

Example from the Boat-billed Heron (*Cochlearius cochlearius*) Exercise



A large variety of images from a heron colony were taped to the walls in two series ("Subcolony A and Subcolony B"). Participants worked in pairs (Observer 1 and Observer 2), walking slowly past the walls of images. For Subcolony A, Observer 1 pointed out the herons she/he saw in the images while Observer 2 took notes (including any that Observer 1 failed to see). In Subcolony B, the observers switched roles.



Observer	Subcolony A	Subcolony B
Observer 1 – Eduardo	70 herons	+ 7 missed
Observer 2 - Ghisselle	+ 5 missed	60 herons

Calculation of Detection Probability and Actual Population Size				
variable	definition			herons
X_{11}	Birds detected by both			130
X_{10}	Birds detected by Observer 1 but not by Observer 2			7
X_{01}	Birds detected by Observer 2 but not by Observer 1			5
N	Total Population Count			143
				probabilities
P_1	Observer 1's detection probability	$= X_{11} / (X_{11} + X_{01})$ $= 130 / (130 + 5) = 130 / 135$		0.963
P_2	Observer 2's detection probability	$= X_{11} / (X_{11} + X_{10})$ $= 130 / (130 + 7) = 130 / 137$		0.949
P_{1+2}	Team's detection probability	$= 1 - (1 - P_1)(1 - P_2)$ $= 1 - (1 - 0.963)(1 - 0.949)$		0.9981
				herons
N	Total Population Estimate	$= (X_{11} + X_{10} + X_{01}) / P_{1+2}$ $= (130 + 7 + 5) / 0.9981$		143

Example from Island Aerial Count Exercise

Observers work side-by-side, counting birds in both West and East sides of island (switching roles as lead observer as they switch sides of the island.).



Observer	East	West
Observer 1 – Eduardo	125	+33 missed
Observer 2 - Ghisselle	+25 missed	139

Calculation of Detection Probability and Actual Population Size			
variable	definition		birds
X_{11}	Birds detected by both		264
X_{10}	Birds detected by Observer 1 but not by Observer 2		33
X_{01}	Birds detected by Observer 2 but not by Observer 1		25
N	Total Population Count		322
			probabilities
P_1	Observer 1's detection probability	$= X_{11} / (X_{11} + X_{01})$ $= 264 / (264 + 25) = 264 / 289$	0.913
P_2	Observer 2's detection probability	$= X_{11} / (X_{11} + X_{10})$ $= 264 / (264 + 33) = 264 / 297$	0.889
P_{1+2}	Team's detection probability	$= 1 - (1 - P_1)(1 - P_2)$ $= 1 - (1 - 0.913)(1 - 0.889)$	0.991
			birds
N	Total Population Estimate	$= (X_{11} + X_{10} + X_{01}) / P_{1+2}$ $= (264 + 23 + 16) / 0.995$	325