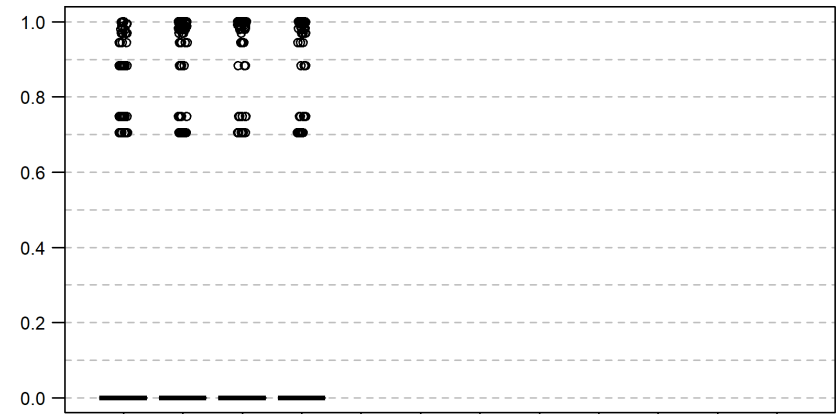


— 3 x ref. mean - - 10 x ref. mean ··· 20 x ref. mean — 1/3 x ref. mean

Hotspot



Coldspot

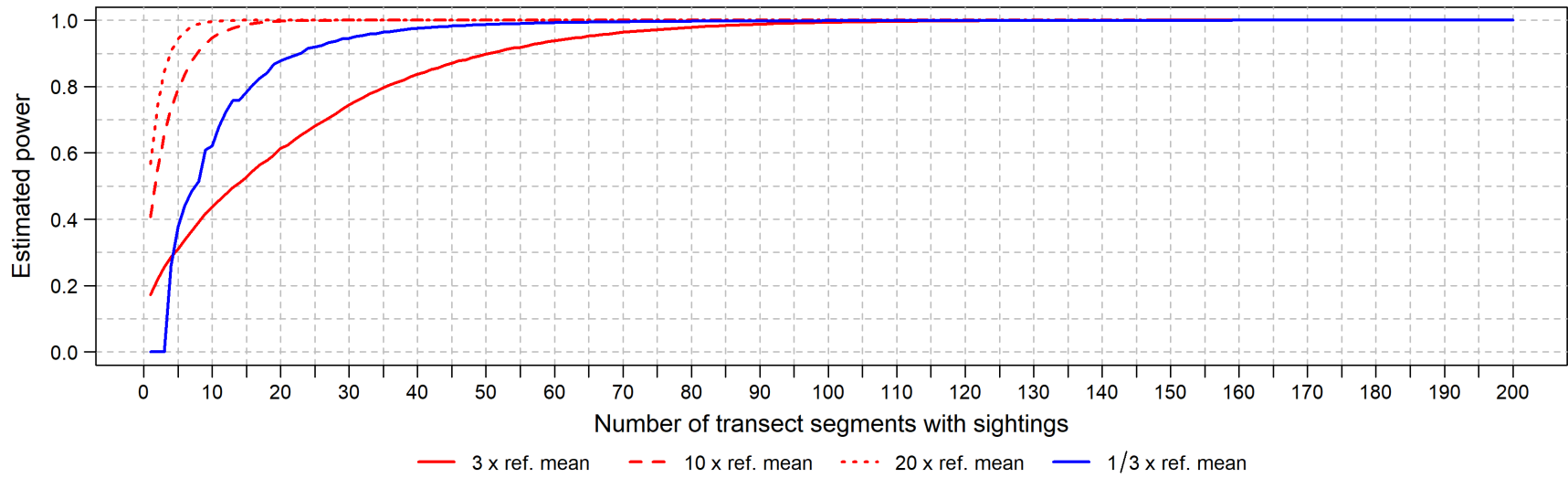


Grid cell size:	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
Effect size:	3	3	3	3	10	10	10	10	20	20	20	20
No. grid cells:	788	475	332	257	788	475	332	257	788	475	332	257
Percent ≥ 0.8 :	0.3%	2.1%	7.8%	8.9%	16.2%	22.3%	26.5%	31.5%	39.6%	44.8%	55.4%	60.3%

	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
Effect size:	1/3	1/3	1/3	1/3	1/10	1/10	1/10	1/10	1/20	1/20	1/20	1/20
No. grid cells:	788	475	332	257	788	475	332	257	788	475	332	257
Percent ≥ 0.8 :	4.2%	14.7%	15.1%	19.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Figure D23. Power analysis results for Laughing Gull during summer based on the non-zero count model (type I error rate = 0.05)

Laughing Gull: fall



D-28

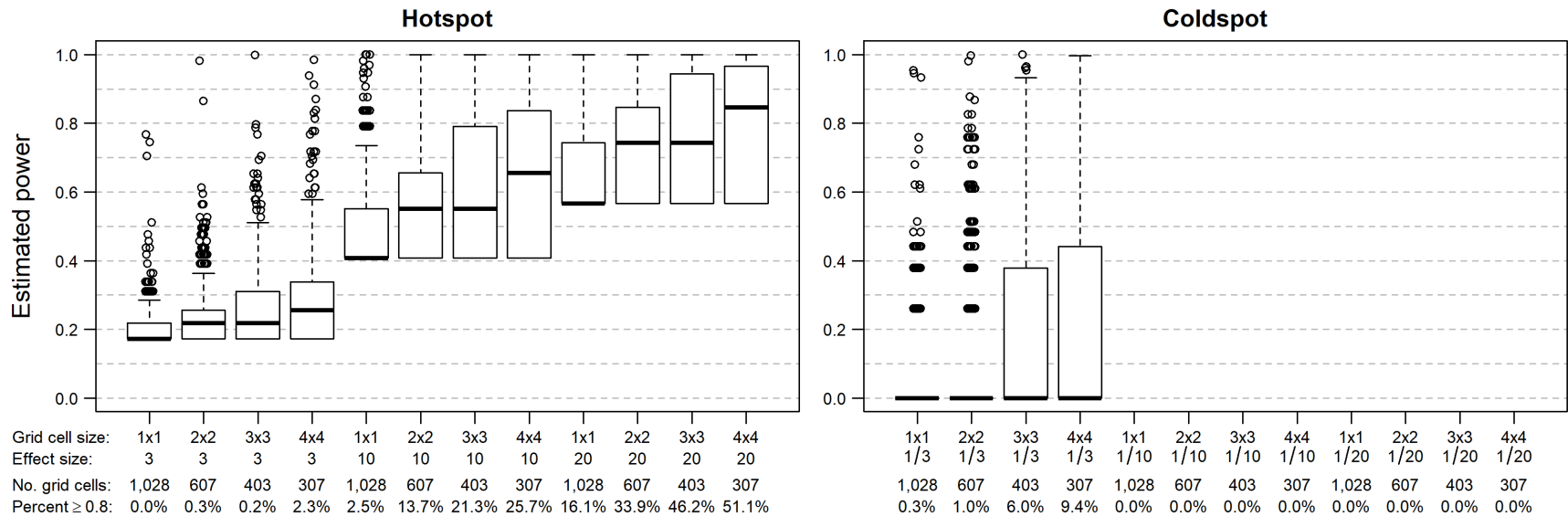
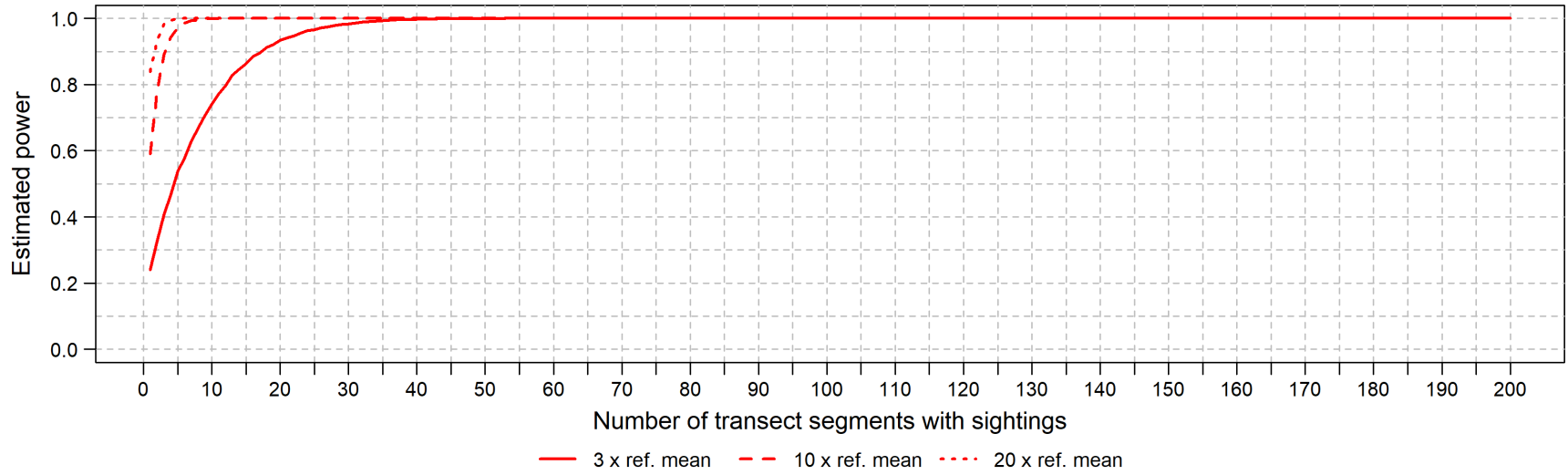


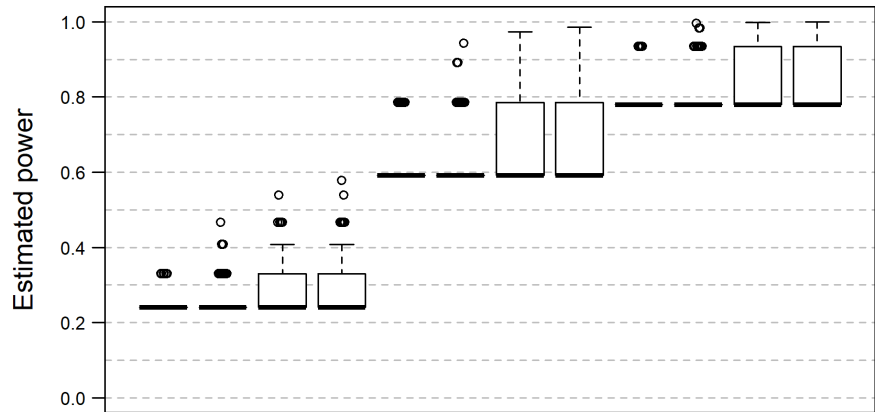
Figure D24. Power analysis results for Laughing Gull during fall based on the non-zero count model (type I error rate = 0.05)

Laughing Gull: winter



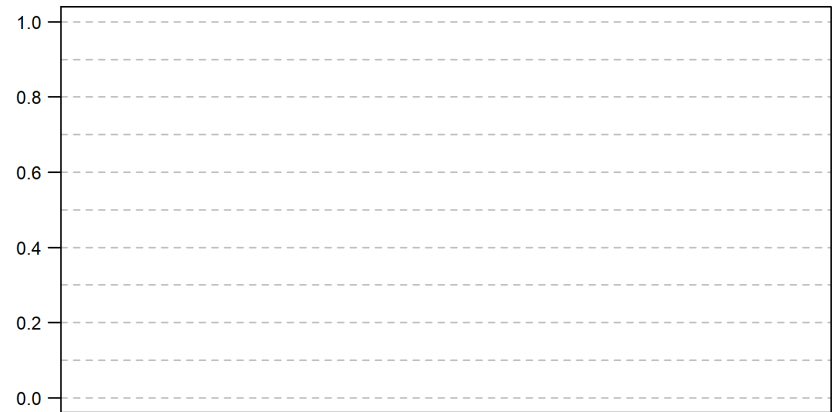
D-29

Hotspot



Grid cell size:	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
Effect size:	3	3	3	3	10	10	10	10	20	20	20	20
No. grid cells:	128	107	91	76	128	107	91	76	128	107	91	76
Percent ≥ 0.8 :	0.0%	0.0%	0.0%	0.0%	0.0%	2.8%	8.8%	23.7%	7.0%	24.3%	31.9%	40.8%

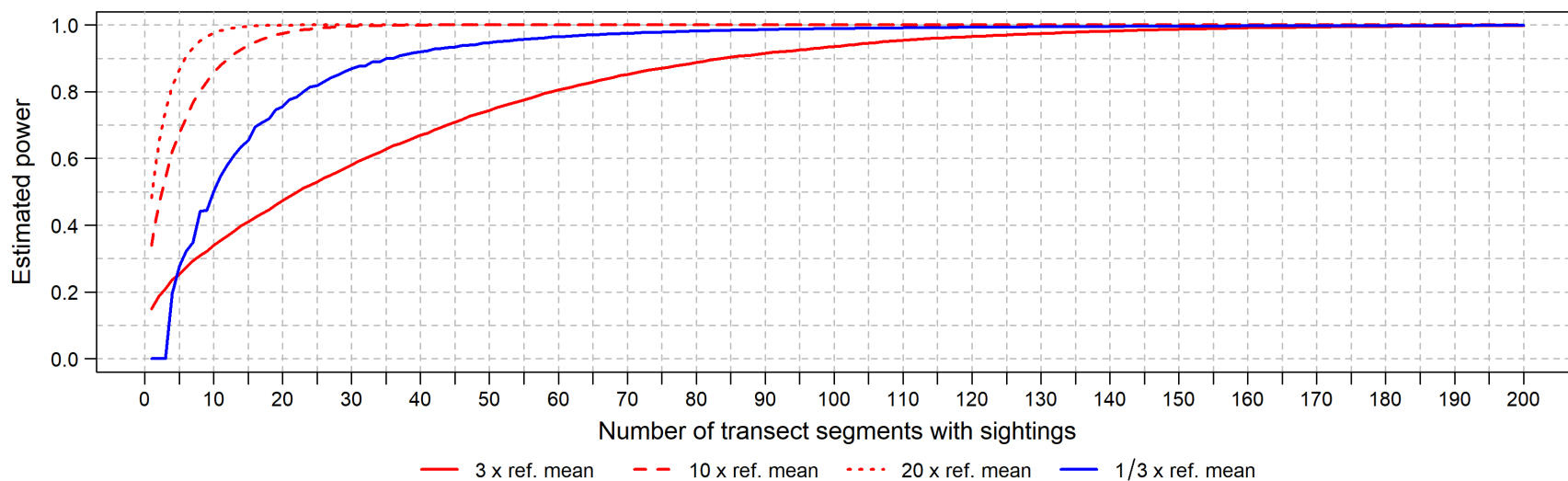
Coldspot



Grid cell size:	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
Effect size:	1/3	1/3	1/3	1/3	1/10	1/10	1/10	1/10	1/20	1/20	1/20	1/20
No. grid cells:	128	107	91	76	128	107	91	76	128	107	91	76
Percent ≥ 0.8 :	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Figure D25. Power analysis results for Laughing Gull during winter based on the non-zero count model (type I error rate = 0.05)

Herring Gull: spring



D-30

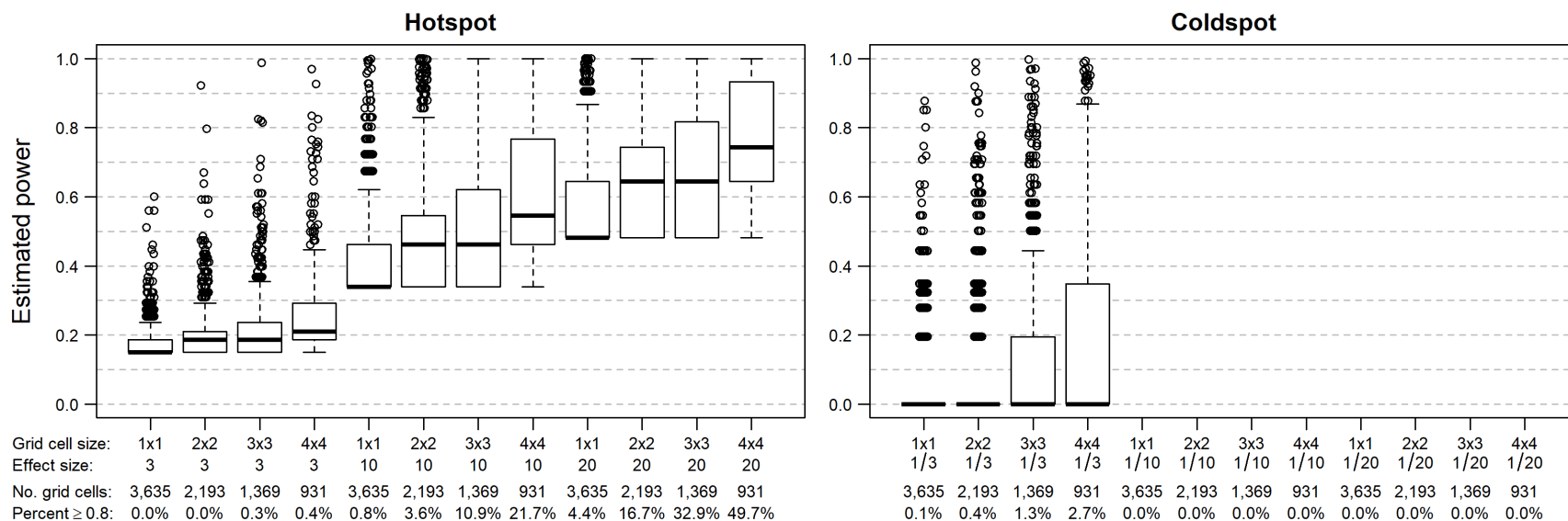


Figure D26. Power analysis results for Herring Gull during spring based on the non-zero count model (type I error rate = 0.05)

Herring Gull: summer

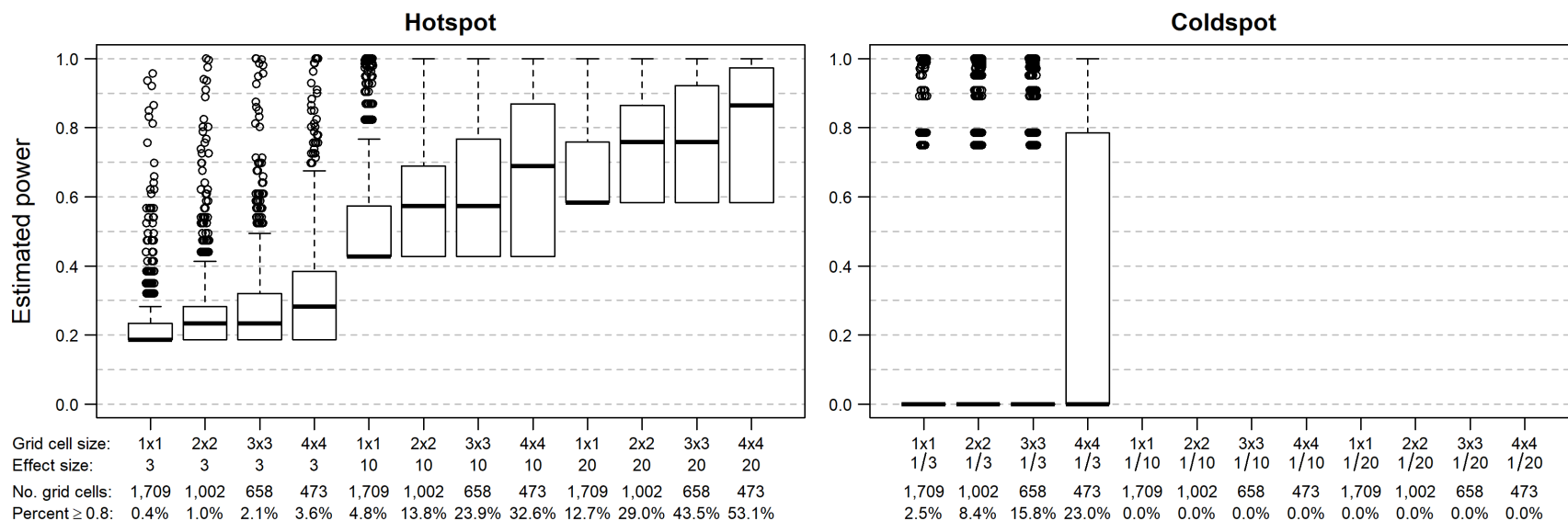
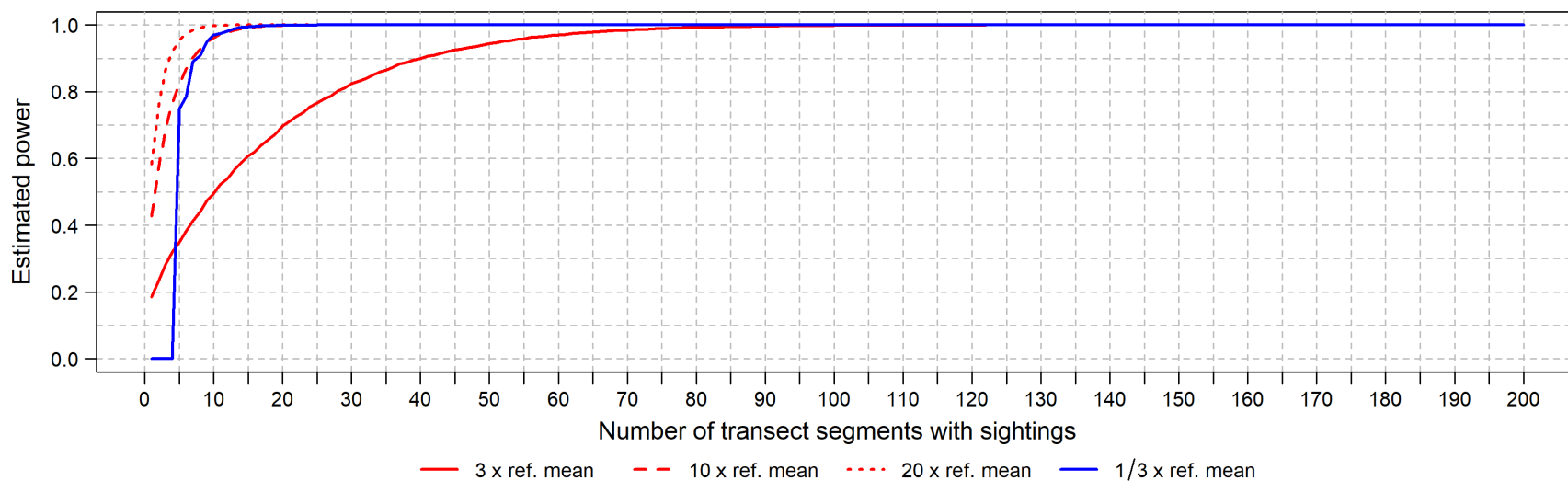
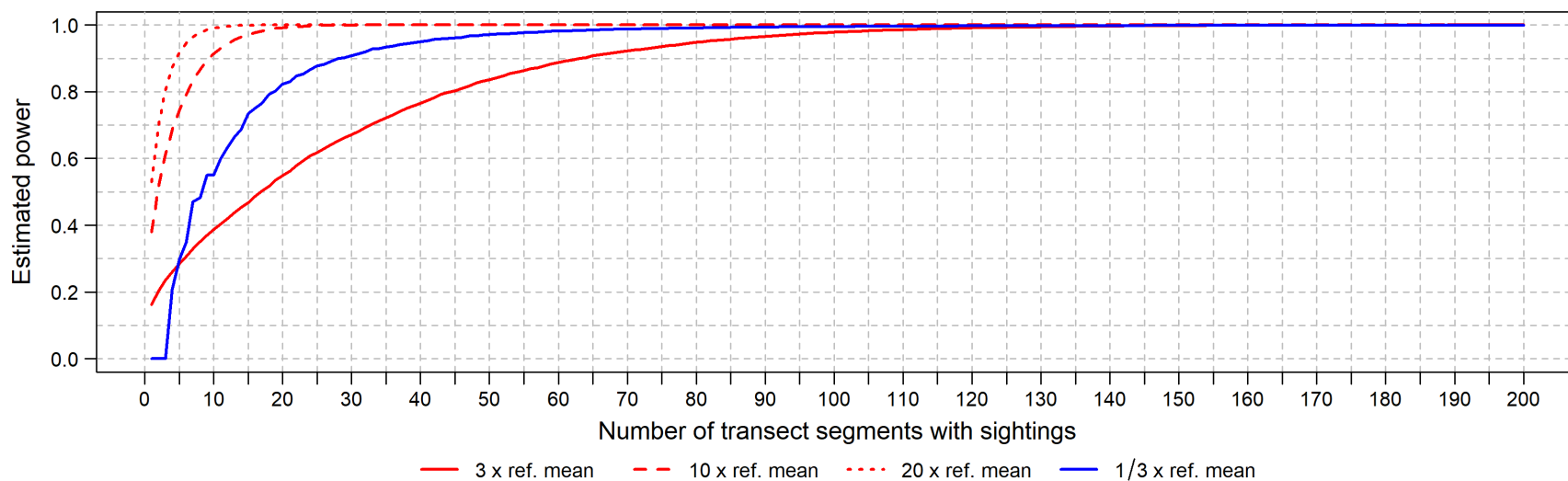
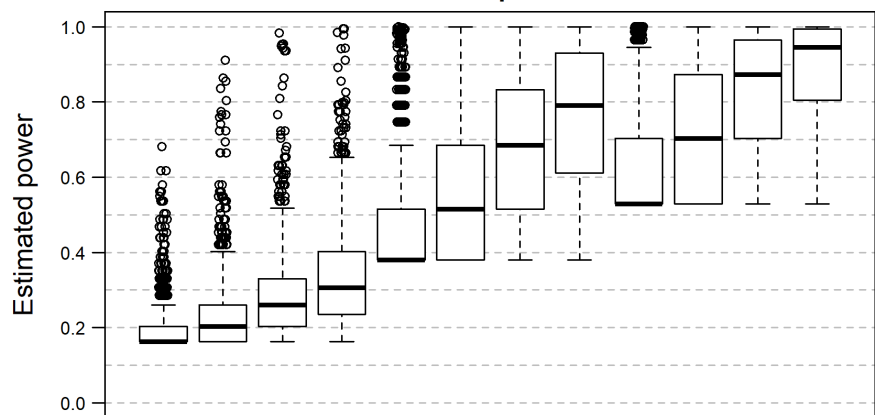


Figure D27. Power analysis results for Herring Gull during summer based on the non-zero count model (type I error rate = 0.05)

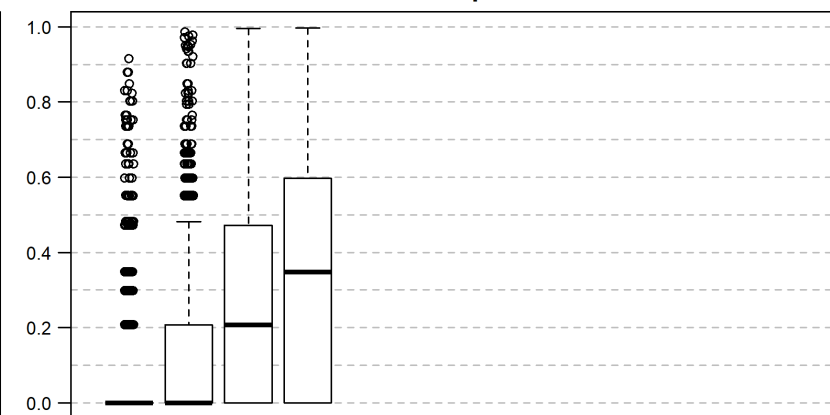
Herring Gull: fall



Hotspot



Coldspot

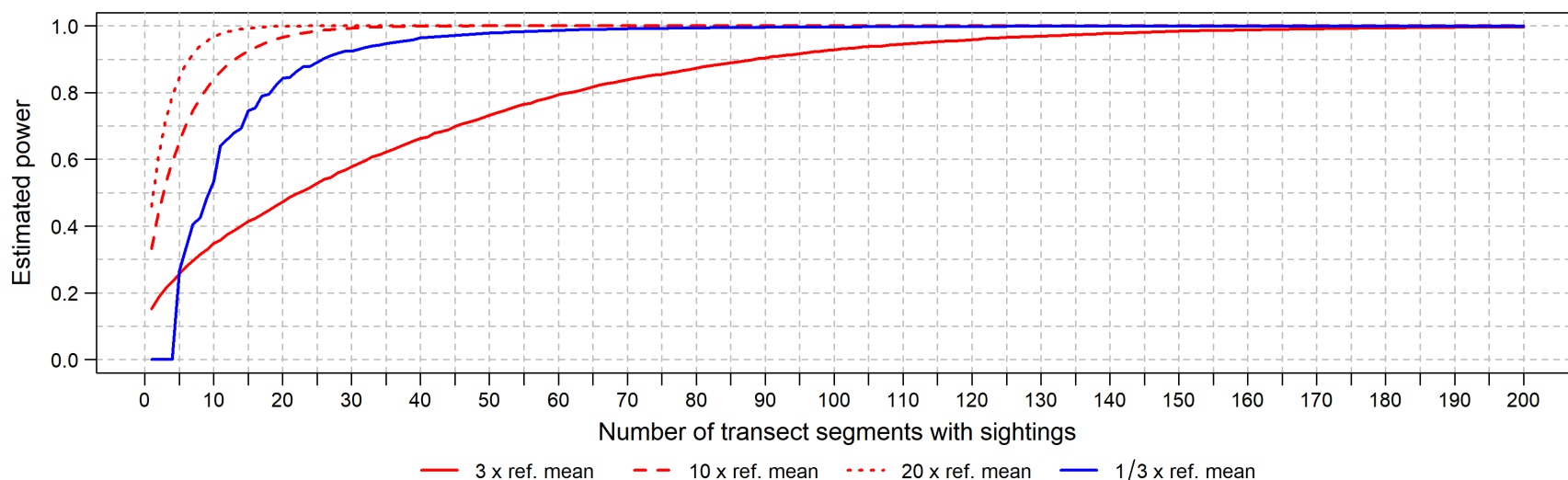


Grid cell size:	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
Effect size:	3	3	3	3	10	10	10	10	20	20	20	20
No. grid cells:	4,544	2,338	1,329	861	4,544	2,338	1,329	861	4,544	2,338	1,329	861
Percent ≥ 0.8:	0.0%	0.2%	0.8%	1.3%	1.6%	11.0%	27.9%	44.1%	15.2%	43.3%	64.1%	76.1%

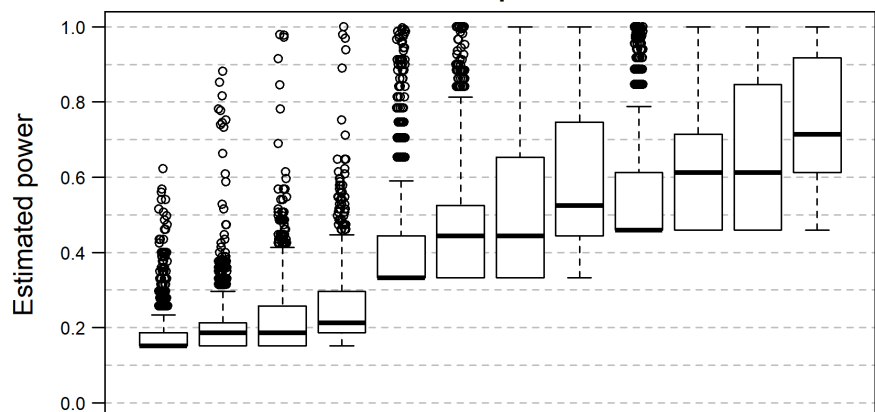
Grid cell size:	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
Effect size:	1/3	1/3	1/3	1/3	1/10	1/10	1/10	1/10	1/20	1/20	1/20	1/20
No. grid cells:	4,544	2,338	1,329	861	4,544	2,338	1,329	861	4,544	2,338	1,329	861
Percent ≥ 0.8:	0.2%	1.2%	3.5%	12.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Figure D28. Power analysis results for Herring Gull during fall based on the non-zero count model (type I error rate = 0.05)

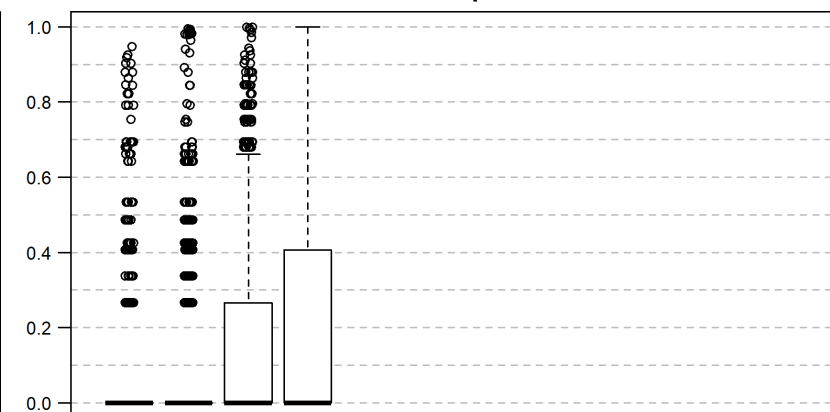
Herring Gull: winter



Hotspot



Coldspot

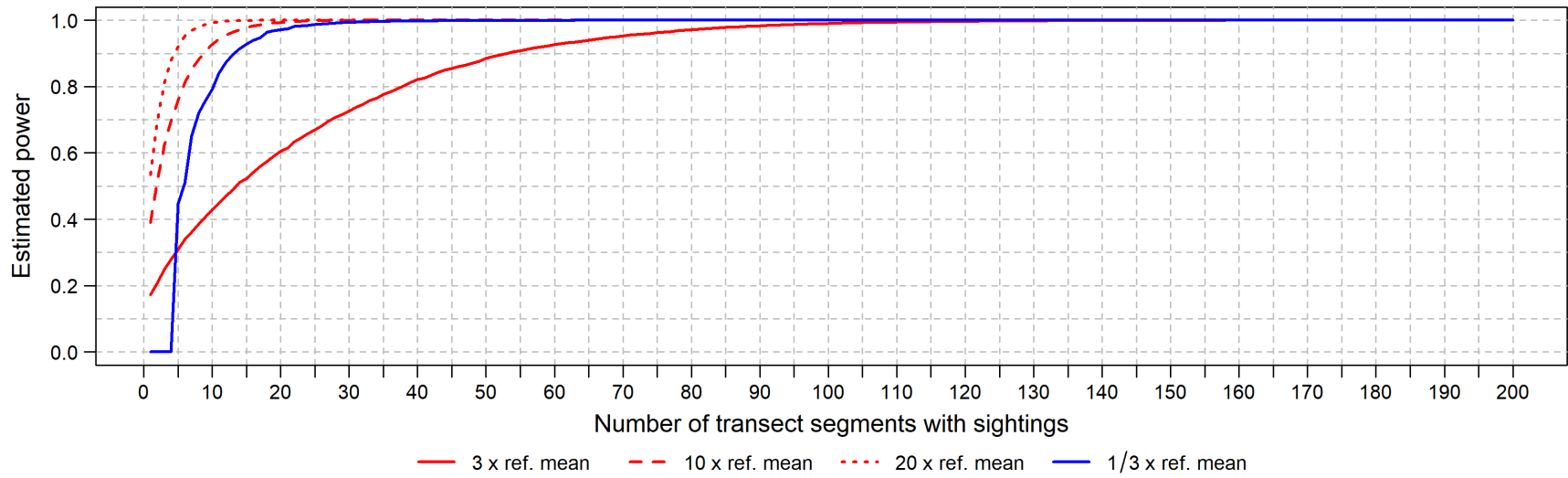


Grid cell size:	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
Effect size:	3	3	3	3	10	10	10	10	20	20	20	20
No. grid cells:	2,964	1,755	1,140	782	2,964	1,755	1,140	782	2,964	1,755	1,140	782
Percent ≥ 0.8 :	0.0%	0.2%	0.4%	0.6%	1.5%	4.9%	12.2%	19.4%	4.1%	15.3%	25.7%	40.9%

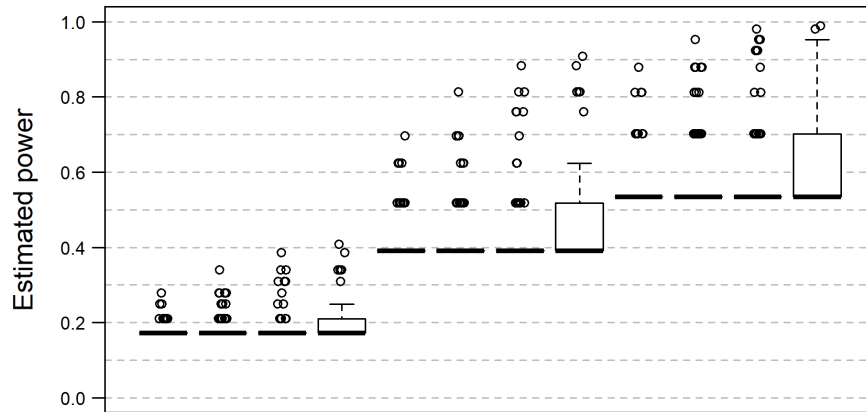
1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
1/3	1/3	1/3	1/3	1/10	1/10	1/10	1/10	1/20	1/20	1/20	1/20
2,964	1,755	1,140	782	2,964	1,755	1,140	782	2,964	1,755	1,140	782
0.4%	0.9%	2.7%	7.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Figure D29. Power analysis results for Herring Gull during winter based on the non-zero count model (type I error rate = 0.05)

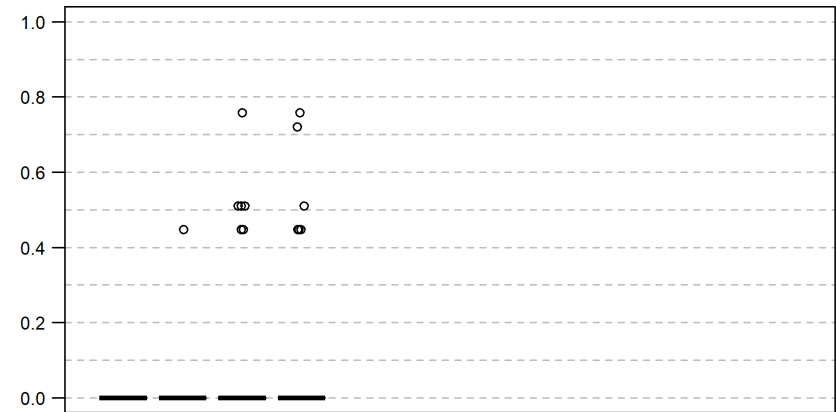
Least Tern: summer



Hotspot



Coldspot

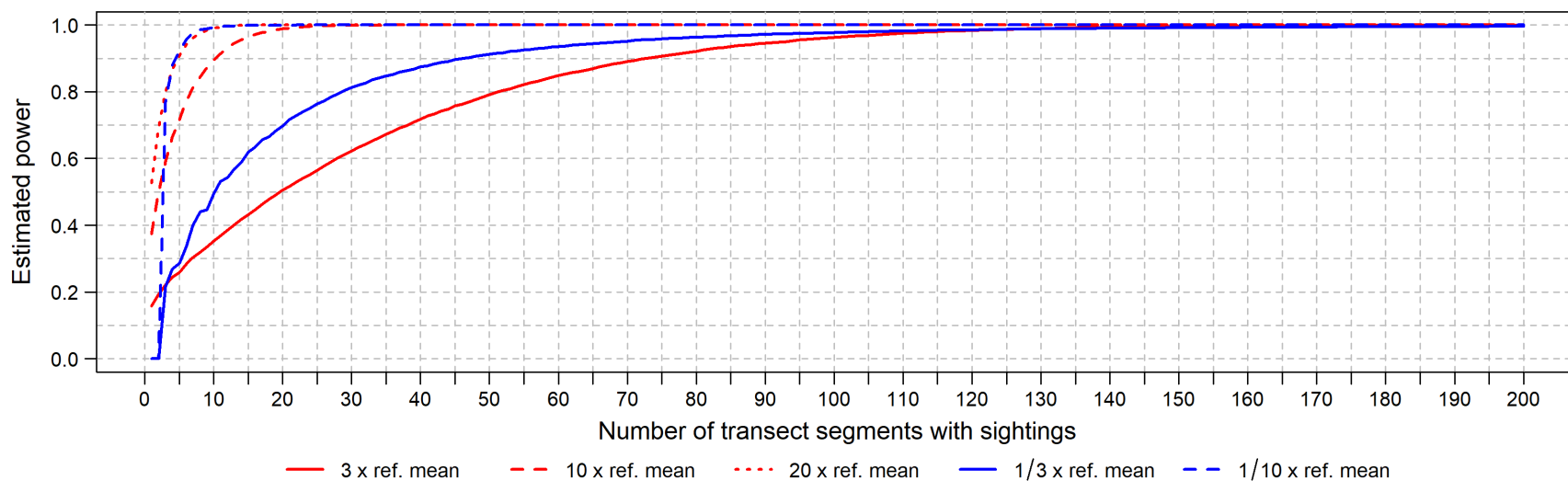


Grid cell size:	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
Effect size:	3	3	3	3	10	10	10	10	20	20	20	20
No. grid cells:	117	97	84	78	117	97	84	78	117	97	84	78
Percent ≥ 0.8 :	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	3.6%	6.4%	3.4%	8.2%	11.9%	12.8%

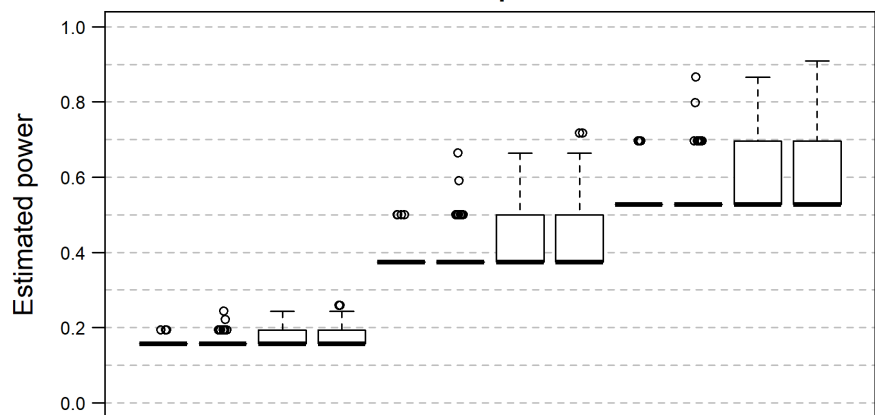
1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
1/3	1/3	1/3	1/3	1/10	1/10	1/10	1/10	1/20	1/20	1/20	1/20
117	97	84	78	117	97	84	78	117	97	84	78
0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Figure D30. Power analysis results for Least Tern during summer based on the non-zero count model (type I error rate = 0.05)

Least Tern: fall

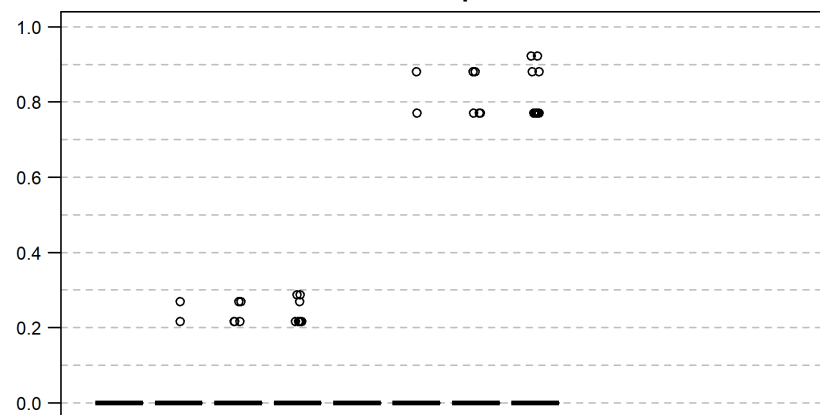


Hotspot



Grid cell size:	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
Effect size:	3	3	3	3	10	10	10	10	20	20	20	20
No. grid cells:	93	81	66	55	93	81	66	55	93	81	66	55
Percent ≥ 0.8 :	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	3.0%	7.3%

Coldspot

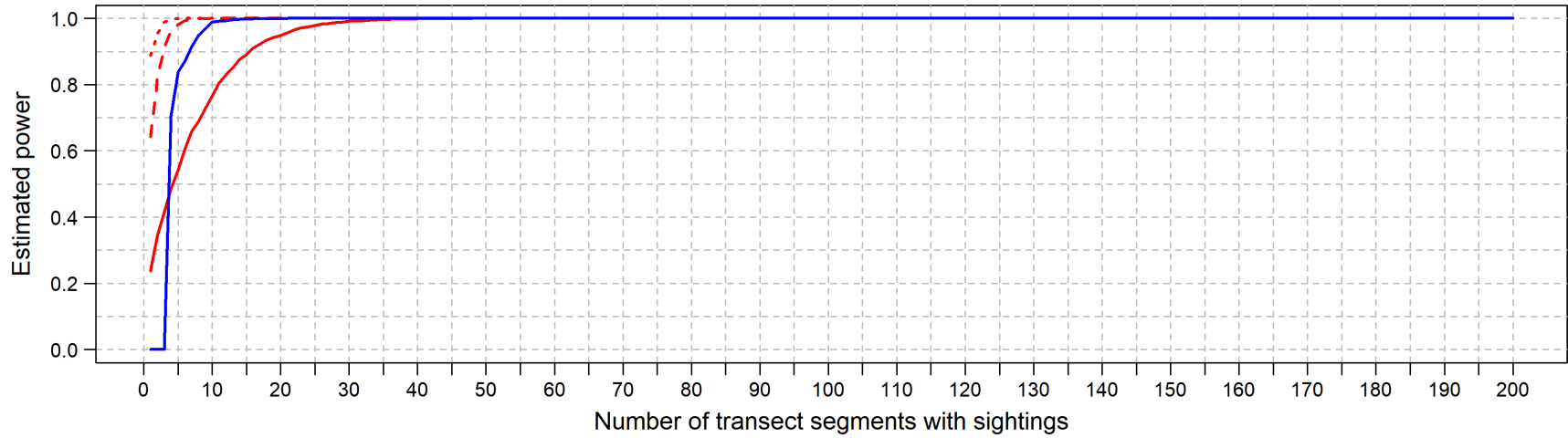


Grid cell size:	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
Effect size:	1/3	1/3	1/3	1/3	1/10	1/10	1/10	1/10	1/20	1/20	1/20	1/20
No. grid cells:	93	81	66	55	93	81	66	55	93	81	66	55
Percent ≥ 0.8 :	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	3.0%	7.3%

D-35

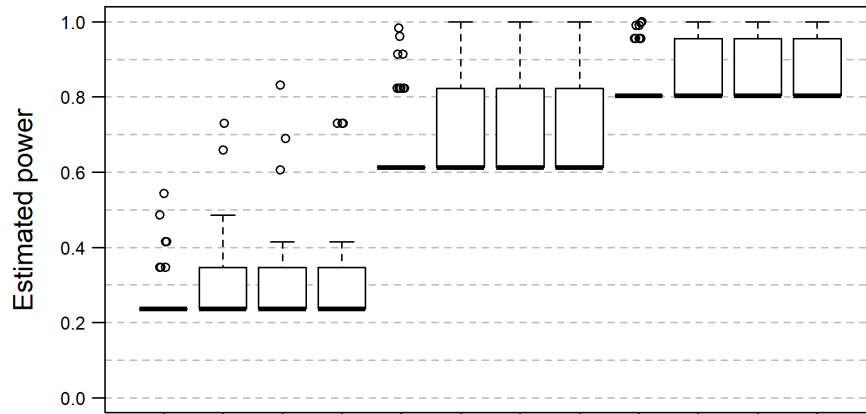
Figure D31. Power analysis results for Least Tern during fall based on the non-zero count model (type I error rate = 0.05)

Roseate Tern: spring

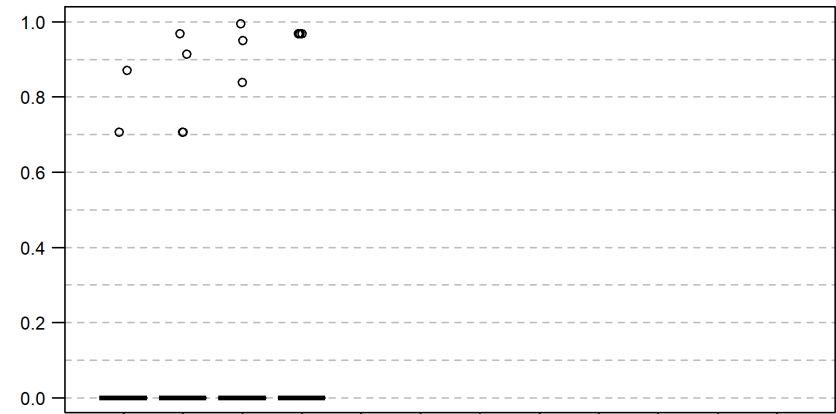


— 3 x ref. mean - - 10 x ref. mean ··· 20 x ref. mean — 1/3 x ref. mean

Hotspot



Coldspot

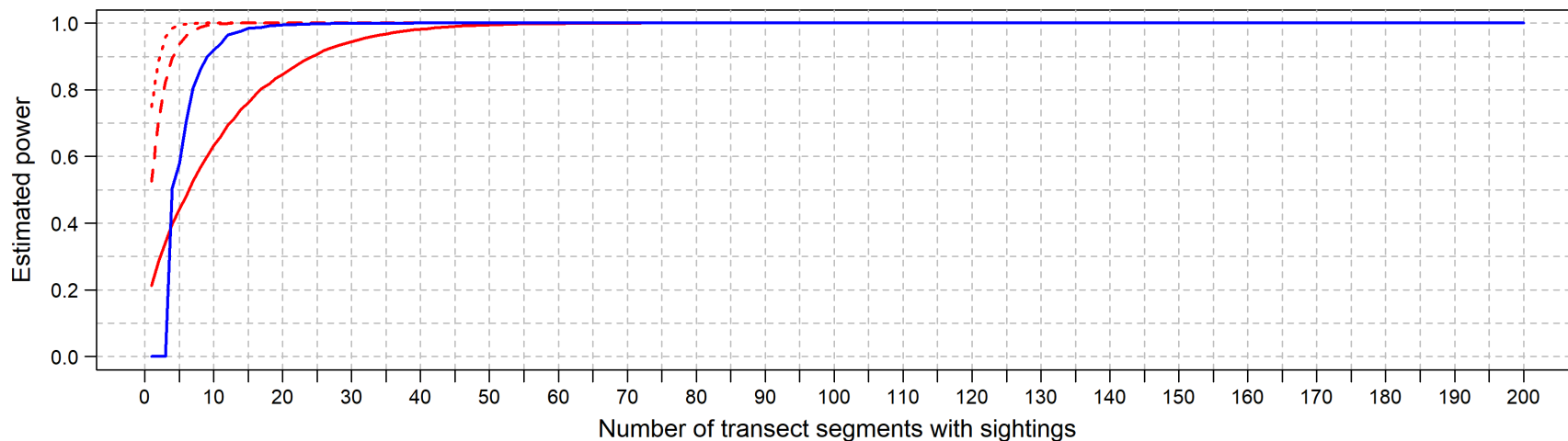


Grid cell size:	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
Effect size:	3	3	3	3	10	10	10	10	20	20	20	20
No. grid cells:	42	32	27	25	42	32	27	25	42	32	27	25
Percent ≥ 0.8 :	0.0%	0.0%	3.7%	0.0%	23.8%	34.4%	40.7%	44.0%	100%	100%	100%	100%

1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
1/3	1/3	1/3	1/3	1/10	1/10	1/10	1/10	1/20	1/20	1/20	1/20
42	32	27	25	42	32	27	25	42	32	27	25
2.4%	6.2%	11.1%	12.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

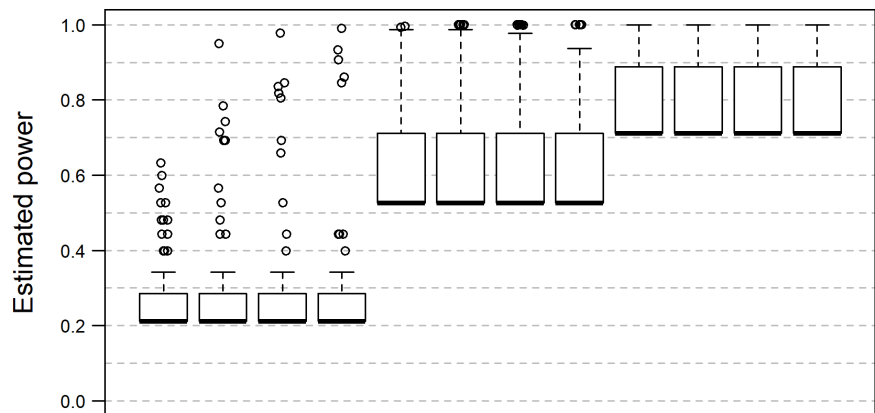
Figure D32. Power analysis results for Roseate Tern during spring based on the non-zero count model (type I error rate = 0.05)

Roseate Tern: summer

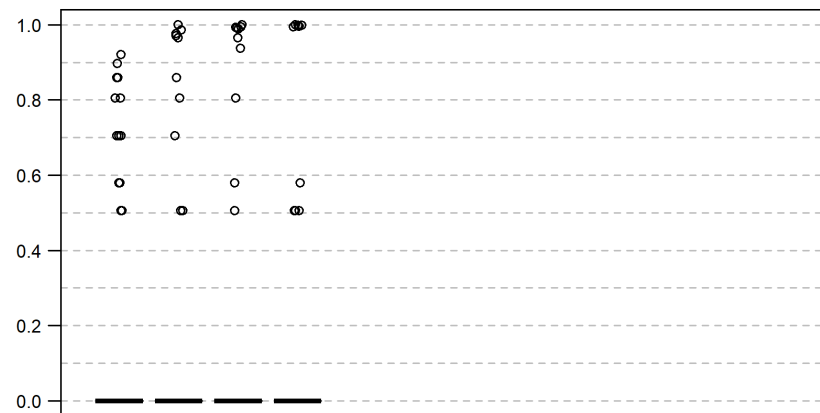


— 3 x ref. mean - - 10 x ref. mean ··· 20 x ref. mean — 1/3 x ref. mean

Hotspot



Coldspot

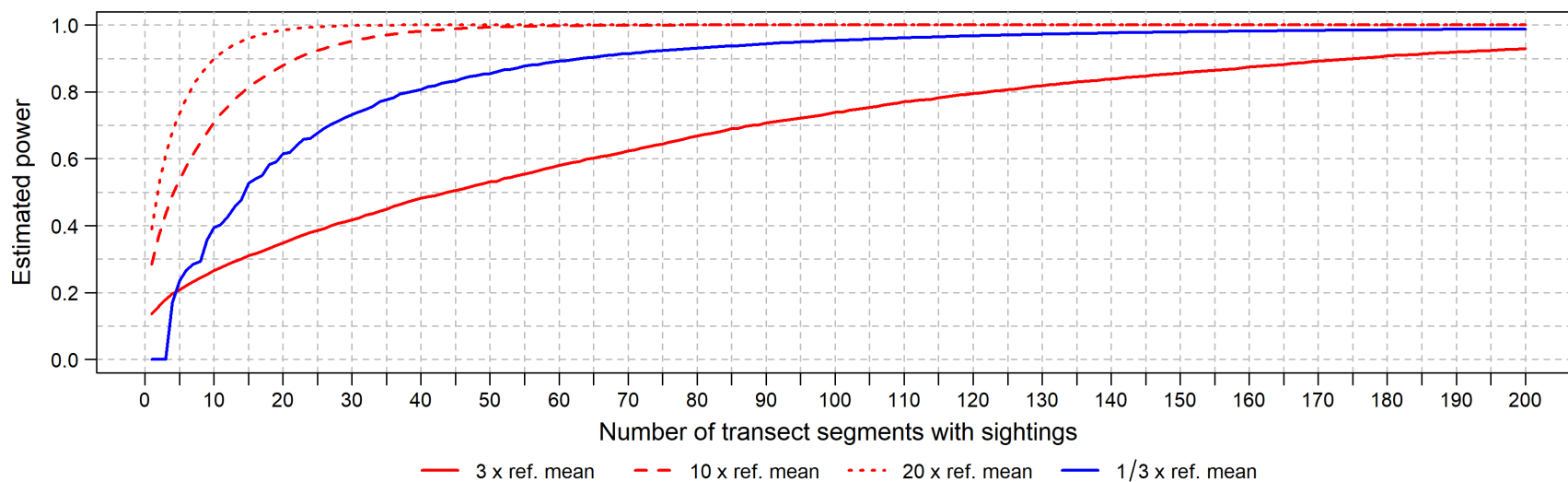


Grid cell size:	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
Effect size:	3	3	3	3	10	10	10	10	20	20	20	20
No. grid cells:	112	75	57	51	112	75	57	51	112	75	57	51
Percent ≥ 0.8 :	0.0%	1.3%	8.8%	9.8%	18.8%	22.7%	22.8%	23.5%	30.4%	34.7%	36.8%	39.2%

Grid cell size:	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
Effect size:	1/3	1/3	1/3	1/3	1/10	1/10	1/10	1/10	1/20	1/20	1/20	1/20
No. grid cells:	112	75	57	51	112	75	57	51	112	75	57	51
Percent ≥ 0.8 :	5.4%	10.7%	14.0%	9.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

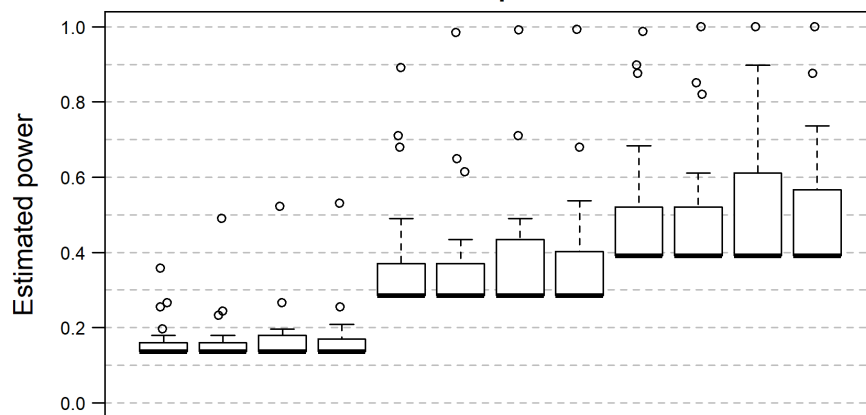
Figure D33. Power analysis results for Roseate Tern during summer based on the non-zero count model (type I error rate = 0.05)

Roseate Tern: fall

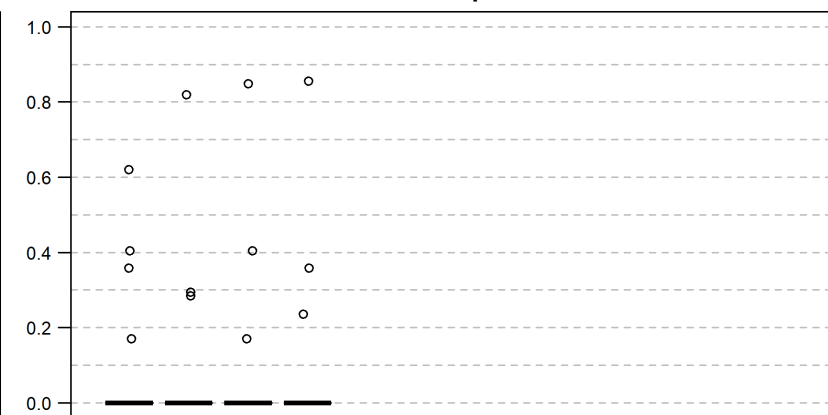


D-38

Hotspot



Coldspot

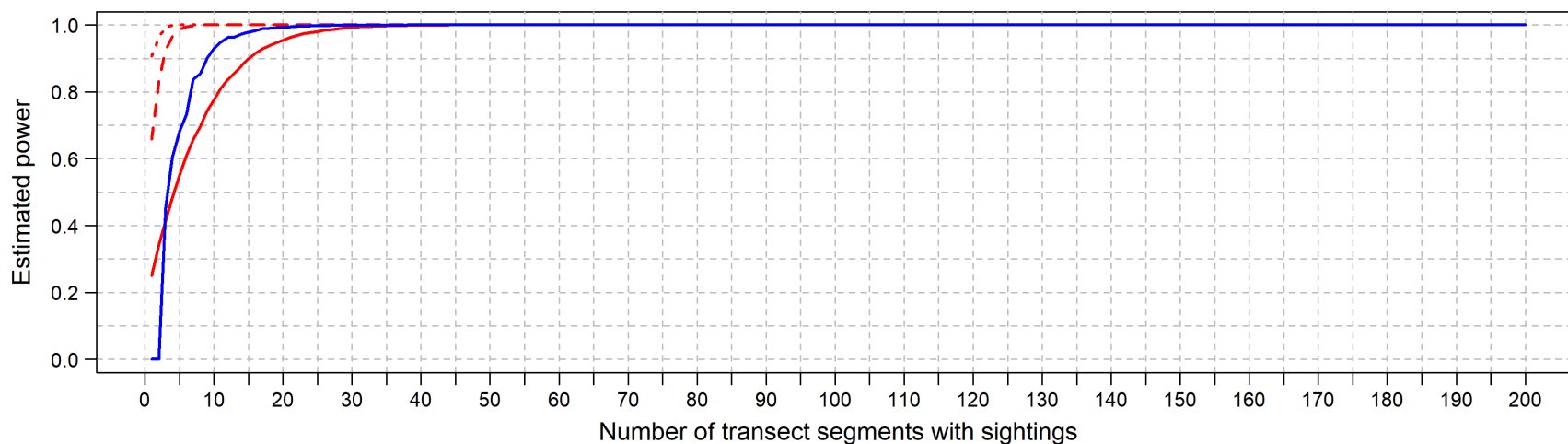


Grid cell size:	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
Effect size:	3	3	3	3	10	10	10	10	20	20	20	20
No. grid cells:	31	22	17	15	31	22	17	15	31	22	17	15
Percent ≥ 0.8 :	0.0%	0.0%	0.0%	0.0%	3.2%	4.5%	5.9%	6.7%	9.7%	13.6%	11.8%	13.3%

Grid cell size:	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
Effect size:	1/3	1/3	1/3	1/3	1/10	1/10	1/10	1/10	1/20	1/20	1/20	1/20
No. grid cells:	31	22	17	15	31	22	17	15	31	22	17	15
Percent ≥ 0.8 :	0.0%	4.5%	5.9%	6.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

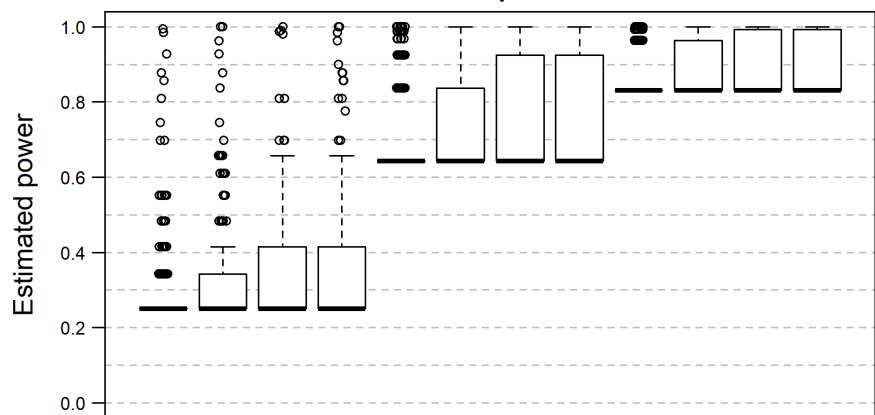
Figure D34. Power analysis results for Roseate Tern during fall based on the non-zero count model (type I error rate = 0.05)

Common Tern: spring

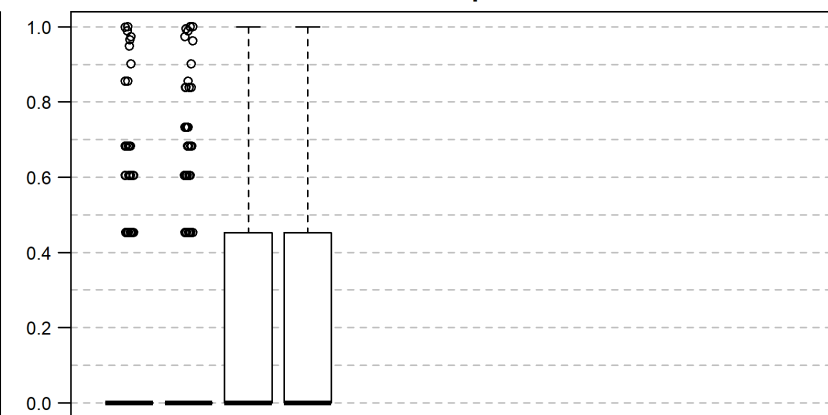


— 3 x ref. mean - - 10 x ref. mean ··· 20 x ref. mean — 1/3 x ref. mean

Hotspot



Coldspot

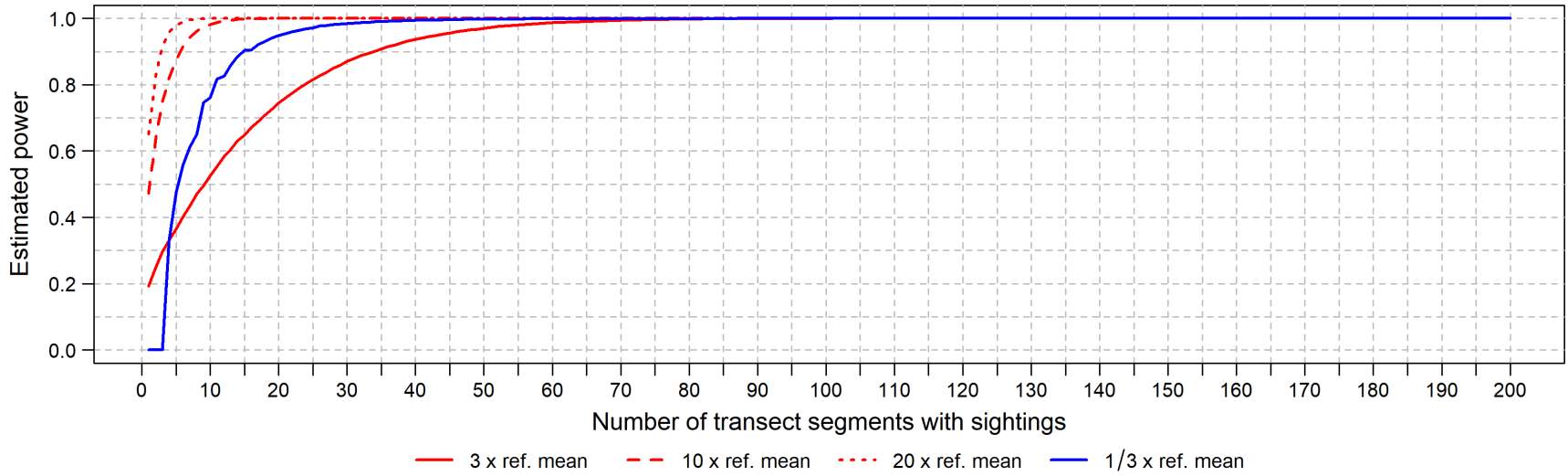


Grid cell size:	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
Effect size:	3	3	3	3	10	10	10	10	20	20	20	20
No. grid cells:	344	239	181	151	344	239	181	151	344	239	181	151
Percent ≥ 0.8 :	1.7%	2.5%	4.4%	7.9%	24.7%	36.4%	45.3%	45.7%	100%	100%	100%	100%

1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
1/3	1/3	1/3	1/3	1/10	1/10	1/10	1/10	1/20	1/20	1/20	1/20
344	239	181	151	344	239	181	151	344	239	181	151
2.6%	5.0%	8.3%	12.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Figure D35. Power analysis results for Common Tern during spring based on the non-zero count model (type I error rate = 0.05)

Common Tern: summer



D-40

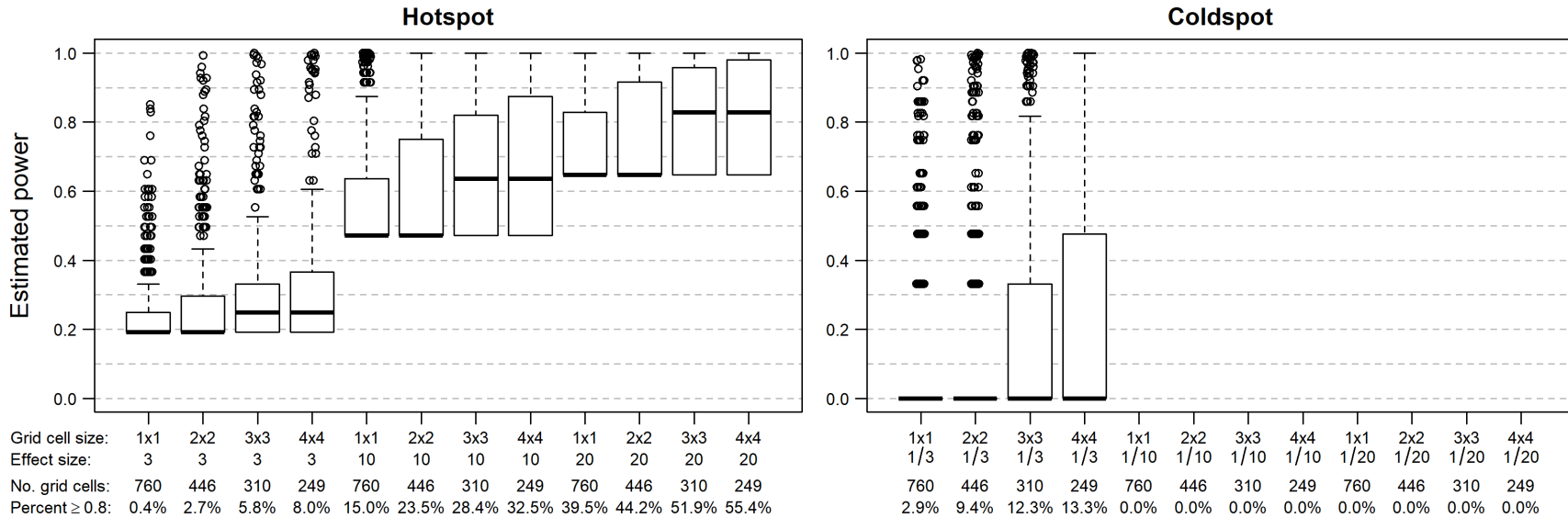
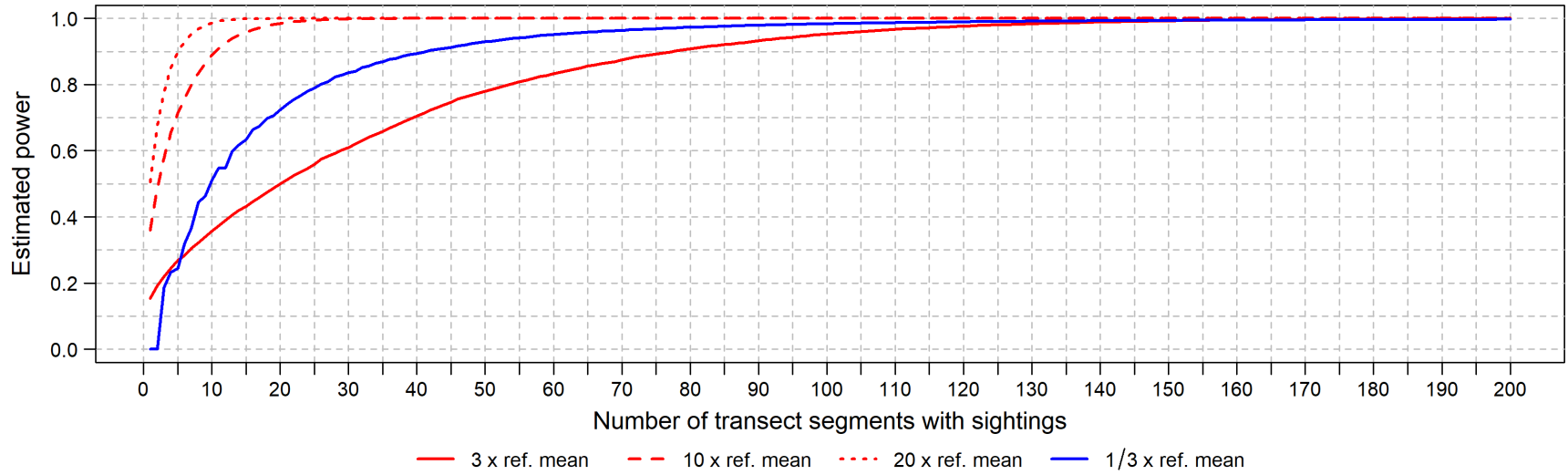


Figure D36. Power analysis results for Common Tern during summer based on the non-zero count model (type I error rate = 0.05)

Common Tern: fall



D-41

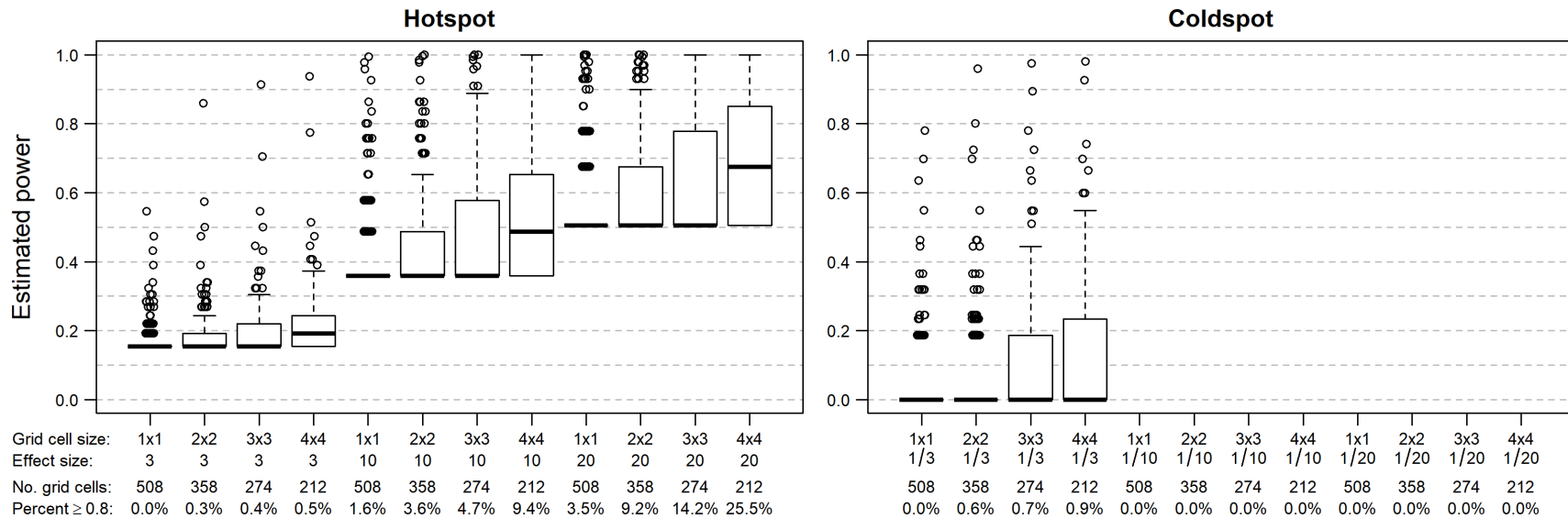
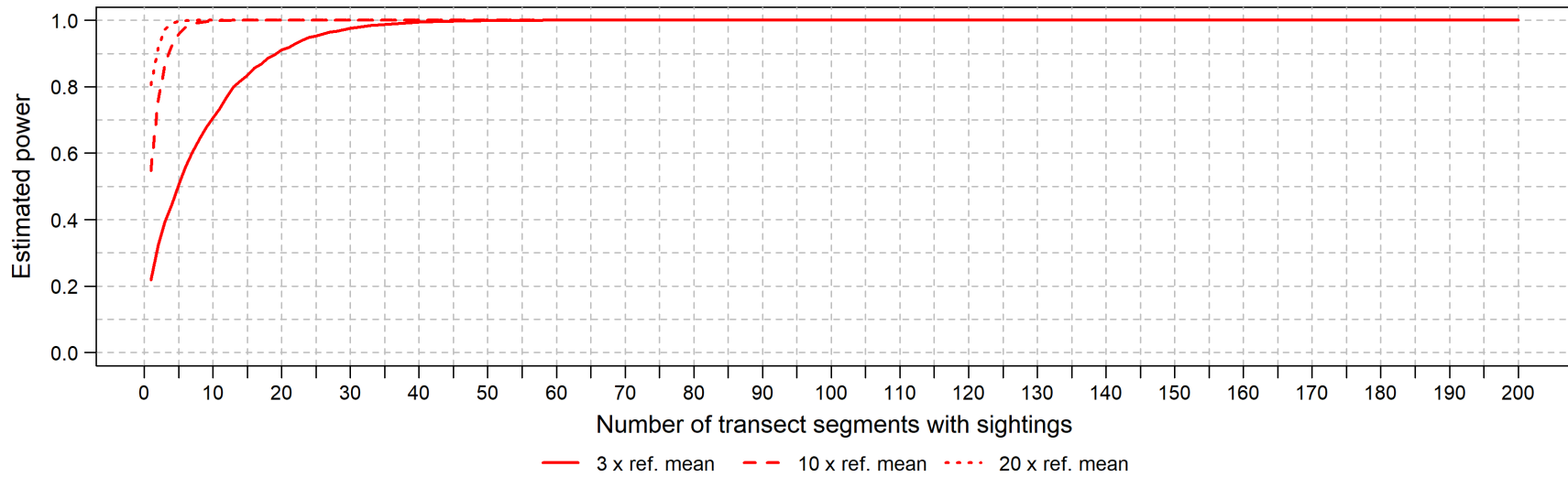


Figure D37. Power analysis results for Common Tern during fall based on the non-zero count model (type I error rate = 0.05)

Royal Tern: spring



D-42

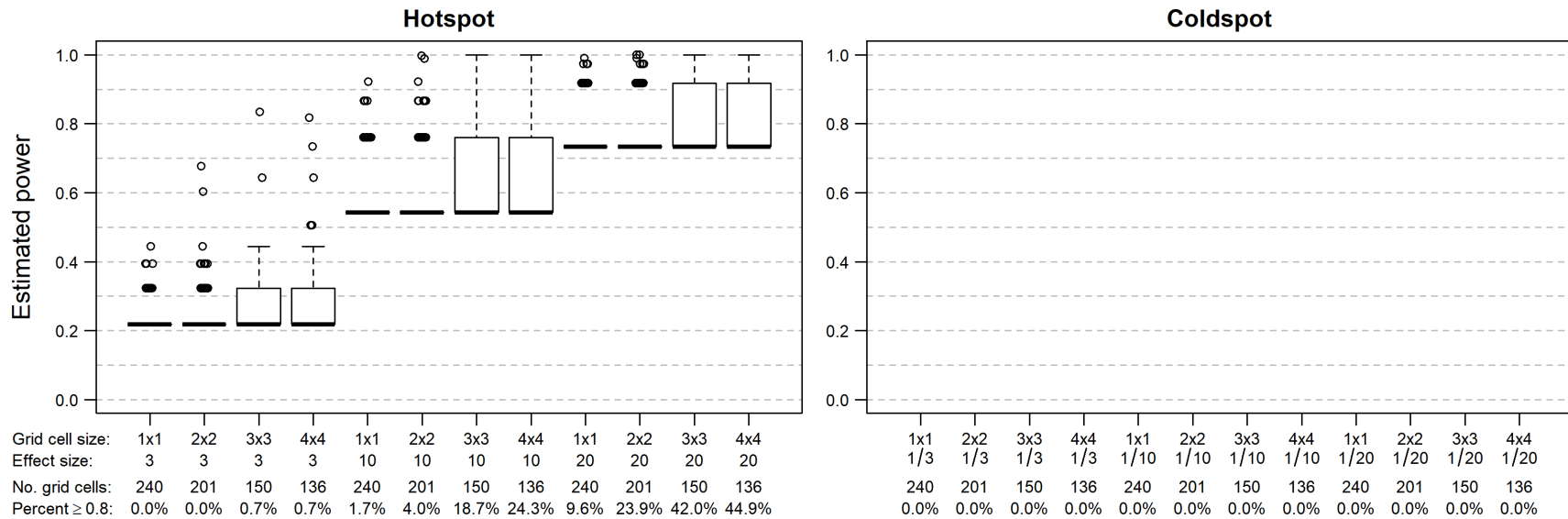
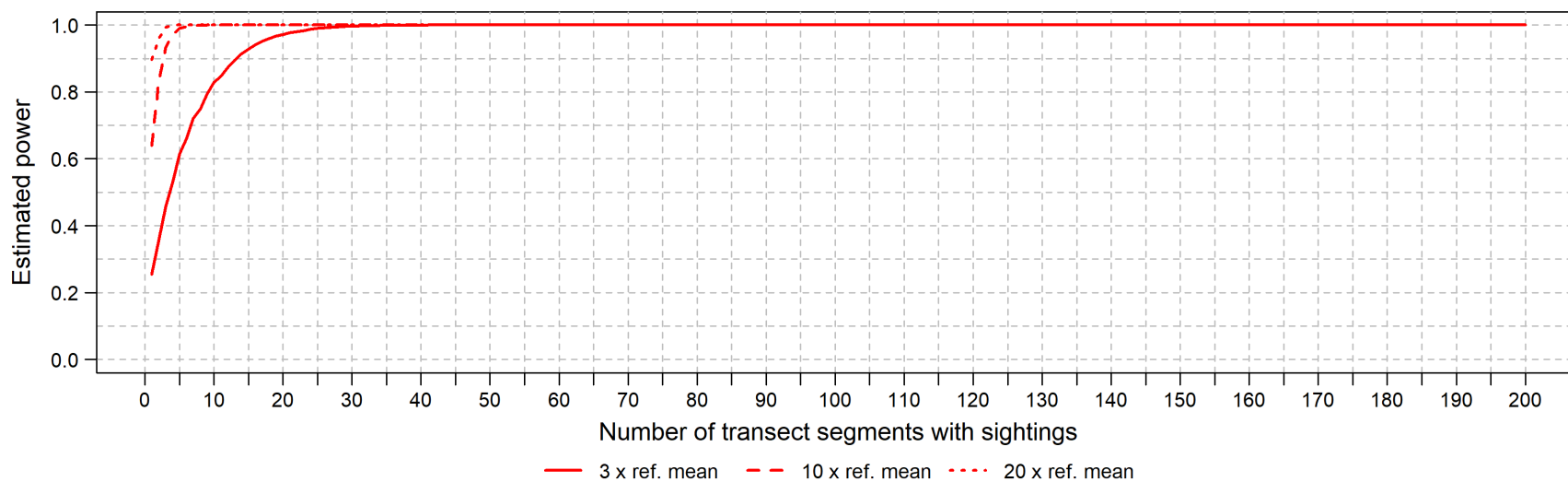


Figure D38. Power analysis results for Royal Tern during spring based on the non-zero count model (type I error rate = 0.05)

Royal Tern: summer



D-43

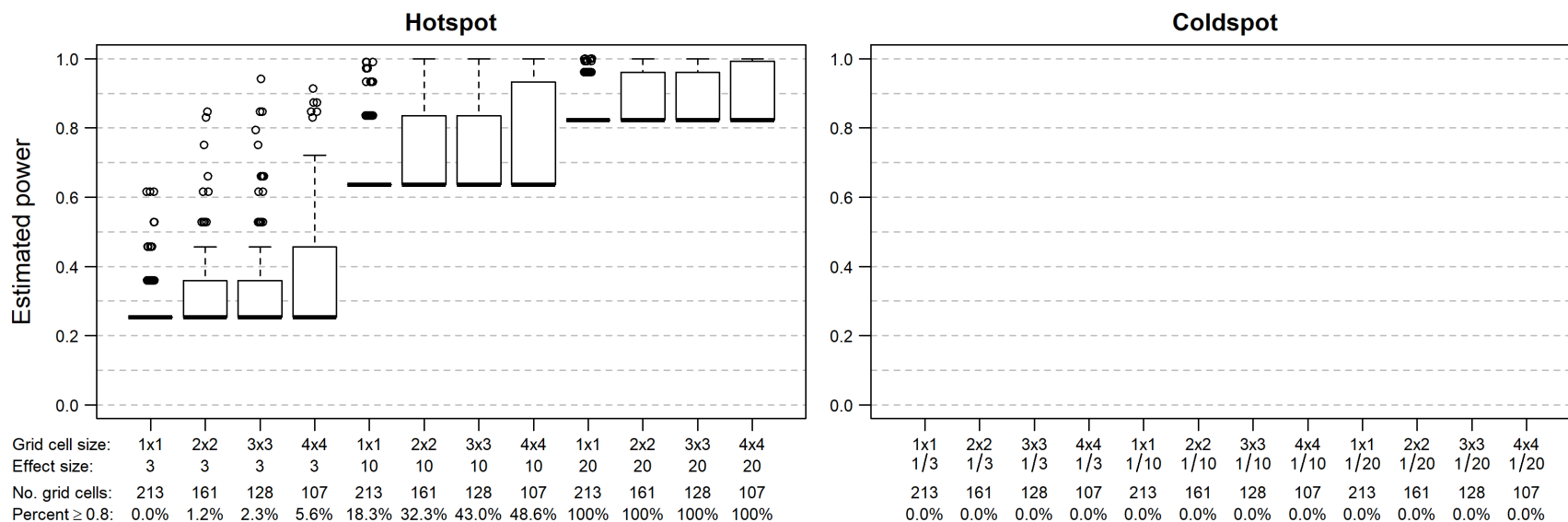
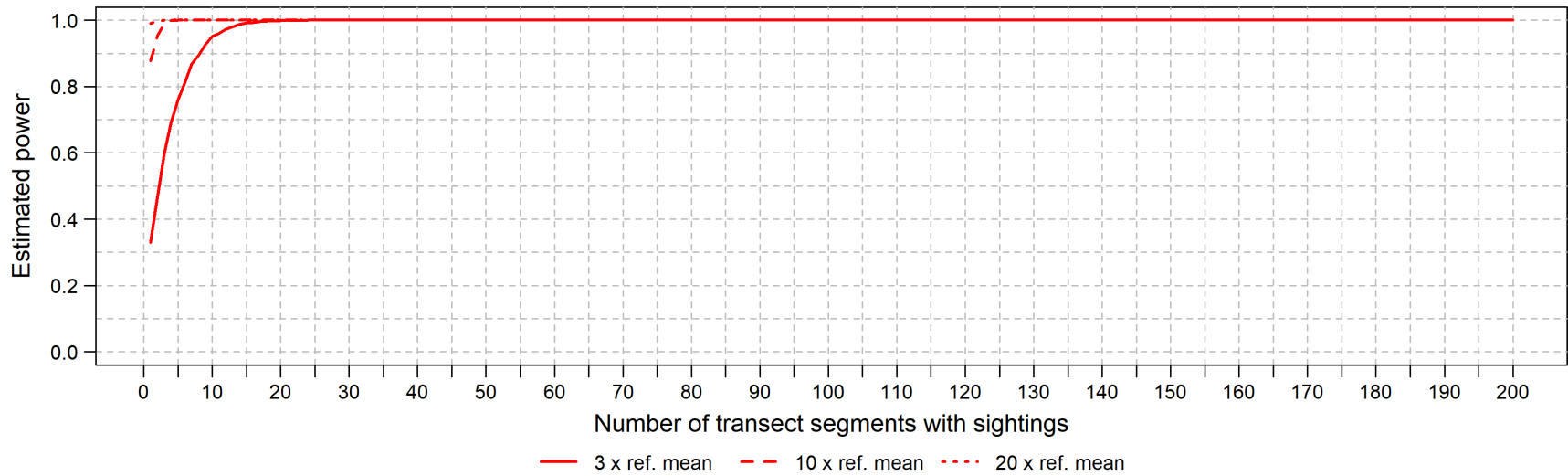


Figure D39. Power analysis results for Royal Tern during summer based on the non-zero count model (type I error rate = 0.05)

Royal Tern: fall



D-44

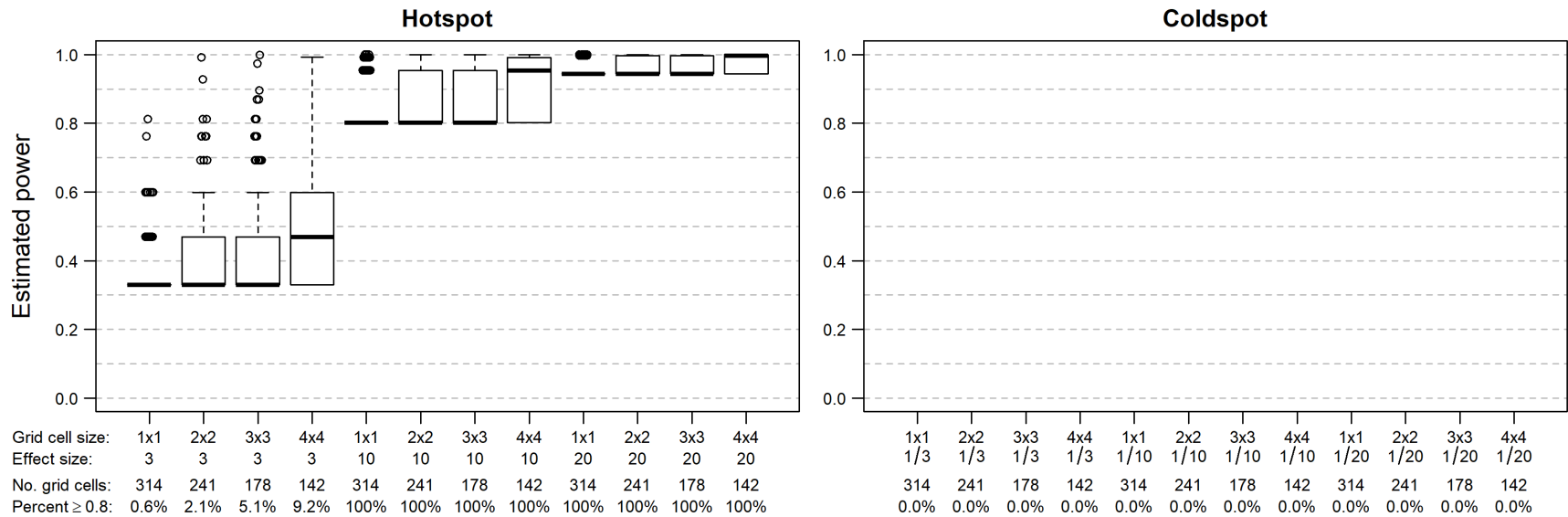
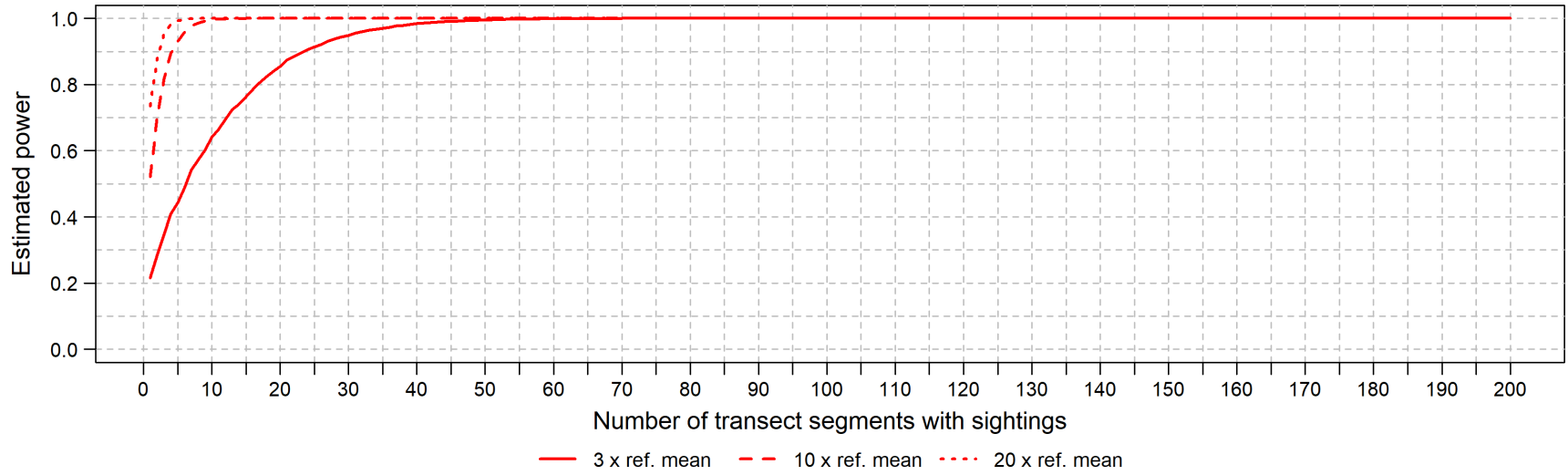


Figure D40. Power analysis results for Royal Tern during fall based on the non-zero count model (type I error rate = 0.05)

Red-throated Loon: spring



D-45

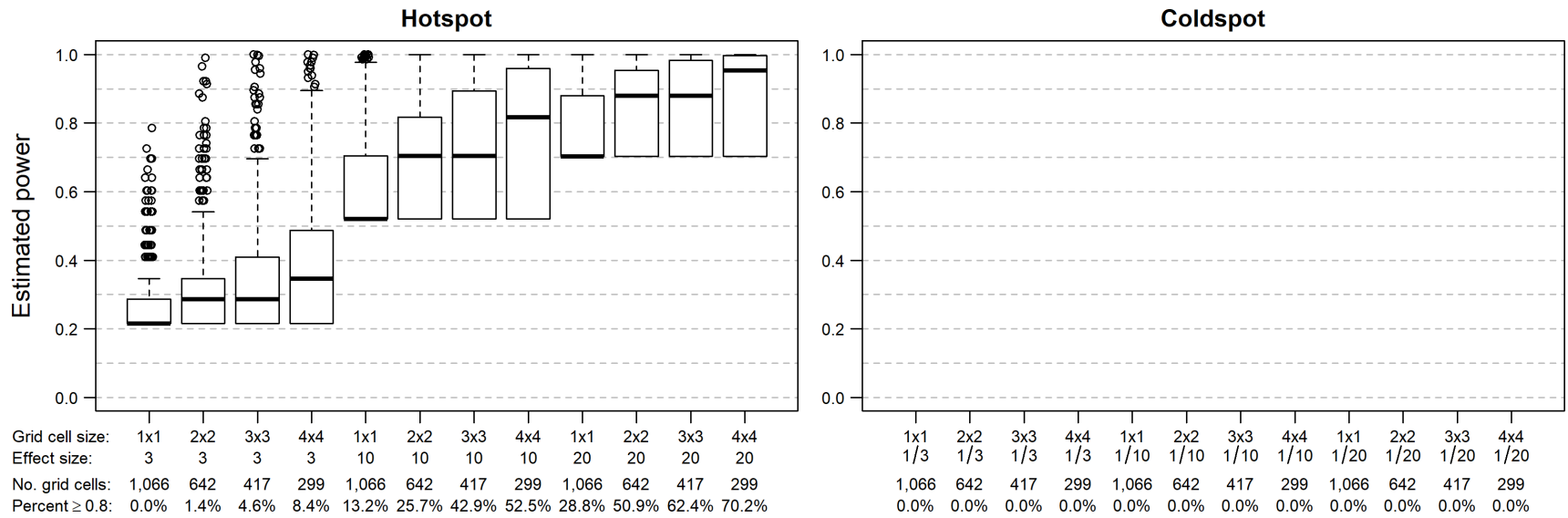
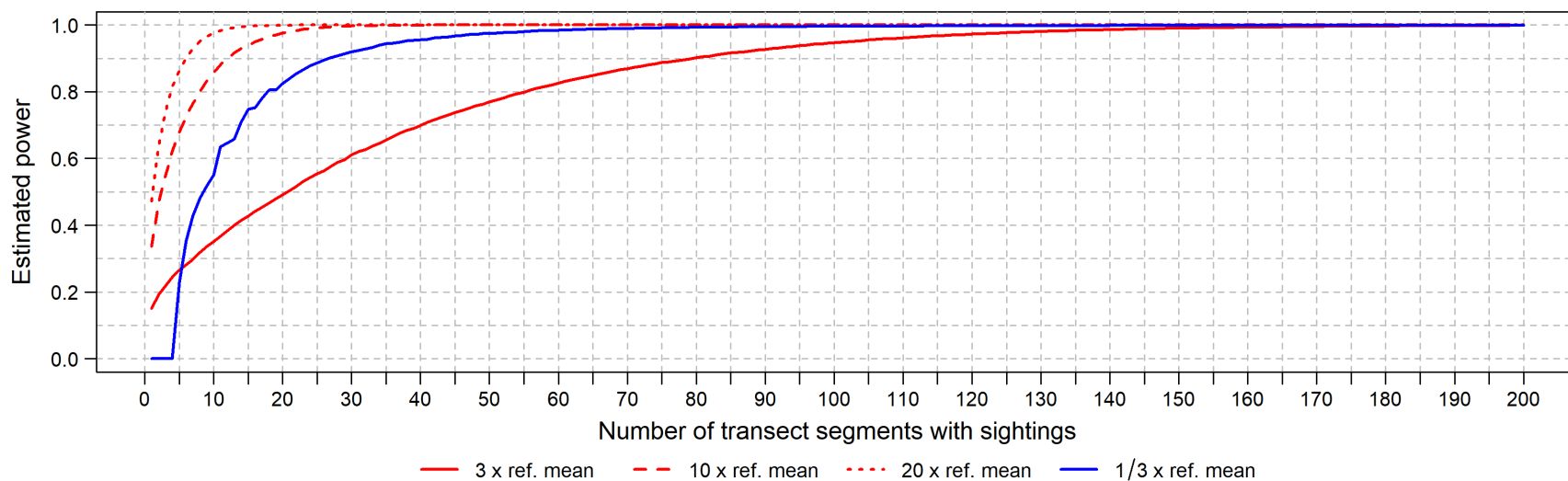


Figure D41. Power analysis results for Red-throated Loon during spring based on the non-zero count model (type I error rate = 0.05)

Red-throated Loon: fall



D-46

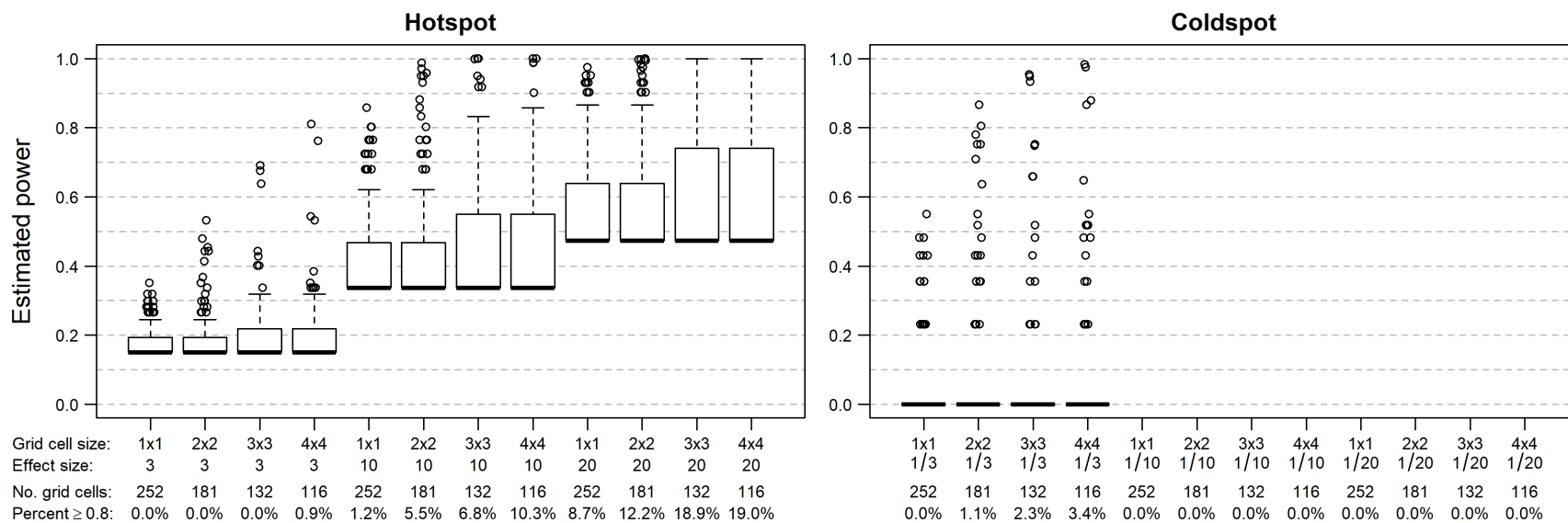


Figure D42. Power analysis results for Red-throated Loon during fall based on the non-zero count model (type I error rate = 0.05)

Red-throated Loon: winter

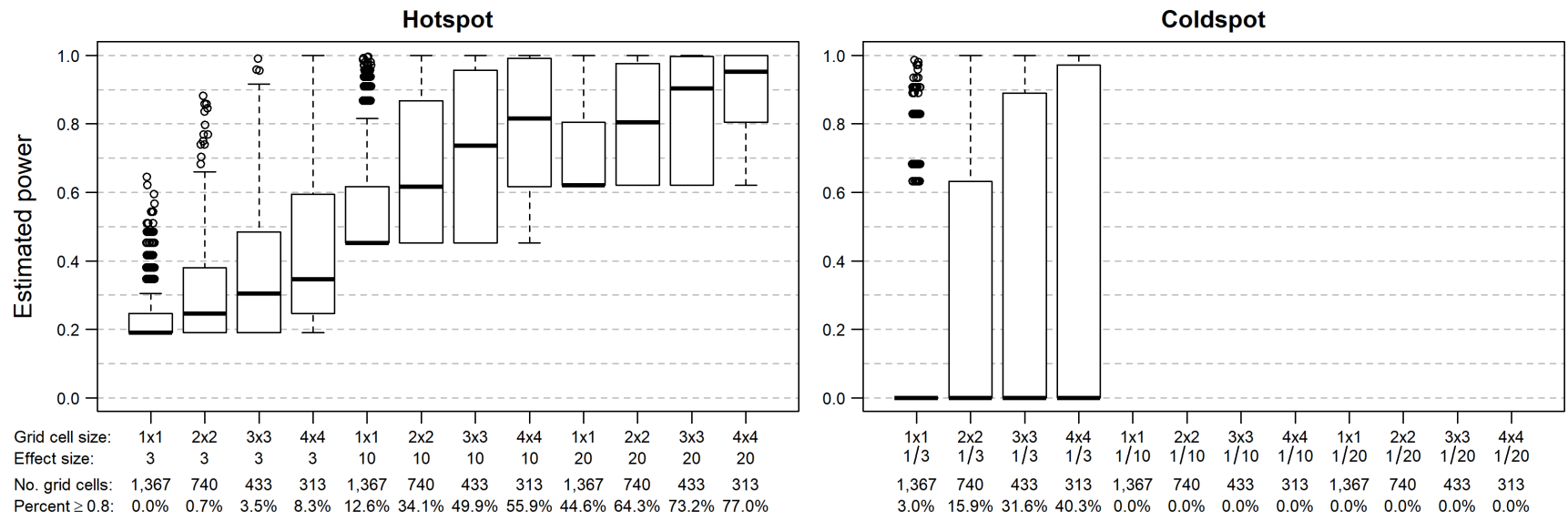
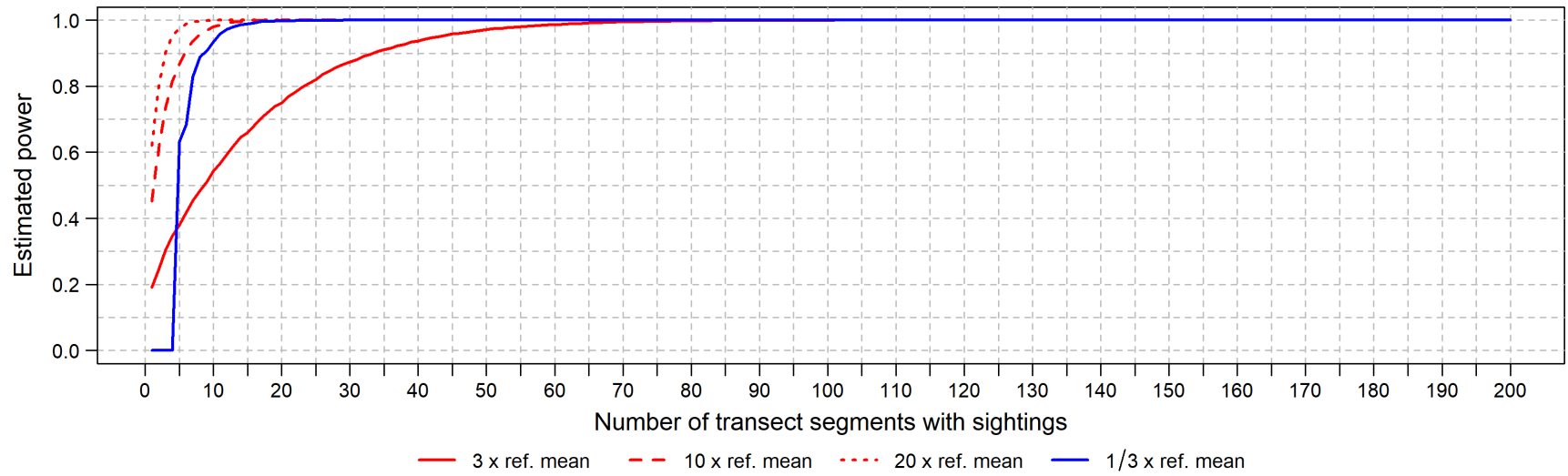
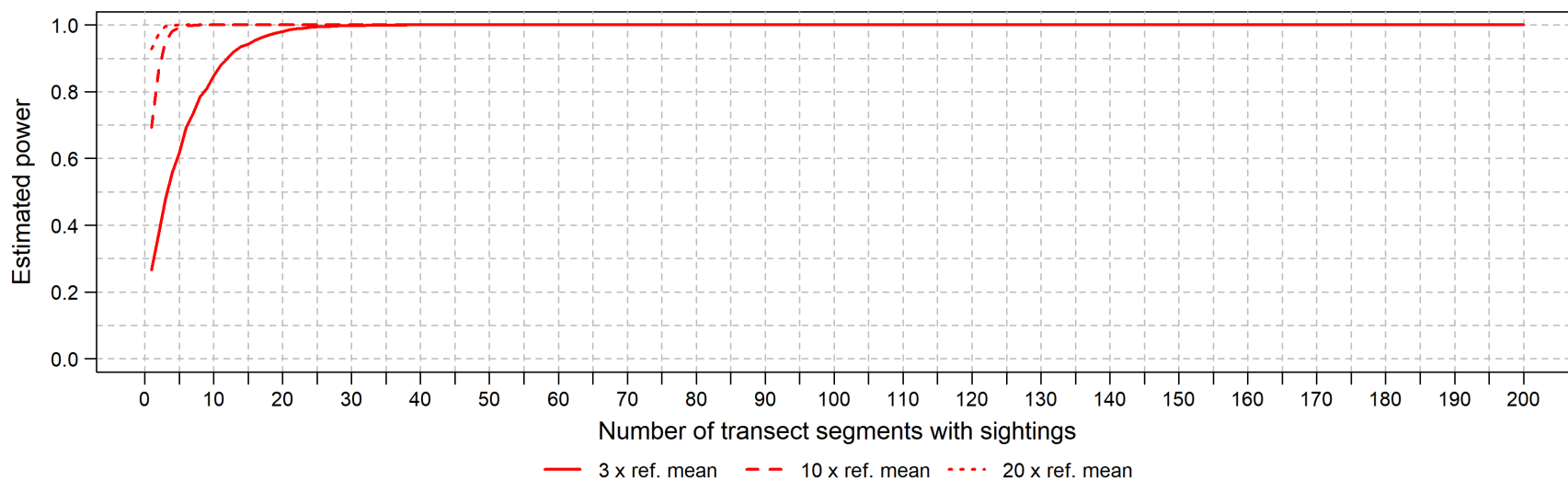


Figure D43. Power analysis results for Red-throated Loon during winter based on the non-zero count model (type I error rate = 0.05)

D-47

Common Loon: spring



D-48

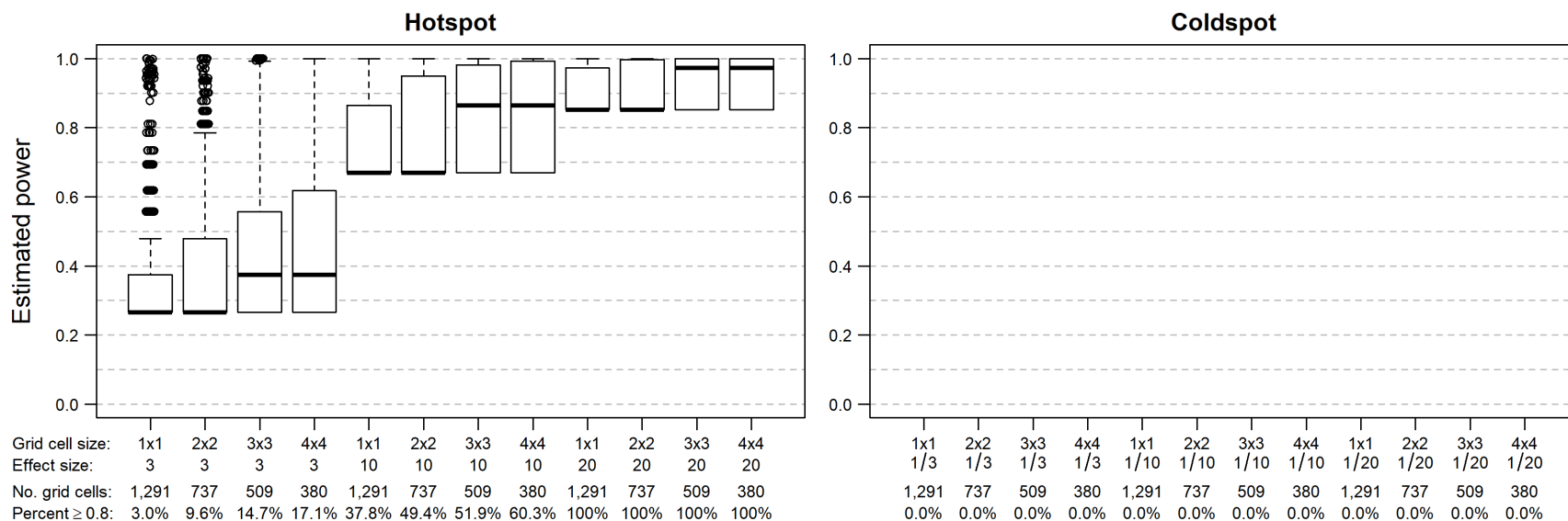
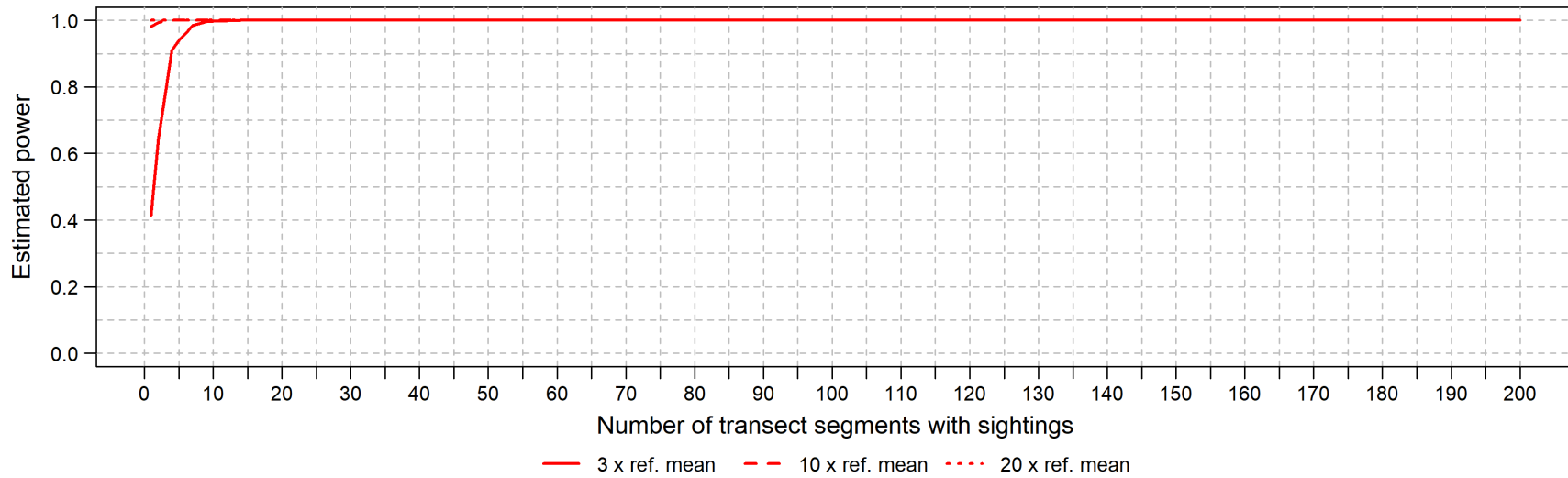


Figure D44. Power analysis results for Common Loon during spring based on the non-zero count model (type I error rate = 0.05)

Common Loon: summer



D-49

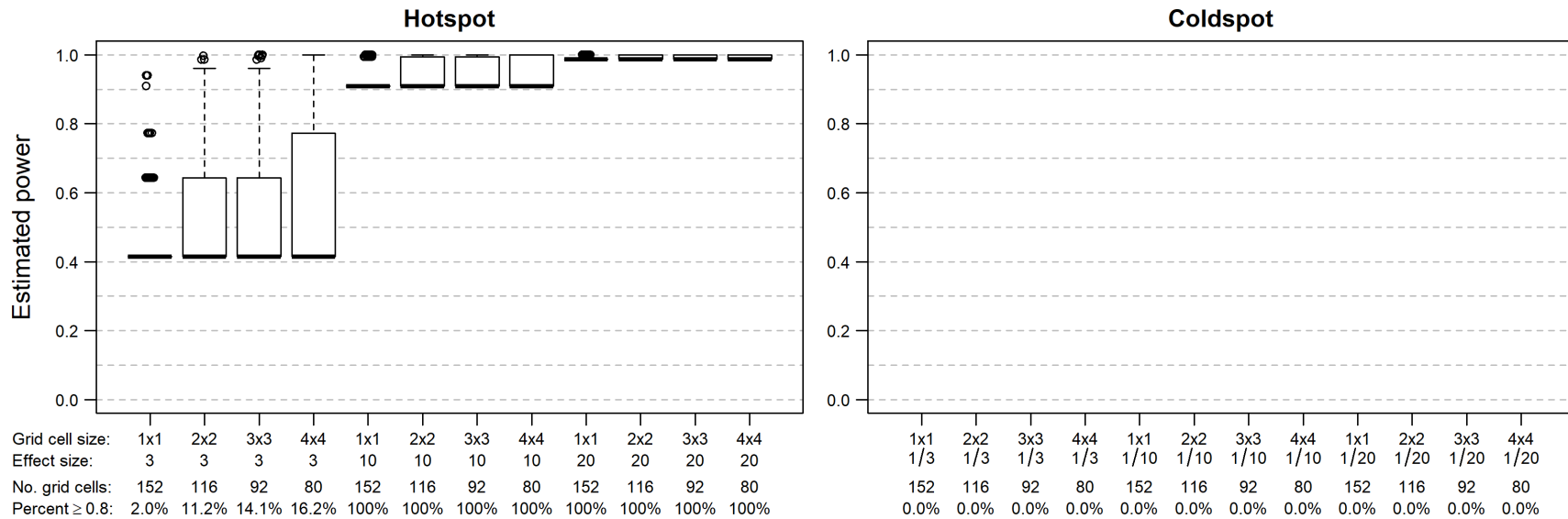
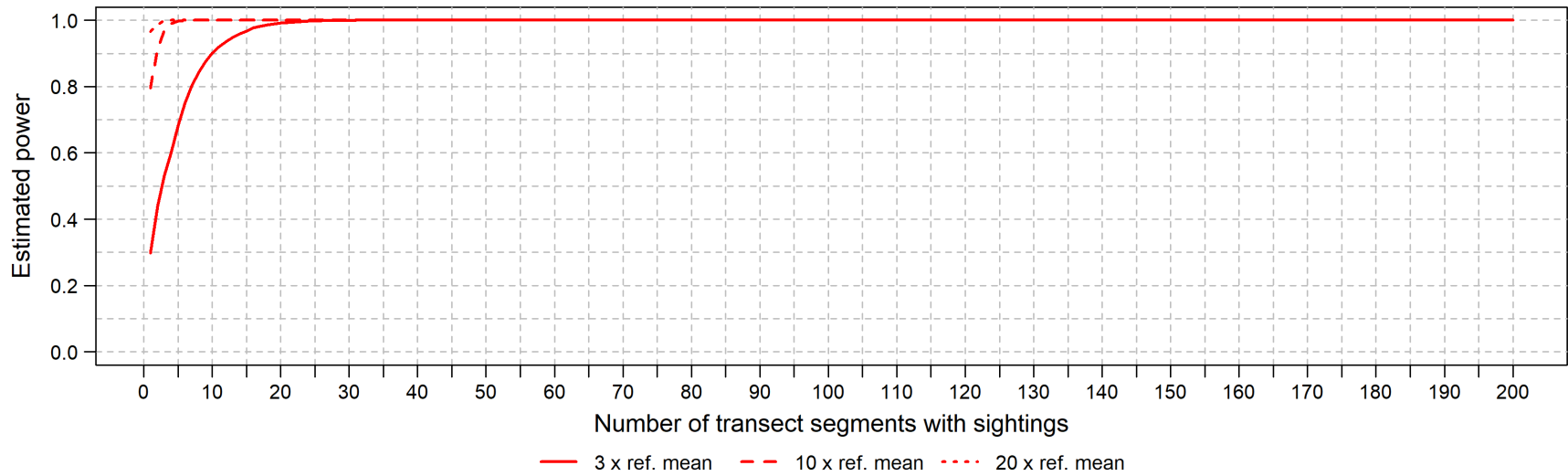


Figure D45. Power analysis results for Common Loon during summer based on the non-zero count model (type I error rate = 0.05)

Common Loon: fall



D-50

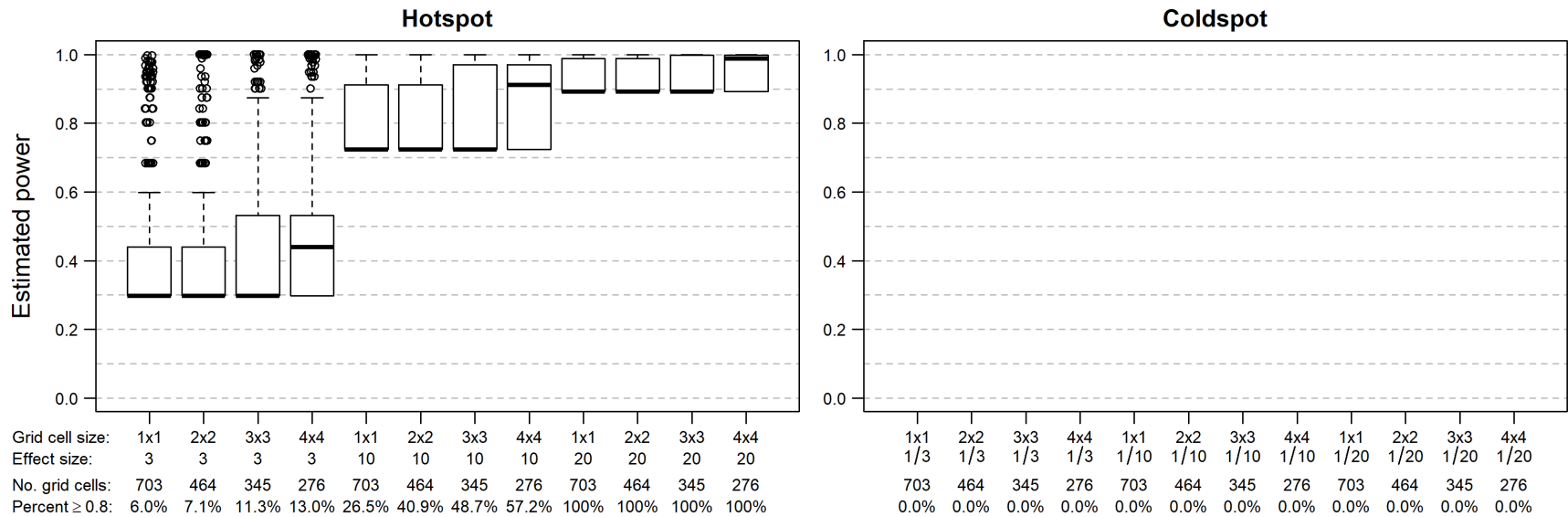
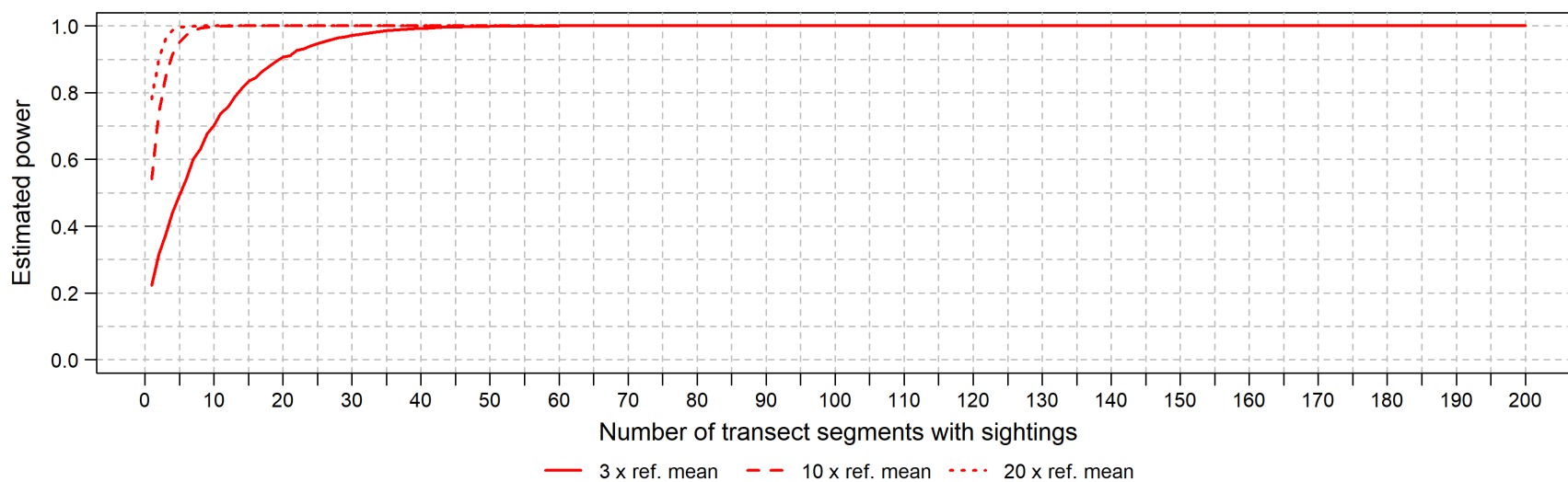


Figure D46. Power analysis results for Common Loon during fall based on the non-zero count model (type I error rate = 0.05)

Common Loon: winter



D-51

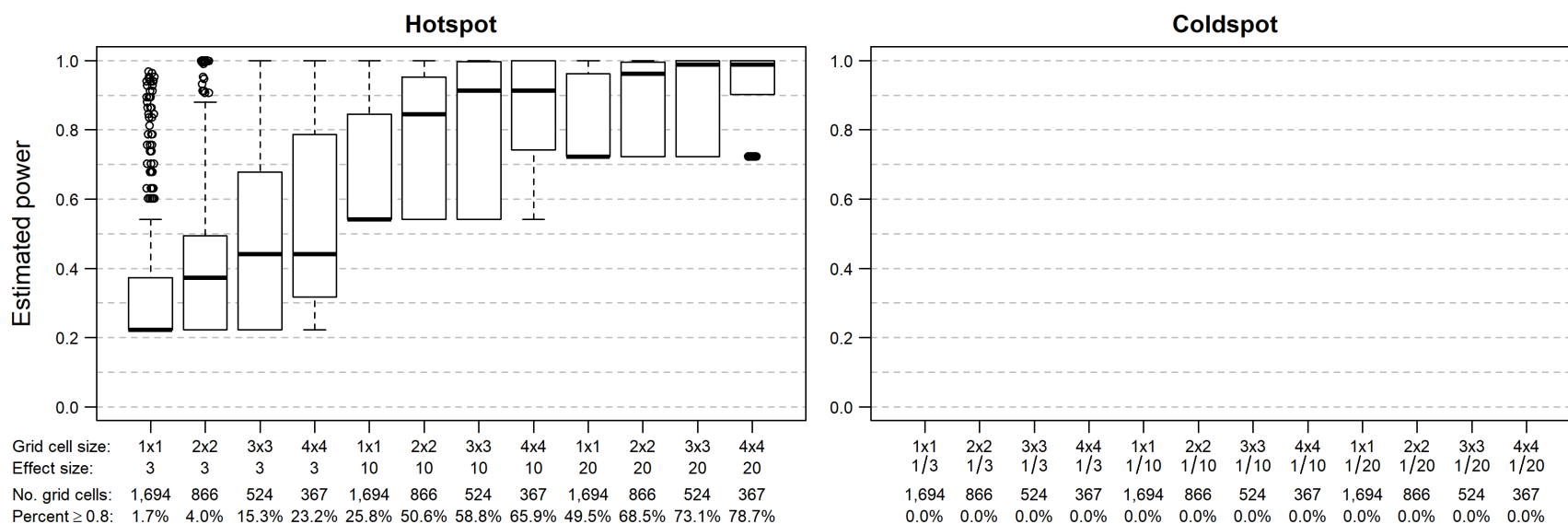
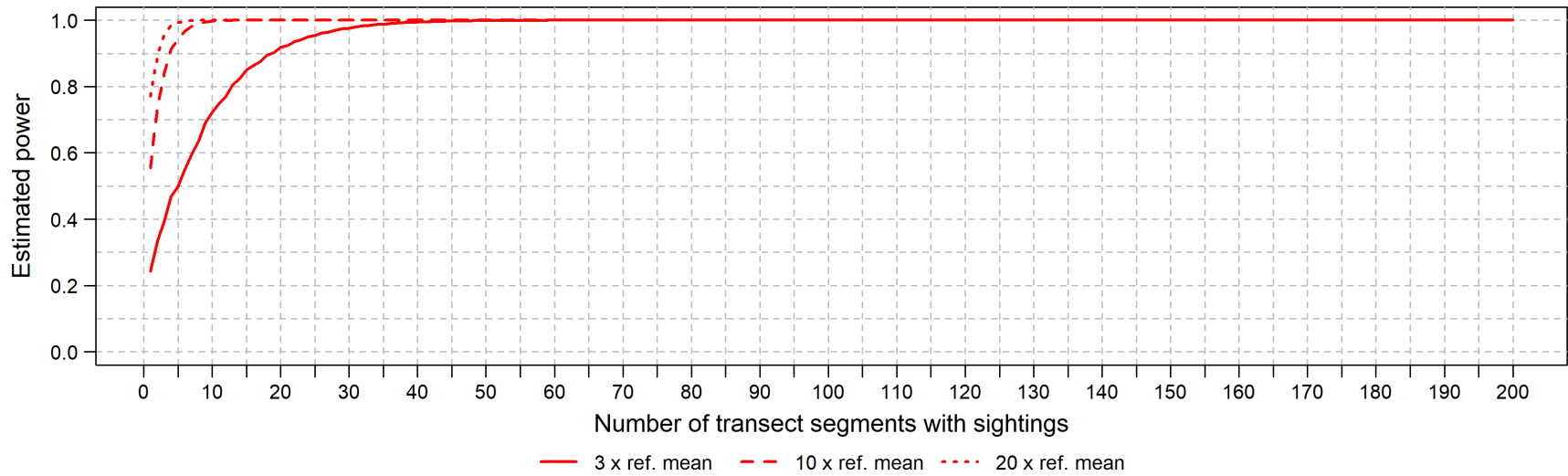


Figure D47. Power analysis results for Common Loon during winter based on the non-zero count model (type I error rate = 0.05)

Black-capped Petrel: spring



D-52

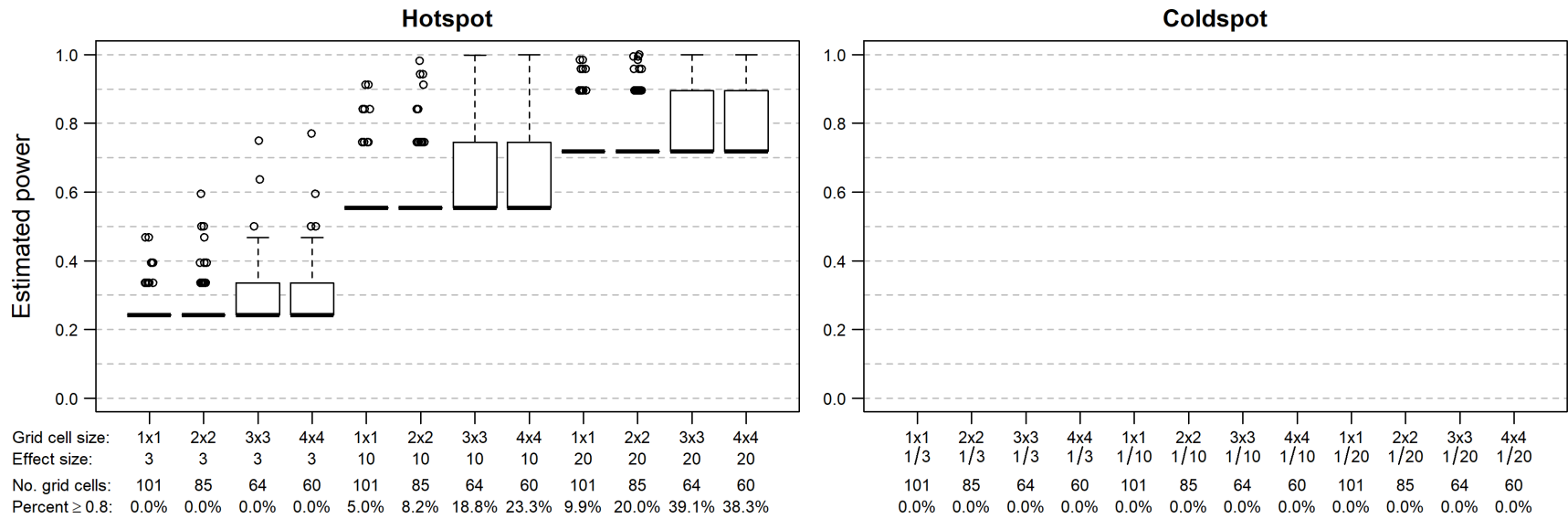
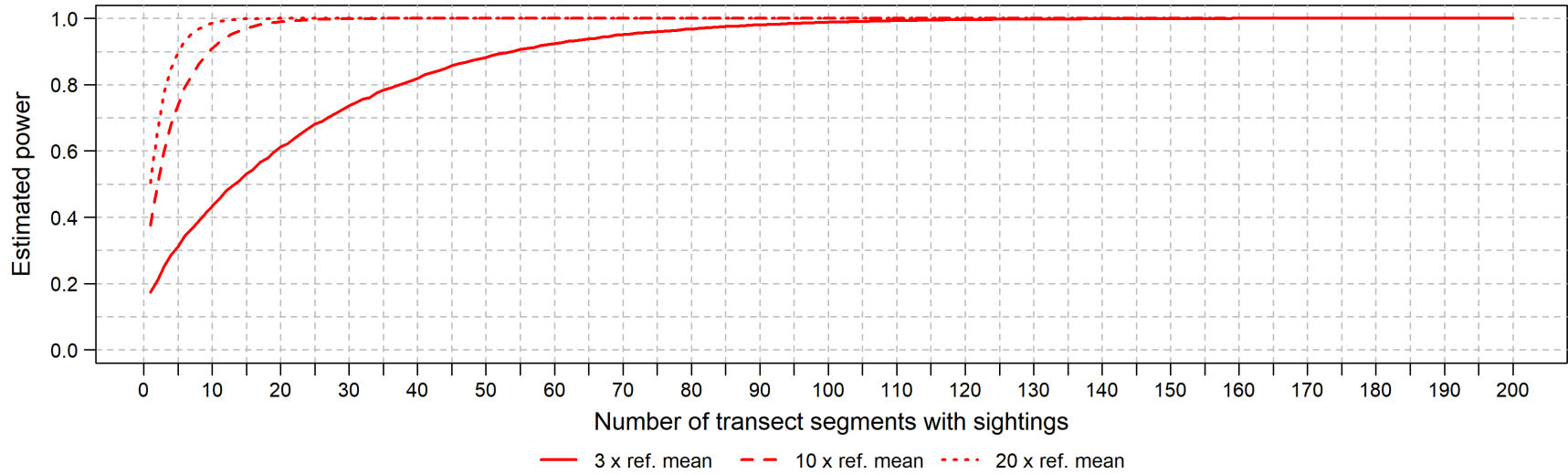


Figure D48. Power analysis results for Black-capped Petrel during spring based on the non-zero count model (type I error rate = 0.05)

Black-capped Petrel: summer



D-53

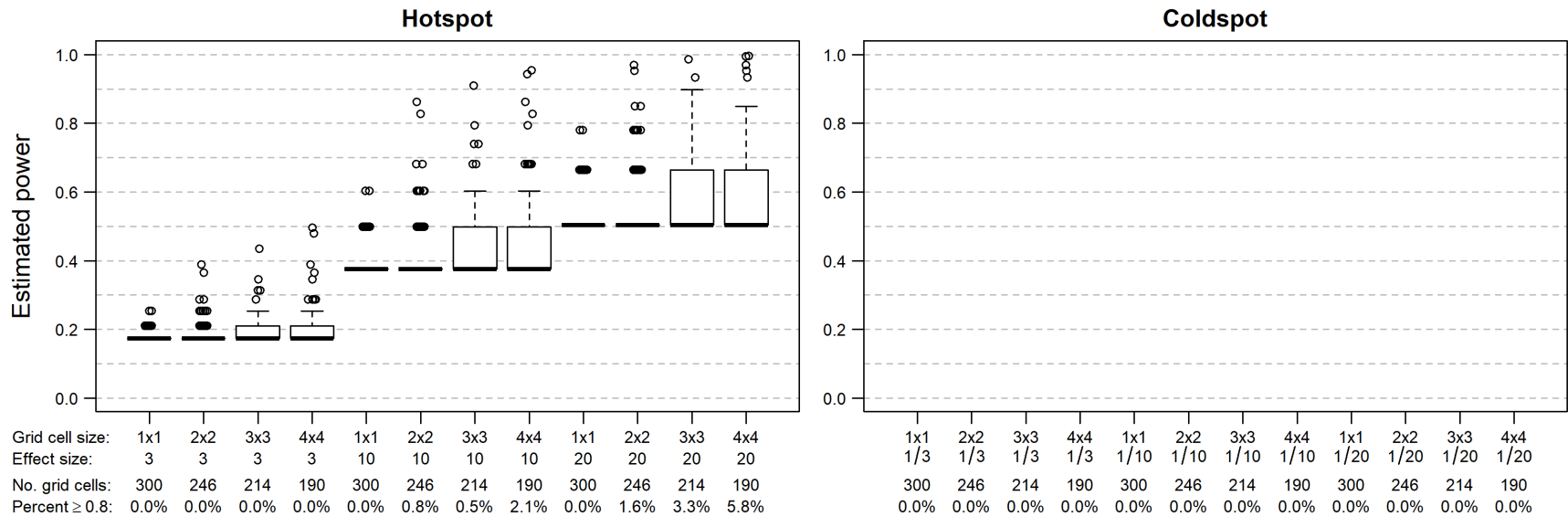
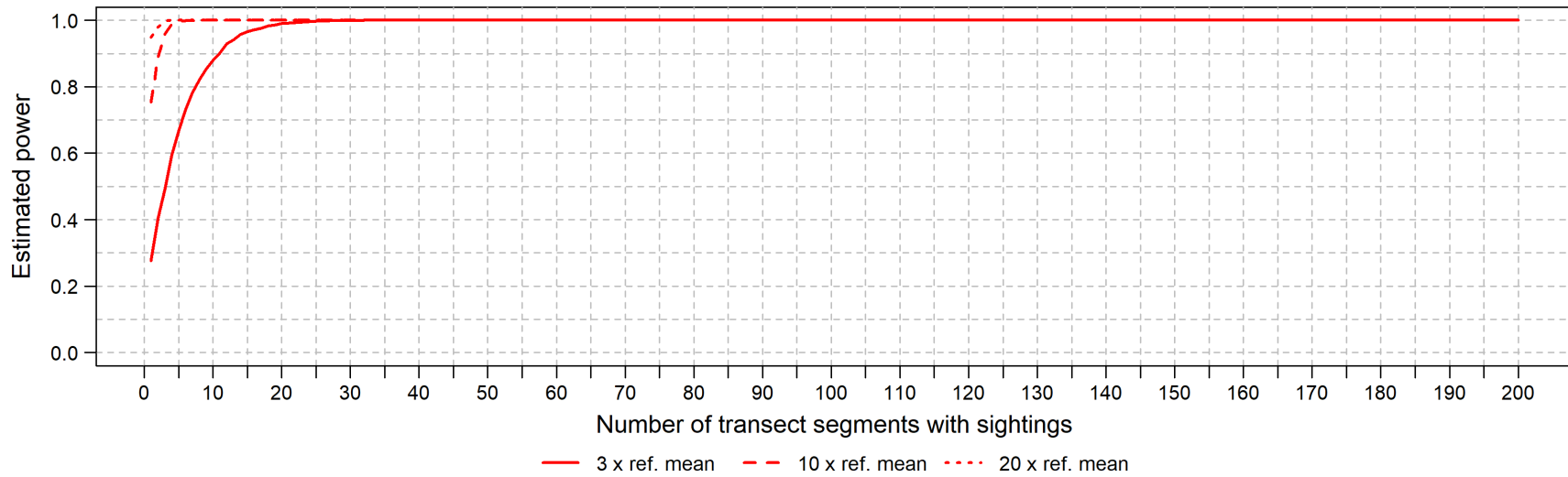


Figure D49. Power analysis results for Black-capped Petrel during summer based on the non-zero count model (type I error rate = 0.05)

Black-capped Petrel: fall



D-54

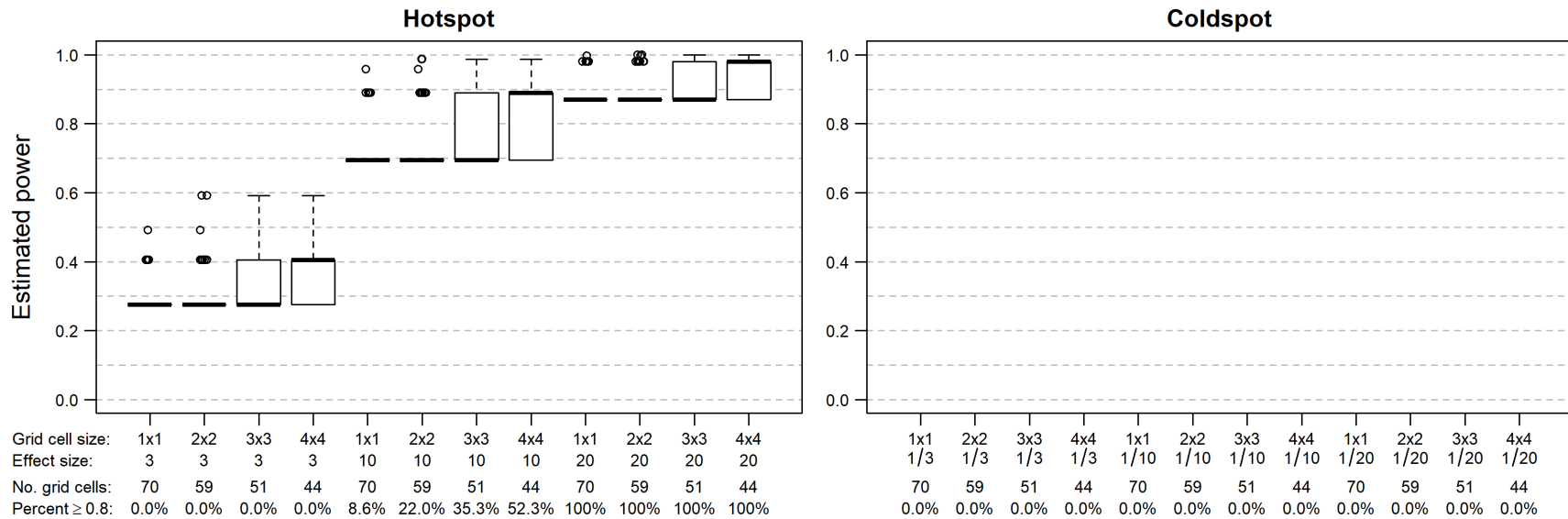
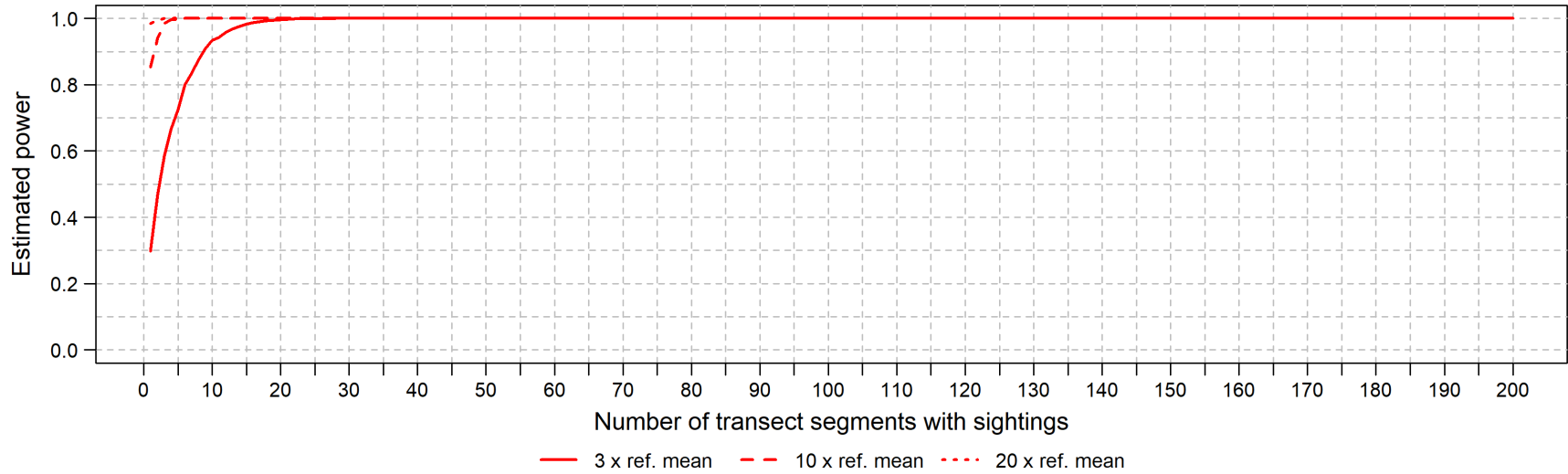


Figure D50. Power analysis results for Black-capped Petrel during fall based on the non-zero count model (type I error rate = 0.05)

Black-capped Petrel: winter



D-55

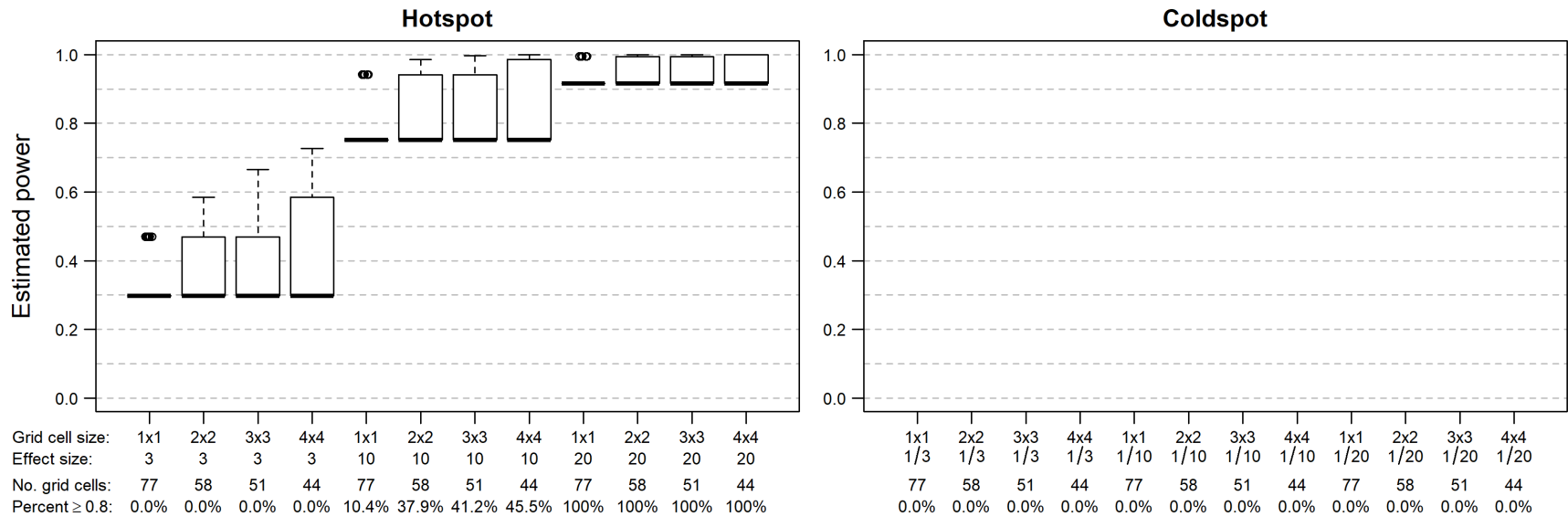
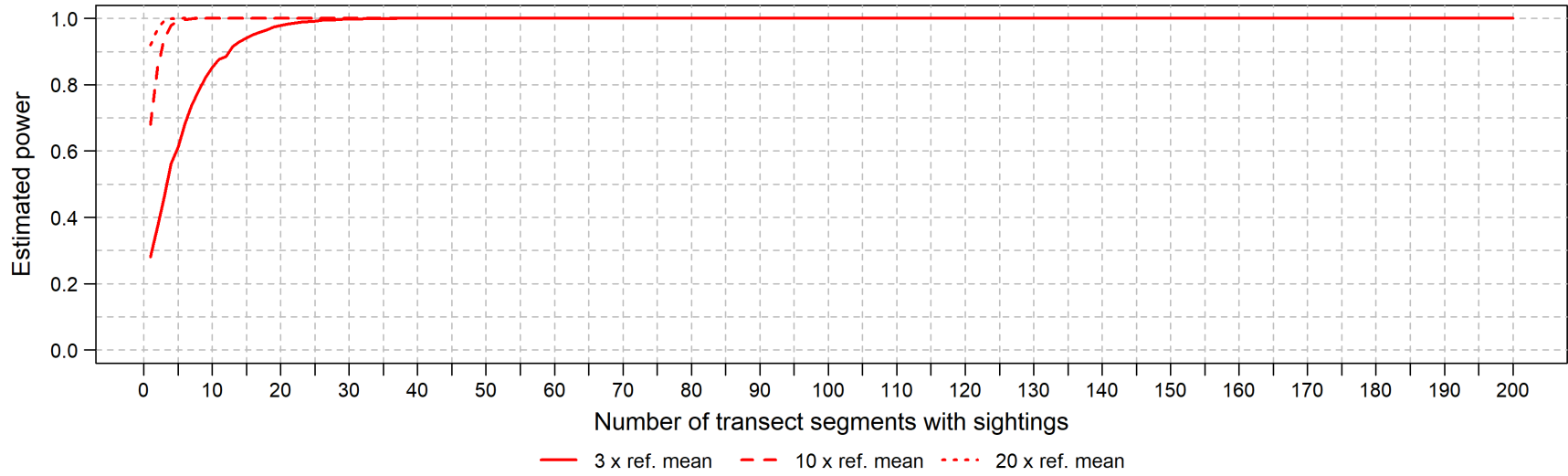


Figure D51. Power analysis results for Black-capped Petrel during winter based on the non-zero count model (type I error rate = 0.05)

Cory's Shearwater: spring



D-56

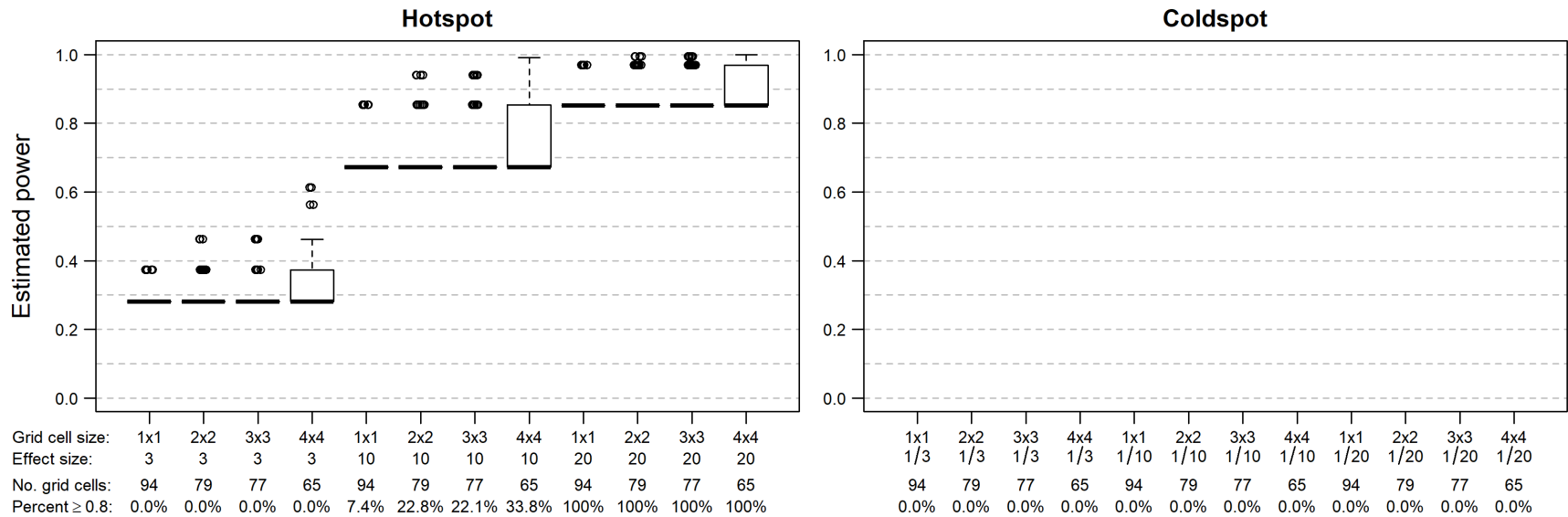
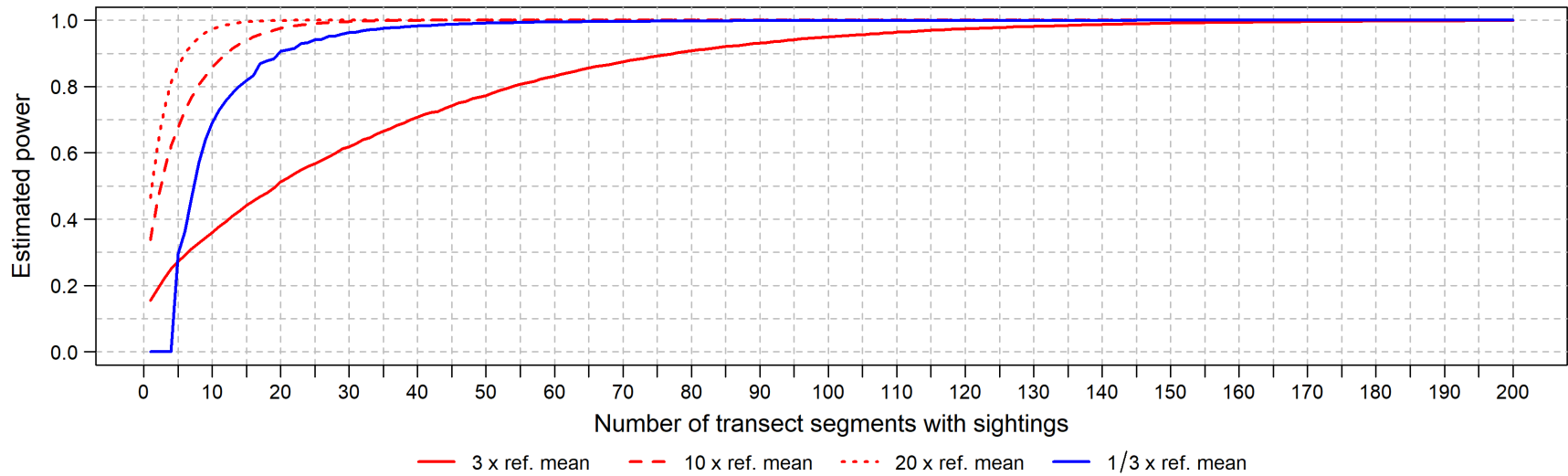


Figure D52. Power analysis results for Cory's Shearwater during spring based on the non-zero count model (type I error rate = 0.05)

Cory's Shearwater: summer



D-57

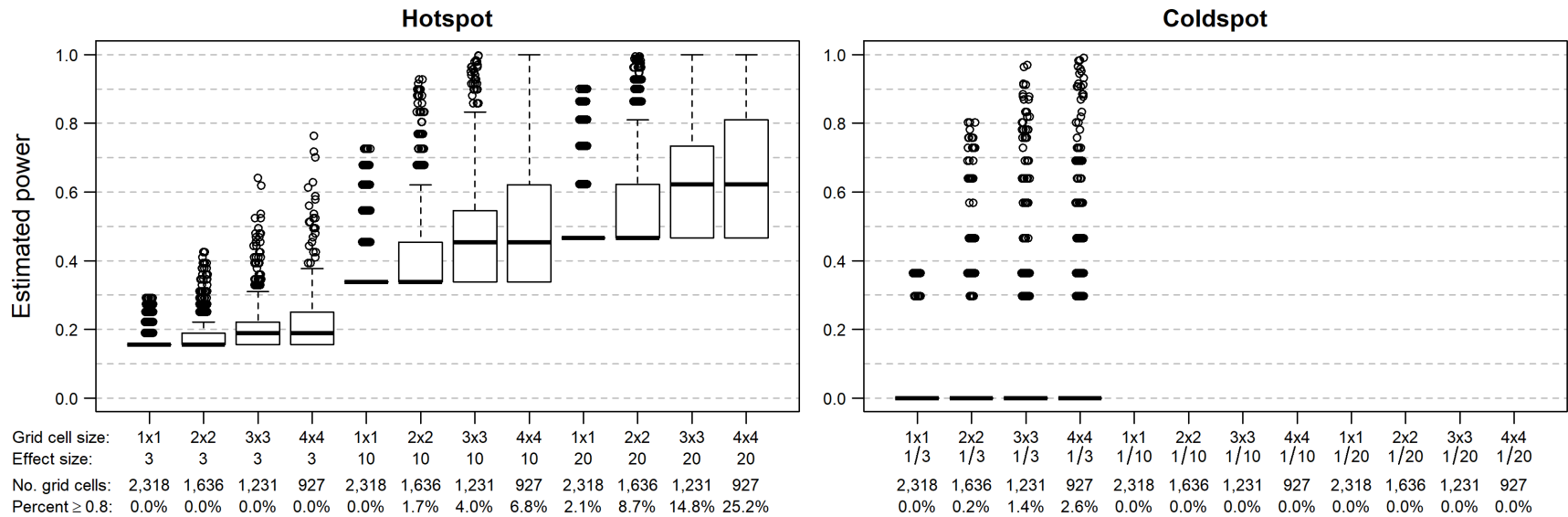
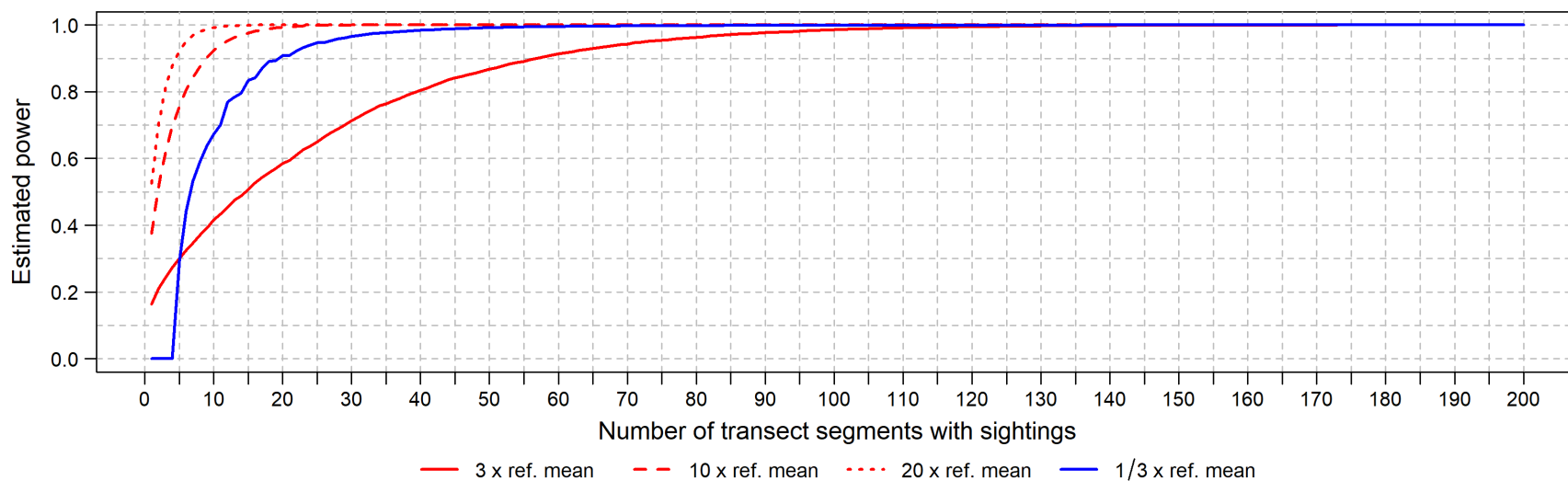


Figure D53. Power analysis results for Cory's Shearwater during summer based on the non-zero count model (type I error rate = 0.05)

Cory's Shearwater: fall



D-58

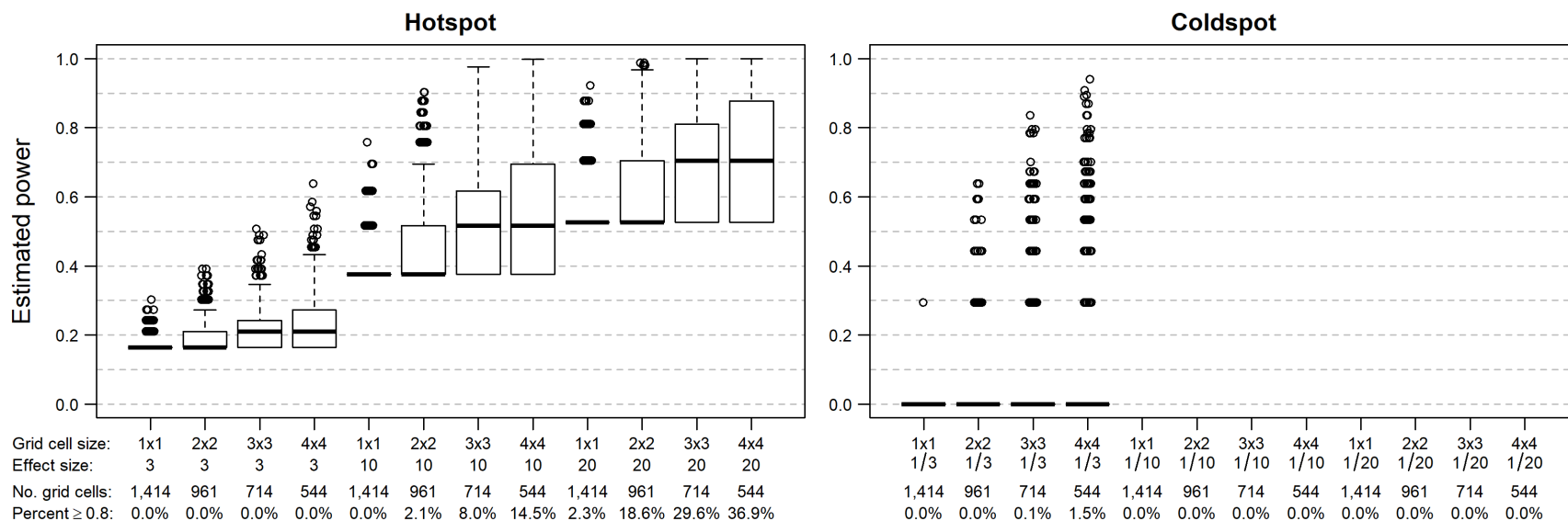
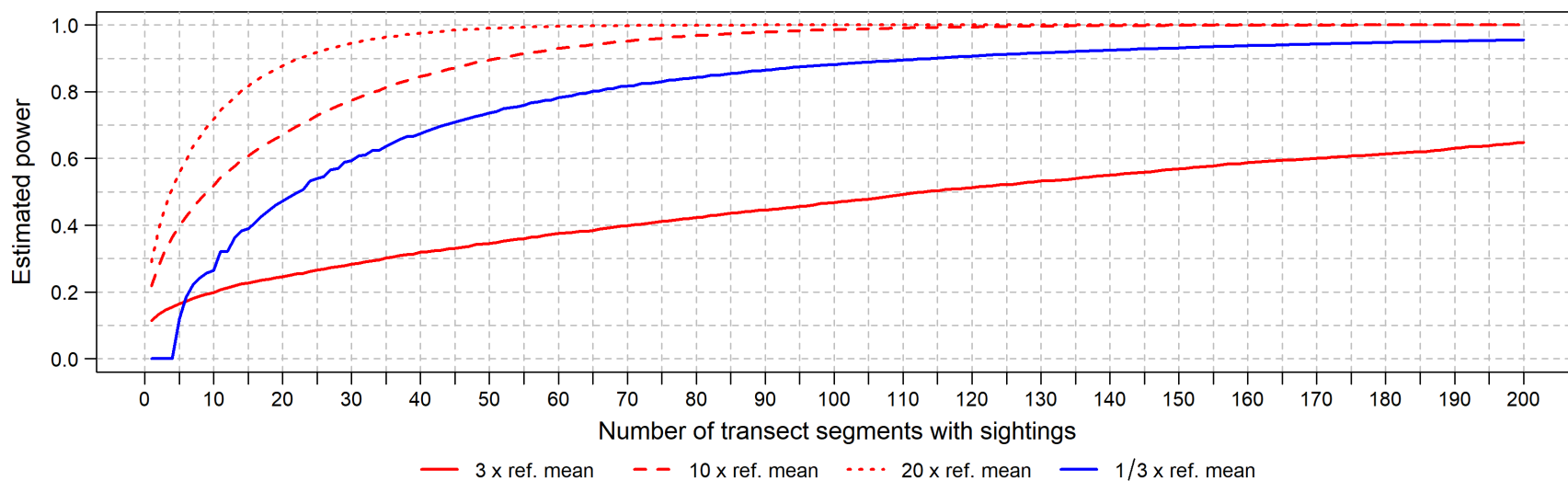


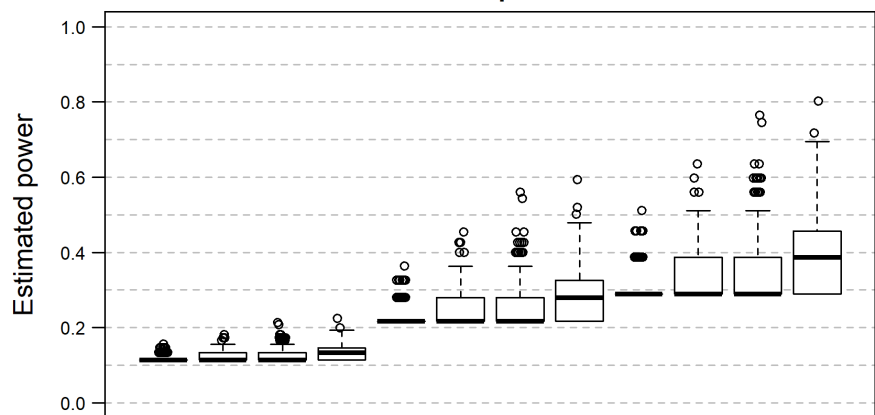
Figure D54. Power analysis results for Cory's Shearwater during fall based on the non-zero count model (type I error rate = 0.05)

Sooty Shearwater: spring

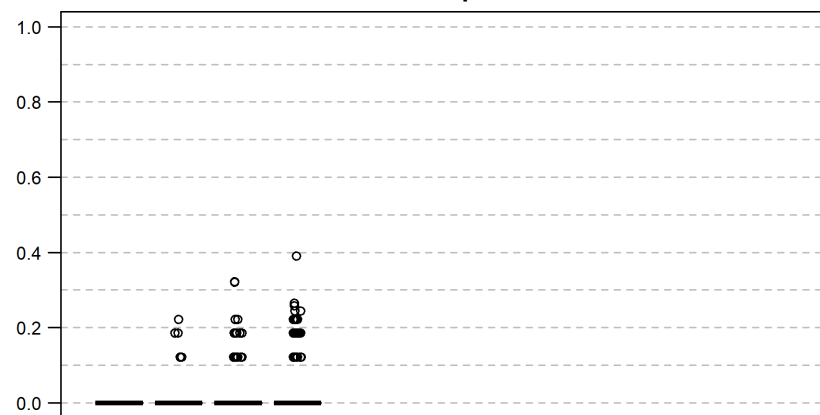


D-59

Hotspot



Coldspot

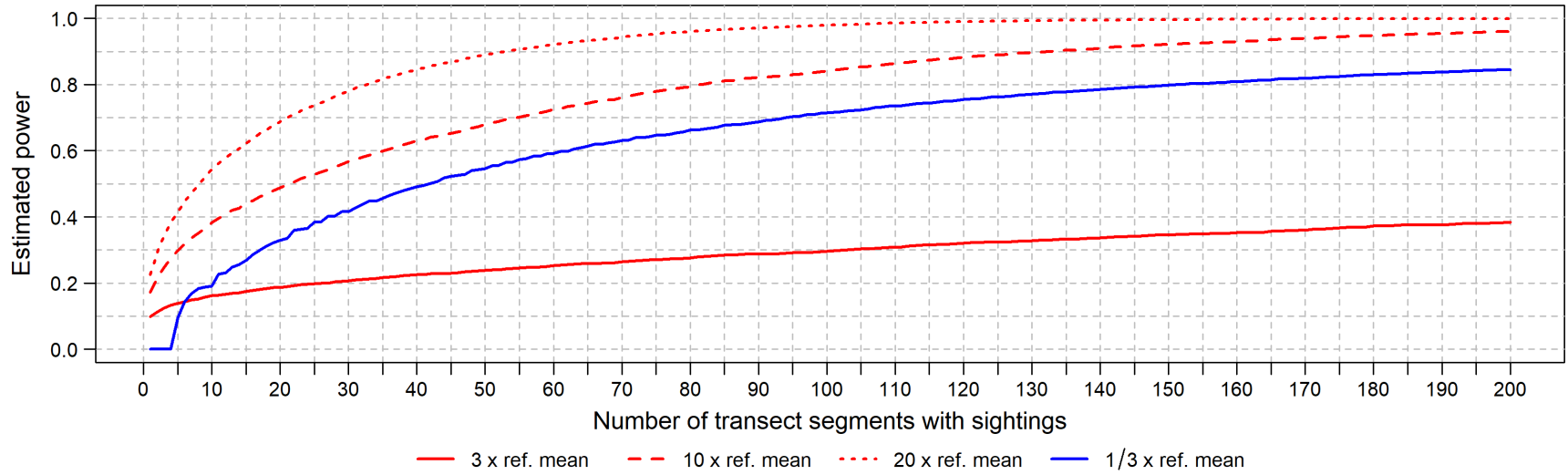


Grid cell size:	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
Effect size:	3	3	3	3	10	10	10	10	20	20	20	20
No. grid cells:	648	490	388	317	648	490	388	317	648	490	388	317
Percent ≥ 0.8 :	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%

Grid cell size:	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
Effect size:	1/3	1/3	1/3	1/3	1/10	1/10	1/10	1/10	1/20	1/20	1/20	1/20
No. grid cells:	648	490	388	317	648	490	388	317	648	490	388	317
Percent ≥ 0.8 :	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Figure D55. Power analysis results for Sooty Shearwater during spring based on the non-zero count model (type I error rate = 0.05)

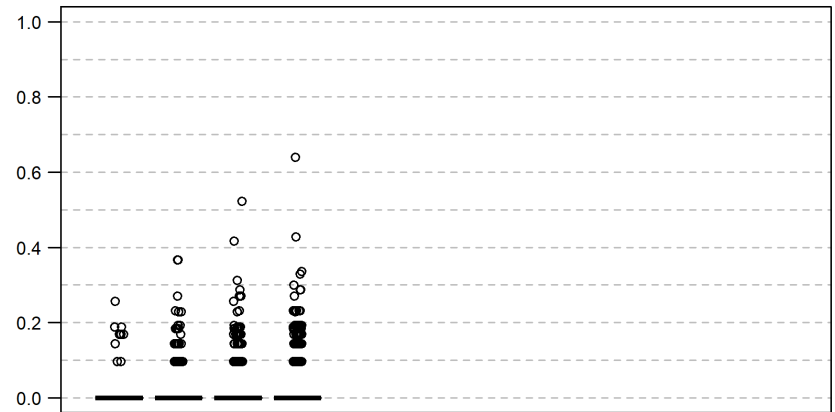
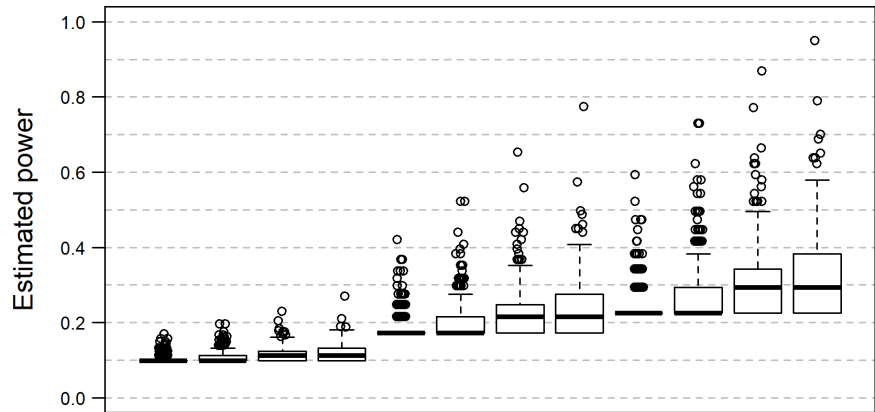
Sooty Shearwater: summer



D-60

Hotspot

Coldspot

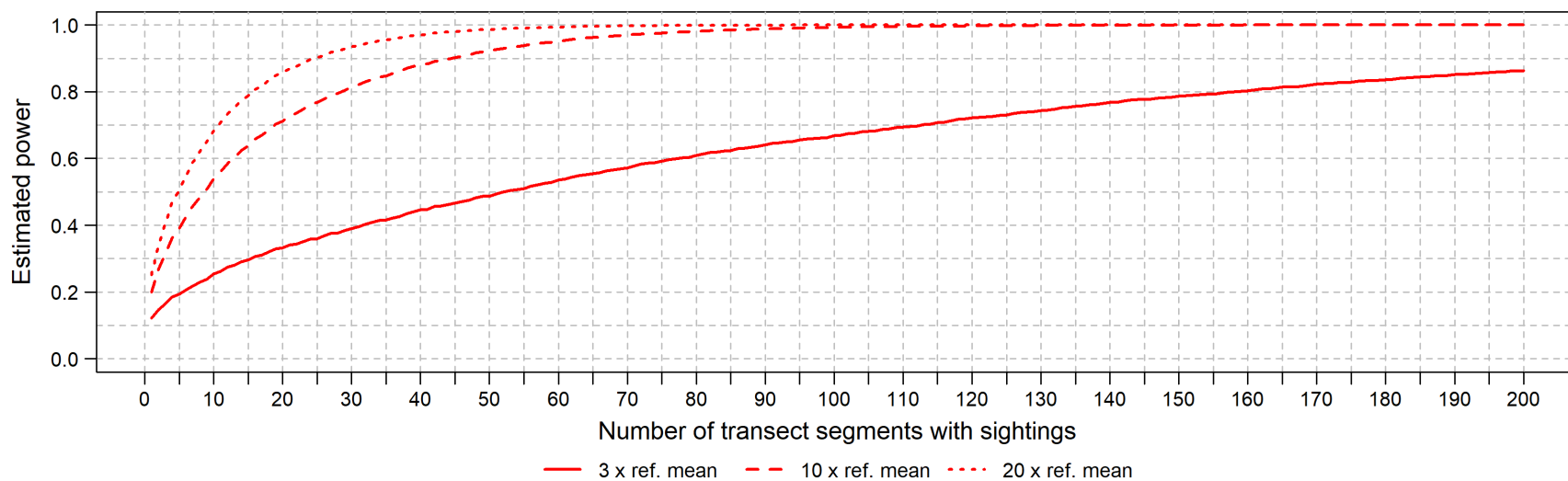


Grid cell size:	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
Effect size:	3	3	3	3	10	10	10	10	20	20	20	20
No. grid cells:	1,252	868	614	459	1,252	868	614	459	1,252	868	614	459
Percent ≥ 0.8 :	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	0.2%

Grid cell size:	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
Effect size:	1/3	1/3	1/3	1/3	1/10	1/10	1/10	1/10	1/20	1/20	1/20	1/20
No. grid cells:	1,252	868	614	459	1,252	868	614	459	1,252	868	614	459
Percent ≥ 0.8 :	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

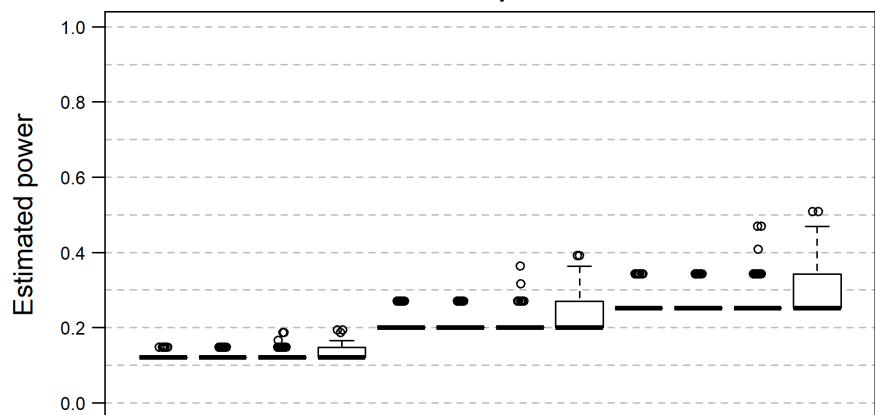
Figure D56. Power analysis results for Sooty Shearwater during summer based on the non-zero count model (type I error rate = 0.05)

Sooty Shearwater: fall

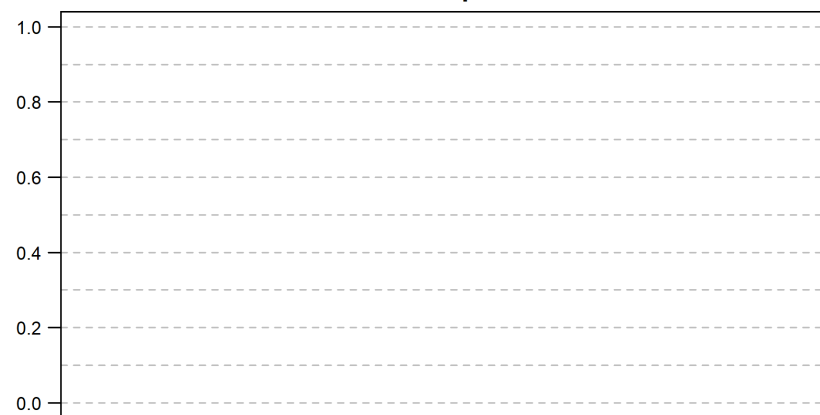


D-61

Hotspot



Coldspot

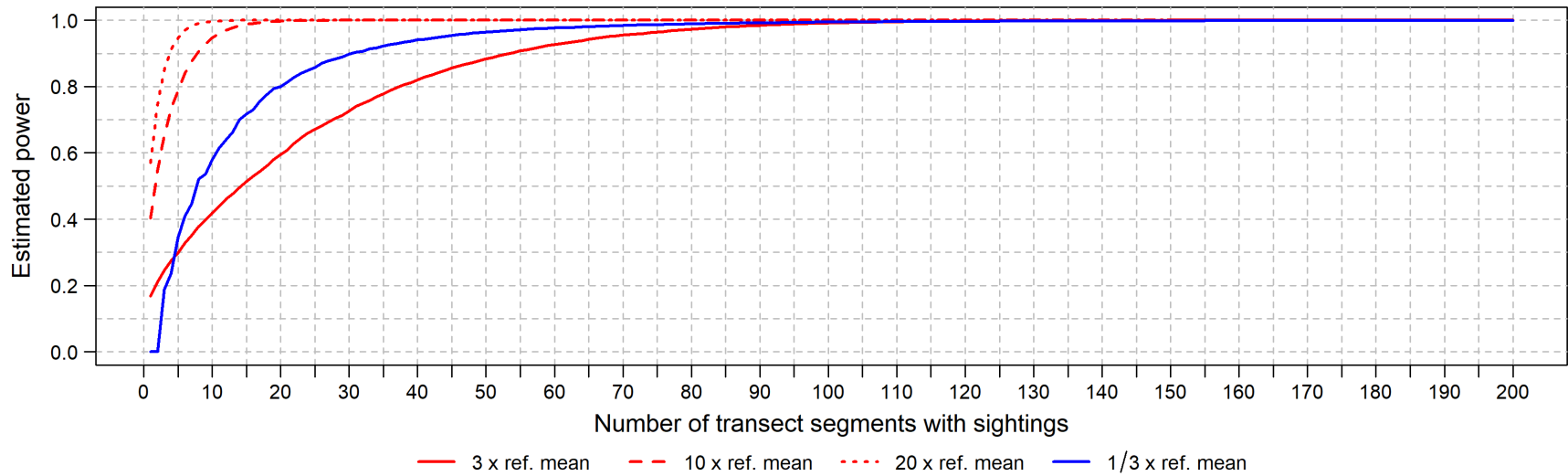


	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
Grid cell size:	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
Effect size:	3	3	3	3	10	10	10	10	20	20	20	20
No. grid cells:	99	94	83	74	99	94	83	74	99	94	83	74
Percent ≥ 0.8:	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
Grid cell size:	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
Effect size:	1/3	1/3	1/3	1/3	1/10	1/10	1/10	1/10	1/20	1/20	1/20	1/20
No. grid cells:	99	94	83	74	99	94	83	74	99	94	83	74
Percent ≥ 0.8:	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Figure D57. Power analysis results for Sooty Shearwater during fall based on the non-zero count model (type I error rate = 0.05)

Great Shearwater: spring



D-62

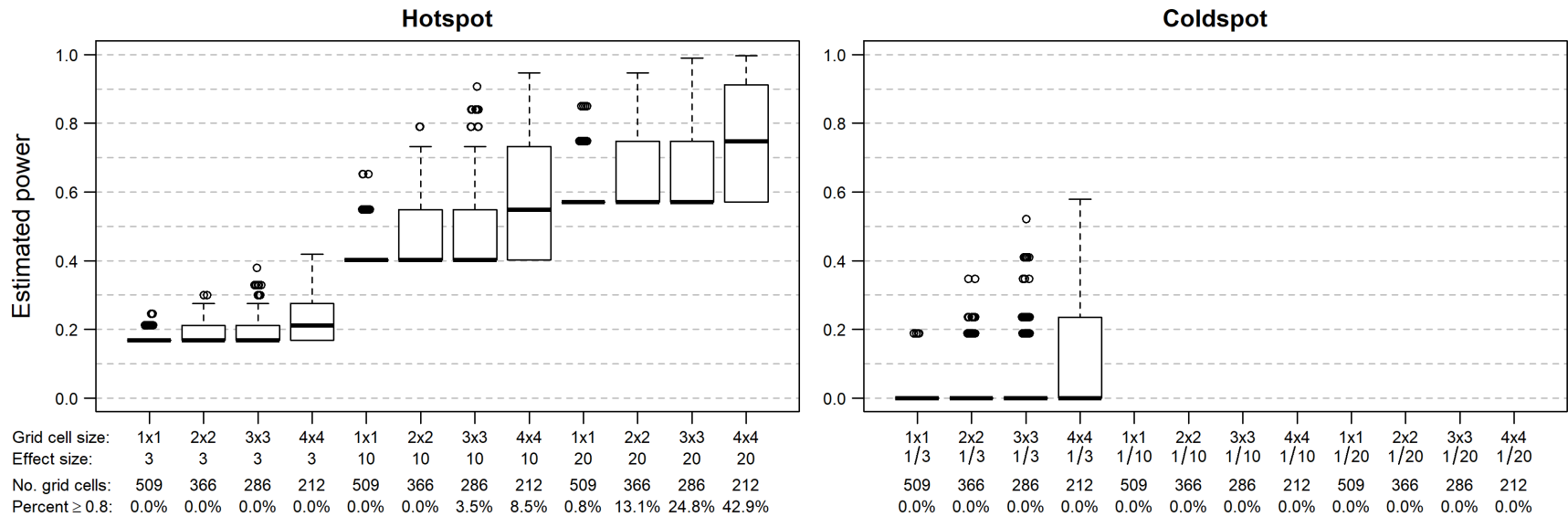
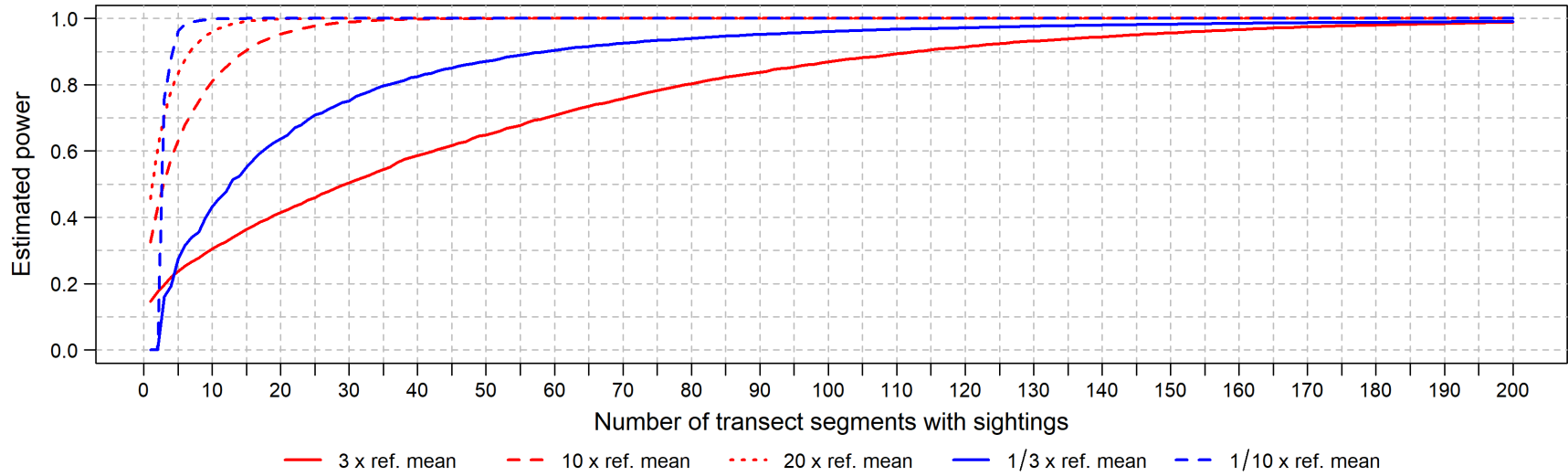


Figure D58. Power analysis results for Great Shearwater during spring based on the non-zero count model (type I error rate = 0.05)

Great Shearwater: summer



D-63

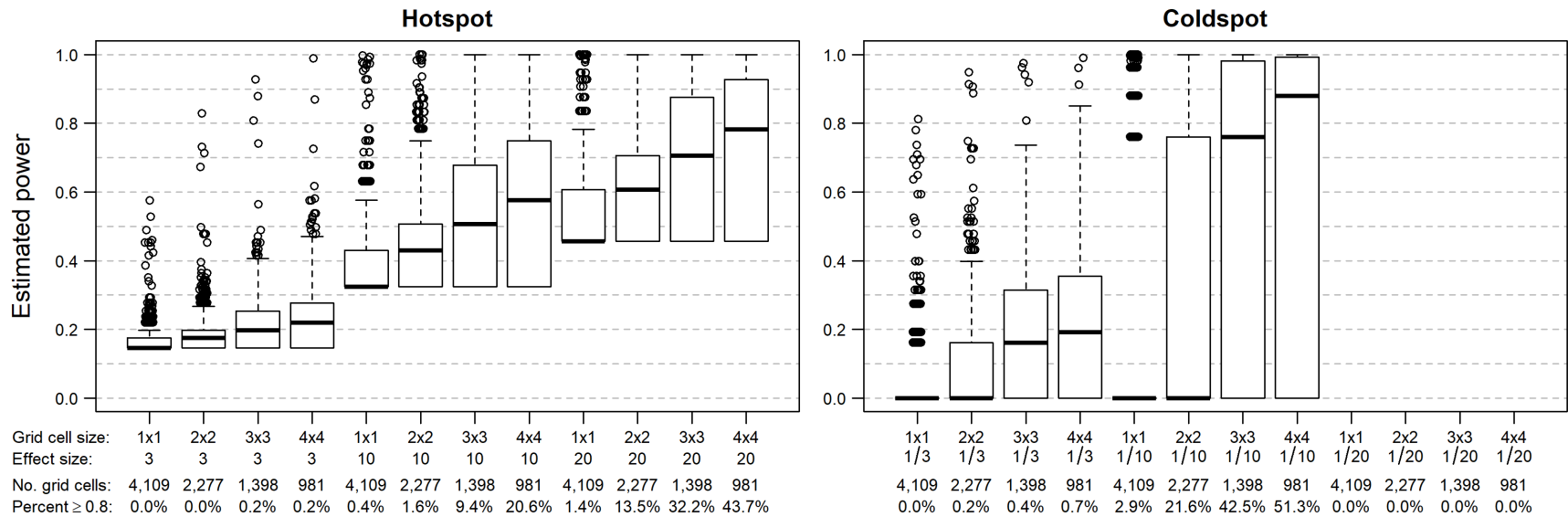
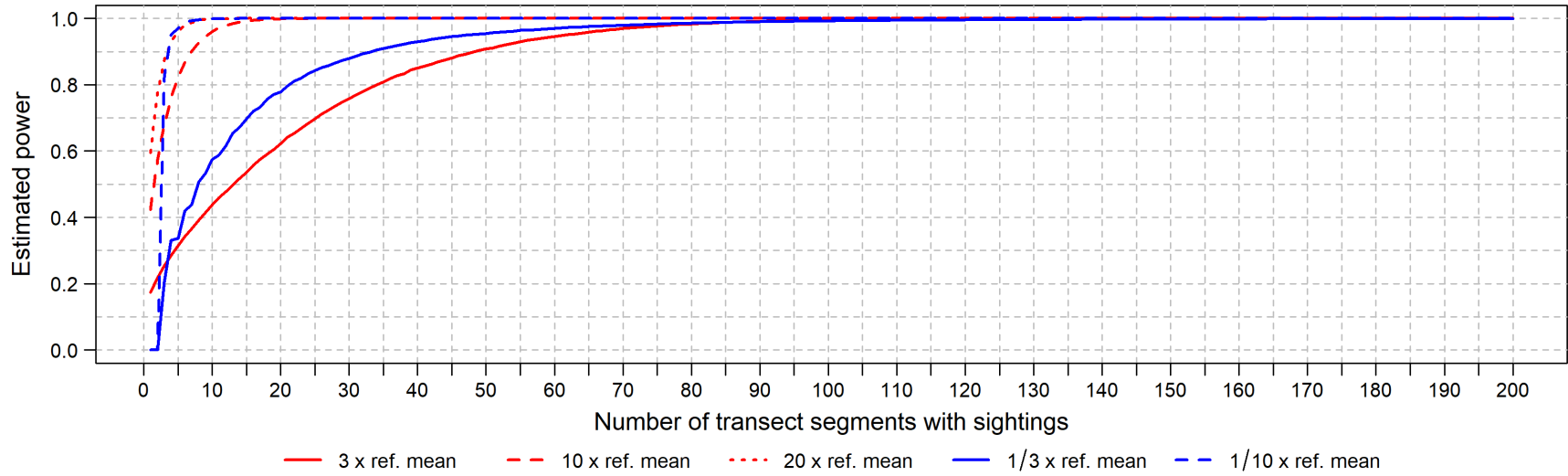


Figure D59. Power analysis results for Great Shearwater during summer based on the non-zero count model (type I error rate = 0.05)

Great Shearwater: fall



D-64

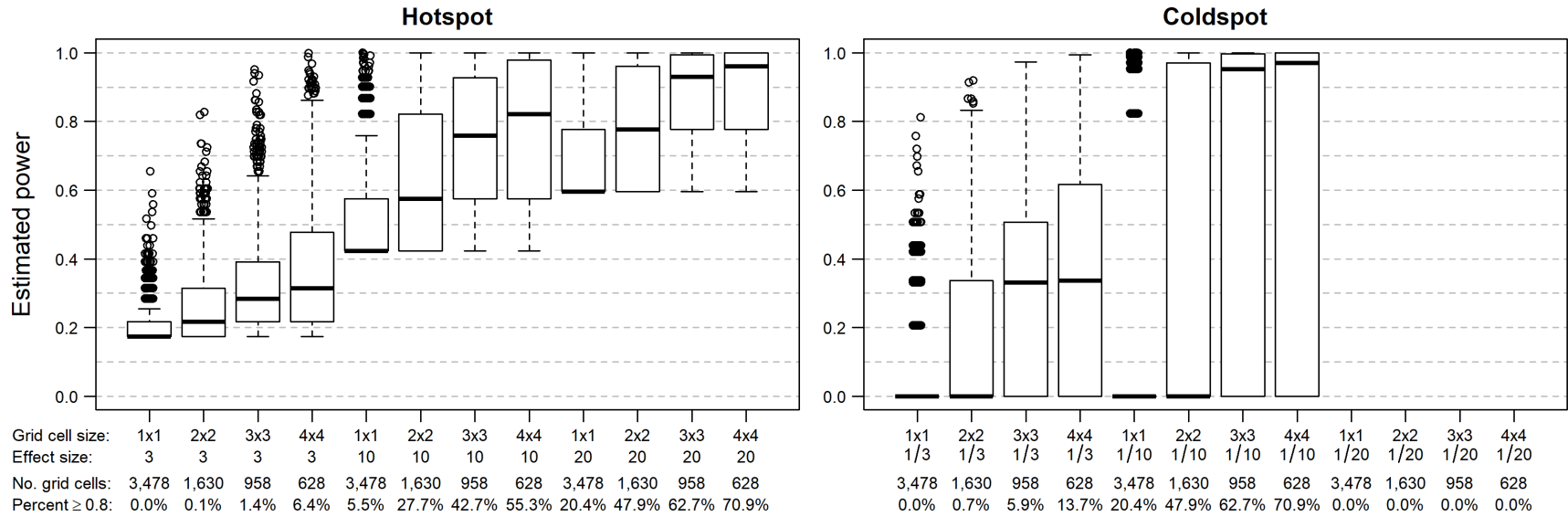
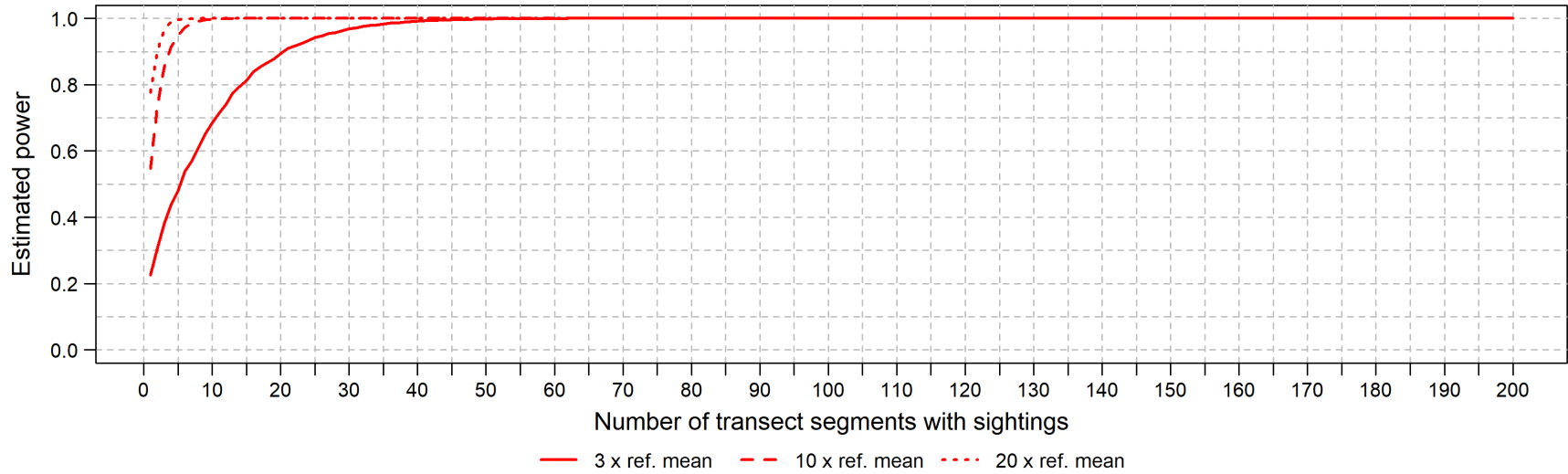


Figure D60. Power analysis results for Great Shearwater during fall based on the non-zero count model (type I error rate = 0.05)

Great Shearwater: winter



D-65

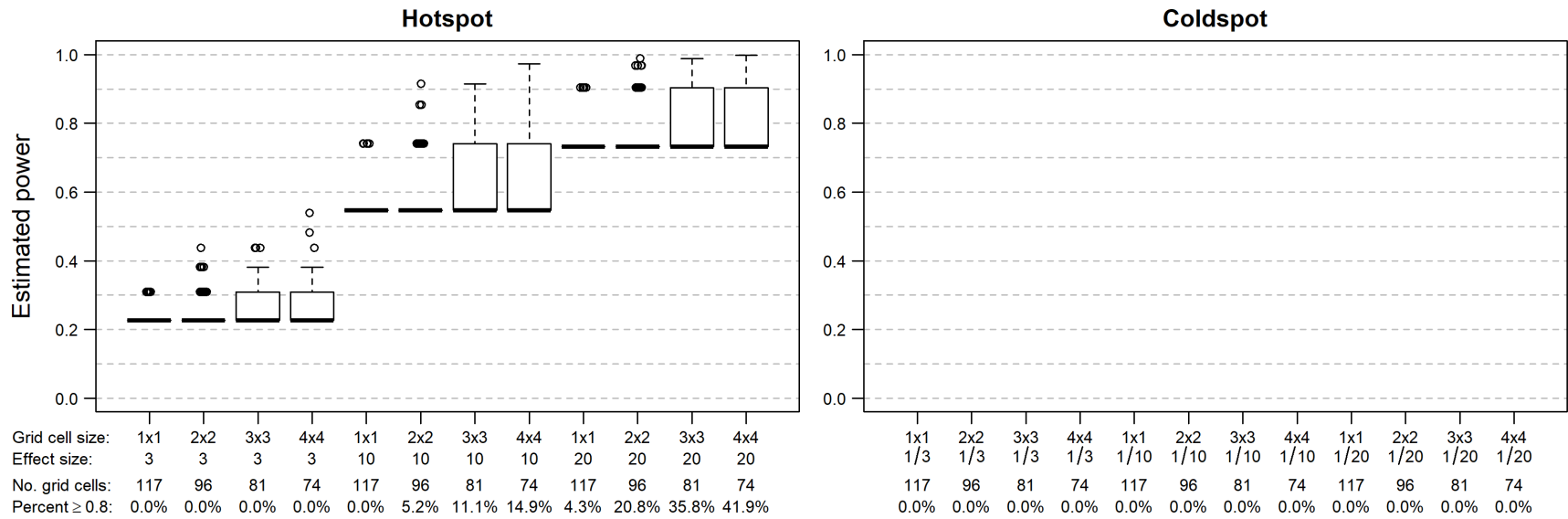
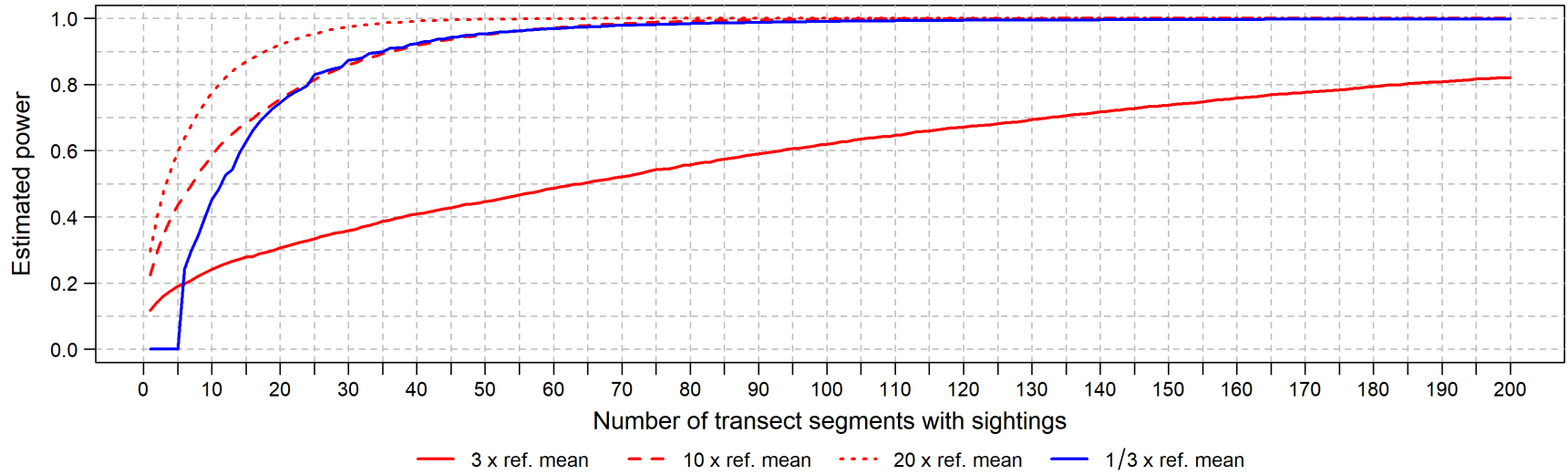


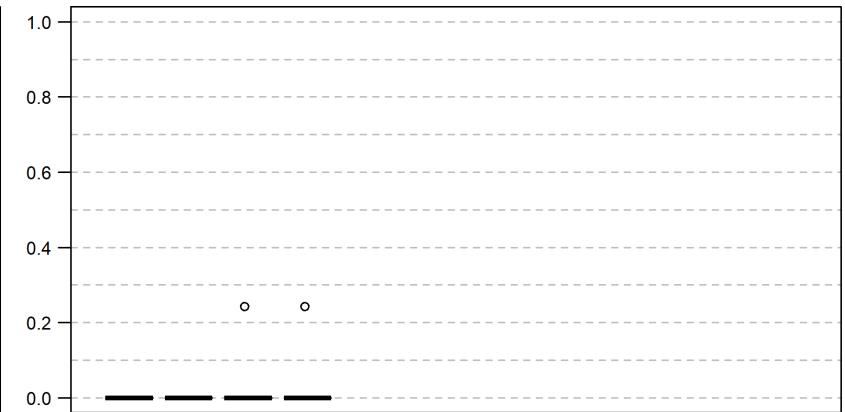
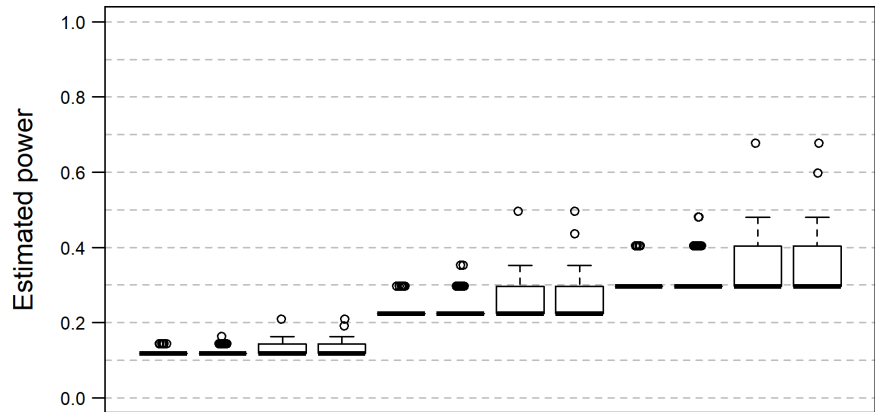
Figure D61. Power analysis results for Great Shearwater during winter based on the non-zero count model (type I error rate = 0.05)

Audubon's Shearwater: spring



Hotspot

Coldspot



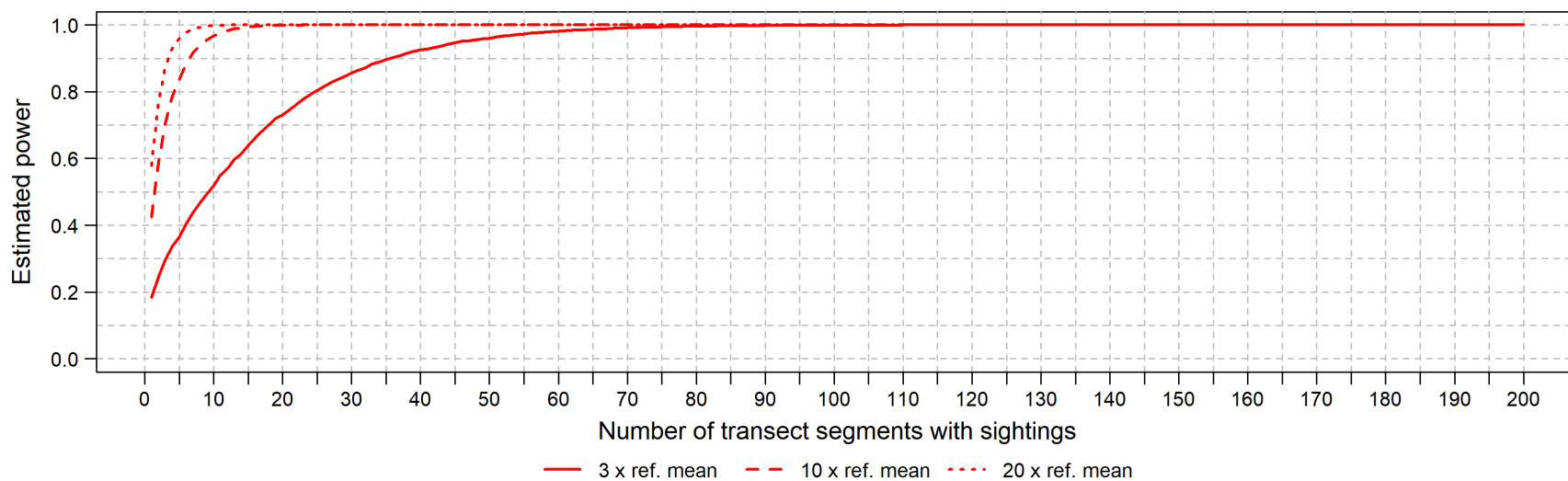
Grid cell size:	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
Effect size:	3	3	3	3	10	10	10	10	20	20	20	20
No. grid cells:	109	92	75	75	109	92	75	75	109	92	75	75
Percent ≥ 0.8 :	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Grid cell size:	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
Effect size:	1/3	1/3	1/3	1/3	1/10	1/10	1/10	1/10	1/20	1/20	1/20	1/20
No. grid cells:	109	92	75	75	109	92	75	75	109	92	75	75
Percent ≥ 0.8 :	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Figure D62. Power analysis results for Audubon's Shearwater during spring based on the non-zero count model (type I error rate = 0.05)

D-66

Audubon's Shearwater: summer



D-67

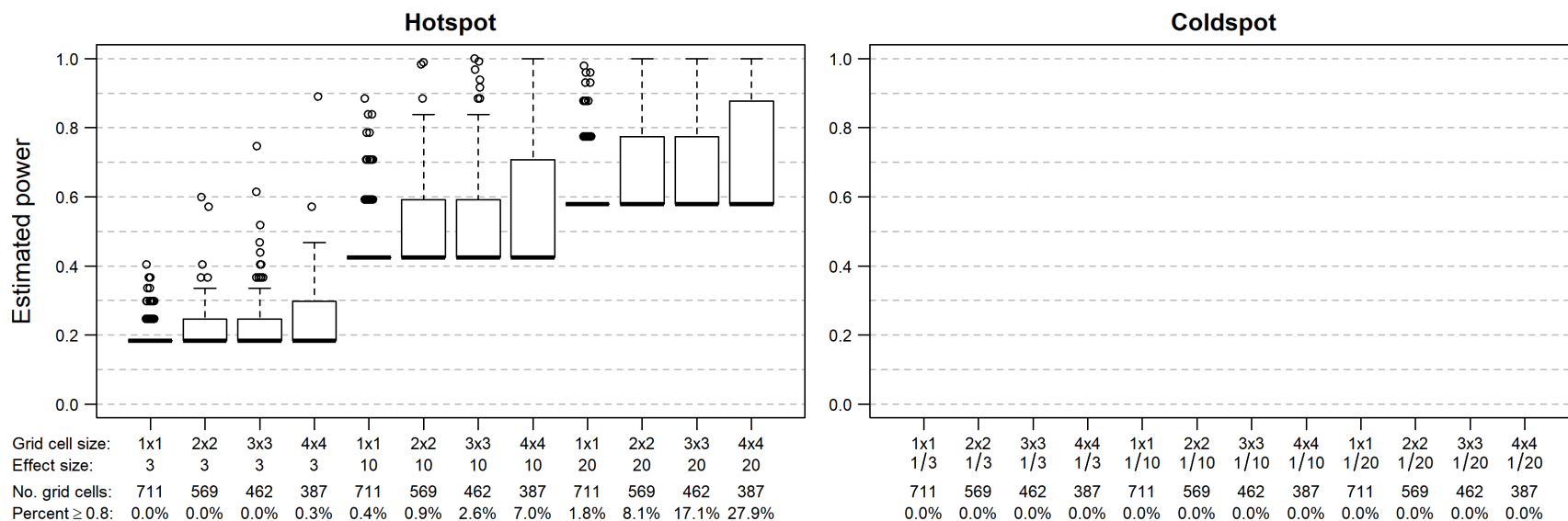
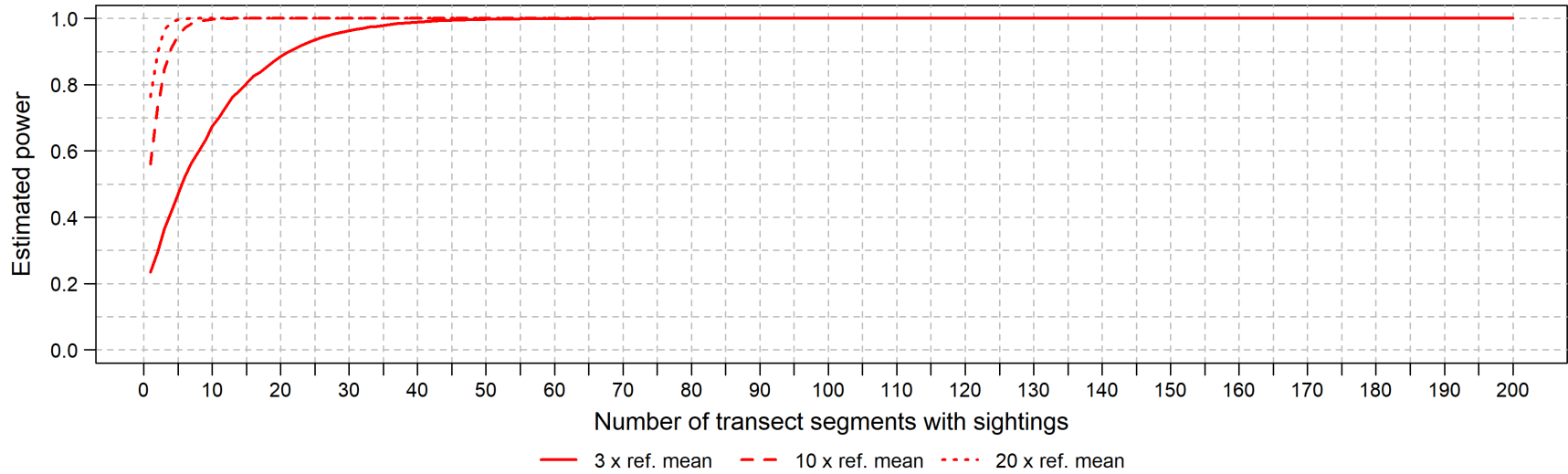


Figure D63. Power analysis results for Audubon's Shearwater during summer based on the non-zero count model (type I error rate = 0.05)

Audubon's Shearwater: fall



D-68

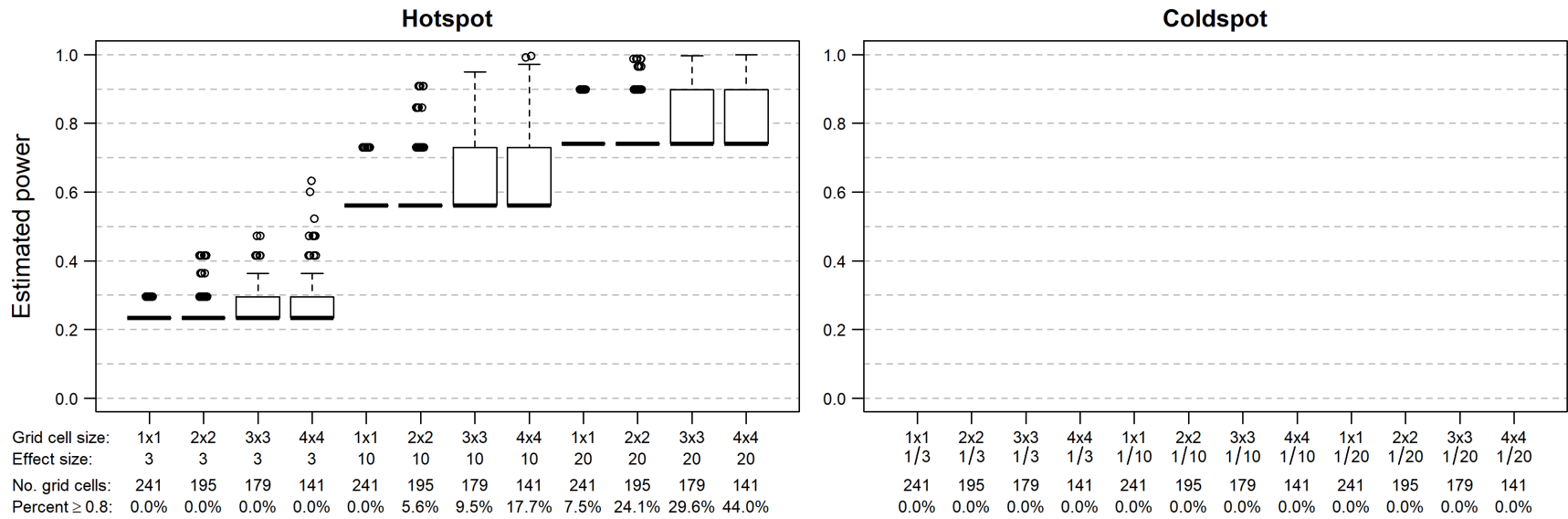
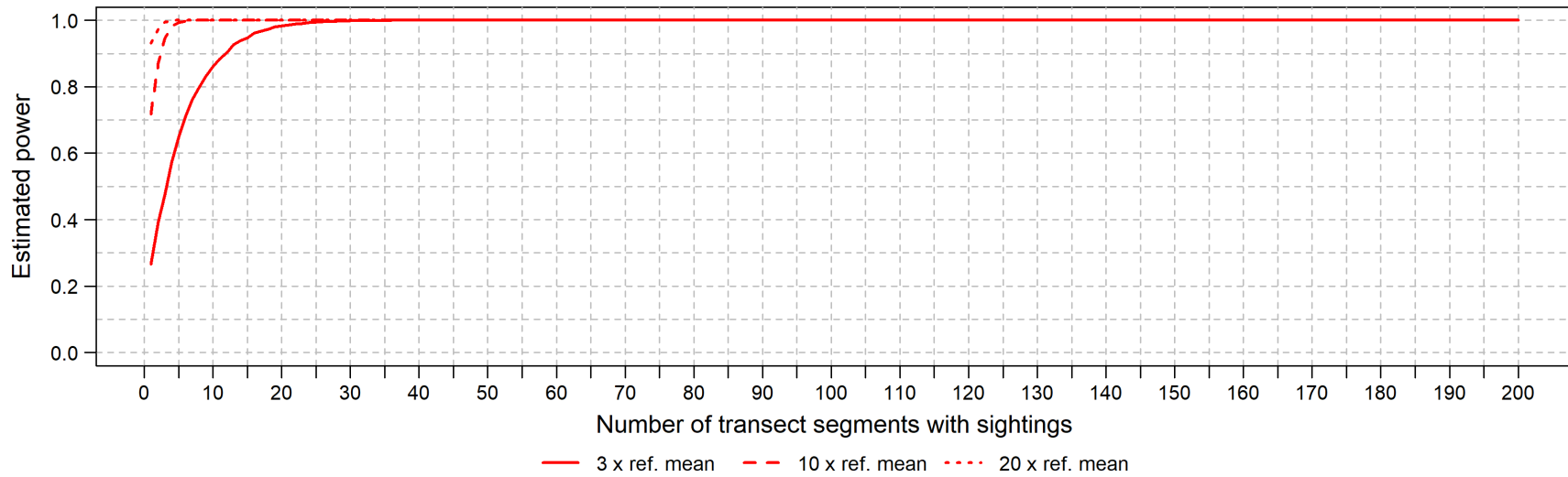


Figure D64. Power analysis results for Audubon's Shearwater during fall based on the non-zero count model (type I error rate = 0.05)

Audubon's Shearwater: winter



D-69

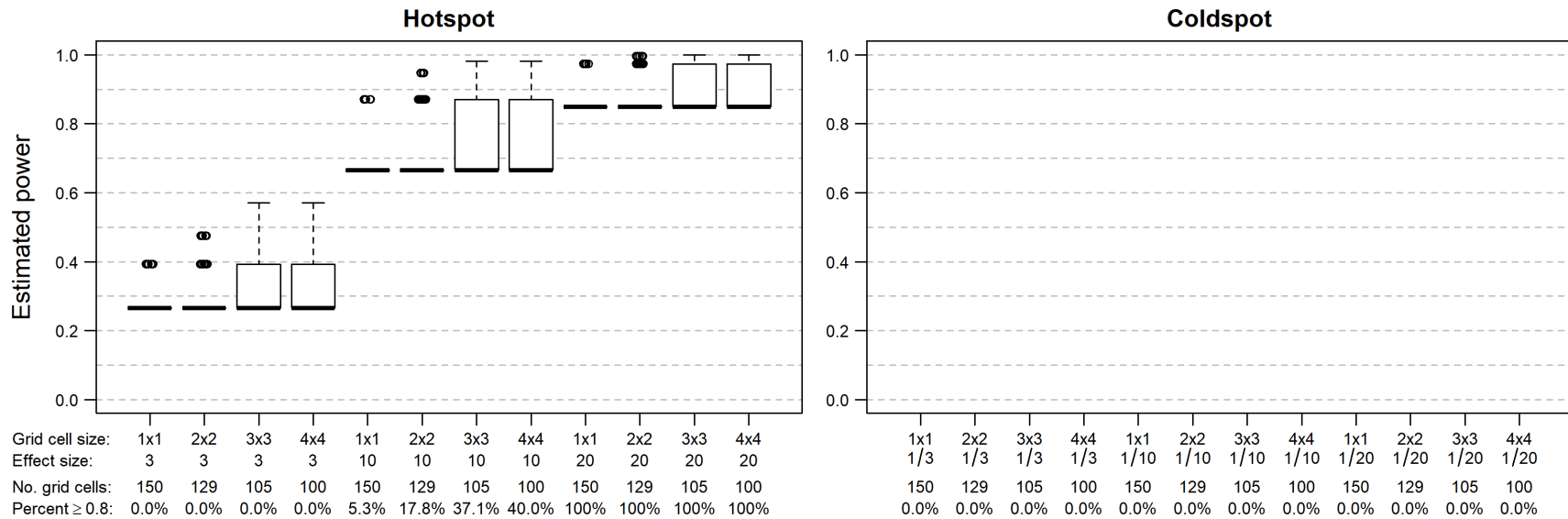
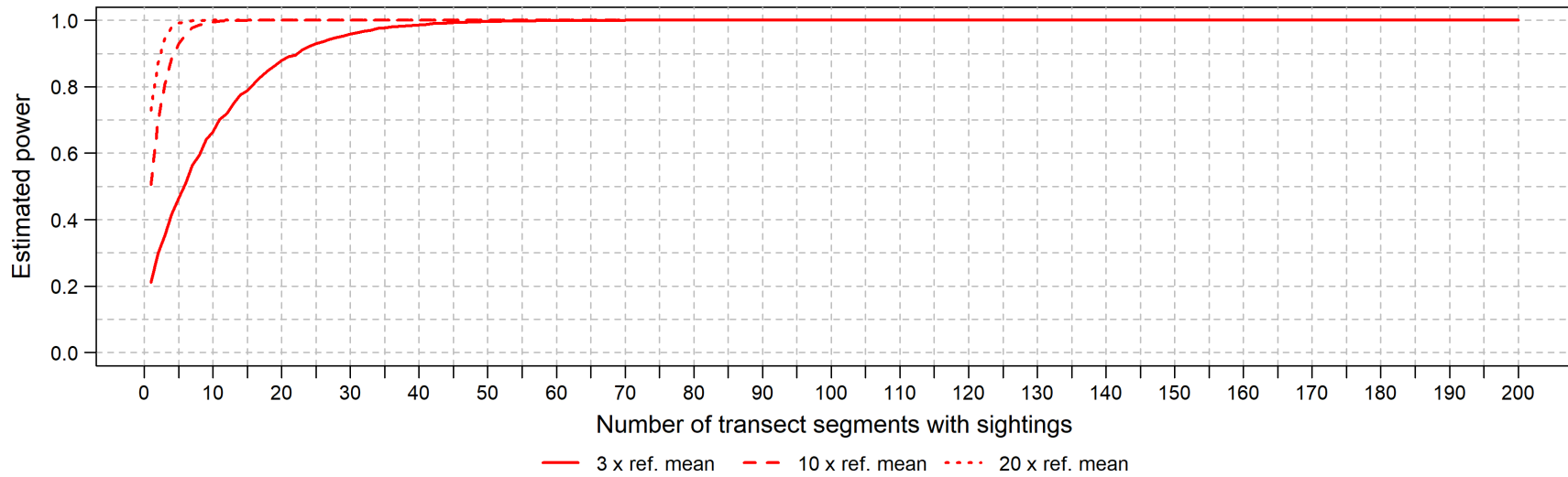


Figure D65. Power analysis results for Audubon's Shearwater during winter based on the non-zero count model (type I error rate = 0.05)

Northern Gannet: summer



D-71

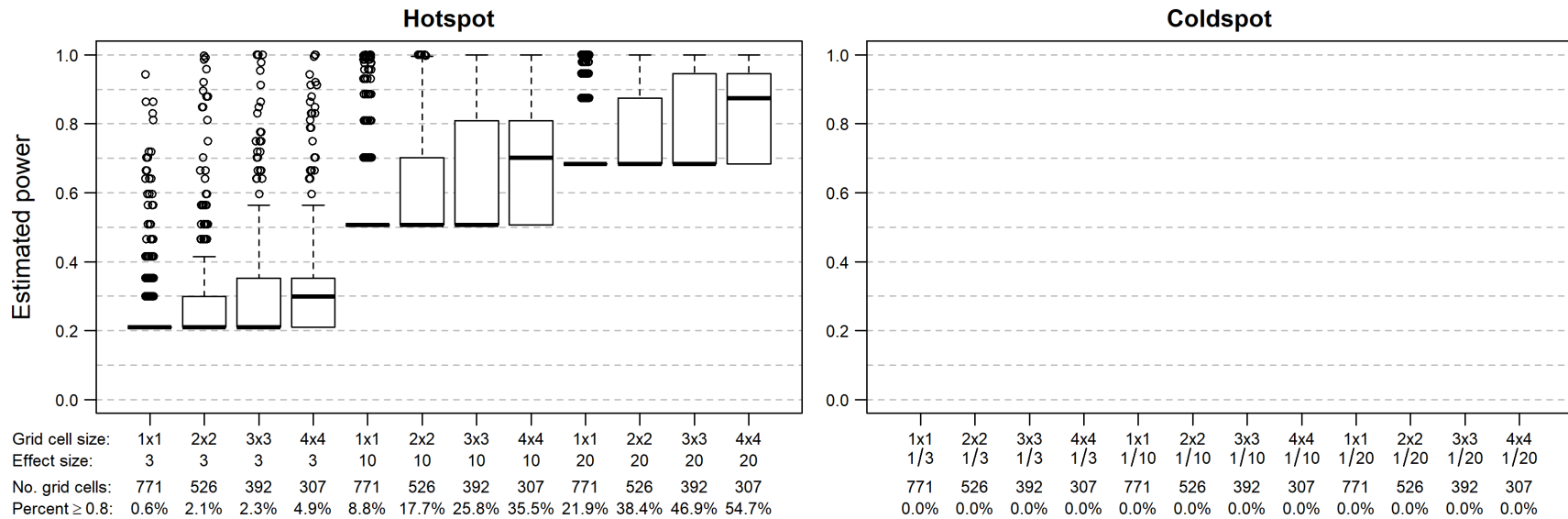
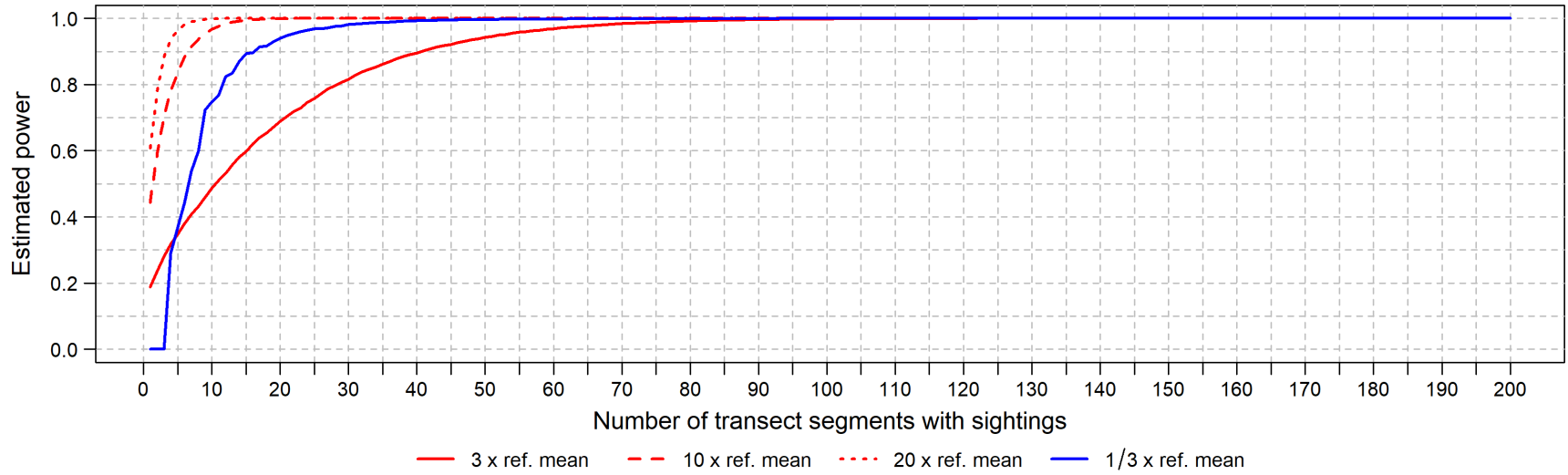
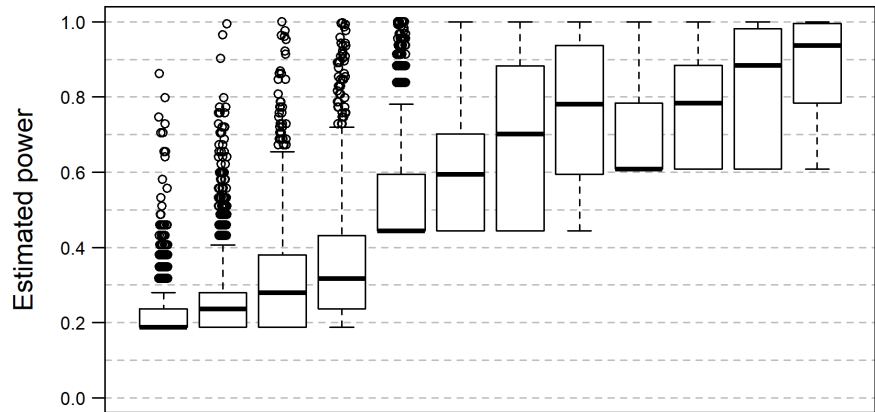


Figure D67. Power analysis results for Northern Gannet during summer based on the non-zero count model (type I error rate = 0.05)

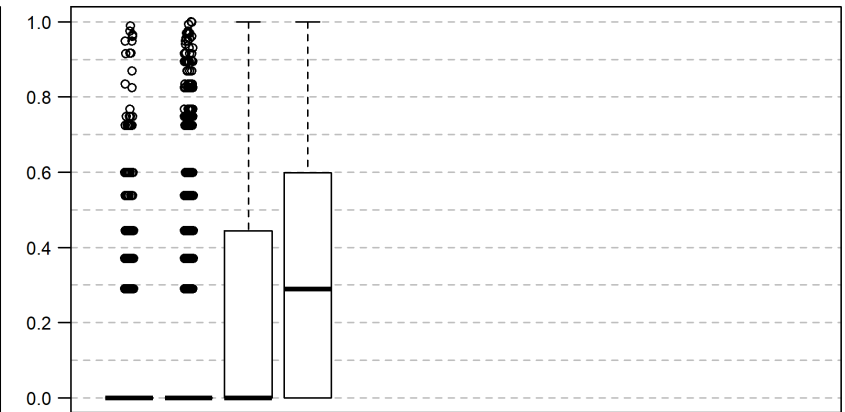
Northern Gannet: fall



Hotspot



Coldspot

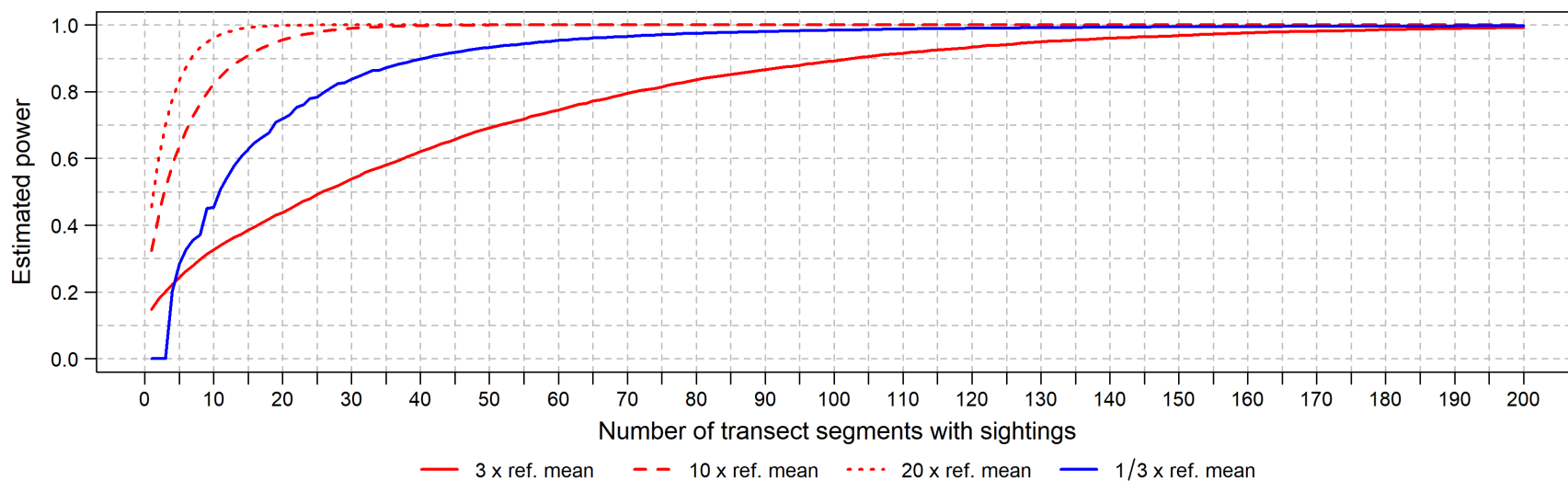


Grid cell size:	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
Effect size:	3	3	3	3	10	10	10	10	20	20	20	20
No. grid cells:	2,864	1,572	962	652	2,864	1,572	962	652	2,864	1,572	962	652
Percent ≥ 0.8 :	0.0%	0.2%	1.5%	4.9%	4.6%	17.4%	31.7%	46.0%	15.2%	36.8%	54.5%	67.2%

Grid cell size:	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4	1x1	2x2	3x3	4x4
Effect size:	1/3	1/3	1/3	1/3	1/10	1/10	1/10	1/10	1/20	1/20	1/20	1/20
No. grid cells:	2,864	1,572	962	652	2,864	1,572	962	652	2,864	1,572	962	652
Percent ≥ 0.8 :	0.4%	3.7%	10.3%	16.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Figure D68. Power analysis results for Northern Gannet during fall based on the non-zero count model (type I error rate = 0.05)

Northern Gannet: winter



D-73

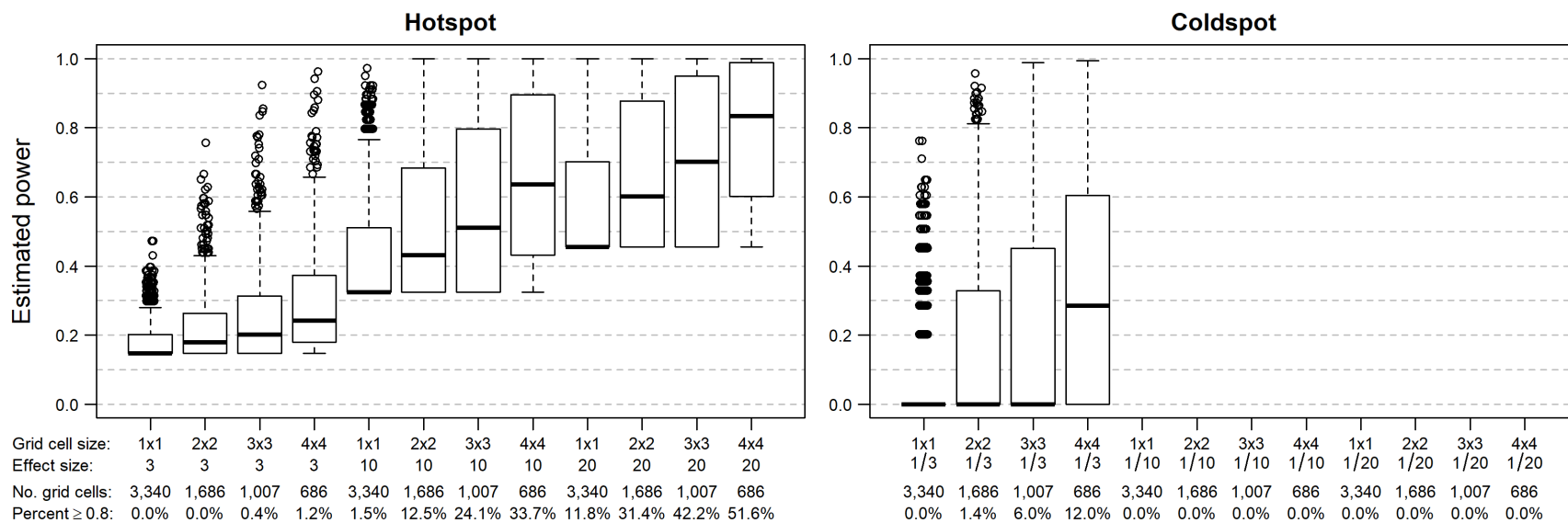


Figure D69. Power analysis results for Northern Gannet during winter based on the non-zero count model (type I error rate = 0.05)