

A HIERARCHICAL BAYES APPROACH TO CAPTURE-RECAPTURE
ABUNDANCE ESTIMATION

by

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TABLE OF CONTENTS

LIST OF TABLES	vii
LIST OF FIGURES	ix
ABSTRACT	xvii
1. INTRODUCTION	1
2. THE BOTTLENOSE DOLPHIN	14
Taxonomy and Systematics.....	14
Distribution and Movements.....	14
Morphology, Hematology, and Growth.....	19
Diet.....	22
Abundance.....	24
Human Interactions	26
3. A REANALYSIS OF THE CHANGE IN THE ABUNDANCE OF THE COASTAL MIGRATORY STOCK OF THE BOTTLENOSE DOLPHIN DURING THE 1987-1988 EPIZOOTIC	29
Introduction.....	29
Methods.....	30
Calculating the Mortality during the Die-off.....	32
Calculating the Change in Abundance and Detection Probabilities.....	33
Numerical Example	35
Results.....	37
Discussion	42
4. A STATISTICAL METHOD FOR ESTIMATING THE ABUNDANCE OF A POPULATION WITH CAPTURE-MARK-RECAPTURE DATA AND A HIERARCHICAL BAYES APPROACH	45
Introduction.....	45
Methods.....	49
Assumptions	50
Models.....	51
Notation	51
Likelihood Functions for Capture Probabilities	52
Beta-Multinomial Model	61
Beta-Binomial Model	65
Computation of Posterior Distribution	66
Simulations	67
Results.....	72

Effectiveness of the two-step approach.....	72
Effects of Capture Probabilities on the Posterior Distribution of Abundance.....	82
Effects of the Number of Primary Periods on the Posterior Distribution of Abundance.....	95
Effects of the Number of Secondary Occasions on the Posterior Distribution of abundance.....	102
Discussion.....	113
 5. ABUNDANCE ESTIMATES OF BOTTLENOSE DOLPHINS IN INSHORE WATERS ALONG THE ATLANTIC COAST OF THE UNITED STATES USING THE EXISTING PHOTOGRAPHIC IDENTIFICATION DATA.....	119
Introduction.....	119
Methods.....	121
Results.....	124
Manteo, NC (R. Mallon-Day).....	125
Beaufort, NC (A. Read).....	131
Beaufort, NC (K. Rittmaster).....	135
Wilmington, NC (L. Sayigh).....	140
Murrell's Inlet and Winyah Bay, SC (R. Young).....	146
Charleston, SC (E. Zolman).....	151
Hilton Head, SC (C. Gubbins).....	157
Georgia (The Dolphin Project).....	162
Jacksonville, FL (M. Caldwell).....	166
Northern Group.....	172
Southern Group.....	172
Discussion.....	173
 6. CONCLUSIONS.....	180
 LITERATURE CITED.....	184
 APPENDICES.....	197
Appendix A: COMPUTATION OF JACOBIAN OF THE HYPERPARAMETERS.....	198
Appendix B: TRANSFORMATION OF THE HYPERPARAMETERS.....	200

LIST OF TABLES

Table	Page
1.1. Estimates of abundance and associated coefficient of variation (CV) for each management unit of coastal bottlenose dolphins (from Waring et al. 2002).	11
3.1. List of notations.	31
3.2. The number of stranded bottlenose dolphins per 30 days along the Atlantic coast of the United States.	36
3.3. Calculated instantaneous additional mortality rate (μ_1) during the epizootic, calculated change in the abundance of the stock (N_T/N_0), and calculated change in detection probabilities before and after the epizootic (f_2/f_0) as a function of the sum of natural and human-induced mortality rates ($\mu_0 + h$).	38
3.4. Effects of change in detection probabilities (α) between during and after the epizootic on calculated additional mortality rate during the epizootic (μ_1).	41
4.1. Combinations of parameters for Monte Carlo simulations.	68
4.2. Estimated parameters for the linear regression analysis between the true abundance and the point estimates for simulation case A, using the non-hierarchical approach.	74
4.3. Estimated parameters for the linear regression analysis between the true abundance and the point estimates for simulation case B, using the non-hierarchical approach.	76
4.4. Estimated parameters for the linear regression analysis between the true abundance and the point estimates for simulation case C, using the non-hierarchical approach.	80
4.5. A summary of the comparison between the two-step and fixed-hyperparameter approaches.	81
4.6. Estimated parameters for the linear regression analysis between the true abundance and the point estimates for simulation case A, using the hierarchical approach.	82

4.7. Estimated parameters for the linear regression analysis between the true abundance and the point estimates for simulation case B, using the hierarchical approach.	87
4.8. Estimated parameters for the linear regression analysis between the true abundance and the point estimates for simulation case C, using the hierarchical approach.	90
4.9. A summary of the comparison among the hierarchical beta-binomial, the hierarchical beta-multinomial, closed captures, and Huggins closed capture models.	95
4.10. Estimated parameters for the linear regression analysis between the true abundance and the point estimates for simulation case D, using the hierarchical approach.	96
4.11. Estimated parameters for the linear regression analysis between the true abundance and the point estimates for simulation case E, using the hierarchical approach.	100
4.12. A summary of the comparison among the hierarchical beta-binomial, the hierarchical beta-multinomial, closed captures, and Huggins closed capture models.	102
4.13. Estimated parameters for the linear regression analysis between the true abundance and the point estimates for simulation case F, using the hierarchical approach.	103
4.14. Estimated parameters for the linear regression analysis between the true abundance and the point estimates for simulation case G, using the hierarchical approach.	110
4.15. A summary of the comparison among the hierarchical beta-binomial, the hierarchical beta-multinomial, closed captures, and Huggins closed capture models.	112
5.1. A summary of posterior distributions of abundance of identifiable bottlenose dolphins for four northern sites.	172
5.2. A summary of posterior distributions of abundance of identifiable bottlenose dolphins for the southern group.	173

LIST OF FIGURES

Figure	Page
1.1. A schematic diagram of Pollock's robust design.	6
1.2. A schematic diagram of proposed management units of coastal bottlenose dolphins along the Atlantic coast of the United States as defined from recent results of genetic, stable isotope ratio, photographic identification, and telemetry studies (from Waring et al. 2002).	10
3.1. Effects of uncertainty in the proportion of undetected stranded carcasses and natural and human-induced mortality rates ($\mu_0 + h$) on calculated additional mortality rate (μ_1).	39
3.2. Effects of uncertainty in the proportion of undetected stranded carcasses on the calculated change in the abundance (N_T/N_0).	40
4.1. A schematic diagram of Pollock's robust design.	47
4.2. The hierarchical structure of the capture-recapture model.	51
4.3. Probability density functions for three beta distributions.	69
4.4. Relationships between point estimates from the beta-multinomial model and true abundance for simulation case A.	73
4.5. The relationships between the true abundance and relative precision for simulation case A, when the beta-multinomial model was used.	75
4.6. Relationships between point estimates and true abundance for simulation case B.	76
4.7. The relationships between the true abundance and relative precision for simulation case B when the beta-multinomial model was used.	78
4.8. Relationships between point estimates and true abundance for simulation case C.	79

4.9. The relationships between the true abundance and relative precision for simulation case C when the beta-multinomial model was used. 81

4.10. Relationships between three point estimates and the true population size for simulation case A. 83

4.11. The relationship between the relative precision and the true population size for simulation case A. 84

4.12. Relationships between the true abundance and maximum likelihood estimates and widths of 95% confidence intervals from MARK for simulation case A. 85

4.13. An example of posterior samples and marginal distributions of hyperparameters for capture probabilities for simulation case G. 86

4.14. Relationships between the relative precision the true population size for simulation case B. 88

4.15. Relationships between true abundance and maximum likelihood estimates and widths of 95% confidence intervals from MARK for simulation case B. 89

4.16. Relationships between the true population size and three point estimates and for simulation case C. 91

4.17. The relative precision as a function of true population size for simulation case C. 92

4.18. Relationships between true abundance and MLE and the widths of 95% confidence intervals for simulation case C. 93

4.19. Relationships between true abundance and point estimates for simulation case D. 97

4.20. Relationships between the relative precision and true abundance for simulation case D. 98

4.21. Relationships between the true population size and three point estimates for simulation case E. 99

4.22. Relationships between the relative precision and true abundance for simulation case E.	101
4.23. Relationships between true abundances and three point estimates for simulation case F.	104
4.24. The relationship between relative precision and true abundance for simulation case F.	105
4.25. Relationships between true abundance and MLE and widths of 95% confidence intervals for simulation case F.	106
4.26. Relationships between the true abundance and three point estimates for simulation case G.	108
4.27. The relationship between the relative precision and the true abundance for simulation case G.	109
4.28. Relationships between the true abundance and MLE and widths of 95% confidence intervals for simulation case G.	111
5.1. Sighting locations of identifiable bottlenose dolphins at the study site near Manteo, NC.	126
5.2. The cumulative number of unique bottlenose dolphins in the dataset for the photographic identification study near Manteo, NC.	127
5.3. A histogram of the number of individuals admitted to the dataset per sampling day for the photographic identification study near Manteo, NC.	128
5.4. A histogram of the sighting frequency of each bottlenose dolphin in the dataset for the photographic identification study near Manteo, NC.	128
5.5. Posterior samples of the hyperparameters for sighting probabilities for the photographic identification study near Manteo, NC.	129
5.6. The posterior distribution of abundance for the 6 th primary period at the photographic identification study site near Manteo, NC.	130

5.7. Sighting locations of bottlenose dolphins near Beaufort, NC. 131

5.8. The cumulative number of unique bottlenose dolphins in the dataset for a photographic identification study near Beaufort, NC (A. Read). 132

5.9. A histogram of the number of individuals admitted to the dataset per sampling day for a photographic identification study near Beaufort, NC (A. Read). 133

5.10. A histogram of the sighting frequency of each bottlenose dolphin in the dataset for a photographic identification study near Beaufort, NC (A. Read). 133

5.11. Posterior samples of hyperparameters for sighting probabilities for a photographic identification study near Beaufort, NC (A. Read). 134

5.12. The posterior distribution of abundance of bottlenose dolphins for the 19th primary period at a photographic identification study site near Beaufort, NC (A. Read). 135

5.13. The photographic identification study site near Beaufort, NC, (K. Rittmaster). 136

5.14. The cumulative number of unique individuals in the dataset for a photographic identification study near Manteo, NC (K. Rittmaster). 137

5.15. A histogram of the number of individuals accepted to the dataset per day for a photographic identification study near Beaufort, NC (K. Rittmaster). 138

5.16. A frequency histogram of the sighting frequency of unique bottlenose dolphins in the dataset for a photographic identification study near Beaufort, NC (K. Rittmaster). 138

5.17. Posterior samples for the hyperparameters of sighting probabilities for a photographic identification study near Beaufort, NC (K. Rittmaster). 139

5.18. The posterior distribution of abundance for the 132nd primary period at a photographic identification study site near Beaufort, NC. 140

5.19. The photographic identification study area near Wilmington, NC. 141

5.20. The cumulative number of unique individuals in the dataset
for the photographic identification study site near Wilmington, NC. 142

5.21. A histogram of the number of individuals accepted to the
dataset per day for the photographic identification study
near Wilmington, NC. 143

5.22. A histogram of the sighting frequency of the unique individuals
for the photographic identification study site near Wilmington, NC. 143

5.23. Posterior samples for the hyperparameters of sighting probabilities
for Wilmington, NC, area. 144

5.24. The posterior distribution of abundance for the 27th primary
period for the photographic identification study site near
Wilmington, NC. 145

5.25. The photographic identification study site for Murrells Inlet, SC. 146

5.26. The photographic identification study area at Winyah Bay, SC. 147

5.27. The cumulative number of unique individuals in the dataset
for the photographic identification study near Myrtle Beach, SC. 148

5.28. A histogram of the number of individuals accepted to the
dataset per day for the photographic identification study
near Myrtle Beach, SC. 149

5.29. A frequency histogram of the sighting frequency of
individuals in the dataset for the photographic identification
study near Myrtle Beach, SC. 149

5.30. Posterior samples of the hyperparameters of sighting
probabilities for the photographic identification study
near Myrtle Beach, SC. 150

5.31. The posterior distribution for abundance of bottlenose
dolphins for the 1st primary period at photographic
identification study sites near Myrtle Beach, SC. 151

5.32. The study area near Charleston, SC. 152

5.33. The cumulative number of individuals in the dataset for the photographic identification study near Charleston, SC.	153
5.34. A frequency histogram of the number of individuals accepted to the dataset per day for the photographic identification study near Charleston, SC.	154
5.35. A frequency histogram of the sighting frequency of individual bottlenose dolphins in the dataset for the photographic identification study near Charleston, SC.	154
5.36. Posterior samples of the hyperparameters of capture probabilities for the photographic identification study near Charleston, SC.	155
5.37. The posterior distribution of abundance for the 27 th primary period for the photographic identification study near Charleston, SC.	156
5.38. The photographic identification study site near Hilton Head, SC.	157
5.39. The cumulative number of unique individuals in the dataset for the photographic identification study near Hilton Head, SC.	158
5.40. A frequency histogram of the number of individuals accepted to the dataset for the photographic identification study near Hilton Head, SC.	159
5.41. A frequency histogram of the sighting frequency of unique bottlenose dolphins in the dataset for the photographic identification study near Hilton Head, SC.	159
5.42. Posterior samples of the hyperparameters of capture probabilities for the photographic identification study near Hilton Head, SC.	160
5.43. The posterior distribution of abundance for the 22 nd primary period for the photographic identification study near Hilton Head, SC.	161
5.44. The cumulative number of individuals in the photographic identification dataset for Georgia.	162

5.45. A frequency histogram of the number of individuals accepted to the dataset per day for the photographic identification study along the Georgia coast. 163

5.46. A frequency histogram of the sighting frequency of unique individuals in the dataset for the photographic identification study along the Georgia coast. 164

5.47. Posterior samples of the hyperparameters of capture probabilities for the photographic identification study in Georgia. 165

5.48. The posterior distribution of abundance for the 26th primary period for the photographic identification study in Georgia. 166

5.49. The photographic identification study site for Jacksonville, FL. 167

5.50. The cumulative number of unique individuals in the dataset for the photographic identification study near Jacksonville, FL. 168

5.51. A frequency histogram of the number of individuals accepted to the dataset per day for the photographic identification study near Jacksonville, FL. 169

5.52. A frequency histogram of the sighting frequency of individual bottlenose dolphin in the dataset for the photographic identification study near Jacksonville, FL. 169

5.53. Posterior samples of the hyperparameters for sighting probabilities at Jacksonville, FL. 170

5.54. The posterior distribution of abundance for the 47th primary period for the photographic identification study site near Jacksonville, FL. 171

ABSTRACT

A reanalysis of stranding data for bottlenose dolphins along the Atlantic coast of the United States during the 1987-1988 epizootic indicated that the widely used mortality rate during the die-off of 53% was an overestimate. Using the same dataset, I computed the mortality during the epizootic to be less than 46%. Continuous and consistent effort in collecting stranding data and estimation of life history parameters were shown to be important in using stranding data to find die-off of a population. To make inferences on abundance of bottlenose dolphins in estuaries along the Atlantic coast of the United States, a hierarchical Bayes approach for capture-mark-recapture data was proposed. The performance of the proposed method was comparable to the maximum likelihood method. When sample sizes were small, however, the proposed method performed better than the maximum likelihood method. Simulation analyses indicated a frequent sampling and high capture probabilities increased the precision of posterior distributions. The proposed method was applied to the existing photographic identification datasets from eight locations along the coast. Opportunistically collected data were useful in obtaining the joint prior distribution of the hyperparameters of sighting probabilities. Although posterior distributions of abundance were computed for these datasets, potential violations of the underlying assumptions and differences in the sampling protocols among studies made impossible to compile all results. To obtain abundance estimations from capture-mark-recapture data, the existing sampling protocols should be modified so that the assumptions of capture-recapture analyses are satisfied.