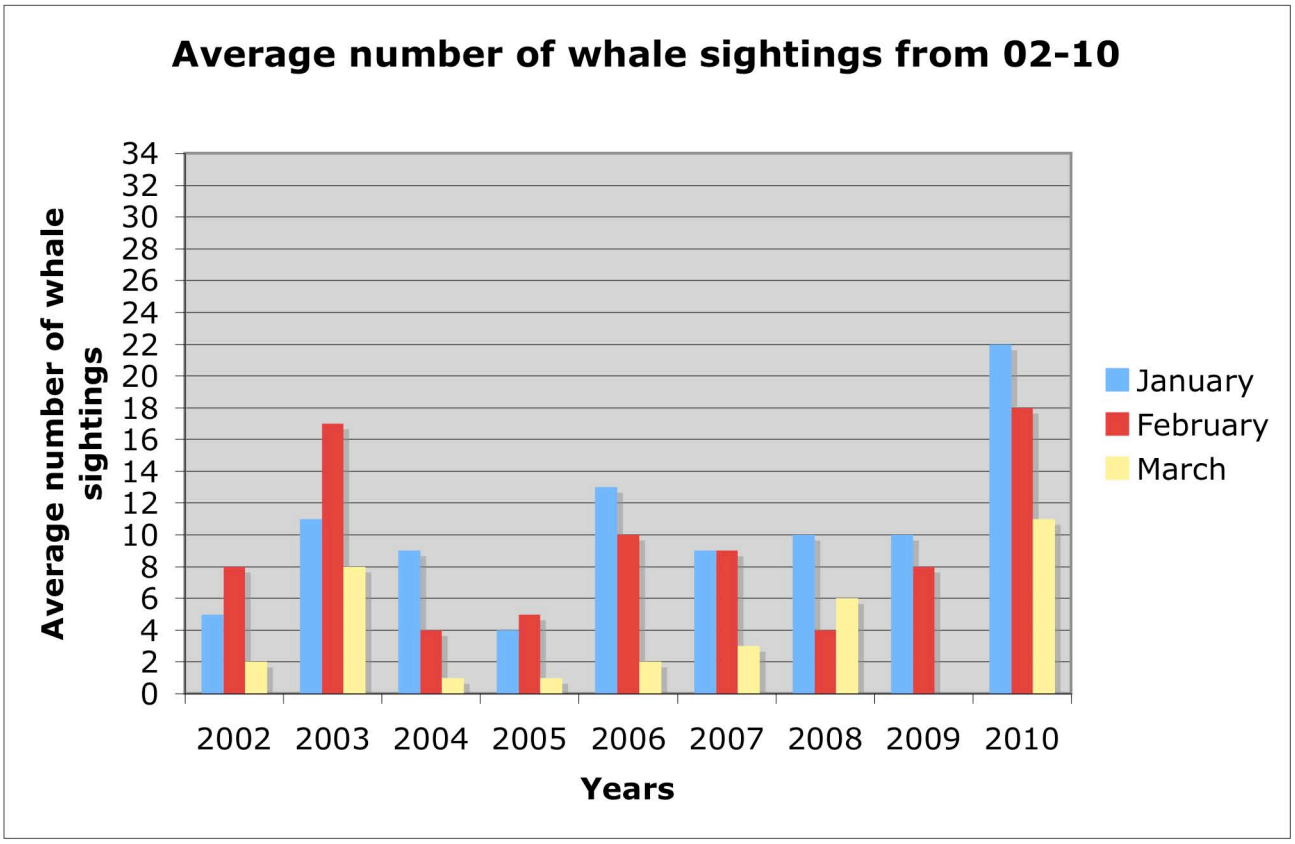
Island: Hawaii Site# 10: Mile Marker 7
Elevation: 180 ft Coastline: Kohala Coast

Average number of whale sightings from 2002-2010			
Years	**January**	**February**	**March**
2002	5	8	2
2003	11	17	8
2004	9	4	1
2005	4	5	1
2006	13	10	2
2007	9	9	3
2008	10	4	6
2009	10	8	NA
2010	22	18	11

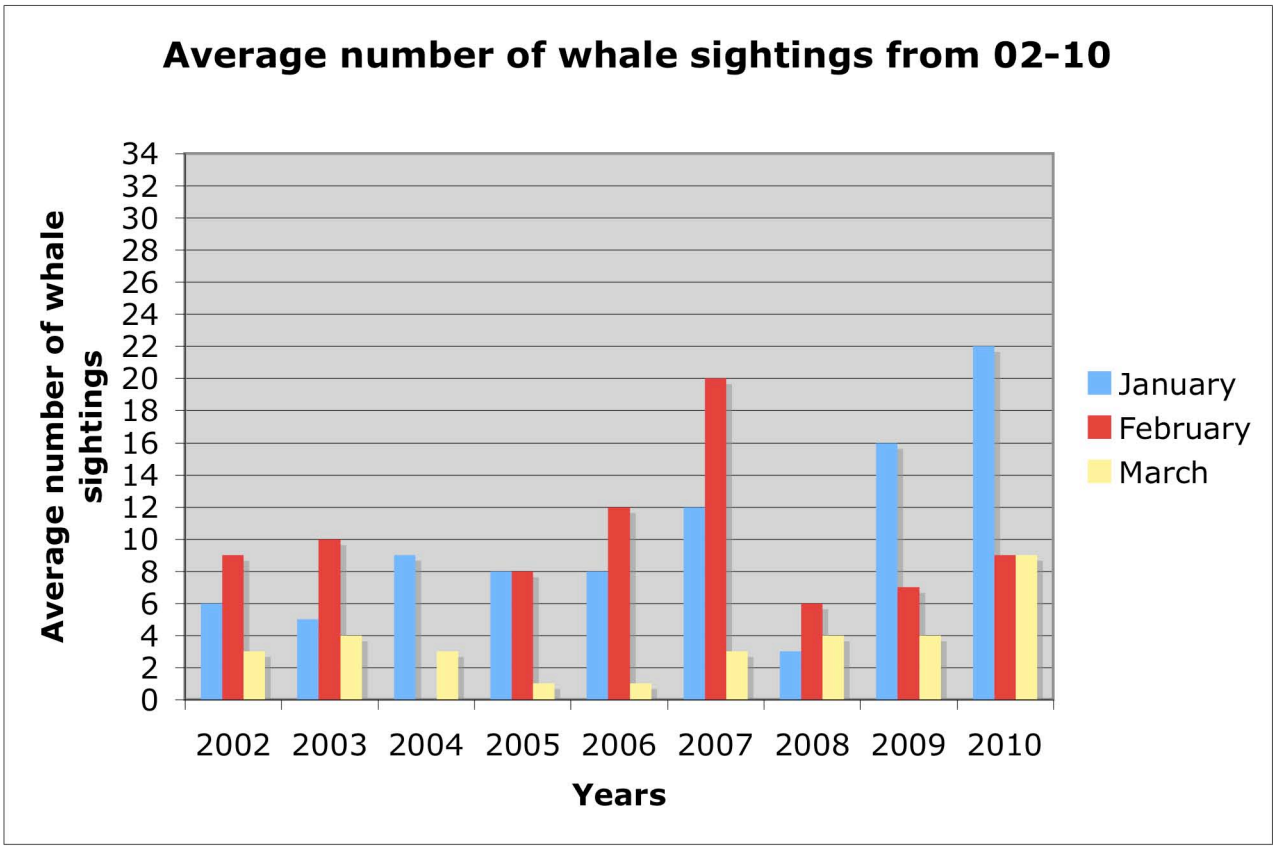


Analysis:

This graph depicts the average number of humpback whales sightings per 15-minute count period (0800-1215) in January, February and March over the years 2002-2010 observed from the shore-based site Mile Marker 7 on the island of Hawaii.

Island: Hawaii Site# 11: Lapakahi State Park
Elevation: 100 ft Coastline: Kohala Coast

Average number of whale sightings from 2002-2010			
Years	**January**	**February**	**March**
2002	6	9	3
2003	5	10	4
2004	9	NA	3
2005	8	8	1
2006	8	12	1
2007	12	20	3
2008	3	6	4
2009	16	7	4
2010	22	9	9

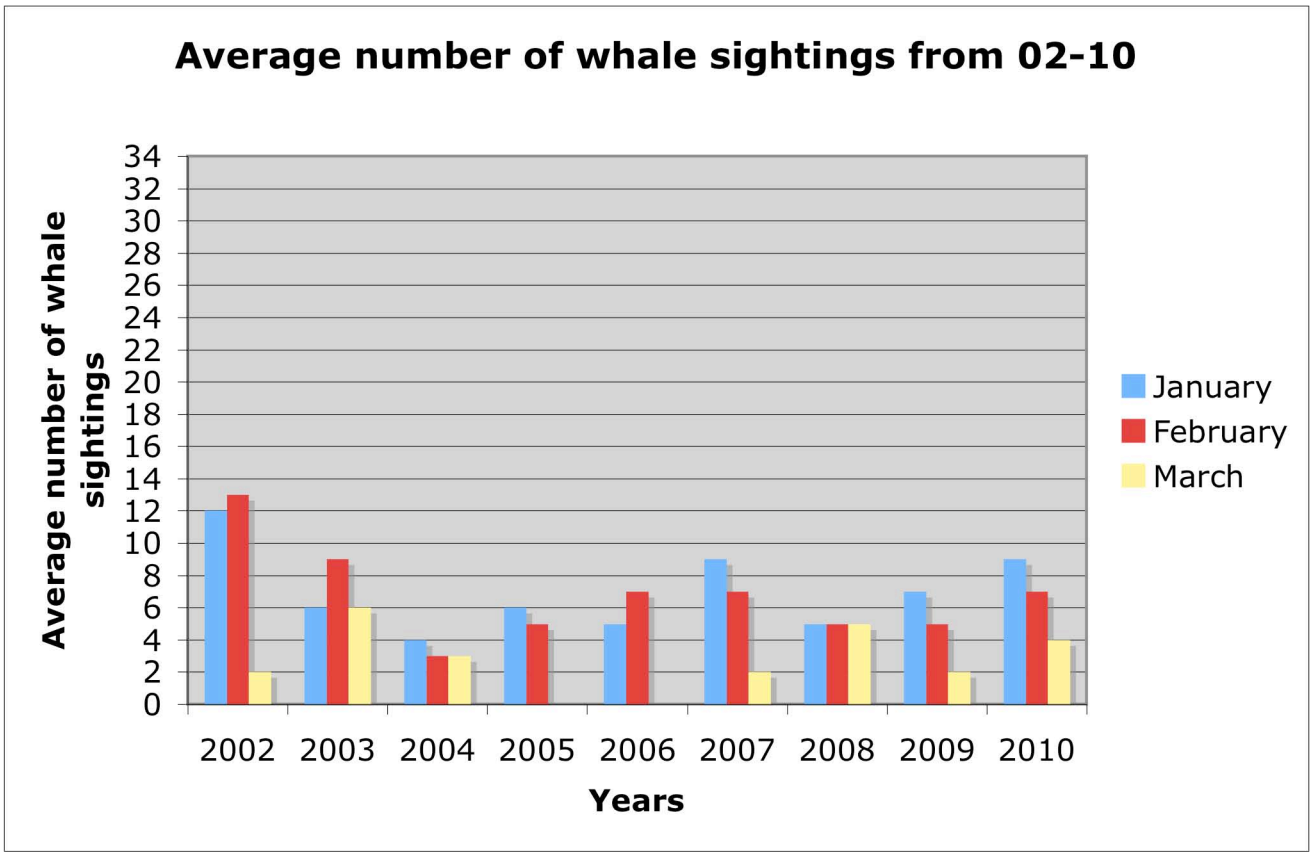


Analysis:

This graph depicts the average number of humpback whales sightings per 15-minute count period (0800-1215) in January, February and March over the years 2002-2010 observed from the shore-based site Lapakahi State Park on the island of Hawaii.

Island: Hawaii Site # 12 : Kapaa Beach Park
Elevation: 20 ft Coastline: Kohala Coast

Average number of whale sightings from 2002-2010			
Years	**January**	**February**	**March**
2002	12	13	2
2003	6	9	6
2004	4	3	3
2005	6	5	0
2006	5	7	0
2007	9	7	2
2008	5	5	5
2009	7	5	2
2010	9	7	4

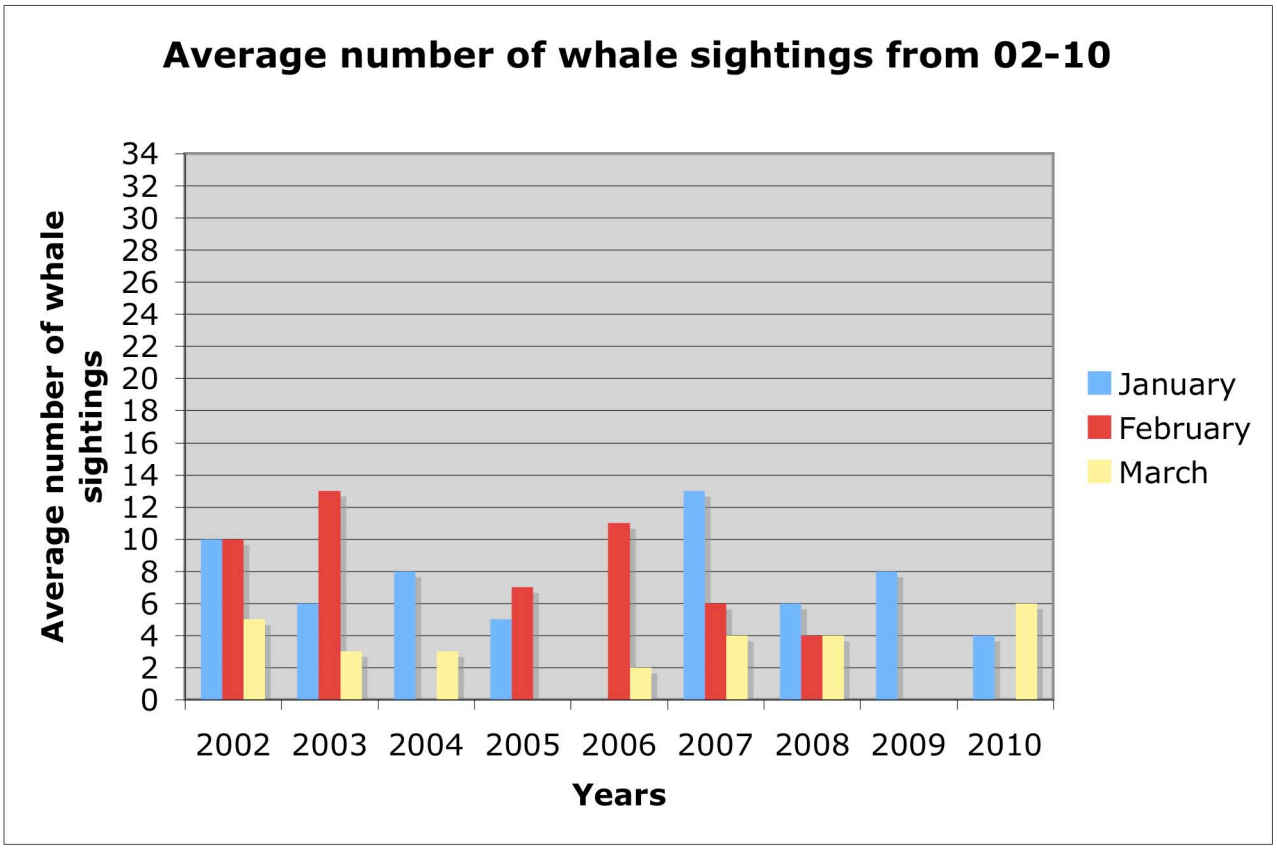


Analysis:

This graph depicts the average number of humpback whales sightings per 15-minute count period (0800-1215) in January, February and March over the years 2002-2010 observed from the shore-based site Kapaa Beach Park on the island of Hawaii.

Island: Hawaii Site# 13: Old Coast Guard Road
Elevation: 20-40 ft Coastline: Kohala Coast

Average number of whale sightings from 2002-2010			
Years	**January**	**February**	**March**
2002	10	10	5
2003	6	13	3
2004	8	NA	3
2005	5	7	NA
2006	0	11	2
2007	13	6	4
2008	6	4	4
2009	8	NA	NA
2010	4	NA	6

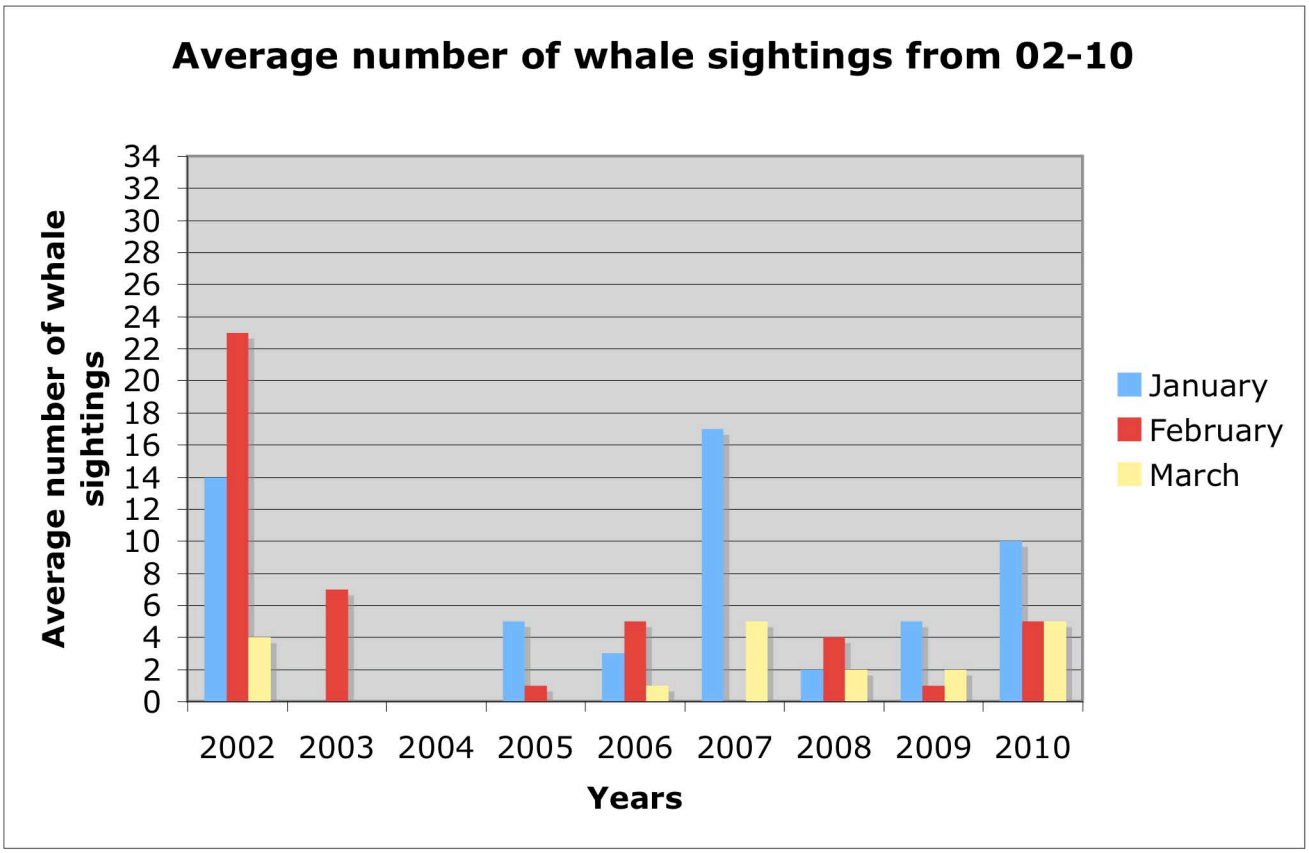


Analysis:

This graph depicts the average number of humpback whales sightings per 15-minute count period (0800-1215) in January, February and March over the years 2002-2010 observed from the shore-based site Old Coast Guard Road on the island of Hawaii.

Island: Hawaii Site# 14: Upolu Point
Elevation: 40 ft Coastline: Kohala Coast

Average number of whale sightings from 2002-2010			
Years	**January**	**February**	**March**
2002	14	23	4
2003	NA	7	NA
2004	0	NA	NA
2005	5	1	NA
2006	3	5	1
2007	17	0	5
2008	2	4	2
2009	5	1	2
2010	10	5	5

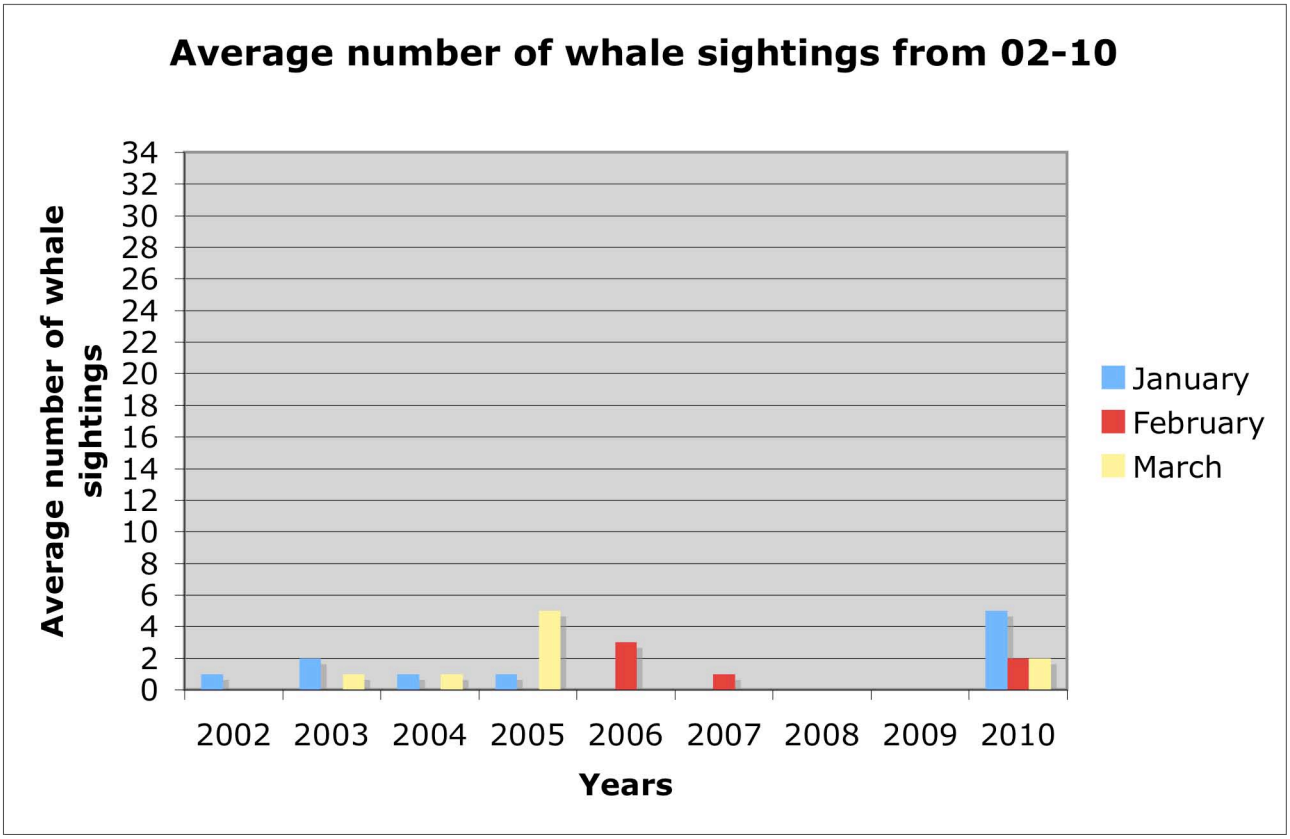


Analysis:

This graph depicts the average number of humpback whales sightings per 15-minute count period (0800-1215) in January, February and March over the years 2002-2010 observed from the shore-based site Upolu Point on the island of Hawaii.

Island: Hawaii Site# 15: Waipio Valley Lookout
Elevation: 880 ft Coastline: Hamakua Coast

Average number of whale sightings from 2002-2010			
Years	**January**	**February**	**March**
2002	1	0	0
2003	2	0	1
2004	1	NA	1
2005	1	0	5
2006	0	3	0
2007	0	1	0
2008	NA	NA	NA
2009	0	NA	0
2010	5	2	2

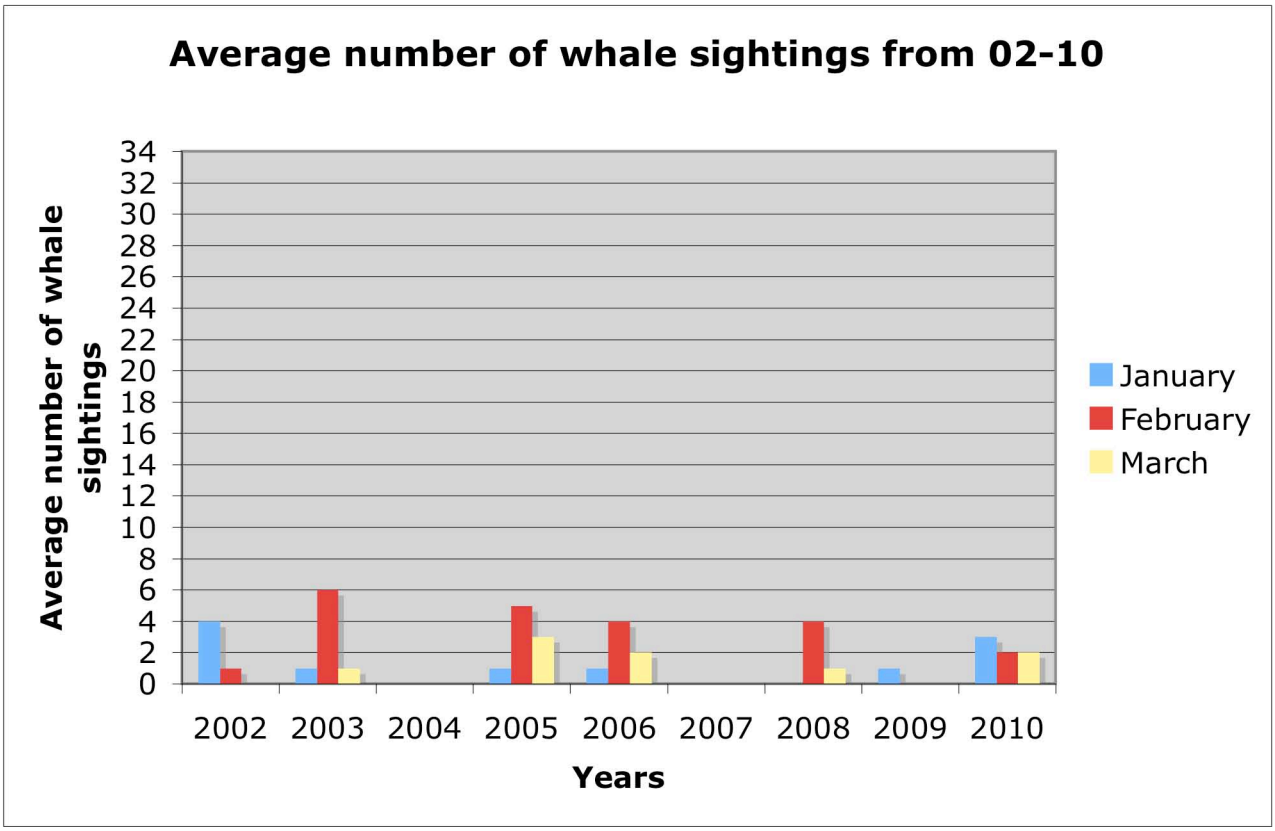


Analysis:

This graph depicts the average number of humpback whales sightings per 15-minute count period (0800-1215) in January, February and March over the years 2002-2010 observed from the shore-based site Waipio Valley Lookout on the island of Hawaii.

Island: Hawaii Site# 16: Laupahoehoe Scenic Lookout
Elevation: 400 ft Coastline: Hamakua Coast

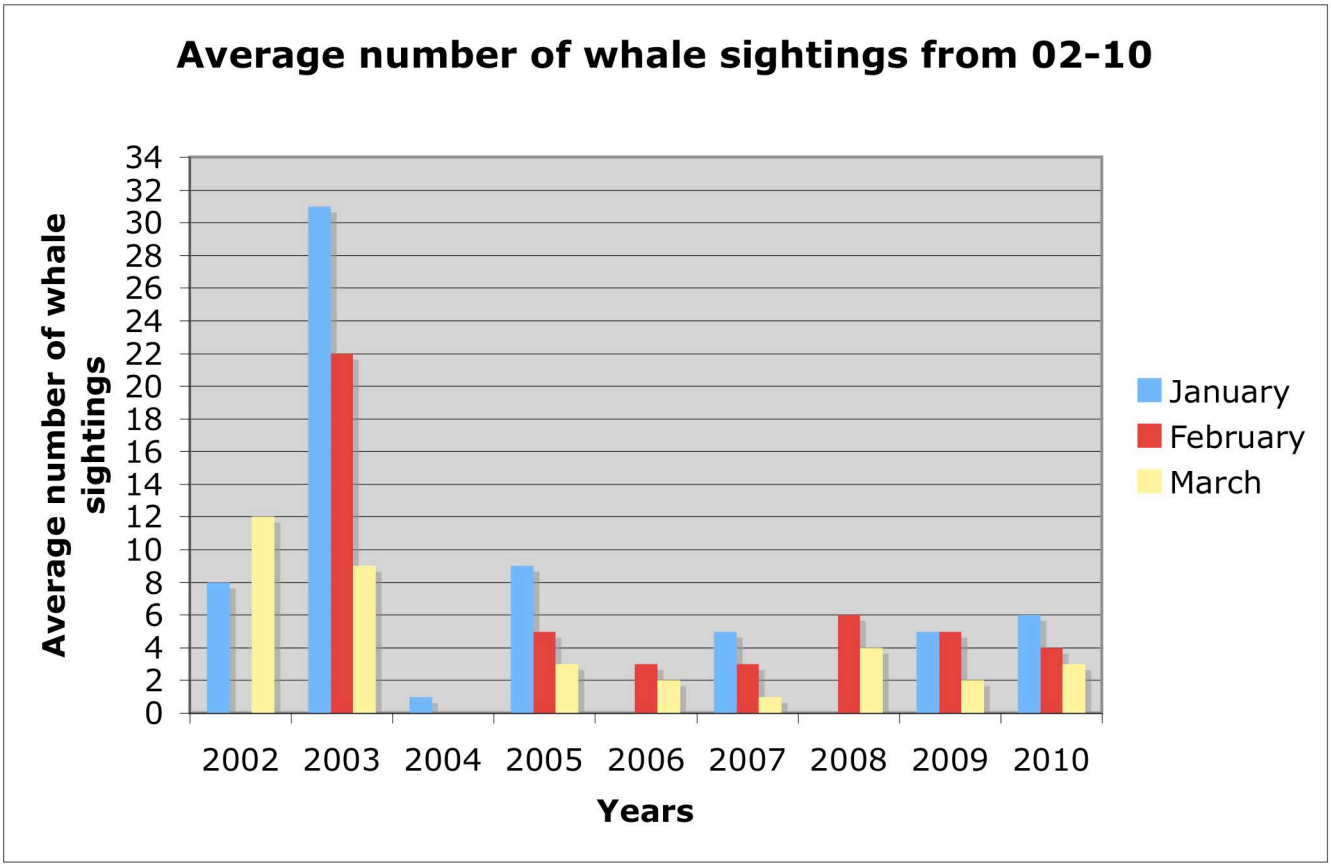
Average number of whale sightings from 2002-2010			
Years	**January**	**February**	**March**
2002	4	1	0
2003	1	6	1
2004	0	NA	0
2005	1	5	3
2006	1	4	2
2007	0	0	0
2008	0	4	1
2009	1	0	0
2010	3	2	2



Analysis:
This graph depicts the average number of humpback whales sightings per 15-minute count period (0800-1215) in January, February and March over the years 2002-2010 observed from the shore-based site Laupahoehoe Scenic Lookout on the island of Hawaii.

Island: Hawaii Site#17: Onekahakaha
Elevation: 0 ft Coastline: Hamakua Coast

Average number of whale sightings from 2002-2010			
Years	**January**	**February**	**March**
2002	8	0	12
2003	31	22	9
2004	1	0	0
2005	9	5	3
2006	0	3	2
2007	5	3	1
2008	0	6	4
2009	5	5	2
2010	6	4	3

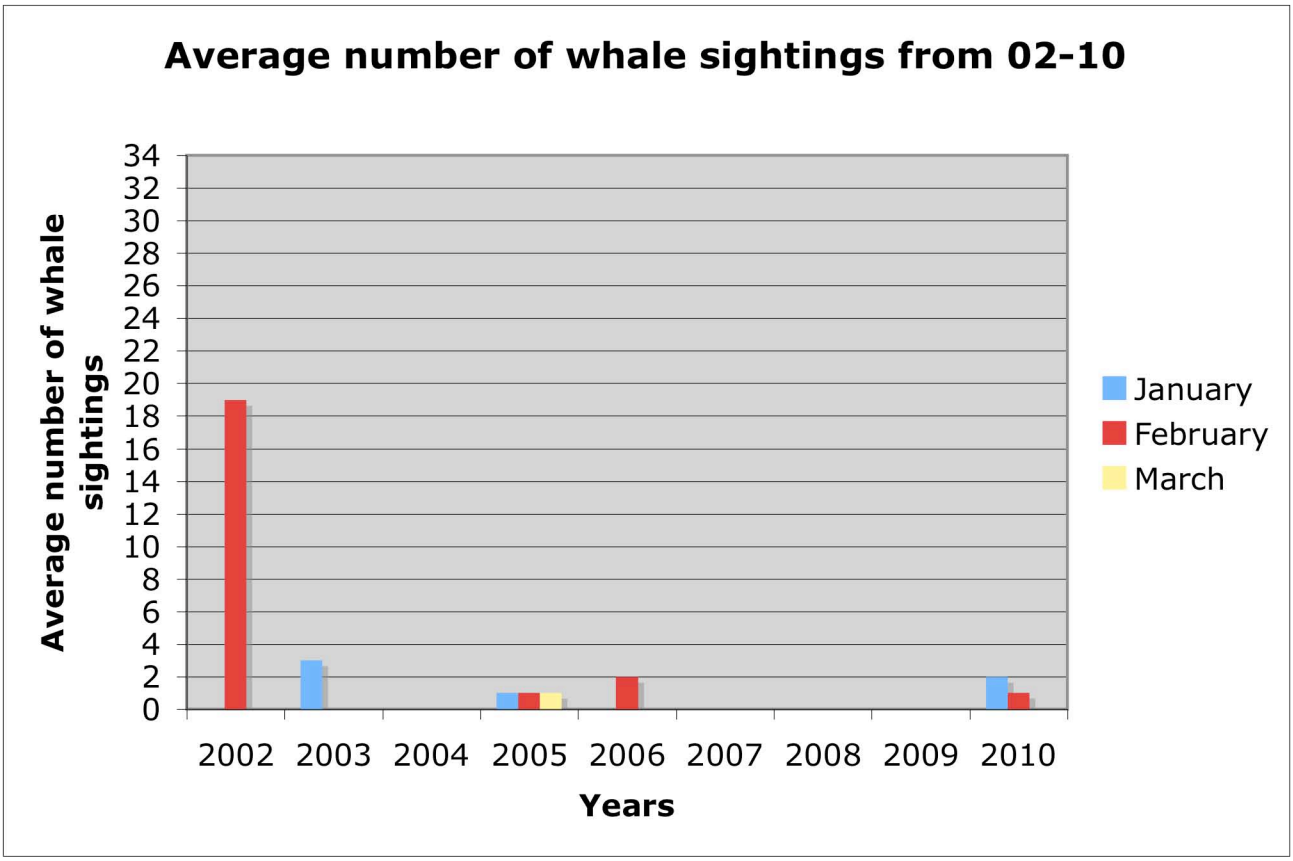


Analysis:

This graph depicts the average number of humpback whales sightings per 15-minute count period (0800-1215) in January, February and March over the years 2002-2010 observed from the shore-based site Onekahakaha on the island of Hawaii.

Island: Hawaii Site# 18: Kumukahi Lighthouse
Elevation: 40 ft Coastline: Hamakua Coast

Average number of whale sightings from 2002-2010			
Years	**January**	**February**	**March**
2002	0	19	0
2003	3	0	0
2004	0	NA	0
2005	1	1	1
2006	0	2	0
2007	0	0	0
2008	0	0	0
2009	NA	0	NA
2010	2	1	0

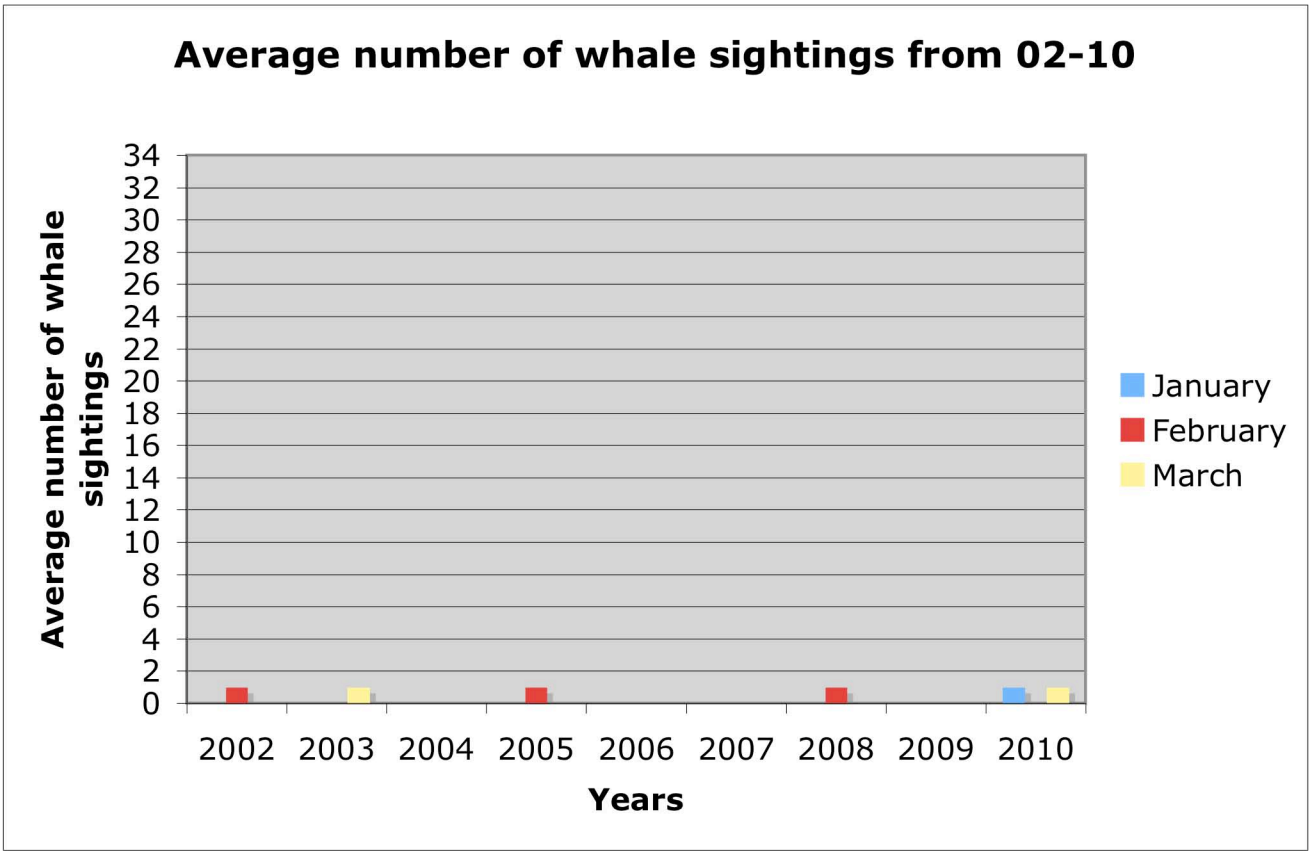


Analysis:

This graph depicts the average number of humpback whales sightings per 15-minute count period (0800-1215) in January, February and March over the years 2002-2010 observed from the shore-based site Kumukahi Lighthouse on the island of Hawaii.

Island: Hawaii Site# 19:Kehena
Elevation: 60 ft Coastline: Hamakua Coast

Average number of whale sightings from 2002-2010			
Years	**January**	**February**	**March**
2002	0	1	0
2003	0	0	1
2004	0	NA	0
2005	0	1	NA
2006	0	0	0
2007	0	0	NA
2008	0	1	0
2009	0	0	0
2010	1	NA	1

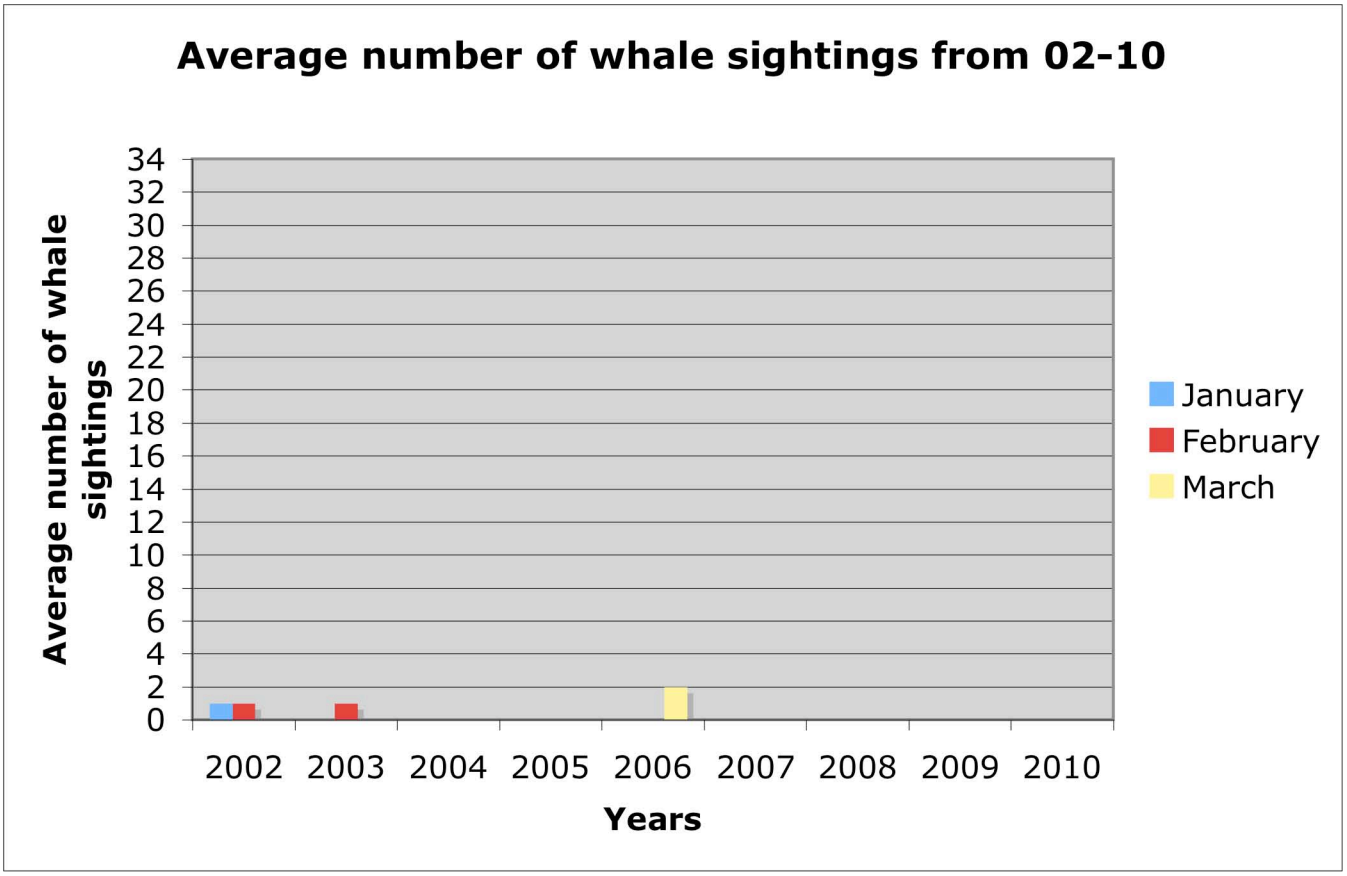


Analysis:

This graph depicts the average number of humpback whales sightings per 15-minute count period (0800-1215) in January, February and March over the years 2002-2010 observed from the shore-based site Kehena on the island of Hawaii.

Island: Hawaii Site# 20: Kaena Point
Elevation: 30-40 ft Coastline: Hamakua Coast

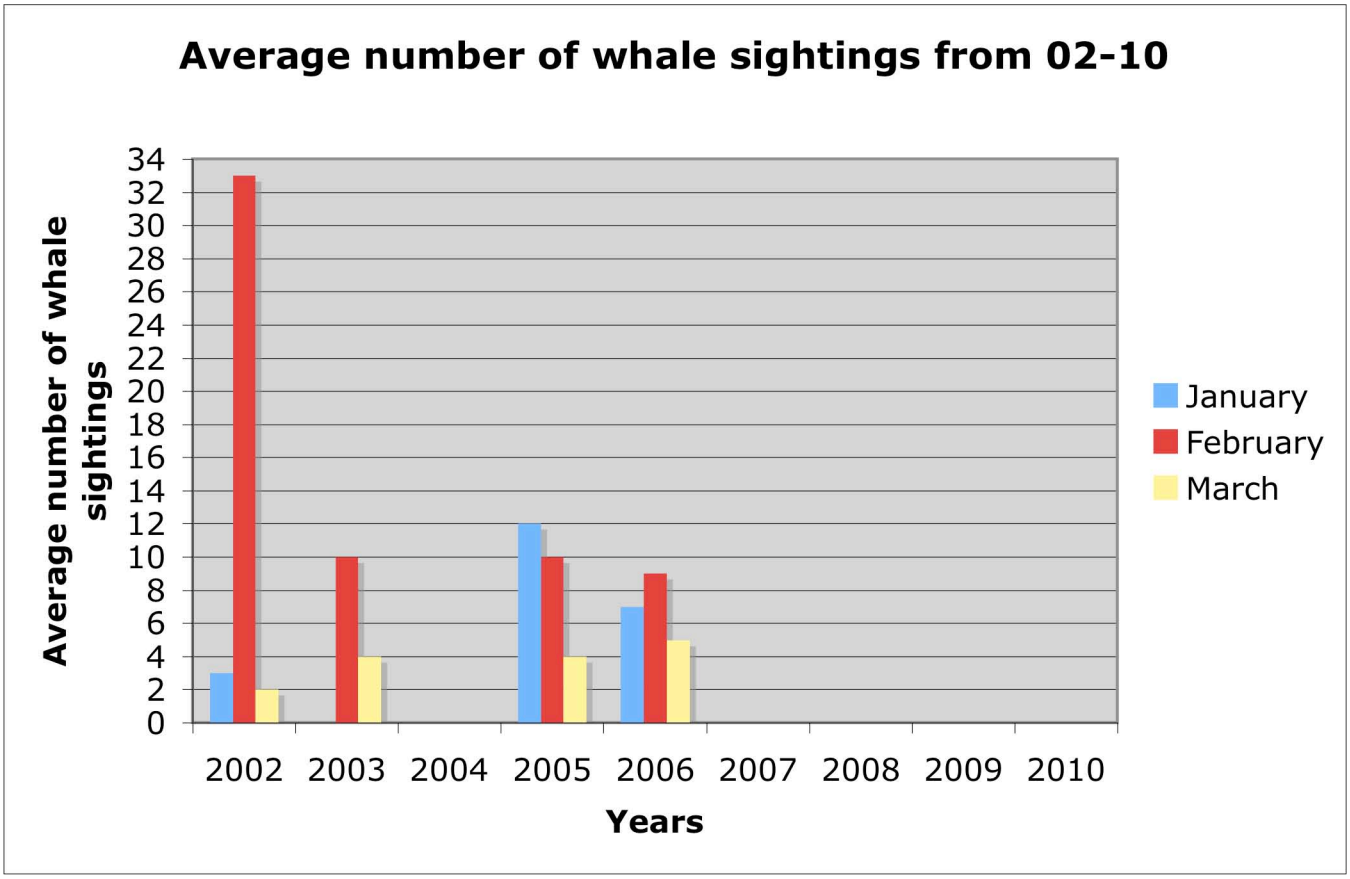
Average number of whale sightings from 2002-2010			
Years	**January**	**February**	**March**
2002	1	1	0
2003	0	1	0
2004	0	NA	0
2005	0	0	0
2006	0	0	2
2007	0	0	NA
2008	NA	NA	NA
2009	NA	NA	NA
2010	NA	NA	NA



Analysis:
This graph depicts the average number of humpback whales sightings per 15-minute count period (0800-1215) in January, February and March over the years 2002-2010 observed from the shore-based site Kaena Point on the island of Hawaii.

Island: Hawaii Site# 21:Paukaa Point
Elevation: 130 ft Coastline: Hamakua Coast

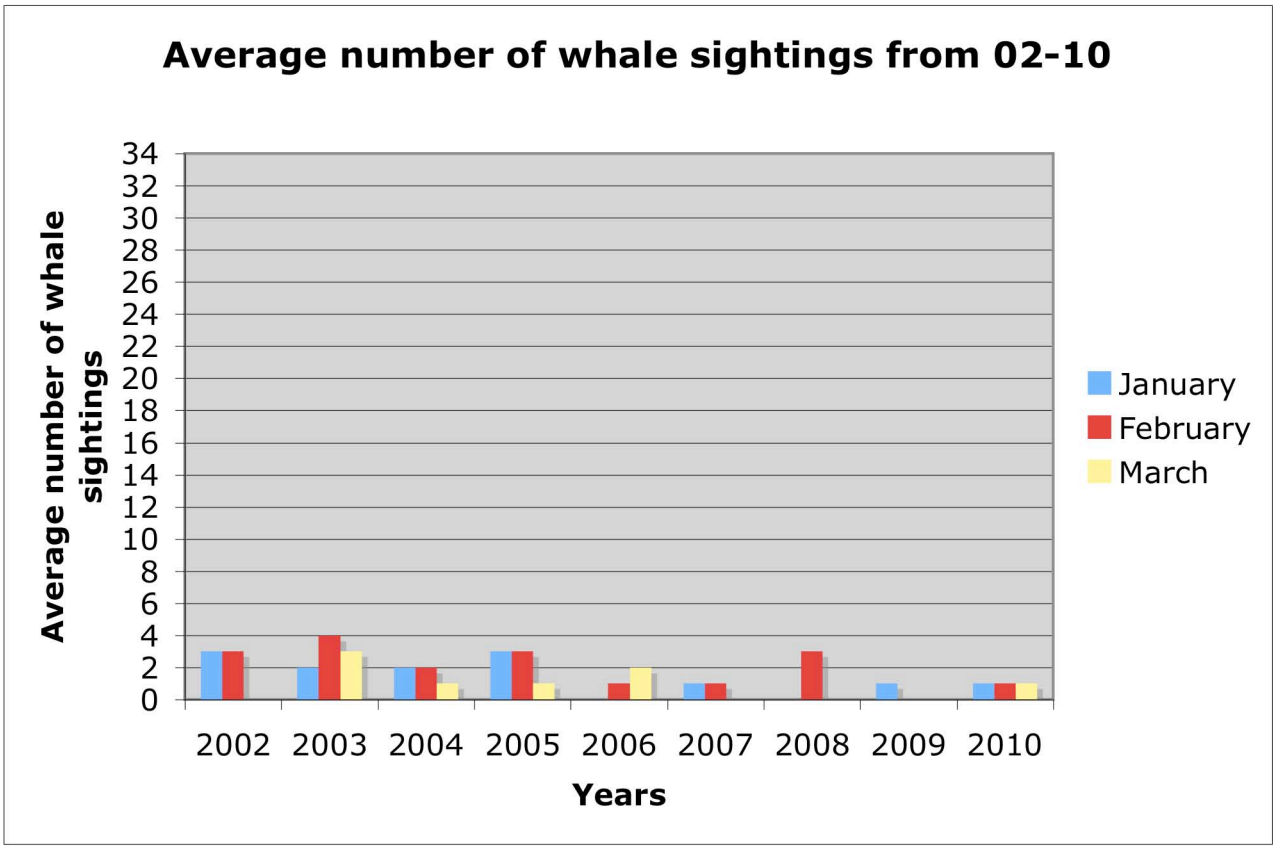
Average number of whale sightings from 2002-2010			
Years	**January**	**February**	**March**
2002	3	33	2
2003	0	10	4
2004	NA	NA	NA
2005	12	10	4
2006	7	9	5
2007	NA	NA	NA
2008	NA	NA	NA
2009	NA	NA	NA
2010	NA	NA	NA



Analysis:
This graph depicts the average number of humpback whales sightings per 15-minute count period (0800-1215) in January, February and March over the years 2002-2010 observed from the shore-based site Paukaa Point on the island of Hawaii.

Island: Hawaii Site# 22: Ookala
Elevation: 265 ft Coastline: Hamakua Coast

Average number of whale sightings from 2002-2010			
Years	**January**	**February**	**March**
2002	3	3	0
2003	2	4	3
2004	2	2	1
2005	3	3	1
2006	0	1	2
2007	1	1	0
2008	0	3	0
2009	1	0	0
2010	1	1	1



Analysis:

This graph depicts the average number of humpback whales sightings per 15-minute count period (0800-1215) in January, February and March over the years 2002-2010 observed from the shore-based site Ookala on the island of Hawaii.

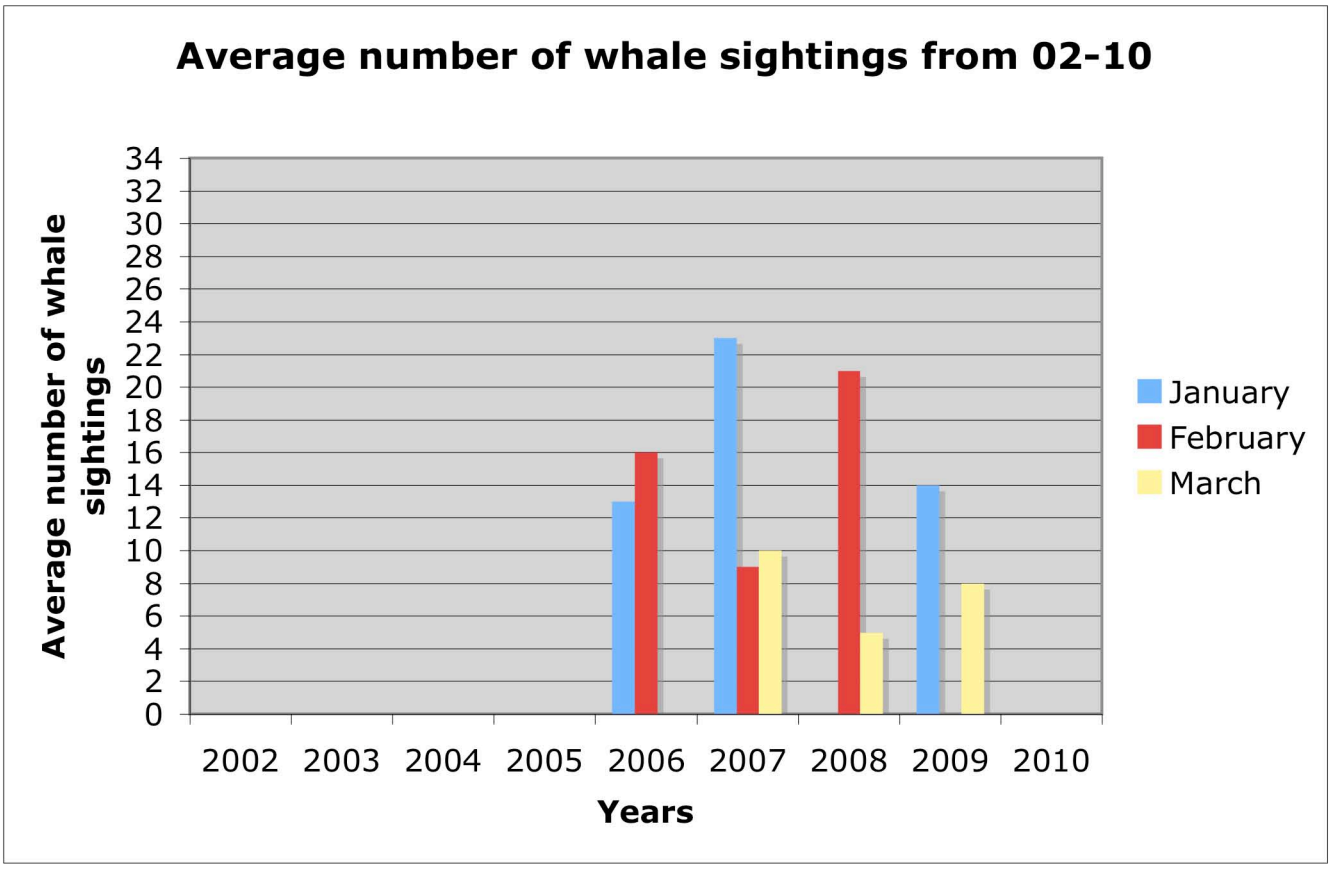
Census Results for Kahoolawe

Data for Kahoolawe is collected from only one site for the years, 2006 to 2009. No data was collected for 2010. It is, therefore, difficult to compare its census data and results with the other islands. However, it is important that we examine the data collected from ocean counts at Lua Kealia Luna, Kahoolawe's only site, because it is a known fact that the majority of the North Pacific stock of humpback whales reside in and around the waters of Maui County. Since another organization conducts a whale count with different protocols on the island of Maui, count data from Kahoolawe yields vital information to the sanctuary offices in regard to the sightings of humpback whales in this important geographical area.

2007 was the only year in which all three counts (January, February and March) for Lua Kealia Luna was conducted. For this particular year (2007), the most sightings occurred in January followed by March and then February. The average number of humpback whale sightings is highly variable for the four years that census data has been collected on Kahoolawe. In 2006 and 2008, February had the highest average; while in 2009, January had the highest overall average number of sightings. It is difficult to see a trend in the data, but the table shows that Kahoolawe has consistently high numbers of whale sightings. This helps support the researchers claim that waters around the islands of Maui and Kahoolawe contain the greatest density of humpback whales from year to year.

Island: Kahoolawe Site#1: Lua Kealia Luna
Elevation: Coastline:

Average number of whale sightings from 2002-2010			
Years	**January**	**February**	**March**
2002	NA	NA	NA
2003	NA	NA	NA
2004	NA	NA	NA
2005	NA	NA	NA
2006	13	16	NA
2007	23	9	10
2008	NA	21	5
2009	14	NA	8
2010	NA	NA	NA



Analysis:

This graph depicts the average number of humpback whales sightings per 15-minute count period (0800-1215) in January, February and March over the years 2002-2010 observed from the shore-based site Lua Kealia Luna on the island of Kahoolawe.

Chapter 4: Island-by-Island List of Most Consistent Sites

Question B: Which ocean count sites on each island are humpback whales sighted consistently from year to year?

Kauai's most consistent sites for seeing a humpback whale

As the table and graph on 81 illustrate, the four most consistent sites around Kauai for seeing humpback whales over every count period and every year on average are as follows: Poipu Beach Park, Makahuena Point, Kilauea Point National Wildlife Refuge and Crater Hill. These sites were deemed the most consistent for seeing whales because each site counted at least one whale every count period, every year with no site cancellations.

The following figures represent the highest average number of humpback whale sightings over the years 2002 through 2010 for every count month (January, February and March) for the four most consistent and reliable sites for spotting whales.

- Poipu Beach Park's highest average number of humpback whale sightings in 2002-2010 was January: 6, February: 5 and March: 3.

- Makahuena Point's highest average number of humpback whale sightings in 2002-2010 was January: 15, February: 7 and March: 5

- Kilauea Point National Wildlife Refuge's highest average number of humpback whale sightings in 2002-2010 was January: 13, February: 7 and March: 6

- Crater Hill's highest average number of humpback whale sightings in 2002-2010 was January: 12, February: 12 and March: 6

Hawaii's most consistent sites for seeing a humpback whale

As the table and graph on 82 illustrate, the four most consistent sites around Hawaii for seeing humpback whales over every count period and every year on average are as follows: Mile Marker 7, Lapakahi State Park, Pu'ukohala Heiau and Kapaa Beach Park. These sites were considered the most consistent for seeing whales because two of these, Mile Marker 7 and Lapakahi State Park, saw at least one whale every count every year a census was taken on average. The other two sites, Pu'ukohala Heiau and Kapaa Beach Park, were considered consistent because the results illustrated similar and consistent data over every count and every year a census was collected with a maximum of one site count closure and two average counts of zeros.

The following figures represent the highest average number of humpback whale sightings over the years 2002 through 2010 for every count month (January, February and March) for the four most overall consistent and reliable sites for spotting whales.

- Mile Marker 7's highest average number of humpback whale sightings in 2002-2010 was January: 22, February: 18 and March: 11

- Lapakahi State Park's highest average number of humpback whale sightings in 2002-2010 was January: 22, February: 20 and March: 9

- Puukohala Heiau's highest average number of humpback whale sightings in 2002-2010 was January: 14, February: 17 and March: 9

- Kapaa Beach Park's highest average number of humpback whale sightings in 2002-2010 was January: 12, February: 13 and March: 6

Oahu's most consistent sites for seeing a humpback whale

As the table and graph on 83 illustrate, the four most consistent sites around Oahu for seeing humpback whales over every count period and every year on average are as follows: Laie Point, Halona Blowhole, Lanai Lookout and Hanauma Bay. These sites were the most consistent for seeing whales because two of these, Laie Point and Lanai Lookout, saw at least one whale every count every year a census was taken on average. The other two sites, Halona Blowhole and Hanauma Bay, were considered consistent because the results illustrated similar and consistent data over every count and every year a census was collected with a maximum of two site count closure and one average count of zero.

The following figures represent the highest average number of humpback whale sightings over the years 2002 through 2010 for every count month (January, February and March) for the four most overall consistent and reliable sites for spotting whales.

- Laie Point's highest average number of humpback whale sightings in 2002-2010 was January: 8, February: 8 and March: 6

- Halona Blowhole's highest average number of humpback whale sightings in 2002-2010 was January: 6, February: 5 and March: 8

- Lanai Lookout's highest average number of humpback whale sightings in 2002-2010 was January: 8, February: 6, and March: 9

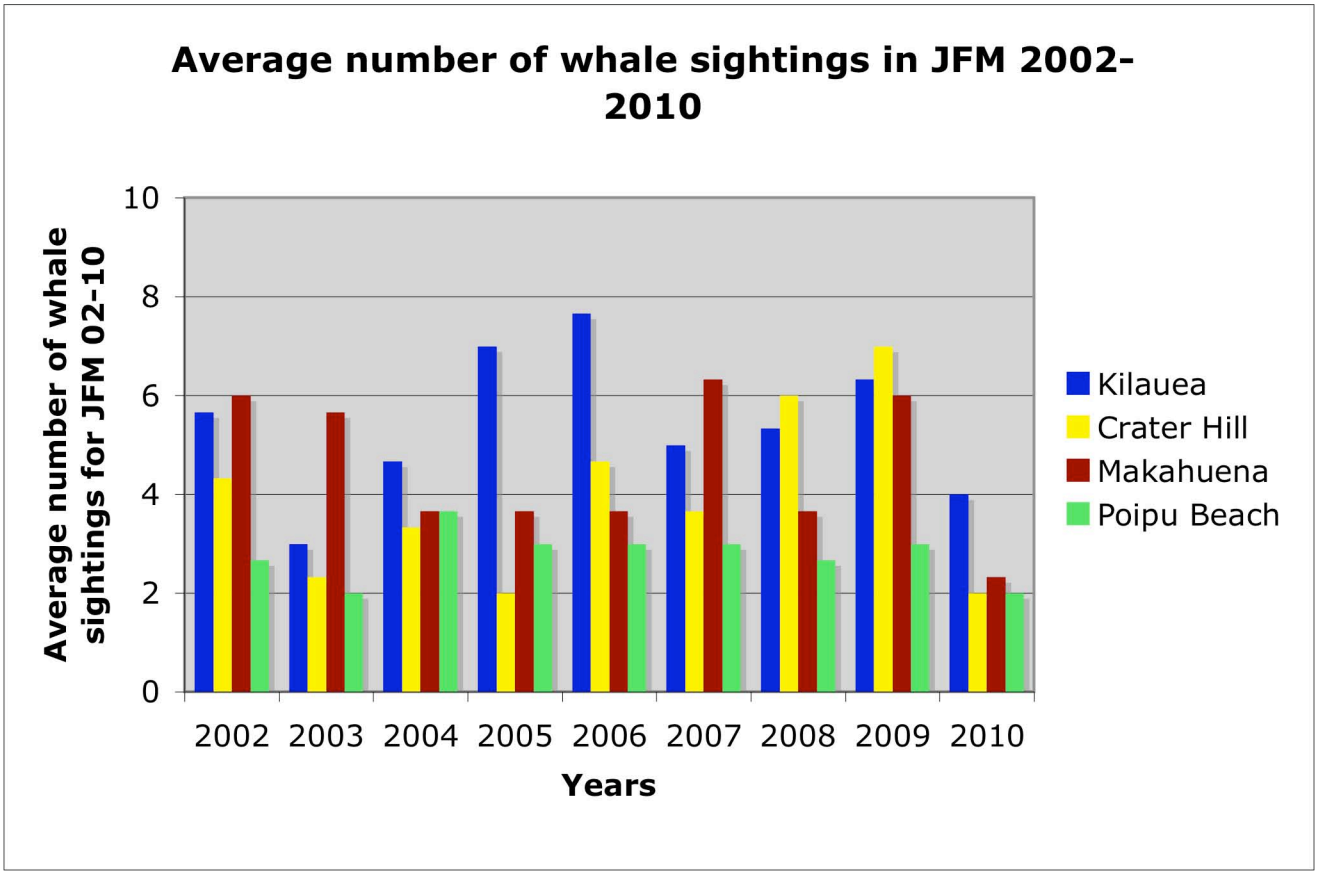
- Hanauma Bay's highest average number of humpback whale sightings in 2002-2010 was January: 8, February: 8, and March: 8

Island: Kauai **Most consistent sites for whale sigtings 2002-2010 on Kauai**

Site #3: Kilauea Point National Wildlife Refuge	Elevation: 180 ft	North Shore
Site # 4: Crater Hill	Elevation: 250 ft	North Shore
Site #11: Poipu Beach Park	Elevation: 0-10 ft	South Shore
Site #10: Makahuena Point	Elevation: 30 ft	South Shore

Sites	2002	2003	2004	2005	2006	2007	2008	2009	2010
Kilauea	5.67	3	4.67	7	7.667	5	5.33	6.33	4
Crater Hill	4.33	2.33	3.33	2	4.667	3.67	6	7	2
Makahuena	6	5.67	3.67	3.67	3.667	6.33	3.67	6	2.33
Poipu Beach	2.67	2	3.67	3	3	3	2.67	3	2

Note: These figures represent the average of the average number of whale sightings for January, February, and March 2002-2010 at the most consistent and reliable sites on Kauai for whale sightings. These sites did not necessarily have the most whales sighted compared to other sites on Kauai, however, there were never closed on a count day and saw at least one whale on average.

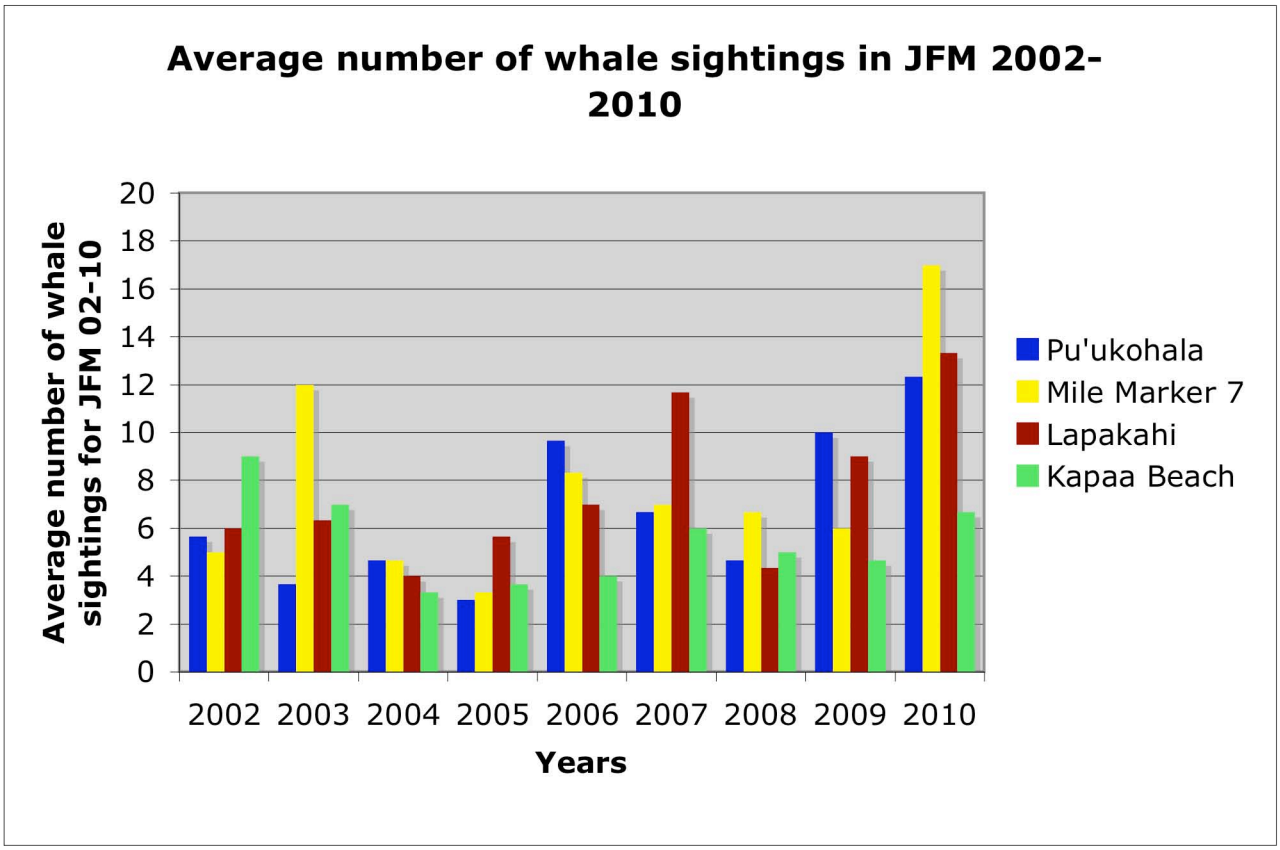


Island: Hawaii **Most consistent sites for whale sigtings 2002-2010 on Hawaii**

Site #9: Pu'ukohala Heiau	Elevation: 120 ft	Kona Coasline
Site # 10:Mile Marker 7	Elevation: 180 ft	Kohala Coastline
Site #11:Lapakahi State Park	Elevation: 100 ft	Kohala Coastline
Site #12: Kapaa Beach Park	Elevation: 20 ft	Kohala Coastline

Sites	2002	2003	2004	2005	2006	2007	2008	2009	2010
Pu'ukohala	5.67	3.67	4.667	3	9.67	6.67	4.67	10	12.3
Mile Marker 7	5	12	4.667	3.33	8.33	7	6.67	6	17
Lapakahi	6	6.33	4	5.67	7	11.7	4.33	9	13.3
Kapaa Beach	9	7	3.333	3.67	4	6	5	4.67	6.67

Note: These figures represent the average of the average number of whale sightings for January, February and March 2002-2010 at the most consistent and reliable sites on Hawaii for spotting humpback whales. The sites did not necessarily have the most whales sighted on average but each had less than two average counts of zero and a maximum of one closure due to miscellaneous reasons.

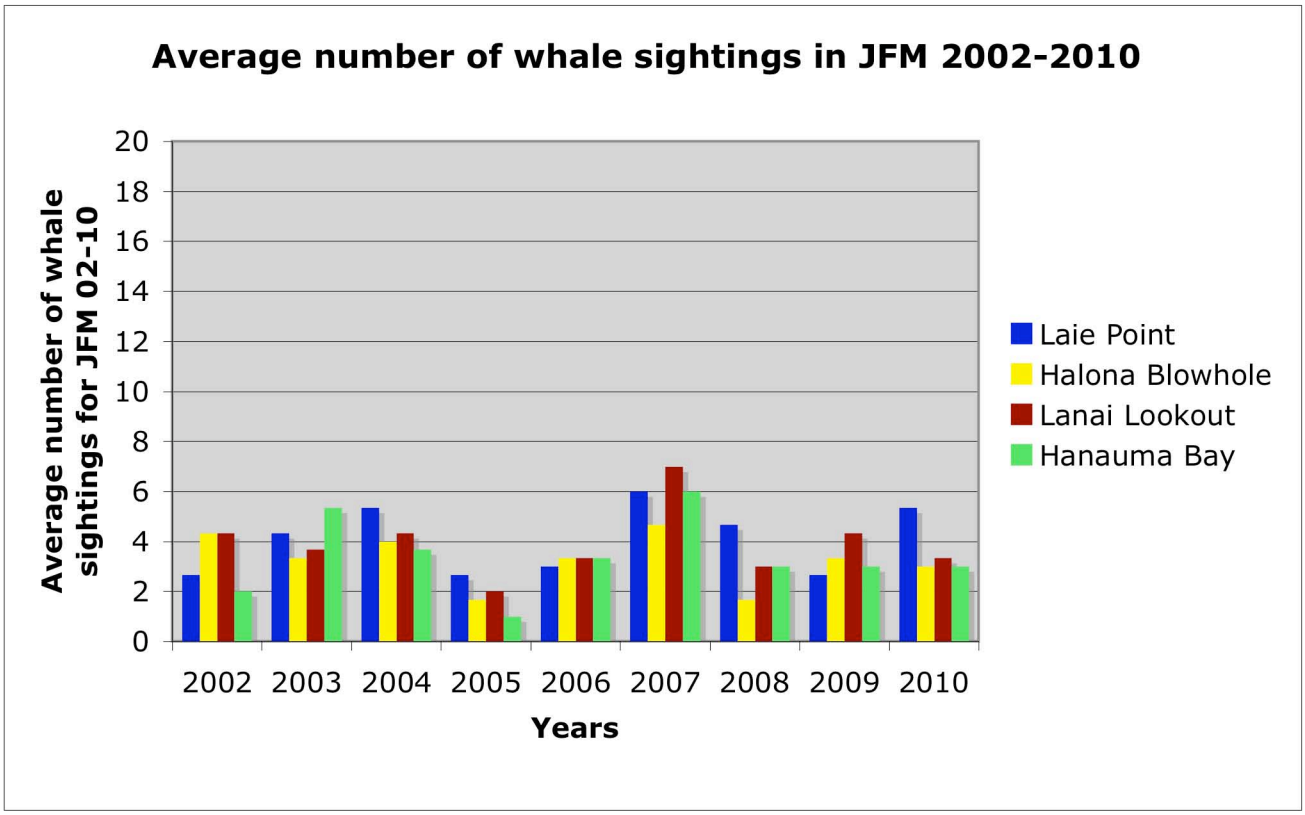


Island: Oahu **Most consistent sites for whale sigtings 2002-2010 on Oahu**

Site #11: Laie Point	Elevation: 40 ft	North Shore
Site # 19:Halona Blowhole	Elevation: 70 ft	Windward Coastline
Site #20:Lanai Lookout	Elevation: 80 ft	Windward Coastline
Site #21: Hanauma Bay	Elevation: 80-120 ft	Windward Coastline

Sites	2002	2003	2004	2005	2006	2007	2008	2009	2010
Laie Point	2.67	4.33	5.333	2.67	3	6	4.67	2.67	5.33
Halona Blowhole	4.33	3.33	4	1.67	3.33	4.67	1.67	3.33	3
Lanai Lookout	4.33	3.67	4.333	2	3.33	7	3	4.33	3.33
Hanauma Bay	2	5.33	3.667	1	3.33	6	3	3	3

Note: These figures represent the average of the average number of whale sightings for January, February and March 2002-2010 at the most consistent and reliable sites on Oahu for spotting humpback whales. The sites did not necessarily have the most whales sighted on average but each had less than one average count of zero and a maximum of two site closure due to miscellaneous reasons.



Chapter 5: Island-by-Island Coastline Comparisons

Question C: Are there similarities in the census data results among ocean count sites along the same coastline?

Comparison of Census Results for the four main coastlines on Kauai

The following figure illustrates the average number of humpback whale sightings around the four main coastlines of Kauai between the years 2002 and 2010 in January, February and March.

The average number of humpback whale sightings varied between the coastlines of Kauai. The four main coastlines are as follows: North Shore, South Shore, East Shore and West Shore. North Shore encompasses four ocean count sites, South Shore encompasses five ocean sites and both East Shore and West Shore contain three ocean count sites.

Anecdotal evidence suggested that March, and more recently February, were considered the peak of whale season on Kauai. Surprisingly, for sites on three of the coastlines, South, East and West Shore, January had the largest average amount of humpback whale sightings followed by February and March's average. The North Shore had a higher average in February with its lowest average in March. For all the coastlines, the month of March had the lowest overall average of humpback whale sightings as to support the earlier claim that many of the whales have left the breeding area by late March.

This comprehensive ten-year analysis depicts different results than Dr. Maldini's original 2002 annual report. Dr. Maldini reported that in January, February and March, the volunteers at East Shore sites counted the highest overall average number of humpback whale sightings (Maldini 88,90,92)[1]. However, in the ten-year summary analysis (2002-2010) which is the focus of this report, it appears in January, South Shore saw the highest average. In February and March, Kauai's North Shore had the overall highest average of humpback whale sightings.

Interestingly, North Shore contains the most sites with the highest elevation on the island. However, volunteers at these sites did not always count the most humpback whale sightings as Kauai's South Shore, with elevations below 50 ft. Further analysis would need to be done to see how elevation levels effect the overall ocean count census. However, from the ten-year summary on Kauai, it seems to suggest that sites at higher elevations do not necessarily always see the most humpback whales.

[1] The same sites on each coastline were used for the coastline comparison analysis in both Dr. Maldini's 2002 annual report and this ten-year comprehensive report.

Island:Kauai
Month: January

Analysis: Average number of humpback whale sightings for the four main coast on Kauai for the years 2002-2010 for January, February and March

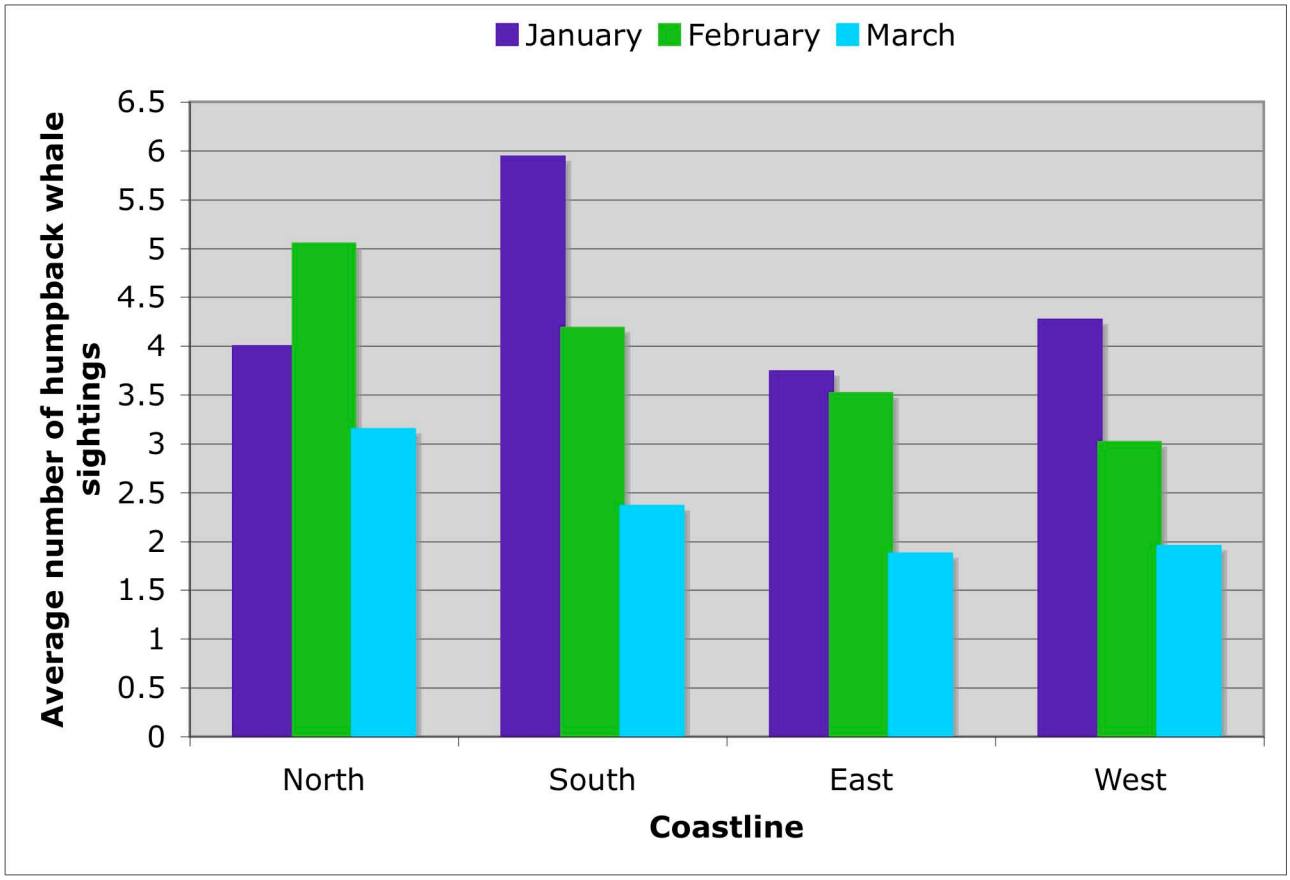
Coastline	2002	2003	2004	2005	2006	2007	2008	2009	2010	Average
North	2.5	1	4	5.8	3.8	4.8	1.8	9.8	2.3	3.97777778
South	4	9	7	6.8	5	7.2	2	8.8	3.5	5.92222222
East	3.3	6	3	6.3	3.7	3.7	1.5	5.7	0.3	3.72222222
West		1.7	5.3	6.3	3	6	4.7	4	3	4.25

Month: February

Coastline	2002	2003	2004	2005	2006	2007	2008	2009	2010	Average
North	6.8	4.3	3.5	4.3	7.8	5.3	7.5	3.3	2.5	5.03333333
South	5.6	4.8	6	3.2	4	4.2	7.2	2	0.5	4.16666667
East	5.7	6	5.7	1	5.7	1.3	4.7	0.7	0.7	3.5
West	5	3.3	1.3	1	2.7	5.7	4	3	1	3

Month: March

Coastline	2002	2003	2004	2005	2006	2007	2008	2009	2010	Average
North	2.3	1	3.3	1.3	3.5	4	5	4.8	3	3.13333333
South	3.8	2.6	2.2	1.6	1.3	4	2.2	1	2.4	2.34444444
East	3.3	3.3	1.7	0.7	1.7	1.3	1.7	1.7	1.3	1.85555556
West	2	1.3	1.3	2.7	2.5	2.3	1	2	2.3	1.93333333



Comparison of Census Results for the four main coastlines on Oahu

The following table and graph depict the average number of humpback whales sightings around the four main coastlines of Oahu between the years of 2002 and 2010 in January, February, and March.

The average number of humpback whale sightings varied between the coastlines of Oahu. The four main coastlines are as follows: Waianae, South Shore, North Shore and Windward Coast. Waianae Coast encompasses 3 ocean count sites, South Shore encompasses 4 ocean count sites, and both North Shore and Windward Coast encompass 9 ocean count sites.

For sites along three of the coastlines, Waianae, South Shore and North Shore, February had the largest average amount of humpback whale sightings followed closely by January's average. The Windward Coast had a higher average in March with its lowest average in January.

In comparison with results found by Dr. Daniela Maldini in her annual 2002 report (one of the first Ocean Count census taken), there are similarities and differences in which coastline had the most average number of humpback whales. In both the 2002 and the comprehensive ten-year analysis between 2002 and 2010, the North Shore of Oahu had the highest average in January. In February, North Shore had the highest average while in the 2002 analysis, South Shore had the highest number of average sightings. In March 2002, it was found that volunteers at South Shore sites counted on average more humpback whales (Maldini 88,90,92). In the comprehensive analysis of 2002-2010, Windward Coast saw on average the most whales of all four coasts on Oahu in March.

Island: Oahu
Month: January

Analysis: Average number of humpback whale sightings for the four main coast on Oahu for the years 2002-2010 for January, February and March

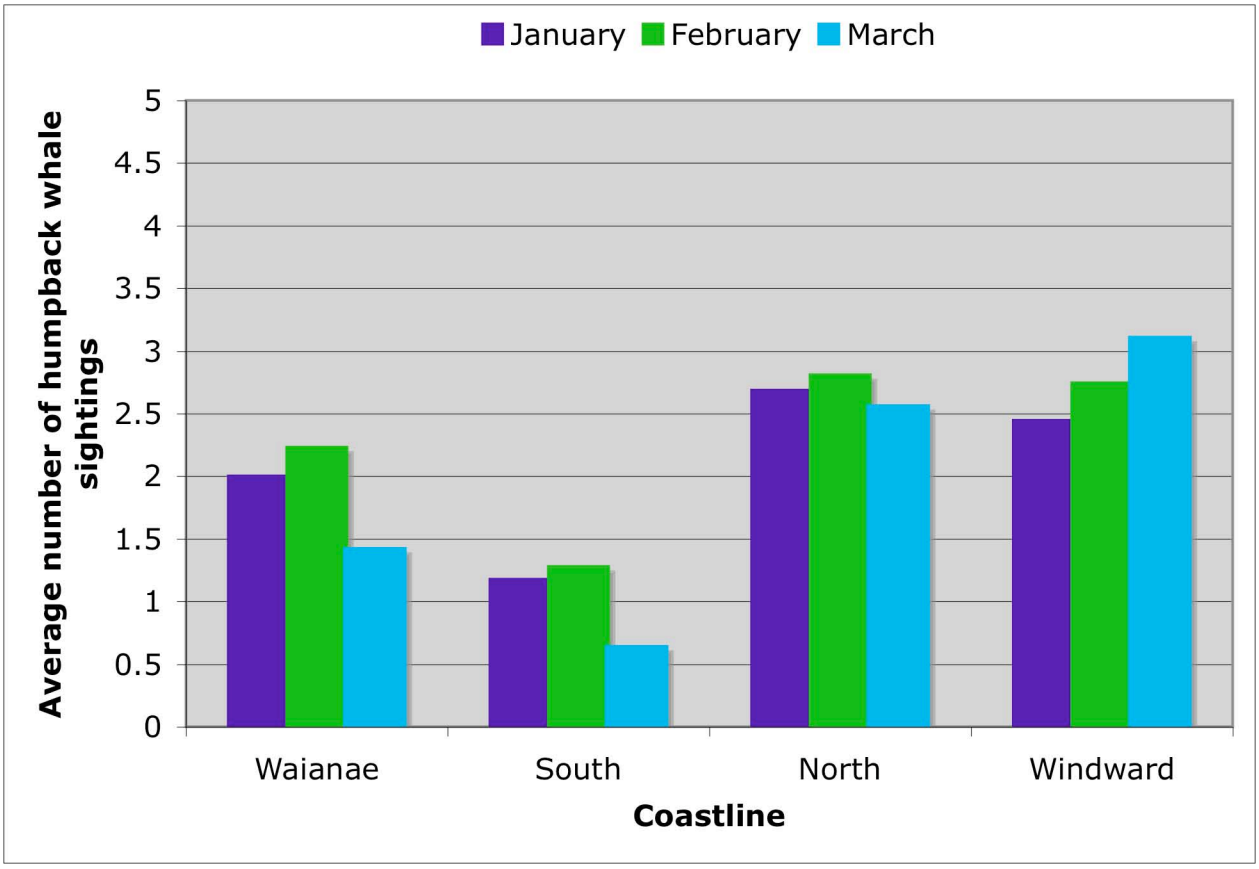
Coastline	2002	2003	2004	2005	2006	2007	2008	2009	2010	Average
Waianae	1.3	0.3	4.7	2	1	3.3	1.3	2	2	1.98888889
South	1	0.8	0	2.8	0.8	2.8	0.3	1	1	1.16666667
North	0.9	1.7	2	2	3.2	3.2	1.8	4.8	4.5	2.67777778
Windward	1.3	2.4	1.9	2.7	1.7	4.7	0.3	3.6	3.3	2.43333333

Month: February

Coastline	2002	2003	2004	2005	2006	2007	2008	2009	2010	Average
Waianae	4.3	1	0	2.7	1.3	1.7	1.3	4.7	3	2.22222222
South	1	1.3	0.7	1.3	0.8	1.8	1.8	1.7	1	1.26666667
North	2.3	1.9	2.4	1.8	4.6	3.8	3.8	1.2	3.4	2.8
Windward	3	3.1	3.3	1.1	3.4	2	4.9	1.8	2	2.73333333

Month: March

Coastline	2002	2003	2004	2005	2006	2007	2008	2009	2010	Average
Waianae	0	0	0.7	1	4	2.3	1.3	1.7	1.7	1.41111111
South	0.3	0.5	0.5	0.8	0.3	1.5	0.3	0	1.5	0.63333333
North	1	1.7	2.4	1.3	3.3	2.7	2.9	3.6	4.1	2.55555556
Windward	4.6	2.6	4.1	1.9	2.9	5.9	1.6	1.4	2.9	3.1



Comparison of Census Results for the four main coastlines on Hawaii Island

The following table and graph depict the average number of humpback whale sightings around the four main coastlines of Hawaii between the years of 2002 and 2010 in January, February and March.

The overall average number of humpback whale sightings varied between the coastlines of Hawaii. The four main coastlines used for comparison are as follows: South Shore, Kona Coast, Kohala Coast and Hamakua Coast. South Shore encompasses three ocean count sites, Kona Coast encompasses five ocean count sites, Kohala Coast includes six ocean count sites and Hamakua Coast includes eight ocean count sites.

As with the island of Kauai, for sites along three of the coastlines, South Shore, Kona Coast and Kohala Coast, January had the largest average amount of humpback whale sightings. The Hamakua Coast had an overall higher average in February with its lowest average number of sightings in March. In fact, all the coastlines around the island of Hawaii had the lowest average count of humpback whale sightings in March.

Hawaii's comprehensive ten-year analysis illustrates different results than Dr. Maldini's original 2002 coastline comparison report. She found that in both January and February, sites along the Kona Coast had the highest overall average of humpback whale sightings. In March, she reported that the Hilo Coastline had the highest average (Maldini 88,90,92). However, in the ten-year summary analysis (2002-2010), it appears that in January, February and March, Kohala Coast had the highest overall average every month.

Coastline comparison similarities between the islands of Oahu, Kauai and Hawaii

Interestingly, when comparing all three islands coastline comparison graphs, the trends are rather similar. Three out of four coastlines on every island have the highest overall average of humpback whale sightings fall within one particular count month with one coastline being different. Both Oahu and Hawaii tend to have similar looking graphs with January and February averages being closely related for most of the coastlines. Finally, every coastline, with the exception of Windward Coast on Oahu, have there lowest averages of humpback whale sightings in the month of March. Researchers have hypothesized and speculated that the peak-breeding season for humpback whales is over by late March and many of the whales have left the main Hawaiian Islands by the time of the last sanctuary ocean count. Thus, the comprehensive ten-year analysis of the ocean count data seems to support this claim.

Island: Hawaii
Month: January

Analysis: Average number of humpback whale sightings for the four main coast on Hawaii for the years 2002-2010 for January, February and March

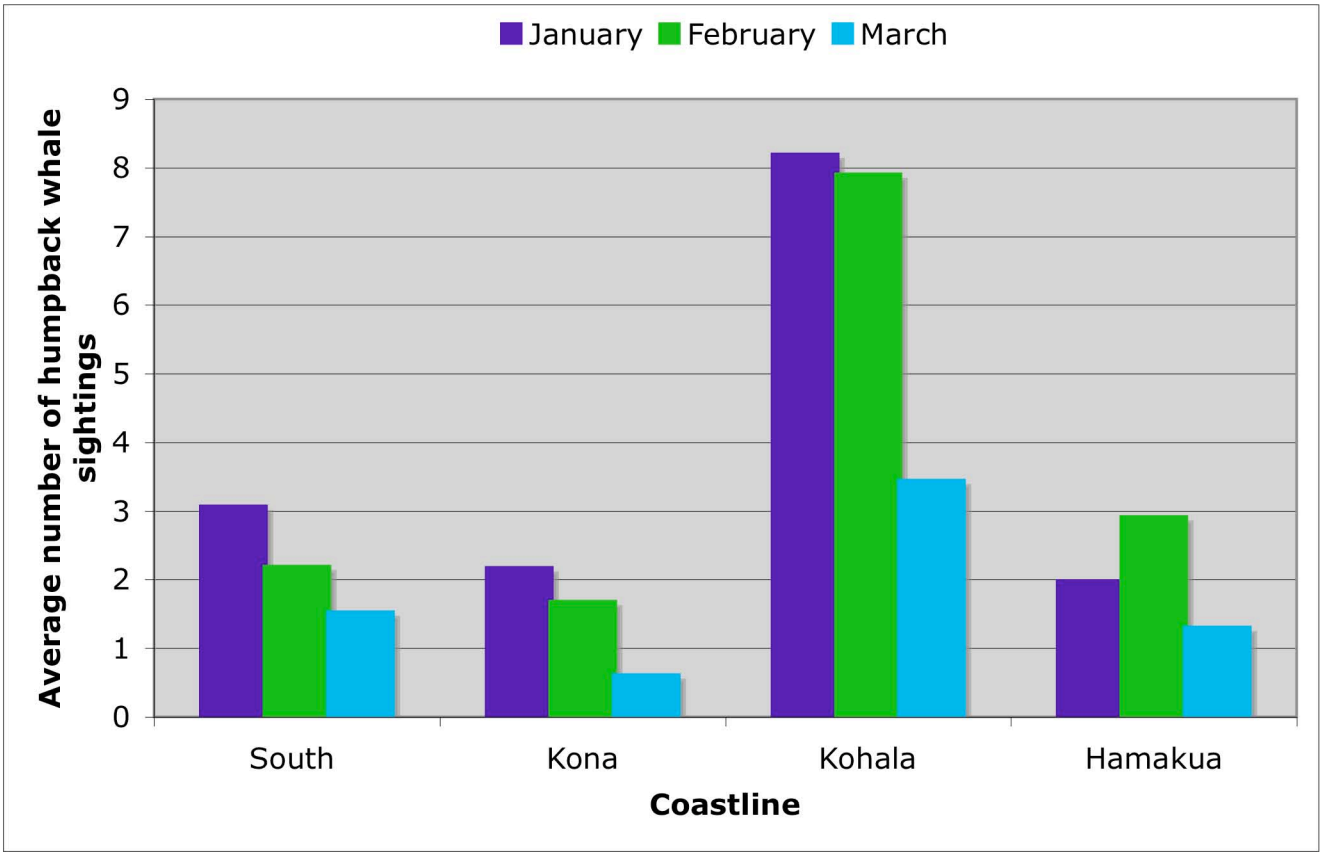
Coastline	2002	2003	2004	2005	2006	2007	2008	2009	2010	Average
South	4.5	11	1	1	1.7	2	1.7	1.3	3.3	3.05555556
Kona	0.8	2	1.6	1.2	1.6	3.4	3.4	2.2	3.2	2.15555556
Kohala	8.7	6.4	6.8	5.3	7.2	11.3	5.2	9.7	13	8.17777778
Hamakua	2.5	4.9	0.6	3.4	1	0.9	0	1.4	3	1.96666667

Month: February

Coastline	2002	2003	2004	2005	2006	2007	2008	2009	2010	Average
South	4	2.3	na	0.7	3	2	1.7	1.7	2	2.175
Kona	2	3.4	0	1.2	0.6	3.4	2.6	0.8	1	1.66666667
Kohala	11.8	10.5	3.5	5	9.8	8.3	4.3	6.6	11.2	7.88888889
Hamakua	7.3	5.4	1	3.1	2.8	0.7	2.8	1	2	2.9

Month: March

Coastline	2002	2003	2004	2005	2006	2007	2008	2009	2010	Average
South	8	1.7	0	0	0.3	2	0.3	0	1.3	1.51111111
Kona	1.2	0.75	0.4	0.2	0.4	0.8	0.6	0.4	0.6	0.59444444
Kohala	3.3	4.2	2.6	0.8	1.2	3.5	4.5	3.5	7.3	3.43333333
Hamakua	1.8	2.4	0.3	2.4	1.6	0.2	1	0.4	1.5	1.28888889



Chapter 6: Island-by-Island Proportion of Calves

Question D: How does the proportion of calves vary between the islands of Kauai, Oahu and Hawaii for the years 2002, 2007-2010?

The following data analysis represents the total number of whales sighted to the total number calves sighted computed by calculating the percentage of calves sighted in each time period for each month a count was held (January, February and March) on each particular island. The total number of whales sighted overall for the month was divided by the total number of calves sighted and an overall percentage was yielded for the island for that month. The comprehensive graphs that follow reflect the percentage of calves sighted around Oahu, Kauai and Hawaii in January, February and March for the years 2002 and 2007-2010.

The following pages contain:

- The average percentage of calves sighted by island and month of the count.
- The percentage of calves sighted in January, February and March combined for the years 2002, 2007-2010 broken up by the particular count year and island.
- The percentage of calves sighted from Kauai in 2002-2010 for January, February and March.
- The percentage of calves sighted from Hawaii for the years 2002, 2007-2010 for January, February and March.
- The percentage of calves sighted from Oahu for the years 2002, 2007-2010 for January, February and March.
- The percentage of calves sighted from Kahoolawe for February and March 2008.

For the 2002, 2007-2010 analysis, the proportion of calves does vary between the three islands with a greatest overall difference of about 7%. The current analysis shows Kauai had the least overall percentage at about 10% followed by Hawaii at about 15% and then Oahu at 17% relative to the total number of whales sighted. The year 2002 was included in the analysis to compare the earliest ocean count research with the present percentage of calves sighted. On the basis of the current analysis, a higher proportion of calves are sighted on Oahu, followed by the island of Hawaii. Future analysis using the proportion of calves for each ocean count site could yield vital information as to possible calving and/or nursery areas.

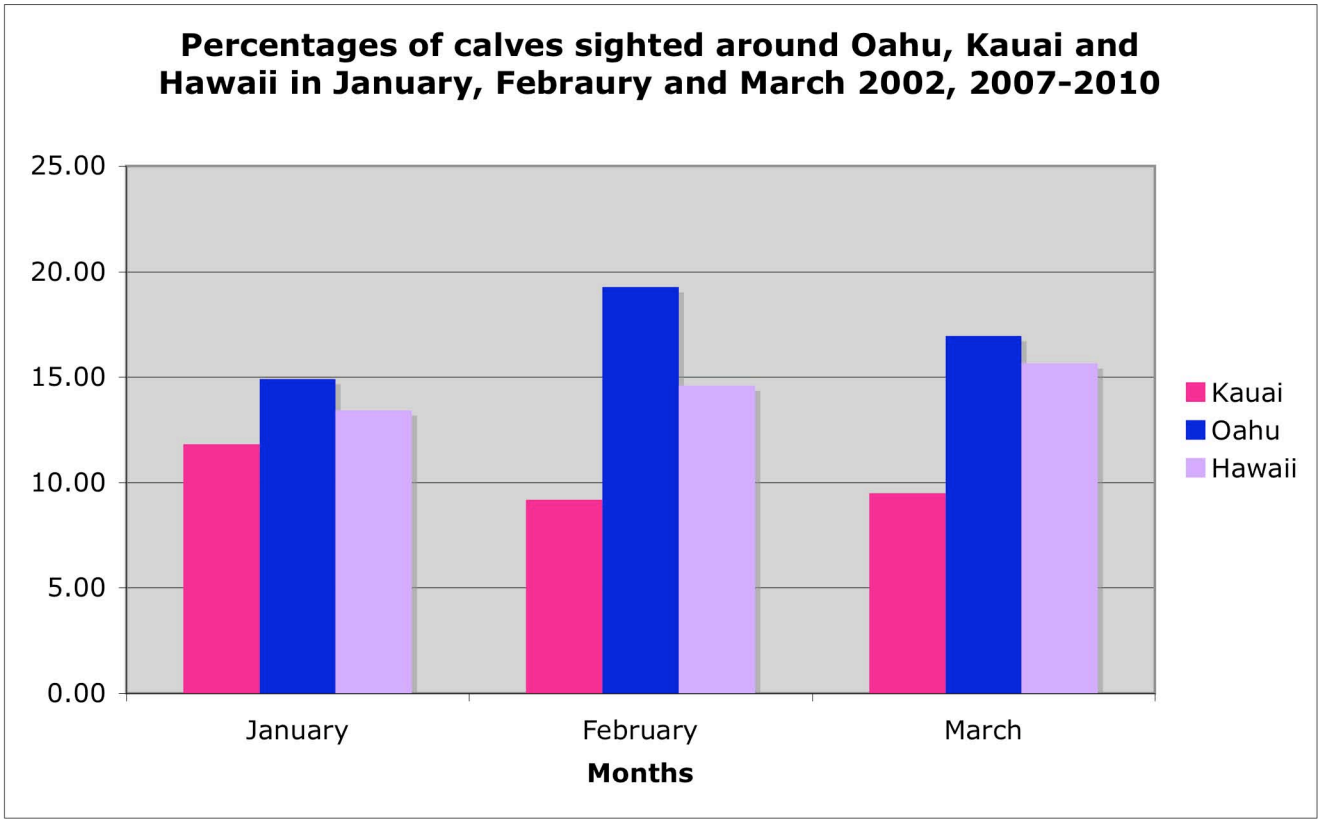
Interestingly, whale researchers had announced that the island of Kauai has fewer calves than the other two islands and that the overall percentage is around 10%. The Sanctuaries Ocean Count project seems to be yielding the same results using there trained volunteers from the fifteen shore-based sites around the island.

The analysis of proportion of calves is new to this project, even though the data has been collected in its raw form since 2002. Due to the temporary inaccessibility of the raw data for 2003-2006, for any island except Kauai, this project focused only on the

2002 and 2007-2010 adult and calf data for those islands. Efforts should be made to analyze the raw data for 2003-2006 for the islands of Oahu and Hawaii to complete the eight-year analysis of the proportion of calves for each island.

Analysis: Percentage of calves sighted around Oahu, Kauai and Hawaii in JFM 2002, 2007-2010

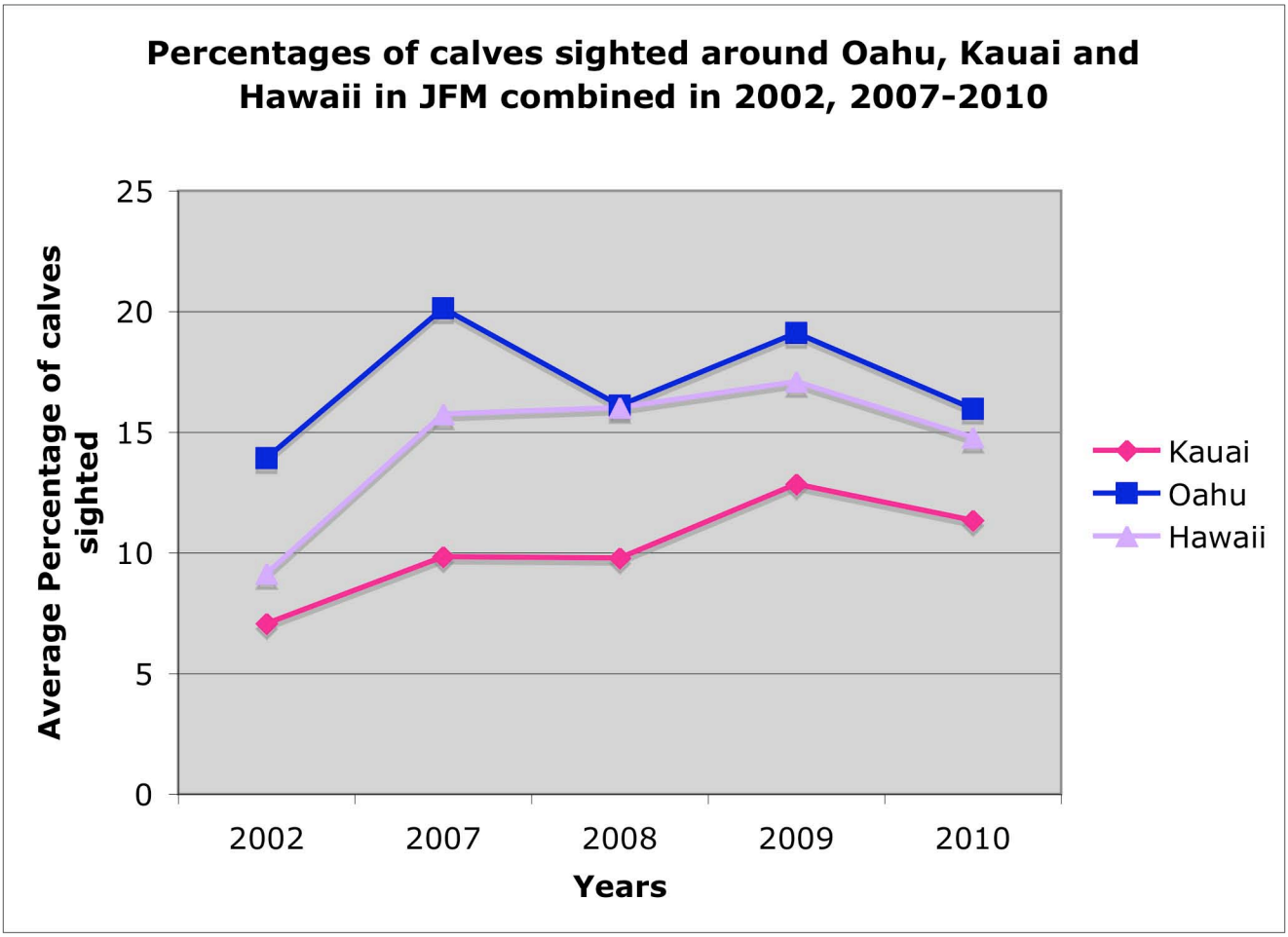
Month: January						
Islands	2002	2007	2008	2009	2010	Average
Kauai	7.98	9.93	9.62	14.90	16.67	11.82
Oahu	10.54	20.05	16.67	13.62	13.67	14.91
Hawaii	7.47	13.53	12.24	16.35	17.52	13.42
Month: February						
Islands	2002	2007	2008	2009	2010	Average
Kauai	7.21	9.46	10.51	10.34	8.46	9.20
Oahu	12.26	22.44	17.94	24.73	19.09	19.29
Hawaii	12.15	10.42	21.11	18.75	10.50	14.59
Month: March						
Islands	2002	2007	2008	2009	2010	Average
Kauai	5.98	10.09	9.26	13.27	8.92	9.50
Oahu	18.98	17.93	13.73	19.00	15.12	16.95
Hawaii	7.78	23.32	14.69	16.23	16.32	15.67



Conclusions: Kauai has the least percentage of calves sighted at around 10%, then the island of Hawaii with a percentage of calves at around 15%, and the island of Oahu has the highest percentage of calves sighted at around 17%.This means that in relation to the total humpback whale population sighted on the three islands, over the five year period, this was the average percentage of calves that were counted.

Analysis: Percentages of calves sighted around Oahu, Kauai and Hawaii in JFM combined 2002,2007-2010

Island	2002	2007	2008	2009	2010	AVERAGE
Kauai	7.06	9.83	9.80	12.84	11.35	10.17
Oahu	13.93	20.14	16.11	19.12	15.96	17.05
Hawaii	9.13	15.76	16.01	17.11	14.78	14.56

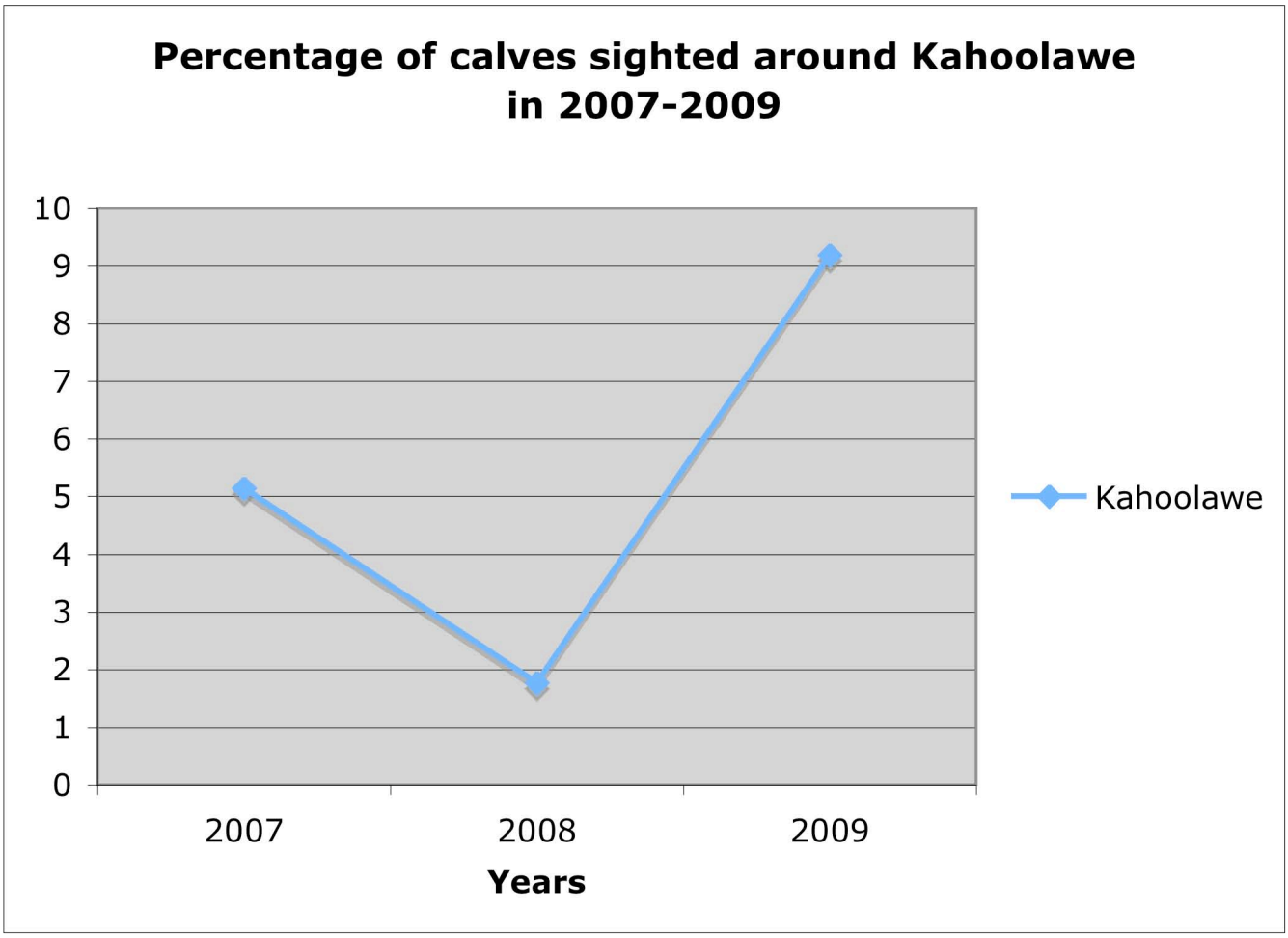


Explantion: This graph represents the same information as the previous graph just illustrated by year. The values in the table are the average of January, February and March's percentages for the particular year and this is what is graphed on the figure below. This graph shows the comparisons between the three different islands in the particular years while the previous graph displayed the same information by the particular month and island respectively.

Conclusions: We can see that again Kauai has the lowest average percentage of calves sighted followed by the island of Hawaii and then the island Oahu had the highest percentage of calves sighted. It is interesting to note that any increase or decrease in proportions tracked fairly consistently on all isladns over the years.

Analysis: Kahoolawe's Percentage of calves sighted

Months	2007	2008	2009	Average	
January	3.9		6.4	5.15	
February	1.3	2.24		1.77	
March	10.9	12.77	3.9	9.19	**5.37**



Conclusion: Kahoolawe's percentage of calves sighed is around 5%, however, this is based on a very limited data sample (6 counts over a 3 year period) compared to the other islands. None the less, this result is surprising, given the general acceptance that the waters of Maui County are known as the principal calving and nursery area in Hawaii.

Kauai

Proportion of Calves to Total Whales Sighted

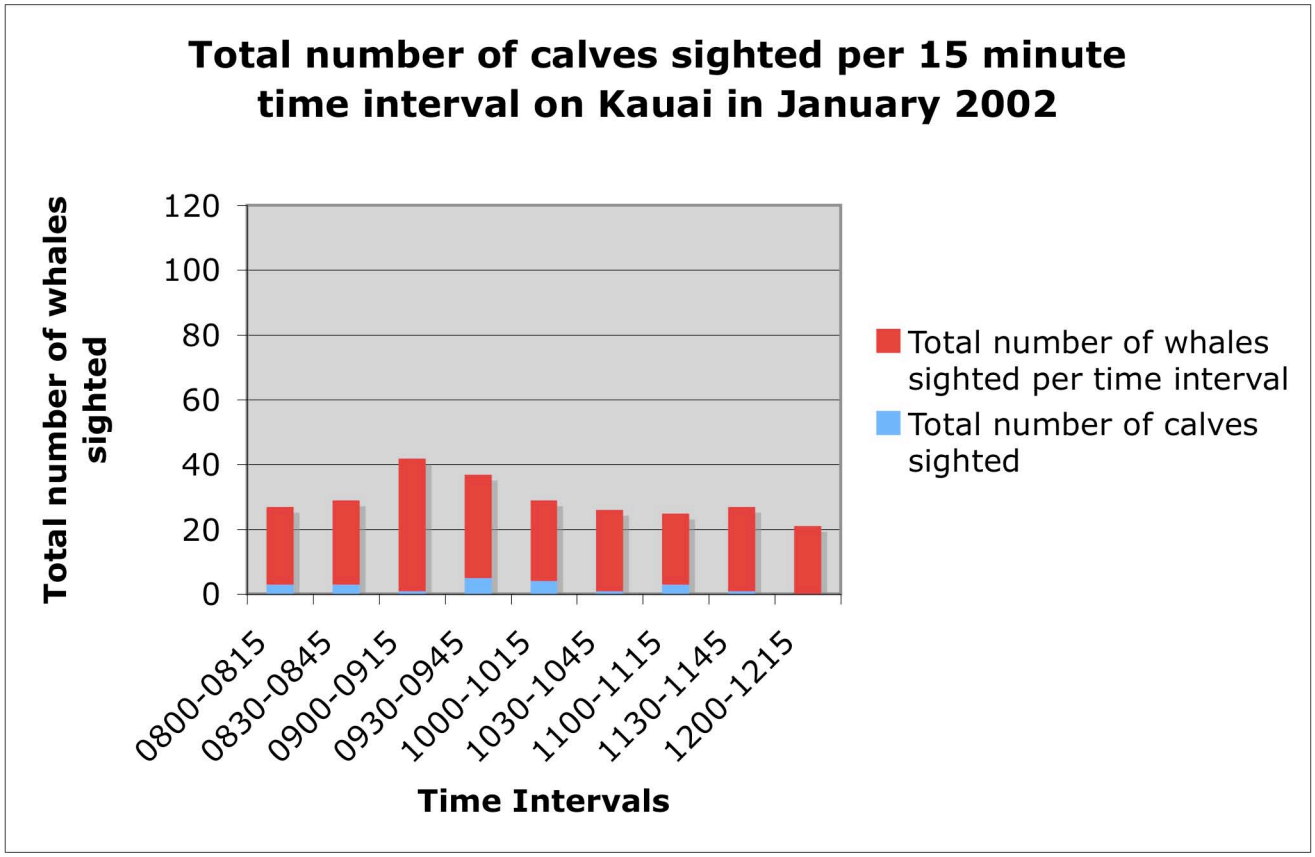
January, February and March

2002-2010

Doug Perrine/ HWRF/ Seapics.com/NOAA Fisheries Permit #882

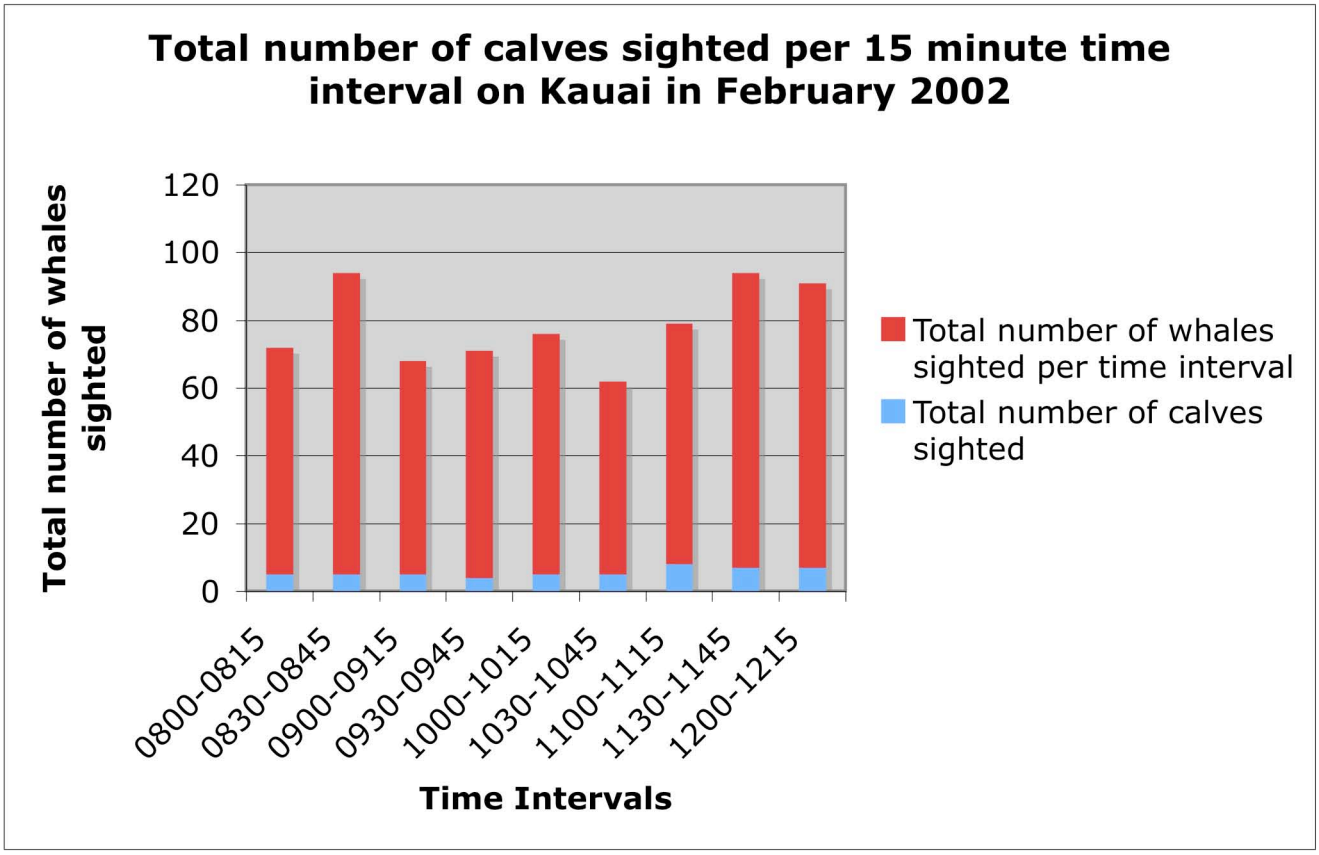
Island: Kauai Jan-02

Time Period	Number of Calves sighted	Number of Adults Sighted	Total number of whales sighted for time period	Percentage of Calves sighted
0800-0815	3	24	27	11.11%
0830-0845	3	26	29	10.34%
0900-0915	1	41	42	2.38%
0930-0945	5	32	37	13.51%
1000-1015	4	25	29	13.79%
1030-1045	1	25	26	3.85%
1100-1115	3	22	25	12.00%
1130-1145	1	26	27	3.70%
1200-1215	0	21	21	0.00%
Total	21	242	263	**7.98%**



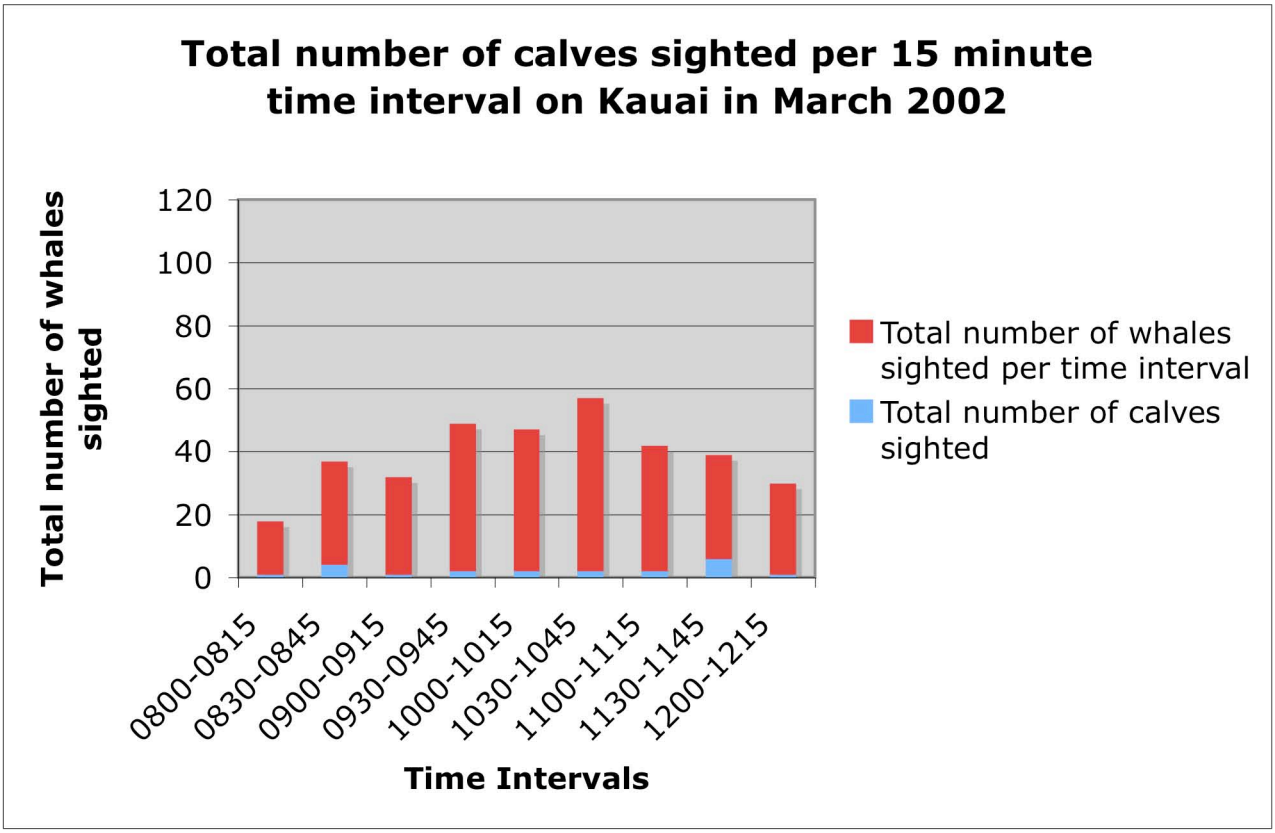
Island:Kauai Feb-02

Time Period	Number of Calves sighted	Number of Adults Sighted	Total number of whales sighted for time period	Percentage of Calves sighted
0800-0815	5	67	72	6.94%
0830-0845	5	89	94	5.32%
0900-0915	5	63	68	7.35%
0930-0945	4	67	71	5.63%
1000-1015	5	71	76	6.58%
1030-1045	5	57	62	8.06%
1100-1115	8	71	79	10.13%
1130-1145	7	87	94	7.45%
1200-1215	7	84	91	7.69%
Total	51	656	707	**7.21%**



Island: Kauai Mar-02

Time Period	Number of Calves sighted	Number of Adults Sighted	Total number of whales sighted for time period	Percentage of Calves sighted
0800-0815	1	17	18	5.56%
0830-0845	4	33	37	10.81%
0900-0915	1	31	32	3.13%
0930-0945	2	47	49	4.08%
1000-1015	2	45	47	4.26%
1030-1045	2	55	57	3.51%
1100-1115	2	40	42	4.76%
1130-1145	6	33	39	15.38%
1200-1215	1	29	30	3.33%
Total	21	330	351	**5.98%**



Island: Kauai Jan-03

Time Period	Number of Calves sighted	Number of Adults Sighted	Total number of whales sighted for time period	Percentage of Calves sighted
0800-0815	4	27	31	12.90%
0830-0845	14	64	78	17.95%
0900-0915	12	70	82	14.63%
0930-0945	11	58	69	15.94%
1000-1015	8	55	63	12.70%
1030-1045	6	62	68	8.82%
1100-1115	6	58	64	9.38%
1130-1145	7	67	74	9.46%
1200-1215	7	70	77	9.09%
Total	75	531	606	**12.38%**