

Discrepancies in mercury and nitrogen assessments on Dutch projects in the Ems estuary

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Preface

In August 2017 the citizens' initiative "Saubere Luft Ostfriesland" has already submitted a comprehensive work in German language about the nitrogen and mercury problems in the Ems estuary. With the document on hand the very crucial and verifiable discrepancies of reports on different Dutch projects are shown in detail and English language.

In the past there were misunderstandings about German terms and authorities. Therefore it might be of advantage at certain places in this document to clarify that a Habitats Directive preliminary study means in German "FFH-Voruntersuchung" and a Habitats Directive impact study means in German "FFH-Verträglichkeitsprüfung". Furthermore the Lower Saxony Water Management, Coastal Defence and Nature Conservation Agency is called in German "Niedersächsischer Landesbetrieb für Wasserwirtschaft, Küsten- und Naturschutz", abbreviated: "NLWKN". The National Park administration for the Lower Saxony Wadden Sea is called in German "Nationalparkverwaltung Niedersächsisches Wattenmeer".

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1 The mercury problem with eggs of the Common Tern

In reports for Dutch projects in the Ems estuary it is repeatedly argued that even the (high) emissions of the Eemshaven coal-fired power plant do not result in significant adverse effects on protected species. In conclusion it has been stated as logic that the lower mercury emissions of other projects in the Ems estuary also cause no significant adverse effects. This conclusion is subject to two crucial discrepancies:

1. The potential exceedance of the toxicity threshold for mercury in Common Tern eggs was not recognized, because of the exchange of values. Subsequently the impact of mercury on the Common Tern (*Sterna hirundo*) was misjudged. According to MENDEL et al. (2008: 374) there is a strong risk of contamination with environmental toxins that accumulate in fish food and then accumulate to high concentrations in terns, who are predators at the upper end of the food chain.
2. The consideration of cumulative effects at each single Dutch project in the Ems estuary is inadequate, because it is incomplete. For example, none of the projects considered the remobilisation of mercury in sediment by the Dutch and (planned) German deepening of the Ems river. Hence serious adverse impacts can not be excluded.

1.1 Exchange of values

The mercury report from ARCADIS (2014: 81) for the RWE Eemshaven coal-fired power plant contains a serious discrepancy. ARCADIS (2014: 89) states that exceeding the no-effect level by the contribution of the RWE Eemshaven coal-fired power station can be excluded.

However, the value of 500 ng/g wet weight used by ARCADIS is not the level at which no harmful effects can be observed, but it is the toxicity threshold at which fertility damage and sublethal effects may occur. ARCADIS (2014: 81) has mixed up the value of “no effect” of 0.1 mg/kg (= 100 ng/g) with the value of the “toxicity threshold” of 0.5 mg/kg (= 500 ng/g).

The following two tables 1 and 2 reveal by comparison this serious mistake, which has led to a misjudgement in the assessment of potential significant adverse effects on an Annex I species of the Birds directive.

Tab. 1: Threshold values for total mercury, for which the literature has stated "no effect" / "geen effect" (ARCADIS 2014: 81).

Groep/soort	Drempel	Waarde	Eenheid	Waar?	Referentie
Vissen	TEL (threshold sublethal effect level)	0,2	mg/kg natgewicht	Whole body	Beckvar, N.et.al. (2005)
	LOAEL (lowest-observable adverse effect level)	0,3	mg/kg natgewicht	Whole body	Sandheinrich, M.B. et. al.(2011)
Vogels	Maximum concentratie in prooi	0,09	mg/kg	Whole	Depew et.al. (2012)
		0,18	natgewicht	body	
		0,27		vis	
	Geen effect	0,5	mg/kg natgewicht	eieren	USEPA (2006)
(Zee)zoogdieren	Geen effect (NOAEL)	64	mg/kg natgewicht	Whole body	Ronald et al., 1977
	Geen effect	100-400	µg/kg natgewicht	Lever	Wagemann & Muir, 1984

Tab. 2: Predicted mercury levels according to UNITED STATES DEPARTMENT OF THE INTERIOR (1998: 93, Table 20).

Table 20.—Summary table for predicted mercury effect levels
[All matrix values expressed as total mercury (includes organic and inorganic forms). All criteria relate mercury risk to populations, not individuals.]

Matrix	No effect ¹	Level of concern ²	Toxicity threshold ³	Explanation
Water (µg/L)	---	---	>30	Sublethal effects to fish (Eisler 1987)
Sediment (mg/kg dw)	<0.065	>0.15	0.2	0.065, surficial materials background (Shacklette and Boerngen 1984); 0.15, ERL of Long et al. (1990); 0.2, threshold to protect clapper rail (Schwarzbach et al. 1993)
			0.24	Toxic to guppies (Gillespie and Scott 1961)
Fish, whole body (mg/kg ww):				
Warm-water sp.	0.11	---	---	Background in bluegill (table 23).
Cold-water sp.	---	---	1.0	FDA action level
Birds, diet (mg/kg bw/day)	---	---	0.064	Effects in mallards (Heinz 1979)
Birds, diet (mg/kg ww)	---	---	0.3	Loon reproductive and behavioral effects (Barr 1986)
			0.1	Mallard reproductive and behavioral effects (Heinz 1979)
Bird eggs (mg/kg fww)	0.1	0.2-1.0	0.5-1.5	0.1, no effects in osprey; 0.5-1.5, low hatchability for pheasant (table 24)
			0.86	Mallard reproductive and behavioral effects (Heinz 1979)
			5.0	Mallard brain lesions (Heinz 1975)
Bird brain (mg/kg ww)	0.13	0.13-1	1	0.13 = mean in controlled, nonexposed population (Finley and Stendell 1978)
			4	Obvious signs of intoxication (Scheuhammer 1988)
			15	Lethal in embryos (Finley and Stendell 1978)
			40	Lethal in adults (Scheuhammer 1988)
Bird feathers (mg/kg dw)	5	5-40	40	Effects highly variable; sample other tissues. 5, upper end of background range; 20, reflects >1 mg/kg in diet (Scheuhammer 1991). Reproduction impaired over range of 5-40 (Eisler 1987)
Bird kidney (mg/kg ww)	<2	---	20	Varies depending on species, sex, form of Hg, and Hg:Se ratio. Toxicity likely whenever kidney conc. > liver conc. See Littrel (1991), Heinz (1996).
Bird liver (mg/kg ww)	<1	1-2	3	1-2, behavioral effects (Zillioux et al. 1993); 3, reproductive harm (Barr 1986)
			5	Threshold for adult waterbirds (Zillioux et al. 1993)
			25	Kidney disease, gout in herons (Spalding et al. 1994)

¹ Concentrations below this level are close to background and are not known to cause adverse effects.
² Concentrations at this level are above background but rarely appear to cause any adverse effects.
³ Concentrations exceeding this level seem to cause some adverse effects, including reproductive impairment and sublethal impacts.

Bird eggs are sampled at several sites in the Dutch, German and Danish Wadden Sea according to the documentation of the TMAP parameter “pollutants in seabird eggs”:

“To categorize the current environmental health status of the Northeast Atlantic and the North Sea, ecological quality objectives (EcoQOs) have been formulated by OSPAR in recent years for different ecological quality elements such as the contamination of the marine environment with anthropogenic heavy metals and organochlorines. To measure it, coastal bird eggs have proven to provide a favorable matrix.

(...)

Measurements of Hg in the new reference areas resulted in an actualized target threshold concentration of 160 ng/g in the tern species.” (DITTMANN et al. 2011: 7)

One sample site important to consider in the Eemshaven / Delfzijl region is located at Delfzijl. The following data of mercury content in Common Tern eggs at Delfzijl (cf. Tab. 3) has been provided by RIJKSWATERSTAAT (2017). The measurement result is made up of the mean value plus the standard deviation and is quoted in ng/g fresh wet weight of egg mass (fww).

Tab. 3: Mercury content in Common Tern eggs at Delfzijl.

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016
Samples	10	10	6	4	3	10	10	10	10
Mean value [ng/g]	165,4	233,6	303,9	331,7	422,5	369,4	267,7	523,2	277,9
Standard deviation [\pm ng/g]	34,4	27,2	73,6	103,7	140,7	120,8	64,1	168,9	52,8
Sum [ng/g]	199,8	260,8	377,5	435,4	563,2	490,2	331,8	692,1	330,7

Considering the standard deviation in addition to the mean value, two years show an exceedance of the toxicity threshold of 500 ng/g fresh wet weight. Furthermore the toxic load is steadily on a high level. The level of no concern of 200 ng/g fww or the individual target threshold for tern species of 160 ng/g is far out of range.

What does that mean?

In their remarks to “Ecological Effects of Mercury” the NEW JERSEY STATE DEPARTMENT OF ENVIRONMENTAL PROTECTION (2002: 61) cited the reviews of EISLER (1987) and BURGER & GOCHFELD (1997) that:

“mercury levels of 0.5-6 ppm in eggs are associated with decreased egg weight, malformations, lowered hatchability, and/or altered behavior in various species.”

NEW JERSEY STATE DEPARTMENT OF ENVIRONMENTAL PROTECTION (2002: 67) pointed again to BURGER & GOCHFELD (1997):

“0.5 ppm (wet weight) in eggs (...) have been associated with adverse reproductive outcomes.”

Already in 2015 the National Park administration of the Lower Saxony Wadden Sea notified (SCHEIFFARTH 2015-1):

“Since the year 2008 there is (also statistically) to monitor a significant increase in the Hg-content of Common Tern eggs from the Delfzijl area.”

Not without reason the National Park administration (MEYER-VOSGERAU 2014) pointed unmistakable to the pollution of Common Tern eggs in its statement from November 10th, 2014,

“(...) from which the embryo development in the egg can be affected and thus an influence on the reproductive success of this bird species can no longer be excluded. As OSPAR environmental quality standard (EcoQS) DITTMANN et al. (2011) suggest a value of 160 ng/g fresh mass. So the current mercury content is far above this threshold.”

The National Park administration continues

“(...) that

- the background level of the Ems-Dollard area with mercury is already now to be considered as high,*
 - within the framework OSPAR and the trilateral Wadden Sea Plan environmental quality standards are partly far exceeded (see OSPAR 2010)*
 - environmental quality standards set in the EU Water Framework Directive are exceeded,*
 - an influence of the current mercury content in Common Tern eggs on the population dynamics of this species can not be completely excluded,*
- the calculated total additional load by the mercury emissions of the RWE power plant in Eemshaven is underestimated,*
- a verification of this additional load in the context of the EU Water Framework Directive and its objectives must urgently be done.”*

Finally, the National Park Administration declares for the expected additional mercury input,

“(...) that a further deterioration of the current, unsatisfying condition related to the mercury pollution can not be excluded. Consequently an achieving of the objectives of the Trilateral Wadden Sea Plan, the OSPAR convention and particularly the EU Water Framework Directive would be highly affected by another input of mercury.”

At this point it has to be remarked that an exchange of values lead to a misjudgement. Till this day significant adverse effects on an Annex I species of the Birds directive can not be excluded.

1.2 Inadequate examination of cumulative effects

The before mentioned concern of the National Park administration is all the more justified, because the mercury emissions from the coal-fired power plant have not been taken into account in cumulation with the other mercury sources in the Ems estuary. Dredging and dumping activities in the context of the Ems river deepening cause a remobilisation of the mercury previously bound in the sediment. Moreover the emissions from the extension of the Delfzijl waste-to-energy plant EEW must also be taken into account. The administration of the National Park “Niedersächsisches Wattenmeer” confirms this view and demands in its statement from June 9th, 2016 (SCHEIFFARTH 2016):

“A closer examination of the cumulative effects by the different mercury sources on the pollution of the Ems estuary should definitely be done.”

The demand is not achieved till this day.

In the Environmental Impact Assessment for the Dutch Ems river deepening „North Sea-Eemshaven“ RIJKSWATERSTAAT (2013-4: 105) says that the mercury content in the sediment exceeds the international OSPAR threshold. However, Rijkswaterstaat does not conclude any consequence.

Tab. 4: Mercury concentration in sediments (µg/kg dry weight).
From: RIJKSWATERSTAAT (2013-4: 105).

Stoff	Messpunkt	1999	2002	2005	2011	Norm
Tributyltin	Doovebalg West	56	44	22	3,0	0,7 (MTR)
	Dantziggat Süd	15	28	20	2,3	
	Bucht von Watum Ost	46	46	35	5,1	
Quecksilber	Doovebalg West	420	280	410	148	220 (OSPAR)
	Dantziggat Süd	300	290	260	250	
	Bucht von Watum Ost	350	320	350	299	

By remobilisation dredging and dumping activities release mercury bounded in the sediment so far. This additional load has so far been disregarded in the mercury balance sheet. This is technically just as wrong as the non-consideration of released carbon dioxide after draining a peat bog in context of a carbon dioxide balancing.

According to the Wadden Sea Quality Status Report (OSPAR COMMISSION 2010: 44), the mercury concentration in the sediment of the Ems estuary is unacceptable. The concentrations of the metal are at values, so that there is an unacceptable risk of chronic effects in marine species, including the most highly sensitive species. The probability of constant pollution is between 60-80 %.

The inadequate cumulative assessment of mercury sources in the Ems estuary has the consequence that a possible worsening of the mercury problem in the Ems estuary and thus an inadequate assessment of the impacts on the bird species Common Tern, listed in Annex I of the EU Birds Directive, are not recognized.

The remobilisation of sediment-bound mercury caused by dredging and dumping activities in the context of the Ems river deepening, as well as the additional emissions from the RWE coal-fired power plant in Eemshaven and the planned extension of the EEW waste-to-energy plant in Delfzijl may worsen the mercury load from the “level of concern” to the “toxicity threshold”.

There is also a high probability the toxicity threshold of 500 ng/g (= 0.5 mg/kg) will not only be exceeded temporarily, but repeatedly due to great uncertainties in the deposition modelling. The values 563 ng/g from the year 2012 and 692 ng/g from the year 2015 confirm this impressively.

The mercury report for the RWE coal-fired power plant in Eemshaven by ARCADIS (2014), which is used repeatedly for Dutch projects, contains the model OPS for the deposition modelling. The RIJKSINSTITUUT VOOR VOLKSGEZONDHEID EN MILIEU (2014) says to the accuracy of the pollutant dispersal model “Operationele Prioritaire Stoffen model” (OPS) that the uncertainties at the local level (individual ecosystems) can each be 50, 60 or 95 %.

A comprehensive assessment should also take into account the ecological conservation status of the species and the Red List status. ARCADIS (2014: 139) states that the conservation status of the Common Tern is described as “good” for Germany. This is wrong. The conservation status is adverse (Fig. 1).

Niedersächsische Strategie zum Arten- und Biotopschutz		– Vollzugshinweise Brutvogelarten –					
Flusseeschwalbe (höchst prioritär)		November 2011					
2.4 Erhaltungszustand							
Erhaltungszustand der Art in Niedersachsen							
<ul style="list-style-type: none"> In Niedersachsen ist der Erhaltungszustand der Art (Brutvögel) als ungünstig zu bewerten. 							
2.5 Beeinträchtigungen und Gefährdungen							
<ul style="list-style-type: none"> Gefährdungsgrad: <table border="1" style="margin-left: 20px;"> <tr> <td>Rote Liste Deutschland (2007):</td> <td>2 – Stark gefährdet</td> </tr> <tr> <td>Rote Liste Niedersachsen (2007):</td> <td>2 – Stark gefährdet</td> </tr> </table> Veränderung des Lebensraumes in den Brutgebieten (Küstenschutzmaßnahmen mit den Folgen veränderter Sedimentations- und Überflutungsbedingungen), dadurch verringerte natürliche Dynamik und geringes Angebot an neuen potenziellen Brutplätzen Zerstörung der binnenländischen Lebensräume durch Gewässerausbau und -begradigung Vernichtung von Koloniestandorten durch Überbauung (Häfen, Industrieanlagen, touristische Großprojekte etc.) Belastung der Küstengewässer mit Schadstoffen und Nährstoffen Verringerung des Nahrungsangebotes Störungen an den Brutplätzen durch Freizeitnutzung (Spaziergänger, Surfer, Segler etc.) und Flugverkehr Bau von technischen Anlagen (v. a. Windkraftanlagen) Sukzession an Abgrabungsgewässern Brutverluste durch (den Prognosen nach zukünftig vermehrt auftretende) Hochwasserereignisse Brutverluste durch Prädation. 				Rote Liste Deutschland (2007):	2 – Stark gefährdet	Rote Liste Niedersachsen (2007):	2 – Stark gefährdet
Rote Liste Deutschland (2007):	2 – Stark gefährdet						
Rote Liste Niedersachsen (2007):	2 – Stark gefährdet						

Fig.1: From the Lower Saxony strategy for species and biotope conservation: conservation instructions for the species Common Tern (NIEDERSÄCHSISCHER LANDESBETRIEB FÜR WASSERWIRTSCHAFT, KÜSTEN- UND NATURSCHUTZ 2012-2).

In summary it is to remark for the Common Tern (according to the conservation instructions "Vollzugshinweise" of the NIEDERSÄCHSISCHER LANDESBETRIEB FÜR WASSERWIRTSCHAFT, KÜSTEN- UND NATURSCHUTZ 2012-2):

- It is an Annex I species of the European Birds Directive.
- The conservation status of this species is adverse in Lower Saxony.
- One of the main threats of the species is the "pollution of coastal waters with pollutants and nutrients".
- Conservation objectives related to the breeding population include the points "Vital, self-sustaining breeding population" and "breeding success is sufficient to maintain the population".
- One of the conservation objectives in relation to the habitats of breeding birds is the point "Lower pollutant load in the North Sea".
- Coastal protection and development measures include the point "Reducing the pollution of the North Sea".

Due to the above-mentioned circumstances, the holistic assessment can not exclude significant adverse effects on the Common Tern in the EU Bird Directive area V01 till this day.

1.3 References

- ARCADIS (2014): Beoordeling Kwikemissies uit de RWE-centrale in het Eemshavengebied. – ARCADIS Nederland B.V., Assen, 204 S. Auf: https://www.provinciegroningen.nl/fileadmin/user_upload/Documenten/Downloads/Beoordeling_kwikemissies_uit_de_RWE-centrale_in_het_Eemshavengebied.pdf
- BURGER, J. and M. GOCHFELD (1997): Risk, mercury levels, and birds: relating adverse laboratory effects to field biomonitoring. *Environ. Research* 75: 160-172.
- DITTMANN, T. et al. (2011): The EcoQO on mercury and organohalogens in coastal bird eggs: report on the pilot study 2008 – 2010. (INBO.R.2011.43). Research Institute for Nature and Forest, Brussel, 73 S. Auf: <http://www.waddensea-secretariat.org/management/publications/the-ecoqo-on-mercury-and-organohalogens-in-coastal-bird-eggs>
- EISLER, R. (1987): Mercury Hazards to Fish, Wildlife and Invertebrates: A Synoptic Review. US Fish and Wildlife Service Biological Report. 85 (1.10), 90 pp.
- MENDEL et al. (2008): Artensteckbriefe von See- und Wasservögeln der deutschen Nord- und Ostsee. – Naturschutz und Biologische Vielfalt 59, Bundesamt für Naturschutz, Bonn - Bad Godesberg, 437 S.
- MEYER-VOSGERAU, A. (10.11.2014): Kraftwerk Eemshaven - Fachliche Stellungnahme der Nationalparkverwaltung Niedersächsisches Wattenmeer zur ‚Ergänzung der Genehmigung nach dem Naturschutzgesetz für RWE Eemshaven‘ der niederländischen Provinzregierungen. – Nationalparkverwaltung Niedersächsisches Wattenmeer, Wilhelmshaven, 6 S.
- NEW JERSEY STATE DEPARTMENT OF ENVIRONMENTAL PROTECTION (2002): New Jersey Mercury Task Force, Volume II: Impacts of Mercury in New Jersey. – Division of Science, Research and Environmental Health, Department of Environmental Protection, State of New Jersey. Auf: <http://www.state.nj.us/dep/dsr/vol2-Chapter6.pdf>
- NIEDERSÄCHSISCHER LANDESBETRIEB FÜR WASSERWIRTSCHAFT, KÜSTEN- UND NATURSCHUTZ (03.09.2012-2): Prioritätenlisten Stand Januar 2011 / Vollzugshinweise für Arten und Lebensraumtypen. – Niedersächsischer Landesbetrieb für Wasserwirtschaft, Küsten- und Naturschutz, Norden. Auf: http://www.nlwkn.niedersachsen.de/naturschutz/natura_2000/vollzugshinweise_arten_und_lebensraumtypen/46103.html
- OSPAR COMMISSION (2010): Quality Status Report 2010. – OSPAR Commission, London, 175 S. Auf: http://qsr2010.ospar.org/en/media/chapter_pdf/QSR_complete_EN.pdf
- RIJKSINSTITUUT VOOR VOLKSGEZONDHEID EN MILIEU (12.11.2014): Betrouwbaarheid - Operationele Prioritaire Stoffen model. – Rijksinstituut voor Volksgezondheid en Milieu, Bilthoven. Auf: http://www.rivm.nl/Onderwerpen/O/Operationele_Prioritaire_Stoffen_model/Modelbeschrijving/Betrouwbaarheid
- RIJKSWATERSTAAT (2013-4): Verbesserung Fahrinne Eemshaven-Nordsee – Umweltverträglichkeitsbericht. – Rijkswaterstaat, Ministerium für Infrastruktur und Umwelt, Den Haag, 216 S.

-
- RIJKSWATERSTAAT (15.08.2017): data of mercury in eggs of the Common Tern at Delfzijl from 2008 until present. – Email note, Behandelgroep Water data, Rijkswaterstaat, Centrale Informatievoorziening, Rotterdam.
- SCHEIFFARTH, G. (11.02.2015-1): Mitteilungen per Email. – Nationalparkverwaltung Niedersächsisches Wattenmeer, Wilhelmshaven.
- SCHEIFFARTH, G. (09.06.2016): Mitteilungen per Email. – Nationalparkverwaltung Niedersächsisches Wattenmeer, Wilhelmshaven.
- UNITED STATES DEPARTMENT OF THE INTERIOR et al. (1998: 93): Guidelines for Interpretation of the Biological Effects of Selected Constituents in Biota, Water, and Sediment - Mercury. – National Irrigation Water Quality Program Information Report No. 3, United States Department Of The Interior, Washington, DC, 113 S. Auf:
<http://www.usbr.gov/niwqp/guidelines/pdf/Mercury.pdf>

2 The nitrogen problem with nitrogen-sensitive habitat types

The argument that even the (high) nitrogen emissions of the Eemshaven coal-fired power plant do not lead to significant adverse impacts has been repeatedly applied on Dutch plans and projects. Thus – so the conclusion – the lower nitrogen emissions of other projects in the Ems estuary can not cause significant adverse impacts in logical consequence, too. This conclusion is subject to five crucial discrepancies:

1. No consideration of the insufficient conservation status at priority habitat type 2130*.
2. No appropriate assessment of cumulative effects.
3. Use of inadequate critical loads for nitrogen.
4. Use of the “German method”.
5. Exceedance of critical loads even when “German method” is applied.

2.1 Insufficient conservation status of priority habitat type 2130*

In its statement from November 10th, 2014 the administration of the National Park Lower Saxony Wadden Sea pointed to the insufficient conservation status of the priority habitat type 2130* (Fig. 2, MEYER-VOSGERAU 2014).

Die Nationalparkverwaltung untermauert dagegen ihre fachliche Auffassung, dass die durchgeführte Prüfung im IBL Gutachten angesichts der erheblichen Vorbelastung der Empfindlichkeit insbesondere der nährstoffarmen LRT im Nationalpark und speziell auf der Insel Borkum gegenüber zusätzlichen Stickstoffbelastungen nicht gerecht wird. Dabei ist besonders hervorzuheben, dass der aktuelle nationale Bericht den Erhaltungszustand für LRT 2130* als unzureichend bewertet. Deshalb hat die Nationalparkverwaltung Maßnahmen ergriffen, um den gegenwärtigen Zustand dieses LRT gerade auf Borkum zu verbessern. Auf diesen Zusammenhang geht die im Verfahren vorgelegte FFH-Vorprüfung allerdings in keiner Weise ein. Deshalb bleibt auch die Frage unbeantwortet, ob die zusätzlichen Nährstofffrachten geeignet sein können, die Bemühungen zu unterlaufen, z.B. den LRT 2130* auf der Insel Borkum insgesamt in einen guten Erhaltungszustand zu bringen.

Fig. 2: Expert statement of the National Park administration from November 10th, 2014 to the coal-fired power plant Eemshaven (MEYER-VOSGERAU 2014).

This is of fundamental importance, because the occurrence of an insufficient ecological conservation status leads automatically to the need of a detailed Habitats Directive impact study.

That has not been carried out till this day.

2.2 Inadequate examination of cumulative effects

As part of the Dutch river deepening of the Ems, the Dutch Environmental Impact Commission has pointed to the fact the critical load values for nitrogen have been exceeded on Schiermonnikoog and Borkum (RIJKSWATERSTAAT 2014: 37).

Aggravating is the fact the examinations of cumulative effects in Dutch plannings are always inadequate. The cumulative examination of the Dutch Ems river deepening is an example in which various sources of atmospheric nitrogen emissions in the Ems estuary are missing. The following projects are taken into account (Fig. 3 from the “Umweltverträglichkeitsbericht zur Emsvertiefung”, p. 204):

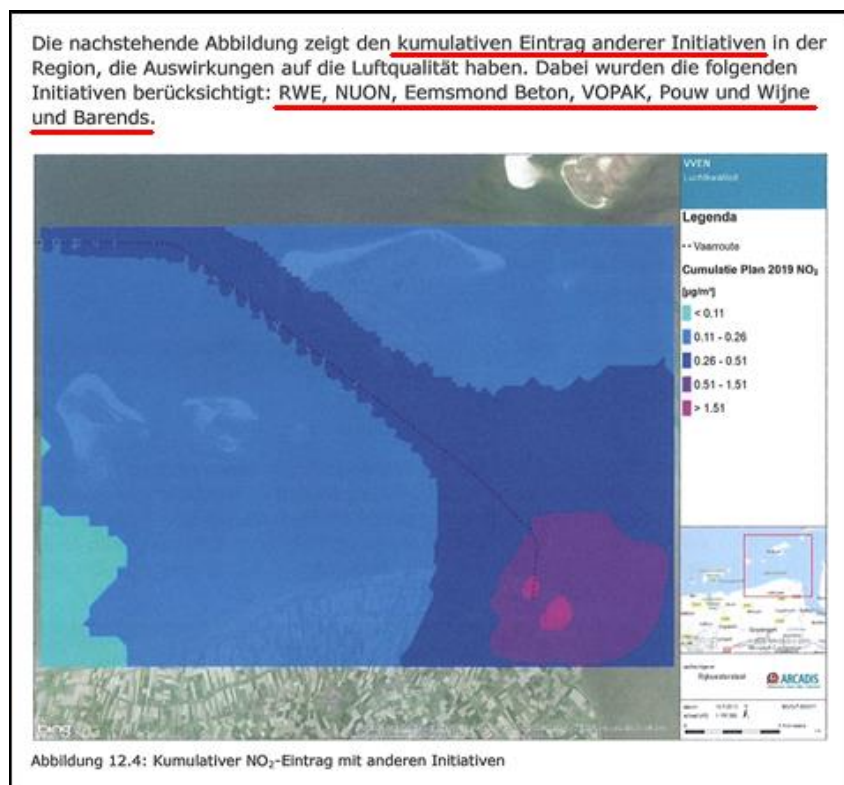


Fig 3: RIJKSWATERSTAAT (2013-4: 204).

Missing projects:

- nitrogen emissions from the controlled burning of gas by the platform “Paragon Prospector 1” in the context of natural gas exploration activities,
- nitrogen emissions from the planned expansion of the EEW waste-to-energy plant in Delfzijl,
- nitrogen emissions from the planned heliport Eemshaven with 10,000 aircraft movements per year,
- ship emissions from cable laying to various wind farms,
- emissions from maintenance activities for various wind farms (offshore catamarans and helicopter flights),
- the ship emissions due to the planned German Ems river deepening (construction phase) as well as the resulting additional German maintenance measures,
- the emissions from the construction phase “Enlargement Eemshaven”.

All nitrogen emissions from further projects in the Ems estuary therefore lead to a further exceedance of the critical load values. Those values are already exceeded.

Example: Island of Borkum

On Borkum four priority habitat types with a high or very high nitrogen sensitivity are present (according to VON DRACHENFELS 2012).

- Priority habitat type 2130* – Xeric grassland at grey dunes with insufficient base nutrients
The sensitivity to nutrient inputs is very high. There are characteristic plant species at least partially with the nitrogen number 1 as well as lichen-rich biotopes of sites with insufficient base nutrients. The critical load value is 5 to 10 kg N / ha*a.
- Priority habitat type 2140* – Coastal dunes with crowberry (*Empetrum nigrum*)
The sensitivity to nutrient inputs is high. There are characteristic plant species present with the nitrogen number 2. Depending on the habitat subtype, the critical load value is between 8 and 20 kg N / ha*a.
- Priority habitat type 2150* – Coastal dunes with heather (*Calluna vulgaris*)
The sensitivity to nutrient inputs is high. There are characteristic plant species present with the nitrogen number 2. Depending on the habitat subtype, the critical load value is between 8 and 20 kg N / ha*a. The suffix "+" indicates biotopes of sites with insufficient base nutrients with higher sensitivity within the relevant class (lower values of the span).
- Priority habitat type 2130* – Mat gras (*Nardus stricta*) at coastal dunes
The sensitivity to nutrient inputs is high. There are characteristic plant species present with the nitrogen number 2. Depending on the habitat subtype, the critical load value is between 8 and 20 kg N / ha*a. The suffix "+" indicates biotopes of sites with insufficient base nutrients with higher sensitivity within the relevant class (lower values of the span).

The impact on nitrogen-sensitive vegetation on Borkum, with possible serious adverse effects, is to be derived from a statement by the Dutch Environmental Impact Assessment Commission while the legal action to the Dutch river deepening of the Ems.

The Dutch Environmental Impact Commission came in its "Prüfungsgutachten zum aktualisierten Umweltverträglichkeitsbericht und der Ergänzung dazu" from July 24th, 2014 (expertise number 1826-250) to the conclusion that gray dunes on Schiermonnikoog could be significantly affected by additional nitrogen depositions (chapter 2.2.1 in RIJKSWATERSTAAT 2014-2):

Auswirkungen der Zunahme der Deposition

UVB

Im FFH-Verträglichkeitsbericht ist die Schlussfolgerung festgelegt, dass ausgeschlossen ist, dass das Vorhaben zur Verschlechterung oder signifikanter Beeinträchtigung der Erhaltungsziele von Lebensraumtypen und Lebensräumen von Arten infolge von Stickstoffdeposition führen wird (Seite 151 des FFH-Verträglichkeitsberichtes). Die Kommission kann diese Schlussfolgerung nicht unterschreiben. Auf der Grundlage der erteilten Informationen kann nicht ausgeschlossen werden, dass eine geringe (kumulative)

Zunahme der Stickstoffdeposition zur Beeinträchtigung der natürlichen Merkmale führen wird. Der KDW wird ja überschritten, und jede weitere Zunahme kann – wie gering sie auch sein mag – ohne weitere Maßnahmen die Realisierung der Erhaltungsziele (wie Bekämpfung der Verbuschung) erschweren.

Die Kommission hat empfohlen in einer Ergänzung Maßnahmen festzulegen, die dazu führen werden, dass es unterm Strich keine Zunahme der Deposition geben wird, oder dass durch zusätzliche Verwaltung eine Verschlechterung von Habitaten und/oder Lebensräumen von Arten vermieden wird. Dabei können die Maßnahmen vielleicht mit den auf Seite 151 des FFH-Verträglichkeitsberichtes genannten Düneninstandsetzungsmaßnahmen kombiniert werden.

(...)

Im Anschluss an die genannten Instandsetzungs- und Verwaltungsmaßnahmen sind in der Ergänzung weitere Maßnahmen festgelegt, in die Rijkswaterstaat investieren kann, um das Dünenökosystem auf eine ausreichend vitale Ebene zu bringen.

Die Kommission folgert, dass infolge der (geringen) Zunahme der Stickstoffdeposition signifikante negative Auswirkungen auf die Lebensraumtypen im zentralen Dünengebiet von Schiermonnikoog nicht ausgeschlossen werden können. Wenn die beschriebenen Instandsetzungs- und Verwaltungsmaßnahmen (also die derzeitigen, die geplanten und die zusätzlichen Maßnahmen) rechtzeitig durchgeführt werden, kann die Beeinträchtigung der natürlichen Merkmale vermieden werden, und kann ein Beitrag zur Realisierung der Verbesserungsziele geleistet werden.

Fig. 4: RIJKSWATERSTAAT (2014-2).

In the “Trassenbeschluss” RIJKSWATERSTAAT (2014: 37) notes: “*Only on the Wadden Sea islands (eg Schiermonnikoog and Borkum) the critical deposition values of some habitat types are locally exceeded.*”

The expert panel of the Raad van State remarks (STAB 2015: 59): “*For German areas, no comparable assessment has been made as described above.*”

It has to be questioned why adverse effects on dunes of Schiermonnikoog are detected and Rijkswaterstaat is advised to improve the dune ecosystem there, while this is not stated simultaneously for the East Frisian Islands?

The main wind directions are to be assigned to western directions. The largest nitrogen deposition is therefore not on the Dutch islands, but in the National Park Lower Saxony Wadden Sea. Transmission of area data from the Netherlands, which is less affected due to wind direction distribution than areas in the Lower Saxony Wadden Sea, is obviously inadequate. Area-specific studies shall be carried out taking into account the main wind direction distribution.

Dr. Olaf von Drachenfels, since 1984 at the Lower Saxony authority for nature conservation (today Niedersächsischer Landesbetrieb für Wasserwirtschaft, Küsten- und Naturschutz) responsible for the evaluation of biotope types, notified by email on April 12th, 2017 there are particularly nitrogen-sensitive characteristics of dunes on Borkum. The proportion of nutrient-poor dunes tends to increase from West to East, so that in comparison to a Dutch island, Borkum is more likely to experience higher sensitivities, Dr. von Drachenfels meant. After asking for clarification Dr. VON DRACHENFELS added on April 13th, 2017 by email:

“(...) that it is not plausible, when for Schiermonnikoog relevance and need for action to be found by the Dutch Environmental Impact Assessment, but not equally for Borkum, which would be more affected than less affected by its location and sensitive biotope species.”

In addition it has to be considered that the restriction period for the dumping site P1, originally planned over 9 months from February 1st to October 31rd while the Dutch Ems river deepening, was abandoned and is now only 3 months in the period from June 1st to August 31rd. Consequently the report about adverse effects on nitrogen-sensitive habitat types includes a difference of 6 months. For this reason there are in fact three times more nitrogen depositions than originally considered in the Habitats Directive preliminary study for the Dutch Ems river deepening.

In conclusion it must be stated that significant adverse effects on four priority habitat types on Borkum can not be excluded till this day.

2.3 Inadequate critical loads for nitrogen

The CL values used by IBL UMWELTPLANUNG GMBH and taken from KIFL (2008: 14) rely on an allocation proposal from Great Britain. Here it is written: *“In the United Kingdom an allocation proposal was worked out that mainly is based upon an expert estimation (...). The following classifications should be approximately transferable in Germany (...).”*

This assumption is not correct. It can be demonstrated by an example. KIFL (2008: 16) wrote: *“The following habitat types are classified as clearly non-sensitive to N-eutrophication in Great Britain: marine habitat types (1110, 1160, 1170)”*. However, NIEDERSÄCHSISCHER LANDESBETRIEB FÜR WASSERWIRTSCHAFT, KÜSTEN- UND NATURSCHUTZ (2011-4: 7) states in its conservation instructions (“Vollzugshinweise”) for habitat type 1170 reefs: *“The main threats of reefs are nutrient and pollutant inputs (...).”*

The head of the Kiel Institute for Landscape Ecology, Dr. Ulrich Mierwald, confirmed by telephone that values of a more recent date, which are specific to Lower Saxony, are preferable to the older values of the United Kingdom (MIERWALD, verbal 2013). Thus the institution of the reference used (KIFL 2008) itself points to its inadequate application by IBL UMWELTPLANUNG GMBH.

The CL-values according to VON DRACHENFELS (2012) depend on the current work of the person responsible for Habitats Directive areas and Habitats Directive habitat types, who has been working since 1984 in the Lower Saxony authority for nature conservation (NLWKN). In the work of January 2012, the biotope types in Lower Saxony were first classified in terms of their sensitivity to nutrient inputs (especially nitrogen). On the use of CL values from abroad and the non-consideration of habitat subtypes Dr. VON DRACHENFELS submitted to attention in a statement of January 28th, 2014:

“Of course I recommend using the CL according to my publication in the Informationsdienst Naturschutz Niedersachsen 1/2012 for impact regulations and assessments of nitrogen depositions, unless newer, scientifically better proved values have been published in the meantime. As is generally known, these values depend on BOBBINK & HETTELINGH 2011, whose compilation in my estimation represented the generally accepted state of science and technology in 2012. The gaps in the type list of this reference have been closed by appropriate classifications for Lower Saxony, so there is no reason in my view, to use older references or those who have been created in other countries.

*During preliminary study and impact regulation it is standard in Lower Saxony that biotope types are mapped according to the Lower Saxony mapping instructions and assessed according to the relevant requirements of my institution. This is the only way to ensure that the country-specific characteristics of the habitats are properly assessed.
(...)*

In case of qualitatively heterogeneous habitat types such as 2190 "Wet Dune Valleys" an assessment at biotope type-level (or habitat subtype-level) is required from a nature conservation point of view, to correctly assess the relevance of impacts (this habitat type contains eutrophic and oligotrophic characteristics with very different sensitivity to nitrogen depositions). If – as in that case – a habitat type includes occurrences with very different sensitivity to certain effects of projects, an appropriate preliminary study requires – different from the estimation of the consultants – the assessment at subtype level. This is the only way the qualitative range of habitat types with all characteristic species can be adequately taken into account according to Article 1 of the Habitats Directive."

Dr. VON DRACHENFELS (2014) clarified with his remarks therefore that a) in Lower Saxony the specifically for Lower Saxony established critical load values for nitrogen are to be used and b) different characteristics of nutrient-poor habitats can only be correctly assessed by taking into account the habitat subtype level.

Both requirements are not achieved till this day.

2.4 The “German method”

The case “RWE coal-fired power plant Eemshaven” is of particular relevance to all other plans in the Ems estuary, because of the recurrent use of the Habitats Directive preliminary study for the coal-fired power plant. The inadequate reports of IBL UMWELTPANUNG GMBH are responsible for the fundamental discrepancy that significant adverse effects are still not excluded till this day.

The administration of the National Park Lower Saxony Wadden Sea criticized the inadequacy of the Habitats Directive preliminary study for the RWE Eemshaven coal-fired power plant by IBL UMWELTPANUNG GMBH, which is recycled over and over again for all other projects in the Ems estuary. The National Park administration remarks in its statement of November 10th, 2014 (MEYER-VOSGERAU 2014):

“Nevertheless the National Park administration remains of its opinion that the potential effects of atmospheric nitrogen inputs on the nutrient-poor dune habitats on the island of Borkum were not properly presented and evaluated in the Habitats Directive preliminary study by IBL.

For various existing nitrogen-emitting facilities in Delfzijl and Eemshaven the summation effects were determined in the IBL report. The deposition calculation apparently relates to Dutch Natura 2000 sites, mainly on the islands of Ameland and Schiermonnikoog. With note to one reference and without further explanations, the IBL report assumes that the values calculated for the Dutch areas are also largely applicable to the island of Borkum. In view of the distribution models referred to in the report, there are serious doubts, whether such analogous conclusion can be assumed as done in the present case. In addition, statements on the possible impact of other islands in the National Park Lower Saxony Wadden Sea can not be found in this context.”

The following text block is particularly relevant, showing that measures planned by the National Park administration for Borkum are endangered by the increase of further atmospheric nitrogen emissions from Dutch projects:

Die Nationalparkverwaltung untermauert dagegen ihre fachliche Auffassung, dass die durchgeführte Prüfung im IBL Gutachten angesichts der erheblichen Vorbelastung der Empfindlichkeit insbesondere der nährstoffarmen LRT im Nationalpark und speziell auf der Insel Borkum gegenüber zusätzlichen Stickstoffbelastungen nicht gerecht wird. Dabei ist besonders hervorzuheben, dass der aktuelle nationale Bericht den Erhaltungszustand für LRT 2130* als unzureichend bewertet. Deshalb hat die Nationalparkverwaltung Maßnahmen ergriffen, um den gegenwärtigen Zustand dieses LRT gerade auf Borkum zu verbessern. Auf diesen Zusammenhang geht die im Verfahren vorgelegte FFH-Vorprüfung allerdings in keiner Weise ein. Deshalb bleibt auch die Frage unbeantwortet, ob die zusätzlichen Nährstofffrachten geeignet sein können, die Bemühungen zu unterlaufen, z.B. den LRT 2130* auf der Insel Borkum insgesamt in einen guten Erhaltungszustand zu bringen.

Fig. 5: Expert statement of the National Park administration from November 10th, 2014 to the coal-fired power plant Eemshaven (MEYER-VOSGERAU 2014).

The National Park administration (MEYER-VOSGERAU 2014) further commented on the inadequacy of the Habitats Directive preliminary study by IBL UMWELTPLANUNG GMBH:

“The National Park administration therefore considers to be necessary a continuation of the Habitats Directive preliminary study in the form of a Habitats Directive impact study to the habitat subtype level.

The National Park administration also considers to be necessary the use of critical loads available to Lower Saxony since January 2012. Only then it will be possible to detect an exceedance of the critical loads in the habitat types 1330, 2130 and 2190. Furthermore, the National Park administration sees a logical contradiction, if the investigation area for German Habitats Directive areas in the main wind direction is limited to 30 km by using a “Abschneidekriterium”, but at the same time the Raad van State retrospectively demands nitrogen investigations for the Dutch Habitats Directive areas Lieftingsbroek and Drouwenerzand in a distance of 53 km from Eemshaven in the most rare wind direction.”

It is repeatedly argued in Dutch reports that the “German method” must be used to assess the nitrogen problem. In response to this argument, the statements of the Nationalparkverwaltung Niedersächsisches Wattenmeer and the Niedersächsischer Landesbetrieb für Wasserwirtschaft-, Küsten- und Naturschutz must be taken into account. These statements clarify that all the examinations made so far are inadequate.

The statements of the official nature conservation institutions in Lower Saxony are not considered till this day.

2.5 Exceedance of critical loads for nitrogen

Even if the “German method” is applied, three habitat types will exceed the critical loads and then it is obligate to lead the Habitats Directive preliminary study into a detailed Habitats Directive impact study. However, the consultants of IBL UMWELTPLANUNG GMBH did not notice this, because they used critical load values from abroad instead of those that exist for Lower Saxony. This is where the arbitrary and inadequate work of the consultants becomes obvious: on the one hand, it is argued that the “German method” should be used for nitrogen assessment. On the other hand, critical load values from abroad are used, even though “German” critical load values especially established for Lower Saxony are available.

Habitat type 1330 Atlantic Salt Meadows

- IBL UMWELTPLANUNG GMBH (2011: 21): CL-value 30-40 kg N / ha*a.
- IBL UMWELTPLANUNG GMBH (2012-1: 25, 30): lower CL-value of 30 kg N / ha*a for the Habitats Directive areas „Niedersächsisches Wattenmeer“ and „Unterems und Außenems“.
- VON DRACHENFELS (2012: 31 f.): depending on characteristic, there may be „medium to high sensitivity“ (CL 15-20/25 kg N / ha*a).

The lower CL-value used by IBL UMWELTPLANUNG GMBH (2011: 22) or (2012-1: 25, 30) corresponds to an allocation suggestion from Great Britain and is to be subordinated to the value especially established for Lower Saxony by VON DRACHENFELS (2012: 31 f.). For this reason a lower CL-value of 15 kg N / ha*a has to be used. The total load in all subareas (Dollart, Rysum, Leybucht, Norden/Dornum, Borkum, Memmert, Juist, Norderney and Baltrum) is according to IBL UMWELTPLANUNG GMBH (2011: 22) or (2012-1: 25, 30) above the lower CL-value of 15 kg N / ha * a. The test step 1, whether the total load is above the lower CL-value, is thus subject to be wrong. The conclusion that test step 2 is not required, is therefore wrong.

The test step 2 now includes the question, whether the additional load is more than 3% of the lower CL-value. According to IBL UMWELTPLANUNG GMBH (2011: 22), additional loads vary between 0.1 and 0.39 kg N / ha*a depending on the subarea. According to IBL UMWELTPLANUNG GMBH (2012-1: 25, 30), the subareas Dollart, Borkum, Memmert, Juist, Norderney and Baltrum are suddenly no longer taken into account.

However, for the still considered subareas Leybucht, Norden/Dornum and Rysum in the second nitrogen report of IBL UMWELTPLANUNG GMBH (2012-1: 25, 30) now an additional load of 0.63 kg N / ha*a was displayed for the Habitats Directive area "Nationalpark Niedersächsisches Wattenmeer" and 0.61 kg N / ha*a for the Habitats Directive area "Unterems and Außenems". Both values are above 3% of the lower CL value of 0.45 kg N / ha*a.

The so called “Irrelevanzschwelle” of the “German method” is therewith exceeded.

Priority habitat type 2130* Grey Dunes with herbaceous vegetation

- IBL UMWELTPLANUNG GMBH (2011: 21): CL-value 10-20 kg N / ha*a.
- According to IBL UMWELTPLANUNG GMBH (2012-1: 23) the habitat type 2130* is suddenly no longer taken into account on the grounds that the expected nitrogen deposition does not exceed 0.1 kg N / ha*a. In exactly the same way IBL UMWELTPLANUNG GMBH (2011: 22) eliminated already the habitat types 1110, 1170, 2150 und 3130 in their first nitrogen report, while they did not eliminate habitat type 2130* with this justification and subjected it to test steps 1 and 2. This reveals an arbitrary course of action.
- VON DRACHENFELS (2012: 33 ff.): depending on the characteristic, there may be a "very high sensitivity" (CL 5-10 kg N / ha*a).

The lower CL-value used by IBL UMWELTPLANUNG GMBH (2011: 23) corresponds to an allocation suggestion from Great Britain and is to be subordinated to the value especially established for Lower Saxony by VON DRACHENFELS (2012: 33 ff.). For this reason a lower CL-value of 5 kg N / ha*a has to be used. The total load in the subareas Norden/Dornum, Borkum, Memmert, Juist, Norderney and Baltrum is according to IBL UMWELTPLANUNG GMBH (2011: 23) above the lower CL value of 5 kg N / ha*a. However, test step 1 is not subject to be wrong, because the consultants have nevertheless correct decided test step 2 has to be passed.

The test step 2 now includes the question, whether the additional load is more than 3% of the lower CL-value. According to IBL UMWELTPLANUNG GMBH (2011: 23), additional loads vary between 0.1 and 0.27 kg N / ha*a depending on the subarea. The values of the subareas Norden/Dornum and Juist are above 3 % of the lower CL-value of 0.15 kg N / ha*a.

The so called "Irrelevanzschwelle" of the "German method" is therewith exceeded the second time. In this case even a priority habitat type is affected.

Habitat type 2190 Humid Dune Slacks

- IBL UMWELTPLANUNG GMBH (2011: 21): CL-value 10-25 kg N / ha*a.
- According to IBL UMWELTPLANUNG GMBH (2012-1: 23) the habitat type 2190 is suddenly no longer taken into account on the grounds that the expected nitrogen deposition does not exceed 0.1 kg N / ha*a. In exactly the same way IBL UMWELTPLANUNG GMBH (2011: 22) eliminated already the habitat types 1110, 1170, 2150 und 3130 in their first nitrogen report, while they did not eliminate habitat type 2190 with this justification and subjected it to test steps 1 and 2. One more time this reveals an arbitrary course of action.
- VON DRACHENFELS (2012: 34): depending on the characteristic, there may be a "very high sensitivity" (CL 5-10 kg N / ha*a).

The lower CL-value used by IBL UMWELTPLANUNG GMBH (2011: 23) corresponds to an allocation suggestion from Great Britain and is to be subordinated to the value especially established for Lower Saxony by VON DRACHENFELS (2012: 34). For this reason a lower CL-value of 5 kg N / ha*a has to be used. The total load in all subareas (Dollart, Rysum, Norden/Dornum, Borkum, Memmert, Juist, Norderney and Baltrum) is according to IBL UMWELTPLANUNG GMBH (2011: 23) above the lower CL-value of 5 kg N / ha*a. However, test step 1 is not subject to be wrong, because the consultants have nevertheless correct decided test step 2 has to be passed.

The test step 2 now includes the question, whether the additional load is more than 3% of the lower CL-value. According to IBL UMWELTPLANUNG GMBH (2011: 23), additional loads vary between 0.1 and 0.39 kg N / ha*a depending on the subarea. The additional load for the subareas Rysum, Norden/Dornum and Juist are above 3 % of the lower CL-value of 0.15 kg N / ha*a.

The so called "Irrelevanzschwelle" of the "German method" is therewith exceeded the third time.

2.6 References

- ARCADIS (2014): Beoordeling Kwikemissies uit de RWE-centrale in het Eemshavengebied. – ARCADIS Nederland B.V., Assen, 204 S. Auf:
https://www.provinciegroningen.nl/fileadmin/user_upload/Documenten/Downloads/Beoordeling_kwikemissies_uit_de_RWE-centrale_in_het_Eemshavengebied.pdf
- IBL UMWELTPLANUNG GMBH (2011): Industrieentwicklung in Eemshaven und Delfzijl (NL) - Untersuchung möglicher Auswirkungen durch Stickstoffeinträge von Vorhaben in Eemshaven und Delfzijl. – IBL Umweltplanung GmbH, Oldenburg, 36 S. Auf:
http://www.provinciegroningen.nl/fileadmin/user_upload/Documenten/Downloads/898_2011-10-20_rev3-0_FFH-VorU_Wattenmeer.pdf
- IBL UMWELTPLANUNG GMBH (2012-1): Rechtliche und naturschutzfachliche Stellungnahme zur Beurteilung der FFH-Verträglichkeit von Stickstoffeinträgen des RWE Kohlekraftwerks Eemshaven in deutsche Natura 2000-Gebiete. – IBL Umweltplanung GmbH, Oldenburg, 44 S. Auf:
http://www.provinciegroningen.nl/fileadmin/user_upload/Documenten/Downloads/898_2012-11-20_rev2-0_report_nitrogen_German_N_2000-sites.pdf
- KIFL (2008): Bewertung von Stickstoffeinträgen im Kontext der FFH-Verträglichkeitsstudie. – Kieler Institut für Landschaftsökologie, Kiel, 46 S.
- MEYER-VOSGERAU, A. (10.11.2014): Kraftwerk Eemshaven - Fachliche Stellungnahme der Nationalparkverwaltung Niedersächsisches Wattenmeer zur ‚Ergänzung der Genehmigung nach dem Naturschutzgesetz für RWE Eemshaven‘ der niederländischen Provinzregierungen. – Nationalparkverwaltung Niedersächsisches Wattenmeer, Wilhelmshaven, 6 S.
- MIERWALD, U. (23.05.2013): Mitteilungen per Telefon. – Kieler Institut für Landschaftsökologie, Kiel.
- NIEDERSÄCHSISCHER LANDESBETRIEB FÜR WASSERWIRTSCHAFT, KÜSTEN- UND NATURSCHUTZ (2011-4): Vollzugshinweise zum Schutz der FFH-Lebensraumtypen sowie weiterer Biotoptypen mit landesweiter Bedeutung in Niedersachsen - Riffe (1170). – Niedersächsischer Landesbetrieb für Wasserwirtschaft, Küsten- und Naturschutz, Norden. Auf: <http://www.nlwkn.niedersachsen.de/servlets/download?C=61900136&L=20>
- RIJKSWATERSTAAT (2013-4): Verbesserung Fahrinne Eemshaven-Nordsee – Umweltverträglichkeitsbericht. – Rijkswaterstaat, Ministerium für Infrastruktur und Umwelt, Den Haag, 216 S.
- RIJKSWATERSTAAT (2014): Verbesserung Fahrinne Eemshaven-Nordsee – Trassenbeschluss. – Rijkswaterstaat, Ministerium für Infrastruktur und Umwelt, Den Haag, 57 S.
- RIJKSWATERSTAAT (2014-2): Verbesserung Fahrinne Eemshaven-Nordsee – Ergänzung zum Umweltverträglichkeitsbericht und dem FFH-Verträglichkeitsbericht. – Rijkswaterstaat, Ministerium für Infrastruktur und Umwelt, Den Haag, 34 S.
- STAB (2015): Beurteilung der Eingaben im Vorfeld der Gerichtsverhandlung, Dokument StAB-39665 vom 26. März 2015. – Stichting Advisering Bestuursrechtspraak voor Milieu en Ruimtelijke Ordening, Den Haag, Niederlande, 87 S.

-
- VON DRACHENFELS, O. (2012): Einstufungen der Biotoptypen in Niedersachsen - Regenerationsfähigkeit, Wertstufen, Grundwasserabhängigkeit, Nährstoffempfindlichkeit, Gefährdung. – Informationsdienst Naturschutz Niedersachsen 1/2012, Niedersächsischer Landesbetrieb für Wasserwirtschaft, Küsten- und Naturschutz, Hannover, 60 S.
- VON DRACHENFELS, O. (28.01.2014): FFH-Vorprüfung bezüglich der Stickstoffeinträge durch das geplante Kohlekraftwerk Eemshaven. – Stellungnahme, Niedersächsischer Landesbetrieb für Wasserwirtschaft, Küsten- und Naturschutz, Hannover, 2 S.
- VON DRACHENFELS, O. (12./13.04.2017): Mitteilungen per Email. – Niedersächsischer Landesbetrieb für Wasserwirtschaft, Küsten- und Naturschutz, Hannover.