

2019

Fluke Book

The Natural History and Family Units of Sperm Whales off Dominica





THE DOMINICA SPERM WHALE PROJECT

STUDY

To learn from the sperm whales of the Caribbean as to better help conserve and protect the populations and cultural diversity of cetaceans worldwide.

COMMUNICATE

To share the stories of the whale families we work with in order to develop public awareness of the importance of the oceans to both marine mammals and humans.

CONSERVE

To promote locally motivated conservation to ensure that marine mammals born today can raise the next generation in a healthy ocean.

The Dominica Sperm Whale Project was initiated by Dr. Shane Gero and Dr. Hal Whitehead in 2005 to learn more about these mysterious ocean giants. The population of whales in the Caribbean has given us the unique opportunity to live among sperm whales and, for the first time, to come to know them not just as animals, but as individuals with families and different personalities. Much in the same way that Jane Goodall worked with her chimpanzees, we follow the lives of sperm whale families. Our program is the first to have followed individual sperm whales across years. Now 15 years into the program, we have followed many calves from birth through weaning and we now know that some individuals have been using the region for at least 30 years. Having spent thousands of hours with over 25 different sperm whale families, we have uncovered mysteries about the sperm whales' diet, genetics, social relationships, and dialects. Sperm whales in the Caribbean behave differently from that of those in the Pacific and other parts of the Atlantic Ocean, not because they are a different species, but because each part of the ocean has different whale traditions, different "ways of doing things", different cultures.

Sperm whales are found throughout the Caribbean region and they are truly extreme animals. They are the largest of all the toothed whales, weighing up to 50 tons. They are among the deepest and longest divers of all mammals. They have the largest brains on the planet, and use the largest biosonar in the ocean. Sperm whales are also a significant element in the ocean's ecosystem. They consume as much squid in a year as humanity does from all its fisheries combined! They can live up to 70 years but have very low reproductive rates and so are susceptible to human threats and are currently listed as Vulnerable.

Our understanding of these whales as brothers and sisters, as mothers and babysitters, allows us for the first time to tell stories about life as a resident of the deep ocean. Whale families are surprisingly similar to ours and as a result these animals can act as ambassadors in communicating the imminent need to conserve our oceans.



THE DOMINICA SPERM WHALE PROJECT

WWW.THESPERMWHALEPROJECT.ORG

SIGNIFICANCE OF THE RESEARCH:

The DSWP is an innovative and integrative study of the behavioural ecology of the world's largest toothed whale. It addresses key questions at the level of the individual about an enigmatic and difficult to study marine species. It serves as a significant marker in our understanding of cetacean behaviour and will provide us with a well-needed comparison between marine and terrestrial mammalian societies. The in-depth knowledge of individuals across years provided by long-term studies provide a real individual-level understanding of the impacts of chronic anthropogenic threats, like ocean noise, whalewatching, and coastal development.

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GOVERNMENT SUPPORT

Research carried out off the coast of Dominica is conducted under research permits granted by the Fisheries Division of the Ministry of Agriculture and Fisheries of the Government of Dominica.



Sperm Whales: Animals of Extremes

The sperm whale (*Physeter macrocephalus*) is truly an animal of extremes. They are the largest of the toothed whales, among the longest and deepest divers, have the planet's largest brain, and can be found in every ocean and most coastal seas and gulfs on the planet, so as a result they are an ecologically significant species in the ocean. Worldwide, they eat as much squid in a year as all of the biomass removed from the oceans by all of the modern human fisheries combined! They also have a complex social structure and a diverse communication system which are the focus of most of our research.

LIFE HISTORY:

Sperm whales have a life history that is roughly similar to humans. Females are sexually reproductive at around age 10. Although males are sexually mature at approximately 15 years old, individuals tend not to return to breeding grounds to breed until they are approximately 30. Males and females also differ in size with females reaching 12m and 24 tons and males 18m and 57 tons. Pregnancy lasts approximately 15 months and calves are born approximately once every 4-6 years and suckle for at least 2 years. Although evidence of menopause at around forty is inconclusive, it is likely that older females rarely give birth. Sperm whales may live to be eighty although some may live as long as a century.

WHALE FAMILIES AND CULTURE:

Sperm whales are animals that form lifelong relationships, that babysit for each other, that have family traditions passed on by grandmothers, that learn a communal dialect, and have different ways of life that resemble our various cultures, some of which coexist in multicultural societies. They live rich, complex and interesting lives that many of us would be surprised to learn about.

The sperm whales off Dominica are predominantly groups of females and their dependent calves living together in 'units'. In the Caribbean, these units are small, about 7 animals, and appear to be matrilineal, meaning it's a female line of grandmothers, mothers, and their calves; so we often refer to them as families. Young males leave their families in their early teens to roam the open ocean, mostly alone, and may never see their families again. Units of females and their young regularly travel across ranges spanning several islands in the Antilles, but they appear to remain in the Caribbean as these families have never been identified in the neighbouring waters in the Gulf of Mexico or the Sargasso Sea, where there is also active research on sperm whales.

We have identified over 25 different whale families which use the waters off Dominica, but there are about 10 that we see very regularly. We know they have been using these waters since at least 1984 based on our pictures, but likely much longer based on their life expectancy. Living that long means that you meet a lot of other whales over your lifetime and it turns out that families have preferences with each other. These social preferences endure across decades suggesting that individuals can remember each other across long separations.

SOCIAL COMMUNICATION:

We think individuals and families recognize each other by using Morse code-like social calls termed 'codas'. Each family has a slightly different coda repertoire, but also share coda types with the other units in the Caribbean. Shared repertoires delineate socially segregated 'vocal clans' – collections of units that share a similar dialect. Units which share the same dialect associate and spend time together and units that have different repertoires never gather together. In the Eastern Caribbean Clan, the '1+1+3' coda type, which sounds like 'Click-pause-Click-pause-Click-Click-Click', is unique to the region, it has been produced in the same way for at least the last thirty years, and is made the same way by all the whales which use it. It's like a marker of Caribbean identity. This distinguishes them from the other Clan in the region, which never makes the 1+1+3 but very often makes a long 5-Regular coda 'Click—Click—Click—Click—Click'. So the Caribbean is an area with multiple clans living together.

Sperm Whales: Populations and Threats

POPULATION STRUCTURE:

Population structure for sperm whales on an oceanic scale is largely unknown. Genetic, photographic, and molecular studies suggest that the female units largely remain in their natal waters, with males moving around the oceans and perhaps around the globe. There appears to be differences in social, vocal, and diving behaviour between regions in the North Atlantic and given recent United Nations resolutions, it suggests that management should be made on the regional scale rather than across broad arbitrary oceanic “stocks” as they are currently.

The community using the waters in the eastern Caribbean has been estimated to be fewer than 300 whales. While **globally it is estimated that there are around 360,000 sperm whales** down from about 1.1 Million prior to ancient and modern mechanised whaling which only stopped in the late 1980's, not so long ago.

THREATS AND CONSERVATION:

While whaling of sperm whales has largely stopped, humans are still the sources of the major threats to sperm whales. Chemical and heavy metals are being found in the tissues of animals from around the world, including those as far away as Antarctica. Animals can become entangled in fishing gear including longline, gill nets, and FADs; and ship strikes are a concern for sperm whales, particularly in island areas like the Caribbean where everything is imported by shipping and fast ferries transit between islands. But ocean noise is increasingly being seen as a major threat to cetaceans around the world. **We have estimated that the current community in the eastern Caribbean is decreasing at around 3% per year. Its likely that most of that mortality is human caused.**

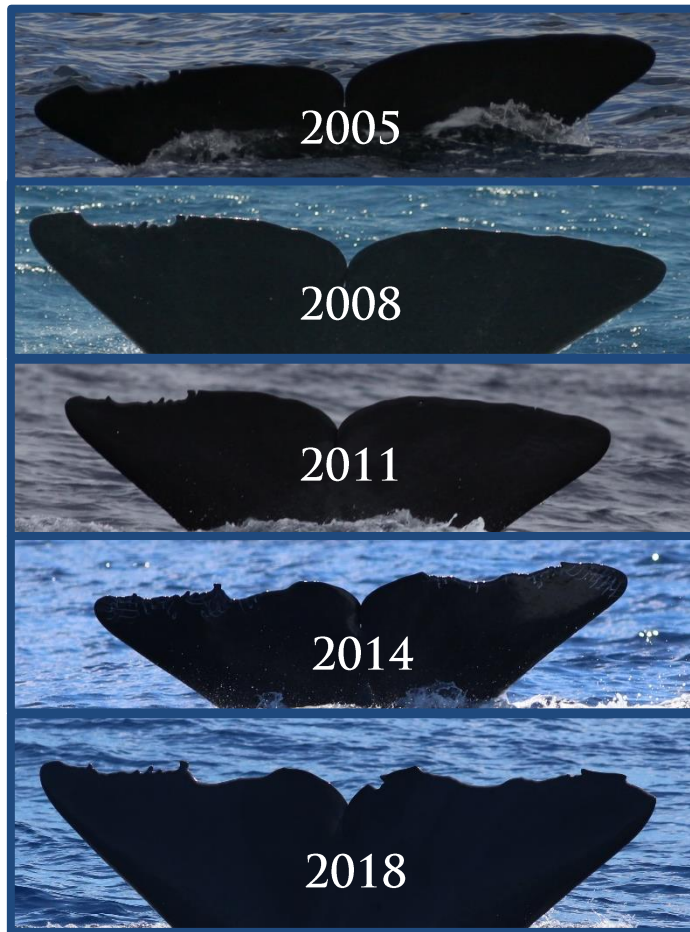
On an evolutionary timeline, sperm whales are among the oldest of the toothed whales. They have lived in the oceans for longer than modern humans have walked upright. Over a modern timeline, these families we have been working with over the last 15 years have known each other for far longer just by living in the same neighborhood. We know that these families have lived in the area for decades, and likely even centuries. Their ocean nation has lived parallel to ours, mostly unnoticed, for generations and the weight of their shared history greatly affects our goals for conservation.

Since 2005, the DSWP have worked closely with stakeholders on the island and have a good working relationship with the government agencies, local whale watch operations, and the public. We have championed the movement for regulation of both the commercial-swim-with and the traditional whalewatch tours in Dominica . Our long-term goal is to work with the government to create an EEZ-wide marine protected area similar to that found in the neighbouring French islands.

Currently, whales and dolphins in Dominica have no legal protection.

Fluke Change

Our understanding of these whales lives is made possible by identification pictures. We build family albums for each whale to better understand their social lives, their movements, and their behaviour. This method is made more powerful by more pictures. Flukes change over the years both slowly and abruptly, as you can see here with Rip from Unit R.



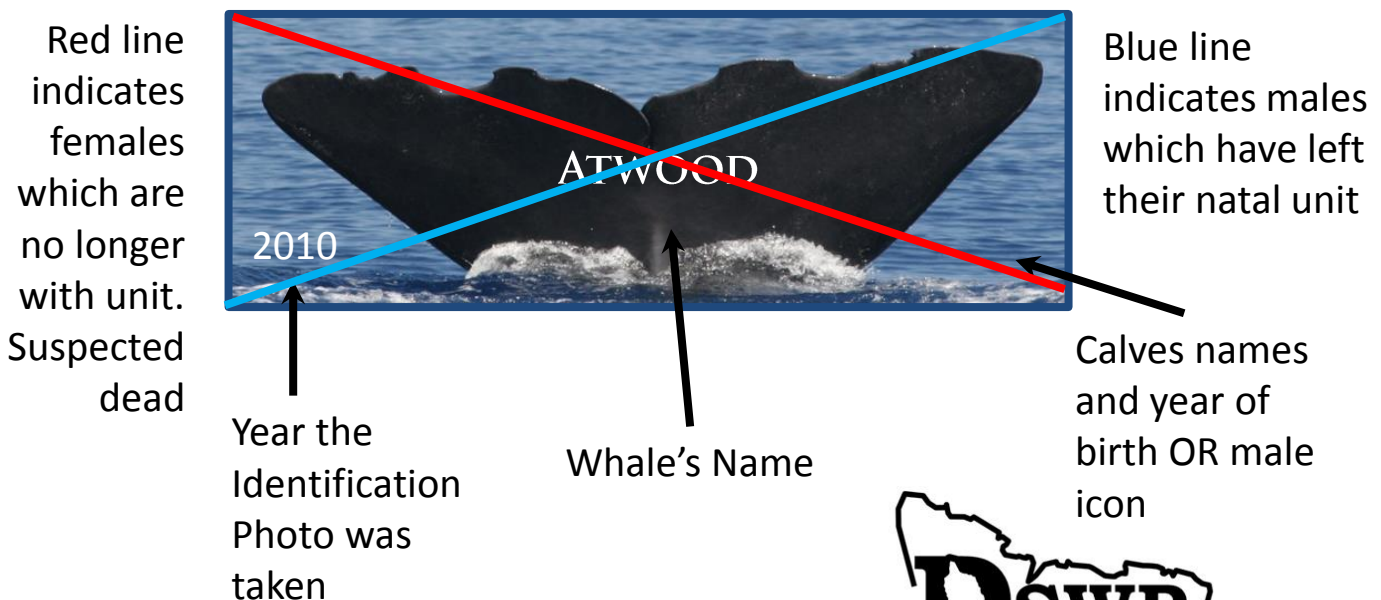
CONTRIBUTE TO FLUKEBOOK.ORG:

The fluke pictures you take on a visit to the Caribbean are valuable for our understanding of the population structure, behaviour, and social structure of the whales living here. Please consider contributing your photographs to help us build their stories by visiting:

www.flukebook.org

Reading The Fluke Book

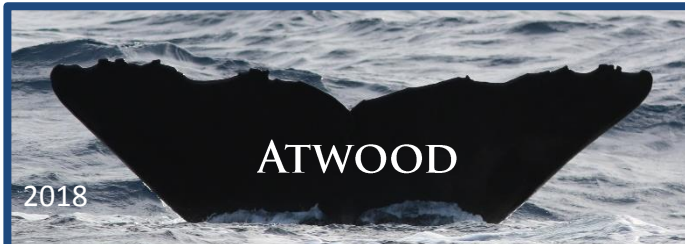
The Fluke book contains the fluke identification pictures for the 13 most often encountered whale families off the coast of Dominica. Only the images of adult females and calves which have reached an age at which they are lifting their flukes are included. In some cases, when we are aware of them, previous members are listed as deceased (red lines) and males which have left their natal units (blue lines). In some cases, the tails of individual whales may have acquired new marks since the identification picture was taken or the picture selected here was of best quality while lacking newer marks.



The Atwood Collective

The Atwood Collective was a large unit, but members of A1 and A2 are rarely seen together any longer. The names of several of the older adults are characters from Margaret Atwood's literary works, while newer animals were given 'A' names.

Unit A1

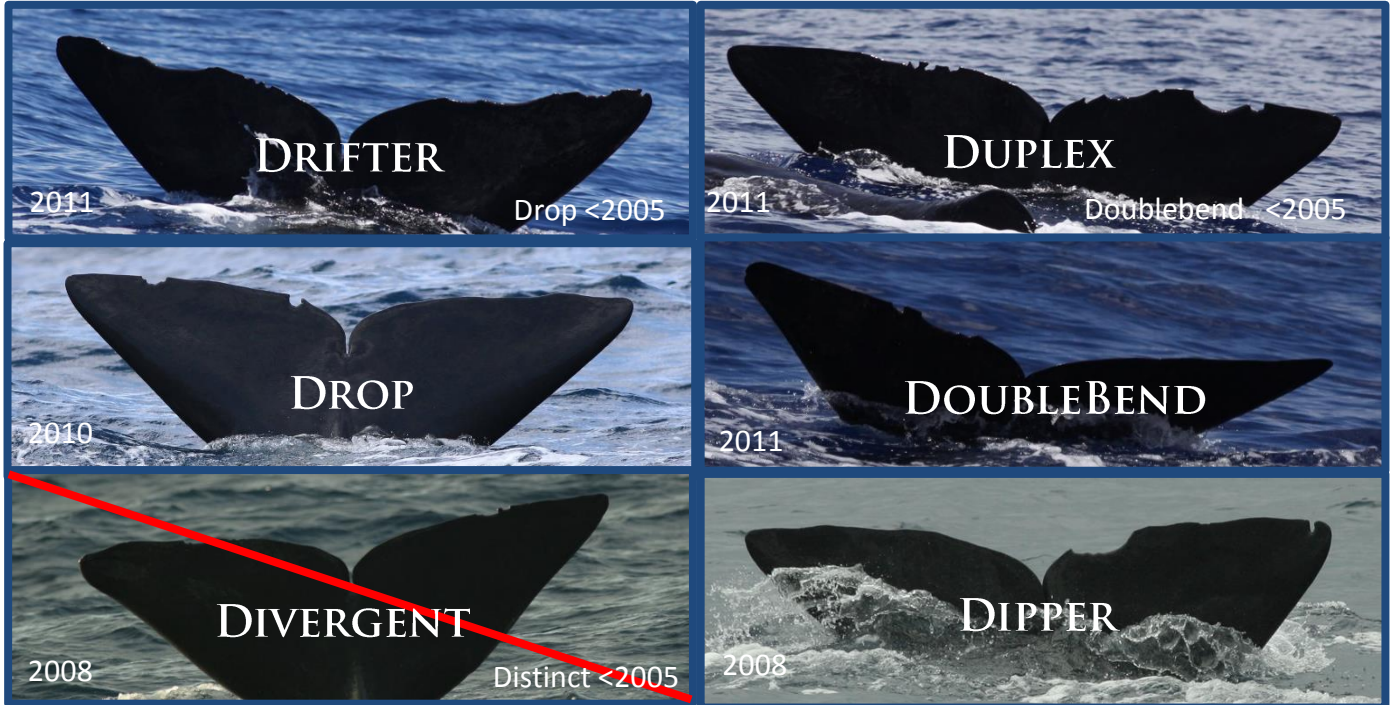


Unit A2



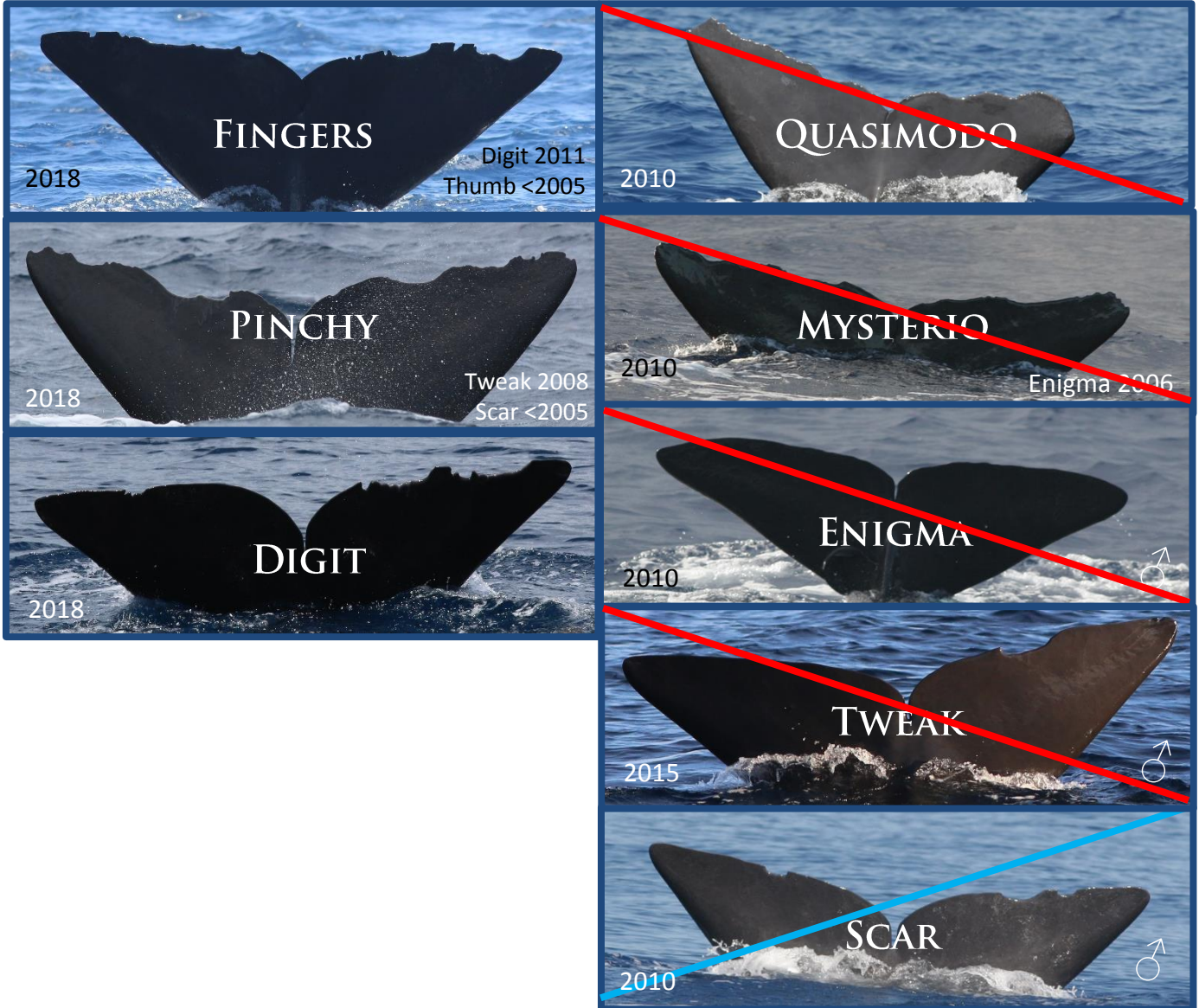
Unit D

Unit D was often seen with Units A and J, but has not been seen since 2014. Drifter is the animal for which we have the longest photo-identification record. She was first identified off Dominica in 1984.



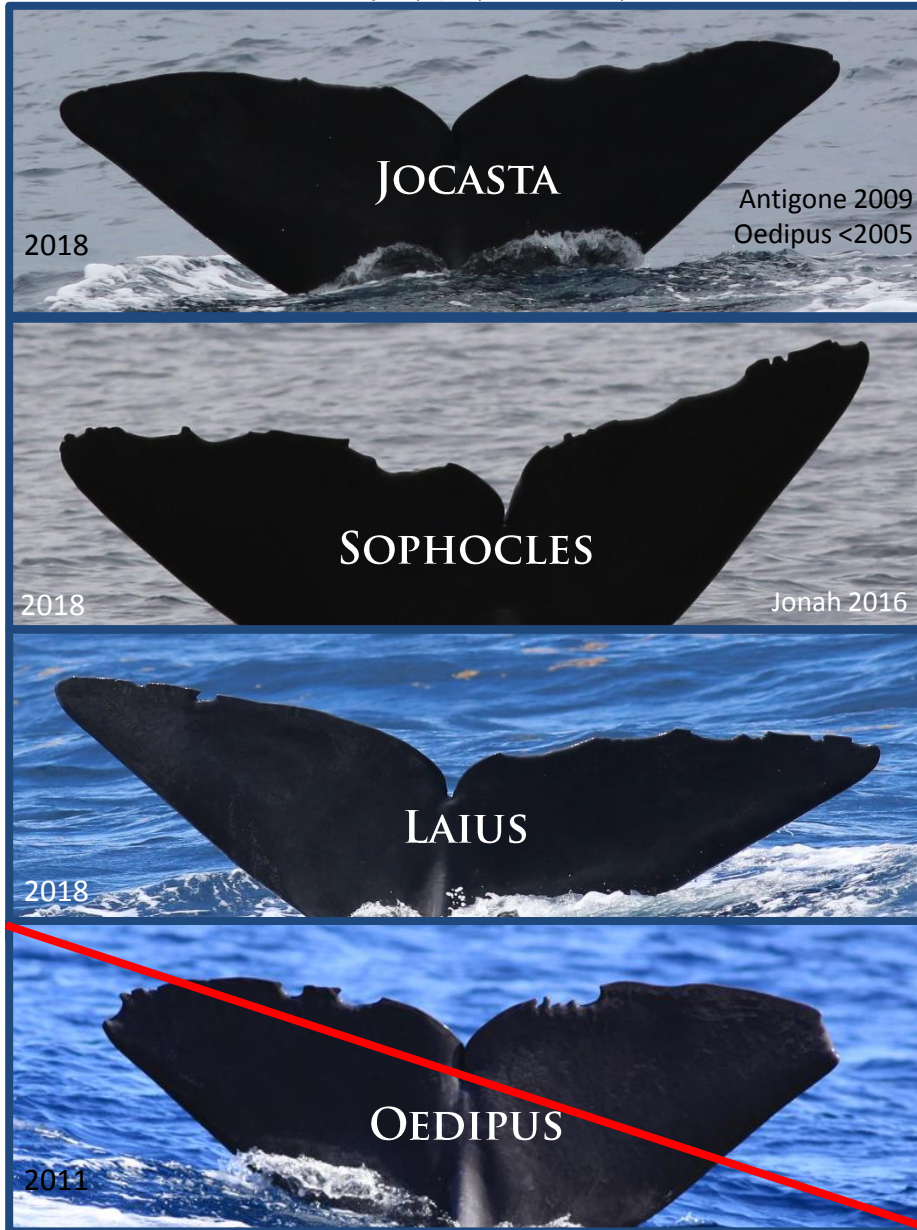
Unit F – The Group of Seven

The best studied social unit of sperm whales in the world, the *Group of Seven* have been observed off the coast of Dominica on a regular basis every year since 2005. Some were identified as far back as 1995.



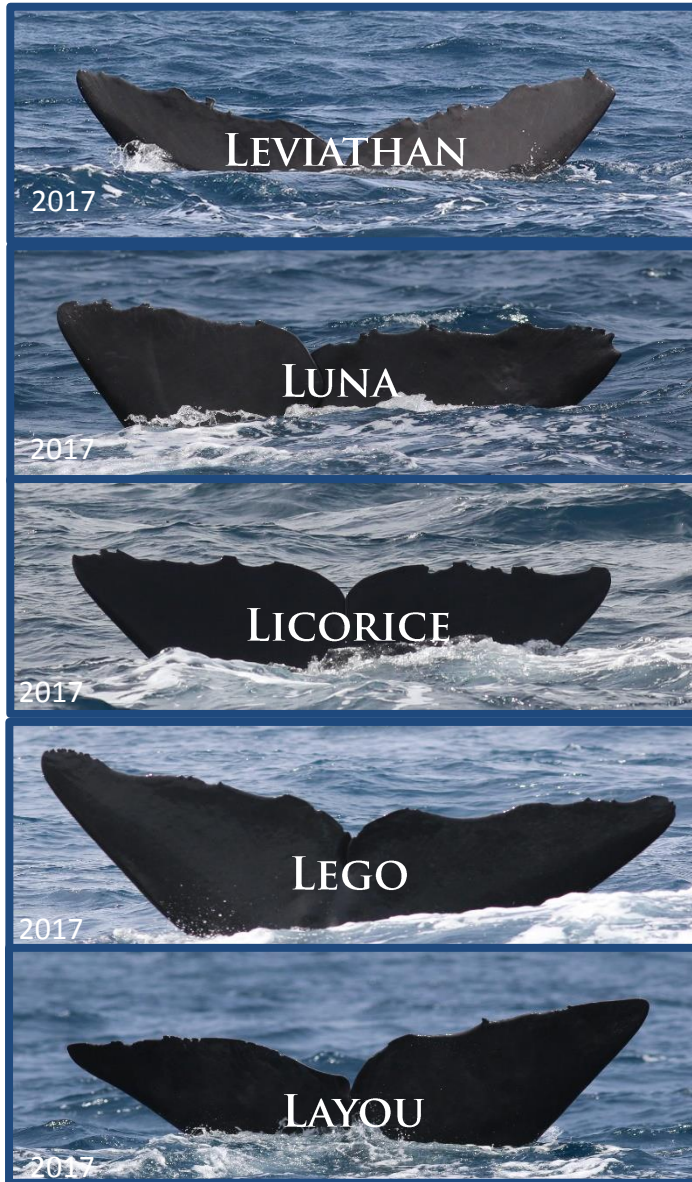
Unit J – Jocasta’s Unit

Jocasta's Unit is quite small only having four members. Adult members of this unit get their names from characters of the famous Greek tragedy play written by Sophocles, Oedipus the King.



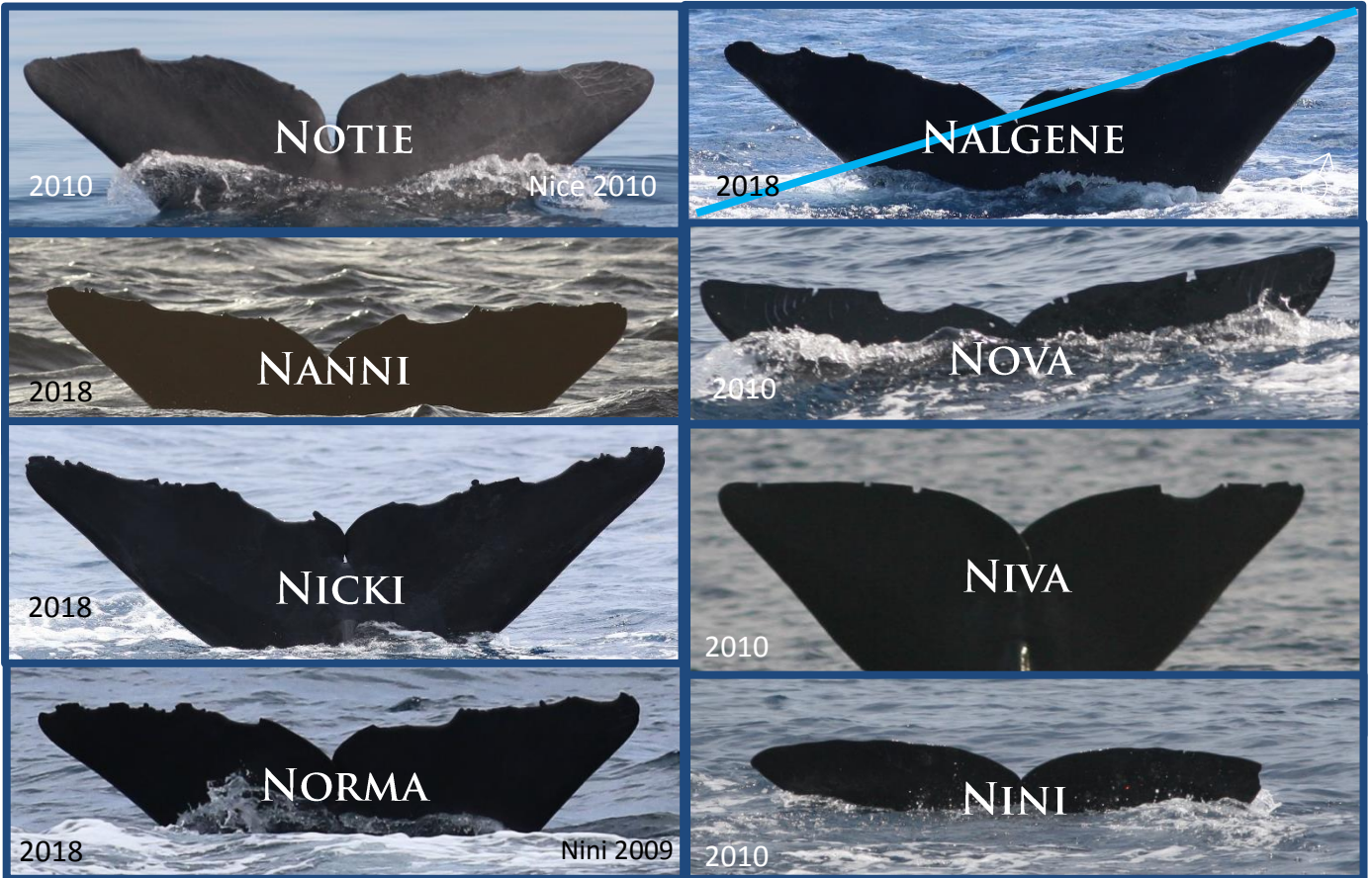
Unit L – The Leviathans

The Leviathans have only been seen very rarely off the coast of Dominica. They were first sighted in 2001 and not again until 2005 off Guadeloupe. The DSWP saw them in 2008 but waited almost a decade to see them again in 2017.



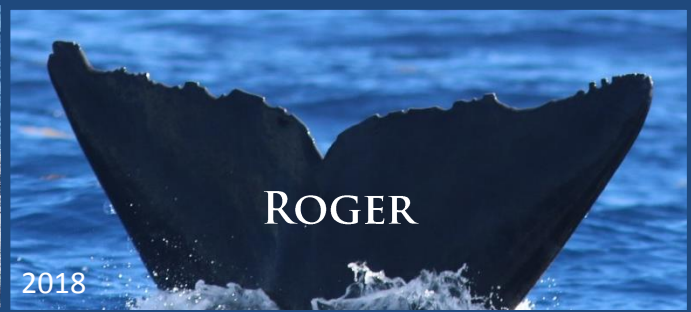
Unit N

Members of Unit N have been known to have used the waters of Dominica since as early as 1995, but were first sighted as a family unit in 2005. Unit N is quite large and has several calves and their fluke marks have changed quickly over the years, making them hard to recognize and resight.



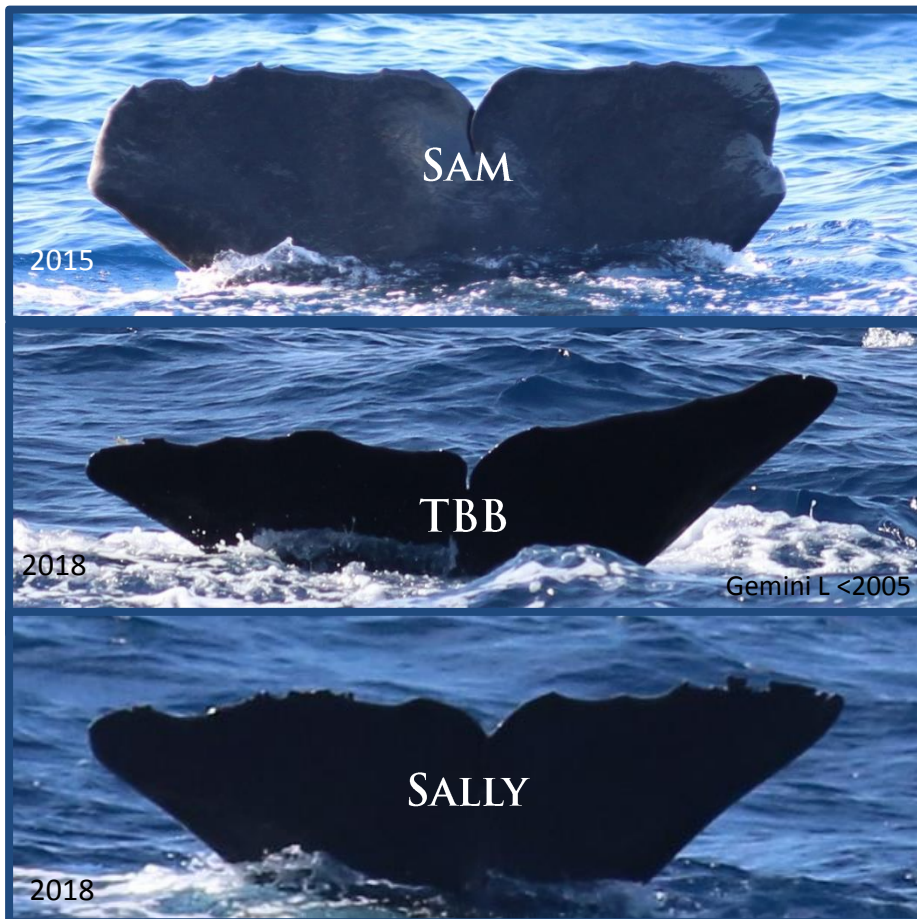
Unit R – Rip’s Rascals

Members of Unit 'R' have been observed regularly since the beginning of the project in 2005. They were first observed off the island of Martinique.



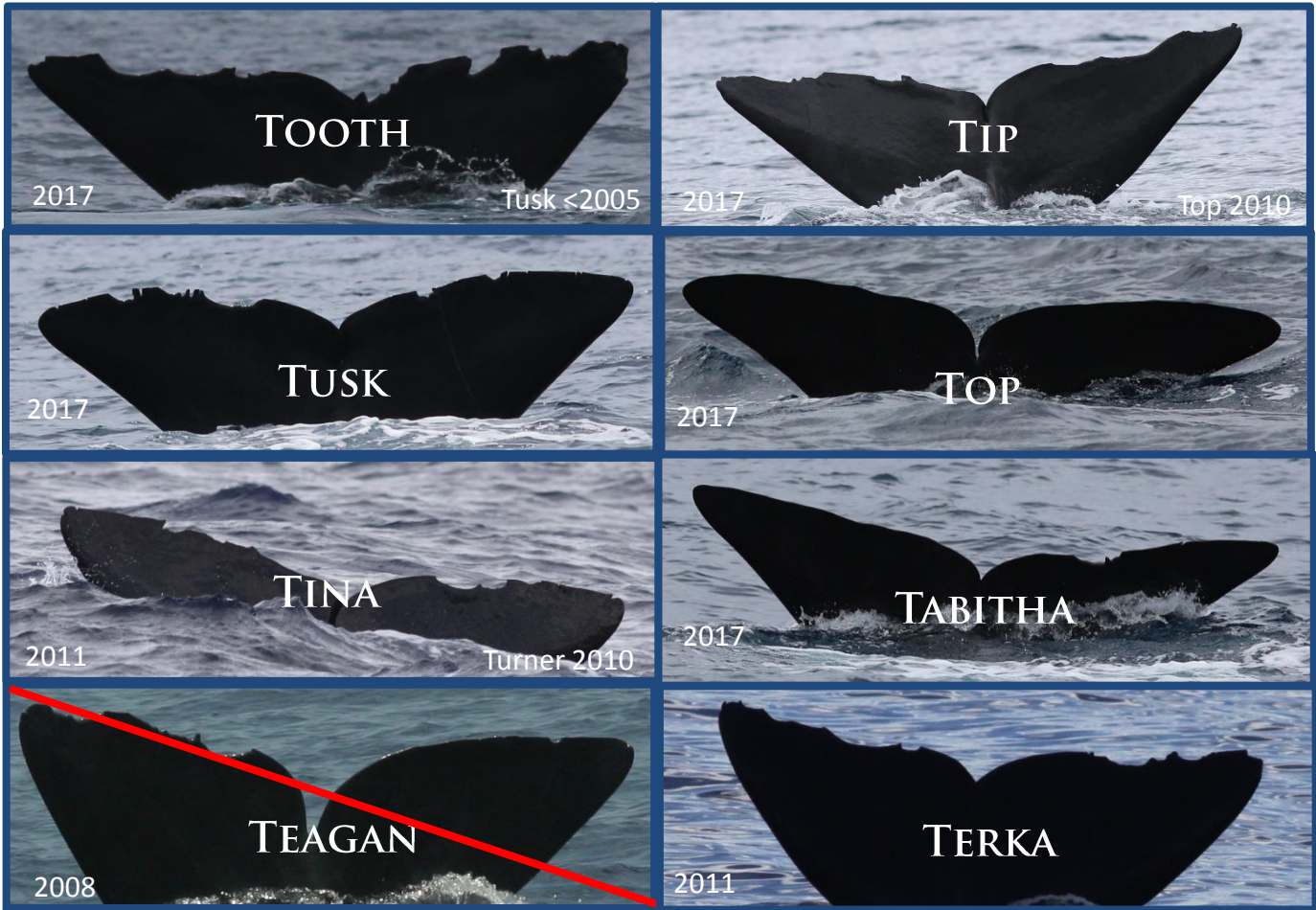
Unit S– Sam’s Squad

Unit S has always been small. At its center is Sam a well-known whale who is easily recognized with each end of her flukes cut off. Unit S and Unit R spend a lot of time together. In fact, for two years, TBB spent more time with members of Unit R than members of Unit S. Sam has not been seen with Sally and TBB in since 2015.



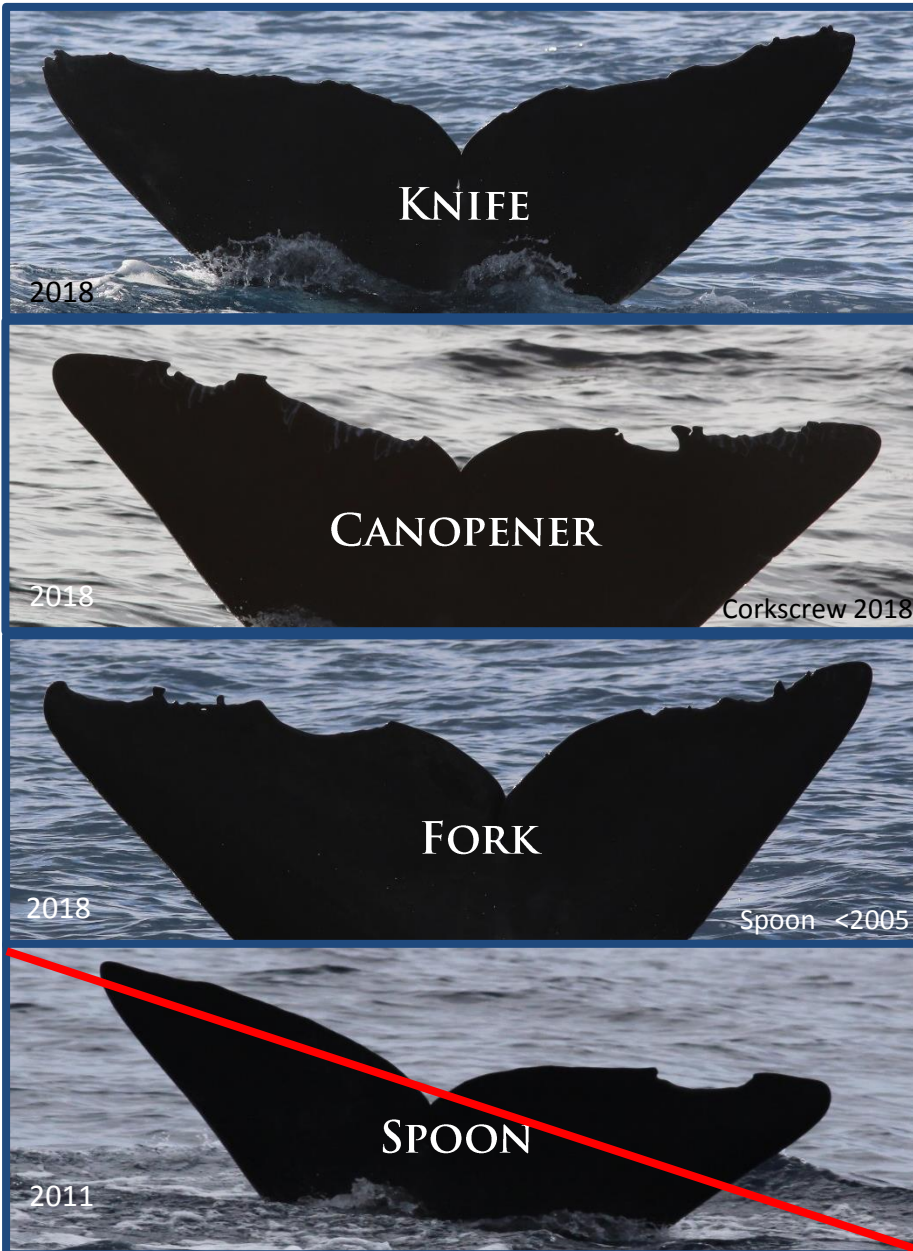
Unit T – Tooth’s Team

Members of Unit T were the first whales encountered on the very first day of the project in 2005. Tooth's Team has spent a lot of time with Unit V. Unit T is unique in that sometime multiple calves will nurse from Terka at the same time – allonursing, feeding milk to calves that are not yours, is common among sperm whales but each family does it differently.



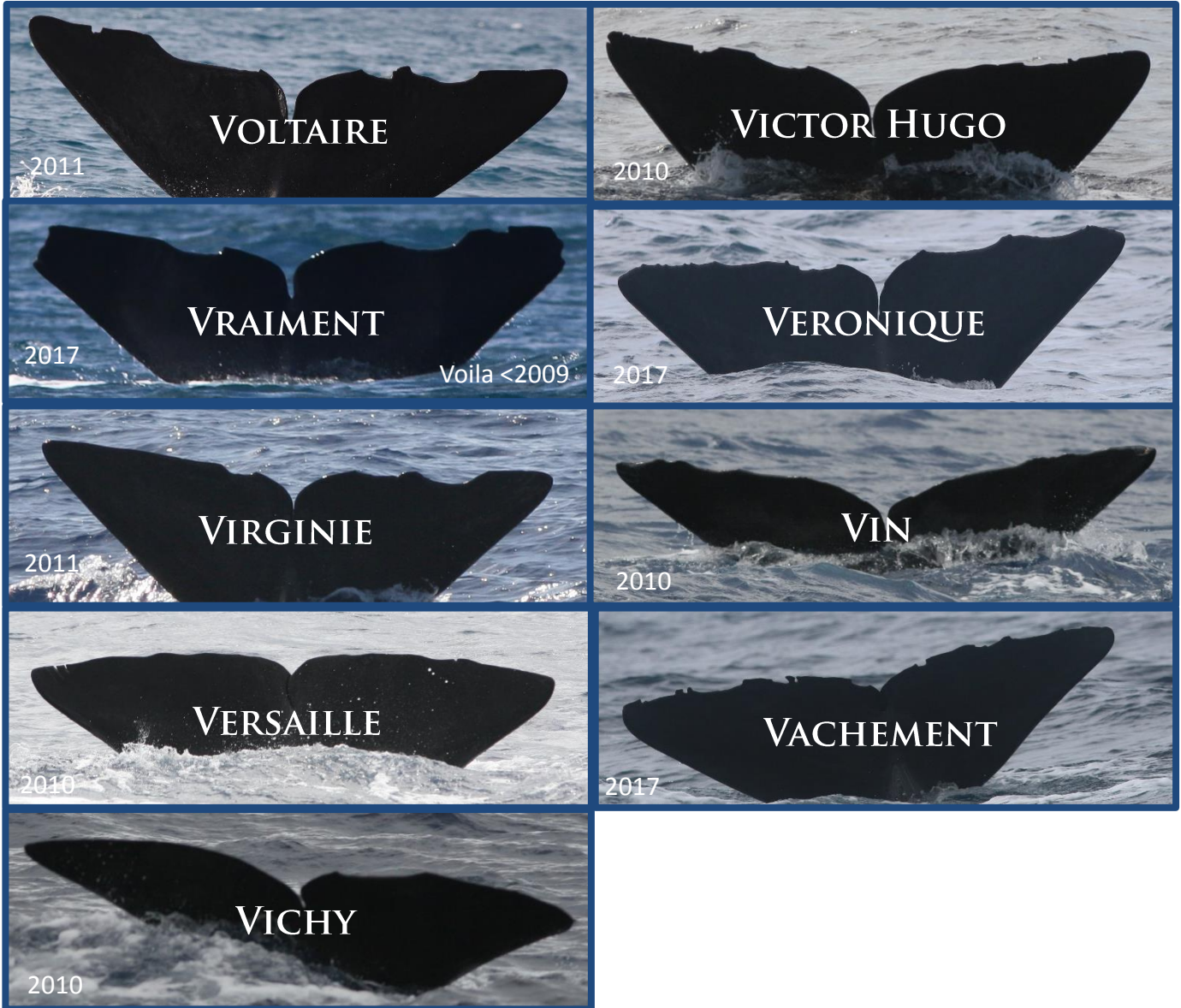
Unit U – The Utensils

Unit U forms a bond-group with Unit F. They are seen together very often and babysit each others calves.



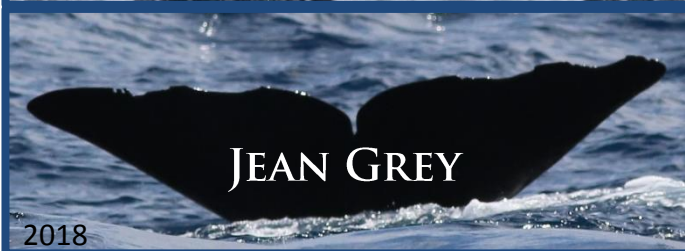
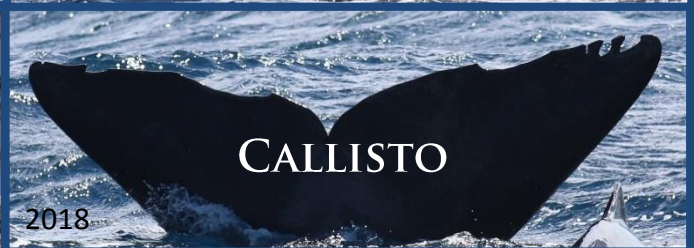
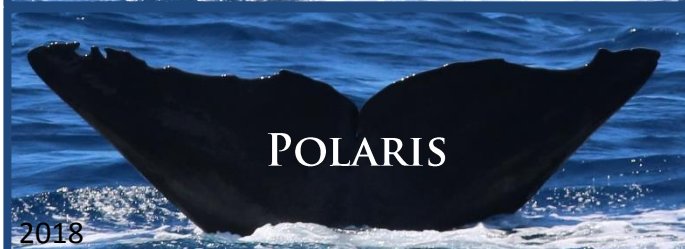
Unit V – Vive la France

Unit V is more often sighted off the island of Guadeloupe than they are off Dominica. They often socialize with Unit T off the northwestern coast of Dominica.



Unit X – The X-Women

The X-Women are a well recognizable unit from the EC2 clan. These whales do not use the 1+1+3 coda like all the more well-known families in the Eastern Caribbean Clan. They belong to the other culture of whales and have only been sighted in recent years. There are at least four calves in this family.



Partnerships

Supporting Partners



The Dominica Sperm Whale Project is pleased to be a participating charity in the Aeroplan Member Donation Program.

Please scan code or visit beyondmiles.aeroplan.com and search 'whale' to donate Aeroplan Miles to our initiatives.



Contributing Organizations

The following organizations have contributed to the project in kind or provided opportunistic data:



IFAW

Data Usage Information

Copyright Information

We appreciate your interest in our research and thank you for reading the Fluke Book. We invite you to learn about the whale families who use the waters off Dominica and the other information contained in this document. The whole purpose of our research project is to pass on what we have learnt about the sperm whales in the Caribbean.

Please understand, however, that the pictures and data contained in this document are acquired through thousands of hours of work by members of The Dominica Sperm Whale Project. We are happy to share this information, these pictures and the data outlined in this document for other purposes once we have provided our expressed, written consent. Without exception, no image displayed in this book is to be copied, duplicated, modified, sampled, redistributed, archived, or used, in whole or in part, without the express prior written authorization of Shane Gero.

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We appreciate your understanding and compliance in this matter. With your cooperation we can continue to provide the most up-to-date information originating from the research project.

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