

# “Whale wave”: Monte Carlo Randomization

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## 1 Data

There are two datasets: sightings and kilometers effort. Each dataset reports numbers for each subblock (n=26) in each month (n=12). These numbers are from the combined efforts of the Gitga’at and NCCS. These two datasets were generated from “> Humpback-shifts > decade > data > effortprocessing > time-block-gggw-n-nccs.R”.

```
> read.csv("eff.csv")
```

	X	caas	caac	caan	ests	estc	estn	
1	jan	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	
2	feb	6.660775	0.000000	0.000000	0.000000	0.000000	1.643998	
3	mar	0.000000	0.000000	0.000000	1.745829	8.424572	5.294243	
4	apr	47.996153	32.451451	13.423140	14.736842	7.548030	8.094527	
5	may	106.729566	63.430450	32.340046	24.424036	18.950508	16.210104	
6	jun	156.590020	137.114658	38.885759	24.694314	20.107458	21.257625	
7	jul	290.081586	307.515887	104.224840	44.706407	28.210377	27.584403	
8	aug	323.878821	260.793699	26.385135	19.554379	15.295654	10.261399	
9	sep	84.797018	35.253500	12.552435	9.377112	7.645034	6.894942	
10	oct	50.892917	7.178662	5.315884	4.739565	3.795537	7.801940	
11	nov	0.000000	1.753220	7.299865	4.979568	4.055294	2.253377	
12	dec	0.000000	0.000000	0.000000	0.000000	0.000000	1.610185	
		cmps	cmpc	cmpn	squs	squc	squn	squz
1		0.000000	1.837432	28.10324	17.52417	13.30864	29.03275	16.48408
2		7.738023	13.621733	42.14008	33.10591	21.46729	30.89331	27.25571
3		0.000000	3.082165	50.35641	35.68692	24.04696	31.44239	24.05394

4	14.480260	15.409046	54.97720	31.14270	24.80178	35.87200	43.49406
5	57.873106	56.863114	146.37565	53.02446	38.81481	107.76128	90.30965
6	130.111123	141.954841	382.46669	87.47973	52.67774	117.79611	59.93100
7	263.009108	284.742365	615.82985	181.23895	81.27505	109.64110	46.29871
8	207.373639	296.279459	1073.23865	382.08970	191.97468	203.36103	48.86550
9	84.421693	130.433088	654.26274	183.91471	101.34594	113.99438	19.60480
10	46.486122	56.937247	349.83023	138.75194	87.28490	88.65913	31.11551
11	3.779402	6.665676	37.01889	20.68796	13.75105	35.99197	28.74090
12	0.000000	5.970470	32.71188	23.13362	17.01507	24.53431	12.23387
	whas	whac	whan	wris	wric	wrin	wriz
1	23.54259	23.36857	32.47412	37.51777	53.52304	33.43189	36.46499
2	35.87009	32.67446	38.76483	14.58144	41.79691	41.85920	59.45020
3	67.92885	62.54580	69.22120	28.56261	51.29090	69.37382	64.87416
4	53.58768	46.51055	67.79719	27.80130	81.04519	82.83164	52.66877
5	115.56797	96.50825	124.68292	46.24960	124.29130	165.22872	141.61502
6	184.15863	110.36789	97.09511	50.69871	98.25805	96.89252	106.89323
7	189.12755	112.14228	77.34162	34.56471	81.44364	66.31138	54.66279
8	408.74049	256.00374	153.31003	179.91264	115.59924	132.82124	64.30167
9	585.77662	394.14466	289.71856	103.83358	91.36659	271.94686	98.33649
10	351.51561	348.10987	284.11023	58.38918	90.20654	243.74709	104.85687
11	36.01984	45.02511	76.81904	51.85685	95.06895	101.47254	74.32138
12	25.21799	21.59568	24.24302	21.10046	24.71515	35.66377	45.03811
	mcks	mckc	mckn	vers	verc	vern	
1	25.64349	39.16947	41.09900	15.48269	28.44701	51.02759	
2	26.08734	23.90988	37.54935	18.53766	35.96887	38.33652	
3	50.84003	49.60444	68.52083	33.21497	65.07539	93.27886	
4	35.43614	46.08659	49.72187	25.06213	50.93191	58.70650	
5	56.12547	64.98067	92.52041	60.40615	116.18901	143.62273	
6	59.45050	63.58245	87.15712	49.93868	94.26730	102.52321	
7	55.44425	53.42378	66.03424	53.07087	95.20746	79.77111	
8	28.52333	26.23135	40.93894	43.21188	67.68382	55.69715	
9	101.13190	92.22176	167.40969	135.87252	205.25939	290.56567	
10	136.56818	137.47981	212.35868	154.14620	232.88728	248.34502	
11	70.94292	68.49805	102.70687	52.50683	100.53102	133.21075	
12	20.23900	28.98390	36.88062	22.24305	43.60284	55.66250	

```
> read.csv("sit.csv")
```

	X	caas	caac	caan	ests	estc	estn	cmps	cmpc	cmpn	squs	squc	squn	squz	whas
1	jan	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	feb	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	mar	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	apr	0	0	0	0	0	0	0	0	2	0	0	1	0	1
5	may	2	0	0	1	1	2	0	1	24	1	0	2	3	2
6	jun	1	48	14	0	0	6	16	43	121	15	10	19	1	15
7	jul	30	78	40	5	8	12	61	35	195	52	8	45	11	33

8	aug	6	52	0	0	0	2	100	56	476	209	55	67	45	128
9	sep	12	1	0	0	0	0	8	48	303	51	30	40	10	363
10	oct	21	0	0	0	0	0	1	7	132	49	5	3	6	139
11	nov	0	0	0	0	0	0	0	0	4	0	0	0	0	13
12	dec	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	whac	whan	wris	wric	wrin	wriz	mcks	mckc	mckn	vers	verc	vern			
1	0	0	0	0	0	0	0	0	7	0	0	10			
2	0	0	0	0	0	0	0	0	0	0	0	0			
3	0	0	0	0	0	0	0	0	0	0	0	0			
4	0	0	0	0	0	0	0	0	0	0	0	0			
5	2	8	0	1	5	0	0	0	0	0	0	0			
6	2	3	2	3	0	1	1	2	1	1	7	1			
7	8	1	4	24	1	0	1	2	6	0	2	3			
8	21	25	81	43	12	2	0	0	2	10	3	4			
9	130	34	40	13	91	4	7	9	63	162	107	23			
10	74	41	0	13	97	6	17	27	130	307	286	101			
11	0	0	0	3	1	0	9	11	47	9	8	39			
12	3	2	1	0	0	0	0	4	19	1	0	0			

## 2 Randomization

The randomization procedure takes place in this R file:

```
> source("hw-randomization-time.R") # Randomization test routine
```

## 3 Outputs

The procedure outputs results to this folder:

```
> list.files(path="./random-results")
```

```
[1] "diff"                "mean-densities.csv" "mean-diffs.csv"
[4] "quartiles.csv"       "raw"
```

The folders “diff” and “raw” contain the raw results of each iteration of the Monte Carlo process. The folders have a file for each subblock (n=26). Raw is the randomized density in each iteration. “diff” is the difference between the simulated and observed densities in each iteration.

The files “mean-densities.csv”, “mean-diffs.csv”, and “quartiles.csv” summarize the data. “quartiles” is used to build the results graphs.