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DANISH AND SWEDISH LIGHTSHIPS SERVING TO GUARANTEE THE SAFETY OF THE DANISH STRAITS AREA SEA ROUTES 1820–1988

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INTRODUCTION

The access to the Baltic Sea is reachable from three different areas. The first one and the most used one is the Danish Straits, connecting the Baltic Sea to the North Sea through the Øresund, the Great Belt and the Little Belt, also called the Baltic Straits. The second way to reach the Baltic Sea is the White Sea-Baltic Sea Canal – 227 kilometers long, about 4 meters deep and equipped with 19 sluices. The channel serves, de facto, as the inner Russian sea route, and its reachability is severely limited. The third way is the Kiel Canal – 98.6 kilometers long, about 11 meters deep and 102 meters wide. It serves as an inner German sea route, made available for the international needs.

All of those routes are difficult sea routes which require good navigational marking. There are a lot of lighthouses there, leading lights, beacons and buoys which ensure the sea routes' safety. Before the said lighthouses appeared, different solutions had to be taken under consideration and, thus, lightvessels were built to serve

there between 1820–1988.¹ Further in the text there will be an analysis presented of the lightships which served in the area of the Danish Straits and their influence on the navigation safety there.

The authors of the given work have been researching the history of lightships and lighthouses for many years. The results of their work have been published and presented in various books and articles as well as during many conferences. The matter of the Swedish, Danish, German, Russian and Finnish lightships' activities has been presented during both national and international conferences. Co-written monographs and books have also been published: *Najstarsze latarnie morskie Zatoki Gdańskiej* (Gdańsk 2009), *Morskie drogowskazy polskiego wybrzeża. Marine Signposts of the Polish Coast* (Gdańsk 2011) oraz monografia Iwony Pietkiewicz *Rozwój statków latarniowych Bałtyku, Cieśnin Duńskich i Kattegatu w latach 1820–1988* (Toruń 2014). Ten articles have been written concerning the matter which have been published in *Zeszyty Naukowe AMW*, *Nautologia*, *Studia Maritima*, *Colloquim* and many more.

It may seem that the matter of the lightships' activity, whose services ended in Europe in 1988, has already been sufficiently researched and presented on various occasions. Those truly unique and hard-working vessels equipped with beautiful, mostly red hulls and often originally shaped, have become an inspiration for artistic photographers and for painters.

In the given work, we are trying to evaluate the influence of the lightship on the safety of the navigation in the area of the Danish Straits. Through this particular sea route there have been countless ships sailing with their goods to and from the Baltic ports. Before modern, electronic navigation systems were born, including the lighthouses, sector lights, leading lights, automatic buoys and such, the lightships had been the units fully responsible for the safety of the vessels.

In order to explain the discussed issues, many documents have been researched on and the method of analysis and synthesis of the historical sources as well as induction and historical and geographical methods have been used. All of this work allowed the main aim of the paper to be pursued and obtained that is to present the most important issues and matters regarding the lightships' role and exploitation in the area of the Danish Straits. Also, a set of lighthouses serving around the Straits has been pointed out.

¹ The very first vessel designated to be a lightship, *The Nore*, appeared in Europe in 1728 (some sources mention 1732 as the initial date) and were a private initiative of two English traders, who wanted to protect their goods from the possible running aground at the mouth of the Thames, as they were on their way to London. It wasn't until four years later, in 1734 when the vessel was taken over by Trinity House.

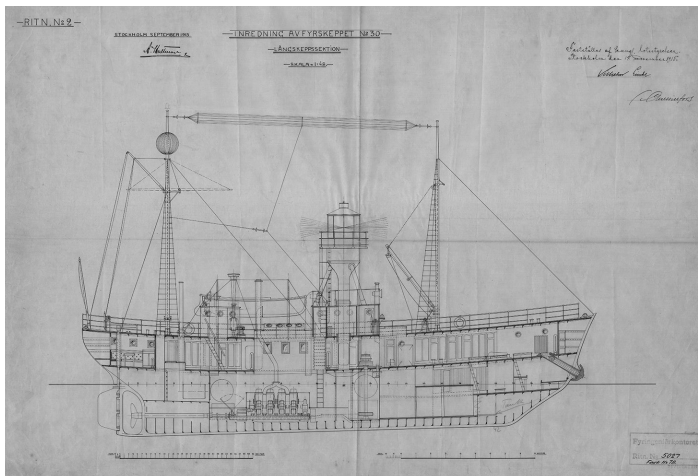
THE RESULTS DISCUSSION

The Danish Straits are basically Scandinavian sea routes navigated mainly by two countries, Denmark and Sweden, although in their southern area also by Germany. The lightships that ensured safety along those sea routes between Kattegat, Øresund and the Great Belt during the 19th century were Danish *Skagens Rev*, *Laeso Trindel*, *Laeso Rende*, *Ostre Flak*, *Kobbergrund*, *Anholt Knob*, *Schultz Grund*, *Gilleleje Flak*, *Lappe Grund*, *Halskov Rev*, *Drogden*, *Mon-SE* and *Gedser Rev* and Swedish *Grisbådarna*, *Vinga*, *Fladen*, *Svindbadan*, *Kalkgrundet*, *Malmo Redd*, *Oscarsgrundet*, *Trelleborg* as well as *Falsterborev*. Further in the work authors present the constructions of some of them and evaluate their crews' efficiency as well as some of the problems they faced while exploiting the vessels.

The constructions of the first lightships were not very different from the ordinary vessels used to carry goods. They were not very big, wooden ships, lacking their own mechanical drive and power. Their hulls weren't longer than 15 meters, wider than 5 meters and their draught was of 3 meters. There were some bigger vessels, capable of holding their position on the open waters. Those ships' length reached up to 40 meters and in some cases even 50 meters.

The policies concerning the development of lightvessels varied, were not unified, and depended on the Baltic country using them.²

Figure 1. Swedish lightship number 30 design. The ship was equipped with a steel hull



Source: Stockholm Riksarkivet Nr 5027.

2 Adam Fleks, "Ostatnie szwedzkie latarniowce", *Morza Statki i Okręty* 3 (2002): 14–17.

A steel hull appeared to be a standard lightship construction around the middle of the 19th century. Those vessels' drive were usually sails and later on, from 1906, steam engines and from 1912 diesel engines with 300–500 horsepower which allowed the units to move with the speed of about 9 knots. The engine of such power was suffice to return to the given position in the case of going adrift or to return back to harbor for maintenance. The lightships constructed earlier, equipped with sails, were built to have two sails on display: gaff rig at the back mast and a triangle-shaped foresail at the front mast. The sails, apart from being the drive force, served also as an element improving the ships' visibility and they would lighten the anchors during storms. Along with the technological development of constructing steel hulls, the sizes of lightships were changing, the vessels were becoming bigger. Bigger hulls made the crews' work safer, especially during stormy weather and guaranteed better social conditions for sailors living onboard.³

Finland had a whole fleet of lightships during the time of the Grand Duchy with about 9 vessels and 13–15 during the time of independence. Those vessels had, at first, wooden hulls, then steel ones. Their length was about 25 meters but there were vessels which were 30 and even 40 meters long. The peak of the Finnish lightships' activity was between 1918 and 1923 and the very last lightvessel was *Kemi* which served until 1974.⁴

Swedish lightships (37 units serving on 24 positions) were used along important trade routes throughout the 140 years from 1844. There were both wooden-hulled and steel-hulled vessels in service. Some of them were used to serve as only lightships, others had different purposes. They were all equipped with strong anchor devices and had anti-icing enhancement. The biggest number of lightships serving on their position, 22 vessels, was recorded between 1930–1935 and the very last one that was on duty was *Falsterborev Redd*, which served until 1972.⁵

The above-mentioned vessels were marked with daytime signals and signs with spheres and other geometrical figures put on the top of the masts. Another thing that marked the lightships were the ensigns. The red-colored hulls soon became a common feature of lightvessels, differentiating them from other ships. At night, there were light signals sent from the masts.

Basin freezing was a big problem during the time of the Baltic lightships service. Usually, during winter, they would just stay in ports and wait until better weather conditions to resume their duties. Other exploitation problems were caused by the anchor

3 Erik Lindberg, "Coase, fyrtorner och marknaden: privata och statliga fyrar i Sverige före 1840", *Ekonomisk debatt* 8, 2012: 61–70.

4 Seppo Laurell, *Suomen majakat. Finnish Lighthouses* (Helsinki: Gummerus Oy, Jyväskylä, 2001), 134–145.

5 Swedish Maritime Administration (Sjöfartsverket) – Norrköping (SMA) acta se sid bl. 3339.

systems which ought to be solid and stormy weather caused the lightships to drift away from their positions or caused the anchor chains to break.⁶

The evolution of the light systems used onboard the lightships was strongly connected with the development of the light systems used in lighthouses. At first, candles in glass containers were used. Such a solution was quite impractical because candle-light wasn't strong enough and was basically invisible during the long, winter nights. Another idea was to use oil lamps fueled with whale or rape oil.⁷ They were dragged up the masts with lines which together created a system of lines called the tackle; it allowed the crew to control the light with ease. Such oil lamps were used on the very first German lightships. Smoke and the necessity of constant soot removal as well as the high price of the proper plant oils made this resort far from perfect.

A Swiss physicist Ámie Argand proposed a solution to those inconveniences in 1755. He constructed a lamp which, thanks to a ring wick and flame cover with a cylinder which allowed the air flow, assured burning of any sort of oil with bright and non-sooting fire. The improved Argand Lamp with a multi-wick burner, used along with the focal reflector, both spherical and parabolic, used together or one-by-one were used onboard the lightships for the next one hundred years. The lamps were not perfect, they had to be taken down every three hours to regulate the wicks' length, which caused the crew a lot of work and effort.⁸

Another problem which had to be faced, was connected with the light stability. In 1807, a Scottish building engineer, Robert Stevenson dealt with this inconvenience by constructing a multi-angle frame with the cardanic suspension inside. The construction would be fixed around the lightship mast along with nine oil lamps with parabolic reflectors. This solution allowed the light to be distributed steadily and evenly both vertically and horizontally. During daytime, when the light wasn't used as well as during maintenance periods, the lamps were brought down to the superstructure placed in the lower part of the mast. The device was improved by a Swedish engineer Gusaf Dalén, who, once the lightships started being equipped with Fresnel lenses,⁹ used earlier in lighthouses, invented an independent optician suspension, in which the lense system – suspended jointly at the center of gravity – wouldn't cause the unwanted light movement caused by the vessel's [‘rocking’ would be better here] on the waves.¹⁰

6 The research has shown that the anchor chains had their links about 42 mm thick and their length was about 300–500 meters. The weight of the mushroom anchor was between 800–1800 kg, and the weight of the whole set was about 15 tons. It needs to be added that the lightships were usually equipped with three anchors of a different mass each.

7 *Latarnie morskie świata* (Warszawa: Muza, 2000), 50–70.

8 Erik Lindberg, “From Private to Public Provision of Public Goods: English Lighthouses Between the Seventeenth and Nineteenth Centuries”, *Journal of Policy History* 25 (2013), 4: 538–556.

9 Augustin-Jean Fresnel (1788–1827) – a French physicist and prismatic lens constructor.

10 *Latarnie morskie świata*, 66.

On the contrary to the lighthouses, the Fresnel lenses appeared onboard the lightships no sooner than around the 1870's and 1880's. Such a situation was caused by the lack of solutions allowing an easy lift of the light systems along with the lenses to the top of the lightship mast. The prototype version of such an equipment consisted of three arms, and on each of them, using the cardanic suspension, were secured with Argand lamps inside of the Fresnel lens. The whole construction was lifted up towards the top of the mast. The light was visible around the mast. The at-the-time-modern lights were much smaller and lighter in comparison to their graceless prototypes.

In 1905 on the German lightships separate light masts were used, which allowed the bigger light systems to be used. In the middle of the ship there would be a mast constructed in such a way to allow the crew to climb up to its very top. On its upper part a platform was settled with a lantern and light system. This solution eliminated the necessity of lifting and lowering the ships' light systems. In order to maintain the system or to cover it for daytime, the crew would simply walk up to the platform, which made their work much easier¹¹.

Another evolutionary step in the history of light system construction used onboard the lightvessels was connected with the usage of gas as the source of energy. It was first used in lighthouses. Initially it was impossible to deliver gas onboard the vessels through pipes, as it was done in the case of lighthouses, so the idea was taken up to use acetylene – gas produced from carbide – in order to fuel the lights on the lightships. The research was conducted in Sweden between 1849 and 1908 and led to obtaining very bright and intense light along with a big consumption of the energy source. The liquidized gas used for this purpose was stored in cylinders. High costs of the method forced further research of the matter and its effect was a construction of a device known commonly as the Dalén lamp in 1906. In 1916, Dalén invented a device that automatically changed the burned-out lamp cover into a new one. As a result, the Dalén lamp, equipped with 24 replaceable covers, was able to work for twelve months without any crew present on the ship.¹²

Despite the usage of direct current on lightships serving at the Baltic Sea already in 1927 (obtained from generators), to provide power to the electric devices, such as radio, anti-fog signaling, anchor elevators and lighting, the electrification of light systems present onboard lightvessels was postponed until after World War II, when long-lasting lightbulbs and electricity generators started to be used on a regular basis. It needs to be said that the Dalén lamp was still in use as a back-up option.

In order to obtain broken light with accurate characteristics suitable for a given lightship, while using electricity, interrupters were used.

11 Friedrich-Karl Zemke, *Feuerschiffe der Welt* (Hamburg: Koehlers Verlagsgesellschaft mbH, 1995), 60.

12 Riksarkivet Stockholm, Fyringeniörkontoret Ritin, SRa No 4175, 4805.

DANISH LIGHTSHIPS

In Denmark the very first lightship started her service near the Island of Laesø in 1829. In 1888 there were already 12 of them, in 1910 – 16, and in 1927 – 17. What was characteristic of the Danish lightships was the fact that their hulls were made of oak wood and they were all almost identical sizes (length: 20,4–35,1 m). The hulls were painted red with the characteristic white cross on the sides, with names of the vessels written on them. The Danish constructions of lightships with no drive had numbers from I to XXI and the engine constructions from I to IV. The biggest number of lightvessels serving Denmark was between 1945 and 1953 when there were thirteen ships operating. The very last of them, with the number XXI, was retired from her MON-SE position in 1988. The Danish lightships which were on duty in the Straits served on the positions mentioned below and those were often changed due to damage and maintenance. Another story are the cases of vessels colliding with lightships. Ships *Drogden* and *Lappe Grund* suffered severely due to such collisions. Officially Danish lightships finished their service in 1988, but the truth is, however, quite different, and we'll get to that in a moment.

The specificity of the construction of the Danish lightships was based on the fact that all of their hulls were made of oak wood and had the above-mentioned length. Those vessels that were on duty around the Straits' position had better serving conditions than the ones that were anchored in the North Sea. The lightvessels' positions were only temporarily connected with their names, which they were given for the time of their mission in the particular area. Despite this system, each lightship had their own numbers written on the stern area.

In general, there were twenty-five lightships exploited in Denmark.¹³ The very first ones were delegated to their positions in 1838 and in 1888 there were already 12 of them.¹⁴ The number of ships and their positions would change and would depend on the navigational needs and the external conditions. During the time of war, the navigational lights would be turned off and there was no need for the lightships to serve. Sometimes, though, they served to help other ships to navigate. Similarly, during winter time, lightships were gathered back in ports to protect them from ice and make sure they remained intact.

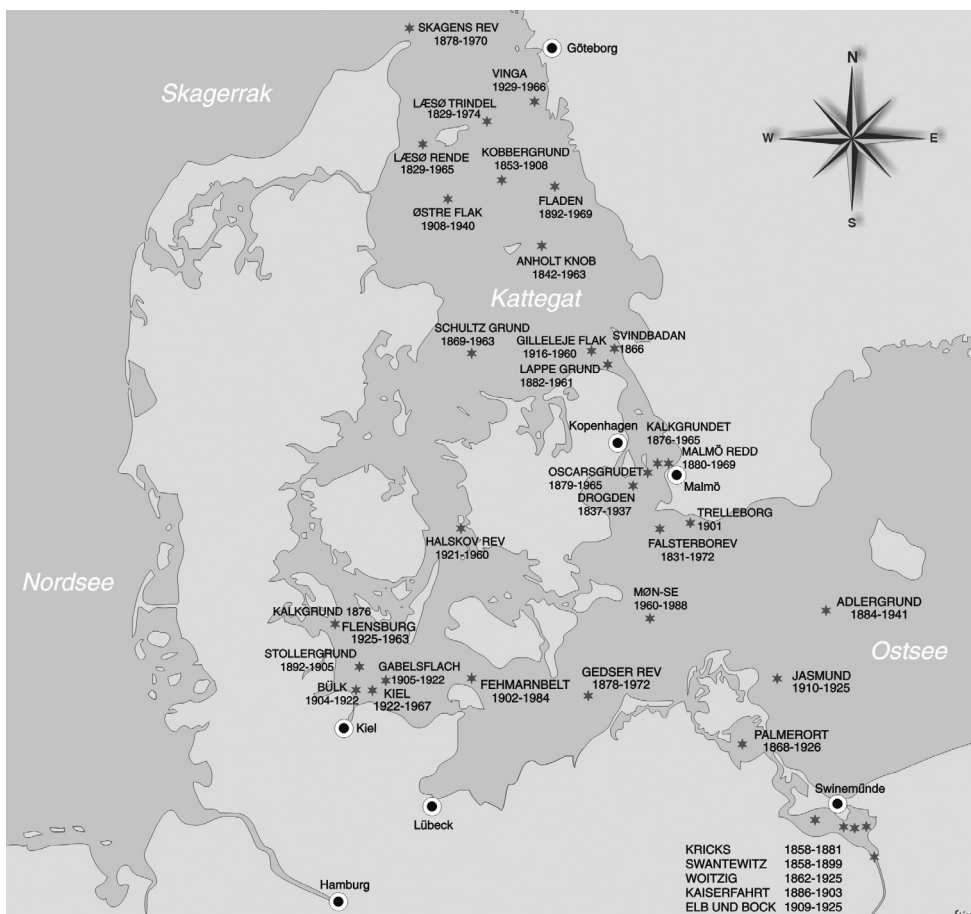
The official history of the Danish lightships has not ended because one of their engine ships, *Motorfyrskib II*, after being bought by a private owner, Jorgen Olsen, was sent to Gdańsk in 2006 for maintenance and necessary fixes. The job was never finished and three years later the ship, abandoned by her owner and the shipyard workers,

13 Ove Hermansen, *Danmarks Fyrterne og fyrskibe* (Vaerløse: Billeso & Baltzer, 2011), 173.

14 Ibidem, 172.

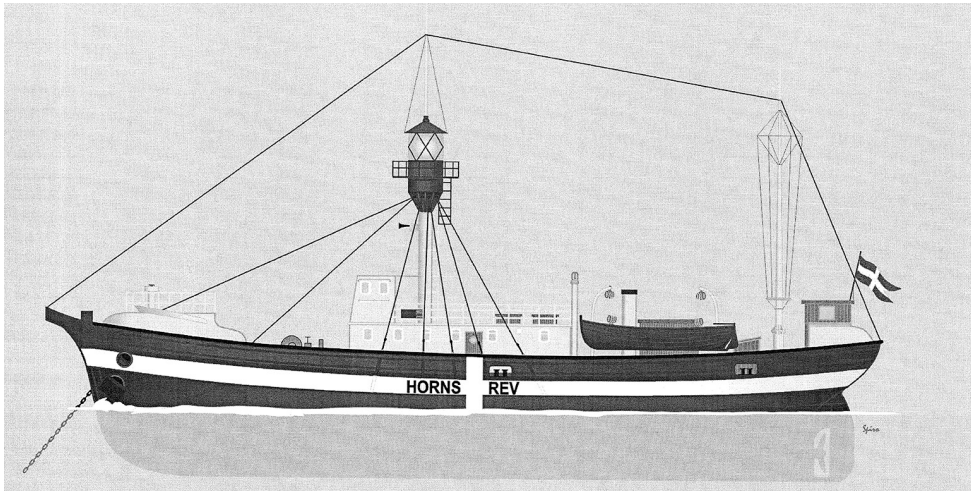
sank in a harbor canal. It was raised from the sea in 2009 and sank once again. Until this day (February 14th 2018), the lightship lies on the bottom of the wet dock. It's assumed it will be lifted once again quite soon and then will be utilized. Oak wood has the properties of being usually well-preserved in water, so it's possible to assume the lightship will still have some sort of a value.

Figure 2. The map of the Danish Straits with marked positions and names of the lightships



Source: Iwona Pietkiewicz, *Rozwój statków latarniowych Bałtyku, Cieśnin Duńskich i Kattegatu w latach 1820–1888* (Toruń: Wydawnictwo Grado, 2014), 117.

Figure 3. Danish lightship *Horns Rev* on her position in the area of the Danish Straits



Drawing: Spirydion Sierakowski.

The details concerning the exploitation and history of the Danish lightships were presented in Iwona Pietkiewicz's book, where a reader may also find the descriptions of other vessels of such kind serving in the Baltic Sea.¹⁵

The list of the Danish lightships securing the navigation in the area of the Danish Straits:¹⁶

The Danish lightships:

Skagens Rev – Fyrskib X, XIV, XVI, XVII, XX, XI.

Laesø Trindel – Fyrskib I, II, IV, VI, IX, X, XII, XV, XVI, XX.

Laesø Rende – Fyrskib I, II, IV, VI, XI, XIII, XV.

Kobbergrund – Fyrskib IV, V, VI, VII, XI.

Anholt Knob – Fyrskib II, V, VI, IX, XI, XII, XIV.

Schultz Grund – Fyrskib IV, VI, VIII, XV, XVI.

Gilleleje Flak – Fyrskib XI, XII, XV i *Motorfyrskib II*.

Drogden – Fyrskib I, VIII, XI.

Halskov Rev – Fyrskib III, IV.

Mon – SE – Fyrskib XXI i *Motorfyrskib I*.

Gedser Rev – Fyrskib II, VI, XI, XIII, XVII.

Attention: The lightships numbered Fyrskib XII, XIII, XVIII, XIX, XX, XXI and *Motorfyrskib I* served in the North Sea.

15 Werner Björn, *Fyrskipp i Sverige – historien om fyrskippsepoken 1831–1972* (Stockholm: CB Marinlitteratur AB, 1999), 7.

16 Leif Elsby, "Fyrskipp i nordiska vatten", *Blänket* 12 (2008): 21–22.

SWEDISH LIGHTSHIPS

The history of the Swedish lightships stretches over 140 years (1831 – 1972). During that time 37 lightships served on 24 positions on very varied, rocky Swedish coastline and filled with countless shoals and in the area that this article is mainly focused on, the Danish Straits and Kattegat, there were 16 lightships serving on 9 positions.¹⁷ Some of them served only one season on the particular position. What is the reason behind such a dynamic rotation among the vessels? It is not possible to determine the reasons based on the available documents, however one can only imagine that countless damage and on-going maintenance are to blame.

Below is a chart displaying the lightships' positions and their names from the oldest to the youngest ones.

Table 1. Swedish lightships serving in the area of the Danish Straits and Kattegat and their positions.

Years in service	Name of the lightship	Serving on the position
1831–1972	Falsterbo	00 <i>Hermina</i> 1831–1831 0 <i>Cyklop</i> 1844–1864 (built for this position) 4 <i>Fasterborev</i> (built for this position) 8 <i>Svinbådan</i> 1883–1930 28 <i>Reserv</i> 1931–1972
1866–1960	Svinbådan	7 <i>Vulkan</i> 1866–1869 8 <i>Svinbådan</i> 1870–1877 (built for this position) 14 <i>Svinbådan</i> 1878–1893 (built for this position) 17 <i>Svinbådan</i> 1894–1960 (built for this position)
1873–1965	Kalkgrundet	7 <i>Vulkan</i> 1873–1873 11 <i>Irene</i> 1874–1874 13 <i>Kalkgrundet</i> 1875–1875 (built for this position) 9 <i>Diana</i> 1876–1878 13 <i>Kalkgrundet</i> 1879–1884 4 <i>Falsterborev</i> 1885–1886 13 <i>Kalkgrundet</i> 1887–1971
1876–1969	Sjollen/Malmö redd	13 <i>Kalkgrundet</i> 1876–1879 10A <i>Odin</i> 1880–1892 27 <i>Malmöredd</i> 1893–1951 (built for this position) 2B <i>Almagrundet</i> 1952–1969
1879–1961	Oscarsgrundet	11 <i>Irene</i> 1879–1931 21 <i>Trelleborgsredd</i> 1932–1961

17 Werner Björn, *Fyrskipp i Sverige*, 7.

Years in service	Name of the lightship	Serving on the position
1892–1969	Fladen	10B Fladen 1892–1899 (built for this position) 18 Reserv 1900–1900 16 Kopparstenarne 1901–1924 24 Reserv 1925–1925 32 Fladen 1926–1929 (built for this position) 10 Fladen 1930–1967 (built for this position) 29 Ölandsrev 1968–1969
1900–1929	Grisbådarna	10B Fladen 1900–1929
1901–1930	Trelleborgs redd	21 Trällebogsredd 1901–1930 (built for this position)
1929–1965	Vinga	32 Fladen 1929–1965

Source: based on: Werner Björn, *Fyrskipp i Sverige – historien om fyrskippsepoken 1831–1972* (Stockholm: CB Marinlitteratur AB, 1999).

The very first ship displaying light and daytime signals began her service on the position by the Falsterbo headland in 1831 and her task was to strengthen the lights beacons by the nearby lighthouse. It was a vessel with the number 00, called *Hermína* – a yacht rebuilt to become a lightship. It was equipped with a light device and rather small devices capable of sending light signals in the fog. The crew consisted of four people. The vessel was small and did not exactly fit the role of a lightship, so about a year later it finished her service. In 1844 a professional lightship called O Cyklop began her duty on the very same position.¹⁸ The Falsterbo Peninsula is a part of the Swedish coastline infamous for the biggest number of ships sinking there, so the area around the peninsula was the one where the Swedish lightships served the longest.

The majority of the lightships were designed and built in Sweden (as seen in the chart), but some of them (as mentioned above) were simply adjusted to the lightship function, and having this in mind, there were many vessels bought (mostly abroad) for this particular purpose. In such cases, the name of the vessel wasn't changed, she was only given a number, for example: a back-up ship *Vulkan* which was given the number 7.¹⁹

What is characteristic for Swedes was also giving subsequent number to the built ship, hence in the Swedish lightship index there are, apart from ships' names, numbers from 00 to 33 (in the described area of the Swedish territorial waters the lightvessels serving were up to number 32 → check the chart).

The positions where the lightships were designated, were chosen having in mind both safety of the vessels and the relative easiness of anchoring.

In accordance with the international practice, Swedish lightships were also painted red and their names were written with white letters on the boardsides. Furthermore, in

¹⁸ Leif Elsby, „Fyrskipp i nordiska vatten”, 10.

¹⁹ Werner Björn, *Fyrskipp i Sverige*, 3.

the case of Swedish lightships, the marking was enriched by Roman numbers; the very first Swedish lightship marked like that appeared in 1875.²⁰

Some of the Swedish lightships were built to serve around a concrete area of anchoring (check the chart). Quite often it would happen, though, that the ship would change her position, but her number visible on the boardsides wouldn't change. A good example is lightship number 33, *Sydostbrotten*, which was built especially for the Sydstötbrottet position and it served also on the position of Norströmsgrund. It wasn't the only example of such cases; another example is a lightship marked as *10B Fladen*, which was built to serve on the Fladen position, but during her years of duty, she'd also serve on the Grisbådarna position.²¹ In Scandinavian countries, lightships were designated to serve on their positions mostly from spring to autumn, when the sea wasn't frozen, however some of them had been equipped with stronger hulls to protect the vessels from ice and in such cases, the lightships would stay on their positions until the first frosty days. The oldest Swedish lightships, just like the oldest lightships serving among the other Baltic countries' fleets, were not equipped with engine drives, and only some of them had sails. As a result, they were towed to their positions rather than getting there on their own. Only very few of them were capable of sailing. Lighthouses constructed and built in the 20th century were usually equipped with an engine drive, thanks to which they were able to move to their position on their own and to come back to the harbor for all the necessary maintenance and fixes before the sea would freeze.

In the middle of the 20th century, Swedish lightships started to be steadily replaced by lighthouses built on the sea bottom. Such a revolution would spread quickly due to the high and consequently growing cost of lightships' exploitation. Due to the changes that appeared in the collective labor agreement, which as of the end of the 1950's included sailors, maintaining a lightship crew working 24/7 demanded the crew to be expanded. Furthermore, modernization of the crew rooms and technical upgrading required big financial input, which was particularly troublesome due to the on-growing costs.²²

In order to replace expensive lightships, caisson lighthouses were invented. In the 1950's such lighthouses started appearing in many places. A fog detector system was also developed, in order to efficiently control the lighthouses' beacon without workers' physical presence. Technical development of electronic navigational systems, such as Decca Navigator or radar, also added its two cents in withdrawing lightships off their duty. The 1950's and 1960's is a period during which dynamic changes in Swedish coastline marking and signaling happened. In 1965 there were only 7 out of 24

20 Iwona Pietkiewicz, *Rozwój statków latarniowych Bałtyku, Cieśnin Duńskich i Kattegatu w latach 1820–1988* (Toruń: Wydawnictwo Naukowe Grado, 2014), 142.

21 Werner Björn, *Fyrskipp i Sverige*, 10–12.

22 Swedish Maritime Administration (Sjöfartsverket) – Norrköping (SMA) se sid bl. 2749.

lightships left and in 1972 the very last one was retired from service, *28 Reserv* serving on the Falsterborev position was replaced by a caisson lighthouse of the same name.²³

The Falsterborev position (1831–1972), 55° 17' N latitude, 12° 47' E longitude, is the oldest functioning position for Swedish lightships, which also served for the longest period of time. For 141 years, the following lightvessels served on this position: Nr 00 *Hermina*, Nr 0 *Cyklop*, Nr 4 *Falsterbo*, Nr 8 *Svinbådan* and Nr 28 *Reserv*. Only two of the vessels, namely Nr 0 *Cyklop* and Nr 4 *Falsterbo* were built specifically for that position. Lightship Nr 0 *Cyklop* was built between 1843 and 1844 in the Kalmar shipyard, whereas Nr 4 *Falsterbo* between 1864–1865 in Karlskrona.²⁴ The two lightships were of wooden construction and weren't too long – each was about 24 meters long – and were anchored at first with admiralty anchors²⁵ and later on with special mooring anchors in the shape of a mushroom. The Nr 4 *Falsterbo* anchors' mass was, for instance, 1700 kilograms and its chain was 380 meters long. The ship had two lights on her masts, each with 12 parabolic reflectors emitting a constant, white light. The light was placed 11.5 meters high above sea level and was visible from the distance of 10 nautical miles.²⁶ The crew consisted of 7 or 6 people.

If the weather was stormy, the chains would often break and the vessel would drift until back-up anchors were used. Such situations often caused accidents. Another threat for Swedish lightships was their icing and the freezing of their position's area. During winter the lightvessels serving on the Falsterborev position were being redirected to the Malmö harbor.²⁷ The Falsterborev position was cancelled in 1972 as Sweden's very last lightship position. It was also the country's very first position that had had a lightship anchored. Those two facts prove how important this particular position was in terms of navigational safety of the region.²⁸

Another position, *Svinbådan* (1866–1960): 56° 10' N latitude; 12° 30' E longitude is a place where for 94 years four different lightships served. The first one, Nr 7 *Vulkan*, was transferred there from a different position and three other ones were built specifically for the purpose of serving in that particular place. They were: Nr 8 *Svinbådan*, Nr 14 *Svinbådan*, Nr 17 *Svinbådan*. Those three were bigger than other lightvessels constructed around that time. The reason behind it was the fact that they were also

23 Riksarkivet Stockholm SRa, Ritn. No 4569.

24 Ibidem, No 5673.

25 An admiralty anchor is the oldest type of anchor, known as far back as the Ancient times. It consists of a shank, two arms, each of them with flukes and a stock. In 1850, following the decision of the British Admiralty, the admiralty anchor became mandatory equipment on all British Navy ships and vessels. Lesław Frumaga, Józef Wójcicki, *Mały słownik morski* (Gdynia: Mitel International Ltd., 1993), 143.

26 Norrköping SMA, se sid bl. 5854. Stockholm SRa, Ritn. No 4290.

27 Werner Björn, *Fyrskipp i Sverige*, 30–31.

28 Leif Elsby, „Fyrskipp i nordiska vatten”.

supposed to serve as stations for maritime pilots and they were expected to be able to serve on the position situated further into the sea.²⁹

Lightship *Nr 8 Svinbådan* was built between 1869–1870 in Oskarshamn. Initially her measurements were as follows: length: 24,78 m, width: 6.49. In 1885 the vessel was rebuilt and her final measurements were 34.05 m of length and 7.13 m of width.

The lightship's crew consisted of seven people. She had two lanterns on her masts with carbide lights inside. They were able to send beacon light to a range of between 6 and 8 nautical miles, which was seen about 8 meters above water.

After the vessel was withdrawn from her initial position, she served twice as a back-up lightship in 1878–1882 and 1931–1972, she also served on the Falsterborev position from 1883 to 1930, a fact that has been included in the chart.

Lightship *Nr 14 Svinbådan* was built in Stockholms Varvs AB shipyard in the years 1876 to 1877. The vessel was 33.25 m long and 7.17 m wide. Her crew consisted of eight people. The ship was held on her position by a mushroom anchor and two bow anchors weighing 1020 and 720 kilograms.³⁰

Once the ship was withdrawn from her original position, it served on the Sydostbrotten position between 1894 and 1943.

The last of the lightships, *Nr 17 Svinbådan*, was built between 1893–1894 by the Linderg company, in Stockholm. Her length was 34.65 m and the width was 6.70 m. The crew also consisted of 8 people. The ship was held on her position by two bow anchors weighing 1049 kg and 729 kg. The lightship served only one position, her initial one, and was withdrawn from it in 1960. Between 1973 and 1976 she served as a maritime pilots' station in Malmö harbor. In 1976 the ship was scrapped and her lantern went on to serve in the yacht port of Skanör.³¹

Kalkgrundet position (1873–1971): latitude 55° 36' N; longitude 12° 54' E. For 98 years, five lightships served on this position: *Nr 7 Vulkan*, *Nr 11 Irene*, *Nr 13 Kalkgrundet* (built specifically for that position), *Nr 9 Diana* and *Nr 4 Falsterbo*.

Lightship number 13, *Kalkgrundet* was built in 1874 in Bonnesen shipyard in Malmö and, according to sources, it was a twinship of *Nr 12 Grepen* built in exactly the same time in Beckholm shipyard in Stockholm.

The lightship was 25.90 m long and 6;76 m wide and her draught was 2;25 m. The crew consisted of 6 or 7 people.³² She was kept on her position by two mushroom anchors weighing 1750 kg and 1800 kg as well as a patent/stockless anchor weighing 800 kg. She beacons a red, steady light visible from the distance of 10 nautical miles, positioned 11.5 meters above sea level.

29 Iwona Pietkiewicz, *Rozwój statków latarniowych*, 152.

30 Stockholm SRa, Ritn. No 4347.

31 www.feuerschiffseite.de, accessed: 2.02.2018.

32 Stockholm SRa, Ritn. No 4315.

The lightship was withdrawn twice from her initial position, during her service. Between 1876 and 1879 she served on the Sjollen position and between 1885 and 1886 she served as a back-up ship.³³

Another Swedish lightship position, Sjollen/Malmö (1876–1969): latitude 55° 38' N; longitude 12° 57' E, was in service for 93 years. During that period four lightships served on the position: Nr 13 *Kalkgrundet* Nr 10A *Odin*, Nr 27 *Malmö Redd*, Nr 2B *Almagrundet*.

The lightship built specifically for the position was Nr 27 *Malmö Redd*. It was a twinship along with *Kalkgrundet* i Nr 12 *Grepén* built in Bonnesen in Malmö and in Beckholm shipyard in Stockholm. Nr 27 *Malmö Redd* was built in Kockum mechanical plant in Malmö. Due to the fact the vessel was riding at anchor in the roadstead, her size wasn't particularly impressive. The ship's length was 21.34 m, width 4.88 m and her draught was 2.60 m. The crew consisted of 3 to 5 people.

The lightship's light was white and steady and its sources were oil lamps placed inside a lens. The light was placed at the height of 8 meters above sea level and if the air was clear it was possible to see it from the distance of 8 nautical miles.³⁴

The vessel was held on her position with two mooring, mushroom anchors weighing 888 kilograms each and one bow anchor weighing 208 kilograms.

During bad weather conditions like strong winds and storms, the ship suffered from a number of accidents but was never badly damaged. She served on her initial position until 1951.³⁵

Oscarsgrundet position (1879–1961), latitude: 55° 35' N, longitude: 12° 51' E is, on the other hand, one of the shortest-functioning positions, for which no lightship had ever been built specifically. Two lightships served on the position: Nr 11 *Irene* and Nr 21 *Trelleborgsredd*.³⁶

In this part of the text, lightship Nr 11 *Irene* will be presented, whereas Nr 21 will be presented along with Trelleborgs Redd position.

Nr 21 *Irene* was built in Rügenwalde in 1869 initially as a schooner – a two-mast sailing ship. In 1873 she was bought by the Royal Pilot Administration and the Administration ordered the vessel to be reconstructed and turned into a lightship. She was 23.83 m long, 6.27 m wide and her draught was 2.36 m. The crew consisted of six people. Her first position was Kalkgrundet, where she was anchored throughout the summer of 1874. The lightship sent a white, steady beacon and its source was three

33 Werner Björn, *Fyrskipp i Sverige*, 33.

34 Stockholm SRa, Ritn. No 5617.

35 Werner Björn, *Fyrskipp i Sverige*, 34.

36 Norrköping SMA, se sid bl. 5935.

carbide lamps placed inside a lens. The light was placed 11 meters above sea level and it reached about 10 nautical miles.³⁷

The ship was withdrawn from the Oscarsgrundet position in 1931.³⁸

Fladen position (1892–1969): latitude 57° 10' N, longitude: 11° 49' E was situated near an 8.5 meter-deep shoal, in the area of Kattogat, on the south of Göteborg and over a period of 77 years the following lightships served there: *Nr 10B Fladen*, *Nr 18 Reserv*, *Nr 16 Kopparstenarne*, *Nr 24 Reserv*, *Nr 32 Fladen*, *Nr 29 Ölandsrev*. Lightships built specifically for that position were *Nr 10B* i 32 called *Fladen*

Their hulls had similar measures: over 34 meters of length, and over 6 meters of width.³⁹ On the ship with the number 10B there were the following anchors: a mushroom one weighing 1732 kg with the chain length of 405 meters, a patent one weighing 994 kg with the chain length of 351 meters and a back-up one. A red beacon light was provided by 9 oil lamps with parabolic reflectors (Dalén lamp). It was placed 9.5 m above sea level and was visible from the distance of 11 nautical miles. Both ships' crew consisted of eight people. The Falden position was cancelled in 1969.⁴⁰

Another position is Grisbådarna (1900–1929): latitude: 58° 58' N; longitude: 10° 49' E. It functioned for only 29 years and there was one lightship serving there – *Nr 10B Fladen* (mentioned above), which, once she had been withdrawn from her initial position, served on the Grisbådarna position.

Trelleborgs Redd position (1901–1930): latitude. 55° 20' N; longitude 13° 08' E is another example of a short-lived position (29 years), situated near the Trelleborg harbor's roadstead. It was built in Kockum mechanical plants in Malmö between 1898 and 1899. During the ship's first year in service, she was a back-up ship and it wasn't until the Trelleborgs Redd position was set up in 1901 that she was anchored there. During those years she was one of the smaller lightships with 19.56 meters of length, 5.83 meters of width and the draught of 2 meters.⁴¹ The crew consisted of six people and because the ship was relatively small, it was very difficult to work onboard. After seven years of exploitation, the ship was renovated in 1908 in Hälsingborg shipyard and her deck was prolonged to 23,95 m.

The lightship emitted a white, steady light. Its source were oil lamps inside a lens. It was placed 7 meters above sea level and visible from the distance of 10 nautical miles. The ship was equipped with three anchors: a mooring mushroom one, it weighed 1800 kilograms, a bow one (638 kilograms) and a towing one (120 kilograms).

37 Werner Björn, *Fyrskipp i Sverige*, 32.

38 Norrköping SMA, se sid bl. 3339.

39 Ibidem, 5542.

40 Iwona Pietkiewicz, *Rozwój statków latarniowych*, 161.

41 Stockholm SRa, Ritn. No 4277.

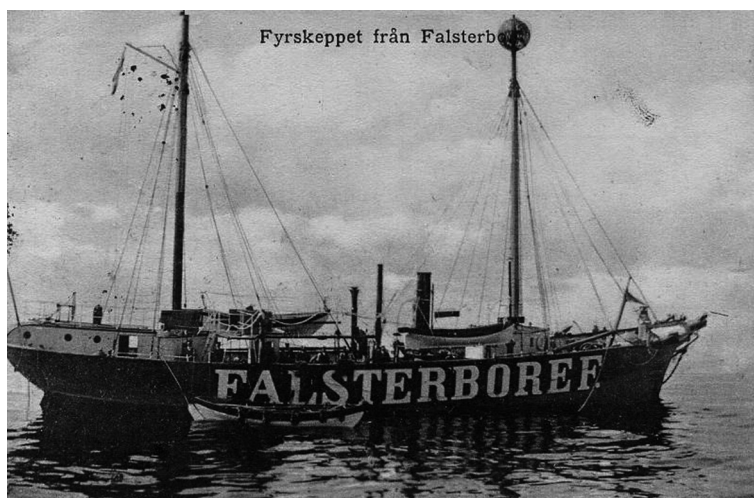
Once the Telleborgs Redd position was cancelled, the lightship continued to serve as a back-up vessel for a year and from 1932 to 1961 it served on the Oskarsgrundet position.⁴²

Vinga position (1926–1956): latitude. 57° 34' N; longitude. 11° 36' E was one of the short-lasting positions, as it was active for only 30 years. It was also one of the positions that never had any lighthouse built especially for the purpose of serving there. There was only one lightship that served on this position, it was *Nr 32 Fladen*, which had already been mentioned and described in the section concerning the Falden position.

The very first conclusion one can reach once the analysis of the construction and the distribution of the Swedish lighthouses had been made is the fact that those were not big vessels, their size was usually between 13 and 35 meters of length and it depended on the position they were supposed to serve. The lightships riding at anchor in the roadsteads in Malmö or Trelleborgs were the smallest vessels, had quite shallow draught and their crews consisted of very few people.

Another conclusion is that apart from lightships built specifically for the purposes of serving on the concrete positions, there were vessels whose purpose was to mark various navigational points. Among them were ships which, throughout the years, served on most of the existing positions.

Figure 4. Swedish lightship *Falsterborev* from 1910



Source: Swedish Maritime Administration. Norrköping. Nr 6050.

42 Werner Björn, *Fyrskipp i Sverige*, 29.

CONCLUSIONS

Maritime navigation has always been an accessible and quite cheap means of communication. It has also served to transport people and goods. The furthest places around the globe have always been connected, for centuries if not for millennia, thanks to sea routes and that makes them the best and most reliable solution when it comes to economic, cultural, civilizational and trade exchange between nations and societies.

Denmark and Sweden, highly developed and economically strong countries, used lightships to mark their territorial waters. The very first and very last lightships that served on the Baltic Sea were Danish: the very first one was *Laesø*, which served near the island of the same name as early as 1838, and the very last one was the lightship withdrawn from the Mön SE position in 1988.

The growing navigational intensity in the area forced the Baltic countries' administrations to create better-marked routes. The changes the sea routes had undergone were forced by both civilizational and technological development.

In the history of the lightships' service there are a few breakthrough moments connected with the construction of both vessels and the light beacons; their intensity and range. The breakthrough moments were: the beginning of the 19th century and the invention of the Argand oil lamp with parabolic reflectors and the cardan suspension, the middle of the 19th century and the usage of the catadioptric lenses which helped focus the light, and the first steel lightships' hulls. At the beginning of the 20th century the technology allowed liquified gas to be used to produce a light beacon on the lightships and in the middle of the 20th century generators appeared and gave birth to the electric lights. The second half of the 20th century witnessed automatic and crewless lightships'.

Because of the civilizational and technological development, lightships have eventually disappeared not only from the Baltic Sea, but from sea routes all around the world and nowadays they can be seen and admired only in museums as exhibit items.

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English version: Mark Atkinson

SUMMARY

The study presents results of several years of research into the issues of the creation, operation and specificity of the operation of Baltic lightvessels – useful at the time of the lack of stationary lighthouses on shipping routes. The described ships were characteristic shipping marks of Denmark, Sweden, Finland, Russia and Germany at the turn of the 11th and 20th centuries. The specificity of the units, also called lightships, required the use of research methods such as historical analysis and synthesis, induction and geographical method.

The presented paper is only a part of the Scandinavian problems that arose during the operation of the specific entities described. A number of scientific papers have been delivered at both national and international conferences. Archival materials related to the operation of lightships were acquired by the authors in the German, Swedish and Russian state archives.

DUŃSKIE I SZWEDZKIE STATKI LATARNIOWE W SŁUŻBIE BEZPIECZEŃSTWA SZLAKÓW CIEŚNIN DUŃSKICH 1820–1988

Słowa kluczowe: Bałtyk – historia, bezpieczeństwo żeglugi, Statki latarniowe – historia

STRESZCZENIE

W artykule zaprezentowano efekty kilkuletnich badań nad problematyką powstania, eksploatacji i specyfiki funkcjonowania bałtyckich statków latarniowych – przydatnych przy braku stacjonarnych latarni morskich na szlakach żeglugowych. Statki, o których mowa były charakterystycznymi znakami żeglugowymi Danii, Szwecji, Finlandii, Rosji i Niemiec na przełomie XI i XX wieku. Specyfika użytkowania jednostek, nazywanych też latarniowcami, wymagała zastosowania w badaniach metod badawczych, takich jak analiza i synteza historyczna, indukcja i metoda geograficzna.

Prezentowane treści są jedynie częścią skandynawskich problemów, jakie powstały w trakcie eksploatacji opisywanych specyficznych jednostek. Materiały archiwalne związane z działalnością statków latarniowych autorzy pozyskali dzięki kwerendzie w niemieckich, szwedzkich i rosyjskich archiwach państwowych.

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