

# INTERNATIONAL DOLPHIN CONSERVATION PROGRAM

## INTERNATIONAL REVIEW PANEL

### 46<sup>TH</sup> MEETING

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### COMPARISON OF OBSERVER PROGRAMS

This paper presents comparisons between the IATTC observer program, by country, and the national programs of Colombia (PRODELCO), Ecuador (PROBECUADOR), Mexico (PNAAPD), Nicaragua and Panama (PRONAOP), Spain (PNOT) and Venezuela (PNOV). Comparisons between the IATTC program and the program of the Forum Fisheries Agency (FFA; for United States vessels), were not performed due to insufficient data. In accordance with the decision of the 42<sup>nd</sup> meeting of the IRP, comparisons of possible infractions identified by the Panel are included. The average differences between programs for 2000-2007 shown in items 2, 3, 5, 6 and 7 were tested statistically using a randomization test, as outlined in Appendix A, when data were available for three or more years for both programs. Statistical comparisons of other items were not possible because not all national programs provide by-set data to the IATTC. Average differences between programs were considered *significant* if the statistical test yielded a probability of 0.05 or less.

'Calendar year data' means data for sets that took place between January 1 and December 31 of a particular year. For example, for a trip that started in November 1999 and ended in February 2000, only data from sets made on or after January 1, 2000, would be used in the analyses for calendar year 2000. 'Departure year data' means that all data from trips that departed in a particular year were used; thus, all the data of a trip that departed in November 2000 and finished in February 2001 would be included in the analyses for 2000.

No comparison was done for 2005 for Program 6 or 2006 for Program 7 because of insufficient data.

#### 1. PERCENTAGE OF SETS BY SET TYPE

Calendar-year data. National program data are from annual summaries provided to the IATTC by the national programs. IATTC data are from the IATTC permanent database. Accidental dolphin sets are treated as either unassociated sets or floating-object sets. Because of rounding and sets on whales (not included in the table), percentages may not sum to 100%.

	<b>Dolphin</b>	<b>Unassociated</b>	<b>Floating object</b>	<b>Dolphin</b>	<b>Unassociated</b>	<b>Floating object</b>
	<b>Program 1</b>			<b>IATTC</b>		
2000	80.8	16.1	2.9	84.7	13.6	1.7
2001	86.5	10.7	2.8	88.0	10.0	1.8
2002	89.1	9.2	1.7	90.2	8.1	1.7
2003	86.7	10.1	3.1	85.9	10.5	3.3
2004	76.8	19.9	3.2	79.4	16.2	4.4
2005	70.5	24.4	5.1	83.6	10.6	5.5
2006	38.6	38.1	23.3	53.0	28.2	18.7
2007	47.9	26.9	25.2	55.1	23.9	20.8
	<b>Program 2</b>			<b>IATTC</b>		
2000	58.0	38.3	3.3	65.1	30.5	4.1
2001	82.0	16.8	1.2	75.2	23.3	1.4
2002	87.7	11.3	1.0	87.4	12.1	0.5
2003	84.0	15.0	0.9	88.0	10.8	1.2

2004	75.2	22.8	1.9	74.0	23.3	2.6
2005	64.3	33.9	1.5	66.5	31.5	1.7
2006	59.2	37.4	3.1	56.5	40.3	2.9
2007	53.1	42.9	3.9	51.9	44.7	3.3
	<b>Program 3</b>			<b>IATTC</b>		
2000	2.0	12.0	86.0	0.0	16.8	83.2
2001	0.0	23.0	77.0	0.03	20.1	79.8
2002	4.9	26.0	69.0	3.7	29.7	66.3
2003	6.8	44.7	48.5	2.6	45.0	52.3
2004	2.9	41.6	55.4	5.4	43.3	51.1
2005	6.4	50.8	42.6	2.7	47.7	49.4
2006	1.6	44.2	54.2	0.7	40.3	59.0
2007	0.2	33.1	66.6	0.4	31.9	67.7
	<b>Program 4</b>			<b>IATTC</b>		
2005	74.3	11.0	14.7	81.1	6.1	12.7
2006	53.0	16.1	30.9	67.8	11.7	20.5
2007	63.0	16.8	20.2	58.8	20.2	21.0
	<b>Program 5</b>			<b>IATTC</b>		
2006	56.6	18.0	25.4	35.1	38.2	26.2
2007	51.8	22.9	25.0	40.7	24.7	34.4
	<b>Program 6</b>			<b>IATTC</b>		
2003	0.0	1.9	98.1	0.0	7.9	92.1
2004	0.0	11.7	88.3	0.0	1.0	99.0
2006	0.0	2.7	97.3	0.0	0.7	99.3
2007	0.0	48.7	51.2	0.0	17.1	82.9
	<b>Program 7</b>			<b>IATTC</b>		
2007	65.4	27.9	6.7	60.7	18.3	21.0

## 2. PERCENTAGE OF TRIPS INVOLVING NO SETS ON DOLPHINS

Departure-year data, from the IRP database. The difference in the percentage of trips between programs was computed as the value for the national program less that for the IATTC. Excludes accidental sets. The average difference (column 4) is the average of the annual differences in column 3. NS = not significant; S = significant.

	<b>Program 1</b>	<b>IATTC</b>	<b>Difference</b>	<b>Average difference</b>
2000	0.0	0.0	0.0	
2001	2.8	7.0	-4.2	
2002	2.6	0.0	2.6	
2003	4.4	3.2	1.2	
2004	5.1	5.7	-0.6	
2005	2.4	4.7	-2.3	
2006	31.4	27.8	3.7	
2007	16.2	18.4	-2.2	-.02 (NS)

	<b>Program 2</b>	<b>IATTC</b>		
2000	6.7	4.3	2.4	
2001	1.2	6.3	-5.1	
2002	5.7	6.7	-1.0	
2003	10.5	8.5	2.0	

2004	9.9	10.8	-0.9	
2005	11.5	14.4	-2.9	
2006	20.5	21.8	-1.4	
2007	27.0	26.5	0.5	-0.8 (NS)
	<b>Program 3</b>	<b>IATTC</b>		
2000	83.3	100.0	-16.7	
2001	98.2	98.7	-0.5	
2002	97.1	94.8	2.3	
2003	94.0	96.0	-2.0	
2004	94.9	92.3	2.6	
2005	92.0	93.4	-1.4	
2006	97.6	97.1	0.5	
2007	95.8	97.5	-1.7	-2.1 (NS)
	<b>Program 4</b>	<b>IATTC</b>		
2005	0.0	0.0	0.0	
2006	4.8	0.0	4.8	
2007	0.0	0.0	0.0	1.6 (NS)
	<b>Program 5</b>	<b>IATTC</b>		
2006	41.5	50.0	-8.5	
2007	28.9	38.9	-10.0	
	<b>Program 6</b>	<b>IATTC</b>		
2003	100	100	0.0	
2004	100	100	0.0	
2006	100	100	0.0	
2007	100	100	0.0	(NA)
	<b>Program 7</b>	<b>IATTC</b>		
2007	0.0	20.0	-20.0	

### 3. AVERAGE NUMBER OF DAYS PER TRIP

Departure-year data. Length of the trip is computed as the number of days from departure date to arrival date. Data are from the IRP database. The difference in the average number of days per trip between programs was computed as the value for the national program less that for the IATTC. The average difference (column 4) is the average of the annual differences in column 3. NS = not significant; S = significant.

	<b>Program 1</b>	<b>IATTC</b>	<b>Difference</b>	<b>Average difference</b>
2000	53.7	46.7	7.0	
2001	34.2	33.0	1.2	
2002	32.8	33.6	-0.8	
2003	44.4	45.4	-1.0	
2004	54.7	50.7	4.0	
2005	57.2	62.8	-5.6	
2006	58.7	66.6	-7.9	
2007	60.2	62.6	-2.4	-0.7 (NS)

	<b>Program 2</b>	<b>IATTC</b>		
2000	49.0	48.3	0.7	
2001	41.0	39.8	1.2	
2002	34.2	34.4	-0.2	

2003	37.5	34.7	2.8	
2004	45.0	40.4	4.6	
2005	48.0	45.4	2.7	
2006	50.4	47.7	2.7	
2007	48.5	49.7	-1.2	1.7 (NS)
	<b>Program 3</b>	<b>IATTC</b>		
2000	43.0	44.8	-1.8	
2001	49.9	47.3	2.6	
2002	44.8	44.8	0.0	
2003	38.5	38.4	0.1	
2004	41.2	41.3	-0.1	
2005	40.2	38.2	2.0	
2006	46.4	41.6	4.7	
2007	50.7	49.3	1.4	1.1 (NS)
	<b>Program 4</b>	<b>IATTC</b>		
2005	92.5	79.3	13.2	
2006	64.6	73.1	-8.5	
2007	84.2	79.3	4.9	3.2 (NS)
	<b>Program 5</b>	<b>IATTC</b>		
2006	49.6	54.7	-5.1	
2007	67.0	59.7	7.3	
	<b>Program 6</b>	<b>IATTC</b>		
2003	47.8	49.3	-1.5	
2004	56.7	50.6	6.1	
2006	40.2	48.4	-8.2	
2007	57.8	58.5	-0.7	-1.1 (NS)
	<b>Program 7</b>	<b>IATTC</b>		
2007	53.6	58.8	-5.2	

#### 4. PERCENTAGE OF INTENTIONAL DOLPHIN SETS WITH ZERO MORTALITY

Calendar-year data. Excludes accidental set data. National program summary data were provided to the IATTC by the national programs. The difference in the percentage of intentional dolphin sets with zero mortality between programs was computed as the value for the national program less that for the IATTC. IATTC data are from the IATTC permanent database. Dashed lines indicate no dolphin sets were reported.

	<b>Program 1</b>	<b>IATTC</b>	<b>Difference</b>
2000	92.5	91.7	0.8
2001	93.5	91.7	1.8
2002	93.9	93.5	0.4
2003	93.1	94.1	-1.0
2004	92.8	92.9	-0.1
2005	93.0	93.5	-0.5
2006	92.9	91.1	1.8
2007	91.2	92.8	-1.6

	<b>Program 2</b>	<b>IATTC</b>	
2000	91.6	89.6	2.0
2001	92.5	91.0	1.5

2002	93.7	92.6	1.1
2003	94.0	93.8	0.2
2004	93.7	93.5	0.2
2005	94.1	94.5	-0.4
2006	94.4	93.4	1.0
2007	95.3	94.5	0.80
	<b>Program 3</b>	<b>IATTC</b>	
2000	100.0	-----	-----
2001	-----	100.0	-----
2002	97.3	99.1	-1.8
2003	99.1	94.4	4.7
2004	95.7	95.8	-0.1
2005	95.2	97.2	-2.0
2006	100.0	100.0	0.0
2007	100.0	100.0	0.0
	<b>Program 4</b>	<b>IATTC</b>	
2005	95.1	94.8	0.3
2006	94.3	92.1	2.2
2007	93.4	95.0	-1.6
	<b>Program 5</b>	<b>IATTC</b>	
2006	98.6	97.5	1.1
2007	97.9	97.7	0.2
	<b>Program 6</b>	<b>IATTC</b>	
2003	-----	-----	-----
2004	-----	-----	-----
2006	-----	-----	-----
2007	-----	-----	-----
	<b>Program 7</b>	<b>IATTC</b>	
2007	96.4	92.3	4.1

## 5. AVERAGE MORTALITY PER SET

Calendar-year data. The average mortality per set (MPS) is computed as the sum of all dolphin mortalities in intentional dolphin sets, divided by the sum of all intentional dolphin sets during the study periods. The difference in the average mortality per set between programs was computed as the value for the national program less that for the IATTC. The average difference (column 4) is the average of the annual differences in column 3. Data are from the IRP database. NS = not significant; S = significant. Dashed lines indicate no dolphin sets were reported.

	<b>Program 1</b>	<b>IATTC</b>	<b>Difference</b>	<b>Average difference</b>
2000	0.149	0.171	-0.022	
2001	0.228	0.172	0.056	
2002	0.132	0.117	0.015	
2003	0.130	0.117	0.013	
2004	0.140	0.161	-0.021	
2005	0.121	0.121	-0.0003	
2006	0.127	0.156	-0.029	
2007	0.167	0.158	0.009	0.002 (NS)
	<b>Program 2</b>	<b>IATTC</b>		
2000	0.162	0.197	-0.035	

2001	0.143	0.151	-0.008	
2002	0.132	0.140	-0.008	
2003	0.105	0.106	-0.002	
2004	0.108	0.106	0.002	
2005	0.108	0.098	0.010	
2006	0.095	0.125	-0.030	
2007	0.087	0.094	-0.007	-0.010 (NS)
	<b>Program 3</b>	<b>IATTC</b>		
2000	0.0	-----	-----	
2001	-----	0.0	-----	
2002	0.013	0.018	-0.005	
2003	0.018	0.244	-0.226	
2004	0.149	0.125	0.024	
2005	0.096	0.093	0.003	
2006	0.0	0.0	0.0	
2007	0.0	0.0	0.0	-0.034 (NS)
	<b>Program 4</b>	<b>IATTC</b>		
2005	0.080	0.102	-0.022	
2006	0.117	0.150	-0.033	
2007	0.114	0.084	0.030	-0.008 (NS)
	<b>Program 5</b>	<b>IATTC</b>		
2006	0.029	0.063	-0.034	
2007	0.038	0.040	-0.002	
	<b>Program 6</b>	<b>IATTC</b>		
2003	-----	-----	-----	
2004	-----	-----	-----	
2006	-----	-----	-----	
2007	-----	-----	-----	(NA)
	<b>Program 7</b>	<b>IATTC</b>		
2007	0.108	0.128	-0.02	

## 6. AVERAGE RATE OF POSSIBLE OBSERVER INTERFERENCE INFRACTIONS

Departure-year data. The average rate of possible observer interference infractions is computed as the sum of the number of cases of interference reported by observers divided by the number of trips. The difference in the average rate of possible observer interference infractions between programs was computed as the value for the national program less that for the IATTC. The average difference (column 4) is the average of the annual differences in column 3. Data are from the IRP database. NS = not significant; S = significant.

### 6.1. Reported by observers

	<b>Program 1</b>	<b>IATTC</b>	<b>Difference</b>	<b>Average difference</b>
2000	0.030	0.0	0.03	
2001	0.0	0.0	0.0	
2002	0.0	0.0	0.0	
2003	0.0	0.016	-0.016	
2004	0.0	0.0	0.0	
2005	0.0	0.023	-0.023	
2006	0.0	0.028	-0.028	

2007	0.0	0.0	0.0	-0.005 (NS)
	<b>Program 2</b>	<b>IATTC</b>		
2000	0.0	0.065	-0.065	
2001	0.0	0.025	-0.025	
2002	0.01	0.03	-0.02	
2003	0.0	0.0	0.0	
2004	0.0	0.0	0.0	
2005	0.0	0.0	0.0	
2006	0.012	0.0	0.012	
2007	0.0	0.0	0.0	-0.013 (S)
	<b>Program 3</b>	<b>IATTC</b>		
2000	0.0	0.053	-0.053	
2001	0.0	0.0	0.0	
2002	0.0	0.0	0.0	
2003	0.0	0.012	-0.012	
2004	0.0	0.013	-0.013	
2005	0.03	0.005	0.025	
2006	0.012	0.006	0.006	
2007	0.0	0.013	-0.013	-0.007 (NS)
	<b>Program 4</b>	<b>IATTC</b>		
2005	0.056	0.042	0.014	
2006	0.0	0.048	-0.048	
2007	0.0	0.0	0.0	-0.011 (NS)
	<b>Program 5</b>	<b>IATTC</b>		
2006	0.0	0.047	-0.047	
2007	0.0	0.0	0.0	
	<b>Program 6</b>	<b>IATTC</b>		
2003	0.0	0.0	0.0	
2004	0.0	0.0	0.0	
2006	0.0	0.0	0.0	
2007	0.0	0.0	0.0	(NA)
	<b>Program 7</b>	<b>IATTC</b>		
2007	0.0	0.1	-0.1	

## 6.2. Identified by the IRP

	<b>Program 1</b>	<b>IATTC</b>	<b>Difference</b>	<b>Average difference</b>
2000	0.030	0.0	-0.030	
2001	0.0	0.0	0.0	
2002	0.0	0.0	0.0	
2003	0.0	0.016	-0.016	
2004	0.0	0.0	0.0	
2005	0.0	0.023	-0.023	
2006	0.0	0.028	-0.028	
2007	0.0	0.0	0.0	-0.005 (NS)

	<b>Program 2</b>	<b>IATTC</b>		
2000	0.0	0.054	-0.054	
2001	0.0	0.025	-0.025	
2002	0.011	0.033	-0.022	
2003	0.0	0.0	0.0	
2004	0.0	0.0	0.0	
2005	0.0	0.0	0.0	
2006	0.0	0.0	0.0	
2007	0.0	0.0	0.0	-0.013 (S)
	<b>Program 3</b>	<b>IATTC</b>		
2000	0.0	0.005	-0.005	
2001	0.0	0.0	0.0	
2002	0.0	0.0	0.0	
2003	0.0	0.012	-0.012	
2004	0.0	0.013	-0.013	
2005	0.030	0.005	0.025	
2006	0.0	0.006	-0.006	
2007	0.0	0.013	-0.013	-0.003 (NS)
	<b>Program 4</b>	<b>IATTC</b>		
2005	0.0	0.042	-0.042	
2006	0.0	0.048	-0.048	
2007	0.0	0.0	0.0	-0.030 (NS)
	<b>Program 5</b>	<b>IATTC</b>		
2006	0.0	0.031	-0.031	
2007	0.0	0.0	0.0	
	<b>Program 6</b>	<b>IATTC</b>		
2003	0.0	0.0	0.0	
2004	0.0	0.0	0.0	
2006	0.0	0.0	0.0	
2007	0.0	0.0	0.0	(NA)
	<b>Program 7</b>	<b>IATTC</b>		
2007	0.0	0.10	-0.10	

## 7. AVERAGE RATE OF POSSIBLE PROCEDURAL INFRACTIONS

Departure-year data. The average rate of possible procedural infractions (explosives use, night sets, no backdown, sets after reaching the DML, sacking up or brailing live dolphins, unavoided dolphin injury or death, and sets without continued rescue) is computed as the sum of such infractions reported by observers divided by the sum of the number of intentional dolphin sets. The difference in the average rate of possible procedural infractions between programs was computed as the value for the national program less that for the IATTC. The average difference (column 4) is the average of the annual differences in column 3. Data are from the IRP database. NS = not significant; S = significant. Dashed lines indicate no dolphin sets were reported.

### 7.1. Reported by observers

	<b>Program 1</b>	<b>IATTC</b>	<b>Difference</b>	<b>Average difference</b>
2000	0.062	0.089	-0.027	
2001	0.040	0.053	-0.013	



2002	0.018	0.019	-0.001	
2003	0.012	0.014	-0.001	
2004	0.009	0.011	-0.002	
2005	0.010	0.013	-0.003	
2006	0.012	0.025	-0.013	
2007	0.005	0.017	-0.012	-0.009 (NS)
	<b>Program 2</b>	<b>IATTC</b>		
2000	0.006	0.045	-0.039	
2001	0.005	0.013	-0.008	
2002	0.003	0.007	-0.004	
2003	0.001	0.002	-0.001	
2004	0.004	0.002	0.002	
2005	0.003	0.003	0.0005	
2006	0.0	0.002	-0.002	
2007	0.003	0.003	0.0	-0.006 (S)
	<b>Program 3</b>	<b>IATTC</b>		
2000	1.0	-----	-----	
2001	-----	0.062	-----	
2002	0.086	0.0	0.086	
2003	0.0	0.031	-0.031	
2004	0.017	0.006	0.011	
2005	0.008	0.022	-0.014	
2006	0.0	0.0	0.0	
2007	0.0	0.0	0.0	0.009 (NS)
	<b>Program 4</b>	<b>IATTC</b>		
2005	0.005	0.004	0.001	
2006	0.0	0.004	-0.004	
2007	0.004	0.006	-0.002	-0.002 (NS)
	<b>Program 5</b>	<b>IATTC</b>		
2006	0.010	0.009	0.0003	
2007	0.008	0.005	0.003	
	<b>Program 6</b>	<b>IATTC</b>		
2003	-----	-----	-----	
2004	-----	-----	-----	
2006	-----	-----	-----	
2007	-----	-----	-----	(NA)
	<b>Program 7</b>	<b>IATTC</b>		
2007	0.005	0.013	-0.008	

## 7.2. Identified by the IRP

	<b>Program 1</b>	<b>IATTC</b>	<b>Difference</b>	<b>Average difference</b>
2000	0.062	0.089	-0.022	
2001	0.040	0.053	-0.014	
2002	0.018	0.019	0.001	
2003	0.012	0.014	-0.001	
2004	0.009	0.011	-0.002	
2005	0.010	0.013	-0.002	
2006	0.012	0.025	-0.011	

2007	0.0	0.012	-0.012	-0.007 (NS)
	<b>Program 2</b>	<b>IATTC</b>		
2000	0.003	0.037	-0.034	
2001	0.003	0.010	-0.007	
2002	0.003	0.002	0.0004	
2003	0.0003	0.0	0.0003	
2004	0.0007	0.0	0.0007	
2005	0.001	0.001	0.0006	
2006	0.0	0.0	0.0	
2007	0.0	0.0	0.0	-0.005 (S)
	<b>Program 3</b>	<b>IATTC</b>		
2000	1.0	-----		
2001	-----	0.0		
2002	0.086	0.0	0.086	
2003	0.0	0.020	-0.020	
2004	0.0	0.0	0.0	
2005	0.0	0.0	0.0	
2006	0.0	0.0	0.0	
2007	0.0	0.0	0.0	0.011 (NS)
	<b>Program 4</b>	<b>IATTC</b>		
2005	0.002	0.002	-0.0008	
2006	0.0	0.002	-0.002	
2007	0.0	0.0	0.0	-0.001 (NS)
	<b>Program 5</b>	<b>IATTC</b>		
2006	0.003	0.0	0.003	
2007	0.001	0.0	0.001	
	<b>Program 6</b>	<b>IATTC</b>		
2003	-----	-----	-----	
2004	-----	-----	-----	
2006	-----	-----	-----	
2007	-----	-----	-----	(NA)
	<b>Program 7</b>	<b>IATTC</b>		
2007	0.0	0.006	-0.006	

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The comparisons presented in this series of papers have focused on differences among the results of the programs. Any such differences do not necessarily indicate whether the results of one program are better than those of another, but may indicate persistent differences in observer training, data handling techniques, *etc.* Obviously, the programs should collaborate to try to identify and to remove any such differences. However, whether or not there are differences among programs, individual observers in any program could be reporting unreliable data, and a lack of differences between programs does not guarantee data reliability.

The Secretariat has started a program of analysis of IATTC observer data to look for instances of unusual patterns of reporting by observers. Advanced statistical analyses are being developed to detect observers whose data exhibit patterns of unusual set types given other data related to the set, unusually low dolphin mortality in circumstances in which higher mortality would be expected, and unusual patterns of tuna catches and dolphin mortality.

This work is at an early stage, but if it is successful, it will be more fruitful to apply this type of analysis to all observers than to focus solely on differences among programs.

## **APPENDIX A. DESCRIPTION OF THE RANDOMIZATION TEST**

To statistically evaluate differences between programs, a randomization test was used to obtain an estimate of the probability that an average annual difference as large as, or larger than, that observed could be due to the chance assignment of trips to programs. The test was performed by randomly assigning trips from the pooled IRP data set for a particular country, by year, to two programs, and then computing the simulated average annual difference in the quantity of interest (e.g., average mortality per set) between programs for the random sample of trips. A total of 4,999 random samples of trips were simulated. The *p*-value for this test was computed as the proportion of simulated average annual differences with an absolute value as large as, or larger, than that actually observed. These calculations represent an approximation to a two-tailed test of the null hypothesis: no difference between programs.