

# The common seals in the Dollard 2009



**Marlan de Boer**  
**Seal Rehabilitation and Research Centre**  
**Pieterburen, The Netherlands**



# **The nursing season of Harbour seals in the Dollard area**

## **1. Introduction**

The Dollard area, in the North-East part of the Dutch Wadden Sea, is very important for harbour seals; every summer the sandbanks in the area are used for reproduction and moulting. Females give birth on the sandbanks and during low tide mothers use the sandbanks to feed their pups and to haul out. Some of these sandbanks are situated very close to the dike, making mother and pup vulnerable to disturbances caused by human activities on land, such as farming and recreational activities. Because the Dollard area is protected and no vessels are allowed to enter, disturbance caused by vessels does not happen frequently anymore.

The seals in the Dollard are facing others problems as well, affecting the health status of the population. Intensive industrial activities are carried out near the estuary and the water quality of the Eems river is poor, which is particularly problematic for a top predator such as the seal. The Seal Rehabilitation and Research Centre (SRRC) has been monitoring the seal population in the Dollard area since 2006. In 2009, 176 seals were counted by aerial surveys carried out by the SRRC (Osinga, pers. comm.). The present study focuses on haul out behaviour, mother and pup bond, and on the different types of disturbance and their effect on seal behaviour during the nursing season. The harbour seal nursing season starts in May, reaches a peak in June and ends in July.

## **2. Material & Method**

### **2.1 The Dollard area**

The Dollard area is home to a growing colony of harbour seals. The area is influenced by tides and is also the tide estuary of the Eems river, causing the position and shape of the sandbanks to be different each year. The composition of the sand may vary between sandbanks, some being muddy while others are sandy, but even on one sandbank muddy areas and sandy patches may exist. Seals prefer to haul out on sandy parts of the sandbanks, giving them the opportunity to flee into the water quickly when sensing danger. They usually stay close to the water line, preferring sandbanks where the wind is mainly blowing from the direction of the sandbank towards the water line the seals are near (Shumann, 1985).

This research was carried out near the Punt van Reide, where fishing and sailing are not allowed during the period May 15 until September 1, including the period in which seal pups are born and weaned. Large ships and boats however, pass north of the sandbanks multiple times a day on their way to the main channel of the Eems estuary, and small airplanes sometimes fly over at low altitude.

Behind the dike a wetland was constructed, called the Breebaart Polder. Because of the many migratory birds in the area, paths for pedestrians and bikers are constructed all around the Breebaart polder, enabling visitors of the area to watch the resting, nesting and feeding birds. Also, people can walk on top of the dike to watch birds and seals. On the dike sheep graze. Farmers have access to the area with cars and agricultural vehicles. The culvert that runs through the dike allowing salt water to enter the wetland creates a tidal stream on the seaside of the dike, producing sandbanks on both sides of the passing water. This is a favoured haul out site for seal mothers and their pups. However these are also the sandbanks closest to human presence.

### **2.2 The Harbour seal in the Dollard**

Of the two species of seals living in the Wadden Sea - the grey seal (*Halichoerus grypus*) and the harbour seal (*Phoca vitulina*) - the harbour seal is most abundant. Approximately 4500

seals (both species) were counted in the Dutch part of the Wadden Sea during the observation period of this study (counted by use of an airplane by the SRRC). Numbers of harbour seals in the Wadden Sea fluctuate during the year, since seals move away in winter to forage in the North Sea. In spring, numbers on the sandbanks increase as females come back to haul out and give birth to their young in June and July. At the end of the nursing season, the adult males arrive from the North Sea and the mating season starts. After this (in August) the adult seals moult (the sub adult seals shed their fur during the nursing season), and the numbers of seals hauling out on the sandbanks slowly decreases again (Selvaggi, 2001).

In the Dollard area, no grey seals were observed during present and former studies (Bakker & De Vries, 2007; Nussbaum & Selvaggi, 2008). Harbour seals, however, can be seen in large groups hauling out on different sandbanks during low tide between May and September. The seals use the sandbanks to rest, give birth, lactate and moult.

Because harbour seals give birth on intertidal sandbanks, which will be submerged, newborn seals have to be able to swim within hours after birth. For the first 8 to 14 days, the pup needs to be on a sandbank to suckle (Wipper, 1975), therefore, disturbances causing the seals to flee into the water might cause the pups to miss a feeding. When the pups are a bit older and are able to dive for a longer time, they can also suckle under water (Venables & Venables, 1955). At about 4 weeks old, the pups are weaned.

At birth, pups measure around 70 to 80 centimetres and weigh between 8 to 10 kilograms, which makes them easy to recognise in a group of sub adult and adult seals during observation, even on far away sandbanks. However, in 4 weeks time, their weight rises to over 30 kilograms, making older orphans, weaned pups and yearlings (which weigh about 40 kilograms) hard to distinguish.

Seals in the Wadden Sea have no natural enemies. They are, however, sensitive to disturbances caused by human activities and bad weather.

### **2.3 The Seal Rehabilitation and Research Centre**

The Seal Rehabilitation and Research Centre (SRRC), also known as Zeehondencrèche Lenie 't Hart, is located in Pieterburen in the northern part of the Netherlands. Each year, about 300 seals that are ill, wounded or orphaned mainly because of human activities are rescued and released into the wild again after having recovered at the SRRC. It is of great importance for the recovery of seals and the conservation of their natural environment to learn about the problems the seals are facing in the wild. Therefore, apart from rehabilitation, research is carried out by the SRRC, this study being only one of many studies carried out over the years.

### **2.4 Research method**

This study is part of an ongoing research that started in 2007 (Bakker and De Vries) and was carried out in 2008 by Nussbaum and Selvaggi. In 2009, only one observer carried out the research, namely the author of this report. In order to keep data continuous and allow differences throughout the years to be observed, the same research methods were used this year as were used in the two previous years. The point of observation was the same: near the Punt van Reide in the Dollard area, near the top of the dike but on the landside to avoid the observer disturbing the seals. A telescope and binoculars were used to observe and count the seals on five different sandbanks, starting on May 30 (no pups born yet) and ending on July 19 (most pups weaned and no clear distinction anymore between weaned pups and yearlings). Observation days were seven hours, from four hours before low tide until three hours after low tide, the period in which sandbanks started to emerge from the water and mothers and pups came to nurse and haul out, until most sandbanks had disappeared under water again and the seals went back into the water. In total, this study consists of 18 observation days, two days a week over a period of nine weeks.

Weather conditions were recorded every day at the start of the observations and then every two hours, changes in between recordings were noted as well. For this report three fields of research were studied: the distribution and abundance, the effect of disturbance on seal behaviour and the mother and pup bond.

#### **2.4.1 Distribution and abundance**

In order to be able to compare data from this study with data from previous studies, first the sandbanks were mapped and analysed. Because of the changes in shape and location of sandbanks occurring every year due to the tide and currents, it had to be established which of the present sandbanks were the same as the ones observed in the previous years.

The seals present on the five selected sandbanks were counted every 30 minutes and the recorded numbers were registered for each sand flat, with a distinction between adult seals and pups. Also, the location of seals that were individually recognisable for the observer (6 seals in total) was mapped, so their movement and preferences could be analysed.

##### **The different sandbanks that were observed:**

**Sandbank 1 (SB1)**, also known as Reiderplaat, is the sandbank closest to the dike. It's a very long tongue of sand but only a few sites on this sandbank are used by seals. Part of this sandbank stayed dry for all 7 hours during almost every observation day and seals could be seen on or near this site all the time the observer was present.

This sandbank was subdivided in three parts: **1A**, **1C** and **1E** (given the same name as in the study of last year), with sites 1B and 1D identified last year no longer in use by the seals.

**Part 1A** stayed dry for 4 hours (two hours before until two hours after low tide);

**Part 1C** stayed dry for 6,5 hours (submerged during the last 30 minutes of each daily observation period). Seals at this site were on the far away side of the sandbank from the observer's point of view;

**Part 1E** stayed dry, but was used by very few seals and only until 2 hours before low tide.

**Sandbank 2 (SB2)**: has become larger than it was during the study of last year, it also stays dry longer: for 5 hours (3 hours last year), and is now used by more seals.

**Sandbank 3 (SB3)** is also called Herringsplaat. It is the sandbank farthest from the point of observation and difficult to see on cloudy or rainy days, even though the seals haul out on the side of the observer. This sandbank stayed dry during the complete 7 hour observation period and seals were always there.

**Sandbank 4 (SB4)**: this used to be a separate sandbank (Nussbaum & Selvaggi, 2008) but is now attached to sandbank 1. Sandbank 4 is hard to see on any day because it is very far away (in the southern part of the observation area) from the observation point.

**Water Inlet (WI)**: this is a man made channel with a dry patch of sand on both sides. This site stays dry after sandbank 1 and sandbank 2 are submerged and is used by seals throughout the entire 7 hour observation period. It was subdivided in a back part and a front part:

**The back part**: stays dry for about 5 hours (3 hours before low tide until 2 hours after);

**The front part**: stays dry during the complete 7 hour observation period. However, this part is not used by seals from about 1 hour before low tide until 2 hours after low tide (seals move to the back part and then return to the front about 3 hours later).

The front part of the **WI** is very close to the dike and this is the location where seals are most easily and often disturbed by people. It is also the site where some seals are individually recognisable by certain spots, a blind eye, tags, size & colour, wounds, underfeeding and sex (at the end of the observation period, when the males arrived from the North Sea).

### 2.4.2 Disturbance

To study the disturbance in the research area, the same method was used as in previous studies (Bakker & De Vries, 2007, Nussbaum & Selvaggi, 2008). A difference was made between potential disturbances and actual disturbances. All events occurring during the day were noted as potential disturbances, while only the disturbances having an effect on seal behaviour were noted as actual disturbances.

Potential disturbances coming from land included: people walking on top of the dike (sometimes speaking with loud voices) or sitting on the seaside watching or photographing the seals, cyclists on top of the dike or travelling on the landside (making a rattling noise when crossing the cattle grid), cars on the landside or seaside of the dike, agricultural vehicles and sheep on the seaside of the dike running towards the seals. Potential disturbances coming from the water were: boats and ships, while potential disturbances in the air included: jet fighters, small airplanes flying over the sandbanks at low altitude, hard rain and geese flying low over the seals making a lot of noise.

Effects of actual disturbance had on seals were noted as: no effect, heads up, commotion, movement towards the water and movement into the water.

Table 1: list of recorded events

<b>Recorded events</b>	<b>Description</b>
Airplane	The smaller airplanes (propeller aircrafts) and helicopters. Both kinds fly at relatively low height and produce about the same amount of noise. They were recorded when they flew over the Dollard area.
Agricultural vehicle	All kinds of vehicles used in agriculture, casting noise around. This category includes grass mowers, tractors and vehicles with a trailer that drove over the gated cattle grid just behind the dike.
Boat	All kinds of smaller boats within the area of the seals, excluding the big cargo boats and big ferry boats.
Ship	All kinds of big boats, such as cargo boats and big ferry boats, passing the area of the seals.
Car	All kinds of cars, excluding the farmer's, driving on the road at the landside of the dike.
Cyclist	All persons on top of the dike or on the roads at the land- or seaside of the dike with a bicycle.
Farmer	All the farmer's activity in the surrounding area. Farmers usually used a car, casting noise, to drive through the area and on 'Punt van Reide'.
Jet fighter	A jet aircraft flying at high speed and casting a lot of noise around.
Person	Any person walking or sitting on top of the dike or at the seaside. People walking on the road at the landside of the dike were not noted as potential disturbance because they were quiet and had never an effect on the seals.
Animal	Any animal other than a seal on a sandbank or underneath the dike at the water inlet
Rain	All kinds of rain, ranging from a soft drizzle to a thunderstorm.

All events described above can possibly have an effect on seal behaviour. When any of the events occurred, the kinds of effects, the number of seals showing the behavioural effect and the total number of seals on the sandbank influenced by the event were noted.

Table 2: list of recorded effects (seal behaviour)

<b>Seal behaviour</b>	<b>Description</b>
No effect	No effect observed, seals show normal haul out behaviour
Heads up	Seals becoming alert, heads go up. No difference was made between low or high head uplifting.
Commotion	Heads go up, movement and restlessness of the seals.
Movement towards the water	Movement of seals towards the water, without entering.
Into the water	Seals enter the water as a consequence of the disturbance.

### **2.4.3 Mother and pup bond**

The relationship between mother seals and their pups was monitored by observations and counting. Every observation day, one hour before low tide when all the seals were well visible, the distance between every mother and her pup on the different sandbanks during haul out behaviour was noted. Also, the distance between a mother and her pup while moving over land or swimming was noted, as well as 'who follows who' during this behaviour and the vocalization and physical communication between the two. All observed behaviours mothers showed to protect their pups were also noted and described, including the circumstances leading to the protective behaviour. Pups resting on sandbanks by themselves or in pairs were observed to see if an adult seal would later come for them, which in some cases happened. In case of separation, the search behaviour of both mothers and orphaned pups was observed. Towards the end of the research period, most pups were weaned and the behaviour of these seals was also noted.

### 3. Results and analysis

#### 3.1 Distribution & abundance

Numbers increased in the first weeks observation and fluctuated over the summer (figure 1). Observations were stopped when pups were difficult to distinguish from one year old seals. A substantial part of the seals use the water inlet area (table 3).

Table 2: Maximal daily counts (total and pups only) over the season

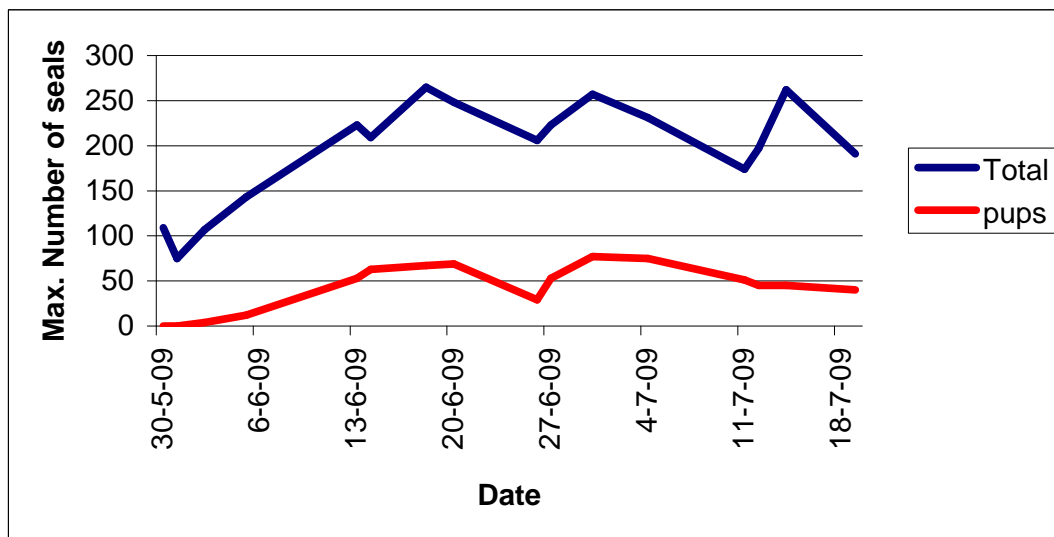


Table 3: Numbers observed

	2009
Highest number of seals observed in Dollard	265 (June 18)
Highest number of pups observed in Dollard	77 (June 30)
Highest number of seals water inlet area	68 (July 14)
Highest number of pups water inlet area	30 (July 14)

#### 3.2 Disturbance & seal response

Disturbances of seals were recorded. Some disturbances harassed seals into the water, other disturbances made the seals alert. At average seals were harassed into the water 0,983 times per hour and seals were alerted 0,161 times an hour (see table 4). The number of orphans stranded along the Dollard coast (Termunten-German border) was 13 in 2009, which is a substantial part of all orphaned seals admitted to the SRRC that year (N= 71, see table 4). Most disturbances came from the land, especially pedestrians on the dike area often caused disturbance. For the first time we saw disturbance by geese flying low over the seals while making a lot of noise.

Table 4: frequencies of disturbance and number of orphans

	2009
Frequency of seals going into the water (disturbances/hour)	0,983
Frequency of seals alert (disturbances/hour)	0,161
Orphans admitted for rehabilitation found in Dollard	13
Orphans admitted for rehabilitation found in The Netherlands	71

### **3.3 Interaction between mother and pup**

#### **3.3.1 hauling out & feeding**

#### **3.3.2 protective behaviour of mother seals**

5-6-2009 A mother and her pup are resting near the water inlet. People arrive on top of the dike at the water inlet. The mother seal becomes very restless. After a minute or so she starts to move around, getting the pups attention. Both mother and pup start to move away from the people, then the mother leads the way towards the water. The pup follows its mother into the water and they swim away.

5-6-2009 A mother seal is nursing her pup near the water inlet. The pup is very relaxed, the mother is not at all because nearby another adult female is restlessly moving around. The nursing mother lifts her head every few seconds to follow the moves of the restless female. Eventually the restless female lies down and the mother can finally relax.

5-6-2009 Just a few minutes after the mother mentioned above is in a relaxed state, two people arrive on top of the dike at the water inlet. The pup stays calm at first, but the mother tries to get the pup to follow her by moving around and looking back at the pup multiple times. The pup follows after a while and the mother takes the pup to a safer place on the sandbank, some distance away.

5-6-2009 A mother seal and her pup are resting on sandbank 1. A seagull approaches them. The mother tries to scare the seagull away by waving her front flipper at it, and trying to hit it. The seagull won't leave, so the mother positions herself between the bird and her pup. The pup stays behind its mother. Then the bird walks away.

13-6-009 A mother seal and her pup are resting near the water inlet. An adult female looking for her pup is approaching. The pup's mother lifts her head and makes small 'threatening' movements towards the searching female, which is now sniffing at the pup. The pup looks up when the strange seal sniffs at its belly but stays with its mother. The searching female continues her search elsewhere.

14-6-2009 Two pups are sleeping close together near the water inlet, surrounded by a group of resting mothers and their pups. After a few hours two adult seals are swimming towards the resting pups. Somehow, the two pups are aware of the two adult seals waiting in the water, even though they are approximately six meters away. They wake up and move towards them. As the pups approach, one of the waiting females hits the other waiting female with her front flipper. The second female tries to bite the first. Then the pups enter the water and both of them approach their own 'mother' quite confidently. The adult and pup pairs are sniffing and circling each other in the water. Then both pairs swim away.

30-6-2009 An adult seal and a pup are resting together near the water inlet. Another adult is passing them over land with quite a high speed. This activates the pup and it starts to follow the passing seal (on land). The resting adult follows the pup, and when the pup reaches the speedy seal, the adult following the pup snaps at the speedy seal. The speedy seal is threatened by this behaviour and escapes into the water. Both the pup and the other adult follow and all three of them disappear.



### 3.3.3 Who follows who while moving around

- 13-6-2009 On many occasions pups were observed following their mother while swimming. The pups were all in close contact with their mothers, pressing their noses against the mother's back flippers.
- 13-6-2009 Another way of movement in the water observed regularly is the mom swimming and her pup 'riding' on her back
- 13-6-2009 Mothers that were leading their pups over land, would constantly wait and look back to see if their pup was still following. They never were more than 4 seal's lengths away from the pup, because then they would look back and wait for the pup to catch up.
- 13-6-2009 The only occasion observed where the mother followed the pup was on one of the sandbanks near the water inlet, when a pup accidentally slipped and started to slide towards and then into the water. The mother then followed the pup into the water but as soon as she reached it, she started leading the way again (in the water), with the pup 'riding' on the mother's back while swimming.
- 14-6-2009 A mother wakes up and moves into the water. Here, she's waiting for her pup to wake up and follow her. It does within a few minutes.
- 14-6-2009 On different occasions a mother was observed helping the pup out of the water. The mother would lead the way to where she wanted to get out, then wait for the pup to pass her and use her body (her side) to help the pup onto the sand.
- 14-6-2009 Two pups (on different sandbanks) were observed moving around a bit, exploring the sandbank. Both the resting moms were watching their pup and when it was about 2 or 3 seal's lengths away, the mother followed. When the pups noticed the mother was following, they stopped to rest with mom again.
- 18-6-2009 No events observed of a mother following her pup. Pups always followed their mother in the same way as mentioned above.
- 20-6-2009 Only one event observed of a mother following a pup (many pups following mom): this happened when a mother was resting and her pup was moving in and out of the water, playing a bit. The mother watched the pup for a while, then followed it into the water. They swam away with the mother leading the way (pup with its nose on her back flippers).
- 20-6-2009 For the first time, pups and mothers were observed not only following each other but also moving next to each other. They were swimming side by side (touching each other or being a few seal's widths apart), moving over land side by side, ...
- 26-6-2009 A mother and a pup are resting. The pup suddenly moves towards the water. The mother watches the pup for a moment, then, after about 20 seconds, decides to follow the pup into the water.

26-6-2009 Although most pups are now old enough to move out of the water by themselves, mother seals with smaller pups are still occasionally observed 'helping' their pups out using their own body for support.

4-7-2009 A mother and a pup are swimming together near the water inlet. The pup comes out of the water but the mother stays in. She is waiting for the pup to come back in. The pup notices the mother waiting and goes back into the water. They swim away together.

4-7-2009 A mother and pup are swimming without a specific destination. Sometimes the mother takes the lead, then she follows the pup for a while, then she takes the lead again...

4-7-2009 From this day on no pups were observed 'riding' on the back of their mothers. All of the observed pups are now capable of swimming on their own or are swimming with their nose on the back flippers of their mother.

12-7-2009 A lot of movement is taking place, both of adults and pups. However, mothers and pups are not often seen moving together anymore.

### **3.3.2 Behaviour of mothers that lost their pup**

13-6-2009 A searching female without a pup comes out of the water near the water inlet. Two mothers are resting here with their pup and three one-year-old seals are resting a little to the side. The searching female looks around, then approaches one of the pups resting with its mother. She sniffs at the pup (the real mother lifts her head) but leaves, since the pup doesn't belong to her. Then she glances at the three one-year-olds. After about 3 minutes she goes back into the water and swims away.

13-6-2009 Another searching female arrives at the sandbank near the water inlet. She has her eyes set on a pup on a specific location that had been sleeping alone for a few hours. She approaches the pup, sniffs at it, and then looks around. It's not her pup. She moves away from the pup, but makes a u-turn and comes back. She sniffs at the pup again. Still not hers. She moves away again and stops. She looks around. She looks back at the location of the pup. She tries again. Doesn't smell like her pup. Finally she moves away a little further and looks at some other mothers and their pups. She moves towards them but then changes her direction and moves back towards the pup in that spot that had her interest from the moment she came out of the water. She sniffs at the pup again. It just isn't her pup. Then she moves towards the water and glides in. In the water she turns around and looks at the pup again. She comes out of the water, goes back to the pup and sniffs at it one last time. Then she enters the water and swims away (the pup did not respond to any of this).

14-6-2009 Twelve adults and six pups are resting near the water inlet. A mother seal with no pup is swimming towards the water inlet looking left and right as she approaches the group. She then climbs out of the water and starts to look for her pup amongst the resting seals. She keeps moving and looking left and right, but can't seem to find her pup anywhere. Then she goes back into the water and leaves, still searching while swimming.

18-6-2009 At the sandbank near the water inlet two pups without a mom are vast asleep. Two searching female seals arrive. Unfortunately, these pups don't belong to the two females. Both searching mothers sniff at both pups carefully but then decide neither of them is theirs. They both leave, leaving the pups behind.

18-6-2009 A pup has been resting without a mother near the water inlet for approximately 3 hours. At first it was surrounded by other seals, but during these three hours they one by one (or in mother and pup pairs) entered the water and left, until the pup was alone. Shortly after the last mother and pup pair had entered the water, an adult seal climbed out of the water and went towards the pup. The adult seal sniffed at the pup and took it with her into the water. They left together.

### **3.3.3 Behaviour of orphaned pups**

Two types of orphaned pup behaviour were observed:

\* Pups that are actively searching for their mother: swimming around, coming out of the water, moving around on a sandbank, going back into the water and start swimming again. They are crying for their mother constantly.

\*\* Pups that seem quite relaxed: they get out of the water, lie down and sleep. No crying or searching at all. When they are done sleeping (hours later), they just go back into the water and swim away quietly.

Both types of behaviour were noticed on many more occasions than the cases described mentioned in the following section. Since the behaviours are the same in most cases, I haven't noted them all here.

14-6-2009 A pup without a mother is crying and swimming near the water inlet. It isn't looking around, just keeps swimming and crying.

18-6-2009 A pup is swimming in the little canal near the water inlet, crying. It climbs out of the water on different locations, stays there a while, cries some more and then goes back into the water.

18-6-2009 An orphaned pup tries to follow an adult that's not its mother. The adult sniffs at the pup, but it doesn't belong to her. She tries to escape by moving fast over land, but the pup manages to keep up with her. Then the adult dives into the water, leaving the pup behind.

20-6-2009 A pup without a mother is swimming calmly towards the sandbank near the water inlet. It climbs out of the water and starts to move around amongst the resting seals (about 17 adults and 12 pups). The pup is not crying and doesn't appear to be stressed. Although there are many adults, the pup moves towards another pup, resting without a mother. Both pups sniff at each other. Then the pup decides to take a nap close to the pup that was already there. Eventually they leave together.

20-6-2009 Another pup without a mother gets out of the water near the water inlet. This one also isn't crying or looking for its mother. It calmly positions itself between some adult seals and falls asleep.

20-6-2009 Two pups are swimming back and forth near the water inlet, crying. They keep swimming towards the dike, even though there are no seals here. They keep crying and trying to get out of the water. After about an hour they swim to the back of the

sandbank and climb out of the water. Here they lie down and rest with the other seals present.

20-6-2009 An orphaned pup is moving along the sandbank near the water inlet. It sniffs at a resting adult that in response lifts its head. Then another adult passes, the pup starts to follow this adult. The adult tries to escape the pup and succeeds. The pup eventually goes into the water and swims away, crying.

26-6-2009 An orphaned pup is swimming at the base of the water inlet. There are no other seals here. There's a very strong stream because of the low tide and the water passing the water inlet. The pup keeps trying to swim upstream for at least ten minutes, even though it could have easily left the strong stream and swim a little to the side instead. It's using a lot of energy crying continuously and swimming against such a strong stream.

27-6-2009 An adult seal comes out of the water near the water inlet with three pups. Also following are two more pups without a mother. The adult lies down, surrounded by five pups.

12-7-2009 An orphaned pup is swimming back and forth in the canal near the water inlet, crying all the time. It comes out of the water, moves around a bit and then goes back in. This behaviour is repeated for at least half an hour. Then it swims away.

### **3.3.4 Mothers and pups reunited**

Only one event has been observed where a mother lost her pup but found it again

14-6-2009 The redheaded mother has suddenly lost her pup; just a few minutes ago they were still together. Her pup is swimming back and forth in the little canal near the water inlet, crying for its mom. Another pup, that's not hers, is sleeping all alone on the sandbank near the water inlet. The redheaded mother, however, is convinced that this is her pup. Maybe because this is where she lost her pup, or has seen it last. She tries to get ashore, but the slope is very steep (low tide) so it's a big struggle. While she keeps trying, her real pup is still swimming and crying for its mother (at a distance of about ten-twelve meters), but the redheaded mother pays no attention to this at all. For at least a half an hour she keeps trying to climb out of the water. The sleeping pup stays vast asleep during all this activity. Eventually there is success for the redheaded mother, when she manages to get out of the water. When she starts sniffing at the sleeping pup she gets confused. She looks around and sniffs at it again a few times, but the pup really isn't hers. All this time her real pup is nearby and screaming. The redheaded mother enters the water and starts swimming away. Due to some luck mother and pup find each other in the water about an hour after they were separated. They both climb ashore at the end of the sandbank and the mother starts nursing her pup.

## **4. Other events**

20-6-2009 An adult female is resting on the sandbank near the water inlet. A pup is resting with her. They are both very relaxed and close to each other (distance  $< \frac{1}{4}$  of a seal's length). No other seals are around. Then the female seal with the red head and back and the blind right eye comes out of the water and approaches them. Both stay calm and relaxed. The red mother sniffs at the pup, the other adult doesn't mind, she gives

no response. The pup seems a bit confused about which of the adults is its mom. It looks at both the adult seals, then decides to follow the red female. The other adult does not respond to the pup leaving her. The red female starts nursing the pup. It was suggested that the adult female watched the pup while the mother was away, however this is not a common behaviour in harbour seals. She could also have been just ignorant to the presence of the pup and therefore showed no reaction to the animal.

20-6-2009 Two orphaned pups are sleeping together on the sandbank near the water inlet, about halfway up the canal. There are no other seals left on this part of the sandbank. They came out of the water together a few hours earlier and have not moved since they fell asleep. Now an adult (estimated a few years old by its length and appearance) comes out of the water and starts moving with determination towards the pups. She wakes them both up by pushing her nose against them and makes them follow her. All three of them disappear into the water.

20-6-2009 The mother with the red head, back and blind right eye is swimming towards the front of the sandbank near the water inlet, her pup following her. She sends the pup up the sandbank (close to a resting adult) by waiting for the pup to catch up and then giving it a gentle push with her side while she herself stays in the water. The red mother doesn't go far from the pup, but is swimming and diving in the water. After 5 minutes the pup decides to enter the water and starts to play, swim and dive with its mom.

26-6-2009 A pup alone is vast asleep on sandbank 4. An adult comes from a very far distance over land and joins the pup. They sleep close together.

30-6-2009 An adult seal and a pup come out of the water together near the water inlet. The pup is following the adult at a distance of less than half a seals length. When the adult lies down, the pup tries to drink. The adult won't let it and hits it with its front flipper (pup being weaned?).

4-7-2009 The redheaded mother allows her pup to 'ride' on her back while swimming. She bends her head all the way back to touch the pups nose with her own. They keep sniffing each other and are diving around each other. There's a lot of physical contact between the mother and her pup.

11-7-2009 without any obvious disturbance three adult seals start heading towards the water with quite some speed. They don't appear to be in a panic. They plunge in, causing the other seals nearby to get very excited. The other seals copy the first three seal's - and each other's - behaviour and suddenly all seals are heading for the water, jump in and swim away.

11-7-2009 A group of approximately 12 seals resting on sandbank 3 suddenly all head for the water without an apparent reason. They move fast but seem calm. They all move in a straight line and dive in at the same time. About five minutes later they come out of the water onto sandbank 2.

11-7-2009 The first males (two) have arrived. They are jumping like dolphins and splashing the water with their flippers. They get out of the water, move past the resting females at high speed and close distance. Then they jump back into the water with a

lot of energy. One of them is later resting near the water inlet. Because it was lying with its belly towards me, I was able to identify it as a male.

12-7-2009 Again one male is resting near the water inlet. Another is doing his dolphin-jumps between sandbank 1 and the sandbank at the water inlet and hitting the water with his flippers to make it splash. Close to sandbank 3 another male is showing the same behaviour.

19-7-2009 One of the males is very active on the sandbank near the water inlet. He is 'running' towards the water, letting himself slide down the slope of the sandbank but turns around right before he would have hit the water. Then climbs back up the sandbank and repeats this behaviour a few times. He also moves with high speed past some females. They pay no attention to him, or only briefly lift their heads.

## **5. Case studies: description & distribution of recognisable seals and their pups observed during the entire observation period (May 30– July 19)**

### **Light colored juvenile**

This was probably a one year old seal, with quite a light coat. Observer wasn't able to determine whether the seal was female or male. This seal was seen almost every observation day and always at the front of the water inlet. Four hours before low tide, when the observer arrived at the location, this seal was already present (with the exception of June 13, when it arrived about an hour and a half later than the observer). Because the seal always had a dry coat when the observer arrived, it must have been at WI front for some time, possibly as soon as the tide allowed it. It was usually the only seal with a completely dry coat, so it may have been the first seal to arrive at WI front, and was often the last to leave (about two hours before low tide, as observed). The seal had a preference for a specific spot for hauling out: on the sandbank to the right of the stream caused by the culvert, close to the dike. During hauling out, it would stay in the same spot without movement, except from lifting its head occasionally. The seal did not respond to disturbance quickly; in most cases it did not respond at all or only briefly lifted its head to see what was going on.

Where this seal went after it left WI front, is unknown (except for June 30, when it arrived at WI back 4,5 hours after having left WI front). This could be explained by the fact that this seal was recognised by its light (dry) coat. Once it entered the water, the observer lost track (because the seal would dive) and was unable to identify the seal, now with a darker wet coat, in a group of seals on a further away sandbank.



## Light colored juvenile

May 2009						
M	T	W	T	F	S	S
					□	□

June 2009						
M	T	W	T	F	S	S
	□			□		
					□	□
			□		□	
				□	□	
	□					

July 2009						
M	T	W	T	F	S	S
					□	
					□	□
	□					□

Grey square: observation day, seal not seen

Green square: observation day, seal seen without pup



## Light colored juvenile

June 5	WI front	
	Arrived	Left
	13.56	14.26

June 13	WI front	
	Arrived	Left
	8.09	10.39

June 14	WI front	
	Arrived	Left
	7.11	9.11

June 18	WI front	
	Arrived	Left
	10.36	13.06

June 20	WI front	
	Arrived	Left
	12.55	14.55

June 26	WI front	
	Arrived	Left
	6.06	8.36

June 27	WI front	
	Arrived	Left
	6.47	10.17

June 30	WI front		WI back		WI front	
	Arrived	Left	Arrived	Left	Arrived	Left
	9.03	10.03	14.33	15.03	16.03	16.03

July 4	WI front	
	Arrived	Left
	13.20	15.50

July 11	WI front		WI front	
	Arrived	Left	Arrived	Left
	5.52	9.22	11.52	12.52

July 12	WI front	
	Arrived	Left
	6.25	9.55

Times written in red

Under arrived: seal was already present when observer arrived

Under left: seal was still present when observer left

## **Red head I**

This seal was spotted during the whole period of observation - including the first and last day - but not every day. She was first seen with a pup on June 18, which was also the first time she was hauling out at the water inlet; the days before her pup was born she used sandbank 1 and sandbank 2 to haul out. On June 20, the pup still had a piece of an umbilical cord. On July 11, she had two pups with her. During the days this seal was seen with her pup, she always used the water inlet to haul out and feed her pup. On July 12 she was first seen with no pup and back on sandbank 1 again.

On days this seal was observed without her pup, she wasn't spotted for hours after the observer arrived. She usually arrived around low tide (six times; exceptions are July 12 & 19). The days when the pup was with her, she was either already at WI front when the observer arrived (two times), or arrived within 30 minutes (two times). The first of the sites she used to haul out during the hours of observation, she stayed somewhere between 30 minutes to 2,5 hours. When moving between different haul out locations, she would stay in the water for one to two hours (even WI front → WI back → WI front). Then she would stay at the second haul out site for 30 minutes to 4,5 hours.

Mother and pup were seen together for about 3,5 weeks, but because observation days were sometimes several days apart, the pup may have been with its mother a few days longer (maximum 27 days).



## Red head I

May 2009						
M	T	W	T	F	S	S
					□	□

June 2009						
M	T	W	T	F	S	S
	□			□		
					□	□
			□		□	
				□	□	
	□					

July 2009						
M	T	W	T	F	S	S
					□	
					□	□
	□					□

Grey square: observation day, seal not seen

Green square: observation day, seal seen without pup

Orange square: observation day, seal seen with pup

## Red head I

May 30	SB1A	
	Arrived	Left
	11.40	13.10

May 31	SB1A		SB3	
	Arrived	Left	Arrived	Left
	13.36	14.06	15.06	15.36

June 2	SB2		SB1C	
	Arrived	Left	Arrived	Left
	15.06	16.06	17.06	17.36

June 5	SB1A	
	Arrived	Left
	16.56	19.26

June 14	SB1A		WI front	
	Arrived	Left	Arrived	Left
	10.11	12.11	14.11	14.11

June 18	WI front		WI back		WI front	
	Arrived	Left	Arrived	Left	Arrived	Left
	11.06	11.36	12.36	16.36	17.36	17.36

June 20	WI front		WI back	
	Arrived	Left	Arrived	Left
	12.55	13.55	14.25	18.55

July 4	WI front		WI back		WI front	
	Arrived	Left	Arrived	Left	Arrived	Left
	13.20	13.50	15.50	18.20	19.50	20.20

July 11	WI front	
	Arrived	Left
	6.22	6.52

July 12	SB1C	
	Arrived	Left
	7.25	7.55

July 14	SB1C	
	Arrived	Left
	13.28	14.28

July 19	SB1C		SB1C	
	Arrived	Left	Arrived	Left
	12.55	13.56	16.26	18.56

## **Red head II**

This female seal also had a red head, but lighter than the head of Red head I. She was first seen on June 13, with a pup. This was the seal that lost her pup on June 14 and fortunately found it again after about an hour (see: *mothers and pups reunited*). On June 20 she was swimming around near the water inlet without her pup; the pup was resting on the sandbank near the water inlet with another adult female (see: *other events*). On June 26 she was hauling out at the water inlet without her pup and she wasn't spotted with her pup since. So she was seen with a pup for only one week. However, she may have had the pup for a while before she was first observed. Also, the last time she was seen with a pup (June 20) was almost a week before the next observation day (June 26). So, in fact, she may have had the pup much longer than was observed.

This seal was observed at SB1C once, and also once at SB2. All other observations occurred on WI front and WI back. On most days this seal was seen (7 out of 9 days), she was either already at WI front when observer arrived, or arrived at WI front within 30 minutes to an hour after the observer did. Exceptions are June 14 and 30, when the seal did not arrive until the end of the observation day. The seal usually left WI front within an hour after the observer arrived, so three hours before low tide. Somewhere between one to two hours later, it would reappear at either WI back (four times), SB1 (one time), or it would not be seen again (two times). The four times it was seen hauling out at WI back, it would stay for about 30 minutes (July 4) to four hours (June 13). On two observation days, the seal then went back to WI front (and once to SB1C), and was still there when observer left.

**NO PICTURE AVAILABLE**

## Red head II

May 2009						
M	T	W	T	F	S	S
					□	□

June 2009						
M	T	W	T	F	S	S
	□			□		
					□	□
			□		□	
				□	□	
	□					

July 2009						
M	T	W	T	F	S	S
					□	
					□	□
	□					□

- Grey square: observation day, seal not seen
- Green square: observation day, seal seen without pup
- Orange square: observation day, seal seen with pup

## Red head II

June 13	WI front		WI back	
	Arrived	Left	Arrived	Left
	6.39	7.09	9.09	13.09

June 14	WI front	
	Arrived	Left
	14.11	14.11

June 20	WI front	
	Arrived	Left
	12.55	13.55

June 26	WI front		SB 2		WI front	
	Arrived	Left	Arrived	Left	Arrived	Left
	6.06	7.06	9.06	11.06	13.06	13.06

June 27	WI front		WI back		WI front	
	Arrived	Left	Arrived	Left	Arrived	Left
	6.47	8.47	10.17	12.17	13.47	13.47

June 30	WI back		WI front	
	Arrived	Left	Arrived	Left
	14.33	15.03	15.33	16.03

July 4	WI front		WI back		SB1C	
	Arrived	Left	Arrived	Left	Arrived	Left
	13.20	14.20	16.20	16.50	19.20	20.20

July 11	WI front	
	Arrived	Left
	6.52	7.22

July 12	WI front		WI back	
	Arrived	Left	Arrived	Left
	6.55	7.25	8.25	9.25

Times written in red

Under arrived: seal was already present when observer arrived

Under left: seal was still present when observer left

### **Red head & back & blind right eye**

This very orange and easily recognisable seal was often seen at the water inlet. June 18 was the first time she was seen with a pup, and the pup stayed with her for little over three weeks (minimal 24, maximal 27 days). This seal usually moved between the front and the back of the water inlet during the hours of observation. She seemed to prefer the sandbank to the right of the stream; on seven of the eight days she was observed, she hauled out at the right side. June 27 was the only time she was seen at another location than the water inlet, namely at sandbank 2.

On three of the observation days this seal was already present at the front of the water inlet when the observer arrived. On four more days, the seal arrived within half an hour after the observer did. So, on the days this seal used the WI front to haul out, it usually arrived at the location within two and a half hours after high tide, when only SB1C, SB3 and WI front were available. On the days the seal left WI front to go to WI back, it left WI front 2 to 2,5 hours before low tide (4 out of 5 times). It didn't swim immediately to WI back: there were 30 minutes up to 4 hours between her leaving WI front and arriving at WI back (however, most of the time she stayed away for 1 to 1,5 hours). The time this seal stayed at WI back to haul out varied between 30 minutes up to 5 hours. When WI back disappeared again with the rising of the water (two hours after low tide), the seal swam to WI front straight away and came out of the water within 10 to 15 minutes after having left WI back. On every observation day the seal returned to WI front after low tide, it was still there when observer left.





**Red head & back & blind right eye**

May 2009						
M	T	W	T	F	S	S

June 2009						
M	T	W	T	F	S	S

July 2009						
M	T	W	T	F	S	S

Grey square: observation day, seal not seen  
 Green square: observation day, seal seen without pup  
 Orange square: observation day, seal seen with pup

### Red head & back & blind right eye

June 14	WI front		WI back		WI front	
	Arrived	Left	Arrived	Left	Arrived	Left
	7.11	7.41	8.41	13.41	14.11	14.11

June 18	WI front		WI back		WI front	
	Arrived	Left	Arrived	Left	Arrived	Left
	11.06	12.06	16.06	16.36	17.06	17.36

June 20	WI front		WI back		WI front	
	Arrived	Left	Arrived	Left	Arrived	Left
	13.25	14.25	15.55	18.55	19.25	19.55

June 26	WI front		WI back		WI front	
	Arrived	Left	Arrived	Left	Arrived	Left
	6.06	7.36	9.06	12.06	12.36	13.06

June 27	WI front		SB2		WI front	
	Arrived	Left	Arrived	Left	Arrived	Left
	6.47	9.17	9.47	11.17	13.47	13.47

July 4	WI front		WI back	
	Arrived	Left	Arrived	Left
	13.50	14.50	16.20	17.50

July 11	WI front		WI back		WI front	
	Arrived	Left	Arrived	Left	Arrived	Left
	7.22	7.52	8.22	9.52	12.22	12.55

July 12	WI front	
	Arrived	Left
	6.55	7.25

Times written in red

Under arrived: seal was already present when observer arrived

Under left: seal was still present when observer left

### **Red head & back**

This seal also has a red head and back, only of a little less bright orange than the previously described seal (red head & back & blind right eye), and the last one third of her back and the back flippers had a normal color. This seal moved around between sandbanks (and sites) a lot. She was seen on: SB1E, SB1C, SB1A, and the front and back of the water inlet. It was the only seal of the ones described that was seen using site SB1E to haul out.

During the weeks she was with her pup, she moved around between the water inlet and different sites on sandbank 1. On the observation days she was seen with her pup, she would already be hauling out at one of the sites when the observer arrived, or start doing so within a half an hour. On some of the days this seal was spotted without her pup, however, it would not appear until the end of the observation day, or it appeared quite late: after 2,5 to 5 hours. During the hours of observation, this seal would stay in a certain spot somewhere between 30 minutes and 2,5 hours, with the exception of July 4, when she and her pup stayed at WI back for 4,5 hours.

When this seal was seen on different sites in one observation day, it would be in the water for no more than 30 minutes to 1 hour (7 out of 9 times).

This seal was seen with her pup for two weeks (minimal 15 days), but may have been with her pup longer (maximal 22 days), since the last time they were seen together and the first time she was seen without her pup were a week apart.



## Red head & back

May 2009						
M	T	W	T	F	S	S

June 2009						
M	T	W	T	F	S	S

July 2009						
M	T	W	T	F	S	S

- Grey square: observation day, seal not seen
- Green square: observation day, seal seen without pup
- Orange square: observation day, seal seen with pup

## Red head and back

June 5	SB1E	
	Arrived	Left
	14.26	14.56

June 14	WI front	
	Arrived	Left
	14.11	14.11

June 18	SB1E		WI back	
	Arrived	Left	Arrived	Left
	13.06	13.36	16.06	17.06

June 20	SB1C		SB1C	
	Arrived	Left	Arrived	Left
	13.36	14.06	15.06	15.36

June 27	SB1E		SB1A		WI front	
	Arrived	Left	Arrived	Left	Arrived	Left
	6.47	8.47	9.17	11.47	13.47	13.47

June 30	WI front		WI back		SB1C		WI front	
	Arrived	Left	Arrived	Left	Arrived	Left	Arrived	Left
	9.33	11.03	12.03	14.33	15.03	15.33	16.03	16.03

July 4	WI front		WI back	
	Arrived	Left	Arrived	Left
	13.20	14.50	15.20	19.50

July 11	WI front	
	Arrived	Left
	11.22	12.52

July 12	WI front		WI back	
	Arrived	Left	Arrived	Left
	6.55	7.25	8.25	11.55

July 14	WI back	
	Arrived	Left
	12.28	12.58

Times written in red

Under arrived: seal was already present when observer arrived

Under left: seal was still present when observer left

### **Wounded neck seal with striped pup**

This female has a deep scar around the neck from having been trapped in a fishing net. This female was also observed in 2008 (Nussbam & Selvaggi), when she was the first mother to be seen with a pup during that observation period. During the present study, the wounded neck seal had a pup with 3 dark stripes on the left side of the body. Both mother and pup paid very close attention to each other and were never seen apart during the nursing period. Like last year, the pup stayed with its mother for at least three and a half weeks (minimal 25 days, maximal 30 days).

This female was never seen anywhere else than on the sandbanks near the water inlet, mostly at the front, either to the left or right of the stream. She may in fact very well have been using other sandbanks to haul out, but with the exception of site SB1A, the other sandbanks were too far away to be able to identify this seal. However, even though this seal would have been recognisable on sandbank SB1A, it was never seen using this site.

From June 27 up to and including July 12, this seal was already present at WI front (with pup) when the observer arrived. On two observation days, the seal first arrived at WI back somewhere around low tide (2 – 5,5 hours after observer arrived). This means it must have stayed in the water longer, or it first used another site than WI front to haul out. On two more observation days, it didn't arrive until less than 30 minutes before observer left, both times with pup and at WI front. This seal was seen at WI back 4 times in total and stayed in this spot somewhere between 30 minutes (June 13) and 3 hours (July 14). On the four observation days the seal was already at WI front when the observer arrived, it left this site no later than 2 hours before low tide. After leaving WI front on those days, the seal wasn't seen again for 4,5 to 6 hours (with the exception of July 4: 1,5 hours). The moment this seal returned to WI front was very consistent: it always showed up about 2,5 hours after low tide and would still be there when observer left.





### Wounded neck

May 2009						
M	T	W	T	F	S	S

June 2009						
M	T	W	T	F	S	S

July 2009						
M	T	W	T	F	S	S

Grey square: observation day, seal not seen  
 Green square: observation day, seal seen without pup  
 Orange square: observation day, seal seen with pup

## Wounded neck

June 13	WI back		WI front	
	Arrived	Left	Arrived	Left
	12.09	12.39	13.09	13.39

June 18	WI back	
	Arrived	Left
	12.36	13.36

June 20	WI front	
	Arrived	Left
	19.55	19.55

June 26	WI front	
	Arrived	Left
	13.06	13.06

June 27	WI front		WI front	
	Arrived	Left	Arrived	Left
	6.47	8.47	13.17	13.47

June 30	WI front		WI front	
	Arrived	Left	Arrived	Left
	9.03	10.33	15.33	16.03

July 4	WI front		WI back		WI front	
	Arrived	Left	Arrived	Left	Arrived	Left
	13.20	14.50	16.20	17.50	19.50	20.20

July 12	WI front		WI front	
	Arrived	Left	Arrived	Left
	6.25	6.55	12.55	13.25

July 14	WI back		WI front	
	Arrived	Left	Arrived	Left
	9.58	12.58	13.58	14.28

Times written in red

Under arrived: seal was already present when observer arrived

Under left: seal was still present when observer left



## References

- Bakker K., De Vries A.W.R. 2007. *The common seal in the Dollard (Wadden Sea), a research into distribution and abundance, disturbance and mother-pup bond*. SRRC.
- Hart 't P., 2007. *Zeehondenjacht in Nederland 1591-1962*. Academisch proefschrift Vrije Universiteit Amsterdam.
- King J. E. 1983. *Seals of the world*. Oxford University Press, Oxford, United Kingdom.
- Nussbaum S., Selvaggi E. 2008. *The Common seal in the Dollard*. SRRC.
- Pauli B. D., Terhune J. M. 1987. *Tidal and temporal interaction on harbour seal haul out patterns*. Aquatic Mammals. 13(3): 93-95
- Selvaggi E. 2001. *Effects of disturbance on daily rhythms and haul out behaviour in the Harbour seal (Phoca vitulina) in the tide estuary of the Dollard (The Netherlands)*. Poster at the ECS Annual Conference, Rome (2001)
- Schumann W., 1985. *Seehunde im Wattenmeer*: 1-112 (Landbuch-Verlag GmbH, Hannover
- Thompson P. H., 1993. *Harbour seal movement patterns*. Symp. Zool. Soc. Lond., 66:225-239
- Venables U. M., Venables L. S. V. 1955. *Observations on a breeding colony of the seal Phoca vitulina in Shetland*. Proc. Zool. Soc. Lond., 125: 521-532
- Wilson S. C. 1978. *Social organisation and behaviour of harbour seals 'Phoca vitulina concolor', in Maine*. Final Report contract MM6ACO13, GPO-PB-280-188, Marine Mammal Commission, Washington, DC, 36 pp.
- Wipper E. 1975. *Die Bedeutung des Wattenmeeres Für den Seehund*. Natur u. Museum, Frankfurt a. M. 105(1):15-24