Report on the eel stock and eel fishery in the Netherlands in 2010.

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Rapport C152/2011

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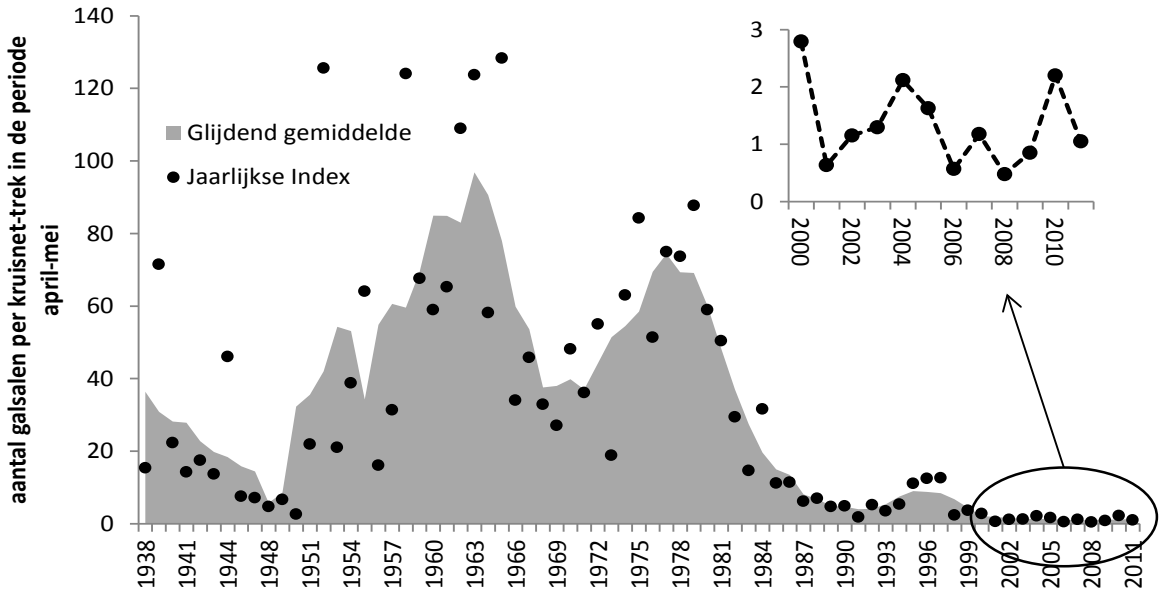
Inhoudsopgave

In dit rapport wordt een uitgebreid, Engelstalig overzicht gegeven van de toestand van de aal en de aalvisserij in Nederland, zoals dat jaarlijks aan de aalwerkgroep van EIFAC/ICES wordt gepresenteerd. In de samenvatting wordt een Nederlandstalige, verkorte presentatie van de inhoud gegeven, met de nadruk op de meest recente gegevens. Het Engelstalige overzicht beoogt compleet en gedetailleerd te zijn – in de samenvatting staat de leesbaarheid en toegankelijkheid voorop.

1. Nederlandse samenvatting

In 2002 (ICES 2003) deed de gezamenlijke aalwerkgroep van de Internationale Raad voor het Zeeonderzoek ICES en de Europese Adviesraad voor de Binnenvisserij EIFAC de aanbeveling dat deelnemers jaarlijks aan de werkgroep zouden rapporteren over de toestand van de aalstand en aalvisserij in hun land. Deze rapportages konden dan vervolgens door de werkgroep gebruikt worden als uitgangspunt voor het internationale bestandsoverzicht en de daarop gebaseerde advisering. In 2003 (ICES 2004) werden gedetailleerde rapporten voor elk van de deelnemende landen opgesteld, die aan het (internationale) rapport van de werkgroep werden toegevoegd. In de jaren daarna zijn deze landenrapporten telkens bijgewerkt en aangevuld. Onderliggend rapport bevat het overzicht van de toestand van de aalstand in Nederland dat in de zomer van 2011 is opgesteld. De tijdreeksen in dit rapport lopen tot en met 2010, met uitzondering van de glasaalintrek waarvoor gegevens tot en met het voorjaar van 2011 beschikbaar zijn. De gerapporteerde gegevens zijn merendeels verzameld in het kader van Wettelijke onderzoekstaken (WOT); de analyse en rapportage heeft ook in dat kader plaatsgevonden.

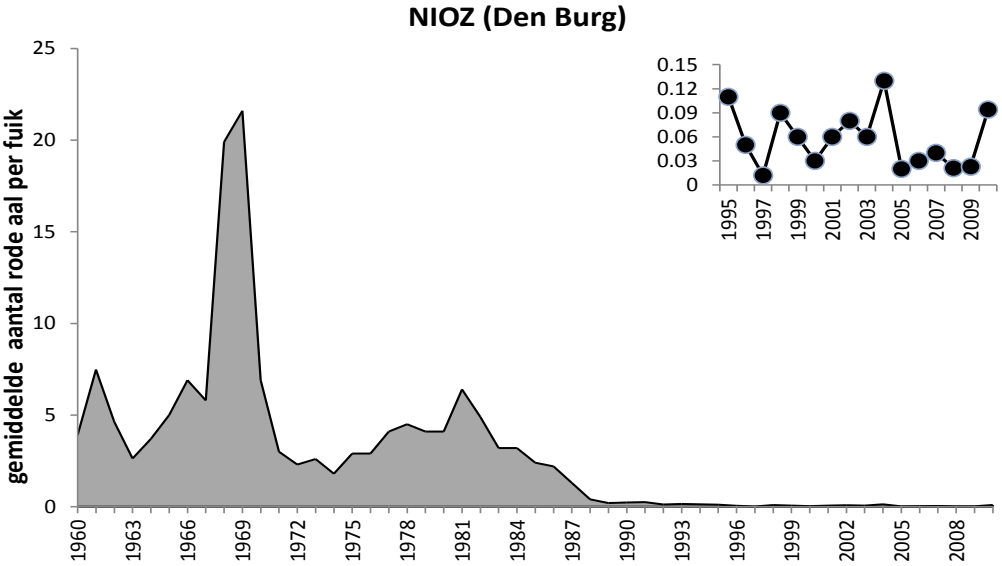
Trend Glasaal



Figuur 1. *Trend in de aanwas van glasaal bij Den Oever.*

De intrek van jonge aal (glasaal) uit zee naar onze binnenwateren wordt bemonsterd op 12 plaatsen langs de kust. In Den Oever is sinds 1938 een intensief programma uitgevoerd, elders is tussen 1970 en 1995 een netwerk van vrijwilligers opgezet. De resultaten tonen een sterke afname sinds 1980 en het glasaal niveau is momenteel minder dan 5 % van het vroegere niveau. De laatste tien jaar is de intrek van een vergelijkbaar laag niveau.

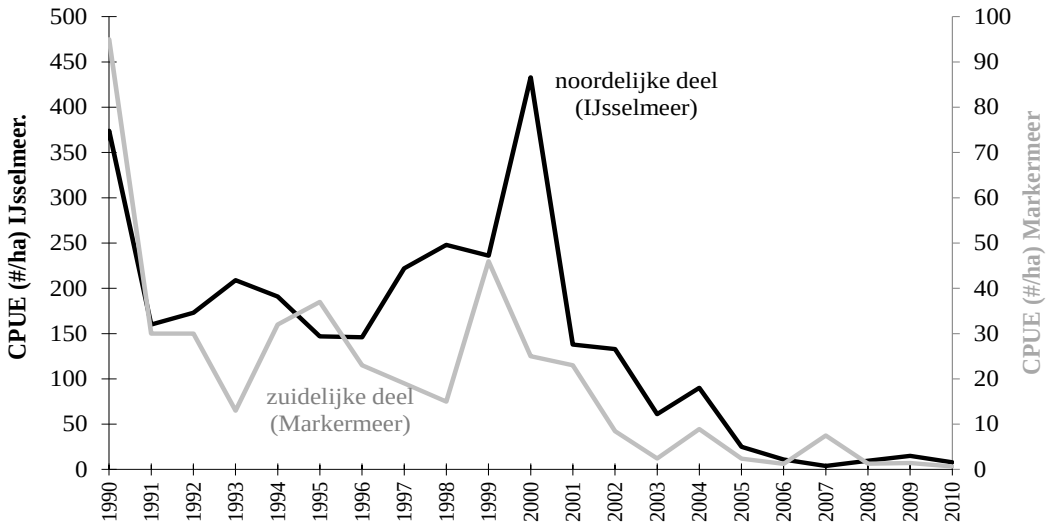
Trend Aal Waddenzee



Figuur 2. *Trend in de hoeveelheden rode aal in de NIOZ fuik (Bron: van de Meer, in prep*).

Sinds 1960 worden de vangsten rode aal in de haven van Den Burg door medewerkers van het NIOZ nauwkeurig bijgehouden. Deze zeldzame tijdsserie (Figuur 2) is in 2010 toegevoegd aan het jaarlijkse aalrapport. Deze nieuwe dataset toont ook een duidelijk afname van de rode aal populatie sinds de jaren tachtig, vergelijkbaar met de drastische afname aan glasaal bij Den Oever.

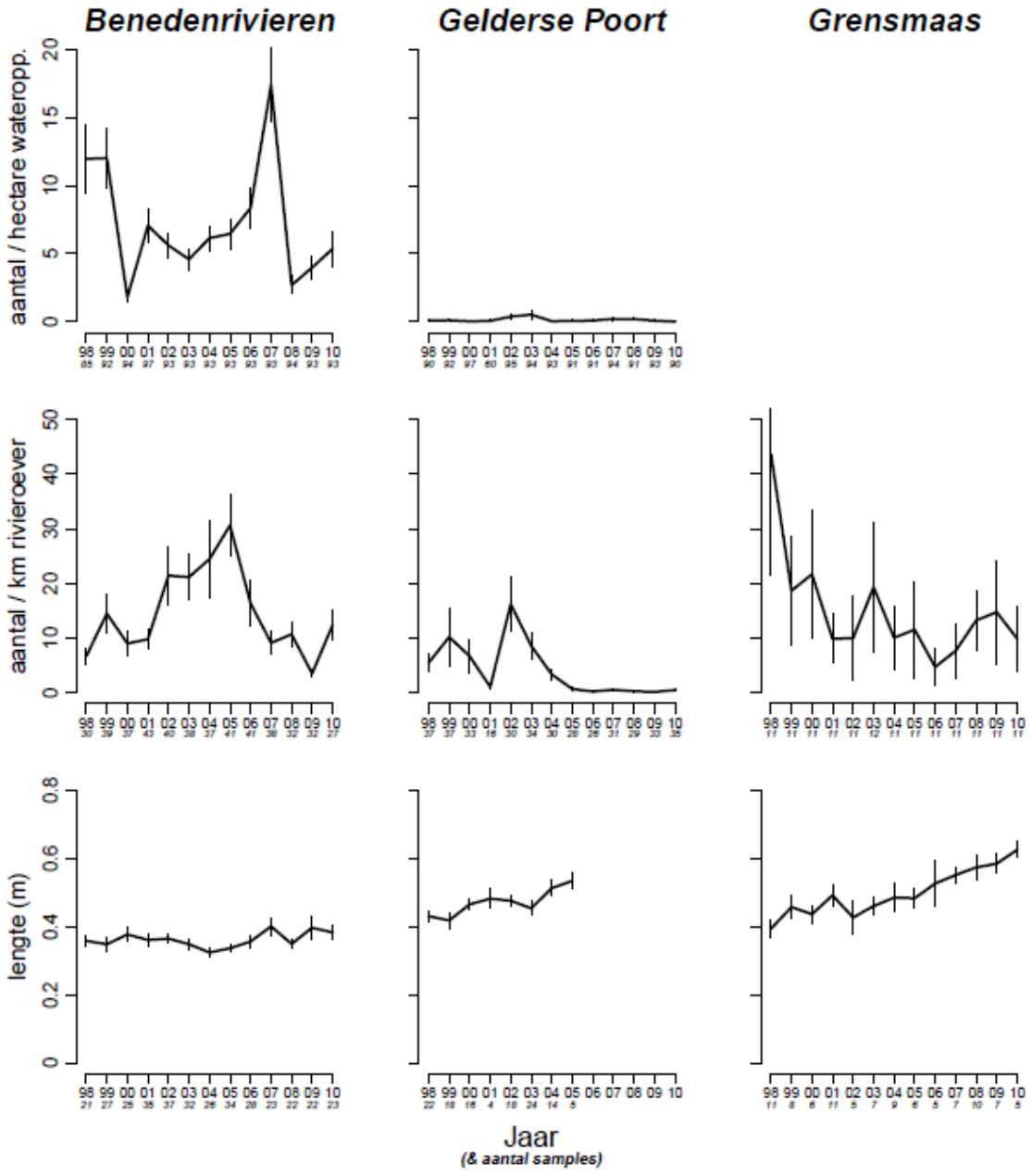
Trend Aal IJsselmeer



Figuur 3. *Trend in de hoeveelheid (aantallen per ha) (rode) aal in het IJsselmeer en Markermeer op basis van de vangst met de electrostramienkor*.

De bestandsopname met de electrostramienkor in IJsselmeer/Markermeer toont een scherpe afname aan rode aal sinds 2000.

Trend Aal Rivieren

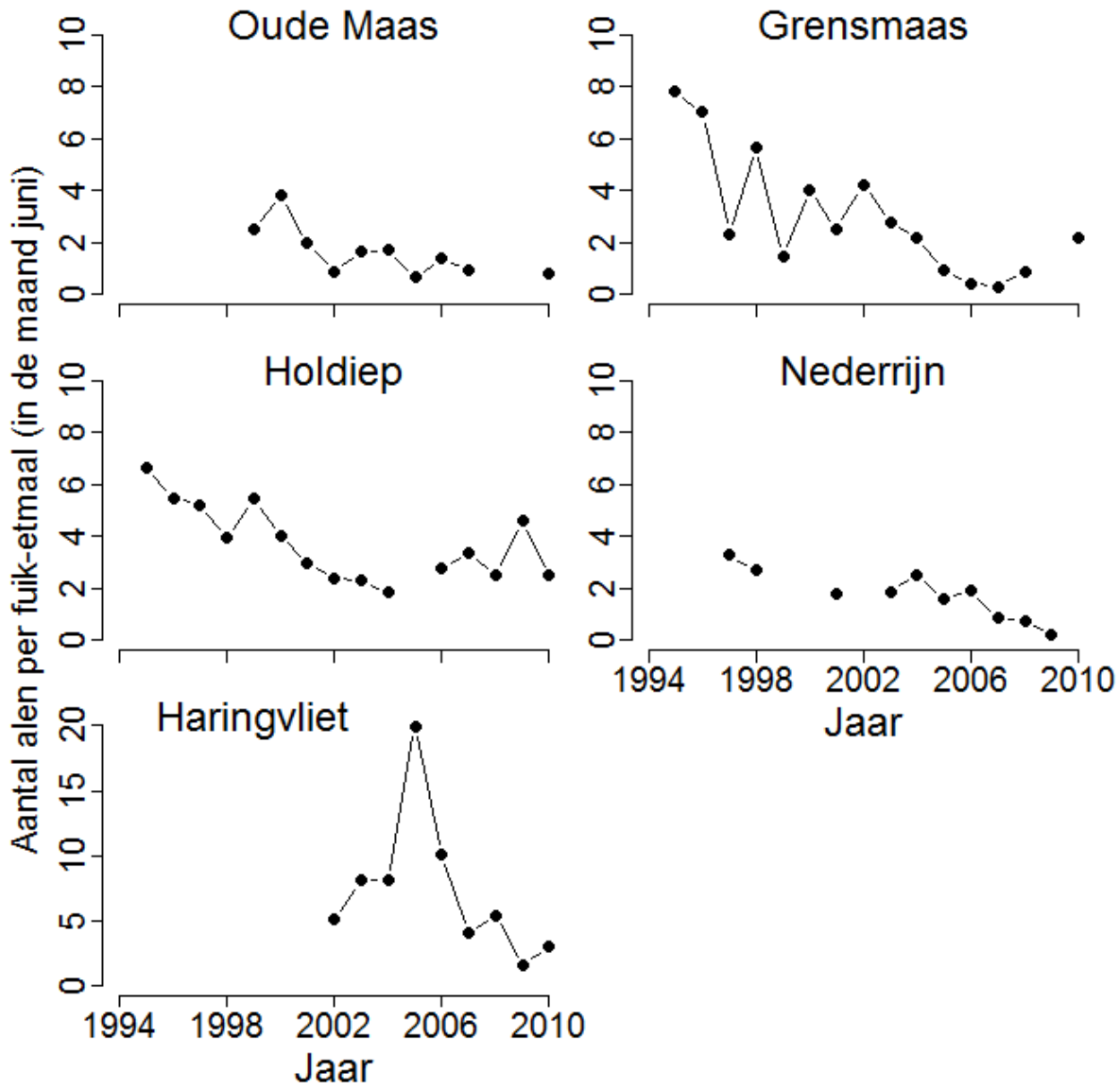


Figuur 4. *Dichtheden en gemiddelde lengte van aal in de benedenloop (benedenrivieren) en bovenloop (Gelderse Poort; Grensmaas) van de Rijn en Maas; bodemtrawl in de hoofdstroom (bovenste grafieken), electro-vissen in de littorale zone (middelste grafieken) en gemiddelde lengte aal (electro-vissen, onderste grafieken).*

Sinds 1998 vindt er een visserij-onafhankelijke survey (Active Monitoring) plaats in het rivierengebied om het verloop van de visbestanden in kaart te brengen. In de bovenloop van het rivierengebied zijn de aantallen aal afgenomen en neemt de gemiddelde lengte van de overgebleven aal toe. Dit duidt op een gebrek aan aanwas van jonge aal in deze gebieden. In de benedenloop van het rivierengebied is sinds

1998 is geen afname in aantallen aal of een verandering in de gemiddelde lengte van aal waargenomen sinds 1998.

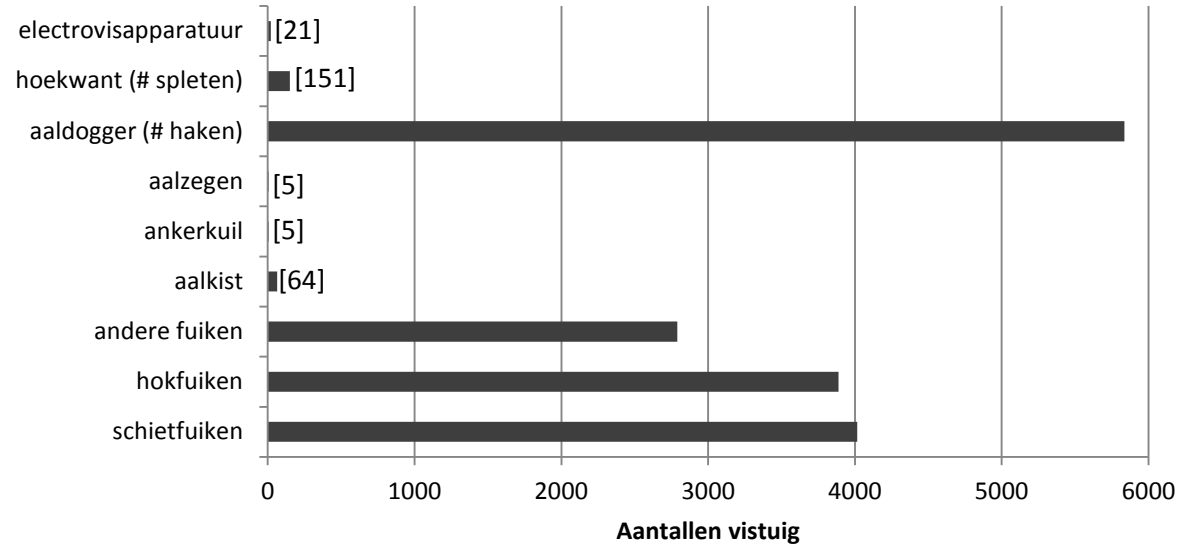
Sinds 1993 loopt op grofweg dezelfde locaties in het rivieren gebied als de Actieve Monitoring een tweede vismonitoringsprogramma in samenwerking met de beroepsvissers. In dit programma, Passieve Monitoring, registreren beroepsvissers van een beperkt aantal fuiken de vangsten van commerciële vissoorten en bijvangsten van andere soorten. Alhoewel de variatie tussen de jaren en de locaties groot is, laat dit programma op een aantal locaties een dalend trend zien in de hoeveelheden gevangen aal. Door de invoering van de gesloten periode en de gesloten gebieden voor de aalvisserij staat de voortgang van deze belangrijke tijdsreeks onder druk.



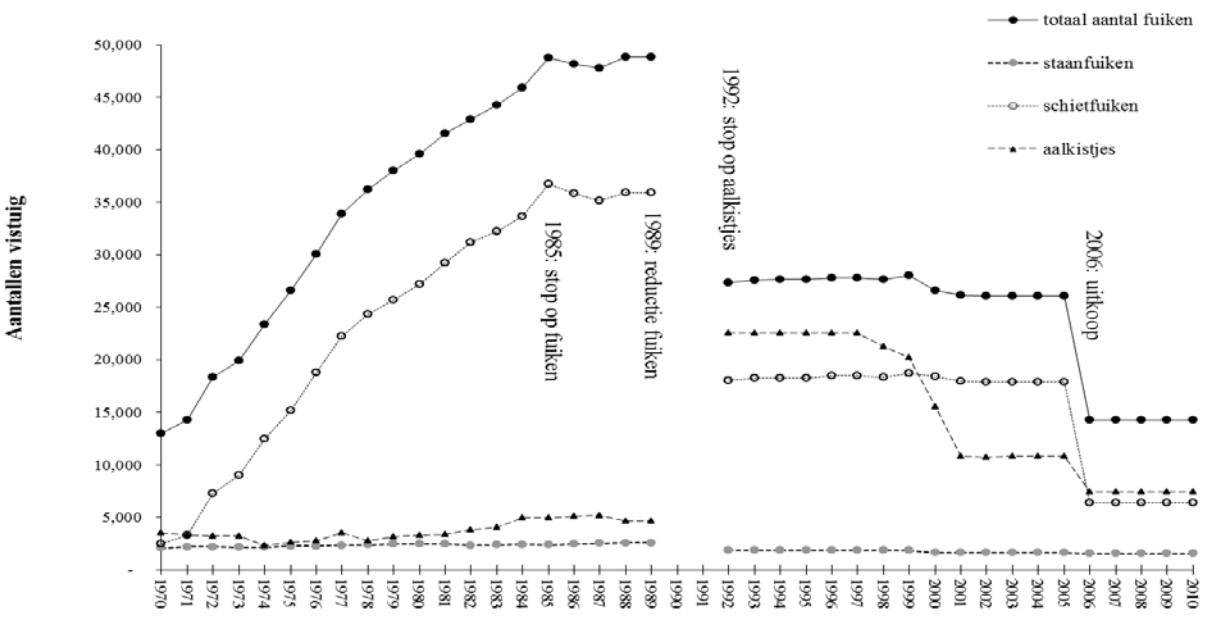
Figuur 5. *Gemiddeld aantal rode alen per fuik-dag (schietfuiken) in de beneden- en bovenloop van de Rijn en de Maas in Nederland.*

Trend Aalvisserij

De visserij op aal in Nederland is nauwelijks gedocumenteerd; het aantal vergunningen is bekend, maar van de aantallen vistuigen, het gebruik daarvan en de vangsten zijn slechts schattingen beschikbaar, en deze schattingen verouderen nu snel. Invoering van de Europese Aalverordening en het Nederlandse Aal Beheersplan zal de documentatie naar verwachting snel verbeteren. De eerste stap is gezet met de invoering van de verplichte vangstregistratie voor aalvissers per 1/1/2010. Een nadeel van de huidige registratie is dat rode aal en schieraal vangsten gecombineerd worden geregistreerd en dat vistuig en visserijinspanning niet worden gedocumenteerd. Het Ministerie van EL&I zal per 1/1/2012 de visserijinspanning opnemen in de verplichte digitale vangstregistratie. In 2011 heeft het Ministerie van EL&I een eenmalige, landelijke inventarisatie uitgevoerd naar het aanwezige vistuig in de aalvisserij.



Figuur 6. *Overzicht van de door de beroepsvissers opgegeven vistuigen tijdens het 2010 aalseizoen. (exclusief IJsselmeer/Markermeer en gesloten gebieden*).

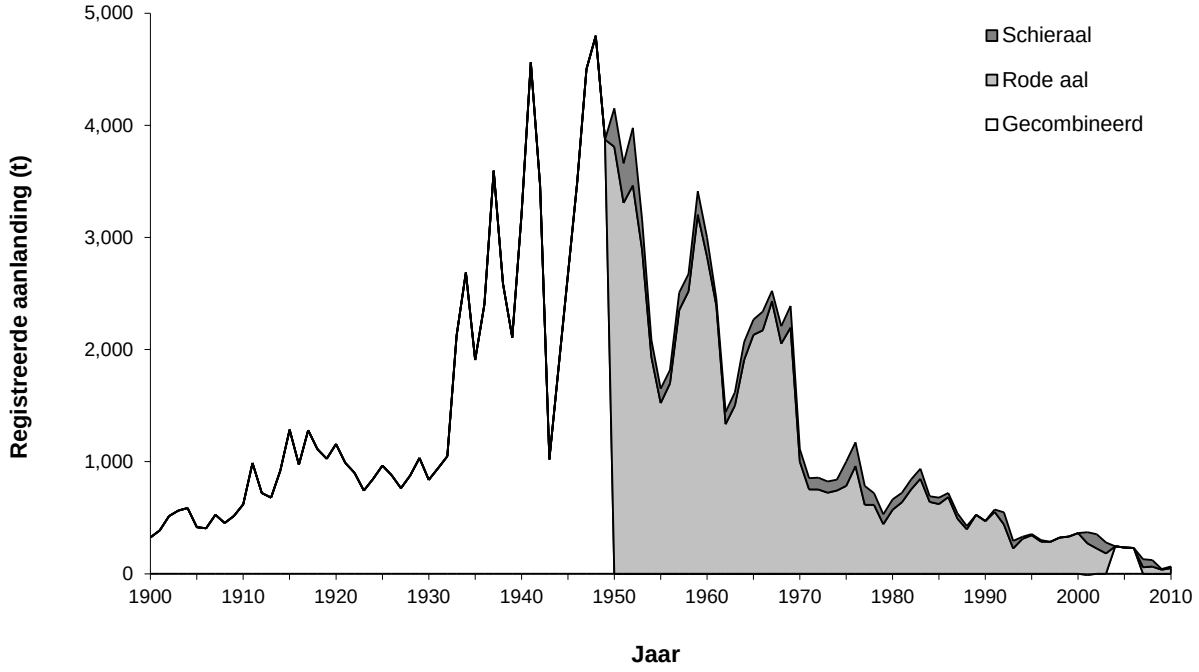


Figuur 7. *Trend in de nominale hoeveelheden vistuig binnen de aalvisserij op het IJsselmeer*.

Op het IJsselmeer is het aantal te gebruiken vistuigen gelimiteerd door merkjes, die aan de vistuigen bevestigd dienen te worden. Dit aantal is in de periode 1970-1985 sterk toegenomen; daarna is het aantal stapsgewijs verminderd. Na de laatste grote beperking in 2006 liggen de aantallen voor de meeste vistuigen nu nog steeds hoger dan in 1970. Alleen voor staanfuiken heeft er in de jaren 1970-1980 vrijwel geen groei plaatsgevonden, terwijl er later wel reducties zijn doorgevoerd. Daarmee ligt het aantal grote fuiken in 2009 een kwart lager dan in 1970. Het is momenteel echter duidelijk welk deel van de “merkjes” ook daadwerkelijk wordt ingezet tijdens de visserij en of met de invoering van de gesloten periode en meer ongebruikte merkjes zijn ingezet. De visserijinspanning door hoekwantvissers in het IJsselmeer is ook onduidelijk. Het maximum aantal hoekwantvissers ligt vast maar iedere visser mag zelf bepalen met hoeveel “spleten” (een hoekwant met 250 haken) wordt gevist.

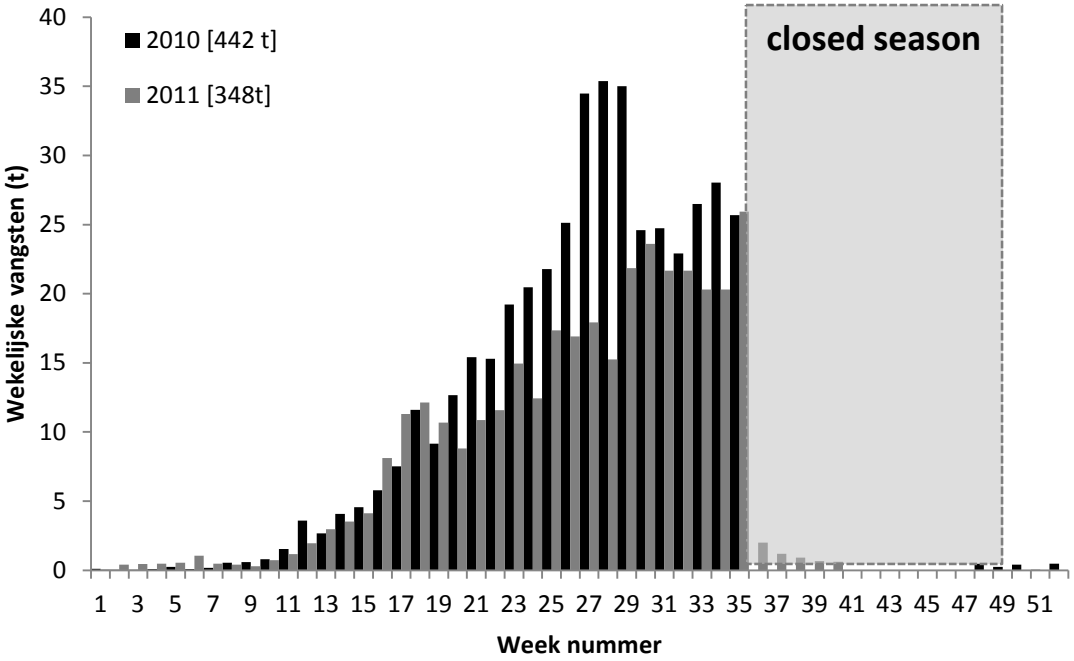
De visserij op aal in Nederland vindt plaats in meren, rivieren, kanalen en kustwateren, met de grootste concentraties in de wateren in de lagere delen van ons land. Voor de Zuiderzee/IJsselmeer zijn gegevens beschikbaar over de aanvoer op de afslagen sinds 1880. De aanlandingen van de Zuiderzee toonden in de periode 1880-1932 een lichte stijging van 300 naar 1000 t. Bij de afsluiting van het IJsselmeer namen de aanlandingen plotseling toe tot ca. 2500 t, om daarna verder te stijgen tot rond 3500 t in de jaren 1940-1955. Sinds 1950 heeft de aanvoer sterk gefluctueerd, maar is wel een gestage daling opgetreden tot minder dan 400 t sinds 2000, en nog maar 42 t in 2009.

De vangststatistieken van de afslagen rond het IJsselmeer worden sinds 1994 bijgehouden door het Productschap Vis (PVIS). De kwaliteit van de gegevens is de laatste jaren achteruitgegaan. Ter illustratie, het blijft erg lastig om goed inzicht te krijgen in vangsten uit het IJsselmeer/Markermeer. In 2010 waren de aalvangsten volgens PVIS 20 t (bij navraag bijgesteld tot 65 t), volgens PO IJsselmeer 79 t en volgens de vangstregistratie van EL&I 117 t.



Figuur 8. *Trend in de geregistreerde aanlanding van aal op alle IJsselmeerafslagen (Bron PVIS). In 2009 is de aalvisserij gedurende oktober en november gesloten en vanaf 2010 is de visserij gesloten gedurende september, oktober en november.*

Tot voor kort waren er geen betrouwbare aanlandingsgegevens van de wateren buiten het IJsselmeer. Op 1 januari 2010 heeft EL&I een verplichte vangstregistratie ingevoerd voor alle aalvissers op de binnenwateren. De wekelijkse aalvangsten (rode aal en schieraal gecombineerd) worden per VBC gebied opgenomen in de database van het Ministerie van EL&I. Vistuig en visserijinspanning worden niet geregistreerd maar dit zal in 2012 veranderen.



Figuur 9. *Verloop van de wekelijkse aanlandingen aal in de binnenwateren in 2010 en 2011*.

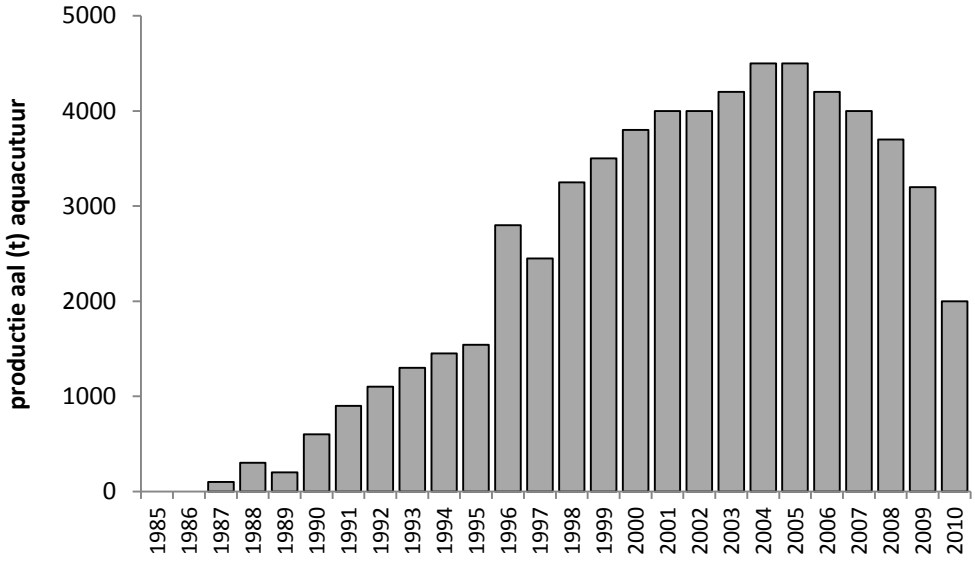
Van de 440 t die in 2010 werd gevangen kwam ongeveer 170 t aal uit de gebieden die per 1 april 2011 zijn gesloten voor de aal- en wolhandkrabvisserij ("gesloten gebieden"). De resterende 270 t werd gevangen in de resterende "open gebieden". In 2011 is de vangst (350 t) "open gebieden" aanzienlijk hoger dan in 2010 (270 t). Door het gebrek aan een robuuste inspanningsregistratie is niet mogelijk om te zien of deze stijging in aanlanding veroorzaakt wordt door een toename aan aal of een toename aan visserijinspanning.

In 2009 is het Recreatieve Visserij programma van start gegaan. Een voorlopige schatting van de hoeveelheid onttrokken aal in 2010 door de recreatieve visserij ligt rond de 100 t.

Trend Aquacultuur

De grootste hoeveelheid aal (~90%) in Nederland wordt geproduceerd in intensieve kwekerijen. Hierin wordt in het wild gevangen, geïmporteerde glasaal uit voornamelijk Frankrijk en Spanje (Tabel 1), opgekweekt onder gecontroleerde omstandigheden. De totale productie sinds 1985 is gestegen tot meer dan 4000 t, maar sinds 2005 neemt de productie weer af. In 2010 is ongeveer 2000 t aal geproduceerd. Buiten Nederland, is de intensieve kweek vooral van belang in Denemarken, waar ook sprake is van een sterk dalende productie, en een meer extensieve vorm in Italië.

Kunstmatige voortplanting van de aal voor commerciële doeleinden is tot op heden niet mogelijk.



Figuur 10. *Trend in de hoeveelheden aal die worden geproduceerd door de aquacultuur sector.*

Tabel 1. *Herkomst van de geïmporteerde, wild gevangen glasaal in de Nederlandse aquacultuur sector. (Bron: DUPAN).*

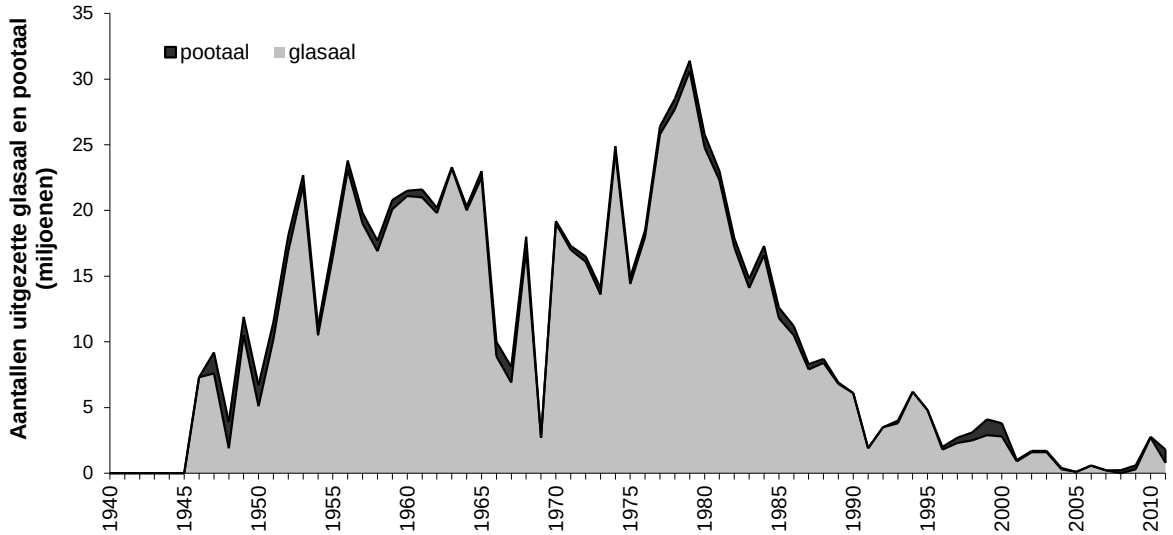
Seizoen	Frankrijk	Spanje	Engeland	Totaal (kg)
2010/2011	4725	1890	135	6750

Trend Uitzet Glasaal en Pootaal

Sinds de jaren 1950 is er op grote schaal glasaal uit de omgeving van de Golf van Biskaje aangekocht en uitgezet in de binnenwateren. Daarnaast is jonge rode aal (pootaal) uitgezet. Deze pootaal werd voornamelijk gevangen in de kustzone en/of de benedenloop van de rivieren. In recente jaren heeft de uitzet van gekweekte aal (opgekweekt uit glasaal van Frankrijk/Engeland) de overhand. De uitzet van glasaal heeft min of meer gelijke tred gehouden met de natuurlijke intrek; in 2009 werd nog maar ca. 0.3 miljoen glasalen uitgezet. Voorheen was het aantal uitgezette pootaal verwaarloosbaar klein ten opzichte van de glasaal. Deze hoeveelheid is in tegenstelling tot de glasaal echter maar weinig afgenomen, waardoor de hoeveelheden uitgezette glasaal en pootaal de laatste paar jaren ongeveer even grootwaren. Sinds de opheffing van de OVB in 2005, wordt de aanvoer van glasaal en pootaal voor uitzet niet meer centraal geregistreerd. De latere cijfers zijn gebaseerd op opgave van de belangrijkste initiatiefnemers, maar mogelijk zijn kleinere partijen gemist.

In 2010 en 2011 heeft de Combinatie van Beroepsvissers de uitzet gecoördineerd van de door het Ministerie van EL&I aangekochte glasaal ter bevordering van het herstel van de aalstand. Er is echter (internationaal) verdeeldheid over het nut van de uitzet van geïmporteerde, in het wild gevangen glasaal als maatregel voor het herstel van de aalstand. In het 2010 ICES aaladvies staat: *"Given the current record-low abundance of glass eels, ICES reiterates its concern that glass eel stocking programs are unlikely to contribute to the recovery of the European eel stock. This is because (a) there is no surplus anywhere of glass eel to be redistributed to other areas and (b) there is evidence that stocked/translocated eels experience impairment of their navigational abilities."* Tijdens de ICES WGEEL bijeenkomst in september 2011 is nogmaals uitgebreid aandacht besteed aan de voors en tegens van het uitzetten van geïmporteerde glasaal voor hersteldoeleinden. De rapportage van ICES WGEEL 2011 zal begin 2012 naar alle waarschijnlijkheid openbaar zijn.

In 2011 is naar schatting 3.5% van alle door Nederland geïmporteerde glasaal uitgezet in binnenwateren (Tabel 2 en 3). Het merendeel van de uitzetting heeft plaatsgevonden in wateren waar bevissing plaatsvindt.



Figuur 11. *Trend in de hoeveelheden uitgezette glasaal en pootaal.*

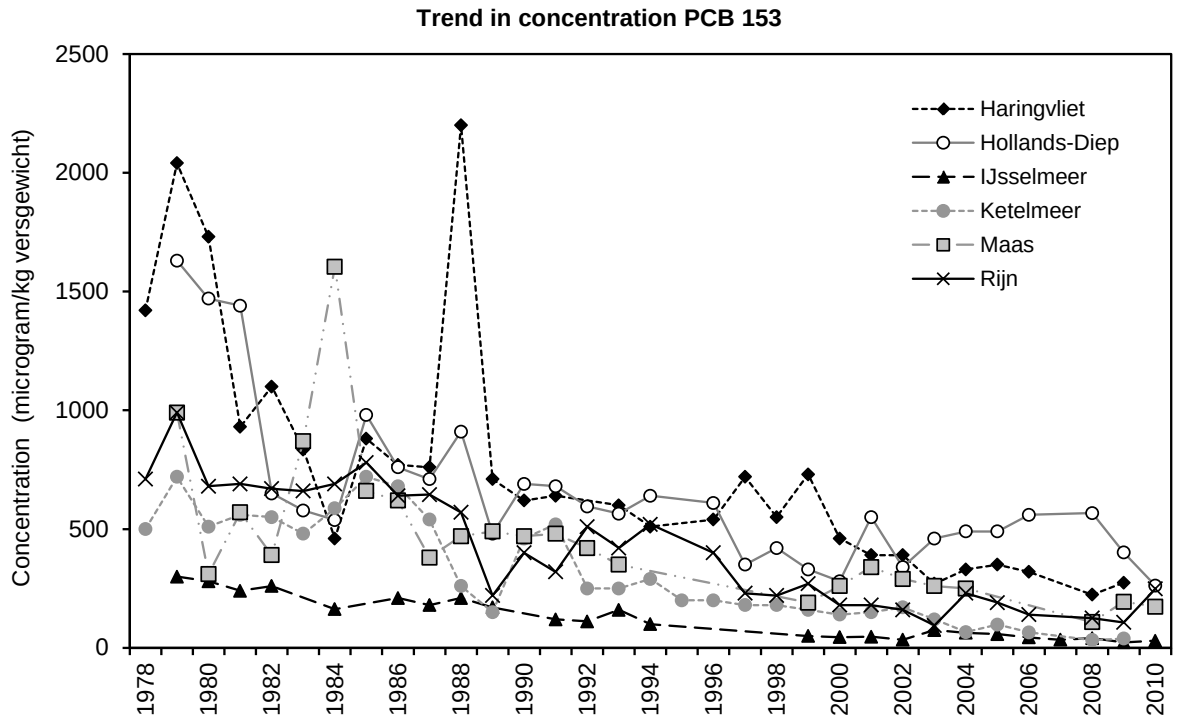
Tabel 2. *Overzicht van de in 2011 in Nederland uitgezette glasaal en pootaal (Bron CvB en DUPAN).*

Datum	Uitzet locatie	Type	Herkomst	Kg	#/kg	#
27/4/2011	Veluwe Randmeer (Harderwijk)	Glasaal	Frankrijk	113	3,000	339,000
16/5/2011	Veluwe Randmeer (Harderwijk)	Glasaal	Engeland	51	3,730	190,230
27/4/2011	Friesland	Glasaal	Engeland	20	3,420	68,400
27/4/2011	Westeinderplas	Glasaal	Engeland	3	3,420	10,260
27/4/2011	Stichtse-Ankeveense plassen	Glasaal	Engeland	14	3,420	47,880
27/4/2011	Noord-west Overijssel	Glasaal	Engeland	28	3,420	95,760
27/4/2011	Krommenie (Noord-Holand)	Glasaal	Engeland	3	3,420	10,260
27/4/2011	Hoorn (Noord-Holland)	Glasaal	Engeland	2	3,420	6,840
?	?	Glasaal	?	10	3,000	30,000
			TOTAAL	244		798,630
16/6/2011	Zuidelijke Randmeer (Almere)	Pootaal	Denmark	323	196	63,308
16/6/2011	Zuidelijke Randmeer (Almere)	Pootaal	St Anthonis (NL)	517	179	92,543
16/6/2011	Zuidelijke Randmeer (Spakenburg)	Pootaal	Nijvis (NL)	555	455	252,376
?	Kampen	Pootaal	Nijvis (NL)	1,500	100	150,000
?	Alkmaardermeer	Pootaal	?	500	100	50,000
?	Markiezaatsmeer	Pootaal	?	1,000	100	100,000
?	Veluwe Randmeer	Pootaal	St Anthonis (NL)	1,400	133	186,667
?	Westeinderplas	Pootaal	?	200	100	20,000
?	Friesland	Pootaal	?	125	100	12,500
?	Noord-Holland	Pootaal	?	175	100	17,500
?	Reeuwijkse Plassen	Pootaal	Kraan	100	400	40,000
?	Lemster Brekken	Pootaal	Kraan	50	225	11,250
			TOTAAL	6,445		996,293
?		Pootaal	Nijvis (NL)			350,000
	Duitland			?	?	0

Tabel 3. *Overzicht van het gebruik van geïmporteerde, in het wild gevangen glasaal in Nederland.*

KG	2011	2010	2009
Uitzet in Nederlandse wateren	244	904	100
Aquacultuur (consumptie)	6750	?	?
Direct geconsumeerd	0	0	0
Mortalities	-	-	-

Trend Vervuiling en Ziekten



Figuur 12. *Trend in PCB 153 in rode aal (elk punt is het gemiddelde van 25 alen*).

In het kader van de monitoring van voedselkwaliteit, zijn sinds eind jaren 1970 de gehaltes van vervuilende stoffen in aal bepaald. Na de sterke vervuiling in de jaren daarvoor, is een gestage daling in de gehaltes van PCBs en dioxines in aal waargenomen. In Figuur 12 wordt een enkel voorbeeld (PCB 153) getoond; PCB 153 is een goede indicator voor de andere PCBs.

Conclusies 2011

In dit rapport wordt een up-to-date overzicht gegeven van de beschikbare informatie over de toestand van de aal en de aalvisserij in ons land, op basis van de beschikbare informatie halverwege 2011. Alle informatie wijst erop dat het bestand zich al enige jaren op een historisch dieptepunt bevindt. De komende jaren zal er gezamenlijk moeten worden gewerkt aan het verkrijgen van de meest betrouwbare schattingen van verschillende bronnen van sterfte (poldergemalen, waterkrachtcentrales, beroepsvisserij en recreatieve visserij) en de huidige biomassa van uittrekkende schieraal (Rode Aal Model).
Gezien de historisch lage intrek aan glasaal, lage biomassa aan uittrekkende schieraal, hoge sterfte door menselijk handelen en lange levenscyclus van aal, is de kans op een spoedig herstel van de aalstand uiterst klein. Nederland heeft echter wel de mogelijkheid om op korte termijn de sterfte door menselijk handelen aanzienlijk te verlagen door de visserij (eventueel decentraal) te sturen op mortaliteit. Het ontwikkelen van een “trap-and-transport” systeem in samenwerking met vissers en beheerders van kunstwerken (gemalen en waterkrachtcentrales) om aal over barrières te helpen is een andere mogelijkheid.

Het hieronder weergegeven rapport is als bijlage opgenomen in het rapport van de EIFAC/ICES Working Group on Eels. In het EIFAC/ICES rapport is voor elk deelnemend land een dergelijke bijlage te vinden. De hoofdstukindeling is in grote lijnen uniform voor alle landen; waar geen informatie beschikbaar was, of een hoofdstuk niet relevant, is dat als zodanig vermeld.

2. Report on the eel stock and fishery in: The Netherlands 2011

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Contributors to the report: Contributions: The following persons and institutions provided information for this report: Nicola Tien (ACTMON data analysis), Arjan Heinen (Combinatie van Beroepsvissers; stocking data), Jaap van der Meer (NIOZ: yellow eel data NIOZ fyke), Michiel Kotterman (IMARES; eel contaminants), William Swinkels (DUPAN, glass eel data & eel aquaculture production), Olga Haenen and Marc Engelsma (CVI; parasites and pathogens).

2.1 Introduction

2.1.1 General overview fisheries

Eel fisheries in the Netherlands occur in coastal waters, estuaries, larger and smaller lakes, rivers, polders, etc. Management of eel stock and fisheries has been an integral part of the long tradition in manipulating water courses (polder construction, river straightening, ditches and canals, etc.). Governmental control of the fishery is restricted to on the one hand a set of general rules (gear restrictions, size restrictions, for course fish: closed seasons), and on the other hand site-specific licensing. Within the licensed fishing area, and obeying the general rules, fishermen are currently free to execute the fishery in whatever way they want. Since 1/1/2010 there is a general registration of landings, a general registration of fishing efforts has not been implemented yet. In recent years, licensees in state-owned waters are obliged to participate in so-called Fish Stock Management Committees ['Visstand Beheer Commissies' VBC,], in which commercial fisheries, sports fisheries and water managers are represented. The VBC is responsible for the development of a regional Fish Stock Management Plans. The Management Plans are currently not subject to general objectives or quality criteria. The future of VBC and their role in fish stock management is under debate.
Until April 2011 the total fishery involves approx. 200 companies, with an estimated total catch of nearly 442 tonnes in 2010. However, on 1 April 2011 a large part of the fishery was closed due to high PCB-levels in the eel (Figure NL. 1). This closure has affected ~50 fishing companies catching 170 tonnes of eel in 2010, roughly a third of the annual landings of inland waters in the Netherlands.

For details on the closure , visit the following website;
http://www.rijksoverheid.nl/ministeries/eleni/nieuws/2011/03/31/vangstverbod-paling-en-wolhandkrab-vanaf-1-april-van-kracht.html.

Figure NL. 1 *Overview of the areas closed for eel and Chinese mitten crab fishery as of 1 April 2011 (Source Ministry of Economic Affairs, Agriculture & Innovation*).

2.1.2 Spatial subdivision of the territory

The fishing areas can be categorised into 5 groups:

The Waddensea; 53ºN 5ºE; 2591 km^2. This is an estuarine-like area, shielded from the North Sea by a series of islands. The inflow of sea water at the western side mainly consists of the outflow of the river Rhine, which explains the estuarine character of the Waddensea. The fishery in the Waddensea is permitted to license holders and assigns specific fishing sites to individual licensees. Fishing gears include fyke nets and pound nets; the traditional use of eel pots is in rapid decline. The fishery in the Waddensea is obliged to apply standard EU fishing logbooks. Landings statistics are therefore available from 1995 onwards; <50 tons per year. There are 21 companies having a commercial license for fishing eel, and the total number of fyke nets is estimated at 400.

Lake IJsselmeer; 52º40'N 5º25'E; now 1820 km2. Lake IJsselmeer is a shallow, eutrophic freshwater lake, which was reclaimed from the Waddensea in 1932 by a dike (Afsluitdijk), substituting the estuarine area known before as the Zuiderzee. The surface of the lake was stepwise reduced by land reclamation, from an original 3 470 km^2 in 1932, to just 1 820 km^2 since 1967. In preparation for further land reclamation, a dam was built in 1976, dividing the lake into two compartments of 1200 and 620 km^2, respectively, but no further reclamation has actually taken place. In managing the fisheries, the two lake compartments have been treated as a single management unit. The discharge of the river IJssel into the larger compartment (at 52º35'N 5º50'E, average 7 km^3 per annum, coming from the River Rhine) is sluiced through the Afsluitdijk into the Waddensea at low tide, by passive fall. Fishing gears include standard and summer fyke nets, eel boxes and long lines; trawling was banned in 1970. Licensed fishermen are not spatially restricted within the lake, but the number of gears is controlled by a gear-tagging system. The registered landings at the auctions are assumed to cover some the actual total.

There are, however, differences in estimated landings reported by PO IJsselmeer, PVIS and catch registration system of the Ministry of EL&I. There are 70 fishing licenses, owned by ca. 30 companies. The total number of gears allowed in 2010 was: fixed fykes 1579, train fykes 6386, eel boxes 7415 and unknown numbers of longlines.

Main rivers; 180 km^2 of water surface. The Rivers Rhine and Meuse flow from Germany and Belgium respectively, and constitute a network of dividing and joining river branches in the Netherlands. Traditional eel fisheries in the rivers have declined tremendously during the 20th century, but following water rehabilitation measures in the last decades, is now slowly increasing. The traditional fishery used stow nets for silver eel, but fyke net fisheries for yellow and silver eel now dominates. Individual fishermen are licensed for specific river stretches, where they execute the sole fishing right. No registration of efforts is required. There are 28 fishing companies, using an estimated number of 318 fixed fykes, 2433 train fykes, 551 eel boxes, and unknown quantities of other gears (electric dipnet, longlines, etc). This fishery has been almost completely stopped due to the introduction 1/4/2011 of a total fishing ban on eel and Chinese mitten crab in rivers polluted with dioxins. Since 1 April 2011 the eel fishery on the main rivers has been closed due to high levels of pollutants in eel (Fig. NL. 1).

Zeeland; 965 km^2. In the Southwest, the Rivers Rhine, Meuse and Scheldt (Belgium) discharge into the North Sea in a complicated network of river branches, lagoon-like waters and estuaries. Following a major storm catastrophe in 1953, most of these waters have been (partially) closed off from the North Sea, sometimes turning them into fresh water. Fishing is licensed to individual fishermen, mostly spatially restricted. Fishing gears are dominated by fyke nets. Management is partially based on marine, partly on fresh water legislation. There are 27 companies, using an estimated number of 174 fixed fykes, 233 train fykes, and unknown numbers of eel pots. This area has also been affected by the ban of eel and Chinese mitten crab fishery in the closed (dioxine)areas.

Remaining waters; inland 1340 km^2. This comprises 636 km^2 of lakes (average surface: 12.5 km^2); 386 km^2 of canals (> 6 m wide, 27,590 km total length); 289 km^2 of ditches (< 6 m wide, 144,605 km total length); and 28 km^2 of smaller rivers (all estimates based on areas less than 1 m above sea level, 55% of the total surface; see Tien and Dekker 2004 for details). Traditional fisheries are based on fyke netting and hook and line. Individual licenses permit fisheries in spatially restricted areas, usually comprising a few lakes or canal sections, and the joining ditches. Only the spatial limitation is registered. Eight small companies operating scattered along the North Sea coast have been added to this category. There are approx 100 companies, using unknown quantities of gears of all types.

The Water Framework Directive subdivides the Netherlands into 4 separate River Basin District, all of which extend beyond our borders. These are:

The *River Ems* (Eems), 53º20'N 7º10'E (=river mouth), shared with Germany. This RBD includes the north-eastern Province Groningen, and the eastern part of Province Drente. Drainage area: 18,000 km^2, of which 2,400 km^2 in the Netherlands.

The *River Rhine* (Rijn), 52º00'N 4º10'E, shared with Germany, Luxemburg, France, Switzerland, Austria, Liechtenstein. Drainage area: 185,000 km^2, of which 25,000 km^2 in the Netherlands, which is the major part of the country.

The *River Meuse* (Maas), 51º55'N 4º00'E, shared with Belgium, Luxemburg, France and Germany. Drainage area: 35,000 km^2 , of which 8,000 km^2 in the Netherlands.

The *River Scheldt* (Schelde), 51º30'N 3º25'E, shared with Belgium and France. Most of the south-western Province Zeeland used to belong to this RBD, but water reclamation has changed the situation dramatically. Drainage area: 22,000 km^2, of which 1,860 km^2 in the Netherlands.

Within the Netherlands, all rivers tend to intertwine and confluent. Rivers Rhine and Meuse have a complete anastomosis at several places, while a large part of the outflow of the River Meuse is now redirected through former outlets of the River Scheldt. Additionally, the coastal areas in front of the different RBDs constitute a confluent zone. Consequently, sharp boundaries between the RBDs cannot be made - neither on a practical nor on a juridical basis. This report will subdivide the national data on a pragmatic basis.
In the following, we will subdivide the national data on eel stock and fisheries by drainage area on a preliminary assumption that water surfaces and fishing companies are approximately equally distributed over the total surface, and thus, totals can be split up over RBDs proportionally to surface areas.

2.2 Dutch Eel Management Plan

The Ministry of Economic Affairs, Agriculture and Innovation (responsible for fisheries) has submitted an Eel Management Plan (MinLNV 2008); the initial version (December 2008) has been replaced by a second version (April 2009), which in turn has been replaced by a new decision in July 2009 (decision published 14 July 2009, approved by EU on 20 October 2010). Major elements of this plan are:
One single Eel Management Plan for the whole territory, including coastal areas. Target escapement for Lake IJsselmeer estimated at 3080 t (length structured model, auction statistics), for the whole country at 4000-6000 t (historical landings per surface area, 1950s data, recent surfaces). Following the initial version of the EMP, the calculations have been reviewed by a committee, and targets are now set at 2600-8100 t, “most probably lower than the previous” calculations. Current escapement is estimated at 400 t, half of which is silver eels from upstream, only passing through Dutch territory.
Fisheries for yellow and silver eel currently occurs in almost all waters, see previous section. Relative impact on the stock is unknown. Other mortalities are omnipresent, but unquantified. Minimum estimates (including fishing) are: 1000 t for yellow eel, and 345 t for silver eel. Restocking of approx 0.2 million individuals (mostly bootlace); future restocking of 1 – 1.6 t of glass eel is foreseen.

Management measures planned as follows:

- Reduction of mortality at pumping stations. Within the framework of the WFD, a budget of 200 M€ is available.
- The hydropower industry will be asked to reduce mortality by 35%. On new installations, a migration passage is obligatory.
- Fishery-free zones near barriers and sluices, presumably extending 500 m up- and downstream.
- Release of angler catches; this is a voluntary measure by the recreational fisheries.
- Ban on recreational fishing (a few fyke nets per person) in coastal areas from 2011.
- Stop on sniggle licenses in state owned waters.
- For the fishery, version 1 of the EMP set a closed season in Sept+Oct (yellow & silver eel, total ca. 50% of the annual catch).; version 2 decided to trap and transport 157 t of silver eels (of which 50 t from unpolluted waters) for release into the sea, but no closed season; and the July 2009 decision returns to a closed season (2009: Oct+Nov; 2010 onwards: Sept+Oct+Nov).

The time until recovery depends very much on the immigration of glass eels in the years to come. Assuming that glass eel recruitment will have recovered by 2027, the targets set for silver eel escapement will be met.

2.3 Time Series Data:

2.3.1 Recruitment Series and associated effort

2.3.1.1 Glass eel

2.3.1.1.1 Commercial
Glass eel fisheries is forbidden, NO AVAILABLE DATA

2.3.1.1.2 Recreational
Glass eel fisheries is forbidden, NO AVAILABLE DATA

2.3.1.1.3 Fishery Independent
Recruitment of glass eel in Dutch waters is monitored at Den Oever and 11 other sites along the coast (Figure NL. 2; see Dekker 2002 for a full description). In Den Oever (Figure NL. 3), 2011 recruitment was lower than 2010 and similar to levels observed during the first part of the decade. The data at the other sites (Figure NL. 3) confirm the overall trend, though individual series may deviate. Note that in contrast to previous years the glass eel data are presented simply as the average number of glass eels per haul in the months April and May.

Figure NL. 2 *Locations of glass eel monitoring in the Netherlands.*

Table NL. a *Average number of glass eel caught per lift net haul at the sluices in Den Oever in de period Arpil-May.*

Decade	1930	1940	1950	1960	1970	1980	1990	2000	2010
Year									
0		22.4	2.7	58.9	48.1	59.0	4.9	2.8	2.2
1		14.3	21.9	65.2	36.1	50.4	1.8	0.6	1.1
2		17.5	125.6	108.9	55.0	29.4	5.2	1.2	
3		13.7	21.1	123.7	18.8	14.7	3.5	1.3	
4		46.1	38.8	58.1	63.0	31.6	5.4	2.1	
5		NA	64.1	128.3	84.3	11.2	11.1	1.6	
6		7.5	16.1	34.0	51.4	11.4	12.5	0.6	
7		7.2	31.3	45.8	75.0	6.2	12.6	1.2	
8	15.3	4.8	124.0	32.9	73.6	7.0	2.4	0.5	
9	71.5	6.6	67.6	27.1	87.7	4.8	3.7	0.9	

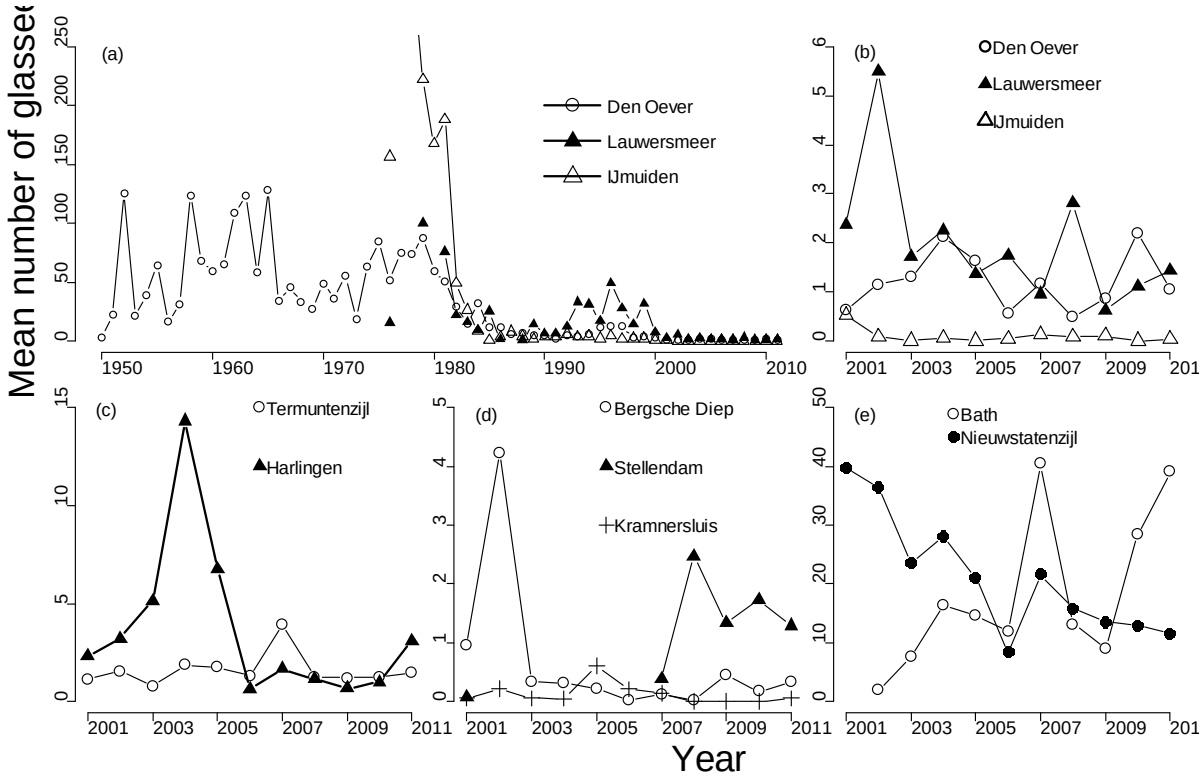

Figure NL. 3 *Trend indices (mean number per haul in April and May) of glass eel recruitment at different locations along the coast of the Netherlands.*

Table NL. b *Average number of glass eel caught per lift net haul in the period April-May at 12 sites in the Netherlands. If 5 or less hauls were conducted it was recorded as NA. * = very early season (warm spring), sampling stopped early (start of May), low number of empty samples. ** = sampling took place in part of the season.*

	Otheense Kreek	Bath	Krammersluis	Bergsche Diep	Stellendam	Katwijk	Ijmuiden	Den Oever (schiplock)	Harlingen	Lauwersmeer	Nieuwstaten-zijl	Termunten-zijl
RBD	Scheldt	Scheldt	Meuse	Meuse	Meuse	Rhine	Rhine	Rhine	Rhine	Rhine	Ems	Ems
1969	NA	NA	NA	NA	NA	NA	50.8	NA	NA	NA	NA	NA
1970	NA	NA	NA	NA	NA	NA	28.0	NA	NA	NA	NA	NA
1971	NA	NA	NA	NA	18.4	NA	NA	NA	NA	NA	NA	NA
1972	NA	NA	NA	NA	5.6	NA	NA	NA	NA	NA	NA	NA
1973	NA	NA	NA	NA	NA	NA	30.7	NA	NA	NA	NA	NA
1974	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1975	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1976	NA	NA	NA	NA	NA	NA	156.6	NA	NA	15.4	NA	NA
1977	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1978	NA	NA	NA	NA	NA	NA	332.4	NA	NA	NA	NA	NA
1979	NA	NA	NA	NA	NA	NA	222.3	NA	NA	100.4	NA	NA
1980	NA	NA	NA	NA	NA	NA	168.0	NA	NA	NA	NA	NA
1981	NA	NA	NA	NA	NA	NA	188.7	NA	NA	75.9	NA	NA
1982	NA	NA	NA	NA	NA	NA	49.2	NA	NA	21.6	NA	NA
1983	NA	NA	NA	NA	NA	NA	26.2	NA	NA	15.8	NA	NA
1984	NA	NA	NA	NA	NA	NA	8.1	NA	NA	9.5	NA	NA
1985	NA	NA	NA	NA	NA	NA	0.6	NA	NA	25.2	NA	NA
1986	NA	NA	NA	NA	NA	NA	3.3	NA	NA	1.3	NA	NA
1987	NA	NA	NA	NA	NA	NA	7.7	NA	NA	NA	NA	NA
1988	NA	NA	NA	NA	13.8	NA	4.0	NA	NA	1.0	NA	NA
1989	NA	NA	NA	NA	4.4	NA	1.5	NA	NA	14.3	NA	NA
1990	0.3	NA	0.3	NA	10.9	NA	3.2	NA	NA	6.0	NA	NA
1991	0.0	NA	0.2	1.3	3.1	5.1	3.6	NA	NA	6.6	NA	0.5
1992	0.0	14.5	0.4	2.2	16.9	8.1	5.8	NA	16.7	12.1	NA	0.6
1993	0.0	22.7	0.4	NA	10.1	13.5	3.3	NA	NA	33.2	NA	1.2
1994	0.0	14.2	0.5	NA	4.0	15.1	4.0	NA	16.0	31.0	NA	2.8
1995	0.5	17.8	0.4	NA	3.3	29.7	2.0	34.7	6.6	16.9	NA	3.7
1996	1.2	35.3	0.7	NA	0.5	25.3	4.5	11.0	34.2	49.4	27.5	7.7
1997	NA	41.6	0.6	NA	2.8	12.3	1.8	11.4	14.0	27.8	30.0	15.6
1998	0.7	28.2	0.6	NA	1.0	38.8	2.0	6.5	18.3	14.4	21.8	1.4
1999	1.4	29.7	0.5	NA	1.2	122.7	1.9	7.2	19.1	31.7	13.5	10.1
2000	0.8	10.2	1.0	3.8	7.1	11.6	0.7	5.0	2.9	7.2	38.8	8.7
2001	0.4	NA	0.1	0.1	1.0	14.1	0.5	1.7	2.3	2.4	39.7	1.1
2002	NA	1.9	0.2	NA	4.2	12.3	0.1	1.4	3.2	5.5	36.4	1.6
2003	NA	7.5	0.1	NA	0.3	12.7	0.0	4.7	5.1	1.7	23.6	0.8
2004	0.0	16.4**	0.0	NA	0.3	4.5	0.1	NA	14.3**	2.3	28.1	1.9
2005	0.0	14.6	0.6	NA	0.2	5.6	0.0	NA	6.8	1.4	21.1	1.8
2006	0.0	12.0	0.2	NA	0.0	1.4	0.0	0.28	0.6	1.7	8.3	1.3
2007*	0.0	40.5	0.1	0.4	0.1	24.8	0.1	0	1.7	1.0	21.7	4.0
2008	0.0	13.2	0.0	2.5	0.0	4.1	0.1	0.76	1.1	2.8	15.9	1.3
2009	0.0	9.1	0.0	1.3	0.4	3.5	0.1	NA	0.7	0.6	13.6	1.2
2010	NA	28.4	0.0	1.7	0.2	NA	0.0	1.19	1.0	1.1	13.0	1.2
2011	NA	39.2	0.1	1.3	0.3	NA	0.0	NA	3.1	1.4	11.6	1.4

2.3.1.2 Yellow Eel Recruitment

2.3.1.2.1 Commercial
NO AVAILABLE DATA

2.3.1.2.2 Recreational
NO AVAILABLE DATA

2.3.1.2.3 Fishery Independent
At various places in the Netherlands, facilities have been built to allow glass eel and yellow eel to migrate through or over dykes and sluices. Some of these places monitor the quantities of eel being caught and transported, but these data series are currently too short to be used as time series. There is one noticeable exception: for the eel trap at pumping station Stroink in Vollenhove (52º42'16N 5º28'22E), records have been kept since the late 1950s, but unfortunately, the data prior to 1976 have been lost. Unfortunately no data are available for 2010, check WGEEL 2010 Country Report The Netherlands for further information.
One of the few long time series for yellow eel is the fyke monitoring at NIOZ (Den Burg, Texel). This data set shows a familiar pattern of a steep decline in abundance since the 1980s.

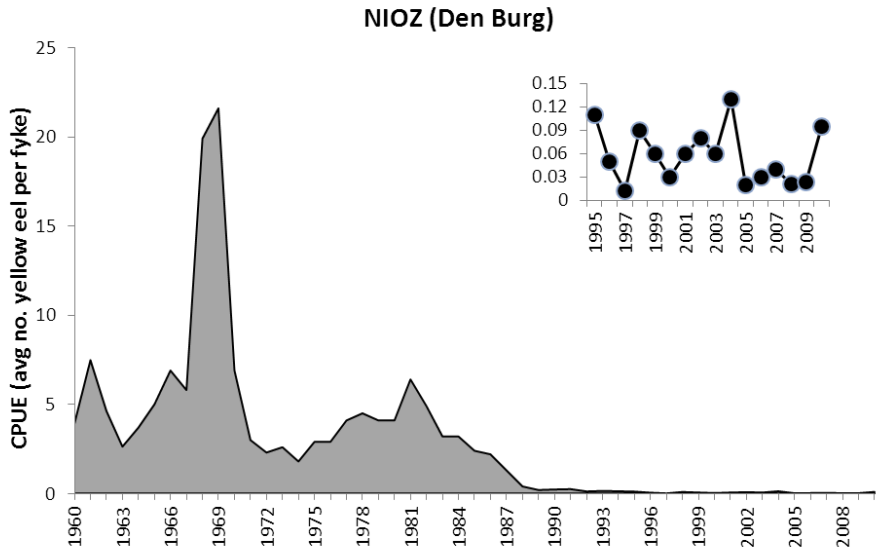

Figure NL. 4 *Time series of the mean catch per fyke (numbers) of yellow eel at NIOZ (data from Van der Meer, in prep.).*

2.3.2 Yellow Eel Landings

2.3.2.1 Commercial
No reliable long term time series of yellow eel landing exist; total landings of yellow and silver eel combined, have been reported. However, data from auctions around Lake IJsselmeer did report yellow and silver eel separately, but information in recent years (early 1990s onwards) is unreliable: yellow eel from eel boxes and silver eel from all gears have been combined; see section NL.6.2.1 for details. An obligatory catch registration system was introduced in the Netherlands in January 2010 by the Ministry of Economic Affairs, Agriculture, Innovation. However, weekly catches of eel are reported but yellow eel and silver eel catches are combined in this program and no information on effort and gears is reported.

2.3.2.2 Recreational
NO AVAILABLE DATA

2.3.3 Silver Eel Landings

2.3.3.1 Commercial
No reliable long term time series of yellow eel landing exist; total landings of yellow and silver eel combined, have been reported. However, data from auctions around Lake IJsselmeer did report yellow and silver eel separately, but information in recent years (early 1990s onwards) is unreliable: yellow eel from eel boxes and silver eel from all gears have been combined; see section NL.2.6.2.1 for details. An obligatory catch registration system was introduced in the Netherlands in January 2010 by the Ministry of Economic Affairs, Agriculture and Innovation. However, weekly catches of eel are reported but yellow eel and silver eel catches are combined in this program and no information on effort and gears is reported.

2.3.3.2 Recreational
NO AVAILABLE DATA

2.3.4 Aquaculture Production

2.3.4.1 Seed supply

Table NL. c *Origin of glass eel used for aquaculture in the Netherlands in 2011 (Source DUPAN*)

Season	France	Spain	England	Total (kg)
2010/2011	4725	1890	135	6750

2.3.4.2 Production

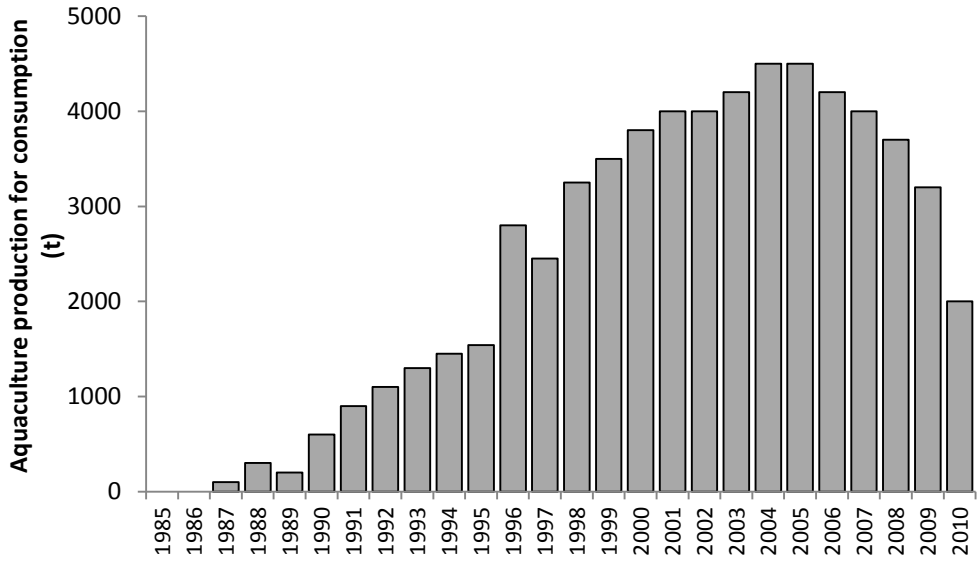

Figure NL. 5 *Trend in aquaculture production for consumption in the Netherlands (Source DUPAN*).

2.3.5 Stocking

2.3.5.1 Amount Stocked

Glass eel and young yellow eel are used for re-stocking inland waters since time immemorial, mostly by local action of stakeholders. Although a minimum legal size for capture, holding and transport of eels is set in a byelaw, the existing practice of short-range transports has never been prosecuted. Since World War II, the Organisation for the Improvement of Inland Fisheries OVB has organized a re-stocking programme, importing glass eels from France and England, and buying yellow eel from commercial fishermen fishing in the Waddensea. Data on re-stocking quantities in 2011 are listed in Table NL.d.
In recent years, the OVB has merged with the major anglers organisation, and subsequently handed over the glass eel importing to the Organisation of Professional Fishermen CvB. Information on recent glass eel imports was made available by the CvB. Restocking of young eel is no longer organised centrally, although trade of small eels (undersized) still occurs. The listed estimates are probably a minimum, not including unregistered trade. Since the government does not keep track of imports and re-stockings anymore, it is not known anymore to what extend re-stocking has been practiced by other parties. In 2011, more than ~0.8 million glass eels and ~0.95 million yellow eels have been re-stocked by some parties.
In the earlier decades, young yellow eels were derived from fisheries for wild eel in the Wadden Sea; in recent years, the catches in the Wadden Sea have dropped to almost nothing, and young yellow eels are derived from the aquaculture industry, i.e. eels derived from imported glass eel (England, France).

Table NL. d *Overview of glass eel and young yellow eel stocked in the Netherlands in 2011 (Source CvB, DUPAN). Note that all young yellow eel stocked in 2011 originated from glass eel caught in France and England in 2011 and 2010*.

Date	Stocking Location	Type	Origin	Kg	#/kg	#
27/4/2011	Veluwe Randmeer (Harderwijk)	Glass eel	France	113	3,000	339,000
16/5/2011	Veluwe Randmeer (Harderwijk)	Glass eel	England	51	3,730	190,230
27/4/2011	Friesland	Glass eel	England	20	3,420	68,400
27/4/2011	Westeinderplas	Glass eel	England	3	3,420	10,260
27/4/2011	Stichtse-Ankeveense plassen	Glass eel	England	14	3,420	47,880
27/4/2011	Noord-West Overijssel	Glass eel	England	28	3,420	95,760
27/4/2011	Krommenie (Noord-Holland)	Glass eel	England	3	3,420	10,260
27/4/2011	Hoorn (Noord-Holland)	Glass eel	England	2	3,420	6,840
?	?	Glass eel	?	10	3,000	30,000
			TOTAL	244		798,630
16/6/2011	Zuidelijke Randmeer (Almere)	Young yellow eel	Denmark	323	196	63,308
16/6/2011	Zuidelijke Randmeer (Almere)	Young yellow eel	St Anthonis (NL)	517	179	92,543
16/6/2011	Zuidelijke Randmeer (Spakenburg)	Young yellow eel	Nijvis (NL)	555	455	252,376
?	Kampen	Young yellow eel	Nijvis (NL)	1,500	100	150,000
?	Alkmaardermeer	Young yellow eel	?	500	100	50,000
?	Markiezaatsmeer	Young yellow eel	?	1,000	100	100,000
?	Veluwe Randmeer	Young yellow eel	St Anthonis (NL)	1,400	133	186,667
?	Westeinderplas	Young yellow eel	?	200	100	20,000
?	Friesland	Young yellow eel	?	125	100	12,500
?	Noord-Holland	Young yellow eel	?	175	100	17,500

?	Reeuwijkse Plassen	Young yellow eel	Kraan	100	400	40,000
?	Lemster Brekken	Young yellow eel	Kraan	50	225	11,250
			TOTAL	6,445		996,293
?		Young yellow eel	Nijvis (NL)			350,000
	Duitsland			?	?	0

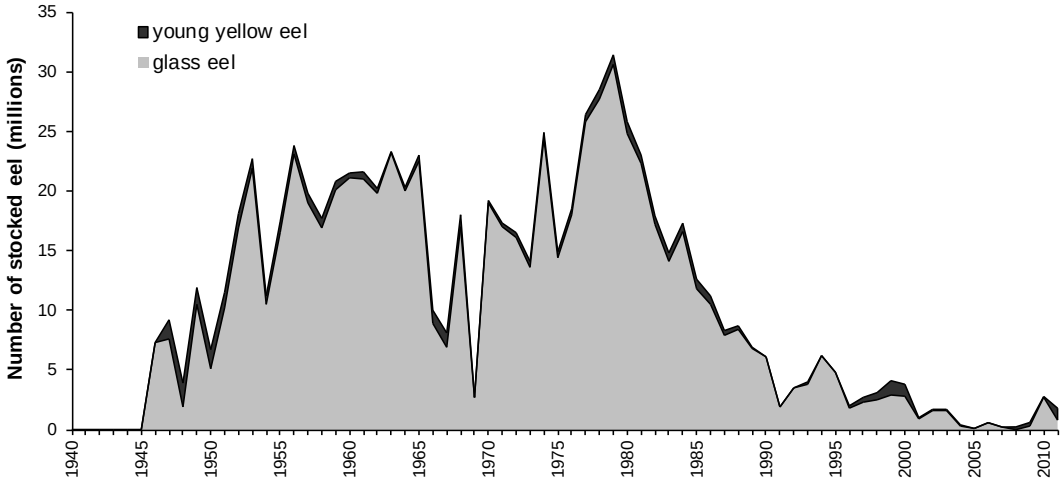

Figure NL. 6 *Overview of glass eel and young yellow eel stocking in the Netherlands*.

2.3.5.2 Catch of Eel <12 cm and proportion retained for restocking
Catch and retain of eels < 28 cm is illegal. There is no organised trap and transport of undersized eels.

2.4 Fishing capacity:

For marine waters and Lake IJsselmeer, a register of ships is kept, but for the other waters, no central registration of the ships being used is available. Registration of the number of gears owned or employed is lacking. For Lake IJsselmeer, a maximum number of gears per company is enforced (authenticated tags are attached to individual gears), but the actual usage is often much lower, amongst others since restrictions apply on the combinations of types of fishing gears (e.g. no fyke nets and gill nets should be operated concurrently, since perch and pikeperch are the target species of the gill netting, while landing perch and pikeperch from fyke nets is prohibited).

2.5 Fishing effort:

For most of the country, fishing capacity is unknown. In areas where fishing capacity is known, no record is kept of the actual usage of fishing gears. Consequently, no information is available on fishing effort. For Lake IJsselmeer, an estimate of the number of gears actually used is available for the years 1970-1988 (Dekker 1991). In the mid 1980s, the number of fyke nets was capped, and reduced by 40 % in 1989. In 1992, the number of eel boxes was counted, and capped. Subsequently, the caps have been lowered further in several steps, the latest being a buy-out in 2006. Since the number of companies has reduced at the same time, the nominal fishing effort per company has not reduced at the same rate, and

underutilisation of the nominal effort probably still exists. The effort in the longline fishery is not restricted, other than by the number of licenses.

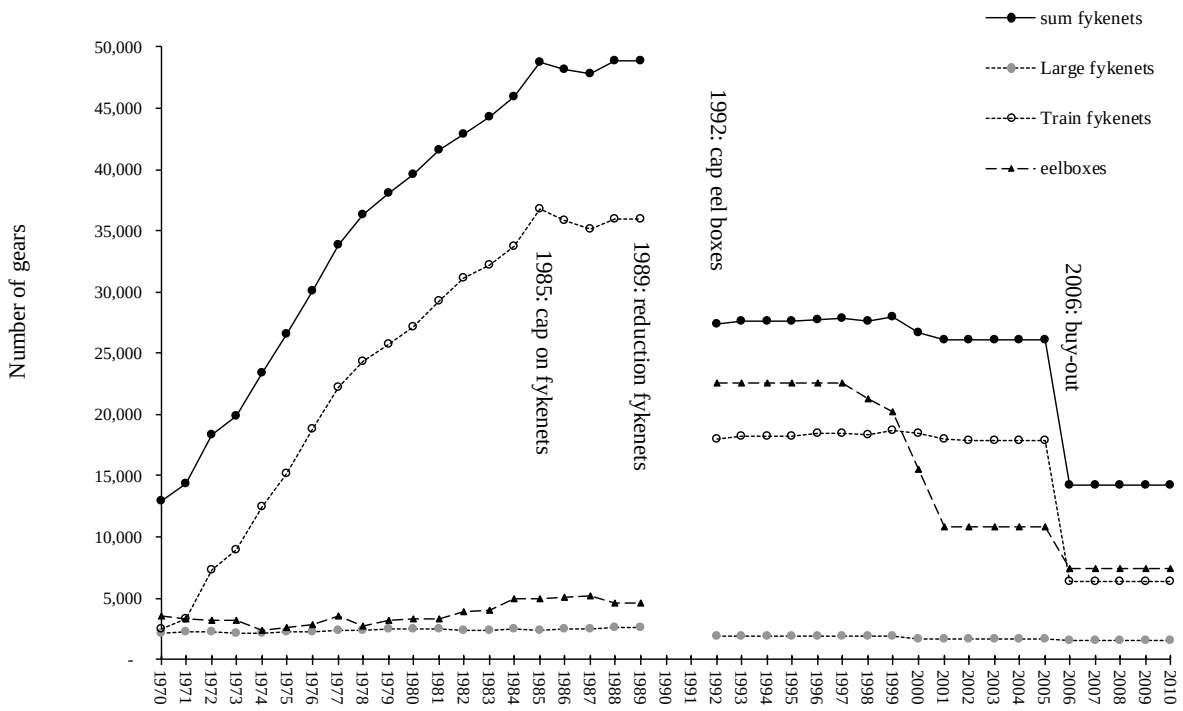

Figure NL. 7 *Trends in the nominal number of fishing gear employed in the eel fishery on Lake IJsselmeer. Information before 1989 is based on a voluntary inquiry in 1989 (Dekker 1991); after 1992, the licensed number of gear is shown. The reduction in-between is realistic.*

The Ministry of Economic Affairs, Agriculture and Innovation is currently conducting a survey of eel fishing gears used in 2010. In 2012 information on fishing effort will be added to the obligatory catch registration system of the Ministry.

2.6 Catches and Landings:

2.6.1 Glass Eel

Glass eel fishing is forbidden, no available data.

2.6.2 Yellow Eel

2.6.2.1 Catches and Landings from Lake IJsselmeer

For Lake IJsselmeer, statistics from the auctions around Lake IJsselmeer are now kept by the Fish Board (Table NL.e); before 1994, the government kept statistics. These statistics are broken down by species, month, harbour and main fishing gear; the quality of this information has deteriorated considerably over the past decade, due to misclassification of gears, and the trading of eel from other areas at IJsselmeer

auctions. For example, the estimates for the total number of eel caught in Lake IJsselmeer in 2010 vary from 117 t (registration Min EL&I), 79 t (PO IJsslmeer) to 65 t (Fish Board).

Table NL. e *Landings in tons per year, from the auctions around Lake IJsselmeer, Rhine RBD. Only landings recorded at the auctions are included; other landings are assumed to represent a minor and constant fraction. Figures in italics are suspect, due to misclassification of catches and trade from areas outside Lake IJsselmeer at the IJsselmeer auctions*.

Decade	1900	1910	1920	1930	1940	1950	1960	1970	1980	1990	2000	2010
Year												
0	324	620	1157	838	3205	4152	2999	1112	641	472	368	65
1	387	988	989	941	4563	3661	2460	853	701	573	381	
2	514	720	900	1048	3464	3979	1443	857	820	548	353	
3	564	679	742	2125	1021	3107	1618	823	914	293	279	
4	586	921	846	2688	1845	2085	2068	841	681	330	245	
5	415	1285	965	1907	2668	1651	2309	1000	666	354	234	
6	406	973	879	2405	3492	1817	2339	1172	729	301	230	
7	526	1280	763	3595	4502	2510	2484	783	512	285	130	
8	453	1111	877	2588	4750	2677	2222	719	437	323	122	
9	516	1026	1033	2108	3873	3412	2241	510	525	332	42	

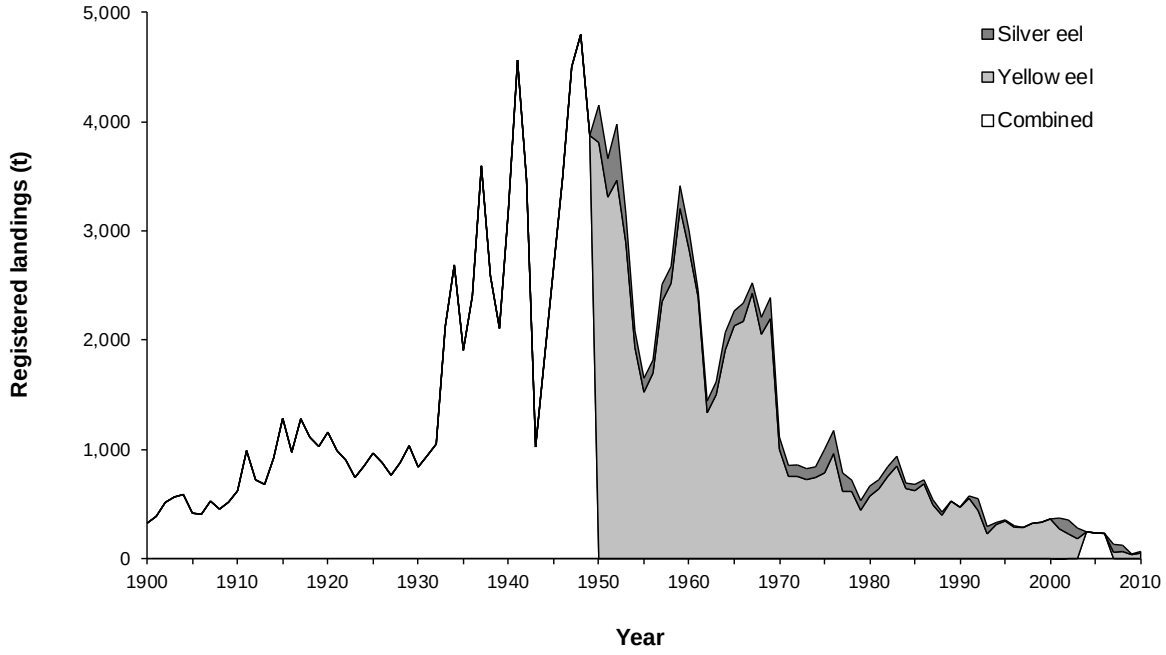

Figure NL. 8 *Time trend in the landings from Lake IJsselmeer*.

2.6.2.2 Catches and Landings inland waters

For the inland areas outside Lake IJsselmeer, no detailed records of catches and landings were available until 2010. In January 2010 the Ministry of Economic Affairs, Agriculture and Innovation introduced an obligatory catch recording system for inland eel fishers (IJsselmeer and Rivers). Fishermen are required to report their weekly eel catches for each of the 43 so-called Fish Stock Management Committees ['Visstand Beheer Commissies' VBC].

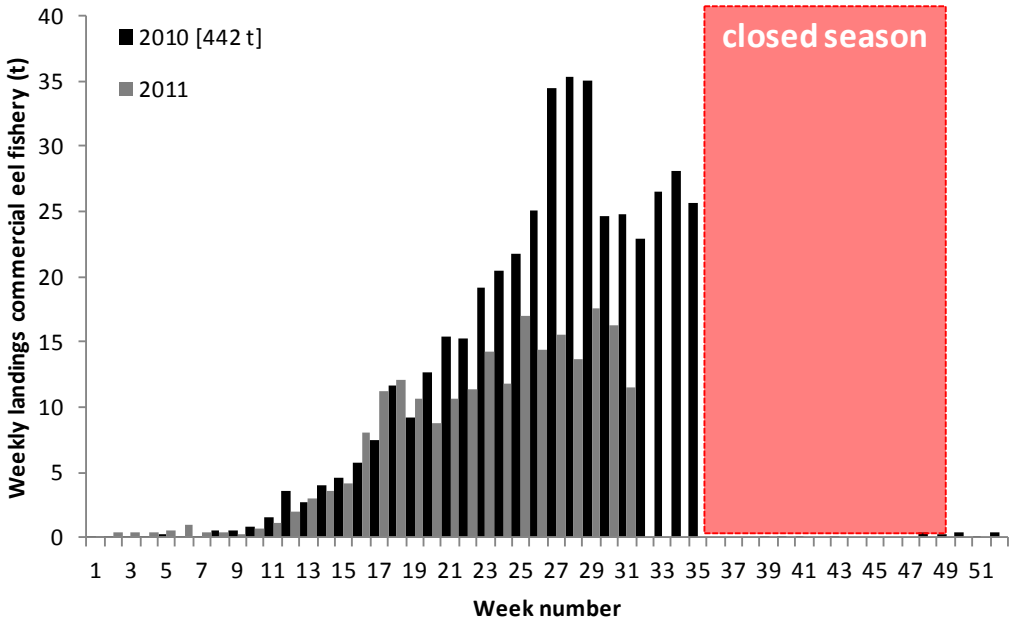

Figure NL. 9 *Weekly catches in tons of eel (yellow + silver eel combined) by inland fishermen.*

2.6.2.3 Recreational fisheries

In 2009 an extensive Recreation Fisheries Program was started in the Netherland. In December 2009 50.000 households were approached during the screening survey to determine the number of recreational fishermen in the Netherlands (result 1.69 million recreational fishermen). In 2010, 2000 recreational fishermen were selected for a 12-month logbook programme (Mar 2010 – Feb 2011). Preliminary results of the logbook program indicate that in the Netherlands around ~1.500.000 eels (~200 t) are caught while 553.000 eels (114 t) are retained by anglers.

2.6.3 Silver Eel

See 2.6.2 Yellow Eel.

2.6.4 Marine Fishery

Catches and landings in marine waters are registered in EU logbooks, but these do not allow for a break down by RBD. Registrations are available for the years since 1995; data prior to 1984 are presented in the 2009 Country Report. Until 2001, vessels with a total length (LOA) ≥ 15 m were obliged to report all their eel catches. This obligations did not apply to smaller vessels. From 2001 onwards, vessels with a total length ≥ 10 m are obliged to report their eel catches, if their landings per day exceeded 50 kg. That is: in 2001 the number of ships potentially reporting rose, but the actual reporting per ship declined. This change in the regulations was partly driven by changing practices, and vice versa. In practice, the abrupt change in the regulations in 2001 led to a gradually changing reporting practice. Overall, the number of ships reporting in a year declined from 130 before 2001 to 59 thereafter, while the average landing per ship increased from ~230 kg/ship/year before 2001 to ~436 kg/ship/year thereafter.

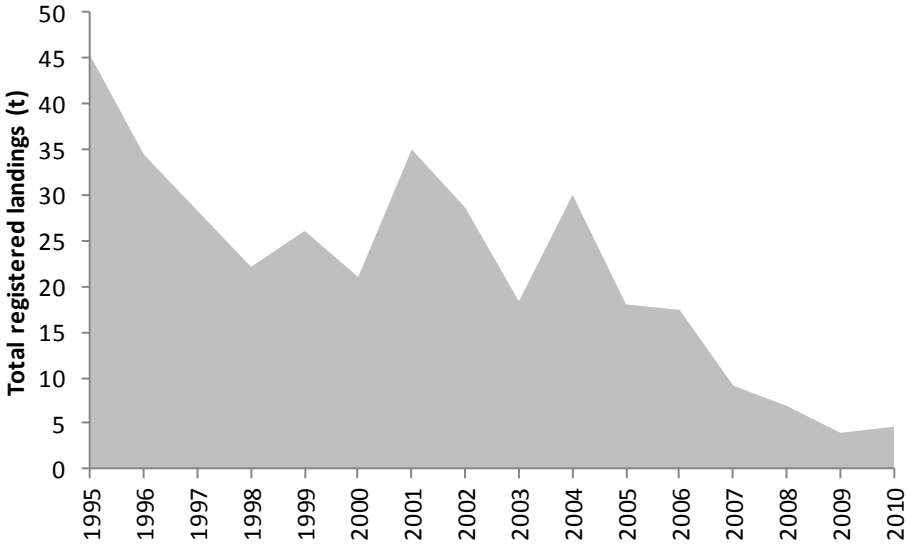

Figure NL. 10 *Time trend in the total registered landings from marine waters in Dutch harbours.*

2.7 Catch per Unit of Effort:

No data on CPUE are available in the Netherlands.

2.8 Other Anthropogenic Impacts:

Nothing to report under this heading.

2.9 Scientific surveys of the stock:

2.9.1 Recruitment surveys, glass eel

See 2.3.1.1.3

2.9.2 Stock surveys, (yellow) eel

2.9.2.1 Lake IJsselmeer (active gear)

Figure NL. 11 presents the trends in CPUE for the annual (yellow) eel surveys in Lake IJsselmeer (25 sites) and Lake Markermeer (15 sites), using the electrified trawl.

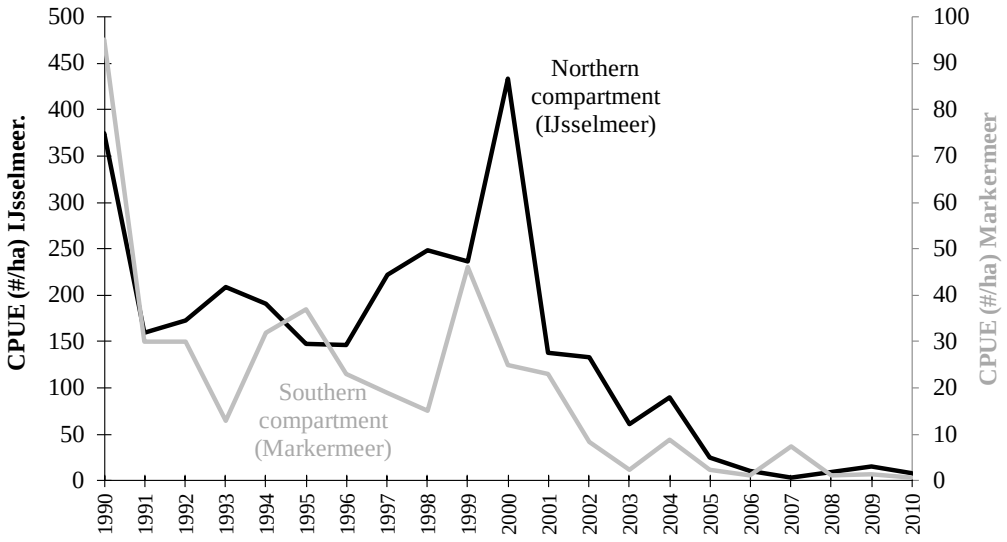

Figure NL. 11 *CPUE trends in Lake IJsselmeer stock surveys, in number per hectare swept area, using the electrified trawl. Note: The northern and southern compartments are separated by a dyke*.

2.9.2.2 Main Rivers (active gears)

Eel stocks in the main rivers are surveyed yearly since 1998. Within a river, the main stream is sampled with a beam trawl and the river banks are sampled with an electric dipnet. Data is collected annually in eleven river systems, which are clustered in six regions. In Fig. NL.12, data is presented for three regions, namely Downstream (consisting of Hollands Diep, Nieuwe Merwede and Oude Maas), Gelderse Poort (consisting of the upstream section of the Rhine, Waal, Nederrijn and Gelderse IJssel, near the German border) and the Grensmaas (a shallow, upstream section of the Maas, near the Belgian border). Downstream is surveyed in September/October (i.e., during the migratory period of the silver eel), Gelderse Poort in March/April, and Grensmaas in May.

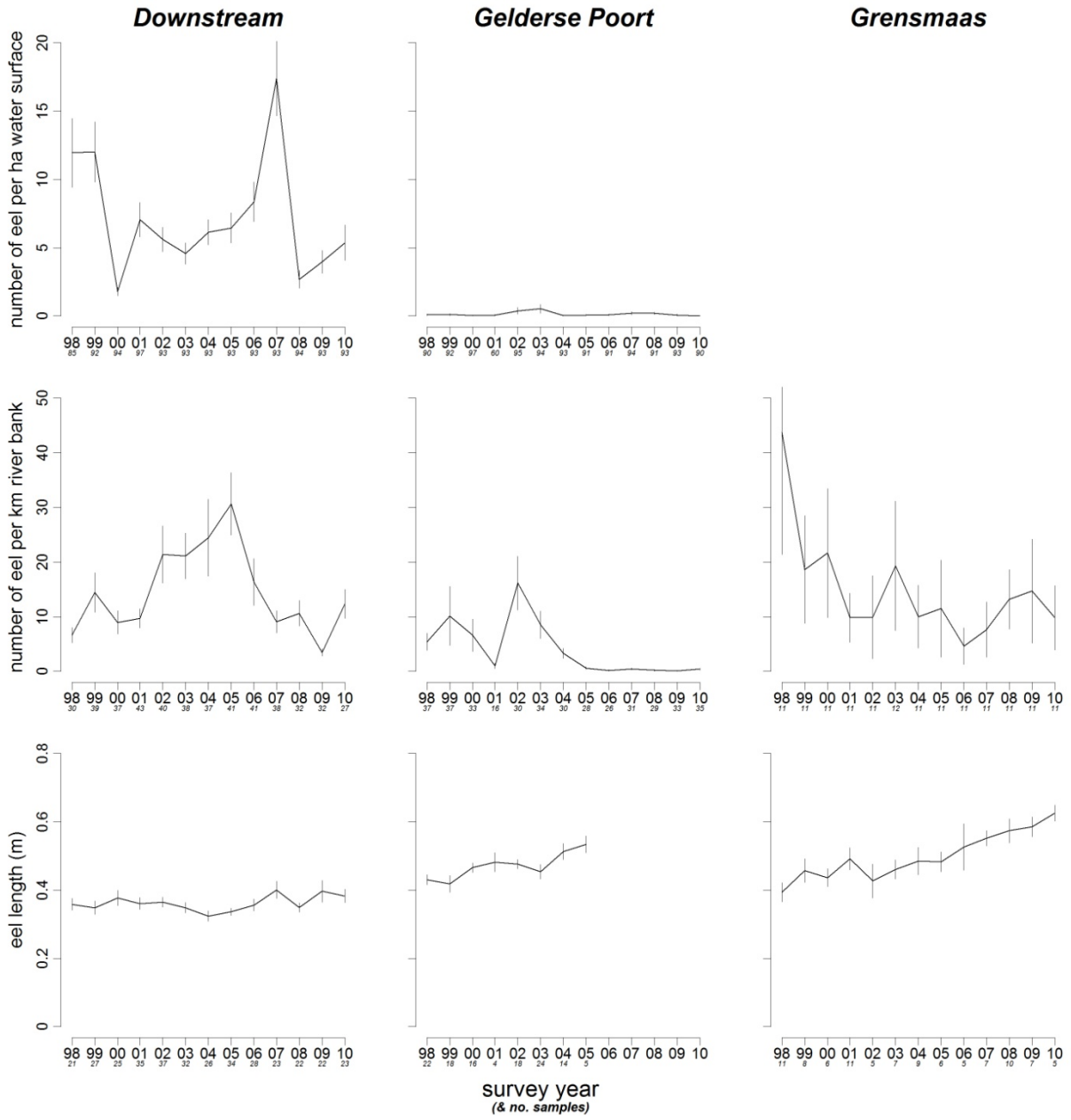

Figure NL. 12 *Eel stock survey in downstream and upstream (Gelderse Poort; Grensmaas) the main rivers; densities with beam trawl (top graphs), densities with electrofishing (middle graphs) and average length (bottom graphs*).

For the downstream region, Figure NL. 12 shows high densities of eel, both in the main stream and the river bank. In this region, no trend seems present through the years, in either abundance or length. The upstream location of the Gelderse Poort has very low densities of eel in the main stream, and strongly declining densities in the river banks, with almost no eel detected in the last four years. Also, the average length in the Gelderse Poort seems to increase, for the years in which enough data are available. The trend in the Grensmaas seems to be similar to that in the Gelderse Poort, with decreasing densities and increasing average length.
These data suggest that in the upstream regions the abundance of eel is decreasing while the average length is increasing, which could imply a declining recruitment of young eel in the upstream regions.

2.9.2.3 Main rivers (passive gear)

Starting in 1993, the fish assemblage in the main rivers and linked waters has been monitored, by means of logbook registration of commercial catch and by-catch, in a restricted number of fyke nets (4 large fyke nets or 2 pairs of summer fyke nets per location), mostly on a weekly basis. For eel, the number of yellow eels and silver eels caught is recorded. Results show a slowly declining trend over the years in the main rivers, but the year-to-year and site-to-site variation is considerable. The closed season (Aug-Oct) since 2009 and especially the closing of the fishery in the dioxine areas (indicated blue in Fig. NL. 13) caused an interruption of this time series.

Figure NL. 13 *Sampling sites for ACTMON and PASMON (4-fyke monitoring of commercial catches and by-catch).*

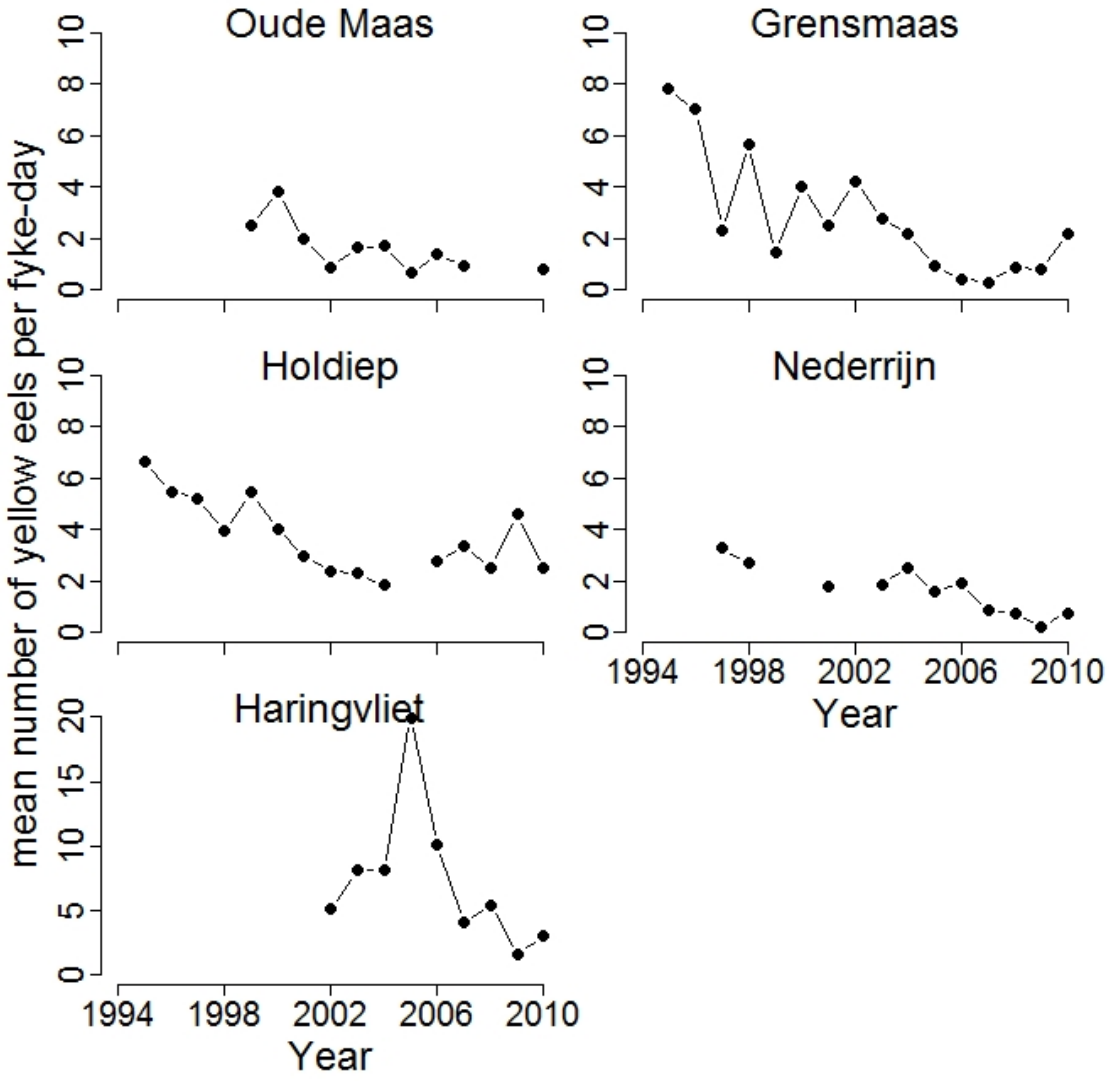

Figure NL. 14 *Mean number of yellow eel per fyke day in the lower and upper reaches of the rivers Meuse and Rhine in the Netherland*.

2.9.2.4 Coastal waters

No update of the Demersal Fish Survey available.

2.9.3 Silver eel

There are no routine surveys for silver eel in the Netherlands. Ad hoc estimates based on tagging and/or transponder experiments are available from:

- Klein Breteler, J., Vriese, T., Borcherding, J., Breukelaar, A., Jörgensen, L., Staas, S., de Laak, G., and Ingendahl, D. 2007. Assessment of population size and migration routes of silver eel in the River Rhine based on a 2-year combined mark-recapture and telemetry study. – ICES Journal of Marine Science, 64: 1–7.
- Winter, H. V., Jansen, H. M., and Breukelaar, A. W. 2007. Silver eel mortality during downstream migration in the River Meuse, from a population perspective. – ICES Journal of Marine Science, 64(7):1444-1449.

A Silver Eel Index is currently being designed and is expected to be implemented in the autumn of 2012.

2.10 Catch composition by age and length:

2.10.1 Biological composition of eel catches in the Netherlands

In 2009 and 2010, a pilot market sampling survey has been conducted of Dutch eel catches in two areas in The Netherlands: Friesland (fisheries in polders and lakes) and downstream areas of the Rhine and Meuse. From 2011, eel catches will be sampled in all areas of the Netherlands. Estimated numbers at length by sex, maturity at length by sex and weight at length by sex are given in Tables NL. f (downstream areas of Rhine and Meuse) and table NL. g (Friesland). Estimates of numbers of eels are expressed as numbers of individuals per metric ton of commercial eel catches.

Tabel NL. f *Estimated numbers at age by sex, maturity at age by sex and mean weight at age by sex, in commercial eel catches in downstream areas of the Rhine and Meuse. Estimates of numbers of eels are expressed as numbers of individuals per metric ton of commercial eel catches*.

Length-interval		Numbers of eels		Proportion in Silver eel stage		Mean weight (gram)	
From (cm)	To (cm)	Male	Female	Male	Female	Male	Female
150	200	1.2	0.4	0	0	4.59	4.85
200	250	8.7	5.0	0	0	15.57	15.15
250	300	114.7	110.6	0	0	39.21	33.42
300	350	278.7	451.2	0.08	0	67.17	61.34
350	400	260.7	763.5	0.18	0.014	100.93	99.10
400	450	118.2	810.4	0.29	0.024	133.34	147.90
450	500	0.0	640.3	0.61	0.039	219.10	206.46
500	550	0.0	556.8		0.059		266.81
550	600	0.0	351.3		0.121		401.70
600	650	0.0	209.4		0.168		482.96
650	700	0.0	106.2		0.266		627.16
700	750	0.0	58.4		0.381		781.10
750	800	0.0	20.5		0.541		1003.37
800	850	0.0	9.1		0.639		1162.05
850	900	0.0	6.8		0.774		1457.17
900	950	0.0	2.3		0.843		1682.50
950	1000	0.0	0.8		0.843		1682.50
1000	1050	0.0	0.0				

Table NL. g. *Estimated numbers at age by sex, maturity at age by sex and mean weight at age by sex, in commercial eel catches in Friesland. Estimates of numbers of eels are expressed as numbers of individuals per metric ton of commercial eel catches.*

Length-interval		Numbers of eels		Proportion in Silver eel stage		Mean weight (gram)	
From (cm)	To (cm)	Male	Female	Male	Female	Male	Female
150	200	0	0				
200	250	0	0				
250	300	13.76	13.27	0.03	0	39.21	33.42
300	350	82.74	133.95	0.08	0	67.17	61.34
350	400	174.07	509.78	0.18	0.014	100.93	99.10
400	450	81.35	557.81	0.29	0.024	133.34	147.90
450	500	0	507.17		0.039	219.10	206.46
500	550	0	453.65		0.059		266.81
550	600	0	365.31		0.121		401.70
600	650	0	228.12		0.168		482.96
650	700	0	163.17		0.266		627.16
700	750	0	108.09		0.381		781.10
750	800	0	61.32		0.541		1003.37
800	850	0	35.86		0.639		1162.05
850	900	0	10.39		0.774		1457.17
900	950	0	8.31		0.843		1682.50
950	1000	0	0		0.843		1682.50
1000	1050	0	0.52				

2.11 Other biological sampling:

2.11.1 Length & Weight & Growth (DCF)

The following biological parameters for the Dutch eel stock (downstream areas Rhine and Meuse) have been estimated using measurements on eels collected from the market sampling scheme (sampling of commercial catches):
Ages of individual eels: determination of growth curves (Figures NL. 15 and NL. 16).
Maturity stage frequency-at-length (Figure NL. 17.
Sex-ratio at-length (Figure NL. 18).
A Length-Weight relationship by sex (Figure NL. 19).

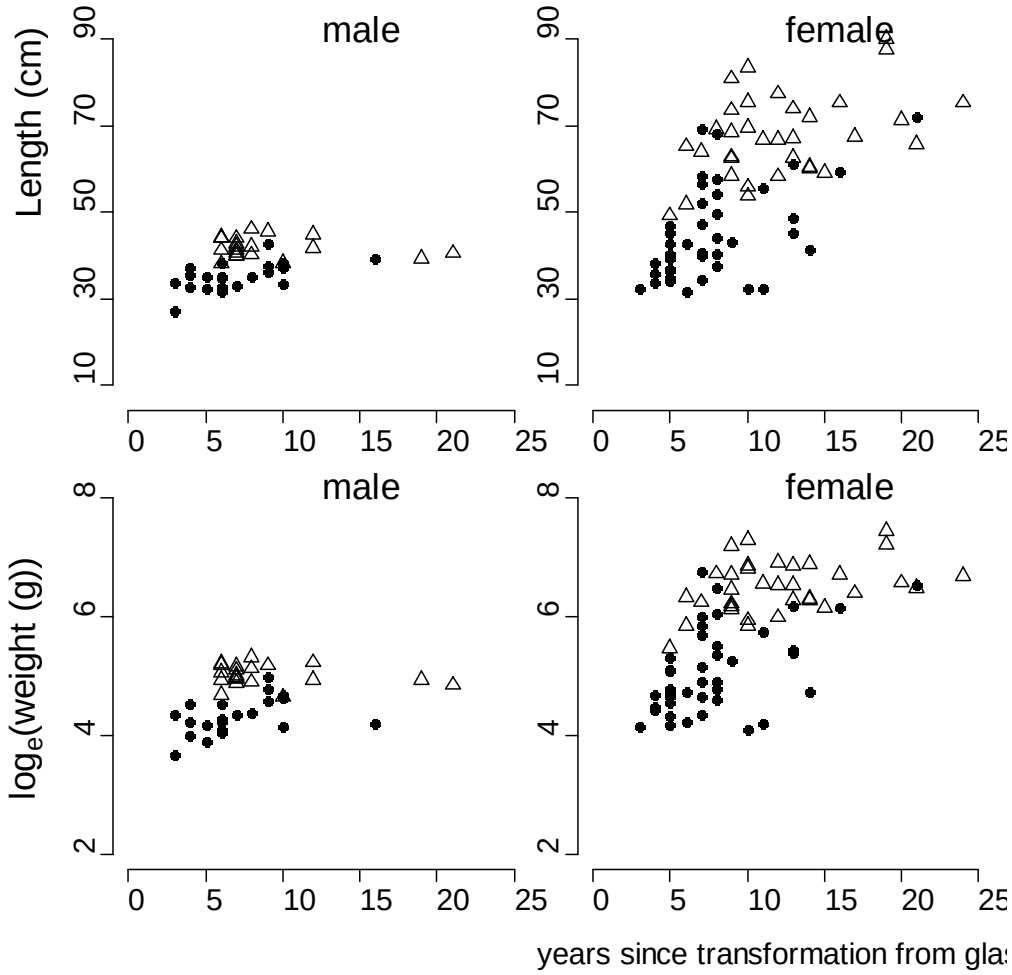

Figure NL. 15 *Length-at-age and weight-at-age by sex. Open triangles: silver eels, closed circles: yellow eels (downstream areas Rhine and Meuse).*

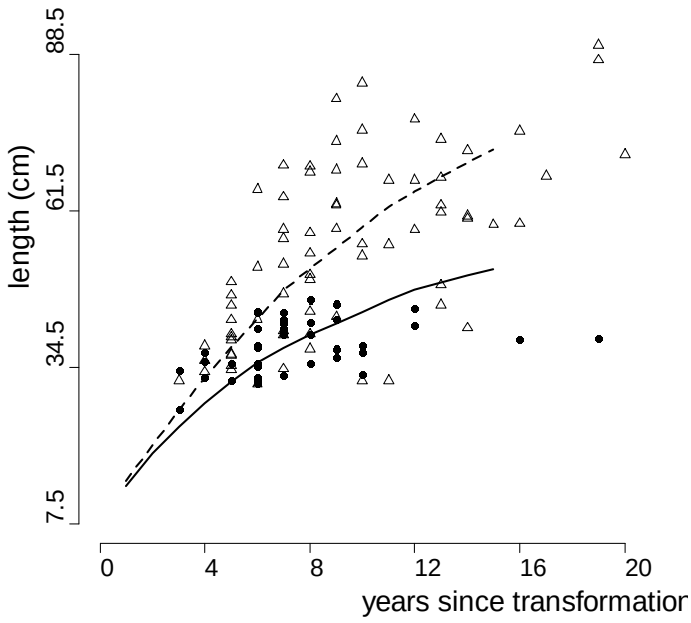

Figure NL. 16 *Estimated average growth curves for eels in The Netherlands. Closed circles and solid line: males; Open triangles and segmented line: females.*

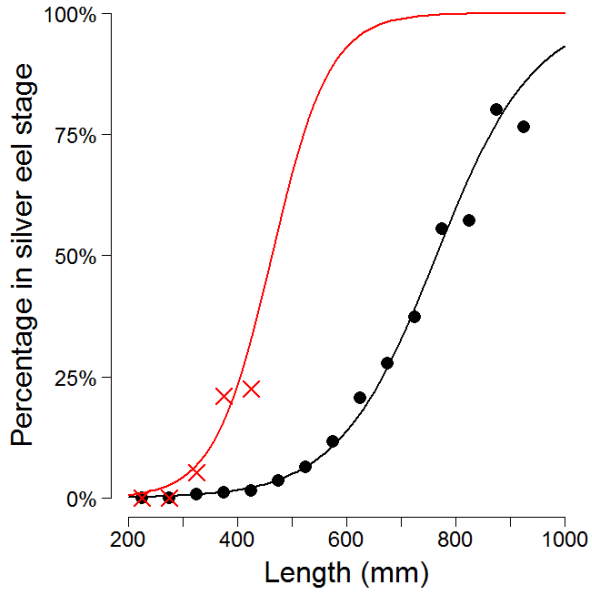

Figure NL. 17 *Maturity-at-length. Symbols: observed proportions in the silver eel stage per 50 mm length-class. Lines: predicted relationship between length and proportion mature (logistic relationship). Black line: females; red line: males.*

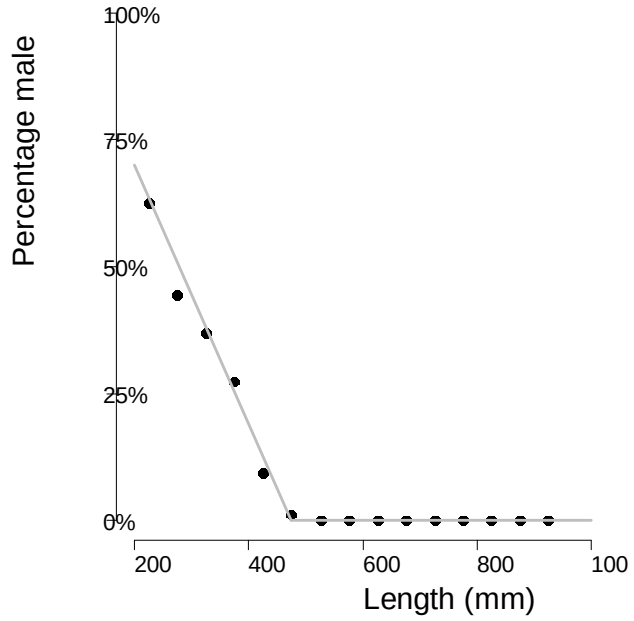

Figure NL. 18 *Sex ratio-at-length. Symbols: observed proportions of males per 50 mm length-class. Grey line: predicted relationship between length and proportion male proportion ('broken-stick' model).*

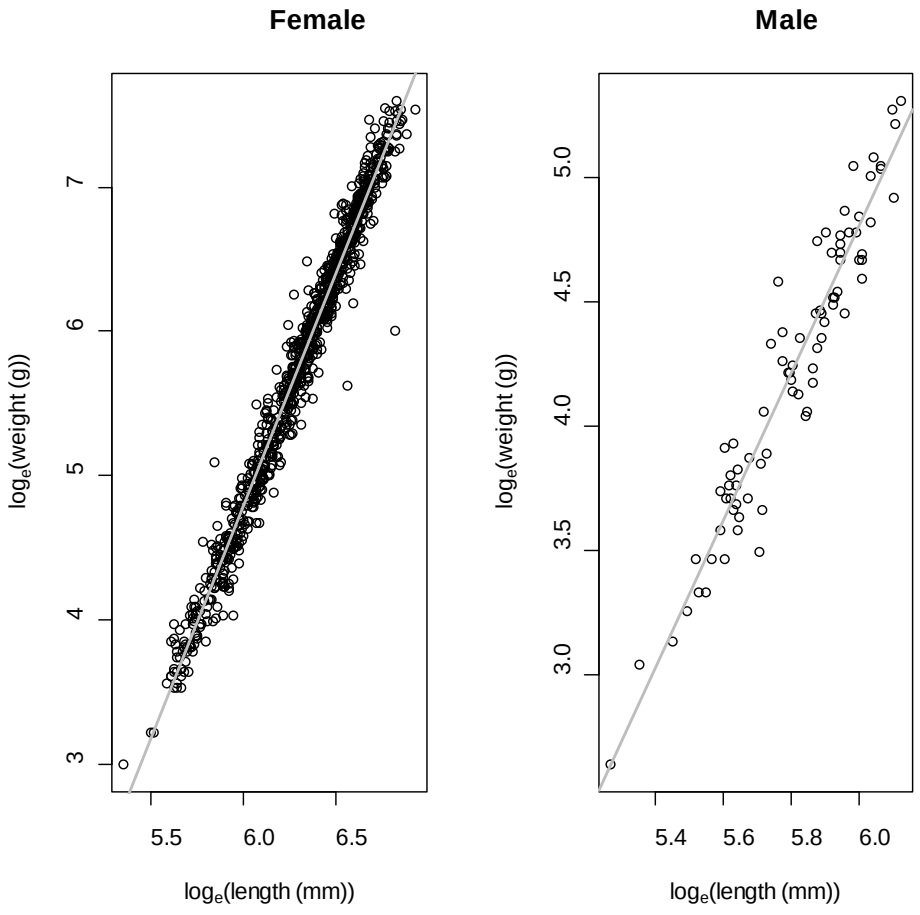

Figure NL. 19 *Length-weight relationship for males. Symbols: observed lengths and weights on individual eels. Grey lines: predicted relationship from simple linear model.*

2.11.2 Parasites & Pathogens

The market sampling for Lake IJsselmeer collects information on the percentage of eels showing *Anguillicoloides crassus* infection based on inspection of the swim bladder by the naked eye). Following the initial break-out in the late 1980s, infection rates have stabilised between 40 and 60%. In recent years, the infection rate was slightly decreasing. As part of the extended market sampling program in 2009, data on *Anguillicoloides* infection rates was also collected in two other areas (Friesland and Rivers). In both areas the infection rate was similar to the levels observed in Lake IJsselmeer over the past years. No new locations were sampled in 2010. In 2011 the market sampling will be conducted throughout the whole country.
At the Fish & Shellfish Diseases Laboratory of the Central Veterinary Institute of Wageningen UR, in 2010-2011 sofar 2 groups of diseased wild eels (juvenile to adult) were submitted for diagnosis. In August 2010, wild yellow and silver eels from a lake in Friesland (north Netherlands) showed severe clinical signs: apart from many gill worms (*Pseudodactylogyrus*), the eels had some cestodes in their gut, and some A.crassus in their swim bladders. The disease was however caused by 2 viruses: AngHV-1 (HVA) and EVEX virus, with a bacterial infection by *Edwardsiella tarda*.
In June 2011, wild yellow eels from the Noordzeekanaal had some *Trichodina* as ectoparasite, Acanthocephalus in the gut, and *A.crassus* in their swimbladder, not in high numbers, and virus isolation of these eels was negative. (data: Olga Haenen & Marc Engelsma, pers.comm.)

Parasites:
The swimbladder nematode *Anguillicoloides crassus* was introduced in wild stocks of European eels in The Netherlands in the start of the 80s, from SE-Asia. Wild eels showed high prevalences and intensities (no. of parasites per eel), and an acute reaction of the swimbladder by sometimes severe fibrosis (Banning & Haenen, 1990). It was questioned if these eels with their nonfunctional swim bladders would be able to reach the spawning grounds (Banning & Haenen, 1990; thesis Haenen, 1995). In the 1990s the prevelance decreased as did the severity of pathology. It seemed, a kind of equilibrium was settling, like it happens with newly introduced parasites.

Borgsteede et al. (1999) have described the parasitofauna of 361 wild eels of 17-73 grams in Volkerak, Marker- en IJsselmeer: Various parasites were found, predominantly *Myxidium* sp. (33%), *Pseudodactylogyrus anguillae* (30%), and *Acanthocephalus clavula* (49%). In 2004-2005 Haenen et al. (2010) diagnosed 98 wild silver eels from the lower River Rhine, River Merwede, and the IJsselmeer for pathogens and disease: A quarter of the eels had ectoparasites, mostly *Trichodina* species, *Ichthyophthirius multifiliis*, *Ichthyobodo* species, *Glosattella* species, *Dermocystidium* species (single celled), and *Dactylogyrus* species. A quarter also had gut parasites, like cestodes (*Proteocephalus* species, a.o.) and *Acanthocephus* sp.; Approximately three quarters had A.crassus in their swimbladder, with an intensity of 5 parasites per swimbladder.

Bacteria:
In March and April 1997 seven cases and in June 1997 another case of ‘red spot disease’ were diagnosed in groups of diseased glass eels *Anguilla anguilla*, originating from South-western France and Northern Portugal. In all 8 cases *Pseudomonas anguilliseptica* Wakabayashi and Egusa (1972), was isolated. The mortalities varied from lower than 5 to 20% in total, within 2-3 weeks. The isolates were sensitive for a list of antibiotics. After the water temperature was raised to 26-27°C, mortalities stopped (Haenen & Davidse, 2001). In wild silver eels, apart from some secondary skin inflammations, some cases of *Aeromonas hydrophila* and *Aersobria* were seen (Haenen et al., 2010). In hot summers, eels from rivers with a low water level once had a severe *Edwardsiella tarda* infection.

Viruses:
Since 1999, both AngHV-1 (HVA, herpesvirus anguillae) and EVEX (Eel Virus European X) virus have been found in wild eels in The Netherlands, but not yet EVE (Eel Virus European, also known as IPNV type Ab or VR299). From silver eels from Lake Grevelingen, EVEX and AngHV-1 were isolated, and AngHV_1 was also found in silver eels of Lauwersmeer (Van Ginneken et al., 2005, 2004). In silver eels from the lower River Rhine/Merwede AngHV-1 was detected in 44% of 92 eels, without the eels showing disease (Haenen et al., 2010). It is however known, that AngHV-1 may cause disease, when eels are stressed, at ambient water temperatures for the virus. Therefore, it was hypothetized, that AngHV-1 may be a factor in the decline of silver eels, carrying the virus, during their migration to the spawning grounds, when they are stressed and swim at ambient water temperatures for exposition of the viral disease (Haenen et al., 2010).
In general, some parasites and the viruses are worrisome in the wild eel. The contact with eel farms should be avoided, as EVE might be introduced into wild eels from positive eel farms in The Netherlands

2.11.3 Contaminants

As shown in the Figure NL.20 it is clear that a substantial decrease in PCB concentrations has been achieved, however, the current rate of decline is low or non-existant. In 2010 four trend locations have been monitored. Though the concentration in location Hollands Diep seem to decrease the last years, the levels are still comparable to the period 1997-2000. The levels in the other locations have not changed significantly either.
In total 23 locations have been monitored in The Netherlands, see table NL.h. This clearly shows that locations fed by the river Rhine or Meuse contain eels with elevated PCB (TEQ) levels. Only those water ways not influenced by Rhine, Meuse or local industry can be considered low contaminated.

Table NL. h. *Monitoring results 2010 in yellow eel, size class 30-40 cm. Numbers in bold are above regulatory limit of 12 pg/g total TEQ (incl 10% uncertainty*).

Location	Fat content (%)	Total TEQ pg TEQ/g product	PCB 153 ug/kg product
Amer HD61-63	16	34	442
Dortsche Biesbosch	12	52	532
IJssel, Deventer	18	19	183
IJsselmeer Medemblik	15	5.2	30
Lek, Culemborg	15	23	213
Maas, Eijsden	7.8	14	173
Rijn, Lobith	11	33	248
Volkerak	19	22	200
Waal Tiel	11	25	220
Hollands Diep	20	26	262
Markiezaatsmeer	6.4	2.6	34
Schermerboezem	11	3.1	13
Vossemeer Tholen	13	15	131
Westkapelsche Watergang	11	3.0	40
Hoeksche Waard	12	1.5	17
Nieuwkoopse Plassen	25	3.0	17
Hollandse IJssel	24	73	974
Binnenbedijkte Maas	21	6.7	41
Veerse Meer	11	2.7	12
Oostvoornse Meer	11	13	171

Brielse Meer	8.4	7.0	60
Oosterschelde	7.7	3.7	18
Grevelingenmeer	17	5.7	27

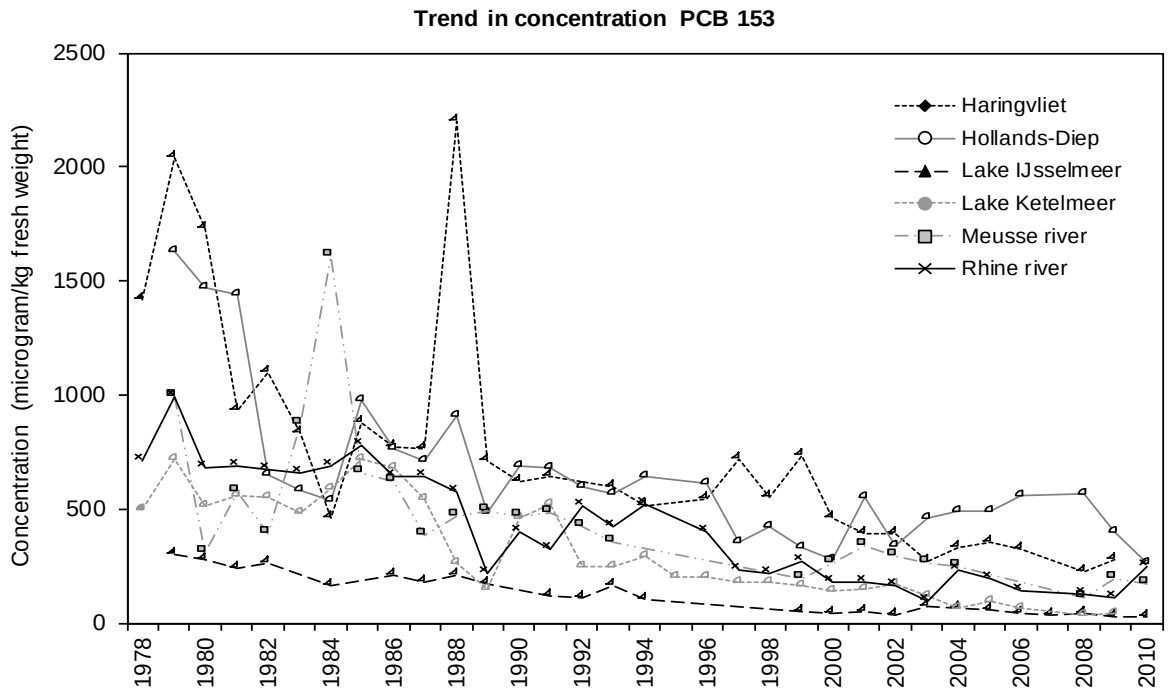

Figure NL. 20 *Temporal trend in PCB in eel (data from IMARES and RIKILT).*

2.11.4 Predators

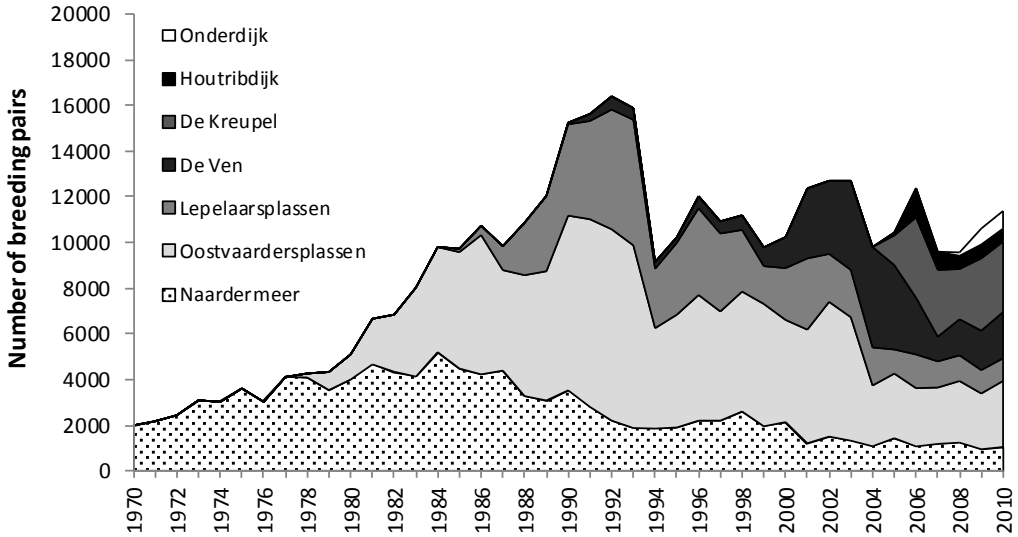

Figure NL. 21 *Trends in the number of breeding pairs of cormorants (Phalacrocorax carbo) in and around Lake IJsselmeer (Source van Eerden, Waterdienst RWS).*

Predation of eel by cormorants (*Phalacrocorax carbo*) is much disputed amongst eel fishermen and bird protectionists. The number of cormorant breeding pairs increased rapidly until the early 1990s, and then stabilised (Figure NL. 21), remaining stable in recent years. For Lake IJsselmeer, food consumption has been well quantified (van Rijn & van Eerden 2001; van Rijn 2004); eel constitutes a minor fraction here. In other waters, neither the abundance, nor the food consumption is accurately known, but predation on eel appears to be a bigger issue here.

2.12 Other sampling:

Nothing to report under this heading.

2.13 Stock assessment:

2.13.1 Local Stock Assessment

It is impractible and nearly impossible to determine the absolute number of escaping silver eel from the Dutch waterways directly. Therefor, IMARES is, like France, UK, Germany and Belgium developing a Yellow Eel Model. From the biomass, length frequency, sex-ratio, growth and silvering rate of the Yellow Eel population an estimate can be made for the biomass of migrating silver eel. In addition the anthropogenic mortality (fishing, hydropower, pumping stations) during the migration to the sea needs to be determined to provide a final estimate of the biomass of escaping silver eel.
The biomass of yellow eel can be estimated using several modelling approaches. In fished areas (Ijsselmeer, Friesland, Noord-Holland, Grevelingen etc.). For most of these areas data are available or are being collected. Using a recruitment index, landings data, length frequency etc. fishery models can be used to estimate fishing mortality and the biomass of the yellow eel population. Prototypes of such models have already been developed for the yellow eel populations in Lake IJsselmeer (Dekker) and Waddenzee (van de Meer). In areas with limited data (areas where nop fishing or market sampling occurs) the yellow eel population can be estimated by upscaling yellow eel density estimated obtained by fishery independent sampling programs like Water Framework Directive. In co-operation with DELTARES, IMARES is developing a GIS based model to upscale yellow eel densities per water body and include migration barriers like pumping stations and hydropower plants.

2.13.2 International Stock Assessment

2.13.2.1 Habitat

An overview of habitats (ha) available is presented by Dekker et al. (2008), based on the information in Tien & Dekker (2004, 2005), complemented with data from various sources.

The summarising table is reproduced here in ***Table NL. i.***

Provincie	Ditches †	Canals †	Lakes ‡	Rivers	Coastal waters	sum
Friesland	5,345	7,057	9,454		-	21,856
Groningen	2,003	2,040	6,905		3,843	14,791
Drenthe	657	503	-		-	1,160
Overijssel	1,516	1,985	1,872		-	5,372
Gelderland	831	733	-		-	1,564
Flevoland	3,115	4,959	-		-	8,074
Utrecht	1,699	2,349	2,699		-	6,747
Noord-Holland	5,227	7,938	1,243		-	14,408
Zuid-Holland	4,843	6,935	7,454		-	19,232
Zeeland	2,421	2,873	17,871		95,745	118,909
Noord-Brabant	1,247	1,241	-		-	2,488
Limburg	-	-	-		-	-
Larger water bodies						
Randmeer			16,110		-	16,110
IJsselmeer/Markermeer			169,150		-	169,150
Rijn & Maas				18,067	-	18,067
kleinere rivieren				2,800	-	2,800
Waddenzee, incl. Eems			-		259,214	259,214
Zeeuwse Delta			17,871		95,745	113,616
Sum	28,905	38,610	232,758	20,867	358,802	679,942

† For ditches and canals, only the areas less than 1 m above sea level have been considered.

‡ Fresh water areas in the south-western delta have been included under Lakes, the saline waters under Coastal Waters.

2.13.2.2 Silver Eel Production

2.13.2.2.1 Historic production (B_0=13.000t)

Table NL. j *Overview of the different estimations of $B_{pristine}$, B_{lim} , $B_{current}$ and B_{best} for eel in Lake IJsselmeer and the Netherlands.*

Lake IJsselmeer					Netherlands				
$B_{pristine}$	B_{lim}	$B_{current}$	B_{best}		$B_{pristine}$	B_{lim}	$B_{current}$	B_{best}	
			770 t	Dekker 2000				min. 1455 t	Dekker et al. 2008 (Table NL. n)
7700 t	3080 t	11 t (1990)		Dekker et al. 2008	10.000-15.000 t	4.000-6.000 t	200 t		Klein Breteler 2008
						221 t			Combinatie van Beroepsvissers 2008
						2.600-8.100 t "probably lower"			Eijsackers et al. 2009
						2600-8100 t "probably lower"			Nederlandse Aalbeheerplan Juli 2009
					13.000 t	5.200 t			ICES 2009

2.13.2.2.2 Current production (B_{best} = 1455 t)
B_{best} is B_{pre} (200 t) + 1255 t (anthropogenic mortality "eel" [yellow + silver] Table NL. l) = 1455 t

2.13.2.2.3 Current Escapement (B_{2010} = 452 t)
B_{2010} is 200 t (B_{2008}) plus the estimated increase in escapement due to the closed season (target 90% reduction in fishing mortality), therefore B_{2010} = 200 t + 90% 280 t silver eel catches (Table NL. l) = 452 t.

2.13.2.2.4 Production values e.g. kg/ha

Table NL. k *Production values by water type. Data derived from Dekker et al. (2008).*

	IJsselmeer/ Markermeer	Rivers	Coastal waters	Other waters	Total
Number of fishing companies	73	28	48	ca. 100	249
Surface area, ha	169,150	20,867	354,959	134,966	679,942
Landings, tons	280	150	115	375	920
Surface area per company, ha	2,317	745	7,395	1,350	2,731
Landings per company, kg	3,836	5,357	2,396	3,750	3,695
Landings per surface area, kg/ha	1.66	7.19	0.32	2.78	1.35

2.13.2.2.5 Impacts

Vriese et al. (2007) and Dekker et al. (2008) estimated quantities of eel impacted by anthropogenic activities, from which the summary in Table NL.l is compiled. In the majority of cases, the relative impact on the stock is unknown. For Lake IJsselmeer fishery, current fishing mortality F ≈ 0.33 per annum (Dekker et al. 2008). For hydropower generation in the main rivers, the impact on the silver eel is estimated at H ≈ 16 – 34 % per run. For all other factors and other areas, the relative impact is unknown, and consequently, the interaction and overlap between different mortality sources can not be assessed.

Table NL. l Estimated quantities (t) of anthropogenic mortalities. Data from Vriese et al. (2007) and Dekker et al. (2008).

Impact	Yellow eel	Silver eel	Yellow & Silver
Cormorants	50	0	50
Barriers	?	?	?
Pumping stations	50	40	90
Parasites	?	?	?
Pollution	?	?	?
Inland fishery	640	280	920
Marine fisheries	20	0	20
Sports fishing	200	0	200
Hydropower	4	15	19
Total (min. est.)	970	335	1305

2.13.2.2.6 Stocking Requirement eels <20cm

The Dutch EMP mentions a budget of 300 k€, but additional budget may become available from private sources. It is unclear what quantities of eel will be purchasable for this budget, while a turbulent price development is expected, because of the implementation of CITES restrictions and the impact of restocking programmes on the glass eel market.

2.13.2.2.7 Summary Data on Glass Eel

Table NL. m Overview usage of glass eel.

KG	2011	2010	2009
Caught in commercial fishery	0	0	0
Used in stocking	244	904	100
Used in aquaculture for consumption	6750	?	?
Consumed direct	0	0	0
Mortalities	-	-	-

2.13.2.2.8 Data Quality issues

Nothing to report

2.14 Sampling intensity and precision:

Nothing new to report, see Country Report WGEEL 2010.

2.15 Standardisation and harmonisation of methodology:

2.15.1 Survey Techniques

Glass Eel Monitoring

Gear	Location	Frequency	Time	Period
liftnet (1x1m; mesh 1x1mm)	Den Oever	daily	5 hauls every 2 hours between 22:00-5:00	~Mar-May
	10 other locations along the coast	weekly	2 hauls at night time	

Passive Monitoring Program: Main Rivers and Lake IJsselmeer

Gear	Location	Frequency	Period
Summer fykes (4) (stretched mesh 18-20mm) Fykes (4) (stretched mesh 18-20mm)	34 locations in main rivers, estuaries and lakes	continuous	~May-Sep

Due to closure of the eel fishery in polluted areas, this program which started in the 1990s has been interrupted. Almost two thirds of the sampling station ate located in the polluted areas and sampling ceased on 1 April 2011. An alternative program is currently being developed and will hopefully start in 2012.

Active Monitoring Program: Main Rivers

Gear	Location	Frequency	Period
bottom trawl (channel; 3m beam; 15mm stretched mesh)	~50 locations in main rivers	10 min trawl, ~1000m transect	~May-Sep
Electrofishing (shore area)		20 min, 600m transect	

Active Monitoring Program: Lake IJsselmeer

Gear	Location	Frequency	Period
Electrotrawl (open water; 3m beam; 2mm bar mesh)	20 locations in Lake IJsselmeer, 10 locations in Lake Markermeer,	2 hauls per location, 10 min trawl, ~1000m transect	Oct-Nov
Electrofishing (shore area)	7 locations in Lake IJsselmeer, 7 locations in Lake Markermeer, 1-3 habitats per location (sand, vegetation, rock)	2-3 sites per habitat per location	Aug-Sep
Beach seine (shore area; 18mm stretched mesh; length 20m)			

2.15.2 Sampling Commercial Catches

Area	No. eels for Length-frequency	Sampling frequency	Locations	Biology (sex, life stage, parasites)	Period
Friesland	150-200 eels per sample	monthly	10	2 eels per 10 cm size class	Apr-Aug
Main Rivers	150-200 eels per sample	monthly	8	2 eels per 10 cm size class	Apr-Aug
Lake IJsselmeer	1200 (total per year)	May-June Aug-Sep	1 (samples collected for each fishing gear: summer fyke, fyke, eelbox, long line)	350	Apr-Aug
Lake Markermeer	800 (total per year)	May-June Aug-Sep	1 (samples collected for each fishing gear: summer fyke, fyke, eelbox, long line)	250	Apr-Aug

2.15.3 Sampling
Nothing to report in this section

2.15.4 Age analysis
Age readings were obtained from a total of 150 otoliths, which were collected from eels in six different areas of the Netherlands. The number of annuli were counted to determine the age of individuals (“crack and burn” method). Furthermore distances between consecutive annuli were measured using image analysis software to determine individual growth curves (see section 11.1).

2.15.5 Life Stages
Life stages (yellow, silvering, silver) are visually determined based on colouration of body and fins and eye diameter. Criteria for life stages are at present not formally described.

2.15.6 Sex Determinations
Sex is determined by macroscopic examination of the gonads.

2.16 Overview, conclusions and recommendations:

The availability of data on eel stock and fisheries presented in this report is summarised in Table NL.n. Overall, the larger, State owned waters are reasonably documented, but the smaller regional waters are not yet. Within the framework of the implementation of the national EMP, various extensions are being developed.

Table NL. n *Overview of the data collection by area, described in this report.*
+ = present, - = absent, +/- = incompletely present, (+) = present, but inadequate, !=under development.

Area Item	Waddensea	IJsselmeer	Main Rivers	Zeeland, waters: open	closed	Smaller inland waters (lakes, polders, small rivers)
C capacity	+	+/-	!	+	!	!
D effort	+	-!	-!	+	-!	-!
E catch	+	+	+	+	-!	+
F CPUE	-	(+)	(+)	-	-	-!
G surveys	+	+	+	+	-!	-!
H age/length	-	+	+	-	-	!
I sex, growth	-	+/-!	+!	-	-	+/-!
J other sampling						
K assessment	-	(+)	!	-	-	!
L precision		+	!			

In conclusion: this report provides an update of all data series regarding the eel stock in the Netherlands. Almost all data series show a further decline of the stock and fishery; anthropogenic impacts are high, or undocumented. In 2010 the highly important catch registration for inland fishers was introduced by the Ministry of EL&I. In 2012 effort registration will be added to the catch registration. In 2011 a range of new eel projects has been implemented including a Red Eel Model, eel ageing, mortality migrating silver eel in rivers and “polders” and nation wide catch sampling programme. In 2012 a few more will be added like the Silver Eel Index and fishery independent eel monitoring closely linked with Water Framework Directive fish sampling.

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Kwaliteitsborging

IMARES beschikt over een ISO 9001:2008 gecertificeerd kwaliteitsmanagementsysteem (certificaatnummer: 57846-2009-AQ-NLD-RvA). Dit certificaat is geldig tot 15 december 2012.

De organisatie is gecertificeerd sinds 27 februari 2001. De certificering is uitgevoerd door DNV Certification B.V. Daarnaast beschikt het chemisch laboratorium van de afdeling Milieu over een NEN-EN-ISO/IEC 17025:2005 accreditatie voor testlaboratoria met nummer L097. Deze accreditatie is geldig tot 27 maart 2013 en is voor het eerst verleend op 27 maart 1997; deze accreditatie is verleend door de Raad voor Accreditatie.

Verantwoording

Rapport C152/2011
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Dit rapport is met grote zorgvuldigheid tot stand gekomen. De wetenschappelijke kwaliteit is intern getoetst door een collega-onderzoeker en het betreffende afdelingshoofd van IMARES.

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