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ÜBERNAHME DER LEITUNG DER CENTRAL/BALTIC-GRUPPE IM RAHMEN DER INTERKALIBRIERUNG VON SEENBEWERTUNGEN MIT FISCHEN

PROJEKT NR. O 14.09

Endbericht

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Im April 2010

AUFGABENSTELLUNG UND ZIELE

Die Wasser-Rahmenrichtlinie (WRRL 2000) hat ein ambitioniertes Ziel vorgegeben: alle europäischen Gewässer sollen bis zum Jahr 2015 in einen guten ökologischen Zustand versetzt werden. Zwingende Voraussetzung dieser Forderung ist die Bewertung des aktuellen Zustandes der Gewässer, um einen eventuellen Handlungsbedarf zu erkennen. Daher wird von der WRRL die Bewertung des Zustandes von Oberflächengewässern anhand der biologischen Qualitätselemente (BQE) Phytoplankton, Makrophyten, Makroinvertebraten und Fische gefordert. Die entsprechenden nationalen Bewertungssysteme der Mitgliedsstaaten der EU werden im Interkalibrierungsprozess miteinander verglichen und harmonisiert, um auf europäischem Niveau vergleichbare Resultate zu erzielen.
Der vorliegende Bericht beschäftigt sich mit dem Interkalibrierungsprozess für die Bewertung von Seen mit Fischen. Deutschland wurde von der Koordinierungsstelle der Interkalibrierung (Joint Research Center, JRC in Ispra/Italien) gebeten, die Leitung der Central/Baltic-Gruppe zu übernehmen. Diese Tätigkeit konnte im Rahmen des Projektes O 14.09 für das Jahr 2009 wahrgenommen werden. Die Ergebnisse werden im vorliegenden Bericht dargestellt.

EINLEITUNG UND ÜBERSICHT

Gemäß § 2 Abs. 4 des Vertrags zum Projekt Nr. O 14.09 zwischen dem Ministerium für Landwirtschaft, Umwelt und Verbraucherschutz Mecklenburg-Vorpommern und dem Institut für Binnenfischerei e. V. (IfB) liefert der vorliegende Endbericht eine Beschreibung der Aufgabenstellung und Ziele, der Methoden und Ergebnisse sowie des Nutzens für den wasserrechtlichen Vollzug. Dabei werden die Inhalte gemäß dem vertraglich zugrunde liegenden Leistungsangebot des IfB vom 23.03.2009 wie folgt behandelt:

ERFASSUNG DES BEARBEITUNGSSTANDES ZUR SEEBEWERTUNG IN DEN MITGLIEDSSTAATEN

ZIELE

Der Interkalibrierungsprozess wird vom JRC im Auftrag der Europäischen Kommission koordiniert. Die Interkalibrierung wird auf der Ebene von geographischen Interkalibrierungsgruppen (GIG) durchgeführt. Für die Bewertung von Seen anhand der Fische gibt es zudem noch eine GIG-übergreifende Koordination am CEMAGREF (Christine Argillier, Frankreich). Von hier aus wurde z. B. die gemeinsame Datenbank erstellt und ein Treffen organisiert.
Deutschland hat die Leitung des Central/Baltic-GIG übernommen. Beteiligte Mitgliedsstaaten sind Belgien-Flandern, Dänemark, Deutschland, England, Estland, Frankreich, Lettland, Litauen, Niederlande, Polen, Tschechien und die Slovakei. Damit ist die Central/Baltic-GIG die geographisch größte und vielfältigste Interkalibrierungsgruppe. Mit der Übernahme der Leitung der GIG hat Deutschland gewisse Berichtspflichten gegenüber dem JRC bzw. ECOSTAT. Diese erfordern eine genaue Kenntnis der Systeme der Mitgliedsstaaten. Hierbei sind Informationen über Bearbeitungsstand, konzeptionelle Ansätze, verwendete Typologien, Untersuchungsmethoden, Indikatoren zur Anzeige von Belastungen sowie nationale Berechnungsmodi zur Kennzeichnung des ökologischen Zustandes notwendig. Nur so kann geprüft werden, ob die Anforderungen an die ‚Interkalibrierbarkeit' erfüllt werden. Nach der überabeiteten CIS-Richtlinie zur Vorgehensweise in der Interkalibrierung (CIS 2009) müssen die nationalen Systeme hinsichtlich ihrer Übereinstimmung mit den Vorgaben der WRRL nach folgenden Kriterien untersucht werden:

- fünfstufige Bewertungssysteme
- Klassifizierung entsprechend der normativen Vorgaben
- Typisierung gemäß Anhang II mit Bestätigung durch ECOSTAT
- Bewertung im Vergleich zu typspezifischen Referenzbedingungen
- Berücksichtigung aller vorgegebenen Parameter der biologischen Qualitätselemente
- Bewertung als EQR

Erst wenn diese Kriterien geprüft und erfüllt sind, kommen die entsprechenden Bewertungssysteme für die Interkalibrierung in Betracht. Im Anschluss muss gemäß der gleichen Richtlinie geprüft werden, ob die Interkalibrierung durchführbar ist. Dafür werden folgende Kriterien angelegt:

- werden die gleichen Gewässertypen genutzt?
- werden die gleichen Belastungen angezeigt?
- ist das Konzept der Bewertungssysteme vergleichbar (bzgl. Habitate, Indikatoren usw.)?
- sind die Vorgehensweisen bei der Berechnung von Kennzahlen vergleichbar?

Insgesamt ist also eine genaue Kenntnis der nationalen Bewertungsmethoden zur Einschätzung von Möglichkeiten und Grenzen der Interkalibrierung erforderlich. Die dazu benötigten Informationen wurden mit Hilfe eines Fragebogens zusammengetragen.

METHODIK

Im Februar des Jahres 2009 wurde in Absprache mit dem damaligen Koordinator für die Interkalibrierung von Fischen in Seen am JRC (Niels Jeppsen) ein Fragebogen erstellt und an die Mitgliedsstaaten der Central/Baltic-Gruppe verschickt. Der Fragebogen enthielt folgende Themenbereiche:

- Mitgliedsstaaten und Verantwortlichkeiten
- Befischungsmethodik

- National verwendete Typologien
- National bedeutsame menschliche Belastungen
- Referenzbedingungen

Die letzten beiden Punkte behandelten schwerpunktmäßig die Vorgehensweise bezüglich der menschlichen Belastungen und Festsetzung von Grenzwerten, die aus dem bisherigen Verlauf der Interkalibrierung von Systemen für Fische in Seen resultierte.
Darüber hinaus wurde auch generell wurde um Kommentare, Kritik oder Anregungen gebeten. Die Antworten wurden zusammengefasst und als an die Mitgliedsstaaten sowie das JRC versendet. Desweiteren wurden die Ergebnisse in der vom JRC angefragten Form aufbereitet und als „Milestone 1 Report“ zur Verfügung gestellt.

ERGEBNISSE

An dieser Stelle werden die Ergebnisse der beschriebenen Statusumfrage zusammengefasst. Der vollständige Bericht findet sich im Anhang (A1, in Englisch). Auch der Milestone 1 Report ist dort beigefügt (A2).
Zum Zeitpunkt der Umfrage gab es 10 Mitgliedsstaaten der Central/Baltic-Gruppe, seitdem sind noch die Slowakei und Polen hinzu gekommen. Die Beteiligung an der Interkalibrierungstätigkeit ist sehr unterschiedlich. Von den meisten Mitgliedsstaaten ließen sich Antworten erhalten, auch wenn teilweise mehrere Erinnerungsschreiben notwendig waren. Die Slowakei und Tschechien sehen sich in einer Rolle als eher passive Mitglieder aufgrund des Fehlens von natürlichen Seen, von Bewertungssystemen und/oder administrativen Unklarheiten. Dennoch werden Anfragen beantwortet. England nimmt zwar an den internationalen Treffen teil, E-Mails der deutschen Gruppenleitung bleiben jedoch unbeantwortet.
In der GIG liegen drei mehr oder weniger fortgeschrittene Systeme zur Bewertung des ökologischen Zustandes von Seen anhand der Fische vor. Davon hat nur die Niederlande ein System mit offiziellem Status. Das niederländische System basiert auf Befischungen mit Zugnetzen, in Einzelfällen ergänzt durch Elektrobefischungen. Die beiden weitere Systemansätze basieren auf CEN 14757 Multimaschen-Stellnetz Standardbefischungen (Dänemark) oder auf Daten der Berufsfischerei, Reusenbefischungen und Elektrofischerei (Belgien-Flandern). Beide Systemansätze werden von den verantwortlichen Bearbeitern als bearbeitungsbedürftig angesehen. Deutschland, Estland, Frankreich, und Litauen befischen nach dem gleichen Stellnetz-Standard wie Dänemark, so dass 5 Staaten eine vergleichbare Methodik nutzen, jedoch kein fertiges und als vertrauenswürdig eingeschätztes Bewertungssystem vorhanden ist.
Die drei fortgeschrittenen Bewertungssysteme basieren auf grundlegend unterschiedlichen Befischungsmethoden. Dabei stehen sich aktive und passive Methoden zur Beprobung unterschiedlicher Habitate gegenüber. Derzeit liegen keine Kenntnisse vor, ob und wie sich die Ergebnisse derart unterschiedlicher Methoden miteinander vergleichen lassen. Es kann bezweifelt werden, dass eine Umrechnung möglich ist.
Die „Interkalibrierung“ bedeutet eigentlich den Vergleich von Bewertungsergebnissen der nationalen Systeme miteinander. Es ist an dieser Stelle erkennbar, dass derzeit für See-Bewertungssysteme mit Fischen in der Central/Baltic-Gruppe eine Interkalibrierung im Sinne eines Vergleichs von Ergebnissen nicht möglich ist. Es gibt nur ein anwendungsreifes System. Es ist nicht absehbar, ob und wann mehrere Systeme vorliegen werden.
Neben dem sehr grundlegenden Problem, dass keine Systeme zum Interkalibrieren vorhanden sind, stellten sich noch weitere Schwierigkeiten heraus. Zum einen nutzen die Länder unterschiedliche Typologien in ihren Bewertungssystemen bzw. den entsprechenden Entwicklungsansätzen. Folgende Ansätze existieren in der GIG:

- die von ECOSTAT bestätigte L-CB-Typologie, basierend auf mittlerer Tiefe und Alkalinität (Poikane 2009)
- andere, morphometrische Typologien, meist basierend auf der Maximaltiefe

- funktionelle Typologien auf Basis der Schichtung

Von Seiten der Central/Baltic-Gruppenleitung wurde die Typologie trotz der Unterschiede als eher lösbares Problem eingeschätzt.
Schwieriger gestalten sich die Ansichten der Mitgliedsstaaten bezüglich der relevanten Belastungen und ihrer Berücksichtigung in den Bewertungssystemen. Die Vorgaben aus den CIS Richtlinien (CIS 2003a, b) und die im vorherigen Interkalibrierungsprozess für „Fische in Seen" erarbeiteten Belastungsparameter wurden in der Umfrage sehr unterschiedlich aufgefasst. Einige kontrovers diskutierten Aspekte sind:

- Eutrophierung: Es wird nicht zwischen der Eutrophierung als Abweichung vom Soll-Zustand und der Trophie als aktuellem Zustand unterschieden. Parameter des Einzugsgebietes sind für die Seebewertung ungeeignet.
- Der Verbau umliegender Fließgewässer ist für die Seebewertung nicht bedeutsam.
- Besatz und Fischerei sind keine Belastungen im Sinne der WRRL.

Für diese Punkte ist eine Einigung in der GIG als problematisch anzusehen da die Standpunkte bezüglich Relevanz, Messbarkeit und sogar hinsichtlich der Konformität mit den Vorgaben der WRRL sehr unterschiedlich sind.
Im Jahr 2009 lag also in der Interkalibrierungsgruppe nur ein Bewertungssystem vor. Eine Interkalibrierung war nicht möglich ist. Um dennoch voran zu schreiten, wurde von der GIG-Leitung nur eine Möglichkeiten gesehen: die gemeinschaftliche Entwicklung eines Bewertungssystems auf der Basis von Multimaschen-Stellnetzbefischungen. Dieses System sollte nach Möglichkeit eine gemeinsame Typologie, gleiche Indikatoren und gleiche Klassengrenzen aufweisen. Bei Erfolg hätten fünf Länder ein gemeinsames System und wären damit interkalibriert. Dieses ambitionierte Ziel war nur im Zusammenhang mit der Fortentwicklung des deutschen Bewertungsvorschlages möglich.

ERARBEITUNG EINER GEMEINSAMEN SEE-TYPOLOGIE

ZIELE

Es zeigte sich, dass eine Interkalibrierung von Bewertungssystemen in der Central/Baltic-GIG nicht möglich ist und auch in absehbarer Zeit nicht sein wird. Daher wurde beschlossen, für die Länder mit vergleichbarer Befischungsmethodik ein gemeinschaftliches System zu entwickeln. Die harmonisierte Systementwicklung erfolgte in Form von Vorschlägen, die von Deutschland als Gruppenleitung per E-Mail den Mitgliedsstaaten unterbreitet wurden. Anschließend wurden die Kommentare zusammengefasst und in die Vorschläge eingearbeitet.
Erster Schritt dieser harmonisierten Systementwicklung war die Festlegung einer gemeinschaftlichen Typologie.

METHODIK

Die vorgeschlagene Typisierung basiert auf den Ergebnissen, die im Rahmen der bisherigen deutschen Systementwicklung erarbeitet wurden (BRÄMICK & RITTERBUSCH 2008). Diese wurden in die Form eines englischsprachigen Artikels gebracht, an die Mitgliedsstaaten übersendet und zur Diskussion gestellt. Der entsprechende Text kann dem Anhang A3 entnommen werden.

ERGEBNISSE

In den Analysen des Institutes für Binnenfischerei wurde gezeigt, dass eine funktionelle Typologie eine bessere Grundlage für ein Bewertungssystem darstellt als eine rein

morphometrische. Rein morphometrische Typologien können beispielsweise auf mittlerer oder maximaler Tiefe beruhen. Eine funktionelle, auf der Schichtung basierende Typologie führt jedoch zu größeren Unterschieden der jeweiligen Typ-spezifischen Fischgemeinschaften. Daher wurde der Ansatz einer schichtungsbasierten Typologie auch den Mitgliedsstaaten der Central/Baltic-GIG zur gemeinsamen Verwendung vorgeschlagen. Der Vorschlag beinhaltete 3 Seetypen: Typ POLY - polymiktische Seen, Typ STRAT - geschichtete Seen und Typ DEEP - geschichtete Seen mit einer Maximaltiefe >30 m.
Insgesamt reagierten 5 von 11 Mitgliedsstaaten auf den Typisierungsvorschlag. Generell waren die Antworten positiv. Die funktionelle Charakterisierung scheint eine Möglichkeit der gemeinsamen Typisierung zu sein. Die bessere Eignung des funktionellen Schichtungskriteriums zur Unterscheidung von Fischgemeinschaften zeigte sich auch in anderen Mitgliedsstaaten (im Vergleich zu den „offiziellen" L-CB Typen).
Dennoch bleiben einige diskussionswürdige Aspekte. Hierzu gehören die Fragen ob es möglich (und nötig) ist, das Vorhandensein einer funktionellen Schichtung anhand objektiver Parameter zu messen und wie das realisiert werden kann: Müssen dazu Temperaturprofile vorliegen?, Welche Dauer muss die Schichtung haben um funktionell auf die Fischgemeinschaft zu wirken? usw.

TEILNAHMEN AN TREFFEN

Im Jahr 2009 fanden zwei Treffen im Zusammenhang mit der Interkalibrierung und der Leitung des Central/Baltic-GIG für Fische in Seen statt:
1) ein Treffen der Interkalibrierungsgruppe Fische in Seen (LakeFish IC) für alle europäischen Mitgliedsstaaten im September und
2) ein Treffen zur Interkalibrierung von Bewertungssystemen (Lake IC) für Seen im November.
Beim Letzteren nahmen die GIG-Leiter für alle vier biologischen Qualitätselemente sowie Vertreter des JRC und der ECOSTAT-Arbeitsgruppen teil. Die Protokolle beider Treffen finden sich im Anhang. An dieser Stelle werden nur die Kernpunkte behandelt, insbesondere solche mit Relevanz für Deutschland.

LAKEFISH IC TREFFEN, 22./23.09.2009 IN DROTTNINGHOLM, SCHWEDEN

Das Protokoll des Treffens findet sich im Anhang A4.
Aus den Präsentionen der GIG-Leiter ließ sich entnehmen, dass nur für die NORDIC GIG mit Finnland, Schweden, UK und Irland ein Fortschritt bzw. eine Perspektive erkennbar ist. In einem Pilotprojekt wurden und werden weiterhin die vorhandenen Systeme verglichen, geprüft und harmonisiert. Alle anderen GIG-Leiter erschienen ratlos bezüglich der Zukunft der LakeFish Interkalibrierung.
Vom CEMAGREF wurde dargestellt, wie die weitere Rolle des Institutes als GIG-übergreifende Leitung im Interkalibrierungsprozess zu sehen ist. Demnach wurde die europäische Datenbank dort erstellt und kann nun für die LakeFish Interkalibrierung zur Verfügung gestellt werden. Alle weiteren Interkalibrierungstätigkeiten sind Aufgabe der GIG-Leitung oder der Mitgliedsstaaten. Im Rahmen des WISER-Projektes wird versucht, Vorschläge für einen europäischen Fisch-Index zur Indikation von Eutrophierung und hydromorphologischer Degradation zu erstellen. Es wird am CEMAGREF keine Entwicklung von Bewertungssystemen für die Interkalibrierungsgruppen oder weitere, übergeordnete Tätigkeiten in der Interkalibrierung geben.
Im Zusammenhang mit diesen Ergebnissen verdichtete sich für den Berichterstatter in seiner Tätigkeit als GIG-Leitung die Ansicht, dass der einzige sinnvolle Weg in der Interkalibrierung des Central/Baltic-GIG die harmonisierte Entwicklung eines gemeinsamen Bewertungssystems ist. Die Alternativen wären:
a) abwarten, bis in den Mitgliedsstaaten entsprechende Bewertungssysteme vorliegen. Dabei ist

unklar, ob und wann das der Fall sein wird. Die Dauer der Entwicklung mehrerer Systeme lässt sich jedoch auf 5 Jahre oder mehr abschätzen.
b) abwarten, bis Vorschläge für einen Fisch-Index von WISER kommen. Auch hierfür sind mehrere Jahre zu veranschlagen. Weiterhin bleibt die Möglichkeit, dass im Rahmen des WISER-Projektes keine geeigneten Fischgemeinschafts-Merkmale gefunden werden. Überdies ist unklar, ob sich solche wissenschaftlich entwickelten europäischen Indikatoren in der Anwendungspraxis auf deutscher Ebene bzw. in der Central/Baltic-Gruppe bewähren.
Die Entwicklung eines Bewertungssystems in der Gruppe erschien die sinnvollste Lösung, auch bei Berücksichtigung des enormen Arbeitsaufwandes und des Risikos eines Scheiterns durch mangelnde Ergebnisse, fehlende Anwendbarkeit oder Uneinigkeit in der GIG. Die harmonisierte Systementwicklung versprach den schnellstmöglichen Fortschritt in der Interkalibrierung bei optimaler Einbindung der deutschen Belange hinsichtlich eines solchen Systems. Dieser Weg wurde daher vorgeschlagen.
Die Mitgliedsstaaten des GIG, das CEMAGREF als GIG-übergreifende Leitung sowie das JRC akzeptierten den Vorschlag Deutschlands weitgehend kommentarlos. Vermutlich war eine erhebliche Skepsis vorhanden, dass auf diesem Weg überhaupt Arbeiten stattfinden würden bzw. Fortschritte erzielt werden können.

LAKE IC TREFFEN, 05./06.11.2009 IN ISPRA, ITALIEN

Das Protokoll des Treffens findet sich im Anhang A5.
Auch auf diesem Treffen wurde der Interkalibrierungsleitfaden für Phase 2 vorgestellt und diskutiert (CIS 2009). Wichtige Neuigkeiten waren beispielsweise die WRRL-Konformitätsprüfung und die Machbarkeitsanalyse als Voraussetzung für die Interkalibrierung. Die hohen Ansprüche und die Terminsetzung der neuen Richtlinie wurden kritisch gesehen.
Auf der Ebene der anderen biologischen Qualitätskomponenten in Seen zeigten sich vergleichbare Probleme wie bei den Fischen. So waren Ende des Jahres 2009 die genannten Voraussetzungen in allen BQE noch unvollständig geprüft, auch herrschte Unklarheit über die zu wählenden Interkalibrierungsoptionen. Bezüglich des Qualitätselementes Fische wurde die vom CEMAGREF gewählte Vorgehensweise zur Festlegung von Referenzbedingungen vorgestellt. Die Vertreter der anderen GIGs für die jeweiligen Qualitätselemente sahen die Vorgehensweise kritisch oder lehnten sie ab. Insbesondere die Berücksichtigung der Landnutzung im Einzugsgebiet wurde als nicht relevant für die Seebewertung und ein Grenzwert von 12 µg Gesamtphosphor als nicht repräsentativ eingeschätzt.
Dabei gehen der Ansatz des CEMAGREF und die Arbeiten der REFCOND-Arbeitsgruppe jedoch in die gleiche Richtung. Die Erfahrungen aus Phase 1 zeigten die Notwendigkeit, Verständnis und Anwendung von Referenzbedingungen über die BQE, die GIGs und die Wasserkörpertypen hinweg zu vereinheitlichen. Das wird in Form immer detaillierterer und umfassenderer Listen der menschlichen Belastungen und der jeweilig zu erfüllenden Grenzwerte getan. Überdies sollen die biologischen Qualitätselemente zur detaillierten Indikation einzelner Belastungsarten geeignet sein. Nach Meinung des Bearbeiters des vorliegenden Berichtes ist diese Vorgehensweise nicht zielführend. Die zahlreichen Leitlinien, die die Anforderungen der WRRL interpretieren und im Detail ausarbeiten, stellen in der Summe unrealistische Anforderungen an die Bewertungssysteme. So sind Landnutzung und Bevölkerungsdichte im Einzugsgebiet als Kriterien für Referenzbedingungen genannt, obwohl sie von den BQE-GIG-Arbeitsgruppen überwiegend nicht als geeignete Parameter der Eutrophierung angesehen werden. Noch entscheidender ist, dass die Qualitätselemente als Stellvertreter für direkte Belastungsmessungen ungeeignet sind.
Insgesamt ist festzuhalten, dass die Realität der Interkalibrierung deutlich hinter dem Zeitplan der Wasser-Rahmenrichtlinie und der Interkalibrierungsleitlinien liegt.

BERICHTERSTATTUNG FÜR DAS JRC

Das Joint Research Center (JRC) der Europäischen Kommission übernimmt die Koordinierung der Interkalibrierung sowie die Arbeit an Richtlinien und Berichten zum Fortgang des Prozesses. Folgende Arbeiten wurden seitens des JRC von Deutschland als GIG-Leitung angefordert:

- Ein „Meilenstein-Bericht“ (August 2009 - Anhang A2): Hier wurden die Ergebnisse aus der Erfassung des Bearbeitungsstandes zusammengefasst. Bereits in diesem Bericht zeigte sich, dass die Erarbeitung von Bewertungssystemen für die Länder mit Multimaschen-Stellnetzbefischungen der erfolgversprechendste Schritt zu sein scheint.
- Ein Arbeitsplan (August 2009): Zu diesem Zeitpunkt war die weitere Vorgehensweise noch unklar. Es war nicht deutlich, wie Fortschritte in der gemeinschaftlichen Systementwicklung erzielt werden können: über das CEMAGREF auf der Basis der gemeinsamen Datenbank, über das WISER-Projekt oder über die GIG-Leitung.

Auf der Tagung zur SeeFisch Interkalibrierung im September wurde jedoch deutlich, dass der Interkalibrierungsprozess in der Central/Baltic-Gruppe weitgehend erliegen würde, wenn keine Aktivitäten von der GIG-Leitung ausgehen. Daher wurde die harmonisierte Systementwicklung als einzig möglich Vorgehensweise gewählt. Der Ablauf dieses Verfahrens wurde ebenfalls koordiniert: neben den Mitgliedsstaaten des GIG wurden das JRC (Sandra Poikane), die GIG-übergreifende Leitung für „Fische in Seen“ (Christine Argillier) sowie die Qualitätselement-übergreifende Leitung für die Seebewertung (Marcel van den Berg) über die folgenden Schritte informiert und um Kommentare gebeten. Zur Diskussion gestellt wurden im Jahr 2009:

- Einen Arbeitsplan (November), der als nächstes Ziel einen gemeinsamen Systemvorschlag für das Frühjahr 2010 vorsah.
- Die übersetzte und für die gemeinsame Anwendung vorgeschlagene deutsche Typologie mit drei Schichtungs- basierten Seetypen (Dezember, Anhang A3).
- Ein Konzept zur Indikation von Belastungen durch Fische (Dezember). Hier wurde herausgestellt, dass Fische als integratives biologisches Qualitätselement kaum geeignet sind, die stark wechselwirkenden menschlichen Belastungen in der durch REFCOND und IMPRESS geforderten Genauigkeit anzuzeigen.

Die Vorschlage von deutscher Seite waren stark an die individuellen Erfordernisse des Qualitätselementes „Fische in Seen“ angepasst. Es wurde eine spezifische Typologie vorgeschlagen und die Vorgaben der Interkalibrierungsrichtlinien zu Belastungen und Referenzbedingungen kritisch betrachtet. Einige konstruktive Anmerkungen erfolgten, die erhaltenen Antworten waren durchweg positiv. Es gab keinen Widerspruch zu den in Umlauf gebrachten Texten, auch nicht von Seiten des JRC. Das Fehlen eines Widerspruchs wurde von Seiten der GIG-Leitung (Deutschland) als prinzipielle Zustimmung zu Vorgehensweise und Inhalten gewertet.

Neben der Berichterstattung zur Interkalibrierung bittet das JRC regelmäßig auch um Kommentare zu Richtlinien und Berichten. Im Jahr 2009 wurde insbesondere um Kommentare zur Interkalibrierungsrichtlinie für die sog. Phase 2 (2008-2011) gebeten. Diese wurden von den deutschen Vertretern ab Juni 2009 abgegeben. Wesentliche Kritikpunkte waren unter anderem die unrealistischen Fristen, die geforderte Neubearbeitung bereits interkalibrierter Elemente und die hohen Anforderungen an die Datenqualität. Auf deutscher Seite entstand der Eindruck, dass die Anmerkungen nicht in angemessener Weise Eingang in die fortlaufende Entwicklung der Richtlinie fanden. Auf einem Treffen der deutschen Interkalibrierungsvertreter im November wurde daher beschlossen, die deutschen Kommentare zunächst am Umweltbundesamt zu sammeln und als gebündelte Kommentare an das JRC weiterzuleiten. Damit sollte den entsprechenden Standpunkten mehr Gewicht verliehen werden (vergl. Endbericht zu Projekt O 2.09 vom Februar 2010).

NUTZEN DER ERGEBNISSE IM WASSERRECHTLICHEN VOLLZUG

Die Anforderungen an die deutsche Beteiligung im europäischen Interkalibrierungsprozess von Bewertungssystemen für Fische in Seen konnten im Rahmen des vorliegenden Projektes sowie des damit inhaltlich stark verwobenen Projektes O 2.09 „Praxistest Seenbewertung sowie Interkalibrierung Seenbewertung für Fische“ wahrgenommen werden. Dazu gehörten die geschilderten Treffen, Datenlieferungen und Kommentierungen.
Die Tätigkeit als GIG-Leitung änderte sich im Laufe des Jahres 2009 von einer eher koordinierenden Funktion in der Erfassung des Bearbeitungsstandes zu einer Leitungsfunktion, die ein gemeinsames Bewertungssystem entwickelt. Damit stieg der Aufwand deutlich. Durch die Tätigkeit ergeben sich aber anstrebenswerte Perspektiven. Zunächst wird das Engagement der deutschen Seite im europäischen Interkalibrierungsprozess verdeutlicht. Darüber hinaus kann durch die Entwicklung eines gemeinsamen Bewertungssystems sichergestellt werden, dass die spezifischen nationalen Anforderungen ausreichend repräsentiert sind. Sollte die Systementwicklung für die Central/Baltic-GIG in der geplanten Weise erfolgreich sein, so werden die Seen in der Interkalibrierungsgruppe und in Deutschland mit einem äußerst ähnlichen System bewertet. In diesem Falle ist eine weitere, nachträgliche Interkalibrierung des deutschen Ansatzes nicht erforderlich. Auf der Basis einer fortgeschrittenen Systementwicklung für Deutschland und die GIG kann im Bedarfsfall eventuellen Bewertungssystemen fachlich begegnet werden, die auf europäischer Ebene vorgeschlagen werden, beispielsweise als Ergebnis des WISER-Projektes. Natürlich sind solche Vorschläge nicht automatisch abzulehnen. Die Erfahrung aus der Interkalibrierung für Fische in Fließgewässern zeigt aber, dass ein solches System möglicherweise nicht ausreichend an die nationalen Erfordernisse angepasst ist oder der Bewertungspraxis nicht gerecht wird.
Im gesamten Interkalibrierungsprozess lässt sich beobachten, dass Ansprüche und Realität immer weiter auseinander klaffen. Die Forderungen der Europäischen Kommission, wie sie in den Publikationen des JRC und in den CIS-Berichten formuliert werden, haben oftmals mit dem tatsächlichen Stand der Interkalibrierung nichts mehr zu tun. Problempunkte sind unter anderem: der erforderliche Arbeitsaufwand, die Festlegung der Belastungen und Referenzbedingungen, die geforderten Datenqualitäten und -umfänge, die statistischen Zusammenhänge sowie die gesetzten Fristen. Diese Meinung wird von den deutschen Bearbeitern aus den administrativen und wissenschaftlichen Bereichen sowie aus der Anwendung geteilt. Die kritische Beobachtung des Interkalibrierungsprozesses und die entsprechende Kommentierung von deutscher Seite kann daher als sehr wichtig angesehen werden. Dabei ist die Funktion als GIG-Leitung vorteilhaft. Einzelne Bearbeiter in den Mitgliedsstaaten werden nicht in gleichem Maße über den Fortgang informiert bzw. einbezogen.

PERSPEKTIVE

Auch im Jahr 2010 wird Deutschland im Interkalibrierungsprozess vertreten sein und die Leitung der Central/Baltic-Gruppe für Fische in Seen übernehmen. In diesem Jahr soll das gruppenweite Bewertungssystem für die verbreiteten Multimaschen-Stellnetz Standardbefischungen so weit wie möglich vorangetrieben werden. Im Anschluss wären für die Interkalibrierung neben der laufenden Verbesserung des Systems noch der Vergleich mit den zwei auf anderen Methoden basierenden Bewertungsansätzen notwendig. Dieser Ablauf stellt den bestmöglichen Fall dar. Es ist derzeit nicht absehbar, wann der Interkalibrierungsprozess beendet sein wird. Der neue Leitfaden sieht einen Abschluss der Tätigkeiten für das Jahr 2011 vor (CIS 2009). Es zeichnet sich jedoch ab, dass dieser Termin von vielen Qualitätselementen nicht gehalten werden kann, darunter auch die Fische in Seen. Nach Meinung des Berichterstatters ist es sinnvoll, sich von deutscher Seite aus weiterhin sowohl in der Interkalibrierung als auch in der GIG-Leitung aktiv einzubringen. Nur so kann der Prozess in diesem Teilbereich beeinflusst werden.

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ANHANG

INHALT

A1: INTERCALIBRATION OF SYSTEMS TO ASSESS THE ECOLOGICAL STATUS OF LAKES USING FISH FAUNA (LAKE FISH IC), SUMMARY OF THE STATUS SURVEY IN THE CENTRAL/BALTIC GIG

These are the results obtained by a questionnaire sent to the Member States of the Central Baltic Geographical Intercalibration Group (CB-GIG) in 2009. This summary was edited by the representative of the GIG-leader Germany (David Ritterbusch). It contains summaries which might be influenced by personal opinions and preferences. These comments are marked with a box. If there are any mistakes in the evaluations or if you definitely do not agree, please submit your opinion. Feel free to comment anything else, too.

David Ritterbusch, August 2009

Member States and scientists

The ten active Member States of the C/B-GIG are listed in Table 1. So far, no information was provided from Belgium-Wallonia and Poland, but we are trying to have correspondence as soon as possible.

Table 1: LakeFishIC - the active Member States of the Central Baltic GIG and names of representatives (summer 2009).

MS-Code	MS	Names	Email
BE-F	Belgium-Flanders	Ilse Simoens	ilse.simoens@inbo.be
CZ	Czech Republic	Marie Prchalova	marie.prchalova@hbu.cas.cz
		Jan Kubecka	kubecka@hbu.cas.cz
DE	Germany	David Ritterbusch	david.ritterbusch@ifb-potsdam.de
		Uwe Brämick	uwe.braemick@ifb-potsdam.de
DK	Denmark	Torben Lauridsen	tll@dmu.dk
EST	Estonia	Teet Krause	teet.krause@emu.ee
		Anu Palm	anu.palm@emu.ee
FR	France	Christine Argillier	christine.argillier@cemagref.fr
		Stéphanie Pédron	stephanie.pedron@cemagref.fr
LV	Latvia	Janis Birzaks	janis.birzaks@lzra.gov.lv
LT	Lithuania	Tomas Virbickas	tvirbickas@takas.lt
NL	Netherlands	Eddy Lammens	eddy.lammens@rws.nl
		Nico Jaarsma	n.jaarsma@witteveenbos.nl
SK	Slovakia	Vladimír Kováč	kovac@fns.uniba.sk

The leadership of the CB-GIG for fishes in lakes has been taken by Germany (David Ritterbusch). GIG-Coordinator for all BQE is Marcel van den Berg (NL - marcel.vanden.berg@rws.nl). The IC process is coordinated at the European Commission Joint Research Center (JRC), Institute for Environment and Sustainability (IES) in Italy. Here the action 22002 takes place - European Ecological Water Quality Assessment and Intercalibration (EEWAI), please contact eewai@jrc.ec.europa.eu for general purposes. Sandra Poikane is in charge of the lake IC coordination (Sandra.Poikane@jrc.ec.europa.eu).
The CEMAGREF (Christine Argillier and Stéphanie Pédron, France) investigates the possibilities of developing a European system to assess the ecological status of lakes by their fish fauna.

Assessment systems

Status

Please find an overview of the Member States utilizing or developing lake assessment systems using fish fauna below (Table 2). The Czech Republic has no assessment system for fishes but has an official monitoring system which is by now re-organized. Latvia and Slovakia have no systems for LakeFish-assessment by now.

Table 2: Member States (MS) of the CB-GIG which have developed systems to assess the ecological status of lakes by their fish fauna, status of system (u. d:. under development, u. v: under validation, o. s.: official standard) and pressures addressed.

MS	Status	Pressures addressed
Belgium (Flanders)	u. v.	biotic integrity (habitat quality, water quality)
Germany	u. d.	eutrophication, shoreline degradation
Denmark	u. d.	eutrophication
Estonia	u. d.	eutrophication
France	u. d.	eutrophication, shoreline and catchment degradation
Lithuania	u. d.	eutrophication
Netherlands	o. s.	eutrophication, water level regulation

Seven Member States have LakeFish-systems which are more (BE, DK, NL) or less (other MS) elaborated, tested and validated. There is a profound basis on principles of assessment systems, typology, indicators and pressures to be indicated. On the other hand, only The Netherlands have an official system. Other systems need further development, improvement and/or validation.

Methods

Table 3: Fishing gear used for the assessment systems data collection of the Member States (EN is EN 14757, EN mod is close to EN 14757 but with some modifications).

MS	methods	Remarks / additional gear
Belgium (Flanders)	fyke electrofishing	
Germany	EN / EN mod	Some lakes were fished twice with half EN effort electrofishing (not included in system)
Denmark	EN	
Estonia	EN / EN mod	additional nets with large mesh sizes
France	EN	
Lithuania	EN mod	no mesh sizes smaller then 14 mm
Netherlands	trawl seine electrofishing	
Czech Republic		EN, hydroacoustics, electrofishing
Latvia		Gillnets, trammel nets, fisheries statistics Focus on species of commercial or recreational fishing
Slovakia	-	

While most of the MS rely on EN as a comparable basis for their LakeFish systems, the three MS with the most advanced systems (BE, DK, NL) use three different methods to gather information on the fish community.

Typology (natural lakes)

According to the WFD, the assessment systems have to be based on some kind of typology. Type descriptors for lakes are given in the directive itself (Annex II):

- altitude (< 200, 200-800, > 800 m)
- mean depth (< 3, 3-15, > 15 m)
- size (0.5-1, 1-10, 10-100, > 100 km²)
- geology (calcareous, siliceous, organic)

Based on these criteria an official common typology was set for the Central-Baltic GIG (see 2008/915/EC and WFD Intercalibration Technical Report Part 2:lakes). All types in the CB-GIG are lowland lakes < 200 m altitude. Hydrological water residence time was added to the typology. Three types were defined for the CB GIG:

L-CB1: shallow, calcareous (3-15 m, > 1 meq/l, 1-10 years of residence time)
L-CB2: very shallow, calcareous (< 3 m, > 1 meq/l, 0,1-1 years of residence time)
L-CB3: shallow, small, siliceous (3-15 m, 0,2-1 meq/l, 1-10 years of residence time)

The MS have based their typology mainly on the descriptors named above (Table 4). However, other descriptors are added in some cases (max depth, stratification yes/no). Three MS have a fish-specific typology, i.e. the typology is chosen in order to maximize statistical differences of corresponding fish community descriptors (DE, LT, *DK (?)*).

Table 4: Lake types of the MS for LakeFish assessment systems.

MS	**Nr.**	**types**	**descriptors**
Belgium-Flanders	1	standing waters	Lakes, ponds and canals
Germany	3	not stratified	functional
		stratified	functional, < 30 m max. depth
		stratified, deep	> 30 m max. depth
Denmark	9	LCB2 (shallow, no strat)	< 3 m mean depth, alkaline
		LCB1 (deep, stratified)	3-15 m mean depth, alkaline
		and 7 others (25%)	and others
Estonia	8	not stratified	Functional, avg. hardness
		stratified	Functional, avg. hardness
		soft and dark	
		soft and bright	
		and 4 others	
France	2	Small, deep, high alt.	< 1 km², > 20 m max depth, < 1500 m
		Large, shallow, low alt	- , < 20 m max depth, < 50 m
Lithuania	3	shallow	< 3 m mean depth
		interm. depth	3-9 m mean depth
		deep, stratified	> 9 m mean depth
Netherlands	5	shallow, buffered	< 3 m mean depth, 0.5 - 100 km², mineral
		deep, buffered	> 3 m mean depth, 0.5 - 100 km², mineral
		large, deep, buffered	> 3 m mean depth, > 100 km², mineral
		shallow, calcareous	< 3 m mean depth, 0.5 - 100 km², calcareous
		shallow, peat lake	< 3 m mean depth, 0.5 - 100 km², organic
Czech Republic			No natural lakes > 0.5 km²
Latvia			No typology
Slovakia			No typology

The typologies of the MS are different, but so close, that it should be possible to find a common typology for the GIG. The most important descriptors are mean depth and alkalinity. So with the official typology L-CB1, L-CB2 and L-CB3 many water bodies will be covered.
On the other hand, it is important to use a typology that reflects differences of fish communities the best. In my opinion, the most apparent difference is between stratified and non stratified lakes (supported by EST, LT). Thermal stratification and oxygen depletion will severely affect all benthic species which are essential or even dominating fish communities (*Perca f., Abramis b.*), especially if investigated with multimesh-gillnets. Statistical analyses of fish communities showed that differences between stratified and non stratified lakes were greater than between types dependent on other descriptors including mean depth (DE, LT).
Unfortunately, the mean depth threshold values given by the WFD do not separate stratified lakes from non stratified lakes. In our investigations of 116 German lakes, the maximum mean depth of a non stratified lake was 7.1 m, the minimum mean depth of a stratified lake was 4.0 m. It is possible to objectively determine if a lake is functionally stratified or not by using the ratio of max depth and mean depth (unpubl. results). Stratified lakes can be divided in intermediate and deep lakes, threshold values of 9 m mean depth (LT) and 30 m max depth (DE) are comparable.

If we are looking for a common typology, we have two possibilities:
- Take the official typology. Advantages: no changes of typology for the systems present (DK, NL), no need to justify the typology towards the EC. Disadvantage: the possibility that the assessment of ecological status of L-CB1-lakes is complicated by non-anthropogenic, stratification-dependent fish community differences.
- Develop a fish-specific typology using stratification. Advantages: the possibility of a better assessment of fish community changes by anthropogenic influences. Disadvantages: some MS have to check the suitability of a new typology, and this typology needs to be justified.

It might be of interest, that the BQE phytoplankton of the CB-GIG also aims to implement a typology including stratification (U. Mischke, pers. comm.).

Of course, the typology will not cover every water body. But we should focus on a selection or the most frequent lake types. We will have to discuss how to handle rather rare or otherwise special lakes (e.g. soft water lake types, naturally acidified lakes) and HMWB/AWB.

Pressures and reference criteria

Relevance of potential pressures

The MS were asked to comment the list of potential pressures and the corresponding reference criteria that was agreed on at the 2. meeting in Ranco. Pressures marked with a ² have a Yes/No classification, those with a ³ have a low/medium/strong classification. The MS indicated if the pressure:
- is **relevant** in the MS. This means, it has influences on fish communities and is a pressure that should be considered as relevant according to the WFD
- is **probably relevant**. This means the pressure should be considered as relevant according to the WFD, but it is unknown or doubtful if it influences the fish communities in the MS
- has **no influence**. This means the pressure should be considered as relevant according to the WFD, but is presumed to have no influences on fish communities in the MS
- is **not WFD** compliant. These are pressures not compliant/asked for by the WFD, independent on the fact if they have influences on fish communities or not. This reflects the opinion of the MS representative.
The results are listed in Table 5.

Table 5: Evaluation of potential anthropogenic pressures by the MS of the CB-GIG (total 10 MS) according to the list above.

Potential pressure	Reference	relevant	probably relevant	no influence	not WFD
Eutrophication					
Anthropogenic impact in the catchment area (c.a.)					
% natural c.a.	> 80 %	5			5
Population density c.a.	< 10/km²	4			6
Total phosphorous	12 µg/l	5			5
Acidification					
pH	6-9	2	3	5	
Anthropogenic acid.	No	1	3	6	
Hydromorphological modification					
Catchment impounded by upstream barriers[2]	No	2	3		5
Downstream barriers[2]	No	3	1		6
Water level regulation[2]	No	4	3	3	
Modification shoreline	< 10 %	5	2	3	
In-lake					
Urban discharge[2]	No	3	6	1	
Activities[3]	Low	3	5	2	
Biol./chemical manipulation[2]	No	1	3	6	
Stocking[2]	No	2	2		6
Fisheries[3]	low	5		1	4

Summary of comments on potential pressures

Please find a summary of comments on the potential pressure list below. I have listed pros and contras for controversial pressures as well as comments on the reference criteria (if there were any). I tried to be as objective as possible. My comments can be found in the boxes.

Landuse and population density in the catchment area:

Pro: Landuse and population density give information on eutrophication of lakes, especially on the anthropogenic part, as activities in the c. a. are the main source of anthropogenic N and P. It is therefore a human influence that can change the status of a lake and has to be mitigated if a better status has to be achieved. From a pragmatic point of view it is the best parameter we have, which is obtainable, and laid down in several European documents (e.g. WFD Intercalibration technical report).

Contra: Landuse and population density do not necessarily correlate with eutrophication, as their effect on the lake is dependent on many other factors, e.g. sewage treatment. The assessment systems are supposed to identify the ecological status of lakes, not their catchment area.

Total phosphorous:

Pro: An increased TP is a direct effect of anthropogenic impacts. With TP being one of three parameters for eutrophication, a eutrophic lake without anthropogenic impact in the c.a. can still be in reference status.

Contra: TP is not a parameter of anthropogenic eutrophication, it describes the actual trophic status of a lake instead. Shallow lakes can have high TP values in their reference status.

Reference: Threshold values for TP have to be type-specific and are dependent on morphometric properties like depth and size. Several MS described a reference value for TP of 12 µg/l as too low.

Eutrophication: The comments on the eutrophication parameters are strikingly converse. While half of the MS consider the chosen parameters to be important, the other half considers them to be out of the aim of the WFD. It is remarkable, that half of the MS neglect TP as a suitable parameter. All existing systems or approaches for LakeFish assessment address eutrophication as the most important human pressure and all of them have used TP as a measure of eutrophication during system development. But none differentiates between anthropogenic and natural shares of TP. Maybe other BQE can help us with this problem.

pH / Acidification: Acidification is regarded as an anthropogenic pressure compliant with the demands of the WFD. It needs to be taken into account (common agreement). However, pH can only be used as a reference criterion if deviation is anthropogenic. After all, acidification seems to play a minor role in the CB-GIG and is relevant for a limited number of water bodies/lake-types (e.g. peat bogs).

Upstream/downstream barriers:

Pro: Barriers are a very important anthropogenic impact, especially if they occur in cascades. The presence of barriers is the only parameter for hydrological alterations. Barriers are important, but only if they prevent fish from migration.

Contra: The impact of barriers should be assessed by systems developed for rivers. Our assessment systems should focus on lakes, not on pressures taking effect upstream or downstream.

Reference: Spatial distance should be taken into account.

Barriers: The same controversial situation as it is for eutrophication parameters. It appeared to me as if hydrological and migration barriers were not discussed separately in the comments.

Water level regulation and modification of the shoreline: We have a common agreement that both pressures are in concordance with the WFD and can have influences on the fish community. The extent of these influences appears to be very different in the MS of the CB-GIG. However, these pressures have to be taken into account for reference conditions and assessment systems.

Reference: Some MS assume, that modification of the shoreline has effects on fish communities at high values only and thus the threshold value would be too low. On the other hand, there is no scientific basis for this assumption and/or further discussion.

Urban discharge, activities and biological/chemical manipulation: It is commonly agreed that these pressures have the potential to negatively affect the fish community and are compliant with the demands of the WFD. However, their influence seems to be difficult to estimate (urban discharge, activities) or takes place at a very limited number of lakes (manipulation). Comments on activities indicated that they are of no importance or effect the fish communities by modification of the shoreline only. Others discussed that these activities represent disturbance and pollution, too.

Stocking and fisheries:

There is no doubt in the GIG that fishing and stocking do have effects on the fish community. The stocking with pikeperch and pike seems to be the most important influence. The intensity of both, stocking and fishing, is very diverse in the MS. Their effects range from no changes (especially in large lakes) to a complete lack of 'natural' fish communities. Apart from this, there is a well balanced disagreement in the MS whether fishing and stocking are descriptors of the ecological status according to the WFD or not.

Eutrophication, hydrological barriers and fisheries management present a major problem in selecting relevant pressures and reference conditions:

Do we have to take into account anthropogenic pressures for setting reference conditions, even if they are not addressed by the WFD?

Pro: A fish community altered by these pressures is not in a reference status any more.

Contra: If we include these pressures in setting reference conditions, deviations of fish communities from reference and an incorrect evaluation of the ecological status might be the result of influences that are non-anthropogenic or not WFD-compliant.

Additional pressures

We had some comments on additional potential pressures, too:
Barriers for fish migration:
Pro: Important descriptor of biological integrity. Migration barriers affect the species number.
Contra: Difficult to assess. Migratory fish are not abundant (salmon) or cannot be caught representatively with gill nets (eel). Assessment systems should focus on fishes only dependent on the lake itself. Barriers should be evaluated by river assessment systems.
Oxygen availability: Is a measure of eutrophication.
Suspended particulate matter: Is a parameter for intensive land use and erosion in the catchment area as well as motorized boats, shoreline changes and draining activities. It has effects on light transparency, primary production and thus on the fish stock. It will also effect the fish stock directly, e.g. visual predators.

Indicators

Indicators of the assessment systems

Indicators are properties of fish communities that are altered by anthropogenic pressures. They are used to quantify impacts and evaluate the ecological status of the lake. There are quite a lot of approaches for LakeFish-assessment systems in the GIG. So the knowledge on useful indicators is advanced. Some indicators were identified with the use of statistical analysis, others were chosen by expert judgment and proved to be useful. A summary of the indicators is given in Table 6. The table shows that several indicators are shared by two or more MS. Especially bream and perch seem to have a high potential to indicate anthropogenic pressure in the CB-GIG.
Concerning Table 6, indicator and detail are self explanatory, the other columns show:
↑ ↓: The indicator increases (↑) or decreases (↓) with increasing pressure/deterioration of ecological status.
Lake type: The lakes are preliminary divided in three types using their mean depth.

Shallow	< 3 m
Interm.	3-x (x is 15 for DK, 9 for LT, app. 11 for DE*, app. 7,5 for FR*)
Deep	> x

** I used a regression line between max and mean depth to estimate mean depth equivalents. FR has no subdivision of intermediate and shallow lakes.*
Some of the indicators **indicate** specific anthropogenic pressures (mainly eutrophication). Others are used to identify a combination of pressures or a general degradation of habitat quality (termed comb.).

I believe we have a very good basis to choose indicators to develop a common system in the GIG. Various MS have made intensive investigations to develop their systems. Many of the potential indicators were not used in the assessment systems. So beside Table 6 is a lot of additional, 'hidden' knowledge on potential indicators and a lot of information laid down in literature. It should be possible to make a preliminary extensive proposal of potential indicators. Based on this list, the most useful can be picked out, specified by unpublished results and expert knowledge of the MS. Should we head for pressure-specific indicators and assessment system or not?

General comments and problems

- Methodology of fish stock assessment: There is a high variability of all methods. No method can reliably prove presence / absence or abundance of rare species (often small and bottom-dwelling). Large piscivorous fishes, large bream and tench cannot be caught representatively by EN-standard.
- There are few useful indicators with low variability.
- Some indicators are bidirectional or unimodal at a certain ecological status (species number, WPUE, % piscivorous).
- The reaction of some indicators is dependent on lake types (e.g. mean individual biomass or % perch decrease in shallow lakes due to eutrophication, but increase in deep lakes).
- Species number: A very problematic indicator, although directly mentioned by the WFD. It is strongly dependent on methods and effort, on lake area and connectivity. For some pressures this indicator is unimodal with the maximum at a certain status, i.e. increases with anthropogenic pressure to a certain degree (eutrophication and shoreline degradation).
- Additional indicators suggested: Max. depth inhabited by fish / max. depth of the lake indicates the percentage of lake where fish can live (parameter for eutrophication and pollution).

Table 6: Indicators used in the LakeFish assessment systems or approaches of the CB-GIG.

indicator		detailed	Lake type	indicates	Country
General					
Total species number	↓		all lakes	comb.	BE-F, NL
	↓		deep	comb.	FR
	↑		deep	eutroph.	FR
NPUE	↑		shallow	eutroph.	DK
	↑		interm.	eutroph.	DK
WPUE	↑		-	comb.	BE-F
Indiv. biomass	↓	mean ind. biomass	interm.	eutroph.	DK
	↑		deep	eutroph.	FR
Species					
Abramis b.	↑	% number	shallow	eutroph.	DK
	↑	% biomass	shallow	eutroph.	DK, DE
	↑	% biomass	-	comb.	BE-F, NL
	↑	median ind. biomass	shallow	shoreline	DE
Blicca b.	↑	% biomass	shallow	eutroph.	DE
Esox l.	↓	kg/ha	-	comb.	BE-F
	↓	% number	interm.	shoreline	DE
Gymnocephalus c.	↑	WPUE or % biomass (?)	-	eutroph.	EST
	↑	% number	shallow, deep	shoreline	DE
	↑	% biomass	interm.	shoreline	DE
Perca f.	↓	% number	shallow	eutroph.	LT, DK
	↓	% biomass	shallow	eutroph.	DE
	↓	% number	interm.	eutroph.	LT, DK
	↓	median ind. length	interm.	shoreline	DE
	↑	WPUE or % biomass(?)	-	eutroph.	EST
Rutilus r.	↑	% number	shallow	eutroph.	DK
	↑	% biomass	shallow	eutroph.	DK
	↑	% biomass	-	comb.	BE-F
Sander l.	↑	% biomass	shallow	eutroph.	DE
Scardinius e.	↓	% biomass	-	comb.	BE-F
	↓	% biomass	interm.,	eutroph.	DE
	↓	% number	interm., deep	shore, eutroph.	DE
Tinca t.	↓	kg/ha	-	comb.	BE-F
Tax. groups					
Cyprinids	↑	% number	Deep	eutroph.	LT
	↑	% biomass	interm.		

Funct. groups					
indifferent (to flow)	↑	% biomass	interm.	eutroph.	DE
non-native species	↑	% biomass	-	comb.	BE-F
mean tolerance value	↓	-	-	comb.	BE-F
Perca f. + Rutilus r./	↓	% biomass	all types	comb.	NL
eurytopic species	↓				
phytophilic	↓	% biomass	all types	comb.	NL
	↓	% number	shallow	shoreline	DE
phytolithophilic	↑	% biomass	deep	shoreline	DE
planktivore	↑	species number	deep	comb.	FR
piscivore	↓	% biomass	interm.	eutroph.	DK
piscivore/non pisciv.	↓	% biomass	-	comb.	BE-F
tolerant species	↑	species number	deep	comb.	FR
	↑	% number	shallow	eutroph.	LT
	↑	% number	interm.	eutroph.	LT
Species tolerating	↓	% biomass	all types	comb.	NL
low oxygen level	↓				
Stenothermic	↓	Species number	deep	eutroph.	LT
	↓	NPUE	deep	eutroph.	LT
Stenoth. + Perca f.	↓	% biomass	deep	eutroph.	LT

HMWB/AWB

Artificial or modified water bodies play a very different role in the MS. Please find below a summary of the comments:

- Belgium-Flanders: Almost all lakes are of anthropogenic origin from sand pits, gravel pits and reservoirs (one exception).
- Czech Republic: All lakes > 50 ha are artificial (a number of 70, of which 30 are monitored). The colleagues hope that typology and reference conditions for natural lakes will provide a valuable guidance for the assessment of artificial lakes.
- Denmark: Only few artificial lakes (brown coal open mining areas, gravel pits, reservoirs). No typology and not enough water bodies / data to develop one.
- Estonia: Approximately 50 % of the water bodies are artificial, potential indicators exist for six of them.
- France: Has developed a preliminary system with two types of reservoirs (Reservoir 1: large area, > 35 m max depth, high shoreline development factor - Reservoir 2: small area, app. 20 m max depth, low SLDF). Preliminary indicators for Reservoir 1 are: tolerant species, planctivorous species, mean individual biomass, for Reservoir 2: strict phytophilic species. Water level fluctuation behavior is important and should possibly be added to the typology (e.g. low summer, autumn, winter and high in spring …).
- Germany: Artificial water bodies for Germany are lakes originating in areas of former brown coal open mining areas (some very large), gravel pits and reservoirs. No typology, indicators or system were developed for artificial lakes and there are not sufficient data to do so on a scientific base.
- Latvia: No remarks on this topic.
- Lithuania: Has some reservoirs and quarries. There is no special typology for artificial lakes, they are treated the same as natural waters. Data of fish communities are very scarce.
- Netherlands: Have an important amount of artificial water bodies (29 lake types, 10 of them are artificial). However, indicators and assessment systems are present for natural lakes only.
- Slovakia: Has no natural lakes with natural fish communities. Assessment of HMWB and AWB is not attempted because of the lack of reference conditions, standard methods, and especially, due to intense fishery management (both stocking and fishing) that currently defines the composition of fish communities in the reservoirs.

The HWMB/AWB have very different importances in the MS. Nevertheless, their relevance is too high to neglect them. Maybe the assessment of artificial lakes will be possible with modifications of an assessment system for natural lakes.

Comments on the future system development

Some contributions gave valuable hints on the possibilities of a common assessment system:

- A system based on presence/absence data will not work. The objective evidence of species depends too much on methods and effort.
- A system based on semi-quantitative data (species is rare, regular, abundant) could be applicable for all methods and fisheries statistics. However, there is no scientific method on how to assign comparable semi-quantitative frequencies to fishing data, fisheries statistics or inquiries of fisheries responsibles. A semi-quantitative approach will add even more uncertainty and variability. As a consequence, a common LakeFish assessment system has to be based on quantitative data.
- Some MS left out potential indicators, when they were more or less equivalent to others chosen for assessment (e.g. % number versus % biomass of same species, % Abramis b. versus % Cyprinids, % Sander l. versus % piscivore). The result is a low number of indicators, dependent on what is regarded to be equivalent or not. Other MS argued that there is no need to perform such a selection procedure.
- Potential indicators should not be excluded in advance (e.g. leave out piscivore and use perch instead because perch is the most abundant piscivore species and pike/pikeperch react conversely to eutrophication).
- NPUE and WPUE are useful indicators, if the same gear is used, % number/biomass are better for intercalibration.
- NL have an interesting approach for indicator selection. They divided the lake in main habitats and assigned characteristic species. The habitats are: open water, submerged vegetation, littoral zone and marsh. Characteristic species are pikeperch, bream, roach, perch, pike, rudd, tench and crucian carp (from open water to marsh). The indicators include all these species (species specific, combined or functional - see Table 6).
- We need more time! It is not realistic to assume that the intercalibration work for LakeFish could be finished in the next year (as asked for by the draft of the new IC Guidance).

The only way to proceed faster in our GIG is to combine the present assessment systems with knowledge obtained during the development processes and expert judgment. The result would be a semi-scientific step-by-step process:
- agreement on a common typology (for the most common lake types)
- definition of type specific indicators (if possible also pressure specific)
- set preliminary class boundaries for each method (using the existing threshold values, perhaps modified by expert judgment. The database of CEMAGREF can be used for EN 14757data).
- validation of the preliminary system in the MS
- adjustment of the selection of indicators and class boundaries

This procedure strongly relies on expert opinions and the will to make compromises. It is close to option 1, but with severe cutbacks in scientific accuracy, so we would have to justify this. Since even experts can be wrong, it is possible, that the resulting assessment system is useless or needs a time consuming improvement. It requires equal work of all MS, which makes it advantageous for MS without systems and disadvantageous for MS with well developed systems. The latter would have to assess all their lakes with a new system, but this will be manageable. The procedure is faster then waiting until we have at least two systems based on the same fishing methodology, but will take more then one year, too (I am afraid).

EUROPEAN COMMISSION
DIRECTORATE GENERAL JRC
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Institute of Environment and Sustainability

WFD Intercalibration Phase 2 : Milestone 1 report (for ECOSTAT meeting 1-2 October 2009)

The reporting for the second phase of the intercalibration exercise will be done according to the new guidance document that is in development. A first version of the guidance was distributed earlier. A new draft will be sent out to ECOSTAT members and GIG leads in the first week of September, for discussion at the ECOSTAT meeting of 1-2 October 2009.

The new guidance already foresees a 'Milestone 1' report for the autumn of 2009, with the following key elements:
– overview of the national assessment methods that will be intercalibrated
– check of their WFD compliance of the national methods
–'feasibility check' for intercalibration (do methods address common types and pressures, and follow a similar assessment concept?)
– progress on compilation of IC dataset

The template below follows the requirement of the (draft) guidance. All GIGs are kindly requested to submit their progress reports for the relevant quality elements following this template as much as possible. At this stage it is acceptable to leave empty those sections that have not been addressed in your GIG.

Also, you are requested to update the relevant sections of the intercalibration work plan (distributed as a separate document).

Depending on how the work has been organized, we expect one response for each quality element for each of the GIGs. In case of horizontal activities (e.g. large rivers) or where the work is carried out cross-GIG (e.g. fish in rivers), one coordinated response is expected. Please contact the IC steering group if you need any further clarifications:
Sandra Poikane (Sandra.poikane@jrc.eu.europa.eu) - Lakes
Wendy Bonne (wendy.bonne@jrc.ec.europa.eu) - Coastal/Transitional
Wouter van de Bund (wouter.van-de-bund@jrc.ec.europa.eu) - Rivers.

Please send your responses before 15th September 2009 to eewai@jrc.ec.europa.eu

Water category/GIG/BQE/ horizontal activity:	**LAKES / Central Baltic / Fishes**
Information provided by:	David Ritterbusch

1: Organisation

1.1. Responsibilities and participation

Please indicate how the work is organised, indicating the lead country/person.

Leader of BQE Fishes in Lakes and coordinator for all GIGs is France (Christine Argillier).
Leader of CB-GIG Fishes in Lakes is Germany (David Ritterbusch).
In 2009 the CB-GIG completed an overview of the assessment methods (typology, pressures, indicators) to preliminary estimate the feasibility of a future intercalibration process.

Are there any difficulties with the participation of specific Member States? If yes, please specify

No feedback could be obtained from the Member State Poland. Belgium-Wallonia has an own assessment system and was asked to join as a member 'state'. So far, no response was received.

Slovakia **joined** the GIG, but has no natural waters larger than 50 ha and no assessment system.

1.2. Work plan, Timetables and deadlines

Annex 1 to this questionnaire contains the GIG work plans as presented at ECOSTAT in April 2008 Please provide an updated version the general work plan for your GIG below

GIG CB Last update:
Quality element Fishes in Lakes
Overview of results achieved to date and issues to complete/improve:
Summaries of the following topics exist
- assessment systems and approaches
- methods
- typology
- potential pressures / pressures addressed by present systems
- indicators

The GIG has ten active Member States. One state has an official system for LakeFish-assessment and another state has a system under validation. Five Member States have systems under development. Three systems can be rated to have an advanced status, but all three are based on different methods of fish stock investigation. On this basis, it is very difficult to find a starting point for an intercalibration process.

Scope of the continuation work:
Main scope is to find an agreement for the BQE Fishes in Lakes on how to proceed on a GIG-level as well as on a European level.

Estimated timetable for the completion of the work:
At the moment, it is not possible to provide a timetable. Further results on the perspectives of lake assessment systems using fish fauna will be obtained at the next LakeFish IC meeting, September 22nd.
It can be foreseen, that the IC process will not be finished in 2010.

Comments:

2: Methods to be intercalibrated

2.1. Overview of Member States providing national assessment methods

Do you have an overview of the national classification methods that will be intercalibrated? If not: when will this information be available?

Yes, there is an overview of methods, their status, typology, pressures addressed and indicators used.

2.2. Checking of compliance of national assessment methods with the WFD requirements

*What are the arrangements in the GIG to verify the **compliance of national assessment methods** with the WFD requirements ? Has the GIG already started an evaluation of the compliance of national assessment methods with WFD requirements? Please give a short report on how this is done (or will be done)*

A first evaluation of the compliance of national methods with the more general requirements of the WFD has been made (typology, pressures addressed, use of 5 classes and EQR). A detailed report of numerical and statistical procedures (boundary setting) can be done, when a significant number of systems has been developed.

2.3: Progress on Feasibility checking: method acceptance criteria

The intercalibration process ideally covers all national assessment methods within a Geographical Intercalibration Group. However, the comparison of dissimilar methods ("apples and oranges") has to be avoided. Intercalibration exercise is focused on specific type / biological quality element / pressure combination. The intercalibration guidance foresees an "IC feasibility check" to narrow the actual intercalibration analysis to methods that address the same common type(s), the same anthropogenic pressure(s), and follow a similar assessment concept.

The task of the GIG is compilation of groups including similar assessment methods, and evaluation of "outlying" methods. A feasibility check includes coverage of **intercalibration types**, **pressures** and **method concept**. The aim of the check is to address if all national methods address the same common type(s) and pressure(s), and follow a similar assessment concept.

- *Has the GIG evaluated if intercalibration is feasible in terms of typology? Are the common type delineations suited for the specific BQE intercalibration exercise? Are all assessment methods appropriate for the intercalibration water body types? Are any types going to be added?*

The typologies of the member states are similar and comparable to the IC types. However, there is no common typology yet. It will have to be discussed, whether stratification as a type descriptor will be added or not.

- *Has the GIG evaluated if intercalibration is feasible in terms of pressures? Do all national methods address the same pressure(s)?*

All systems and approaches address eutrophication. Some systems point out additional pressures (degradation of catchment area or shoreline). There is no agreement on pressures relevant for reference conditions and pressures detectable with fishes.

- *Has the GIG evaluated if intercalibration is feasible in terms of assessment concept? Do all national methods follow a similar assessment concept? If the GIG previously encountered problems with regard to checking comparability of dissimilar methods, how are these resolved ?*

-

3: Progress on Collection of IC dataset and Design the work for IC procedure

3.1. Collection of IC dataset

Please describe progress on data collection within the GIG

The common dataset for the LakeFish IC process is compiled at the CEMAGREF (France, Stéphanie Pedrón and Christine Argillier). It should contain data from all European Member States that have performed fishing according to the EN 14757. For the CB-GIG these states are: Czech Republic, Germany, Denmark, Estonia, France and Lithuania. It can be expected, that the database is comprehensive and includes data of the complete geographical range, every ecological gradient available and pressures. Information about the status of this dataset can be obtained from the persons named above. No additional collection of data is available in the CB-GIG at this time.

2.4: Progress on Reference conditions/benchmarking

Which actions are ongoing/planned to compare reference conditions (including the results of the first phase) and boundary setting?

A set of relevant pressures and reference conditions was determined. However, opinions on selected pressures and threshold values are converse, at least in the CB-GIG. Since there is no agreement on indicators, there are no actions concerning boundary setting yet.

2.5. Design the work for IC procedure

Please describe progress of choice of the appropriate intercalibration option.

A clear agreement on the way of progress in the LakeFish IC has to be found at the next meeting on September 22nd. In principle, efforts have to be made to develop a common assessment system (either centralised or for each GIG separately). It looks like the basis of elaborated systems in the MS is too weak to implement a “real” intercalibration (option 1-3).

3. Further comments

-

A3: DEVELOPMENT OF A GERMAN LAKE TYPOLOGY FOR FISH-BASED ASSESSMENTS OF ECOLOGICAL STATUS/INTEGRITY

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Abstract

We compared the potential of different typologies based on morphometric and geographical descriptors to discriminate between fish communities in least disturbed lakes. The best discrimination was achieved by distinguishing three lake types: polymictic lakes, stratified lakes with less then 30 m of maximum depth and deep, stratified lakes with maximum depths above 30 m. We found good correspondence between the typology and the fish community structure in these lake groups. We conclude that this typology is appropriate for future German systems to assess the ecological status of lakes with the fish fauna according to the Water Framework Directive.

Introduction

In 2000 the Water Framework Directive (WFD) has implemented an ambitious goal: all European water bodies should have achieved a good ecological status until 2015. A prerequisite is the evaluation of the present status of the water bodies. This is (among others) done with assessment systems using biological quality elements (BQE: phytoplankton, macrophytes, macroinvertebrates and fishes). The systems compare the present situation with a reference situation in which the water bodies are not significantly impacted by humans. In order to assess the ecological status of the water bodies, the WFD stipulates the use of a typology. Developing assessment systems based on a certain kind of typology has two advantages: a) traits of the BQE which indicate human impacts can be type specific and b) for indicators that reflect impacts in all types, type specific boundaries between the ecological status classes can be set. A typology in the context of the WFD is a pragmatic tool to achieve more precise assessments. In contrast, it is no comprehensive description of abiotic preconditions, ecological networks or BQE community structures in nature.

The development of a typology to assess the impact of human pressures on a BQE has to be restricted to a few candidate parameters. It can neither be based on a potential pressure (like eutrophication) nor on any trait of the BQEs themselves. Therefore, WFD-compliant typologies are based on abiotic parameters, which are unlikely to be altered by human impacts. The Annex II of the Directive and various European guidelines give some suggestions on possible parameters and typologies (2008/915/EG 2008; CIS 2003a; POIKANE 2009).

It is well known, that morphometric, chemical, structural and functional parameters influence fish communities in lakes. These include lake area, depth and nutrients (APPELBERG et al. 2000; BROWNE 1981; ECKMANN 1995; GASSNER et al. 2005; HELMINEN et al. 2000; JENNINGS et al. 1999; JEPPESEN et al. 2000; MEHNER et al. 2005b; PERSSON et al. 1991; RYDER 1981; SONDERGAARD et al. 2005; WHITTIER 1999). In Germany, two distinct fish communities in depth-related lake morphotypes were identified (DIEKMANN et al. 2005; GARCIA et al. 2006; MEHNER et al. 2005a; MEHNER et al. 2004).

Therefore, a suitable typology improves the results of systems which aim to assess the ecological status of a lake by means of fishes. The present investigation compares existing typologies with respect to their potential to discriminate corresponding fish communities. We estimate their suitability for the BQE ‘Fishes’ and suggest a specific typology in order to provide an adjusted basis for assessment systems for Germany.

Materials and methods

Selection of least disturbed sites

The lake typology is needed to improve a potential assessment system in a way that type-specific indicators of anthropogenic pressures can be identified and type-specific boundaries of indicator reactions on pressures can be set. For these purposes, human pressures themselves should not influence the lake typology. Therefore, only lakes with low levels of human pressures are included in developing the typology. The situation in these lakes is close to reference conditions and equals the 'least disturbed conditions' (LDC) concept (JRC 2009).
The anthropogenic pressures considered in our investigation are shoreline degradation, human lake use and eutrophication. The impacts of shoreline degradation and human lake use on the fish community were estimated by experts on a four-step scale (no, low, intermediate, strong/very strong). The experts had scientific training and good knowledge of the lakes. They were employed at institutes dealing with investigations of fish communities and lake limnology. Shoreline degradation included the estimation of effects of swimming places, footbridges/marinas, woody erosion control, rip rap revetment and sheet pile walls. Human lake use included the presence of people swimming, boats without motors, surfing/sailing, motorboats and commercial shipping. Only lakes rated to have no or low anthropogenic impacts in both shoreline degradation and in-lake use were assigned to LDC sites.
To estimate anthropogenic eutrophication, two parameters had to be estimated: the actual trophic status and the status in undisturbed conditions. The trophic reference condition was calculated using a trophic index (TI_{ref}) based on morphometric properties of the lake: volume, area, depth, length and width. The actual trophic index (TI_{act}) was calculated by four weighted parameters (total phosphorous in spring and in summer, chlorophyll-a and secchi depth). The difference of both (Δ TI) is a measure of anthropogenic eutrophication: $\Delta TI = TI_{act} - TI_{ref}$ (eutrophication index instead of trophic index). A lake was assigned to be least disturbed by anthropogenic eutrophication if Δ TI was smaller than 1.0. This value equals the maximum of a potential transition from oligo- to mesotrophic or from meso- to eutrophic conditions. The calculations of TI_{ref} and TI_{act}, as well as accepting a difference between the indices of 1.0 without devaluation followed guidelines of the German Working Group on Water Issues (LAWA 1998).
From a total of 130 lakes in the database, 38 lakes had no or low impacts of both shoreline degradation and human lake use and a Δ TI below 1.0 and were thus selected as LDC sites for the development of a typology.

Typology

The typology for the LDC lakes was developed using morphometric parameters, a typology developed by the German Working Group on Water Issues (LAWA), the river catchment of the lakes and the German federal states in which the lakes are located. For the latter three parameters, the assignment of lakes is clearly given, but for morphometric parameters threshold values had to be set. The thresholds for morphometric parameters were pre-selected following values given by the WFD (WFD 2000), proposals of LAWA-directives (LAWA 2003, 2005; MATHES et al. 2002) and preceding results of ecological assessment of lakes using the fish fauna (MEHNER et al. 2005a; MEHNER et al. 2004). The WFD suggests some additional potential parameters for lake typologies which are not explicitly mentioned here, since all lakes investigated belong to the same type. These are lake category (all natural), ecoregion (all 14), altitude (all lowland) and geology (all calcareous).
Fehler! Verweisquelle konnte nicht gefunden werden. provides an overview of the groups chosen. The parameters 'depth gradient' and 'LAWA-typology' might need additional explanation. The depth gradient is the maximum depth divided by a theoretical depth of the epilimnetic layer, which is calculated by length and width of the lake (LAWA 1998). Lakes with depth gradients above 1.5 usually are steadily stratified in summer. Thus, the depth gradient is a

proxy of the stratification conditions.
The LAWA-typology distinguishes five types of lakes in the ecoregion 14 (lowlands), all of them calcareous (Ca^{2+} > 15 mg/l). These types are:

- type 10: stratified, catchment area is large when compared to lake volume;
- type 11: polymictic, catchment area is large when compared to lake volume;
- type 12: polymictic, catchment area is large when compared to lake volume, water residence time between 3 and 30 days;
- type 13: stratified, catchment area is small when compared to lake volume;
- type 14: polymictic, catchment area is small when compared to lake volume.

The catchment area is denoted as large, if the ratio of the catchment area to the lake volume is above 1.5 m^2/m^3. Type 12 represents flushed lakes and is not represented in the selection of LDC sites. Type 11 is represented by one lake only.
During the analyses it became evident, that stratification might be a very important parameter for a potential typology. However, the stratification criterion of the LAWA-typology did not always reflect the real or dominant situation in the lakes. This might be caused by an assignment based on the depth gradient or by morphometric individualities, e.g. the presence of stratification in limited areas of a lake. It can be expected, that the fish community structure is dependent on the dominating lake properties, not on individualities or limited specialities. Therefore, the concept of a 'functional stratification' was introduced. Each lake was carefully checked using literature (e.g. verbal lake profiles provided by federal environmental agencies) and asking experts who knew the place. For example, information like 'by far the most part is not stratified' or 'stratified in limited areas' led to an assignment of the lake to a functionally polymictic type. Lakes consisting of two connected basins were assigned to the stratification type of the larger one. In fact, the determination of the functional stratification was clear except of one lake with two basins of similar extent.

Fish sampling

Fishing data were available for 38 lakes which fulfilled the LDC criteria mentioned above. The lake areas ranged from 50 to 2,000 ha and the maximum depths from 1 to 70 m. The fishing campaigns were performed in the summers between 1999 and 2006 with only two lakes investigated before 2001.
Electric fishing was performed in all lakes. All structurally different habitats in the lakes were investigated in order to catch specimens of all species present.
In 28 lakes, fishes were caught with Norden multimesh gill nets following a European standard procedure (CEN 2005). Benthic and pelagic gill nets were set in a random stratified sampling design. The number of nets increased with lake size and depth. The nets were set before dusk and lifted after dawn. In 7 lakes with maximum depths below 6 m, pelagic nets were not used. For details of lake parameters and the sampling procedures see MEHNER et al. (2005a).
In 10 lakes located in the federal state of Schleswig-Holstein, fishes were caught with large seines/trawls by local commercial fishermen. These nets were put into the lake by boat and then pulled towards the shoreline using a motorized winch. Depending on lake size and effort, considerable areas between 20 and more than 200 ha were sampled.

Table 7: Parameters and limits used for the development of a typology for German lakes in the ecoregion 14 (without reduced or combined typologies).

parameter	groups	boundaries	comments
area [ha]	3	50-100	WFD
		100-500	refined
		> 500	originally 100 / 1,000 ha
mean depth [m]	3	< 3	WFD
		3-10	changed
		> 10	originally 3 und 15 m
maximum depth (a) [m]	3	< 10	MEHNER et al. 2004
		10-20	extended
		> 20	originally 2 groups (< 10 / > 10 m)
maximum depth (b) [m]	3	< 10	MEHNER et al. 2004
		10-30	extended
		> 30	originally 2 groups (< 10 / > 10 m)
depth gradient	3	< 1.5	New
		1.5-3.0	
		> 3.0	
federal state	4	Brandenburg	New
		Mecklenb.-Vorp.	
		Niedersachsen	
		Schleswig-Holstein	
river catchment	6	Elbe	WFD
		Oder	
		Warnow/Peene	
		Schlei/Trave	
		Eider	
		Ems	
LAWA-typology	4	type 10	LAWA
		type 11	
		type 13	
		type 14	

Analyses

For the analyses of the fish communities, we assumed that both net fishing according to the CEN standard and the seines/trawls provide reliable information on the fish species in the benthic and pelagic areas of the lakes. In combination with the results of the electric fishing, comparable data on the species inventory of a lake were obtained.

The catches of the electric fishing could be compared for 28 lakes (one dip with the electrode as common specification of effort). Standardized catches were calculated as number per dip for every species. Because fish were released alive, fish masses were not determined. These catches described the fish community in the littoral zones of the lakes.

A standardized species-specific catch for net fishing results was calculated for the lakes sampled with multimesh gillnets and expressed as number or weight per 100 m² net during one night including dawn and dusk. Comparable standardized catches could not be calculated for the seine/trawl fishing. Passive, stationary multi-mesh nets rely on the activity of fishes and were set during the night. The active seine/trawl-fishing was performed during daytime. Differences of species composition and size distribution can be expected. The catches of such different methods cannot be converted to a common effort.

All in all, six descriptors of the fish community were compiled as matrices with specific information on lake and species:

1. SI_{lake}: species inventory (presence/absence) of the lake (38 lakes, 31 species)
2. $NPUE_{lit}$ number per unit of effort in catches with electric fishing (28 lakes, 24 species)
3. $NPUE_{bent}$ number per unit of effort in benthic nets (27 lakes, 26 species)
4. $WPUE_{bent}$: weight per unit of effort in benthic nets (27 lakes, 26 species)
5. $NPUE_{pela}$: number per unit of effort in pelagic nets (20 lakes, 15 species)
6. $WPUE_{pela}$: weigth per unit of effort in pelagic nets (20 lakes, 15 species)

The six matrices were used to characterize the fish communities of the lakes. Statistic tests were used to identify, how well the pre-set lake typologies were reflected in differences of fish communities. The test used was the mean similarity (VAN SICKLE 1997), which compares the homogeneity in the groups with the homogeneity between them. Decisions on the suitability of a chosen typology were based on the mean similarity M, which is the ratio B/W (B: mean distance between the groups, W: mean distance in the groups). A lake typology can be regarded as useful to assess the fish fauna, if the fish fauna is homogenous in each of the lake types and heterogeneous between them. This is indicated by high values of M. The tests were based on a permutation procedure with 9,999 iterations and statistical significance of the values could be calculated. The matrices for quantitative fishing results (NPUE and WPUE) were compared using the SÖRENSEN-distance. For the species inventory, the JACCARD-distance was used because of its enhanced suitability for binary data.

In a second step, a combined matrix was created. It was intended to describe a unified fish community for each lake, rather than specific descriptions by electric fishing, benthic or pelagic nets and number or weight, respectively. For this purpose, the 20 LDC lakes represented in all five quantitative matrices were selected (NPUE and WPUE matrices). A total number of 25 fish species occurred in these lakes. Each matrix was rank transformed and the fish species with the highest abundance or weight got the highest rank (25). The ranks of each species in all matrices were summarized and arranged as a new 'combined matrix'. SÖRENSEN-distances were calculated for the combined matrix. Afterwards, the mean similarity M was calculated for the lake types specified by maximum depth, mean depth and LAWA typology. Subsequently it was checked, if the assignment of the lakes to only two types provides even higher M values. The following two-sided typologies were tested:

- polymictic lakes vs. stratified lakes (reduced LAWA-typology)
- lakes with a mean depth < 3 m vs. > 3 m (suggested WFD-typology, reduced)
- lakes with a maximum depth < 10 m vs. >10 m (as suggested by Mehner et al. (2004))

Additionally, a typology combining functional stratification and maximum depth was tested (polymictic / stratified < 30 m max. depth / stratified > 30 m max. depth).

In a last step, the lake typology was compared with a biological classification of LDC lakes by their fish community. To find a common descriptor of the fish community, the 4 matrices of net fishing results were unified to a combined matrix and underwent a rank transformation like described above (20 lakes). The data was processed with a hierarchical cluster analysis with the SÖRENSEN-distance and the flexible $\beta = -0.25$ procedure (MCCUNE et al. 2002).

Results

Effectiveness of typologies assessed by 6 fish community descriptors

Except of lake area, all typologies listed in **Fehler! Verweisquelle konnte nicht gefunden werden.** led to statistically significant discrimination of fish communities. However, differences in number and quality of significant discriminations were found (Table 8 - higher values of M indicate a better discrimination).

Table 8: Mean similarity M values for six fish community matrices in 'least disturbed lakes' as results of different typologies. Bold format marks permutation tests with $P < 0.01$. Details for the typologies are given in **Fehler! Verweisquelle konnte nicht gefunden werden.**, for the descriptors on page 5.

Typology	SI_{lake}	$NPUE_{lit}$	$NPUE_{bent}$	$WPUE_{bent}$	$NPUE_{pela}$	$WPUE_{pela}$	mean
Area	1.037	1.016	1.075	1.091	0.986	1.026	1.039
mean depth	**1.095**	1.042	**1.306**	**1.232**	1.150	1.170	1.166
max. depth (a)	**1.083**	-	**1.226**	**1.160**	**1.205**	**1.148**	1.164
max. depth (b)	**1.104**	**1.044**	**1.240**	**1.182**	**1.266**	**1.188**	1.171
depth gradient	1.037	1.016	**1.204**	**1.148**	**1.170**	1.090	1.111
federal country	**1.199**	1.045	**1.240**	**1.252**	0.945	0.918	1.100
river catchment	**1.148**	1.030	0.934	0.963	1.019	1.102	1.033
LAWA-type	**1.114**	1.027	**1.323**	**1.262**	1.110	**1.168**	1.167
Mean	1.102	1.031	1.194	1.161	1.106	1.101	

Independently of the typology chosen, the standardized catches with benthic nets are the most suitable matrices to detect differences in the fish communities. They show the highest number of significant discriminations and the highest means of the M-values for all typologies.

To obtain an estimate of overall suitability of the typologies, mean M values of all matrices were calculated. A typology based on maximum lake depth provided the highest mean M and significantly discriminated all matrices at a $P < 0.01$ level. The M-values of version b of the lake-maximum depth typology were higher than those of version a (see Table 8). The LAWA-typology was the second best and resulted in high values for M and a good number of discriminated matrices (4 of 6). Grouping the lakes by their mean depth led to high M values only for benthic nets, but did not significantly discriminate the littoral and pelagic fish matrices. If possible, the typology should be reflected in all habitats. Therefore, this typology was considered less suitable. Lake area, depth gradient, federal state and river catchment were less effective in discriminating the fish community matrices.

If summarized, the following two typologies show the most effective discrimination of the fish communities:

- maximum depth - 3 types (< 10 m / 10-30 m / > 30 m)
- LAWA-typology - 4 types (stratified with large catchment area (c.a.) / polymictic with large c.a. / stratified with small c.a. / polymictic with small c.a.)

Effectiveness of typologies if fish community matrices are combined

In the first step, the effectiveness of the typologies was tested using six different fish community matrices. In a second step, it is now investigated, how good the typologies discriminate the fish communities on the basis of the combined matrix. Additionally, we tested if 'less is more', i.e. whether reducing the typology to only two types provides a better discrimination.

Those typologies that well differentiated the six individual fish matrices also significantly

discriminated the combined fish community matrix. The highest M values were obtained by assigning the lakes to two types only (Table 9).

Table 9: Values of mean similarity M for a combined fish community distance matrix in 'least disturbed lakes' for different typologies.

Typology	N types	M	P
maximum depth b (< 10 / 10-30 / > 30 m)	3	1.180	0.0003
LAWA-types (10 / 11 / 13 / 14)	4	1.183	0.0001
maximum depth reduced (< 10 / > 10 m)	2	1.228	0.0003
LAWA-reduced (stratified yes/no)	2	1.270	0.0001
mean depth (< 3 m / > 3 m)	2	1.091	0.0210
functional stratification and und max. depth (polymictic/stratified ≤30 m/stratified > 30 m)	3	1.245	0.0001

The best discrimination was reached by the reduced LAWA-typology. A two-type division of the lakes according to their maximum depth also provided high values for M. Both typologies overlap to a certain degree, because stratification correlates with a lake maximum depth of 10-11 m (GARCIA et al. 2006). Therefore, a stratification-based typology should be chosen (higher M value). Mean depth again showed a lower suitability to discriminate fish communities and had lower M values and apparently lower significance.

The reduced typology based on the LAWA-types provided the best discrimination of the combined fish community matrix. The typology based on maximum depth (b) provided the best discrimination of the six individual fish community matrices, most of them being gear-specific. It can be expected, that future investigations of fish community responses to anthropogenic pressures will include gear-specific indicators to show habitat-specific responses. These considerations led to an additional typology which assigned a functional stratification index per lake and combined it with a threshold value for the maximum depth. High values for M were obtained. Therefore we suggest the following lake typology as a suitable basis to assess the ecological status of natural lakes larger than 50 ha located in ecoregion 14, although M values are slightly lower than for a typology based on stratification yes/no:

Type F1 (L_CB_DE_F1): polymictic
Type F2 (L_CB_DE_F2): stratified, less than 30 m maximum depth
Type F3 (L_CB_DE_F3): stratified, deeper than 30 m

In the following text, the types will be abbreviated by F1, F2 and F3. The complete designation as L_CB_DE_F (Lakes_CentralBaltic_Germany_Fishes) was chosen in order to separate German lake types for the lowlands from the alpine regions, where another typology is used.

Comparison of typologies and a biological classification

The suitability of the abiotic lake typologies described above was assessed by an evaluation of their potential to discriminate corresponding fish communities. Subsequently, a biological classification of the lakes will be given. A good correlation between abiotic typology and biological classification indicates an effective choice of abiotic parameters.

The biological classification had an M value of 1.327 ($p = 0.0001$) for the level of four cluster branches (groups). The biological classes are shown in Fig. 1 (marked with boxes). Information on abiotic lake types is added. The first division of the dendrogram separates the deep stratified F3-lakes from the other ones. The second division separates the stratified lakes with less then 30

m max. depth (F2) from the polymictic lakes (F1). The biological classification and the functional/abiotic typology are quite similar to each other. In 17 of 20 lakes the fish community class is in accordance with the lake type.

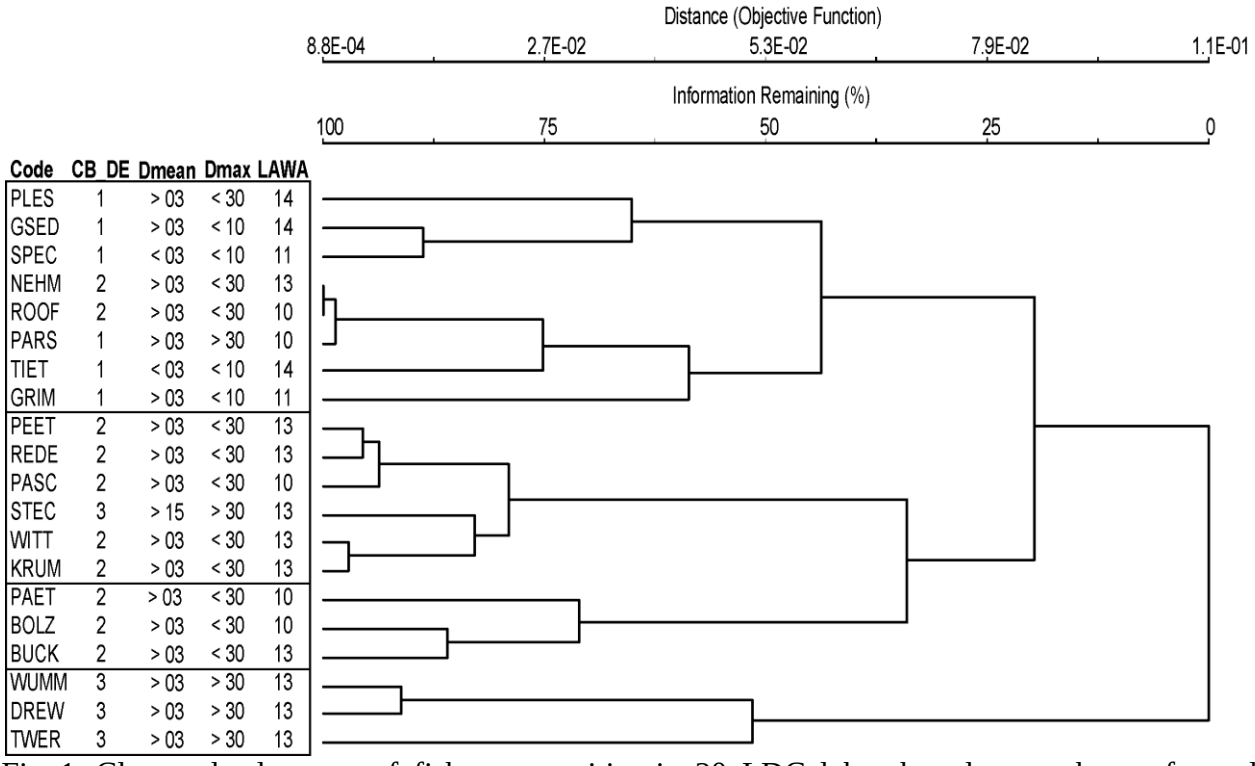

Fig. 1: Cluster dendrogram of fish communities in 20 LDC lakes based on rank-transformed standard catches in benthic and pelagic nets. Boxes on the left side indicate four biological classes. The table provides information on lake code and type (1st row_lake code, 2nd row: L_CB_DE_F typology, 3rd row: mean depth thresholds [m], 4th row: maximum depth thresholds [m], 5th row: LAWA typology).

The L_CB_DE_F typology and the biological classification differ for three lakes. These are Nehmitzsee (NEHM), Roofensee (ROOF) and Stechlinsee (STEC) which are located close to each other and connected by a canal. It is possible that the 'misclassification' is caused by particular geographical or anthropogenic features. Nehmitzsee and Roofensee have high standard catches of *Abramis brama* and *Blicca bjoerkna*, but low catches of *Coregonus albula* when compared to mean values of other F2 lakes.

The typology based on functional stratification and maximum depth is better reflected in the biological classification than the other typologies shown in Fig. 1. In contrast, no correlation with the biological classification is visible using the mean depth typology: 17 of 20 lakes belong to the same type. Therefore, mean depth is not suitable for a typology to assess the fish fauna, at least not with thresholds of 3 and 15 m. Typologies based on maximum depth only and the LAWA types are also less useful. All three types of maximum depths are mixed up in one biological class (PLESS-GRIM), and at least 5 lakes are 'misclassified'. The LAWA-types show no connection to the biological classification, apart from the stratification.

Discussion

We investigated how different typologies based on morphometric, geographic and other criteria are reflected in the discrimination of corresponding fish communities. The results highlight the dominant influence of depth (mean and maximum) on the fish community composition, as already mentioned in several previous investigations of German lakes (DIEKMANN et al. 2005; GARCIA et al. 2006; GASSNER et al. 2005; MEHNER et al. 2005a; MEHNER et al. 2004) and of lakes in the central plains of Europe (MEHNER et al. 2007). This is especially important in the context of assessment systems according to the WFD. Neither the directive itself nor additional guides and documents provide explanatory statements on the biological fundaments of the typologies suggested. The present investigation shows, that the typologies and thresholds provide significant discrimination of fish communities.

Similar results were obtained by earlier investigations. MEHNER et al. (2005a; 2004) discriminate two types of fish communities at a threshold of 10-11 m of maximum depth; a cold-water community with vendace and perch in deeper lakes and a warm-water cyprinid community in more shallow lakes. With regard to mean depths, a threshold of 3 m seems to separate fish communities (GARCIA et al. 2006). A typology according to the LAWA criteria also showed a good discrimination of fish communities, with the stratification component of the typology having much more influence than the relative size of the catchment area.

It became evident that both maximum and mean depths strongly correspond, but some lakes deviate from the regression line. Additionally, the thresholds chosen for mean depth (3 m) and maximum depth (10 m) are close to the mean values of polymictic lakes and thus do not separate them from the stratified ones (see Annex). We concluded with regard to the typology, that a bimodal stratification criterion might lead to a better discrimination of fish communities than an arbitrary threshold setting of a continuous depth parameter. The main reason is that polymictic and stratified lakes substantially differ in their vertical temperature profiles during the summer periods. Stratified lakes offer a continuously cool hypolimnetic volume throughout the seasons and thus provide suitable conditions for cold-water fish communites (DIEKMANN et al. 2005; MEHNER et al. 2005a). These arguments led us to the introduction of a typology based on functional mixing characteristics. As a final result, the best discrimination of fish communities was achieved by a typology based on functional stratification and maximum depth. This approach takes into account both depth and the biological/limnological effects of depth, i.e. stratification.

The results show the need of a fish-specific typology to customize the basis of assessment systems. For the future use in fish-based assessment systems for lakes of northern Germany we propose the following typology.

Type CB_DE_Fpoly: functionally polymictic
Type CB_DE_Fstrat: stratified, less than 30 m maximum depth
Type CB_DE_Fdeep: stratified, deeper than 30 m

The typology was developed using investigations of the fish communities with random stratified multimesh gillnets according to the CEN-standard. It is possible but not proven, that the typology is also suitable for other fishing gear.

The suggestion of these types in the framework of the intercalibration process requires the discussion of some practical aspects: conceptual compliance to the WFD and the feasibility of an intercalibration of fish-based systems within the BQE and with other BQE.

The WFD gives two options for the typology for lakes (Annex II 1.2.2, called Systems A and B). The two systems are similar in that they contain the same obligatory factors: geographic position, altitude, geology, size and (for lakes) depth (CIS 2003a). The L_CB_DE_F-typology replaces the mean depth parameter of System A by a stratification/max depth parameter, which both are parts of the System B. System B should only be used, if it provides the same degree of differentiation (WFD, Annex II, 1.1.IV.). This means according to REFCOND that System B should result in equally low or lower variability of reference condition values (CIS 2003a). We referred to high M

values of fish community matrices in LDC lakes to identify suitable parameters for the typology. High M values are obtained, if variability in a group is small. The LDC lakes are sites with minor or no impairment by anthropogenic pressures and close to reference conditions. We conclude, therefore that the typology is completely compliant with the definitions and the concept of the WFD. It is, however, not identical with the common intercalibration types used until now. During the intercalibration exercise, lake types including mean depth thresholds of 3 m were introduced termed L-CB types (2008/915/EG; POIKANE 2009). The L-CB typology focuses on the WFD System A and the needs of phytoplankton and macrophyte assessment systems.

However, the L_CB_DE_F-typology is unproblematic with regard to the future intercalibration process. National and international lake types can easily be translated into the typology suggested here, allowing all options of possible intercalibration methods. Furthermore, stratification characteristics and maximum depth might be easier to determine than mean depth. The fish typology is broad and each type will include lakes. The problems of too few lakes per type and the impossibility to assign lakes to the present types might be prevented. It should be noted, that the BQE phytoplankton also plans to distinguish between polymictic and stratified L-CB1 types to achieve a better basis for assessment systems (U. Mischke, pers. comment).

The suggested typology revealed to be the most suitable one by discriminating corresponding fish communities on both a gear/habitat-specific and on a combined level. It is compliant with the demands of the Water Framework Directive. We conclude that this typology should be the basis of future German systems to assess the ecological status of lakes by their fish fauna.

Annex: Identification of polymixis in deep lakes

The L_CB_DE_F typology is based on mixing characteristics, which is a functional criterion. Some lakes are deep and stratified in restricted areas and thus functionally polymictic. We investigated 116 lakes in Germany, for which mean depth, maximum depth and functional mixing characteristics were known. The parameter stratified yes/no is not replaceable by single thresholds of maximum depth or mean depth (Table 10).

Table 10: Values of maximum and mean depth for German lakes of different mixing characteristics, given as mean (minimum - maximum).

	polymictic lakes		**stratified lakes**	
maximum depth	9.0	(1.0 - 39.0)	29.5	(11.3-53.0)
mean depth	3.3	(0.6 - 7.1)	11.0	(4.0-28.6)
n lakes	63		53	

However, mean depth and maximum depth can help to isolate lakes, where the assignment of mixing characteristic might need further support (e.g. by the help of knowledge of the place or depth profiles of temperature). The list is additionally explained by Fig. 2:

- polymixis: lakes with maximum depths below 11 m are polymictic OR lakes with mean depths below 4.0 m are polymictic;
- stratification: lakes with mean depths above 7.1 m are stratified (max. depth doesn't provide further information)
- individual check needed: an individual assignment is needed for lakes with max. depths above 11 m AND mean depths between 4.0-7.1 m.

The values given are obtained under the conditions of German lowlands and should be validated, if functional mixing characteristics are to be identified by depth in other countries or ecoregions.

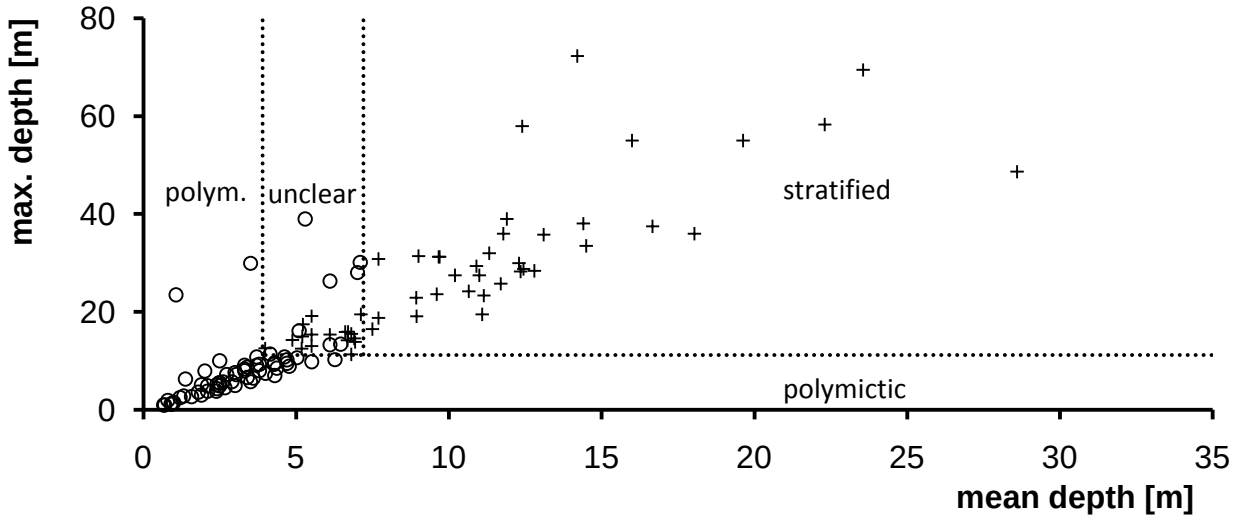

Fig. 2: Isolating lakes where mixing characteristics can clearly be identified by mean and maximum depth. Further explanations in the text.

A4: SECOND LAKE FISH INTERCALIBRATION MEETING IN DROTTNINGHOLM, SCHWEDEN 22./23.09.2009

Agenda

- Presentation of the results achieved in the GIGs: What has been done? Which difficulties encountered? What is plane to do? (Kerstin Holmgren, David Ritterbusch, Hubert Gassner & Serban Iliescu)
- Intercalibration – Fish specific problems - Christine
- New guidance and REFCOND WFD – Sandra
- Pressures data and reference sites: Pressures considered and test of thresholds, Distribution of references by countries, altitudinal classes, Comparison between national reference sites and new selected reference sites
- Structure of the European database, lake and fish data availability
- Connexion with WISER project
- GIGs, cross GIGs and WISER: the next steps

Minutes

- Nordic GIG – Kerstin Holmgren:

First exercise on fish data of CEN benthic gillnets – comparison of two assessment tools: Swedish and Finnish index. Preliminary analyses of the pilot study have been done on 640 lakes –subset of finish and Swedish –with publication of a report. Preconditions check – WFD compliance. Missing data in most of the pressures addressed in the European base. 7 lake types in the northern GIG but no fish sampled lakes in these existing types. Need to create more types? Results of the lake classifications. Swedish too conservative especially for Irish. For the same level of P, different values of the EQR 4 and 8, similar results for pH. One way to make clearer the results is not to include acidified lakes in the assessment of the response to TP. Effect of low species richness: mostly Norwegian lakes and Irish lakes. Proportion of native species: good response for reference values. Need for new common metrics

To conclude: Compliant assessment methods, common intercalibration types to define?, Sufficient reference lakes? Relevant and comparable procedures but different boundary setting procedures!

- Central- Baltic GIG – David Ritterbusch

Abstract of a questionnaire sent to all MS, Ten MS in this GIG - Systems exits in some MS but different methods, Typology – different criteria used by the different MS. Identification of the relevance of pressures according to the different MS : different points of view for several of them (antropogenic impact in the catchment area in particular) Indicators: Species number, Species : abramis, esox, gymnocephalus, perca, rutilus, scardinius, functional traits: phytophil, tolerant.

How to proceed: Impossible at the present time, Impossible to collect more data that in the European database, We need a quantitative assessment system, to rely on experts judgement and experiences, suggestion of a system then validated, Procedure very risky

Discussion: High heterogeneity in this GIG (result of two initial GIGs) and possibility to identify sub-types (est-west), if developed assessment systems are not following the WFD, it is possible to work just on those WFD compliant. If impossible to intercalibrate because of too different methods, it is possible to compare methods on some lakes. But according to Eddy L., it is sometimes very difficult because of local opposition. Official documents would be necessary to get authorization. Christine A. Is it plane to work on reservoirs in this GIG? Indeed, Czech Republic, UK, Denmark and France have HMWF, David R. Initially no.

- Alpine GIG – Hubert Gassner

Meeting in May, Objectives: to discuss sampling method, assessment method, Typology: based on historical fish communities in Austria whereas it is based on environmental parameters in France, Intercalibration: single assessment system, in others: preliminary assessment system,

Different sampling methods (electrofishing, gillnetting) and different reference conditions (historical & less impacted): intercalibration difficult
Idea: to compare fish sampling procedure but because of WISER: no comparison, to work on presence/absence or to intercalibrate some common metrics

- Eastern-Continental – Istvan Falka & Serban Illiescu

First, 5 countries were involved, now 3: Bulgaria, Hungary and Romania! Czech and Slovak Republics in the Central Baltic GIG. Huge differences in sampling protocols and common field exercise was achieved in July. Establishment of a list of lakes included in the intercalibration. Regarding the fish sampling protocol: it's sometimes impossible to use CEN (because of eutrophication & no clear water surface) and in that case, electrofishing is used. But, in some cases, when deep water from the shore, it's impossible to use electrofishing and electrofishing efficient in eutrophic lakes but less efficient in oligotrophics reservoirs. Sampling in fisheries: sometimes impossible. Moreover, this is the result of stocking. Fish is not a good indicator of the status of the lakes. Artificial fish communities due to stocking. Data only from Romania (lost of Hungary!) with CEN and electrofishing. Only 8 reservoirs and 3 natural lakes in the intercalibration. Problem: to get Hungary and Bulgaria in the exercise. Lack of historical data and less impacted lakes as reference probably more possible

- Discussion on the inclusion or not of reservoirs in the intercalibration

We have to be clear of the inclusion of fish in the assessment systems of reservoirs (Willie D.).
According to Sandra P., there are three possibilities: a) if reservoirs are dominated types in a region, and if BQE is not really impacted, it is possible to intercalibrate b) - other case: Netherland where most of the lakes are HMWB – include reservoirs with natural lakes, c) The last one: defining ecological potential as close as possible as high status of natural lakes.
For the intercalibration: requirement for the Good Ecological Status but not regarding the good ecological potential

- Mediterranean GIG – Christine A & MS experts

Different sampling strategies, No assessment methods, all under development, No enough data to start with the intercalibration, Necessary to work at a larger scale and to include others data

- Presentation of the BQE specific problems - Christine A.

Preconditions not fulfill in most of the countries and limited number of lakes in some countries that limit the development of pressures/impacts approaches. Necessary to work at a broader scale than the national and sometimes the GIG ones (Mediterranean and East continental). Existing assessment methods do not consider age structure except in Ireland. Which pressures age structure will assess? Water level fluctuation in reservoirs (Lourdes E.), acidification (Kerstin H. and Trygve H.) and fisheries (Martti R.). CEN protocol doesn't allow assessing the age structure (Eddy L.). It is possible to discuss the relevance of this metric (Sandra P.)

- Presentation of the new guidance - Sandra P.

Update the guidance because a lot of new experience. First draft by JRC in April, preliminary then a drafting group . Current version: number 5 to be discussed at ECOSTAT. Allow type specific approach
News: Flowchart of the IC process, WFD compliance checking, Checking of intercalibr-ability: is it possible to IC? Requirement for common dataset. Option 3 – preferable + common metrics. Alternative benchmarking and not only reference sites!
IC options: Same data acquisition and same numerical evaluation : option 1. Different data acquisition and numerical evaluation: option 2. Similar data acquisition and different assessment evaluation: option 3, common metrics on a common dataset
Benchmarking: Alternative to near natural conditions, still based on a common dataset, sites showing similar level of pressures (harmonized criteria) – common high-good or good-moderate boundary, biological communities at benchmark limits have to be described.
Way forward: Comparability criteria are still under development, planned end of November 2009, Draft- Discussions at October 2009 ECOSTAT meeting, Final draft – April 2010

ECOSTAT meeting

- Presentation of the work of the REFCOIND group - Sandra P.

Different criteria and different approaches used by MS/GIGs. What next? Refine reference concept, Develop harmonised reference criteria based on non-response thresholds, RC – possible or not? Alternative benchmark. All pressures or just few: True reference sites – all pressures, Specific reference sites – specific pressures (eutrophication or acidification for example), Pressure criteria or impact criteria (TP in lake)? Pressure for selection, impact for confirmation, to define threshold, maybe we have to look the non response, common agreement over GIG and as far as possible BQE

- Pressure's data and reference conditions - Stéphanie P.

Review of the list of criteria it was decided to collect in Ranco – status of the collected data. Data collected allow assessment of eutrophication and acidification for most of the lakes. Problems with collection of hydromorphological and in lakes pressures. Need to complete and/or precise the intensity of some pressures: Population density, shoreline bank modified, inlake activities, fisheries. Results of the selection of reference sites are presented. A very low number of reference lakes is identified in each GIG except in the Nordic one.

- Presentation of the database - Stéphanie P.

Review of the organisation of the database. Status of the fish and environmental parameters collected until now. Most of the fish data collected have been obtained in application of the CEN gillnet protocol. Different types of data (CPUE, biomass, number of fish, different types of lots…). Geographical heterogeneity of the environmental data collected. This database is now available for the work of the GIGs. Additional data should be included: a) to improve the description of the sites where fish data have been collected and b) to improve the fish dataset in regions where it is poor (Mediterranean and east-continental in particular).

- Discussion on pressures

Torben L.: How to define fishing activities? How to set up any threshold

Eddy L.: 1, 2 or 3 is OK. Stocking is probably more important but 1, 2 3 is also OK.

If stocking has been done for a long time as a restoration use, it is different of stocking each year. Different purposes on stocking. Differences between regular stocking and introduction of species that have been introduced since a long time and that were now established We have to send a questionnaire to identify how is understanding the 1, 2 & 3classification. Regarding exotic species, maybe important to work with guilds to assess their impact.

Willie D. Fishing pressure is a pressure on the fish community but it doesn't change the ecological status of the lake… Different opinion of Eddy L.

We cannot describe the ecological status of a lake if it is heavily impacted by stocking and fisheries. OK for stocking, not for fisheries because you can assess the impact. Hydroacoustic can be used to assess fish biomass (with differences between small and large fishes).

- WISER project – Torben L.

Use in connection with the cross GIG group, 36 months, 25 partners, 7 modules and 20 WPs

Fish in lakes : Module 3.

Objectives: To develop fish based assessment systems for hydromorphological and eutrophication, to improve lake fish methods.

Status of the WP: a database under development based on existing database and new data acquired on 21 lakes this year, hydroacoustics also on the same place

- Clarification of the Cemagref situation. Christine A.

The European database was build with the financial support of the French Ministry of the Environment. Now Cemagref will continue in the intercalibration and proposes to improve this database and to make it available for the GIGs. According to the new guidance, this intercalibration exercise has to be achieved at the GIG level.

In order to help GIGs in this intercalibration (in particular those with not enough data and those with no assessment systems available), Cemagref will start the development of a fish index based

on metrics at the European scale. To do that, it will use CEN gillnetting data of countries that accept to make available their dataset. The targeted pressures will be first eutrophication and hydromorphology. This work is funded by the WISER project that includes teams of UK, Norway, Germany, Italy, Denmark and France.

- Discussion on the future…

Not realistic to achieve this exercise before 2011 in all the GIGs. Maybe some piece of work that can be done. Maybe to identify on which type of lakes we have to develop effort.
For the Nordic group, it is possible to develop some common metrics.
In the Central/Baltic GIG, it is proposed starting a work on preliminary systems applied to some types. Metrics based on the existing assessment systems. Identifying which type of metrics it is decided to analyse.
Alpine: it seems difficult because differences in reference conditions and fishing strategies… More time needed to have a more precise idea
Eastern-Continental: Is could be plane to develop a common assessment method but we need some new data. It is maybe possible to work with the central Baltic GIG? Need to discuss with the MS involved.

- Workplan

All member states: make a review of fish, environmental and pressures data that they send to Cemagref to improve the European database.
Cemagref: Make available the database to the GIGs and provide necessary support in the process. Start to perform analyses at the European scale in order to test candidate metrics. The method implemented will be site specific and not type specific.
GIG's: exchanges in order to define some strategies to perform intercalibration following the recommendation of the new guidance when possible. If there is one or less methods in the group, discuss how to develop methods in this group. If this is not possible, suggest other ways to fulfill the requirements (e.g. join with other groups, include data from other ms, help to develop (area specific) common metrics and use these.
JRC: Make documents available on CIRCA. Take regular contacts to each GIG to ask for progress.
The GIGs coordinators and Cemagref will met in November in Ispra during the lake intercalibration meeting. They will write the workplan for the next 6 months based on the exchanges between MS that will follow the present meeting?
A new cross GIG meeting will then be organized if necessary to prepare the draft of the Milestone 2 in March or later in autumn.

A5: LAKE INTERCALIBRATION MEETING IN ISPRA, ITALIEN 05./06.11.2009

Phytoplankton BQE session

- Compliance criteria of assessment methods:

Completeness of methods: For abundance - All GIGs should set boundaries for both chlorophyll and biovolume; Taxonomic composition - to be developed in spring 2010 for countries that still lack this part; No GIGs have bloom metrics, such metrics to be explored in WISER/GIG expert group in spring 2010; Combination rules/multimetrics to be considered in autumn 2010.

- Compliance with normative definitions:

ALP GIG has performed compliance checking in the 1st phase, their approach will be sent to all GIGs in order to demonstrate how this can be done. NGIG have to demonstrate compliance with the WFD also for taxonomic composition metrics (if not sufficient after phase 1), CBGIG: compliance was thoroughly checked in phase 1 (for chlorophyll-a metrics), but should be checked/completed for taxonomic composition metrics once these are completed. MED GIG – need to check the normative definition for max, good and moderate ecological potential (as stated

in the WFD Annex V), and add further specifications on that as a basis for checking the chl-a boundaries from phase 1. Will be done through email exchange of draft of verbal definitions for these classes in spring 2010.

- Feasibility criteria:

In NGIG, ALP GIG and Med GIG methods are comparable, based on the same concept (but FR method still under development and have to be checked for comparability using option 3 in spring 2010). CBGIG: non-comparable methods for some countries (EE, NL). If these show large deviation from the other countries, either based on option 2 or option 3 IC, then their methods will have to be modified. This should be tested in an option 3 approach asap (during spring 2010) based on new CBGIG dataset. Types may need to be split to improve comparability; this will also be done through analyses of new dataset in spring 2010. EC GIG: Method of HU may not be comparable with Romanian method. EC lakes may not be feasible to intercalibrate at all for phytoplankton due to high natural TP (above saturation for phytoplankton). Decision on whether this is possible should be taken in spring 2010.

- Reference criteria:

Pressure table already filled in during the group session with info from Phase 1 and plans for Phase 2, but needs to be checked and completed with numbers for reference thresholds (see Table 1). CB, NOR and ALP GIGs will define Reference thresholds for each lake type, based on TP-concentration, either by using median TP for all reference lakes selected according to the agreed land use criteria, or using MEI model. For Alpine GIG the TP thresholds will be the same as already reported in the IC phase 1. Med GIG will define Reference thresholds based on land use criteria only. TP concentration may be difficult to use for reservoirs due to large water level fluctuations. All work for setting reference thresholds will be done once the GIG datasets are completed, so between January and March 2010.

- IC datasets:

CB GIG data ready by early Dec 2009 using WISER template, calculation of national metrics will be programmed; N GIG ready by early Dec 2009, using WISER template; Alp GIG ready by end of Dec 2009, but use in WISER is a matter of IPR for data owners (see under WISER collaboration below); Med GIG ready by mid-January 2010, using WISER template, additional data from Spanish reservoirs are in CEDEX database and will be checked for compatibility with WISER; database in mid-Nov, further data from Italy will come directly from WISER partner in Pallanza; EC GIG – access data base (HU) Gabor Borics is responsible –will get a reminder from WISER (Anne) to deliver data before the end of 2009. HU and ROo are ready, BU may come later.

- IC options, handling of incomparable methods

All GIGs will use option 3;, NOR GIG and CB GIG will also use option 2, based on common metric and/or common pseudo-metric estimated from the mean of normalized EQR of national assessments; MED GIG may also use option 2 depending on outcome from WISER common metric development; EC GIG may have incomparable methods: HU has its own method (functional groups); RO finished method for biomass & taxonomic composition (trophic scores).

- Common metric elaboration:

CB, NOR and MED GIG want to have common metric for tax. comp. and possibly also for combination rules / common multimetric for whole QE IC in collaboration with WISER; CB GIG wants also to work on common metric elaboration also on CB GIG level.

- WISER collaboration:

IPR (intellectual property rights) issues will be specified by each data owner and kept for each data set in WISER data base. It’s an obligation for data users (WISER partners and GIG experts) to check the IPR for each dataset before using the data for publication; two groups for data analysis on common metrics and on bloom metrics are suggested by WISER with experts from GIG´s and from WISER. First meeting to be held as videoconference in Dec and a physical follow-up meeting in Jan 2010.

Macrophyte BQE session

- Recap on actions from meeting on 04/11/09 (GP)

CB GIG data collection via template, expect all data by end December. Missing from template: regulated lakes (may have been excluded from original data – was in UK); helophytes; hydromorphological data for lakes already submitted. N GIG centred on eutrophication; Finland uses helophytes in national assessment method (but restricted list); Common dataset may not have helophytes, or not a full set; IC Option 3 won't work for countries that use helophytes;
When using a common intercalibration metric we need to know how compromised metric affects each MS!! As some of the CB GIG countries (mainly Baltic) also use helophytes consider comparisons of LCB3 with N GIG, at least for Finland and Sweden (low altitude lakes). Need to consider a revision of lake types.
GIG priorities: Finish eutrophication intercalibration: N GIG metric applied to CB- and ALP GIGs; NW's pseudo-metric; Add maximum depth colonisation metric (WISER action – MS); Include hydromorphology (WISER action – SH), Do we want to make another data request???

- Actions/stages for progress

CB GIG: Apply N-GIG metric to CB-GIG data (NW); Get MSs to apply own method to own lakes: provide component metrics and EQR for each lake; have so far asked only for status class; For each MS examine relationship between these two methods: identify weak relationships; Ask MSs to examine all lakes in common dataset, and determine component metrics and EQR (using compromised methods).
N GIG (Norway, Ireland, Sweden, Finland, UK): obtain updated data including cover: use CB GIG template (modified); BD to provide master list, including CB GIG taxa; increase species list with key helophytes (SH to do this, NW, AK to assist) – mid November; include already existing data; ask for measures at original unit, along with method; ask for sites that have HY-MO pressures, which they may have otherwise excluded; should we extend data call for N-GIG to LCB3 lakes – helophyte data?
ALP GIG: KP would like to combine data templates from other GIGs; she will use adapted template to collect ALP GIG data; apply N GIG metric (KP, and maybe NW)

- Overview of CB GIG data collection template

General discussion; template changes: new sheet helophyte records, indication of whether recorded or not: 0=absent, null=not recorded, other=present / per method (indicate in 'additional' sheet, or in 'taxon list' sheet?). Other determinants: Ca (only if no alkalinity); Data source by sample? SH will prepare an extra hydromorphology questionnaire. EQR values to be added (not only ecological status indication): Template to be sent out to N GIG, ALP GIG and CB - countries with LCB3 lakes; deadline for table - early December. GP to find the max depth colonisation collated in phase one, pass to Martin (MS); copy to all at intercal meeting; MS to take forward

- Discussion on general IC Guidance issues:

Views on WFD compliance criteria; Views on feasibility criteria; Views on reference conditions
Feasibility criteria: In general, different methods use different information: taxonomic groups (main example: helophytes – in- or excluded), abundance measures – cover/PVI, etc. Will need to use different methods to assess different countries, e.g. use national (full) and away (compromised) methods; need to quantify the degree of compromise involved in 'away' methods
Reference criteria: Possible: chl vs TP; Not possible (yet?): land use; Loads – are these available? Who should do this? GIGs? Special IC-Ref group? WISER? We will use Chl-a and TP as proxies for pressure; We will assume that literature is adequate to demonstrate relationship between these and pressure.

- WFD compliance criteria:

To postpone until next meeting; but Alpine GIG needs this done this year – she will share her work with all; related to feasibility

Benthic fauna BQE session

- WFD compliance criteria:

CB and AL had criteria already, NOR less detailed, but decision to use IC guidance criteria but additionally collect the following information: pressure(s) addressed by the method. Are all the relevant pressures taken into account? Reference condition: Is Refcond guidance followed? (incl. modeling) Is the method used in the actual national monitoring programs (officially adopted)?

- Feasibility criteria:

All GIG groups will try to follow the guidance.

- View on references in general and reference criteria:

NGIG considers acidity only for acidification methods and nutrients only for eutrophication methods – will collect additional data for hydromorphology; other GIG-groups don't need acidification parameters, since it is known that there aren't any pH problems and for most lakes some pH data are in the database. Parameters considered as relevant for macroinvertebrates. All parameters missing in one of the GIG-groups could be collected until February to August 2010, depending on GIG. N will have enough references, probably also AL, but CB and EC will have only few references - modelling or alternative benchmark will be at least partially necessary.

- IC datasets and pressure parameters:

All GIG-groups have common databases established. CB and AL cover eutrophication and hydromorphology as stressor parameters, N will try to include hydromorphology;

- IC options, handling of incomparable methods (e.g. CPET):

SE might additionally do option 3, but this will not be possible for all countries; Incomparable methods will be handled through parallel sampling of an intercalibrated method to create a linkage; if this will not succeed a direct comparison of stressor-classification relationships might be tried.

- Common metrics derivation:

metrics are/will be mainly derived by pressure gradients; GIG-group leader meeting is planned in February for intensive discussion when first results are ready.

- Alien species

Position paper of CB will be discussed by CB in January and distributed to other groups; Basic message: no downgrading due to presence of aliens, no addressing within status classification – instead within other parts of the WFD, e.g. the pressure assessment.

- WISER collaboration

Use of internal data (existing databases) by N- and AL-GIGs; AL-GIG: LESMA data (internal WISER data) as well as all GIG data will be input into the WISER database structure for WISER analysis; the newly sampled WISER data are input later (end of 2010); N-GIG: REBECCA data (internal WISER data) as well as all GIG data will be input into the WISER database structure for WISER analysis; the newly sampled WISER data are input later (end of 2010); EC-GIG: Data sampling in March; data template will be provided; data to in autumn to WISER; CB-GIG: GIG data will be input into the WISER database structure for WISER analysis; the newly sampled WISER data are input later (end of 2010); Database (CB, AL, N) for Wiser is planed to be in place end of January; WISER meeting in February in Rome then to discuss which work will be done by WISER to support the IC; WISER questionnaires on methods will be used within the GIGs for further updates for reports, compliance checking etc. (only the relevant questions;

Fish fauna BQE session

- WFD compliance criteria

NOR GIG: All taxonomic composition, abundance & aisturbance sensitive taxa metrics are fulfilled. Only Ireland assesses the age/size structure. CB GIG: For the existing and "under development" methods, all taxonomic composition, abundance & disturbance sensitive taxa metrics (except age structure) are used. Only one lake type in NL uses age/size structure. No assessment method for reservoirs. ALP GIG: For the existing methods, all taxonomic

composition, abundance & disturbance sensitive taxa metrics are used. Age structure for AT, IT & need to check for DE (Bavaria). MED GIG: No assessment method for reservoirs. EC GIG: No assessment method.

- Feasibility check

NOR GIG: Existing Methods and comparable data based on CEN standard gillnets, Different pressures (eutrophication & acidification). Different concept: Type-specific versus site-specific approaches in the different countries; More than half of the Nordic lakes are not classified in the different GIG types!! (cf. table 3). We have decided, at the Nordic GIG scale on a first step, to collect the surface and bottom temperature of every lake to consider the stratification in GIG type. With these data, we will be able to check if stratification could be also estimated by the data we already got in the EU database: altitude, mean/max depth and air temperature. We don't know yet if the NOR GIG or the cross-GIG will be in charge of this study.
CB GIG: Common data in 4 MS (DE, DK, CK, FR) of the 12 in the GIG ; 2 existing methods based on CEN standard (DK, DE), 2 others based on others data (NL, BE). A lot of lakes out of the existing GIG types. Pressures: eutrophication & shoreline degradation.
ALP GIG: Existing or under development methods in all the countries but 3 based on CEN data (AT, IT & FR) & one on fisheries data (DE – Bavaria); Common gillnet data in 4 of the 5 countries (Germany excluded) & common electro fishing data in 3 countries (France and Slovenia excluded); New common sampling in 2010; Pressures: eutrophication. Fisheries is an important issue in the AL GIG but difficult to assess. Method concept: 3 MS based on historical references (AT, IT & GE), one on less impacted sites (FR).
MED GIG: No assessment method. No data in IT, CY, GR & MT. Different kind of data cquisition in SP, PT & FR. Pressures: eutrophication & general degradation.
EC GIG: No assessment method. Just RO with CEN data.

- References or alternative benchmarks

List of pressures considered. Discussion on type specific or not… the refinement of reference sites selection and the description of reference conditions which are a key issue in EQR assessments need to be well assessed, especially with the data we have. To develop common metrics, we need common cross GIG reference condition. Problem in the Alpine GIG with historical reference conditions from AT, IT & DE (Bavaria) and reference based on sites with the lowest pressures (FR). We also need to think about the new types some countries will create among the GIG because if we want to harmonize reference thresholds through the BQE, it could be difficult to intercalibrate some types which are completely different from one BQE to another. For Reservoirs? How to consider water level fluctuations and associated pressures? We think about taking into account the different uses of the HMWB (Hydroelectricity, water)Alternative benchmark in some parts of Europe (southern countries).

- IC options & Common metric elaboration

NOR GIG: A first round of analyses has been achieved with the comparison of the Swedish (EQR8) and the finish (EQR4) indexes. The Irish index should be tested on all the dataset in few months. The NO GIG should use a mix of option 2 and 3 and developing some few common metrics on abundance and composition.
CB GIG: As few assessment methods in this GIG, a mix of option 1, 2 and 3 should used…WISER results are also expected in particular for countries without methods.
ALP GIG: Options 2 and 3. Austria will build some new metrics on abundance and composition to possibly intercalibrate with the other countries, because at the moment all Metrics are based on a loss/decrease/increase of species from historical data…
MED GIG & EC GIG: As no methods exist in these 2 GIG, we are supposed to wait for any assessment system or for the cross GIG index/WISER help, based on CEN gillnets to develop/test metrics on the dataset. Difficulties…

- WISER collaboration

WISER and IC lake datasets in most of cases correspond, except some countries, as Austria (see

below)

- Drafting of action plan

NOR GIG: Filling gaps in database for pressures (March 2010); apply Irish tool to the entire dataset (March 2010); exploration of fish communities and lakes characteristics in the reference dataset (2011).
CB GIG: Proposal of common metrics on CEN standard (spring 2010), discussion and validation (end 2010); WISER common metrics; Intercalibration with BE and NL (2011).
ALP GIG: Comparison of references …
MED GIG: WISER common metrics; Start discussion on hydromorphology and reservoir quality;
EC GIG: Send data to the common database (May 2010); New sampling (2010); WISER common metrics, WISER – Cross GIG: Age structure/size structure

- Summary: What is needed for the Lake Fish IC process?

Progress in intercalibration still needs: Development of assessment systems – where are not in place yet (the main gaps – EC GIG and MED GIG, partly ALP GIG and CB GIG). Harmonization of assessment systems – where assessment systems in place (the main gap - CB GIG where the systems are different). Harmonization of sampling methods and collection of new data in some countries and on reference sites.
The common tasks for all GIGs: To complete the common database with fish data (size and abundance), environmental data and pressures in particular pressures on activities and morphology + hydrology for reservoirs; To refine the reference sites selection and the description of reference conditions (or benchmark) which are a key issue in EQR assessments at the European level (i.e. for countries and GIGs without methods);