出國報告(出國類別：開會)

出席第 3 次日本鰻及其他鰻科學家會議及第 17 屆鰻魚資源養護與管理國際合作非正式會議

服務機關：農業部漁業署

姓名職稱：林緣珠副組長、鄭又華科長、張惟翔科長及張雅棻技士

派赴國家：日本東京

出國期間：113 年 6 月 2 日至 6 月 8 日

報告日期：113 年 7 月 17 日

摘　要

日本鰻是台灣重要高經濟水產養殖魚種，捕撈鰻苗亦是臺灣沿海漁民冬季重要傳統產業，然而養鰻產業所需之鰻苗皆來自野生捕撈，近年東亞地區鰻苗捕獲量頻創新低，目前鰻苗仍無法以人工繁殖方式量產，嚴重影響整個東亞的鰻魚產業。國際亦高度關切鰻魚資源量問題，其中國際自然保護聯盟（IUCN）已於103年將日本鰻列入紅皮書中的「瀕危物種」，歐盟已於105年9月-10月的華盛頓公約(CITES)第17屆締約國大會提案加強調查鰻魚資源量及貿易情形，鑒於2007年將歐洲鰻列入附錄二，並進行嚴格管理，倘鰻鱺屬於2025年CITES COP20被提列附錄二，生產國及消費國之貿易將被檢視交易合法性，並被要求提出「無危害證明（NDF）」文件，此在我國產業實務執行上確有困難。

鑑於國際對於鰻苗資源管理日益重視，爰自2012年起，臺灣、日本、中國大陸等經濟體業於APEC架構下交換彼此鰻魚資源管理之情報，迄今已召開16次「鰻魚資源養護與管理國際合作非正式會議」(下稱鰻魚國際非正式會議)，並於2014年第7次鰻魚國際非正式會議時由臺灣、日本、中國大陸及韓國共同發表「聯合聲明（Joint Statement）」，共同推動鰻魚放養量管控等管理措施，並籌組「永續鰻魚養殖聯盟（ASEA）」，強化落實推動鰻魚產業的自主管理。另各國於2021年第14屆鰻魚國際非正式會議中與會各國同意召開日本鰻及其他鰻科學家會議(下稱科學家會議)，廣邀各方科學家討論東亞地區日本鰻資源養護與管理與研究現況，並以科學根據為基礎，提供鰻魚國際非正式會議相關資源養護管理建議，作為今後東亞各國合作方向，迄今已召開2次。

本次第 3 次科學家會議及第 17 屆鰻魚國際非正式會議分別於 2024 年 6 月 3 日至 4 日及 2024 年 6 月 6 日至 7 日接連於日本東京召開，計有日本、南韓、中國大陸及我國等四個經濟體出席，我國由本署林緣珠副組長率署內同仁、產業、學界代表、財團法人中華民國對外漁業合作發展協會及駐日本代表處經濟組與會。前開 2 場會議內容分別摘述如下：

一、第 3 次科學家會議

(一) 本次會議持續由日本東京大學八木信行教授(實體參與)擔任主席及青山潤教授(線上參與)擔任副主席。

(二) 東亞四國（中國大陸、日本、韓國與臺灣）之日本鰻捕撈及科學活動概況分享。

(三) 非會期之任務組合活動報告。

(四) 東亞四國以新興科學且實用有效的方式管理東北亞地區的日本鰻資源。

(五) CITES 公約中關於日本鰻及其他鰻現況討論。

(六) 2025 年科學家任務分組線上會議預計於 2025 年 1 月至 2 月舉辦；第 4 次科學家會議及第 18 屆鰻魚國際非正式會議預計於 2025 年 5 月至 6 月召開。

二、第 17 屆鰻魚國際非正式會議

(一)本次會議持續由日本農林水產省顧問森下丈二擔任主席。

(二)由第 3 次科學家會議主席八木信行教授報告科學家會議總結。

(三)由各方檢視 2023-2024 年漁季各國鰻魚（含鰻苗）之捕撈、養殖、貿易等相關統計數據，各國放養量均低於 2014 年聯合聲明所訂放養量上限。另日本請中國說明 2020 年異種鰻突然下降，且數字改變為整數原因；及韓國與中國均分別詢問各國鰻魚進口狀況。

(四)審視各國目前採取之鰻魚資源保護管理措施，各國針對國內相關管理措施修正部分進行說明，並進行管理實務意見交流；同時與會成員確認下 2 期漁季(2024-2025 年、2025-2026 年)日本鰻及其他鰻放養量上限。

(五)日本分享有關日本鰻及其他鰻於相關國際組織討論概況。

(六)各方針對建立具法律約束力之國際/區域性管理組織進行意見交流，各方均表示建立具法律約束力之國際/區域性管理組織將有助於管理，而組織架構、如何運作及各國應如何合作之細節等須再研議。

(七)通過日本鰻及其他鰻科學家會議及任務分組 1、任務分組 2 職權範

圍(Terms of Reference，簡稱 ToR)。

(八)各方同意聯合秘書處說明之繳交會議資料時程，而現有資料期限後中國將提供更新數據。

(九)日方提議由該國續辦第 4 次科學家會議及第 18 屆鰻魚國際合作非正式會議，並預定於 2025 年 5 月至 6 月在東京或其他主要鰻魚養殖縣市辦理；另考量明年秋天將舉行 CITES 提案國會議，確切會議時間及地點將進一步諮商後決定。

(十)中國提案推動國際聯合研究合作計畫，以利爭取研究經費，主席鼓勵科學家在會議期間就潛在研究主題及可能方案進行討論，並持續開放討論。

(十一) 各方同意發布聯合新聞稿（Joint Press Release），並附有鰻線捕撈、放養，以及各階段鰻魚貿易統計文件。查聯合新聞稿至 7 月 17 日止尚未於日本水產廳官網發表。

另為了解日本鰻魚室內循環水養殖技術及現況 經由日本鰻苗捕撈業者協議會（日本シラスウナギ取扱者協議会）事務局長清水孝之協助安排，本團於會外以自費方式前往日本埼玉縣 2 處冷溫水循環式閉鎖型鰻魚養殖場參訪，並於參訪期間進行意見交流。

關鍵詞：鰻魚資源養護與管理國際合作非正式會議、日本鰻及其他鰻科學家會議、聯合聲明(Joint Statement)

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近年來，鰻苗捕獲量頻創新低，除衝擊東亞鰻魚產業外，亦引發相關國際組織的關切，國際自然保育聯盟（International Union for Conservation of Nature and Natural Resources，以下簡稱：IUCN）已在 2014 年 6 月 12 日正式公佈將日本鰻列入 IUCN 紅皮書（Red List）之瀕危（Endangered (EN) A2bc）等級，美洲鰻於同年亦被列入紅皮書之瀕危等級，IUCN 雖不具法律約束力，但瀕危野生動植物種國際貿易公約，又名華盛頓公約(Convention on International Trade in Endangered Species of Wild Fauna and Flora，以下簡稱 CITES)，締約國將參考 IUCN 之評估報告後於大會中提案，於 2016 年 CITES 締約國大會決議通過應加強調查鰻魚資源量及貿易情形，以作為下屆提案與否之參考。2022 年第 19 屆締約國大會雖未將日本鰻提列為 CITES 附錄管理之物種，但該次大會將真鯊科所有物種列入附錄二管理，即使其中水鯊資源無虞，倘鰻鱺屬於大會中被提案，恐衝擊東亞鰻魚產業。

有鑑於國際對於鰻苗資源管理日益重視，且為免鰻魚被列入 CITES 附錄管理衝擊產業，臺灣、日本及中國大陸為西太平洋鰻苗資源之主要利用國家，爰自 2012 年起業於亞太經濟合作（Asia-Pacific Economic Cooperation，以下簡稱 APEC）架構下，分別於日本長崎、菲律賓馬尼拉、中國上海、日本福岡、日本東京、日本札幌、中國青島及南韓釜山等地點召開共 16 次「鰻魚資源養護與管理國際合作非正式會議（The Meeting of the Informal Consultation on International Cooperation for Conservation and Management of Japanese Eel Stock and Other Relevant Eel Species）」（以下簡稱：鰻魚國際非正式會議），共同進行鰻魚資源管理合作事宜，針對包括鰻魚（苗）捕撈與養殖狀況、生態與資源之資訊搜集及科學研究，以及強化資源管理（包括可追溯性之要求）等資訊交流，並各自訂定管理規範或尋求合作管理之模式，以期復育日本鰻資源外，避免日本鰻被列入瀕臨絕種野生動植物國際貿易公約（Convention on International Trade in Endangered Species of Wild Fauna and Flora，以下簡稱：CITES）附錄中進行貿易管制。

為向外界表達東亞各經濟體對鰻魚資源養護與管理的決心，前述經濟體於2014年9月第7次非正式會議共同發表聯合聲明（Joint Statement），該聲明除承認日本鰻鰻線捕撈量已持續下降，此下降已推定係棲息地/環境劣化、海洋變遷及過度捕撈所造成；也承認日本鰻洄游至東亞地區的沿岸海域，為此區域共同利用之資源，日本鰻資源的養護及管理需要區域性合作；此外，考量日本鰻在鰻線階段供應量的衰減，已導致其他異種鰻引入東亞地區的養殖池，此現象可能對異種鰻資源造成負面影響；另亦關切儘管部分經濟體已採取措施限制鰻線出口，

惟似乎仍有大量鰻線持續在中國大陸、日本、韓國及臺灣間進行交易之事實。此外，為因應基於動物委員會持續表示應加強調查鰻鱺屬物種的資源及貿易情形，又鰻魚屬跨界洄游物種，資源養護於管理應持續透過國際合作，並應基於具體科學研究之上，臺灣、日本、中國大陸及韓國自2022年起共召開2次「日本鰻及其他鰻科學家會議(The Scientific Meeting on Japanese Eel and Other Relevant Eels)」(以下簡稱：科學家會議)，並邀集各方科學家討論東亞地區日本鰻資源養護與管理與研究現況，並以科學根據為基礎，提供鰻魚國際非正式會議相關資源養護管理建議，作為今後東亞各國合作方向。

為促進鰻魚產業的永續發展，我國、日本、中國大陸及韓國於2024年6月3日至4日在日本東京召開第3次科學家會議，並接續於同年6月6日至7日在日本東京召開第17次鰻魚國際非正式會議，檢視鰻魚(苗)捕撈、養殖和貿易數據，交流各國鰻魚資源養護與管理措施、交流日本鰻及其他鰻於國際組織討論概況、交流建立具法律約束力之國際/區域性管理組織意見、確立科學家會議任務分組1及任務分組2職權範圍及研商未來工作計畫，另共同發布聯合新聞稿，再次重申2014年第7次會議發布之聯合聲明是進一步加強東亞地區合作的基石，並且已關注到CITES第19次會議之決議文，也將依據2024年科學家會議之決議，持續進行國際科學研究之合作，各方將在APEC海洋漁業工作小組的架構下，持續推動鰻魚資源養護與管理措施及進行相關議題之合作。

貳、會議過程及結果

一、第 3 次日本鰻及其他鰻科學家會議

第 3 次日本鰻及其他鰻科學家會議於本（2024）年 6 月 3 日至 6 月 4 日假日本東京三田共用會所舉行，計有我國、南韓、日本及中國大陸（線上與會）等四方產、官、學代表出席（出席名單詳如附件 1）。我國由國立臺灣大學漁業科學研究所韓玉山教授率高雄科技大學漁業科技與管理系侯清賢副教授兼永續漁業發展研究中心主任、本署同仁、財團法人台灣區鰻魚發展基金會葉信明董事長、汪介甫執行長及駐日本代表處經濟組王清要簡任秘書與會。

本次會議由日本東京大學八木信行教授（實體參與）擔任主席及東京大學青山潤教授（線上參與）擔任副主席，旨揭會議討論情形謹摘要列點如下：

(一)東亞四國（中國大陸、日本、韓國與臺灣）之日本鰻捕撈及科學活動概況分享（各國科學家簡報詳如附件 6 至附件 9）：

1. 中國大陸：中國鰻魚養殖規模及分布、中國相較於全球的養殖狀況、日本鰻資源保護行動方案（包含：鰻苗捕撈管理、2018-2020 年增殖放流、長江大保護戰略及長江保護法）、鰻鱺資源的科學研究調查，及其自 1973 至 2018 年科研發展歷程，包含：鰻苗人工養殖與繁育研究、PAT 衛星追蹤標示及 T 型標記等議題為主，並強調中國針對日本鰻相關法規及管理作為執行情況，包含：鰻鱺捕撈許可證制度、2021 年開始長江十年禁漁(提供 30 多億美元予 23 萬漁民及 11 萬艘漁船補貼休漁)，擴大長江口禁漁範圍往外延伸，以保障鰻苗的親魚資源與洄游通道。

   長江大保護戰略與 2021 年 3 月 1 日開始實施的長江保護法，強調保護親魚資源，維持資源利用之間的平衡，並以保護優先、合理利用、科技先行、合作共享四大原則推行，為鰻魚資源利用國，共同實現鰻魚產業資源永續目標。

2. 日本：1894 年起收集日本鰻捕撈生產量變化、1900 年起收集日本鰻

養殖產量，自日本長期累計的捕撈量數據變化趨勢顯示，日本鰻資源持續下降。為減少鰻魚非法貿易狀況，自 2023 年起實施《特定水產動植物國內流通適正化法》，並將日本鰻列入指定水產物種。另日本從原日本鰻特別捕撈許可證轉為具強制力的都道府縣府知事許可證制度，將有效針對鰻魚流通進行管控，並促使日本業者建立漁獲交易紀錄，以及提供準確的漁獲捕撈量數據。

研究重點成果分享議題包括：日本水產廳於 2019 年啟動的日本鰻族群動態與漁業管理、日本鰻滅絕風險評估、日本鰻資源趨勢預測分析，以及針對入池量及捕撈生產量採取適當的漁業管理措施。

3. 韓國：持續收集 2003 至 2022 年的捕撈漁獲生產量趨勢、2011 至 2023 年日本鰻進口與出口量趨勢、2012 至 2023 年日本鰻養殖產量趨勢，其養殖量於 2021 年突破 16,000 噸；為保護天然日本鰻資源，日本鰻漁業資源管理法規亦針對四大鰻鱺物種(包括：*Anguilla japonica*、*A. rostrata*、 *A. bicolor*、 *A. mamorata*）進行管理措施規範，根據韓國的《內陸漁業法第 17 章第 17.7.1 條》規定，針對鰻鱺物種現行管理措施，於每年 4 月 1 日至 9 月 30 日禁止捕撈體長 15-45 公分鰻魚個體。

4. 我國：針對 1991 年至 2023 年水產養殖新聞、漁業統計年報漁獲量、臺灣玻璃鰻的每週捕撈量回報等數據，說明臺灣長期漁獲量變化趨勢，研究成果分享議題，包括臺灣西南海域的日本鰻現場調查、不同 LED 燈光譜對 *A. japonica* 與 *A. marmorata* 的成長與免疫力影響、日本鰻基因體轉錄體資料數據庫建立概況、日本鰻性別基因的分子生物鑑定、添加飼料改良劑對日本鰻免疫力與生長的影響，並針對臺灣日本鰻現行的研究結果提出現行四大管理措施，包括禁漁期、放養量上限、公告封溪護鰻規定，以增加產卵種鰻數量、持續進行鰻魚放流活動、防治河川汙染及興建濕地等。

(二)非會期之任務組合活動報告：

1. Eel Task Teams1：由任務分組主要負責人 Leanne Faulks 博士報告 2024 年 4 月 19 日舉辦第二屆線上工作坊情形，包含各國與會科學家代表（我國代表科學家為韓玉山教授、葉信明副所長、侯清賢副教授），分享議題包括環境 DNA（Environmental DNA，簡稱 eDNA）相關研究、運用漁獲資料相關時間序列模式建立與分析族群動態等研究成果概要說明，及與會科學家問答討論重點。
2. Eel Task Teams 2：由任務分組主要負責人箱山洋教授概要說明 2024 年 4 月 19 日於舉辦第二屆線上工作坊討論情形，討論議題聚焦於衛星彈出式標籤追蹤、標籤改良及成本效益、日本衛星標籤調查等，並就成員未來可能進行日本鰻相關追蹤調查及合作意向交換意見。

(三)以新興科學且實用有效的方式管理東北亞地區的日本鰻資源(各國科學家簡報如附件 10 至附件 17)：

1. 講者 1_日本長野大學箱山洋教授：針對日本鰻資源評估與管理方式說明，IUCN 依據 Criterion A 族群評估指數及漁獲量下降情形，透過族群脆弱度分析（Population viability analysis）評估隨機模式日本鰻滅絕機率，而將日本鰻列入瀕危物種。然而，該研究結果顯示，依據 Criterion E 評估模式顯示日本鰻資源量並未達到列入瀕危物種標準，日本鰻既未列入易危(CR)亦未被評估為瀕危(EN)；另更發現 Criterion A 的評估模式僅考慮生物族群量減少，可能出現高估生物滅絕機率的狀況，建議應減少使用 Criterion A 進行海洋物種的評估。

   此外，亦針對 CPUE 的時間序列分析結果進行說明，統計種群模型基本上是使用漁獲量資料構建的，獲取每個地區的時間序列資料很重要，因為考慮到每個棲息地的當地種群的時空模型對日本鰻魚種群管理是有效的。在過去十年中，日本鰻的玻璃鰻族群到達量有所減少，使用族群量的時間序列資料將有助於科學資料的建檔與

保存，CPUE 的時空漁業數據在區域性日本鰻研究扮演重要角色。

放養量管理是非正式會議後商定的日本鰻魚國際資源管理的基礎，應與區域漁業管理和貿易透明度努力相結合，且漁業管理需要可執行的法規。由於玻璃鰻的捕獲量幾乎作為養殖池的幼苗，放養量管理可以透過最佳化水產養殖規模來實現日本鰻魚的可持續使用。玻璃鰻的到來通常是同步的，但每年的漁獲量好壞都有一些區域性差異，可透過國際進出口及國內放養量管理，以緩解區域漁獲量的不足並滿足區域需求。

每個地區的漁業管理也很重要，只有透過適當的漁業管理和漁業監測，我們才能可靠地獲得最重要的時空捕撈資料，應用於資源管理。有必要使玻璃鰻貿易更加透明，追溯養殖池的漁獲量和每個地區捕撈的漁獲量。當達到最大養殖池放養限制時，捕撈禁令和進口禁令需要一個可執行的法律法規和漁業監測系統。

科學的適應性放養管理可用於根據玻璃鰻漁獲量調整養殖池的放養量。如果玻璃鰻漁獲量很差，放養量將進一步減少。這種管理措施理論上會比目前的固定目標“更好”，但目前還不清楚在理論上是否會實現穩定的漁業，尚待更多的研究和討論。

除了資源管理外，還需要保護河流、湖泊和沿海棲息地，正如韓教授指出擴大保護區是有效的，在各個地區建立保護區是有效的。中國建立保護區的努力非常好，保護區也需要可執行的法律法規和漁業監測系統。

2. 講者 2_日本長野大學 Leanne Faulks 博士：根據蒐集長期試驗研究樣本船之非商業性漁業資料(Fisheries independent indices，漁業獨立指數，與依賴商業性漁業的抽樣相比，這些調查資料可以提供較少偏差的魚類族群趨勢估計)與模式系群趨勢及限制進行評估，並探討是否能透過遺傳學方式補足漁業數據不足之處，並改善日本鰻的管理，根據其研究結果亦顯示，準確推斷族群量需要依靠大樣

本及有效小族群樣本的體長大小平均分布狀況，促使模式估計準確率的提升。

3. 講者 3_大西洋海洋漁業管理委員會 Kristen Anstead 博士(播放預錄影片)：針對美洲鰻漁業管理、岸際卸魚量及相關指數與評估進行說明。目前美國聯邦水域尚未針對美洲鰻有特定管理措施，惟已有幾個組織開始針對美洲鰻進行管理措施管制，如大西洋國家海洋漁業管理組織（ASMFC）。另嘗試運用現有漁業、環境資料及耳石研究資料建立鰻魚繁殖空間模型，發現水壩造成棲地破碎化（主因）、氣候變遷及泳鰾寄生蟲等 3 種潛在因素影響種群。

4. 講者 4_中國水產科學研究院東海水產研究所王思凱(Sikai Wang)博士：針對中國長江口日本鰻苗捕撈情況進行研究，以利後續進行資源保護與管理。長江口為日本鰻的重要洄游路線，每年 1 月至 5 月均有大量玻璃鰻出現於該地區， 2 月至 4 月為捕撈高峰期，其捕撈量約佔中國總生產量的 60%以上，惟不同年份間變化趨勢不同。根據 1990 至 2023 年的玻璃鰻生產量資料顯示，近年來的玻璃鰻產量呈現逐年下降的趨勢。該研究使用樣本船蒐集長江口的現場調查資料（包含：網次、每日的鰻苗玻璃鰻捕獲量），並以此計算出 CPUE；再者，亦使用問卷調查蒐集長江口漁撈作業經營相關資料（包含：產值、作業船數、作業成本、作業淨收入等）。

報告中亦說明中國針對鰻鱺資源保護的總體目標與四大原則，總體目標係以強化鱺鰻資源保護與實現永續發展；其 4 大目標原則包括：(1)保護優先、(2)合理利用、(3)科技先行及(4)合作共享；依據 4 大目標原則可分為 10 項關鍵工作包括：(1)深化國際交流合作；(2)推動鰻鱺棲息生態環境；(3)建立鱺鰻增值放流體系；(4)科學規劃養殖利用；(5)推動限額捕撈；(6)加強生殖洄游研究；(7)展開鰻魚專項調查監測；(8)健全鰻鱺保護管理制度；(9)完善鱺鰻保護管理體制；(10)推動限額捕撈。

5. 講者 5_我國學者代表韓玉山博士：我國報告議題為以環境 DNA 評估台灣河川日本鰻資源量及分布。(略)

6. 講者 6_韓國國際漁業研究中心 Shin-Kwon Kim 博士：首先介紹韓國監測方法，主要調查兩條河川出海口、三個水庫以及兩條河川，調查捕獲量、體長、年齡、成熟度及棲地環境，生態研究部分包含年齡成長、元素分析（棲地移動特性）及成熟度；鰻魚洄游通道建立與調查，研究 2019 年 6 月至 8 月期間有 63 隻鰻魚，56 隻玻璃鰻、7 隻幼鰻進入魚道，後續持續進行調查研究。

7. 講者 7_日本長崎大學 Kazuki Matsushige 博士：針對當地淡水河川的棲地生態與保護成效進行說明，報告內容包括河川棲地利用現況、棲地生態利用研究、恢復棲地功能研究與方法。研究結果確定黃鰻棲地利用的關鍵因素，其大體型及小體型的黃鰻均喜歡躲藏於礫石及岩石構成的河床環境，故礫石及岩石構成的河床將可能成為黃鰻的重要躲避場所，現行恢復棲地的機制有兩大方向包括

   (1) 藉由河岸工程設計實現創造合適棲地環境與保護機制，但河岸工程尚有需花費大量成本與時間等問題存在；

   (2) 漁業經營者協助架設緊急臨時設備，如石倉網(Ishikura-net)及河床棲地營造(Riverbed cultivation)。

8. 講者 8_日本水產研究教育機構 Nobuto Fukuda 博士：回顧 1968 至 2011 年間日本鰻成熟種鰻個體之耳石判讀研究、日本鰻洄游路徑與各階段生命週期研究，確認日本鰻歷史分布熱區，依據洄游分布路徑確認馬里亞納海脊為日本鰻產卵區，另研究團隊在該海域中以 3-4 節速度拖網成功採集到成熟日本鰻樣本個體共計 18 尾（雄性計 8 尾、雌性計 10 尾），並藉由成熟個體樣本之耳石年齡、性比、生物棲地等相關數據及樣本分析確認鰻魚族群量。

   研究發現棲息地的使用在個體之間差異很大，雄魚在生長期間偏好待在溪流，雌魚則偏愛河口及海洋棲地環境；另從捕撈行為研

究發現，多尾雌魚多會分布在拖網網側面被抓住，而雄魚則在囊袋末端被單獨抓住，顯示雌魚活動力較佳且具高密度聚集性。

另研究結果亦顯示，產卵地的成熟樣本蒐集與分析，如年齡成長、性比、生長環境參數資料，可為日本鰻繁殖研究提供重要的族群量資訊，其產卵地的調查研究亦可提供瞭解日本鰻的產卵方式或生態狀況，爰建議未來應持續進行日本鰻產卵地的長期監測，並以更有效方法收集產卵區相關資訊。

韓老師建議捕撈成熟個體可嘗試於 6-7 月新月期間提升採集效率。中方追問鰻魚繁殖期是否受新月或水質環境影響，Fukuda 博士回應不確定是否受新月影響，但可以確定不是水質的影響。

(四)CITES 公約中關於日本鰻及其他鰻現況討論：

本節由日本水產廳針對 CITES 動物委員會（Animals Committee）第 32 屆會議與常設委員會（Standing Committee）第 77 屆會議就鰻魚物種的管理現況與未來科學家重要會議日程等議題進行說明。

1. 2022 年 11 月 CITES COP19 會議中，商業性漁業捕撈的水鯊（Blue shark）在未有資源疑慮之情況下被提出討論，提案列入附錄二並經過三分之二成員同意通過。歐洲鰻已於 2007 年被列入附錄二，其 CITES 處理原則為：
   (1) 強化溯源管理措施及執行力，評估合法取得證明（Legal acquisition findings， LAF）的可行性；
   (2) 考量於出口時提供無危害評估結果（NDF）的可行性，並應定義鰻魚各生活史階段之名稱。
2. 2023 年 6 月 19 日至 23 日於日內瓦會議中，成員針對締約方於鰻魚研究有數項關鍵性建議，包括：
   (1) 強化特定物種的統計資料及各生命階段週期生物資料的紀錄與蒐整；
   (2) 共享生物辨識的技術優點及現行研究主要挑戰；

(3) 持續維持基礎生物學參數資料的蒐整，藉此瞭解鰻魚的生長歷程，以及推動跨國研究合作計畫，以永續漁業資源的方式使用鰻鱺資源；

(4) 建立鰻鱺的各階段生命週期監測計畫；

(5) 合作與分享無危害風險評估結果。

3. 針對鰻魚管理現況，未來應特別注意的事項包含：

(1) 歐洲鰻及其他鰻鱺類的非法貿易已開始收到關注，包括日本鰻在內的部分鰻鱺類已開始受到國際貿易的限制及審查；

(2) 未來可能於 2025 年 CITES COP20 會議建議日本鰻、美洲鰻及其他鰻類列附錄二；

(3) 日本鰻與其他鰻類未來的進出口規範將可能比照歐洲鰻的限制與相關規定。

(五)關於 2024 年至 2025 年日本鰻及其他鰻的科學活動與合作研究未來工作計畫：

本節內容為任務小組負責人員協助撰寫與提供，主要內容說明針對日本鰻及其他鰻類資源保護，科學家會議的任務小組主要負責執行任務及促進科學家合作重要性等議題，並於會議中再次簡要說明今年的科學家線上會議結論重點，由 Eel Task Teams1 負責人 Leanne Faulks 博士與 Eel Task Teams2 負責人箱山洋教授擬提會議結論，並提供與會人員確認。

葉信明董事長以水產試驗所副所長身份表達，水產試驗所東部漁業生物研究中心江偉全副研究員有意加入 Eel Task Teams2，未來可以就鰻魚標示放流之跨國合作進行協助。會後本署已協助將江偉全副研究員聯繫資訊以電子郵件報送 Eel Task Teams2 負責人箱山洋教授。

另，2025 年科學家任務分組線上會議預計於 2025 年 1 月至 2 月舉辦；第 4 次科學家會議預計於 2025 年 5 月至 6 月舉辦；第 18 屆鰻魚養護與管理國際合作非正式會議暫定於 2025 年 5 月至 6 月召開，確切

時間將於接下來的第 17 屆鰻魚養護與管理國際合作非正式會議討論決定。

二、第 17 屆鰻魚養護與管理國際合作非正式會議

第17次鰻魚養護與管理國際合作非正式會議(下稱鰻魚國際非正式會議)於本（113）年6月6日至7日假日本東京三田共用會議所舉行，計有南韓、日本、中國及我國等四個經濟體出席（出席名單詳如附件21）；南韓由海洋及漁業部Tae-hoon Won副組長率團、日本由水產廳生態保全室大森亮室長率團、中國由中國水產科學研究院東海水產研究所蔣科技教授率團，我國由林緣珠副組長率本署同仁、財團法人中華民國對外漁業合作發展協會傅家驥組長及駐日本代表處經濟組王清要簡任秘書與會出席（國立臺灣大學漁業科學研究所韓玉山教授、高雄科技大學漁業科技與管理系侯清賢副教授兼永續漁業發展研究中心主任、財團法人台灣區鰻魚發展基金會葉信明董事長及汪介甫執行長列席）。本次會議秘書處由日本水產廳及Global Guardian Trust共同組成，並執行會議安排。

會議主席延續由日本農林水產省顧問森下丈二擔任（第二年），開場歡迎各經濟體與會，日本水產廳生態保全室大森亮室長代表地主國開幕致詞，主席續邀請中國、韓國及我方團長介紹與會團員後致開幕詞（附件 20）。會議討論情形，謹摘要如下：

(一)第 3 次日本鰻及其他鰻科學家會議總結報告：

1. 第 3 次日本鰻及其他鰻科學家會議總結報告由該會議主席八木信行教授簡要說明，是日會議出席成員及科學家研究成果分享、任務分組 1 及任務分組 2 於非會期之活動概況、日本水產廳分享 CITES 公約中關於日本鰻及其他鰻現況等。
2. 關於科學家會議(附件 22)及該會議下下成立日本鰻及其他鰻種科學活動及合作研究的任務分組 1 及任務分組 2 的職權範圍（Terms of Reference，簡稱 ToR）草案(附件 23)，該草案無異議通過。
3. 第 3 次日本鰻及其他鰻科學家會議總結報告(附件 18)經與會成員無異議通過。

(二)檢視 2023-2024 年漁季鰻魚（含鰻苗）之捕撈、養殖和貿易統計數據更新(附件 24)：

1. 日本經彙整各國資料以統計圖表呈現各國放養量概況，於 2023-2024 年漁季各國放養量均低於 2014 年聯合聲明所訂放養量上限。

2. 日本要求中國澄清 2020 年異種鰻突然下降，且數字改變為整數，請中國說明。中國回應受新冠肺炎疫情影響，難以分辨物種並收集相關數據，爰數據資料下降，主席接問疫情已趨緩是否考慮再蒐集，中國回應目前尚未決定，但會先以估算方式來統計；另就數字修改為整數部分，因中國統計單位於提交歷史數據給FAO時是使用整數方式，為確保數據一致，爰藉此修正。中國另已增加現地訪視以提升數據精確性。日本呼籲中國異種鰻放養量能夠控制在低於放養上限的水準。

3. 韓國詢問各國是否有進口歐洲鰻之相關數據，日本、中國（指官方正式管道數據資料）及我國均表示無進口歐洲鰻。

4. 中國要求日本及韓國提供該國從中國進口玻璃鰻數據，日本及韓國均表示需要時間確認，主席同意日本及韓國於會後提供相關數據。會後秘書處於 6 月 19 日電子郵件傳送資訊(附件 25)如下：

   (1) 韓國：2022 年 11 月～2023 年 10 月自中國及香港進口玻璃鰻總計 7,350kg（中國 35kg，香港 7,315kg）。

   (2) 日本：2022 年 11 月～2023 年 10 月自中國及香港進口玻璃鰻（包含非常少量的鰻苗 eel fries）總計 10,394kg(中國 0 kg，香港 10,394kg，依據日本財務省貿易統計）。

(三)鰻魚資源保育措施(附件 26)：

1. 有關中國修正罰則部分，依據各省分管理法規微調法規撰寫方法，但和原本法規差異不大；另中國亦補充現有鰻魚資源養護管理政策及相關細節。

2. 日本詢問中國長江十年禁漁計畫自 2023 年起實施，玻璃鰻捕撈量於 2023-2024 年漁季捕撈量有下降，是否因禁漁計畫影響。中國表示近年監測鰻苗捕撈量確有下降，據觀察捕撈量下降因素繁雜，整體監測及捕撈量確實不如 2022-2023 漁季，且鰻苗集中出現區域亦有變化；另因長

江流域及河口擴張區均為禁漁區域，中國認為被捕撈的鰻苗進入和長江的鰻苗比例已發生較大變化，進入長江數量大於禁漁之前，樂觀估計 6 年後資源量會有恢復趨勢；又因中國管理措施日益嚴格完善，亦可能導致鰻苗捕撈量下降。

3. 韓國詢問日本如何進行捕撈量分配及是否有進一步再分配措施。日方回應鰻苗捕撈量限額先前分配給各縣，近期再透過執照機制分配給漁船，因此可以達成捕撈上限的控管，目前無規劃更進一步的再分配措施。
4. 中國詢問日本因鰻苗來游時間不同，如何藉由科學方式去進行捕撈量管理、鰻苗放養分配模式是以商業模式或政府分配進行管理、鰻苗價格機制如何產生，及日本如何蒐集鰻苗捕撈數據之機制等，請日方提供經驗分享。
5. 日本回應預測鰻苗來游地點確實困難，日本鰻苗捕撈資料每月彙整，並由鰻魚養殖相關組織提供相關入池量資訊，以進行捕撈量管理；分配模式部分，因日本鰻魚養殖歷史悠久，日本鰻苗分配模式延續過往產業機制進行分配，而鰻苗價格則為產業市場機制；另有關日本蒐集鰻苗捕撈數據部分，資訊來自捕撈漁民申報及養殖場放養數據，經整合比對送交學者（長野大學箱山洋博士）進行漁業監測統計分析，而日本養殖新聞相關數據來源可能為貿易商或是業者等非官方管道，僅供參考，實際數據仍是以官方數據為準。
6. 韓國及我國針對鰻魚資源保育措施修正部分簡要說明，無成員提問。
7. 日本依據第 16 屆鰻魚國際非正式會議決議(我國所提出之要求)簡報該國水產流通適正化法內涵及規定，我方請日本會後分享簡報資料(附件 27)。
8. 全日本持續養鰻機構山本浩二會長發表聲明，日本對玻璃鰻及鰻苗進行嚴格放養量管理，並透過此措施，使鰻魚養殖業者強化對資源管理重要性之認知，希望與會成員了解到設定捕獲量上限的重要性，即使在鰻苗資源不穩定情況下，透過滾動式調整四國限額，共同維護鰻魚資源及業

者的利益至關重要，並敦促與會成員落實鰻苗放養量管理。

9. 與會成員支持日本提案，下 2 期漁季(2024-2025 年、2025-2026 年)日本鰻放養量上限將維持 2014 年聯合聲明提到之前一年度放養量 8 成，其他鰻種則維持第 15 屆鰻魚國際非正式會議聯合新聞稿所訂標準。

(四)有關日本鰻及其他鰻現況：

1. 日方報告 CITES 的狀況(附件 28)：

(1) 日本針對 CITES 動物委員會（Animals Committee）第 32 屆會議與常設委員會（Standing Committee）第 77 屆會議就鰻魚物種的管理現況與未來科學家重要會議日程等議題進行說明。

(2) 2022 年 11 月 CITES COP19 會議中，商業性漁業捕撈的水鯊（Blue shark）在未有資源疑慮之情況下被提出討論，提案列入附錄二並經過三分之二成員同意通過。歐洲鰻已於 2007 年被列入附錄二，其 CITES 處理原則為：

I. 強化溯源管理措施及執行力，評估合法取得證明（Legal acquisition findings， LAF）的可行性。

II. 考量於出口時提供無危害評估結果（NDF）的可行性，並應定義鰻魚各生活史階段之名稱。

(3) 2023 年 6 月 19 日至 23 日於日內瓦會議中，成員針對締約方於鰻魚研究有數項關鍵性建議，包括：

I. 強化特定物種的統計資料及各生命階段週期生物資料的紀錄與蒐整。

II. 共享生物辨識的技術優點及現行研究主要挑戰。

III. 持續維持基礎生物學參數資料的蒐整，藉此瞭解鰻魚的生長歷程，以及推動跨國研究合作計畫，以永續漁業資源的方式使用鰻鱺屬物種資源。

IV. 建立鰻鱺屬物種的各階段生命週期監測計畫。

V. 合作與分享無危害風險評估結果。

(4) 針對鰻魚管理現況，歐洲鰻及其他鰻鱸屬物種的非法貿易已開始受到關注，包括日本鰻在內的部分鰻鱸屬物種已開始受到國際貿易的限制及審查；未來可能於 2025 年 CITES COP20 會議建議日本鰻、美洲鰻及其他鰻鱸屬物種列附錄二，倘列入附錄二其進出口規範將可能比照歐洲鰻的限制與相關規定。

2. 全日本持續養鰻機構山本浩二會長表示，面對鰻鱸屬物種可能面臨水鯊及歐洲鰻之遭遇，綜合考量鰻魚生活史各環節、科學討論和證據，對於影響鰻魚資源變動的捕撈、海洋環境和河流環境等因素，需要進行科學的討論。我們希望基於這樣的綜合性和科學性的討論和證據，能夠進一步推進關於鰻魚資源可持續利用的討論，呼籲成員應密切重視 CITES 及鰻魚國際非正式會議成員合作之重要性。

3. 日本表示，在 CITES 中主要擔憂針對歐洲鰻非法交易和美洲鰻資源狀況，為避免日本鰻因類似物種規定而被提案列入附錄二，建議於次屆科學家會議由日本提案討論幼鰻物種鑑別，如制定物種判別指導方針，倘能取得一定的成果，有利於 CITES 提案中提出有效的反論；同時建議各成員討論可能的應對措施，可於次屆科學家會議或鰻魚國際非正式會議中分享。

4. 主席決議此議題在會期外及未來科學家及鰻魚國際非正式會議持續討論，獲各國同意。

(五)有關建立具法律約束力之國際/區域性管理組織

1. 日方以簡報說明可能推動成立國際/區域性漁業組織的三種分類，另提出組織目標、管轄魚種、秘書處設置等清單便利各方討論(附件 29)。日本理解討論該等項目並非易事，惟支持繼續對話。

2. 韓國支持續討論該等議題，並指出鰻魚捕撈和養殖活動涉及領土和領海，未來新成立組織如何處理該等活動的管理值得考量。韓國並提出海洋法公約主要是就高度洄游物種的管理和成立管理組織提供法律

基礎。

3. 中國認為管轄魚種應針對日本鰻，美洲鰻和歐洲鰻未在東北亞區域生息，應無須納入所有鰻種，惟支持繼續討論。

4. 我國認為管轄魚種與未來須合作成員有關，並支持主席看法，認為海洋法公約第 67 條有提供部分法律基礎供各國討論鰻魚物種的管理。我國支持持續討論成立區域性漁業組織議題，惟對可能需要的時程表示憂慮，擔心恐無法應對 CITES 的挑戰。

5. 主席綜整各方意見，認為各方支持討論建立具法律約束力之國際/區域性管理組織將有助於管理，而組織架構、如何運作及各國應如何合作之細節等均表示需再研議，獲各方同意。

(六)日本鰻及其他鰻科學家會議及任務分組 1 及任務分組 2 職權範圍（Terms of Reference，簡稱 ToR）：

1. 日本鰻及其他鰻科學家會議 ToR 經納入成員意見修正後，共識通過。

2. 任務分組 1 及任務分組 2 之 ToR，無異議通過。

(七)未來工作計畫：

1. 聯合秘書處概要說明 2024-2025 年工作計畫(成員應於 2025 年 4 月前依資料格式繳交 2024 年至 2025 年鰻魚相關統計及管理措施等資料)，以及 CITES 相關會議安排及預計討論事項(附件 30)。

2. 中國表示，由於國內鰻苗捕撈期間不同及對外發布統計數據之時間，提議數據繳交截止日改至 6 月後，中國也願意持續更新數據。日本和我國表示希望維持現有資料繳交期限，另建議中國意見可納入報告。

3. 各國未來工作計畫無異議通過，在現有資料期限後中國將提供更新數據。

(八)下屆科學家會議及鰻魚國際非正式會議時間及地點：

1. 日方提議第 4 次科學家會議及第 18 屆鰻魚國際非正式會議由該國籌辦，另比照本次會議模式接連舉辦，並預定於 5 月至 6 月在東京或其他主要鰻魚養殖縣市辦理，獲各方同意。

2. 考量明年秋天將舉行 CITES 提案國會議，附錄提案的截止日期是會議前

150 天，具體的舉辦時間將於進一步諮商後決定。

(九)其他討論事項：

有關中國提案推動國際聯合研究合作計畫，俾中國研究人員向中國科技部爭取研究經費，主席鼓勵科學家在會議期間就潛在研究主題及可能方案進行討論，並持續開放討論。

(十)聯合新聞稿：

1. 秘書處概要說明聯合新聞稿草案，並表示相關統計資料將隨聯合新聞稿對外發布。
2. 聯合新聞稿係參考第 16 次鰻魚國際非正式會議內容發布聯合新聞稿（Joint Press Release），經與會各方依據各國實際概況調整文字後通過之聯合新聞稿內容(附件 31)略以，日本、韓國、中國及我方等參與方考量各方皆為 APEC 之經濟體，並於 2014 年共同發布促進東亞地區鰻魚合作之聯合聲明，另於 2017 年共同發布聯合新聞稿，並已關注到 CITES 第 19 次會議之決議文，爰願意在 APEC 海洋漁業工作小組的架構下持續合作，故各方已合作推動鰻魚資源養護與管理措施，並允諾持續進行相關議題之合作，包括：強化鰻魚的養護與管理措施、依 2014 年聯合聲明通過之限額進行鰻魚放養量控管、促進鰻魚貿易透明化、加強與其他相關國際文書之合作、研議建立具法律拘束力文件的可行性、強化合作因應第 20 次 CITES 締約國大會、鼓勵私部門推動自主性管理措施。

(十一)　會中觀察與會外交流情形：

1. 與中方交流：中方團長仍為蔣科技教授(與上屆非正式會議相同)，團員多為科學家，對我團態度友善。張婷婷教授表示生產量數據以整數呈現，係因各統計單位資料彙整和格式轉換之緣故（公噸轉換為公斤）。
2. 與韓方交流：Tae-hoon Won 副組長感謝我國在其他國際會議和該國的互動，並盼持續合作，另關心我國在 CCSBT 之主席人選及會議安排。
3. 與日方交流：生態保全室大森室長表示將持續討論成立具法律約束力之國際/區域性管理組織議題，惟無意於短期內有具體成果，另對中國說明

官方無紀錄進口歐洲鰻之說法不表認同。生態保全室小川太輝課長補佐提醒 CITES 報告中提及我國和香港間之非法鰻苗貿易議題值得我國重視。我團表示已與海關等單位協調強化打擊鰻苗走私，另也修改法規將查獲走私的鰻苗放流或進行科學研究，以遏阻鰻苗非法貿易，並願與日本學習打擊非法貿易的作法和經驗。小川課長補佐感謝我方所做努力，將與內水面漁業振興室生駒潔室長建議就此議題與我國進行雙邊會議討論(該議題非屬生態保全室業務)，另表示日本水產流通適正化法目前僅規劃規範日本國內之鰻苗交易，暫無規劃適用於國際貿易。小川課長補佐也允諾避免將 CITES 文件列入會議報告之附件，以避免不必要之爭議。

參、會外參訪

本團於6月5日經由日本鰻苗捕撈業者協議會(日本シラスウナギ取扱者協議会)事務局長清水孝之協助安排，前往埼玉縣參訪(設施見學)武州瓦斯株式會社水產研究所(埼玉縣東松山市石橋字番神2173番3，企業網址https://www.bushugas.co.jp/effort/advanced-project/)及平沼水產株式會社上里halk(埼玉縣児玉郡上里町敕使河原字北勝場1801番，企業網址https://food.hiranumasuisan.co.jp/)等2處冷溫水循環式閉鎖型鰻魚養殖場，該等養殖場皆是由日本企業(瓦斯公司及汽車經銷商)多角化經營投入鰻魚養殖事業，相關設施設備均由系統設備商Science innovation科創有限公司(株式会社サイエンス･イノベーション ,公司網址 https://science-innovation.jp/ ，簡稱Science公司)依客戶需求進行規劃建置及保固維護，未來可模組化整廠輸出。謹就參訪觀察及意見交流紀錄如下：

一、 武州瓦斯株式會社水產研究所

(一) 硬體建置部分

因日本傳統棚架溫室養殖方式太熱且溫控不便，仿效韓國改為冷溫水循環式閉鎖型陸上養殖系統，運用水處理技術及省能源技術在育成場所中，以高育成率及短期育成為目標的閉鎖循環型養殖技術。對於水資源較缺乏的埼玉縣，運用循環水系統可以做最小限度的抽取地下水加水量及污水排水量，較傳統養殖模式節省營運成本60%。

該場於2022年4月至同年8月間設置(耗時4個月)，場房設施建設造價計2億円、養殖設備計2億円，全場域整體造價總計4億円。內部建置有PP材質圓形養殖池計6口，池重7.5噸，蓄水量37.5噸/池，池外包覆泡棉保暖層，每池搭配一套獨立過濾系統(去氨氮過濾、沙濾桶逆洗及物理性膜過濾)及監控設備(如水質監測、智能電箱等，可進行遠端監控、異常發報、資料管理)，每池並配置氧氣產生器(酸素発生装置，50萬円/臺)純化空氣中的氧氣，再透過氧氣溶解機(酸素溶解装置)將純氧溶入過濾水中供養殖池使用。

場房屋頂設置太陽能板發電自用，僅供室內部分設備使用，因太陽能供電不穩，主要仰賴一般市電供電並備有緊急用發電機，是否設置儲能設備尚在評估中。場房外設置全自動冷熱交換系統（排熱回収型ヒートポンプ），運用廢熱回收熱泵（ECOマルチ・ヒーポン，ECO Multi Heatpump）可同時產生5˚C～20˚C的冷水和25˚C～60˚C的熱水，並依據氣溫變化自動進行水體冷熱交換，與一般傳統煤油鍋爐/電動冷水機熱源設備相比，運作成本節省約60～65%，同時減少約60%二氧化碳排放。

(二) 營運及管理部分

迄今已營運2年，目前設置管理人員計2人，每日視鰻魚攝食狀況，單用粉狀飼料或單用粒狀浮性飼料或混合2種飼料進行投餵，每日投餵飼料1次，粉狀及粒狀浮性飼料皆是鰻魚專用配合飼料，營養成分相同，惟粒狀飼料可使用自動投餵機（風動式輸送，固定式噴口）投餵較方便省工。監測設備感測元件（sensor）每週以海綿清洗2次，另全場域設備由Science公司每年全面性保修2次，保修費用100萬円/次。該場域屬閉鎖循環型養殖，因此生物安全防疫措施完善，人員進場皆需要置換場區專用雨鞋並須浸泡消毒液，及腳踏式噴灑手部清潔消毒液。

該場主要購入黑子放養，全場域6口池僅4口放養，每口池放養1萬2千尾(密度約200-300尾/噸水)，剩2口空池進行養水及作為分池空間，養殖過程依體型分池2次，池水恆溫約27度，水色呈現黃綠色係循環水系統過濾所致，並無做藻水，養殖最快6至7個月可上市，育成率約70-75%。另有關日本傳統養殖模式有生長遲緩個體的情況，推測每年大約有1,000~2,000萬條生長遲緩的鰻魚，為能讓有限的鰻魚資源再生養殖，據瞭解該場仍持續放置生長遲緩個體再生養殖，爰當日所見養殖池中仍有2年前放養之個體。該場養成鰻魚因數量有限且標榜地產地銷，目前僅於樂天市場網路商城以蒲燒鰻製品形式販售（ https://www.rakuten.co.jp/bushuunagi/ ）。

二、 平沼水產株式會社上里halk

平沼水產株式會社社長係汽車經銷代理出身，因埼玉縣不靠海，希透由在地生產、在地消費方式，回饋鄉里；另該場域於去（2023）年才興建完成，目前尚在試驗性營運中，倘營運有成將會擴大經營，並朝農漁共生循環經濟模式發展，初步構想是能將水產養殖結合水耕栽培作物(如芒果)，因該場域後面備有廣大空地，預計規劃循環農作區，將運用養殖廢水進行灌溉施肥，達到零碳排；或將養殖廢水含氮廢物再製成肥料販售。該場域取名為上里halkハルク，係指該場域配置有hydroponics水耕栽培區，aquaculture水產養殖區，laboratory鰻魚研究室及kitchen廚房（含鰻魚道場職業訓練中心）等區域的縮寫總和，倡議人才與鰻魚培育，也要創造養殖場進化空間之理念。

(一) 硬體建置部分

該場於2023年6月至同年12月間設置(耗時6個月)，座落土地為酒廠用地，非農地且地價便宜，全場域設施設備造價約5億5千萬円。內部建置有FRP材質養殖池計6口，蓄水量50噸/池，池外包覆泡棉保暖層，每池搭配一套獨立過濾系統(厭氣細菌及好氧細菌生物性過濾、沙濾桶逆洗及物理性膜過濾)及監控設備（如水質監測、智能電箱等，可進行遠端監控、異常發報、資料管理），每池並配置氧氣產生器（酸素発生装置）將空氣轉製為純氧，再運用氧氣溶解機（酸素溶解装置）溶入過濾水中，供給養殖池使用。過濾系統設定每天過濾15次，過濾效率為2-3噸水/小時，整套過濾系統佔設置成本2成。

該場仰賴一般市電供電並備有緊急用發電機，目前尚未裝設太陽能板，預計7月安裝，主要發電自用；場房外設置全自動冷熱交換系統（排熱回収型ヒートポンプ），運用廢熱回收熱泵（ECOマルチ・ヒーポン，ECO Multi Heatpump）可同時產生5˚C～20˚C的冷水和25˚C～60˚C的熱水，並依據氣溫變化自動進行水體冷熱交換。該場域原是酒廠用地，使用淡水無需另外申請，若用海水有排水問題才需要申請政府許可；另埼玉縣政府較不重視水產養殖，因此政府未提供相關補助。

(二) 營運及管理部分

目前設置管理人員計3人（養殖場）及臨時人員計5人（飯糰製作與販售），辦公室設置監控戰情系統，手機、電腦及平板均能遠端操作，可設定溶氧、溫度、pH底線數值、自動化設定排程及示警系統，但尚不能AI自主決策；另監測資料儲存雲端，版權屬平沼水產，而science公司亦會運用數據改進修正監測設備。該場域雖屬閉鎖循環型養殖，但生物安全防疫措施相對武州瓦斯場域略為寬鬆，並無更換場區專用鞋，僅提供簡易消毒踩踏地墊及手部酒精消毒，場區內搖蚊滋生。

今年放養黑子（規格10-40p）3萬5千尾，目前僅用5個水槽，每池平均放養9千至1萬尾（最多放1萬5千尾），每天換養殖池水體5%水，其水源為地下水，截至目前有90%育成率，惟本年土用丑日前應來不及達上市規格。該場於活鰻出貨前將活鰻放置於特製籃子以較低溫（17˚C）地下水沖水3天，以利鰻魚鎮靜及清腸排泄。

飼料投餵部分，鰻苗以吃粉狀飼料為主，當鰻魚規格達10P（每尾約100克）後則改為粒狀飼料，據瞭解更改飼料原因係餵食粒料之鰻魚肉質較好吃。另飼料添加物部分，鰻魚規格在7-10P（每尾約100-143克）添加魚油10%，規格達7P以上添加魚油15%。

該場於周末假期會開飯糰餐車於鄰近關越自動車道上里SA休息站（サービスエリア・下り）販售鰻魚飯糰（每600克飯糰配一片20克蒲燒鰻，販售價格為每個500日圓）作為推廣食育，自2023年5月迄今已販售2萬5千個飯糰；目前業已洽談2家餐廳供應該場養殖活鰻。

肆、心得及建議

一、 會議觀察與心得

此次出席在日本東京舉行的第 3 次日本鰻及其他鰻科學家會議以及第 17 次鰻魚資源養護與管理國際合作非正式會議，更進一步瞭解日本、韓國、中國對於鰻魚資源永續利用及養殖管理的重視與盡可能努力邁進，而臺灣應持續加強國際合作，推動科學研究，完善管理措施，以確保鰻魚資源永續利用。以下是此次 2 場會議綜合性重要觀察與心得：

（一） 日本鰻資源下降趨勢受到國際關注：

1. 依據本年度會議統計資料顯示，日本鰻捕撈量持續下降，IUCN 在 2014 年將日本鰻列入瀕危物種名錄，而 CITES 逐年關注日本鰻及其他鰻資源狀況，在美洲鰻嚴峻的資源狀態已被動物委員會認定為步入歐洲鰻列入附錄二之前的狀態，又有真鯊屬（如資源狀態良好的水鯊）以預防性原則列入附錄二的先例，提高了日本鰻等鰻鱺屬物種於 2025 年 CITES 大會列入附錄二提案可能通過之危機與不確定性，為了因應這個不確定性，有必要持續加強臺灣的捕撈漁獲統計及捕撈管理，以利後續因應鰻魚國際貿易須出具產地證明及無危害證明等管理作業。
2. 日本在科學家會議中提出以其他評估方式（Criterion E 評估模式）結果指出，日本鰻魚的資源狀態，既未列入易危（CR）亦未被評估為瀕危（EN），並非 IUCN 所稱瀕危物種（IUCN 以大型魚類評估方式進行日本鰻物種評估，即 Criterion A 評估模式），了解不同資源評估模式所考慮的生物族群量參數應審慎選取，盡可能避免出現高估生物滅絕機率的狀況，影響國際漁業管理決策及消費者觀感，期待日本學者日後發表應能讓日本鰻有新的管理面向。

（二） 科學研究與數據分享：

1. 各國代表分享了有關鰻魚資源的最新研究成果與數據，包括中國、日本、韓國和臺灣的鰻魚捕撈及養殖情況。無論商業與科學研究之數據都必須盡可能收集及格式標準化，對於了解鰻魚資源的時空序列變化趨勢具有

重要意義，亦能提供資源評估模式較為貼近實際狀態，縮小高估或低估差距，以利作為未來滾動式檢討相關資源管理措施之科學後盾。

2.本次日本在會議中亦提出，將科學研究評估及管理建議提供非正式會議參考，係仿效區域性管理組織之操作模式（如科學次委員會決議管理措施提送會員大會通過施行），也為未來鰻魚區域性管理架構鋪路，顯現以科學為本的漁業管理及適應性（滾動式）管理模式係國際趨勢，亦是海洋資源管理之顯學，亦符合 WTO 在漁業補貼議題上要求會員國以最佳科學研究證據進行漁業管理的宗旨。然而，鰻魚因其河海洄游之生態（跨及聯合國海洋法公約所稱的公海、經濟水域、領海、海灣、河口及內水）及商業利用主要在魚苗階段有其獨特性，與一般海洋漁業利用對象如大洋性魚類有所不同，鰻魚的生殖及其魚苗的來游生態研究具有高難度，在在受到海洋環境 4D 影響，包括三維空間、季節、物理、化學、生物的交互作用，鰻魚的科學研究與資源追蹤必定須跨域（地理、學科）整合生物學、生態學、海洋學、氣象學、機電工程學等綜合性科學，政策管理面也須從捕撈管理、棲地復育、物種培育各種層面多管齊下來共同執行，才能夠讓日本鰻資源永續利用。

3.去年第 16 次非正式會議中，中國作為鰻苗供應國，即有正面徵詢日本與韓國所需鰻苗量，而本次非正式會議中中國亦再度詢問日本與韓國是否掌握本漁期從中國進口之鰻苗量，會後日方提供日本與韓國提供數據顯示，日、韓均主要透過「香港」引進中國產鰻苗，雖是因中國通商口岸徵稅之故，因此透過香港減免關稅出口降低成本，但依目前日本高度依賴從香港出口的鰻苗情勢，若後續要日本拒絕從香港出口的走私鰻苗，唯有決心落實「產地證明」始能有所區隔並有效防堵走私問題；另過去所認知鰻魚產業規模較小且主力內銷的韓國即進口超過 7 公噸中國產鰻苗並已完成入池，韓國的養鰻實力與內需市場不容小覷，韓國已成為日本及臺灣的鰻苗競爭國，有必要持續追蹤觀察韓國之鰻魚產業發展。

（三） 建立具法律約束力的國際管理組織：

1.日本在會前提供並在會中簡要說明現行國際上有多樣的跨國或跨域漁業管理組織，在資源管理的角度上各國代表一致認為，建立具法律約束力的國際漁業管理組織對於鰻魚資源的管理具有重要意義，有助於促進各國之間的合作及提升管理措施執行的一致性及適應性管理的有效性，這是無庸置疑的。該議題納入本次會議議程討論，主要是藉由四國會議對於日本鰻資源管理有進一步規劃與構想做成紀錄，供日方在後續 CITES 相關會議場合作為說帖，讓國際瞭解四國決心盡可能不讓日本鰻走上歐洲鰻的後塵。

2.然在政治層面上此議題的討論亦須格外小心，有鑒於過去在第 8 次非正式會議場合退席抗議之不快歷歷在目，我方再與生態保全室大森室長確認日方態度，此議題持續討論即可，無意於短期內有具體成果，可見日方在我國及中國間微妙關係的處理上亦有所考量。鰻魚捕撈和養殖活動涉及領土和領海等國家主權，未來新成立組織如何處理該等活動的管理值得細細研議與考量，富有國際漁業管理組織經驗的日本農林水產省顧問森下丈二主席，亦提出海洋法公約第 67 條有提供部分法律基礎供各國討論鰻魚物種的管理，我方應及早邀集委託熟知海洋法公約與國際漁業管理組織運作之專家學者進行研析，以尋覓我國最佳權益地位之國際組織參與模式。

二、 臺灣鰻魚資源管理與日後參團之建議：

茲就會議觀察並檢討參與會議之狀況以及會後發展，研擬建議事項如下：

（一） 強化日本鰻（鰻苗及成鰻）資源調查與評估、精進養殖與加工技術等科學研究，及國際科研合作：

1. 為因應 CITES 及各界關切，四國仍需有力科學研究基礎並提出具體措施以解除各方疑慮，建議未來應持續支持各國優先對於鰻魚進行科學研究及資源評估，並以科學數據為基礎，滾動檢討各國相關管理措施，以利鰻魚資源永續發展。

2．科學研究是資源管理的基礎，國際趨勢係以科學導向建立相關管理措施，在連資源狀況良好的水鴞都已被列入附錄二的保育浪潮下，相較於臺灣對於日本鰻苗資源僅有基礎漁獲量之蒐集，並無進一步長期調查研究，鑒於鰻魚屬跨界洄游物種，我國應重視對鰻魚資源調查評估工作，並基於具體科學研究之上持續國際合作，以提升我國在國際學研及漁業管理的正面形象與能見度。

3．針對鰻魚管理現況，因歐洲鰻及其他鰻鱺屬物種的非法貿易已受到關注，未來仍不排除可能於 2025 年 CITES COP20 會議建議日本鰻、美洲鰻及其他鰻類列附錄二，倘列入附錄二日本鰻及其他鰻類未來的進出口規範將可能比照歐洲鰻的限制與相關規定，有必要持續強化臺灣的捕撈管理及提升漁獲統計之精確度，結合科學研究證據證確認日本鰻資源狀況，以利後續因應鰻魚國際貿易須出具產地證明及無危害證明等管理作業。

4．本次鰻魚國際非正式會議中，中國提案推動國際聯合研究計畫，且獲主席鼓勵並持續開放討論；鑒於鰻魚屬跨國洄游物種，相關族群資源研究仰賴資源利用國共同合作努力，建議鼓勵我國科學家代表能就潛在研究主題極可能方案持續與各國科學家進行討論，以利我國相關管理政策擬定推行。

5．目前我國已有 4 位科學家（國立臺灣大學漁業科學研究所韓玉山教授、高雄科技大學漁業科技與管理系侯清賢副教授兼永續漁業發展研究中心主任、農業部水產試驗所淡水養殖研究中心楊順德主任及東部漁業生物研究中心江偉全副研究員）加入鰻魚科學家會議之兩大任務小組，為能支持與培育科學家建立科研數據與取得具體實績，建議與水產試驗所攜手爭取農業部科技計畫經費分工執行，有助於未來提供本署制定進一步捕撈管理及溯源政策推動。

（二） 持續建立完善的鰻魚（苗）漁獲透明度溯源體系：

1．本次會議除持續關注鰻魚走私貿易的狀況，各國在鰻苗捕撈管理制度日益強化，顯示前端源頭管理之重要性，如日本從原日本鰻特別捕撈許可證

轉為具強制力的都道府縣府知事許可證制度，將有效針對鰻魚流通進行管控，並促使日本業者建立漁獲交易紀錄，以及提供準確的漁獲捕撈量數據；中國各省分推動鰻苗捕撈許可證限額制度，亦附加捕撈規模、漁具漁法之限制。

2. 我國捕撈源頭管理部分，除了漁船須取得主管機關核發之漁業執照屬許可制外，岸際捕撈業者亦尚待進一步強化管理，另捕撈源頭端目前雖已初步建置卸魚申報制度，因非屬強制性，目前使用狀況尚待強化宣導與輔導，後續仍必須結合運銷端、養殖端及出口端確認來源一致性，尚須多方與整體產業溝通與整合推行，早日建立漁獲透明度溯源體系，確實掌握鰻魚捕撈、養殖及貿易透明化流通，有助於因應未來國際貿易管理之趨勢。

3. 生態保全室小川太輝課長補佐提醒 CITES 報告中提及我國和香港間之非法鰻苗貿易議題值得我國重視，將建議內水面漁業振興室生駒潔室長就此議題與我國進行雙邊會議討論，雖日本已規劃於 2025 年開始就鰻苗執行水產品流通適正化法規定，但目前僅規劃規範日本國內之鰻苗交易，暫無規劃適用於國際貿易，我方應持續透過雙邊會議或會後交流，建議日方日後務必將該法擴及至國際貿易施行，以杜絕走私。

（三） 持續關注並小心應對建立具法律約束力之國際/區域性管理組織議題：

應及早邀集委託熟知海洋法公約與國際漁業管理組織運作之專家學者，就組織架構、如何運作及各國應如何合作之細節等進行研析，以尋覓我國最佳權益地位之國際組織參與模式，並在國際會議上持續參與討論並適時提出反饋，以維護我國權益。

（四） 後續參團成員組成應持續由產、官、學代表共同組團出席：

鑒於國際對於鰻魚資源養護與管理日益重視，且明年度會議亦循本年度 2 場會議接續召開模式，且討論議題與各國與會人員涉及層面廣泛，為能在會場上與會外能有效率地交流意見與應對，及回國後縮短與產業溝通之障礙，有必要由產、官、學代表共同組團出席。

（五） 未來規劃將日本或韓國冷溫水循環式閉鎖型鰻魚養殖場納入青年漁民

海外標竿研習活動參訪行程：

本次出國期間於會外時間參訪埼玉縣2處冷溫水循環式閉鎖型鰻魚養殖場，皆由日本企業（瓦斯公司及汽車經銷商）多角化經營投入鰻魚養殖事業，與系統設備商合作客製化進行場域規劃建置及保固維護，可模組化整廠輸出，並仿效韓國養鰻設備與技術，設置冷溫水循環式閉鎖型陸上養殖系統，運用水處理技術及省能源技術在育成場所中，以高育成率及短期育成為目標的閉鎖循環型養殖技術。對此，台灣企業亦可借鏡學習多角化經營理念，如鰻魚室內養殖結合綠能，除有益ESG評比實績，更有助於企業及鰻魚產業朝永續發展目標前進。

對於水資源較缺乏的內陸地區，運用循環水系統可以做最小限度的抽取地下水加水量及污水排水量，較傳統養殖模式節省營運成本60%。為因應我國水土資源有限，且近年民間自主提升，提倡人才與鰻魚培育、創造養殖場進化空間等理念，我國養殖產業模式改變及場域優化是必須的；而發展循環水養殖系統與我國刻正推行省工、高效、節能之養殖政策相符，值得我國借鏡學習，建議未來可安排我國漁業青年可赴相關養殖場域參訪學習。

另本次參訪學習之冷溫水循環式閉鎖型陸上養殖系統倘要應用於我國產業，尚有應注意之處，如閉鎖循環型養殖應落實生物安全防疫措施；監測資料儲存雲端應注意版權歸屬；多元加值養殖模式應落實養殖為本；為讓有限鰻魚資源再生養殖，日本亦開始飼養生長遲緩個體，我國未來是否還能取得鰻魚黑子資源值得注意。

伍、第 3 次科學家會議照片

陸、第 17 屆鰻魚國際非正式會議照片

柒、第 3 次科學家會議及第 17 屆鰻魚國際非正式會議文件及參考資料

附件 1 第 3 次科學家會議架構

SM03 Doc.01

Concept Paper on the Scientific Meeting of Japanese Eel and Other Relevant Eels

1. MEETING PURPOSE

The Scientific Meeting of Japanese Eel and Other Relevant Eels is held in accordance with the Joint Press Release of 14th Meeting of Informal Consultation for Conservation and Management of Japanese Eel Stock and Other Relevant Eel Species (Informal Consultation) to share scientific knowledge and experience as well as to provide scientific advice for conservation and management measure of the species.

2. PARTICIPANTS

Participants will be invited as follows:

- Scientists, researchers, experts, specialists and government officials;
- Invited scientist, researchers, and specialists on other relevant eels;
- Representatives from eel industries; and
- NGOs.

3. CHAIR and VICE-CHAIR

The host member will suggest appropriate persons to serve as Chair and Vice-Chair for the appointments by the Scientific Meeting.

4. SECRETARIAT

Fisheries Agency of Japan and Global Guardian Trust will service as the interim Secretariat (the Secretariat).

5. OTHERS

The result of the meeting is reported to the Informal Consultation.

附件 2 第 3 次科學家會議出席名單

SM03 Doc.04

The Third Scientific Meeting on Japanese Eel and Other Relevant Eels
- Participant List -

【Chair and Vice Chiar】

	Category	Title	First name	SURNAME	Position	Organizaiton	E-mail
1	Chair	Prof.	Nobuyuki	Yagi	Professor	Tokyo University	yagi@g.ecc.u-tokyo.ac.jp
2	Vice Chair	Prof.	Jun	Aoyama	Professor	Atmosphere and Ocean Research Institute, Tokyo University	aoy@g.ecc.u-tokyo.ac.jp

China

	Category	Title	First name	SURNAME	Position	Organizaiton	E-mail
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3	Member	Mr.	Changwei	SHAO	Professor	Yellow Sea Fisheries Research Institute, Chinese Academy of Fishery Sciences	shaocw@ysfri.ac.cn
4	Member	Mr.	Sikai	WANG	Associate Professor	East China Sea Fisheries Research Institute, Chinese Academy of Fishery Sciences	wangsk@ecsf.ac.cn
5	Member	Mr.	Lei	GAO	Assistant Professor	East China Sea Fisheries Research Institute, Chinese Academy of Fishery Sciences	gaolei@ecsf.ac.cn
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Japan

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21	Members	Ms.	Ishmerai	Galang	Research Assistant	Nagano University	ishmerai-galang@nagano.ac.jp
22	Members	Mr.	Noritaka	Mochioka	Project Professor	Kyushu University	mochioka@agr.kyushu-u.ac.jp
23	Observers	Mr.	Kouji	Yamamoto	President	All Japan Association for Sustainable Eel Aquaculture Incorporated	
24	Observers	Mr.	Yuki	Kinoshita	Vice-President	All Japan Association for Sustainable Eel Aquaculture Incorporated	
25	Observers	Mr.	Hideki	Yoshitomi	Secretariat	All Japan Association for Sustainable Eel Aquaculture Incorporated	yoshitomi@unagi-nichimanren.or.jp
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Korea

	Category	Title	First name	SURNAME	Position	Organizaiton	E-mail
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2	Member	Dr.	Shin-Kwon	Kim	Senior Researcher of Aquaculture Research Division	National Institute of Fisheries Science, Ministry of Oceans and Fisheries	ksk4116@korea.kr
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5	Interpreter	Mr.	Jae-geol	Yang	Policy Analyst	Korea Overseas Fisheries Cooperation Center	jg718@kofci.org

Chinese Taipei

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3	Member	Ms.	YuanJue	Lin	Deputy Director, Aqualculture Division	Fisheries Agency	yuanjue@ms1.fa.gov.tw
4	Member	Ms.	Youhua	Cheng	Section Chief, Aquaculture Division	Fisheries Agency	youhua@ms1.fa.gov.tw
5	Member	Ms.	YaFen	Chang	Associate Specialist, Aquaculture section	Fisheries Agency	yafen1221@ms1.fa.gov.tw
6	Member	Mr.	WeiHsiang	Chang	Section chief, Resource Management section	Fisheries Agency	weihsiang@ms1.fa.gov.tw
7	Observer	Mr.	HsinMing	YEH	Chairman	Taiwan Eel Farming Industry Development Foundation	hmyeh@mail.tfrin.gov.tw

8	Observer	Mr.	ChiehFu	Wang	CEO	Taiwan Eel Farming Industry Development Foundation	a27075603@hotmail.com
9	Interpreter	Mr.	ChinYaw	Wang	Senior Secretary, Economic Division,	Taipei Economic and Cultural Representative Office in Japan	chinyaw@ms1.fa.gov.tw

【Invited experts/specialists】

	Category	Title	First name (Middle	SURNAME	Position	Organizaiton	E-mail
1	Invited expert	Dr.	Anstead	Kristen	The Chair of Working Group on American Eel	International Council for the Exploration of the Sea (ICES)	kanstead@asmfc.org

附件 3 第 3 次科學家會議文件列表

(Attachment II)

List of Meeting Documents

Document Number	Document Title
SM03 Doc. 1	Concept paper on the scientific meeting on Japanese eel and other relevant eels
SM03 Doc.2 rev.2	Meeting agenda of the 3rd scientific meeting on Japanese eel and other relevant eels
SM03 Doc.3 rev.3	Annotated agenda of the 3rd scientific meeting on Japanese eel and other relevant eels
SM03 Doc.4	Participant list
SM03 Doc.5	Basic rules of meeting procedure for the scientific meeting
SM03 Doc.6	Information note for participants
SM03 Doc.7	Industry and scientific research of Japanese eel in China
SM03 Doc.8	The Overview of Japanese Eel catch and scientific activities (Japan)
SM03 Doc.9	Overview of eel catch and scientific activities in Korea
SM03 Doc.10	The overview of Japanese eel catch and scientific activities in Taiwan
SM03 Doc.11	Minutes of the Eel Task Teams Workshop in 2024
SM03 Doc.12	Resource assessment and management of Japanese eel
SM03 Doc.13	Fisheries independent indices of population trends: estimation of Ne from DNA data
SM03 Doc.14	American eel: US Management, landings, indices, and assessments
SM03 Doc.15	The catching status of eel larvae in the Yangtze River Estuary and considerations for their conservation and utilization
SM03 Doc.16	Tracking Japanese eels (*Anguilla japonica*) and revealing their distribution in Taiwanese rivers by environmental DNA Analysis
SM03 Doc.17	Research on eel resource management and conservation in Korea
SM03 Doc.18	Freshwater Ecology and Conservation; the importance of local river habitats and its restoration
SM03 Doc.19	Spawning adult survey and otolith analysis of Japanese eels
SM03 Doc.20	Discussion on the Japanese eel and other relevant eels at the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

SM03 Doc.21	Draft updated workplan for scientific activities and collaborative research on Japanese eel and other relevant eels (2024-25)
SM03 Doc.22	Draft terms of reference for the scientific meeting of Japanese eel and other relevant eels
SM03 Doc.23	Terms of Reference for Task Team 1 & 2 of Scientific Activities and Collaborative Research on Japanese Eel Established under the Scientific Meeting
SM03 Inf.01	Summary report of the 2nd scientific meeting on Japanese eel and other relevant eels
SM03 Inf.02	Summary report of the 16th meeting of informal consultation on international cooperation for conservation and management of Japanese eel stock and other relevant eel species
SM03 Inf.03	Joint statement of the bureau of fisheries of People's Republic of China, the Fisheries Agency of Japan, the Ministry of Oceans and Fisheries of the Republic of Korea and the Fisheries Agency of Chinese Taipei on international cooperation for conservation and management of Japanese eel stock and other relevant eel species
SM03 Inf.04	Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES-AC32 Summary Report)
SM03 Inf.05	Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES-AC32 Doc. 36)
SM03 Inf.06	Summary of the responses to the Notification No. 2021/018
SM03 Inf.07	Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES-SC77 Summary Report)
SM03 Inf.08	Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES-AC77 Doc. 66)
SM03 Inf.09	Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES-AC33 Doc.40)

附件 4 第 3 次科學家會議議程草案

SM03 Doc.02 rev.2

(Draft)

The Third Scientific Meeting on the Japanese Eel and Other Relevant Eels

Venue: Tokyo, Japan
Date: June 3-4, 2024

Agenda

1. **Opening of the meeting**

2. **Meeting arrangement**

3. **Adoption of agenda**

4. **Overview of the Japanese eel catch and scientific activities**

5. **Report of the intersessional activities**
   - 5.1 Task Team 1
   - 5.2 Task Team 2

6. **Emerging Science and practical solutions in the management of the Japanese eel resource in the Northeast Asian region**
   - 6.1 Resource assessment and management of Japanese eel
     Prof. Hiroshi Hakoyama, Nagano University, Japan
   - 6.2 Fisheries independent indices of population trends: estimation of Ne from DNA data
     Leanne Faulks, PhD and Masashi Sekino, PhD et al., Nagano University, Japan
   - 6.3 American eel: US Management, landings, indices, and assessments
     Kristen Anstead, PhD, Atlantic States Marine Fisheries Commission
   - 6.4 Reflection on the protection and utilization of eel resources in China
     Sikai Wang, PhD, East China Sea Fisheries Research Institute, Chinese Academy of Fishery Sciences, China
   - 6.5 Tracking Japanese eels (*Anguilla japonica*) and revealing their distribution in Taiwanese rivers by environmental DNA Analysis
     Prof. Yu-San Han, National Taiwan University, Chinese Taipei
   - 6.6 Research on eel resource management and conservation in Korea
     Shin-Kwon Kim, PhD, National Institute of Fisheries Science, Ministry of Oceans and Fisheries
   - 6.7 Freshwater Ecology and Conservation; the importance of local river habitats and its restoration
     Kazuki Matsushige, PhD, Nagasaki University, Japan
   - 6.8 Spawning adult survey and otolith analysis of Japanese eels
     Nobuto Fukuda, PhD, National Research Institute of Fisheries Science
     Kazuki Yokouchi, PhD, National Research Institute of Fisheries Science

7. **Discussion on the Japanese eel and other relevant eels at the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)**

8. **Revised workplan of scientific activities/collaboration in 2024-2025**

9. **Date and venue of the next Scientific Meeting**

10. **Adoption of summary report**

11. **Other matters**

12. **Closing of the meeting**

附件 5 第 3 次科學家會議職權範圍(Terms of Reference)

SM03 Doc.22

(Draft)

Terms of Reference for the Scientific Meeting of Japanese Eel and Other Relevant Eels

The Bureau of Fisheries of People's Republic of China, the Fisheries Agency of Japan, the Ministry of Oceans and Fisheries of the Republic of Korea and the Fisheries Agency of Chinese Taipei (hereinafter referred to as "Members"),

Recalling the Joint Statement of the Bureau of Fisheries of People's Republic of China, the Fisheries Agency of Japan, the Ministry of Oceans and Fisheries of the Republic of Korea and the Fisheries Agency of Chinese Taipei on International Cooperation for Conservation and Management of Japanese Eel Stock and Other Relevant Eel Species, which was issued in September 2014;

Recognizing the Joint Press Release of the Fourteenth Meeting of the Informal Consultation on International Cooperation for Conservation and Management of Japanese Eel Stock and Other Relevant Eel Species (hereinafter referred to as "Informal Consultation"), which was released in July 2021;

Have decided the following:

1. The purpose of the Scientific Meeting of Japanese Eel and Other Relevant Eels is to:

(a) provide a forum for consultation and cooperation on the Japanese eel and other relevant eels among Members;
(b) promote and collaborate on scientific research;
(c) share scientific knowledge and experience; and
(d) provide scientific advice for conservation and management measures to the Informal Consultation.

2. The functions of the Scientific Meeting are to:

(a) collect, analyze and exchange relevant scientific knowledge and experience on the Japanese eel and other relevant eels;
(b) review scientific assessments and conservation and management measures on the Japanese eel and other relevant eels, and eel statistics submitted by Members to the Informal Consultation;
(c) establish an effective mechanism for international cooperation to encourage

and promote scientific activities that can contribute to the conservation of the Japanese eel and other relevant eels;

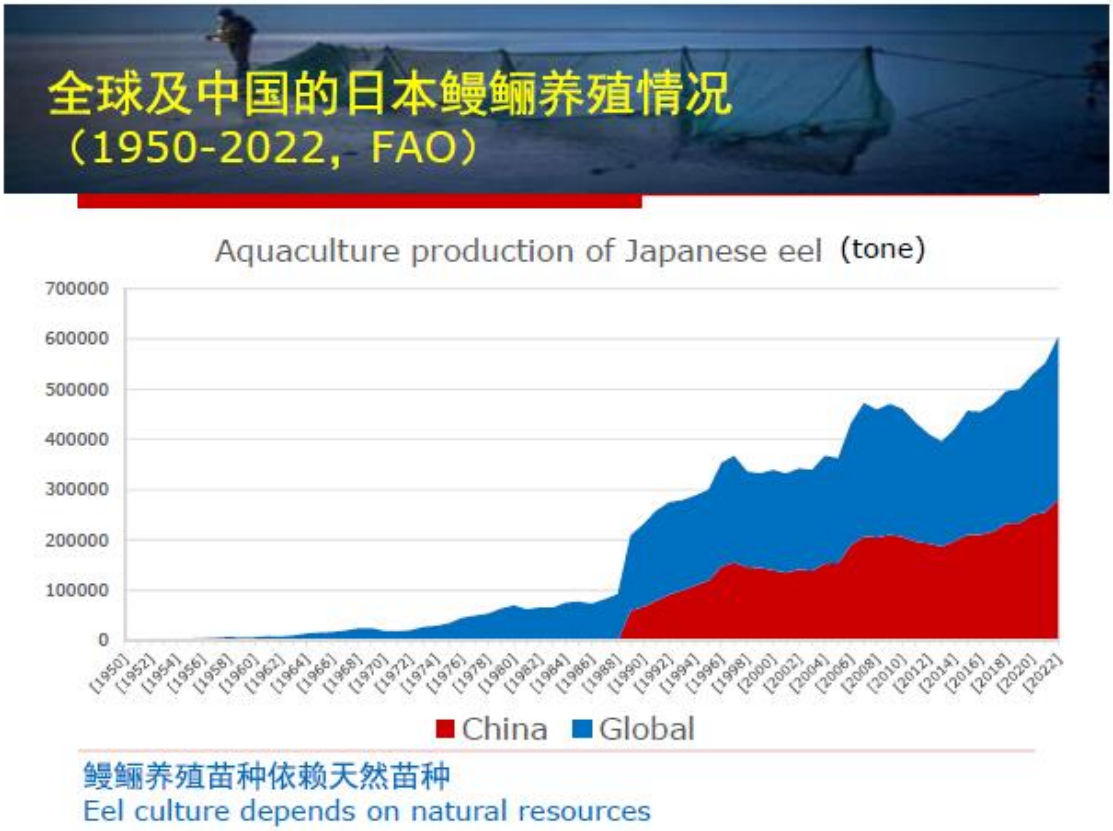
(d) develop and implement a research plan for scientific activities and collaborative research on the Japanese eel and other relevant eels;

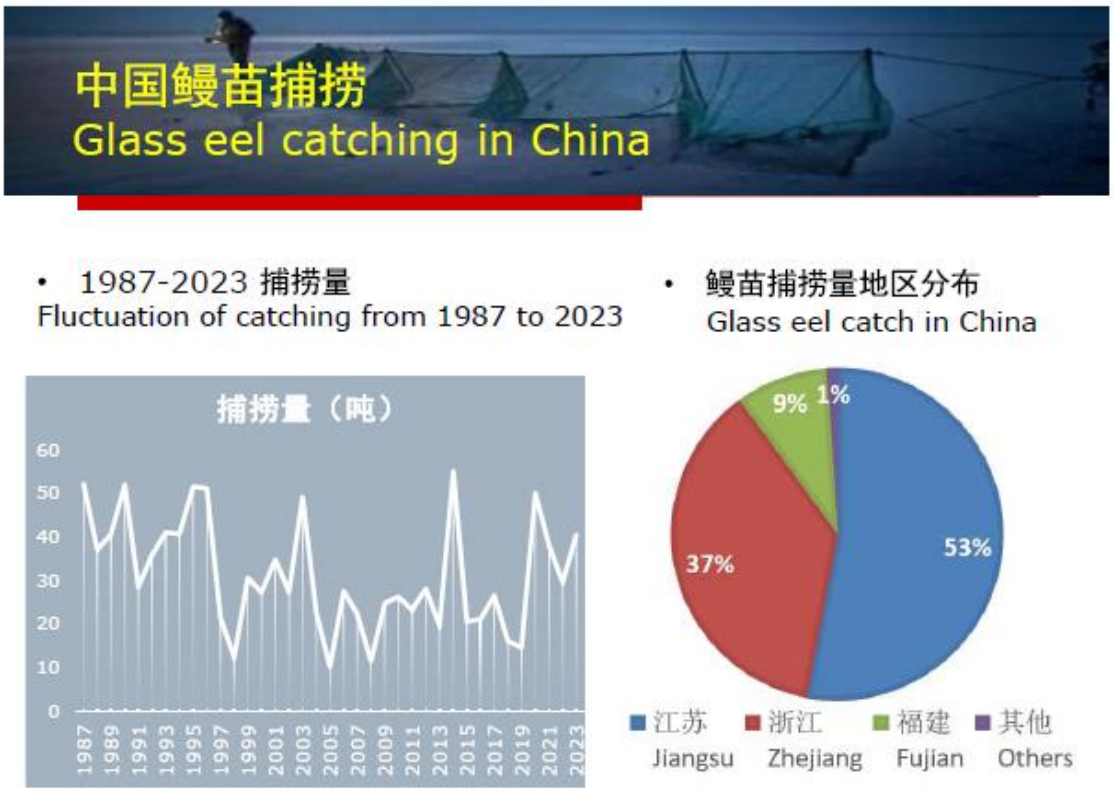
(e) endeavor to conduct a stock assessment of the Japanese eel to identify appropriate measures for its conservation and management;

(f) provide scientific advice on conservation and management measures for the Japanese eel and other relevant eels and any other matters requested by the Informal Consultation; and

(g) prepare a report for the Informal Consultation.

附件 6 中國大陸日本鰻捕撈及科學活動概況分享





鳗鲡资源保护势在必行
Conservation of eel resources is imperative

因过度利用和栖息地破坏，势必导致日本鳗鲡群体资源下降，这也将影响养殖业的持续发展。

Due to overexploitation and habitat destruction, the population of Japanese eel will inevitably decline, which will affect the sustainable development of aquaculture.



鳗鲡资源保护行动方案
Actions for eel resources conservation

资源管理——
对野生资源的养护
Resource Management -- Conservation of wild resources

- 捕捞管理（Catching management）
- 增殖放流（Stock enhancement and releasing）
- 环境保护（Environmental protection）

科学研究——
减少对野生资源的依赖
Scientific research -- Reduce dependence on wild resources

- 资源调查（Resources survey）
- 人工繁殖（Artificial breeding）
- 迁徙追踪（Migration tracking）
- 环境模拟（Environmental simulation）

鳗鲡资源保护行动方案
Actions for eel resources conservation

一、资源管理

Resource management

（1）鳗苗捕捞管理
Catching management

◆ 长江十年禁渔
The fishing ban in the Yangtze River basin
◆ 各地禁渔期制度
Local fishing ban system
◆ 鳗苗捕捞许可证制度
License management system

（二）增殖放流
Eel stock enhancement and releasing

◆ **2018年**
长江口放流鳗鲡亲本3000余尾
Releasing more than 3,000 parent fish at the Yangtze River estuary in 2018

◆ **2019年**
长江口放流鳗鲡亲本2000余尾
Releasing more than 2,000 parent fish at the Yangtze River estuary in 2019

◆ **2020年**
广东佛山放流成鳗2000公斤、鳗苗35000尾
Releasing 2,000 kg of adult eels and 35,000 glass eels in Foshan, Guangdong in 2020.

（三）环境保护
Environmental protection

长江大保护战略和长江保护法（2021年3月1日起施行）

Yangtze River Conservation Strategy and Yangtze River Protection Law (effective March 1, 2021)

Yangtze River and its tributaries

鳗鲡资源保护行动方案
Actions for eel resources conservation

二、科研研究
Scientific research

鳗鲡资源调查
Eel resources survey

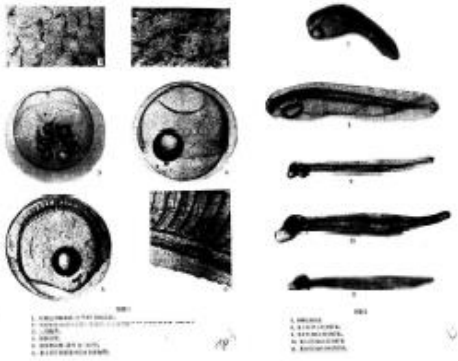
通过现场走访、咨询、观察，详细记录各个调查点的水质参数、种质繁育情况等信息。对调查点的鳗鲡种质进行生物学特征测定、采集图像；采集品质、生理生化、遗传多样性指标的检测样本。

Through on-site visits, consultations, and observations, detailed information on water quality and germplasm at each survey site was recorded. Biological characteristics of eel at the survey sites were measured and images were collected; test samples of quality, physiological and biochemical, and genetic diversity indexes were collected.

中国关于鳗鲡繁殖&迁徙的研究历程
History of research on eel reproduction and migration in China

1973年，王义强教授进行鳗鲡人工繁殖研究，通过亲本鳗鲡的培育，投喂和注射人绒毛膜激素、鲤鱼脑垂体提取液等多种方式刺激亲本鳗成熟并产卵受精，1974年获得存活19天的仔鳗。

In 1973, Professor Wang Yiqiang conducted research on the artificial breeding of Japanese eels. Through the cultivation of parent eels and various methods such as feeding and injection of human chorionic gonadotropin, carp pituitary extract, etc., parent eels were stimulated to mature and spawn. In 1974, the bred larvae survived for 19 days.



中国关于鳗鲡繁殖&迁徙的研究历程
History of research on eel reproduction and migration in China

1993年，陈世群在发现鳗鲡的一个自然产卵场，采到了多颗双细胞期和神经胚后发育期卵。
1994年，我国海洋局学者捕捞到鳗鲡卵、变态仔鳗。

In 1993, Chen Shiqun collected several double-cell and post-neurula stage eggs in a known natural spawning ground of Japanese eels. In 1994, scholars from the China State Ocean Administration caught eel eggs and larvae.

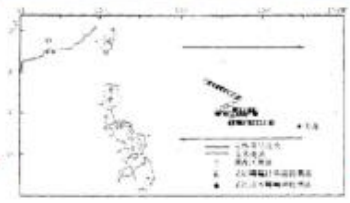


图1

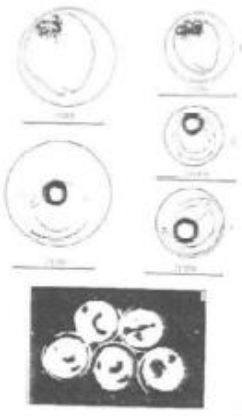


图2

中国关于鳗鲡繁殖&迁徙的研究历程
History of research on eel reproduction and migration in China

1995年，珠江水产研究所谢刚等人研究了鳗鲡胚胎发育盐度、水温的关系，确定了胚胎发育的水温和盐度范围。

In 1995, researchers including Xie Gang from the Pearl River Fisheries Research Institute studied the relationship between the embryonic development of Japanese eels and salinity and water temperature, determining the range of water temperature and salinity conducive to embryonic development.

Some characteristics of breeding biology of *Anguilla japonica*

XIE Gang, QI Bao-lun, YU De-guang

(Key Lab. of Tropical & Subtropical Fishes Selective Breeding & Culture, Agriculture Ministry, Pearl River Fisheries Research Institute, Chinese Academy of Fisheries Sciences, Guangzhou 510380, China)

Abstract: Females and males range from 700 mm to 400 mm in body length in nature, which female eel is bigger than male eel. The percentage of the male decreased gradually, but the percentage of the female increased gradually with increase in body length. The condition factor (CF) of female is bigger than that of male. Relationship between body length and weight of sexual eel are expressed as $W=5.596\times10^{-5}L^{3.002}$, $W_{♀}=4.72\times10^{-7}L^{3.105}$, $W_{♂}=1.317\times10^{-5}L^{2.737}$. Relationship between perimeter, intestine length and body length of mature eels are expressed as $Y=0.22L-34.82$, $D=0.56L-12.11$. When the mature eels are cultured in fresh water and sea water, their gonadosomatic indexes are very low. The gonadosomatic indexes of the mature eels are obviously increased, the body weight and body perimeter increased gradually with increases in frequency of injection of hormones and the liver coefficient of the female is increased regularly under artificial induction of gonadal maturation.

Key words: *Anguilla japonica*; breeding biology; characteristic

中国关于鳗鲡繁殖&迁徙的研究历程
History of research on eel reproduction and migration in China

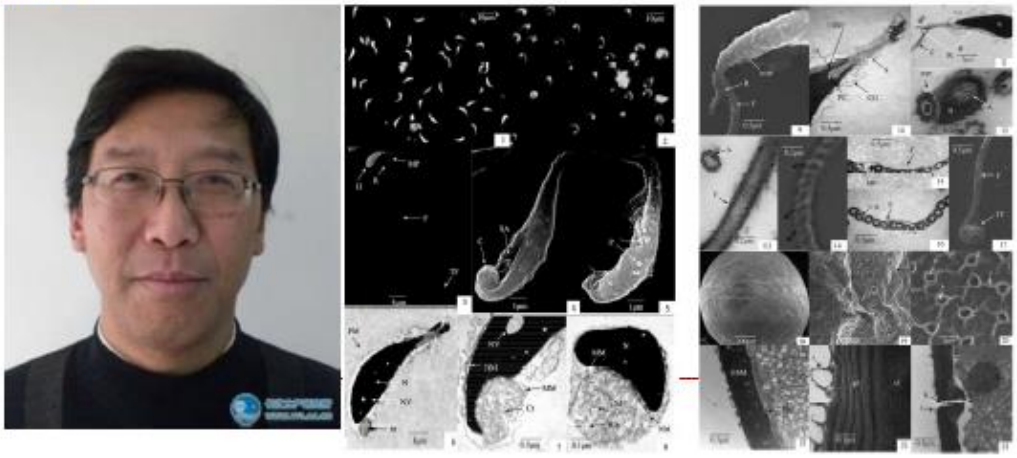
1997年，清华大学黄大明探讨了鳗鲡的生活史和人工育苗研究，同年长江水产研究所刘鉴毅等通过配置人工海水，成功繁殖出鳗鲡苗。

In 1997, Huang Daming from Tsinghua University studied the life history and artificial breeding of Japanese eels. In the same year, Liu Jianyi et al. from the Yangtze River Fisheries Research Institute successfully bred through artificial seawater.

中国关于鳗鲡繁殖&迁徙的研究历程
History of research on eel reproduction and migration in China

2003年，长江水产研究所柳凌等认为在外源激素的有效范围内，尽量延长卵巢的发育时间，对鳗鲡幼苗的发育更加有利。

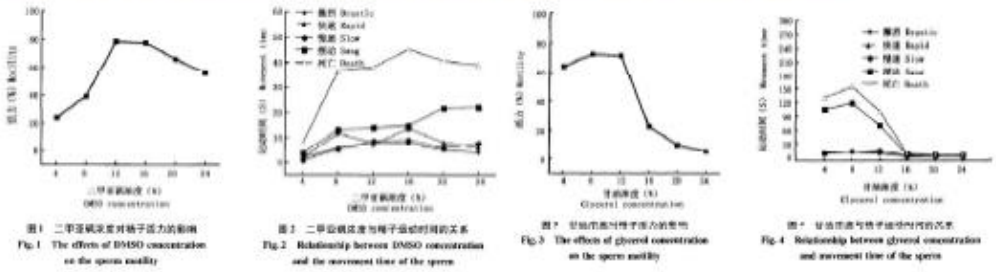
In 2003, Liu Ling et al. from the Yangtze River Fisheries Research Institute suggested that within the effective range of exogenous hormones, prolonging the ovarian development time as much as possible would be more beneficial for the development of Japanese eel larvae.



中国关于鳗鲡繁殖&迁徙的研究历程
History of research on eel reproduction and migration in China

2007-2008年，东海水产研究所黄晓荣等针对日本鳗鲡人工繁殖中雌雄亲鱼性腺发育不一致的问题，在利用超低温冷冻技术长期保存日本鳗鲡精子过程中，分析超低温和抗冻剂对精子活力的影响。

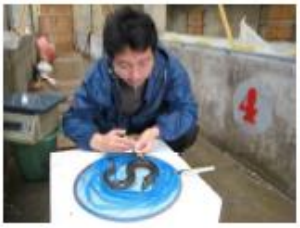
In 2007-2008, Huang Xiaorong et al. from the East China Sea Fisheries Research Institute addressed the issue of inconsistent development of the gonads in male and female parent eels during artificial reproduction of Japanese eels. They analyzed the effects of ultra-low temperature and cryoprotectants on sperm viability during the long-term preservation of Japanese eel sperm using cryopreservation techniques.



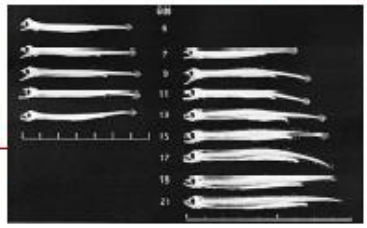
中国关于鳗鲡繁殖&迁徙的研究历程
History of research on eel reproduction and migration in China

2007-2009年，东海水产研究所刘鉴毅等在海南基地开展了日本鳗鲡的人工养殖与繁育研究，采用人工催熟和催产的方法获得了日本鳗鲡正常成熟的精子和卵子，并成功孵化出大批量鳗鲡苗，鳗苗成活至13天。

From 2007 to 2009, Liu Jianyi et al. from the East China Sea Fisheries Research Institute conducted research on the artificial cultivation and breeding of Japanese eels in Hainan. They employed artificial spawning induction methods to obtain mature sperm and eggs from Japanese eels, leading to the successful hatching of a large number of larvae, which survived for up to 13 days.





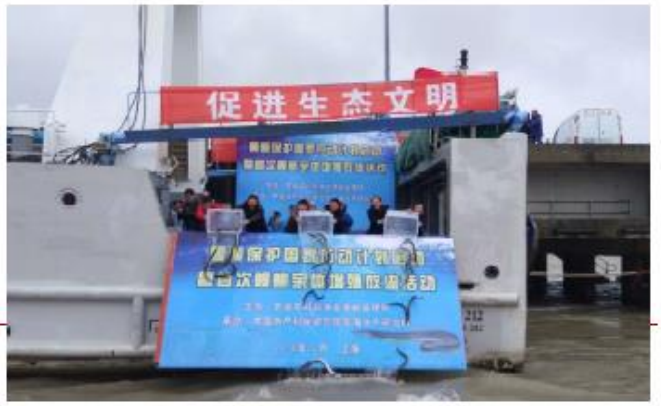



中国关于鳗鲡繁殖&迁徙的研究历程
History of research on eel reproduction and migration in China

2018年12月11日，在长江口放流鳗鲡亲体3000尾，其中10尾进行了PAT卫星跟踪标记，2000尾做了T型标记，以通过有效增殖天然水域的鳗鲡繁殖群体数量恢复鳗苗资源，并通过标志跟踪技术查明鳗鲡成鳗下海产卵的洄游路径。

On December 11, 2018, 3000 Japanese eel parent fish were released into the Yangtze River Estuary, with 10 of them tagged for PAT satellite tracking and 2000 tagged with T-tags. This release aimed to restore the natural spawning population of Japanese eels and to trace the migratory routes of adult eels during their spawning migration using tracking technology.

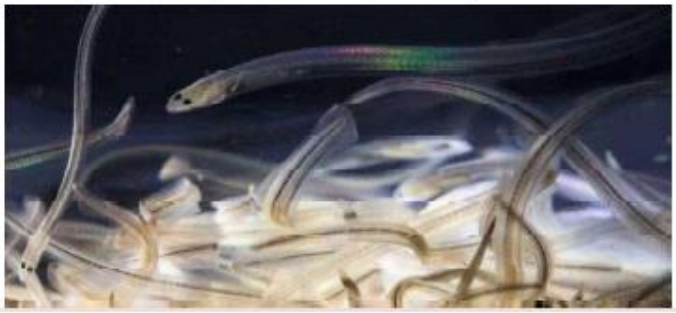




鳗鲡资源保护的目标和原则
Target & Principles

总体目标：加强鳗鲡资源保护，实现可持续利用
Overall goal: to strengthen the protection of eel resources and achieve sustainable utilization

基本原则：保护优先，合理利用、科技先行、合作共享
Basic principles: conservation first, aiming for rational utilization, science and technology development, cooperation and sharing



Thanks

附件 7 日本日本鰻捕撈及科學活動概況分享

SM03/Doc08: The Overview of Japanese Eel catch and scientific activities (Japan)

The 3rd Scientific Meeting on Japanese Eel and Other Relevant Eels, Mita Kaigisho, Tokyo, Japan, June 3–4, 2024

Hiroshi Hakoyama

June 3, 2024

hiroshi-hakoyama@nagano.ac.jp
Institute of Freshwater Biology, Nagano University

Overview of Japanese eel catch data and glass eel survey in Japan

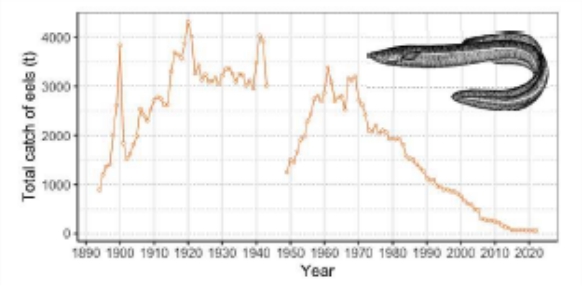
Overview of catch data

In Japan, long-term annual catch time series of Japanese eel since 1894 (about 130 years) have been recorded by prefecture and river, by inland and coastal waters, and by yellow eel and seedling (glass eel and elver) (Hakoyama et al., 2016).

Investigation of the arrival of glass eel

As information that does not rely on fisheries, a survey of glass eel arrivals has been conducted since 2019 in five prefectures in Japan in order to determine the status of glass eel arrivals in months outside of the fishing season (December through April).

Yellow eel catch (total catch) in Japan

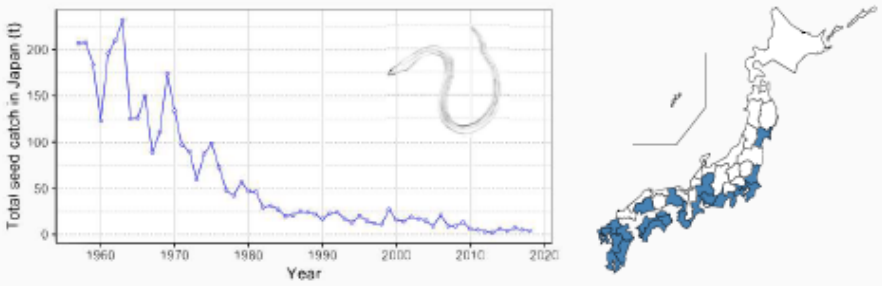


Data are based on the fisheries statistics of the Government of Japan (Hakoyama et al., 2016, The Annual Report of Catch Statistics on Fishery and Aquaculture in 2022). After World War II, only catches in inland waters were counted.

Inland and coastal yellow eel catches by prefecture in 1941, just after World War II (gray: inland, black: coastal)

- In the past, when populations were relatively 'healthy', yellow eel catches in inland waters were twice as large as in coastal waters
- The absence of official eel catch statistics for coastal areas in recent years may suggest that coastal stocks have declined more
- Suggests that inland water populations and environments are inherently more important

Total seed catch (including glass eels and elver eels) in the sea and inland waters in Japan



Data from fisheries statistics of the Government of Japan (Hakoyama et al., 2016, The Annual Report of Catch Statistics on Fishery and Aquaculture in 2018).

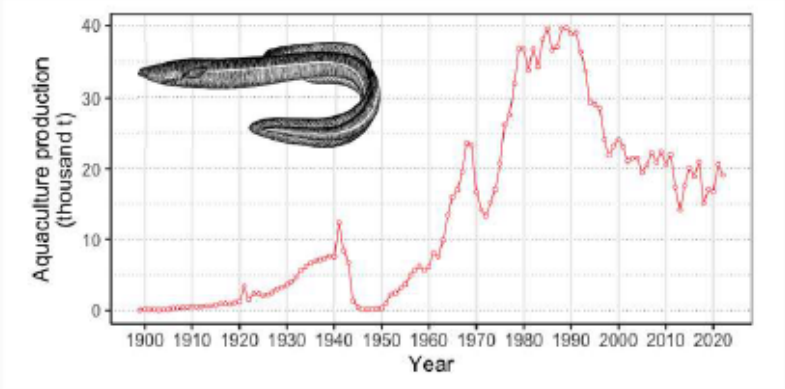
New regulations for glass eel in Japan

To prevent poaching of glass eels, glass eels were designated as "specified aquatic animals and plants" from December 2023, and penalties were strengthened. As a result, the former special catch permit for glass eels was transferred to the governor-licensed fishery in December 2023.

This will regulate exports and make it obligatory for businesses that harvest and handle glass eel to report their business information, communicate their catch numbers, and create transaction records and maintain them.

Meanwhile, the catch caps previously set by each prefecture for glass eel have been eliminated in at least seven prefectures, and the government's official glass eel statistics have been discontinued since 2018.

Aquacultural production of eels in Japan



Data are based on the fisheries statistics of the Government of Japan: The Statistical Yearbook of Ministry of Agriculture and Forestry and the Annual Report of Catch Statistics on Fishery and Aquaculture in 2022.

A research project on population dynamics and fisheries management of Japanese eel

The project

- The Fisheries Agency of Japan started the project from 2019
- 35 institutes in Japan (3 universities, FRA, several prefectural governments) join the project
- Nagano University is the core institute of the project

Scientific administrative contributions required for this project

- Extinction risk assessment
- Understanding and predicting eel resource trends
- Appropriate management measures for pond input and catch quantity

3 groups in the research project

- Group 1: Resource Evaluation and Management: Resource Trend Analysis, Pond Input Recommendations, and Extinction Risk Assessment
- Group 2: Population genetic analysis such as effective population size estimation
- Group 3: Tracking spawning migration of Japanese eels by Pop-up Satellite Tags

Possible Collaboration

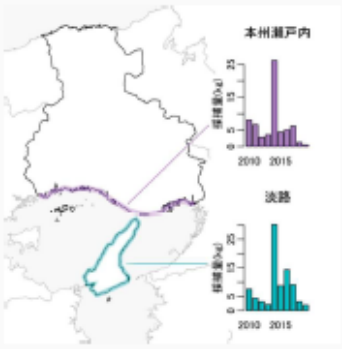
The themes of Group 1 (especially, glass eel monitoring) and Group 3 (satellite tag survey) seem appropriate for international joint research on Japanese eel.

Efforts by researchers to work with prefectural government to develop detailed catch data

- Efforts to develop more detailed data on glass eel from 2019
- Compilation of coastal yellow eel catch data not available in official statistics
- Annual meetings on glass eel and coastal eel catch data (2020, 2021 and 2024)

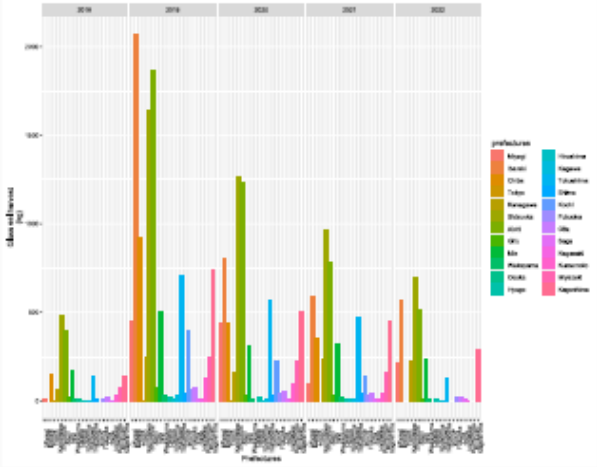
Detailed data items on glass eel by prefecture (not fully supported yet)

- Amount of eels caught by month and season
- Permit to catch (number of cases, number of people, quantity)
- Effort (number of units, number of days in operation)
- Information on fishing gears and methods

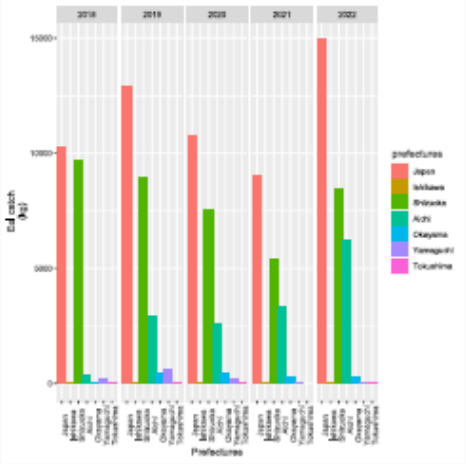


Glass eel catch by prefecture for fiscal years from 2018 to 2022

Fiscal year 2022 (FY2022, 2022-2023 fishing season) is more than FY2018, but may be on a declining trend after FY2019.



Yellow eel catch in coastal fisheries from 2018 to 2022

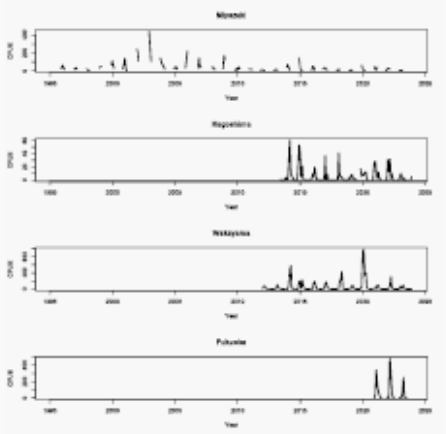


- Yellow eel fisheries off the coast of Japan are limited to 6 prefectures
- Unlike the glass eels, there does not appear to be a downward trend in catch over the past five years

Monitoring the arrival of glass eels at 5 sites in Japan

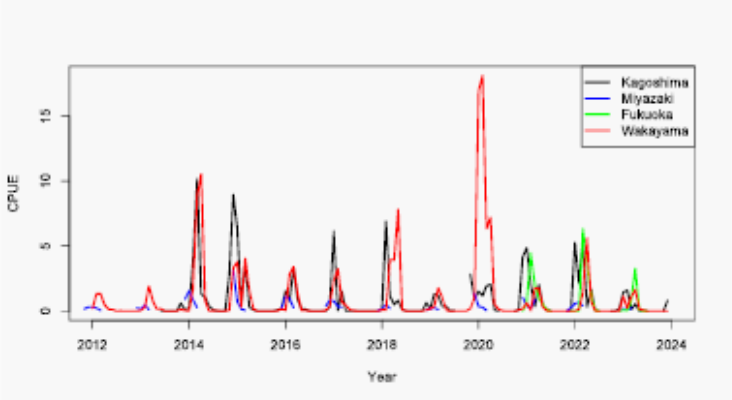
- We have been conducting annual local surveys at 5 sites in Japan since fiscal year 2019 (2019–2020 fishing season)
- These surveys will provide information on non-fishery-specific Japanese eel stock trends, including information outside of the fishing season
- Survey items: CPUE, glass eel length and weight, developmental stages by chromatophore, and physical environment such as salinity and temperature

Monthly glass eel CPUE for Miyazaki, Kagoshima, Wakayama and Fukuoka from the survey



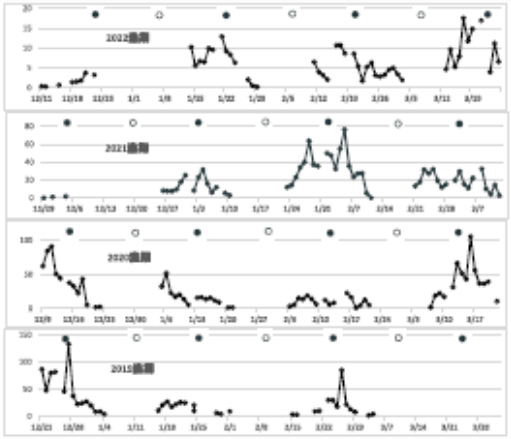
The Kagoshima and Wakayama year-round surveys indicate that few glass eels migrate outside of the December through April fishing season.

It can be read that the peak of Shirasu eel migration slows from west to east (Kagoshima < Wakayama)



Draw the same data over. The peaks of the black line (Kagoshima) are earlier than the peaks of the red line (Wakayama).

CPUE of glass eels at intervals of a few days in Miyazaki Prefecture



Black and white circles indicate the age of the moon. Fluctuations in the amount of migration in response to tides can be analyzed. Statistical analysis of time series of multiple glass eel surveys is under consideration.

Estimating effective population size Ne from genomes: a fishery-independent index of abundance

We also estimate the time series of effective population size from annual genome samples of glass eel as a fishery-independent index of abundance.

Table 1: Effective population size estimates (LD method using SNPs)

Fiscal year	Sample size	Ne	Confidence Intervals
2019	252	22,306	14,756–45,540
2020	723	17,918	11,847–36,359
2021	557	17,352	12,073–30,668
2022	433	22,388	16,899–33,110

There has been no significant change in Ne estimates over the past few years.

Summary

- Japan has accumulated long-term fishing data. There has been a significant long-term decline in catches.
- Over the last 4 years, catch data have shown a decreasing trend for glass eel (not yet statistically confirmed). Survey data for glass eel are also almost consistent with this trend.
- Analysis of fishing data will be shown in a later presentation.

Thank you very much for listening!

References

Hakoyama, H., Fujimoei, H., Okamoto, C. and Kodama, S. (2016), Compilation of Japanese fisheries statistics for the Japanese eel, *Anguilla japonica*, since 1894: a historical dataset for stock assessment, *Ecological research* **31**(2): 153.

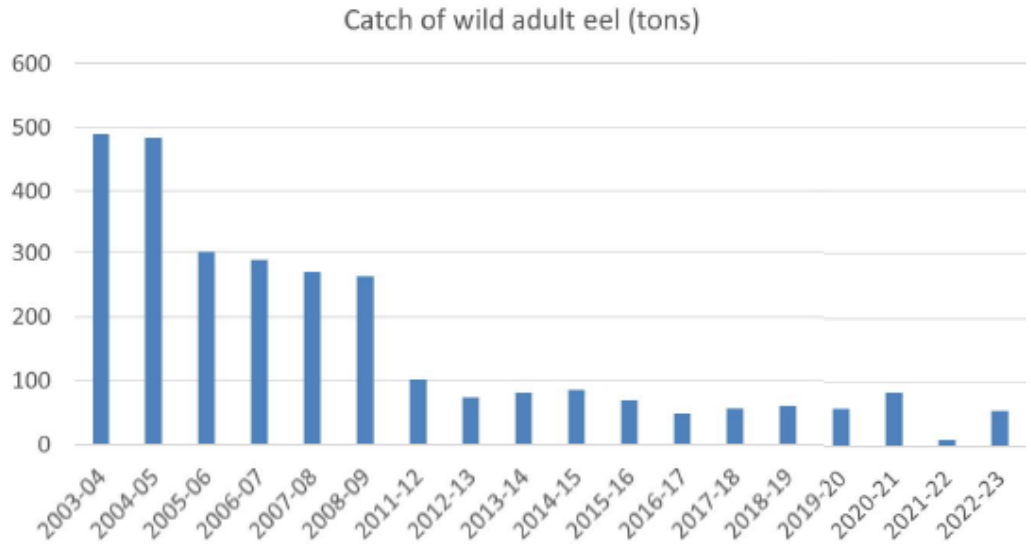
附件 8 韓國日本鰻捕撈及科學活動概況分享

SM03 Doc.9

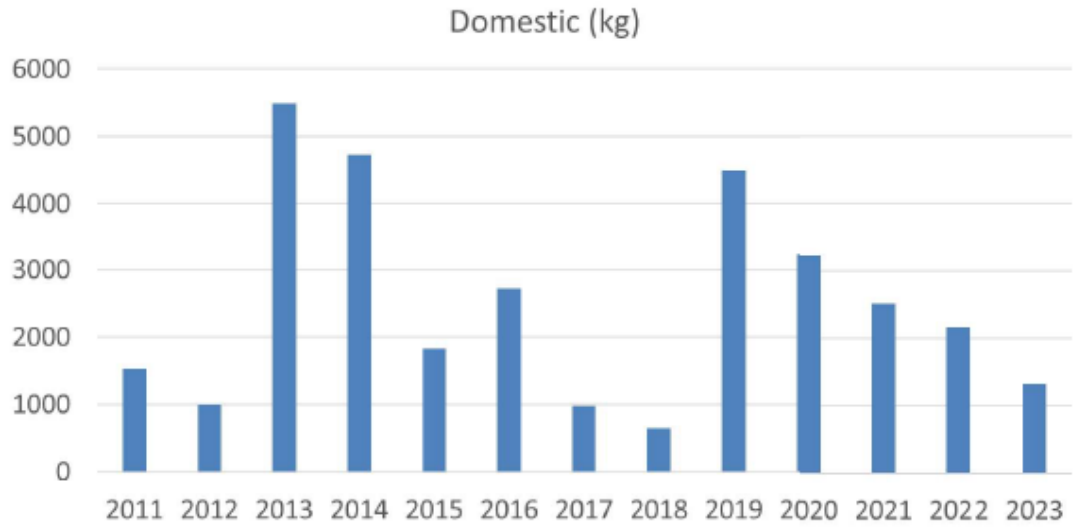
The overview of Eel catch and scientific activities in Korea

Kim Shin-Kwon
Aquaculture Research Division, NIFS

Catch of Wild adult eel in Korea

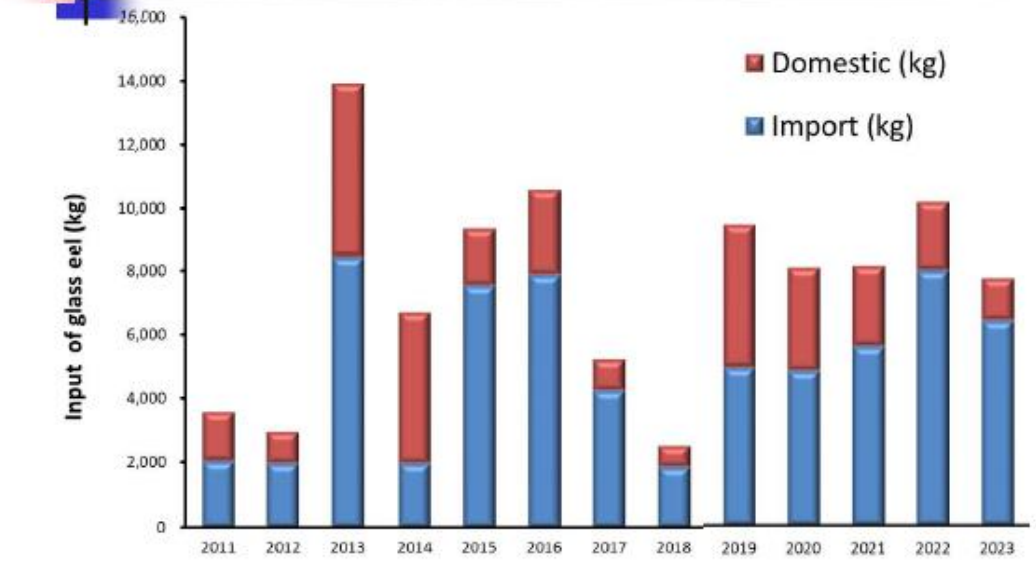


Glass eel Catch in Korea

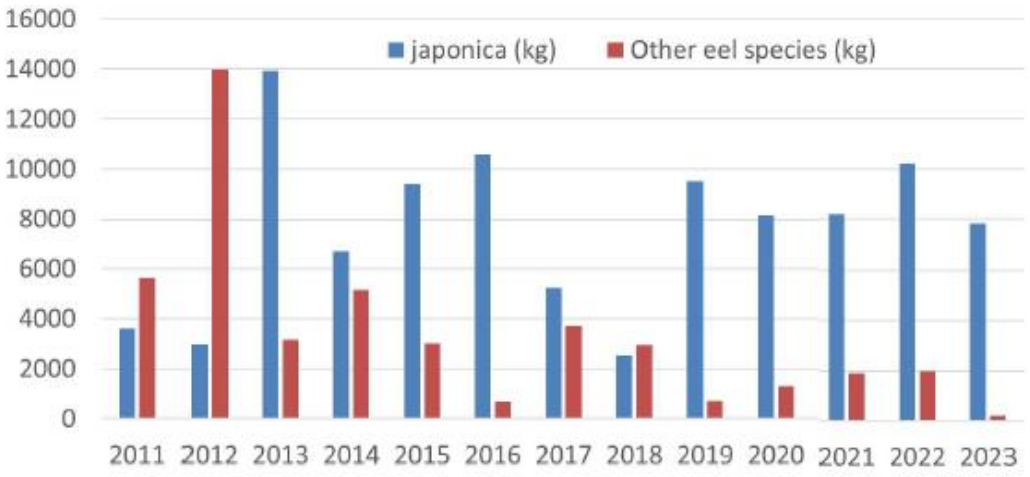


Ⅱ. Production

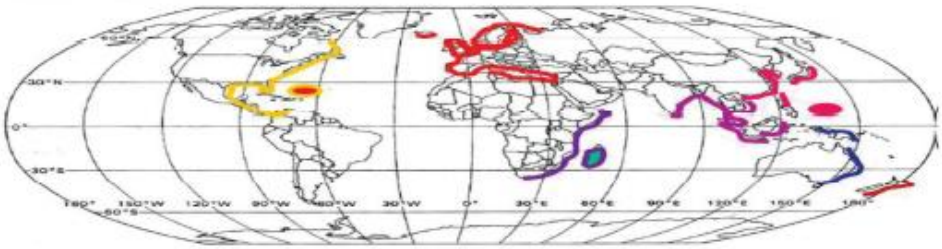
Input of glass eel in Korea (Anguilla japonica)



Input of glass eel in Korea (Total)



Geographic distribution of the genus *Anguilla*



Anguilla genus : 19 species(뱀장어속 어류 16종 30아종)

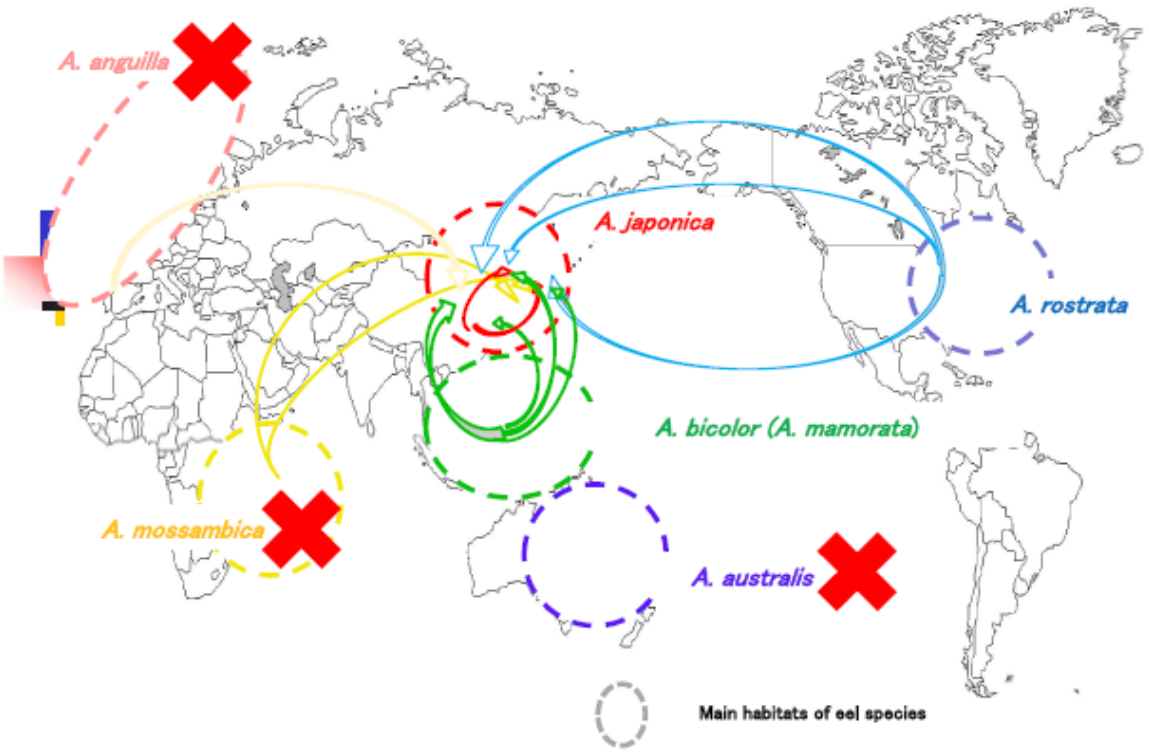
Tropical

- *A. celebesensis*
- *A. megastoma*
- *A. interioris*
- *A. reinhardti*
- *A. mamorata* (무태장어)
- *A. nebulosa nebulosa*
- *A. nebulosa labiata*
- *A. borneensis*
- *A. mussambica*
- *A. bicolor bicolor*
- *A. bicolor pacifica*
- *A. obscura*
- *A. luzonensis*

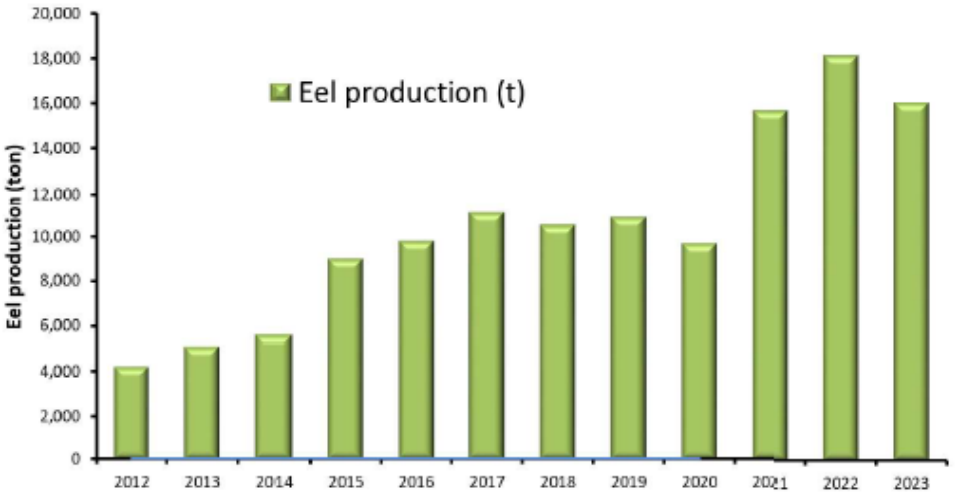
Temperate

- *A. rostrata* (북미산 뱀장어)
- *A. anguilla* (유럽산 뱀장어)
- *A. japonica* (극동산 뱀장어)
- *A. dieffenbachi* (뉴질랜드산 뱀장어)
- *A. australis australis* (호주산 뱀장어
- *A. australis schmidti* (호주산 뱀장어

Glass eel import from world



Aquaculture production of eel in Korea



Fishery Resources Management Act

Approval standards for transplantation of fishery resources

Only 4 eel species approval

Anguilla japonica

Anguilla rostrata

Anguilla bicolor

Anguilla mamorata

Management for Anguilla japonica

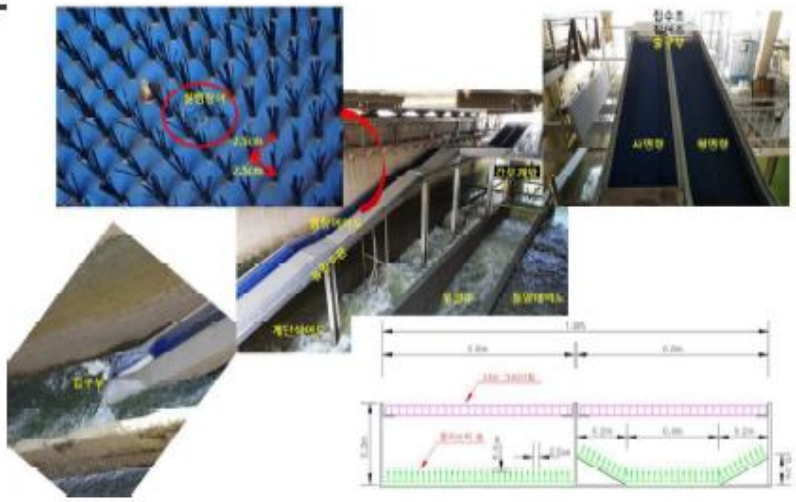
- **Prohibit periods & Length**

Regulations prohibiting capture and collection of inland fishery resources

Enforcement Decree of inland fisheries Act 17('17.7.1)

1 Species	Prohibit length	Prohibit periods	area
eel	15-45cm	April 1 ~ September 30	

1st Eel fishway and monitoring



2nd Eel fishway in Korea



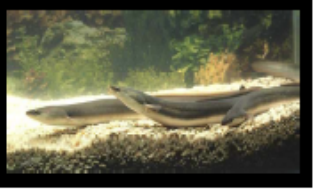

附件 9 臺灣日本鰻捕撈及科學活動概況分享

The 3rd Scientific Meeting on Japanese Eel and Other Relevant Eels, Tokyo, Japan, June 3-4, 2024

SM03 Doc.10

The overview of Japanese eel catch and scientific activities in Taiwan

Dr. Yu-San Han and Dr. Ching-Hsien Ho
韓玉山 及 侯清賢



Outlines

-Longterm catch of the Japanese glass eel in Taiwan

-The scientific research of the eel in Taiwan

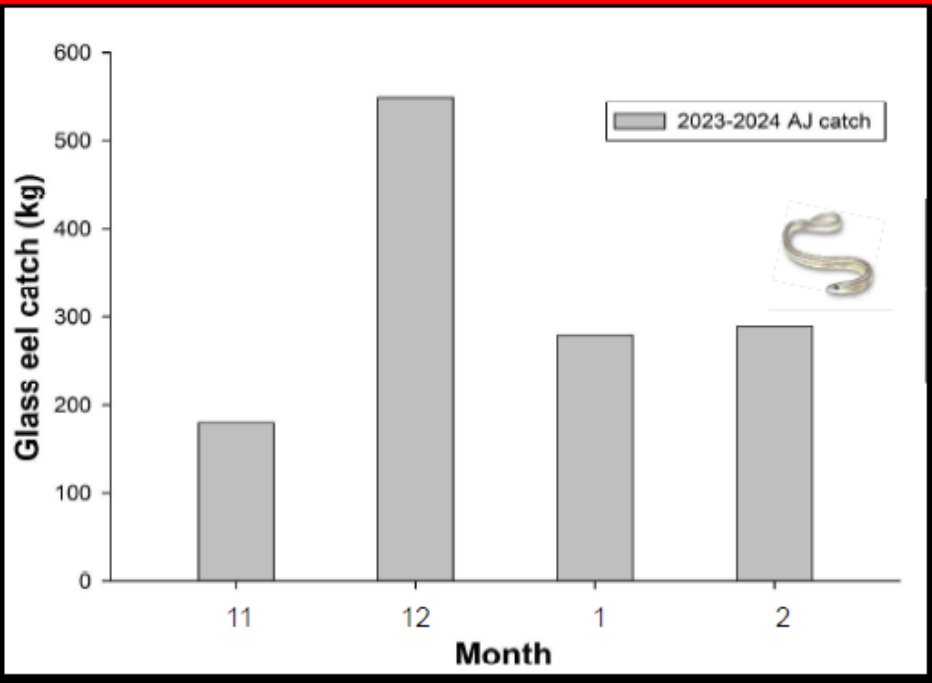
-Suggested eel management plan in Taiwan

Year	Aquaculture News	Fisheries Yearbook
91-92	12	30.3
92-93	9	8.3
93-94	6	3.1
94-95	15	9.8
95-96	12	9.1
96-97	8	2.9
97-98	8	2.5
98-99	25	8.7
99-00	12	6.3
00-01	25	18.3
01-02	2	1.9
02-03	6	1.6
03-04	8	1.8
04-05	6	4.6
05-06	20	5.7
06-07	8.5	4.4
07-08	4.5	1.3
08-09	5	1.2
09-10	4.2	1.4
10-11	4.2	2.6
11-12	1.9	0.9
12-13	1.5	0.8
13-14	8	5.8
14-15	1.2	0.9
15-16	2.5	1.2
16-17	4.5	2.3
17-18	1.1	1.1
18-19	2.7	2.6
19-20	7	7.5
20-21	5.7	6.0
21-22	**1.5**	**1.5**
22-23	**1.8**	**1.8**
23-24	**1.3**	**1.3**

Current glass eel catch data source in Taiwan

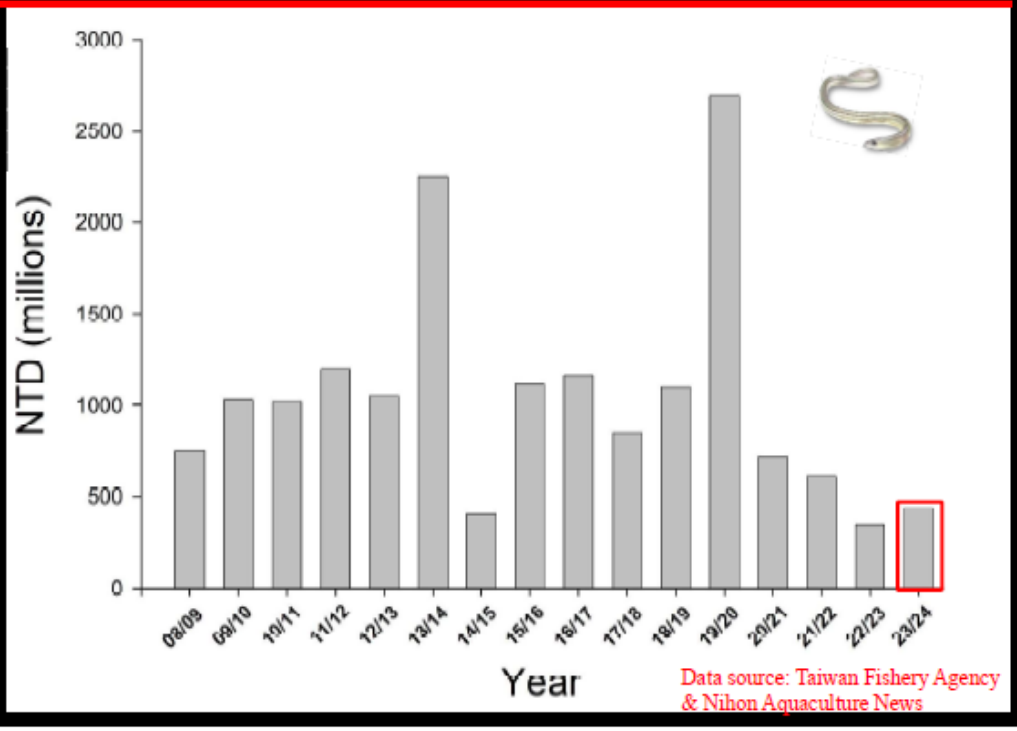
1. **Aquaculture News: from eel distributor/trader**
2. **TW Fisheries Yearbook: from fisherman's club of each County (by season)**
3. **TW glass eel catch reporting system : from fisherman's club of each County (by week)**

Japanese glass eel catch in Taiwan

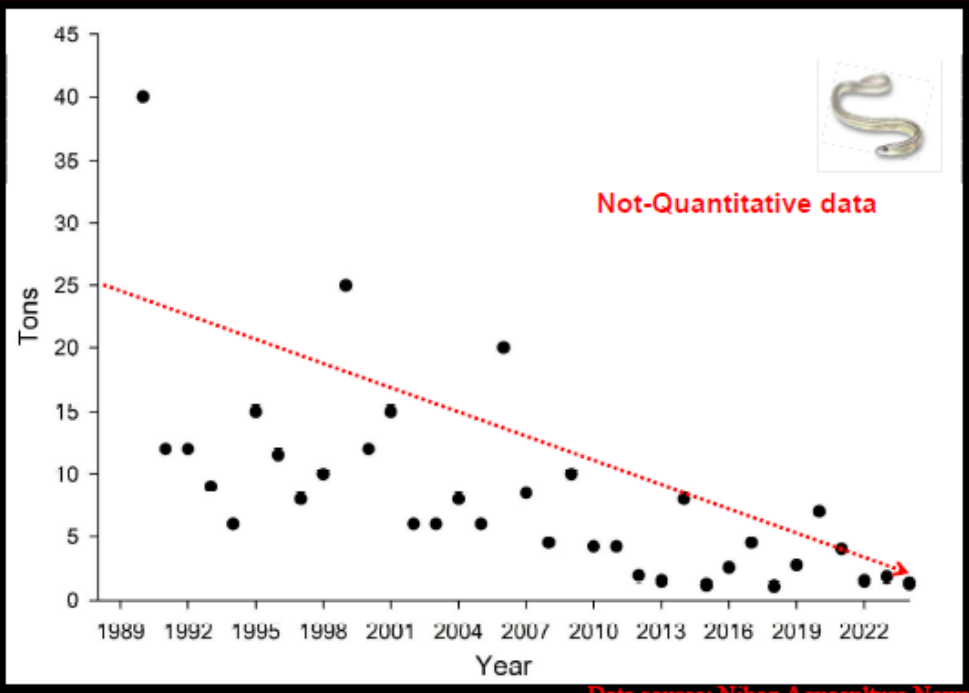


Data source: Taiwan Fishery Agency & Nihon Aquaculture News

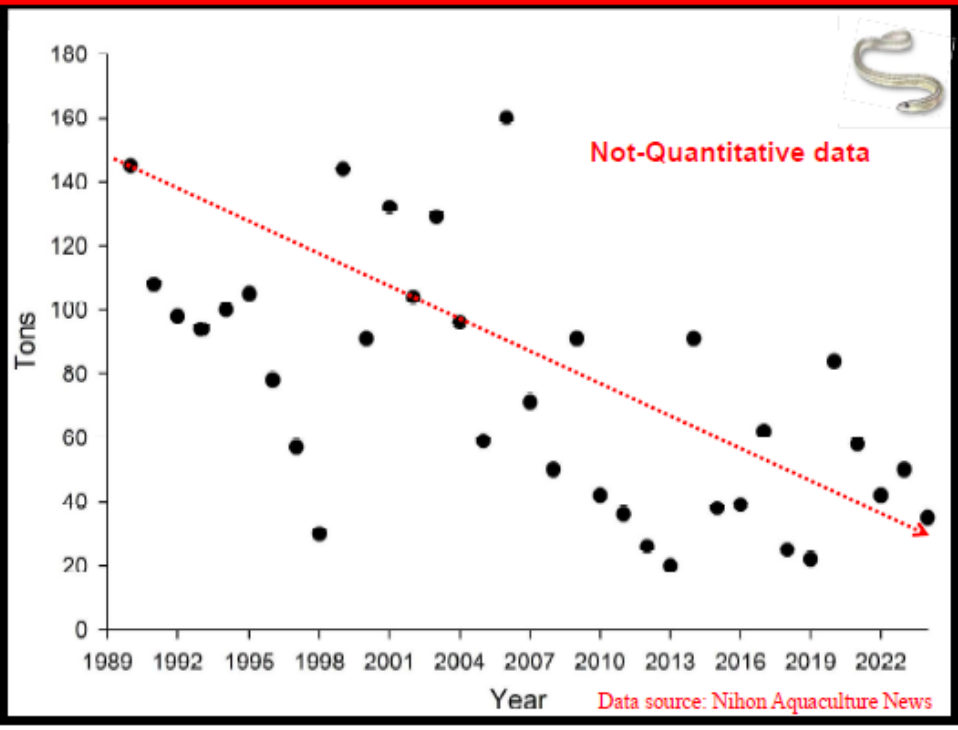
Japanese glass eel value in Taiwan



Japanese glass eel catch in Taiwan



Japanese glass eel catch in East Asia



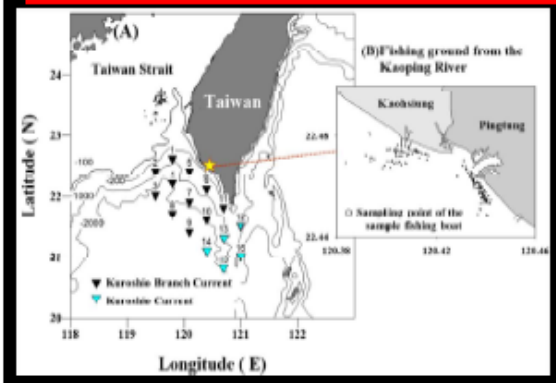
Outlines

-Longterm catch of the Japanese glass eel in Taiwan

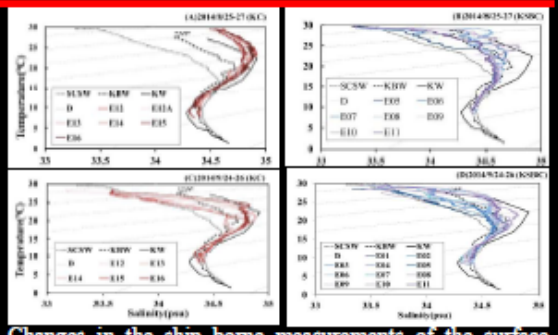
-The scientific research of the eel in Taiwan

- Suggested eel management plan in Taiwan

Potential Effect of the Intrusion of the Kuroshio into the South China Sea on Catches of Japanese Eel in the Taiwan Strait

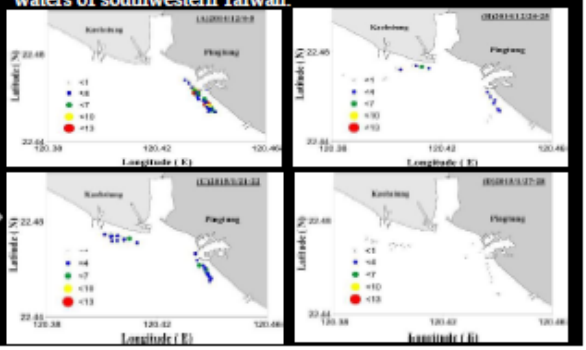


Locations of the shipborne sampling sites and sampling sites in the traditional fishing ground waters of Kaoping in southwestern Taiwan. (A) Locations of the shipborne sampling sites. (B) Sampling sites in the fishing sites of *A. japonica*.



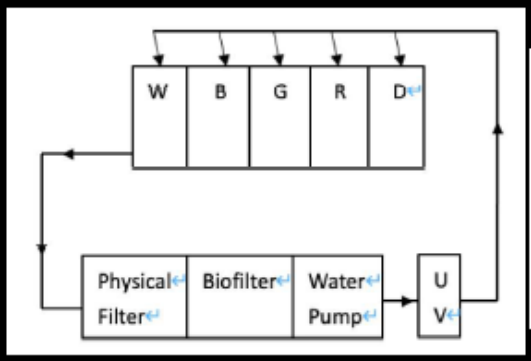
Changes in the ship–borne measurements of the surface temperature and salinity of the main Kuroshio and KSBC waters of southwestern Taiwan.

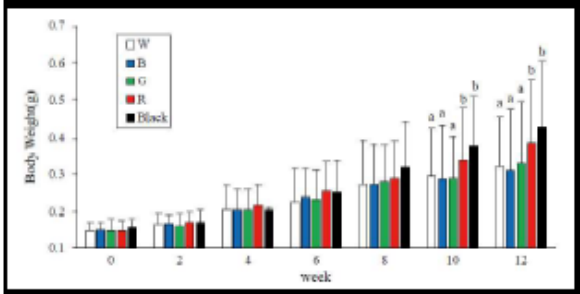
Locations and catches at the sampling sites of larval *A. japonica* eels.



Ho et al. 2022

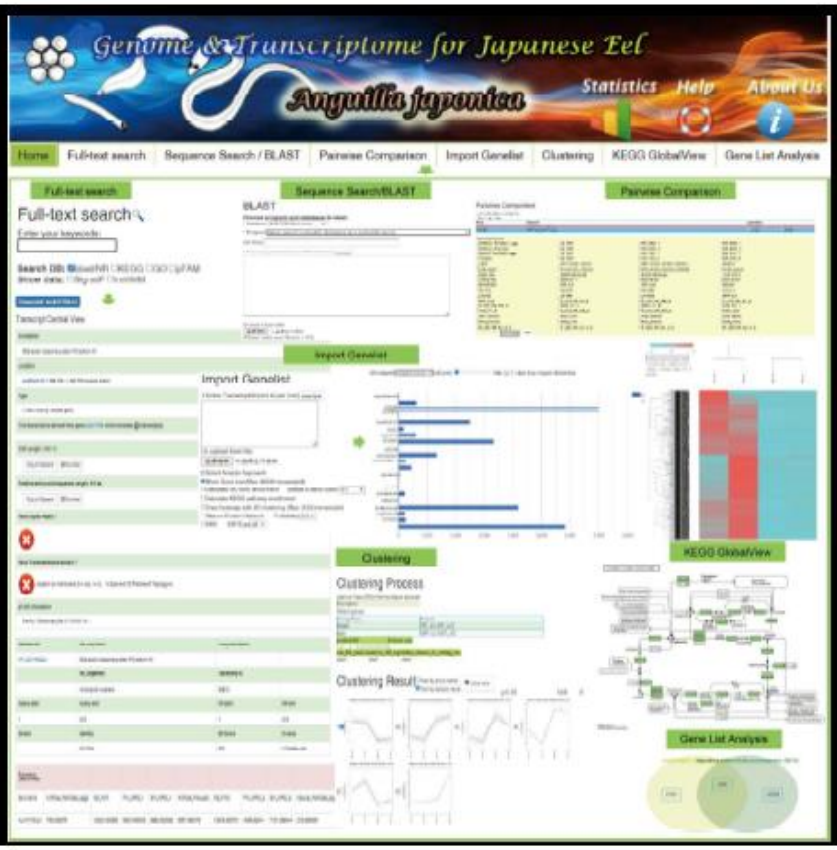
Effects of Different LED Light Spectra on Growth and Immunity of the Japanese Eel (*Anguilla japonica*) and Giant Mottled Eel (*A. marmorata*)



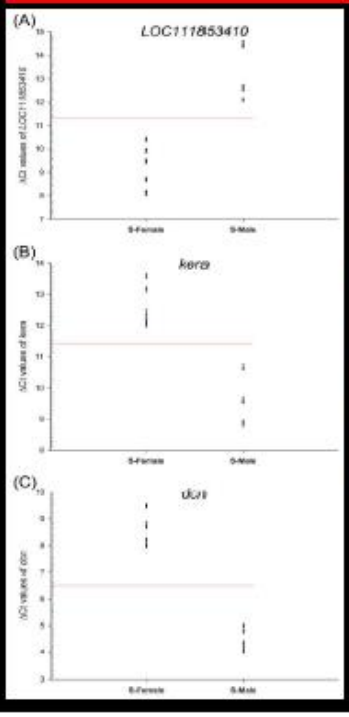


The growth of the Japanese glass eel was not significantly sensitive to different LED wavelengths, while the giant mottled glass eel showed better growth under red light and dark environments.

Lin et al. 2023 ZS



Identification of Sexually Dimorphic Genes in Pectoral Fin as Molecular Markers for Assessing the Sex of Japanese Silver Eels



The transcriptomic analysis and RT-qPCR data implicated three potential markers (*LOC111853410*, *kera*, and *dcn*) in sex typing. The expression of *LOC111853410* was higher in females than in males. In contrast, the expression of *kera* and *dcn* was higher in males than in females.

Hsu et al. 2023 ZS

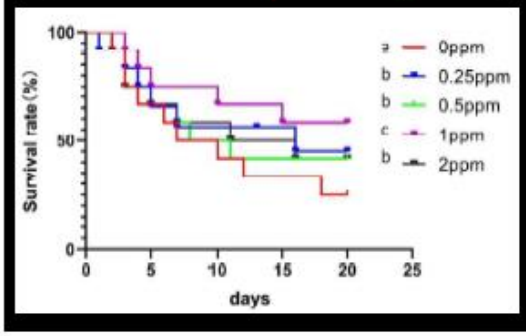
Effects of adding spermidine carbon quantum dots in feed on growth, intestinal morphology, immunity and disease resistance of *Anguilla japonica* and *A. marmorata*

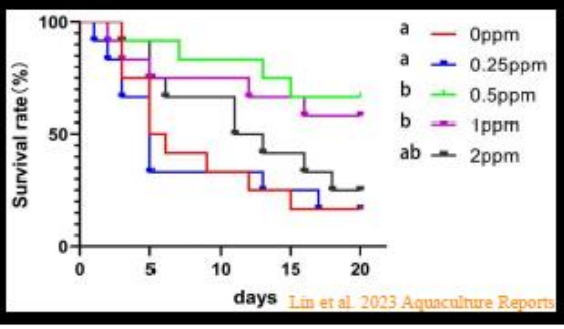
Effect of different contant of CQDSpds supplementation on growth and survival rate of A. japonica for 56 days (Mean±SD; n = 50) . Data in the same row with different letters are significantly different ($p < 0.05$) among different treatments.

	0 ppm	0.25 ppm	0.5 ppm	1 ppm	2 ppm
IBW (mg)	395.87 ± 3.85^a	400.55 ± 7.99^a	393.40 ± 8.94^a	389.20 ± 9.90^a	398.82 ± 2.29^a
FBW (mg)	917.07 ± 33.55^a	926.03 ± 15.34^a	1030.90 ± 4.65^b	1100.70 ± 37.26^b	973.62 ± 33.40^a
WG (%)	131.93 ± 6.21^a	131.77 ± 9.45^a	160.77 ± 9.58^b	185.56 ± 2.47^c	144.65 ± 6.96^a
SGR (%/day)	1.00 ± 0.03^a	1.00 ± 0.04^a	1.17 ± 0.06^b	1.24 ± 0.31^c	1.06 ± 0.05^a
FCR (%)	46.61 ± 9.75^a	47.10 ± 7.35^a	59.42 ± 7.34^b	62.24 ± 5.21^c	51.52 ± 1.49^{ab}
K	0.95 ± 0.03^a	0.93 ± 0.02^a	0.93 ± 0.01^a	0.94 ± 0.03^a	0.94 ± 0.02^a
SR (%)	62.00 ± 2.83^a	64.00 ± 5.66^a	64.00 ± 5.66^a	70.00 ± 2.83^b	66.00 ± 2.83^a

Effect of different contant of CQDSpds supplementation on growth and survival rate of A. marmorata for 84 days (Mean±SD; n = 60) . Data in the same row with different letters are significantly different ($p < 0.05$) among different treatments.

	0 ppm	0.25 ppm	0.5 ppm	1 ppm	2 ppm
IBW (mg)	91.15 ± 1.44^a	90.73 ± 3.51^a	91.76 ± 1.08^a	92.28 ± 1.67^a	91.20 ± 2.02^a
FBW (mg)	222.12 ± 4.82^a	231.00 ± 1.60^{ab}	265.62 ± 8.17^b	244.67 ± 5.09^{ab}	231.55 ± 1.06^{ab}
WG (%)	144.68 ± 13.95^a	153.93 ± 13.17^a	189.86 ± 24.16^b	167.70 ± 27.12^b	153.86 ± 6.49^a
SGR (%/day)	1.28 ± 0.05^a	1.28 ± 0.03^a	1.29 ± 0.12^a	1.24 ± 0.08^a	1.28 ± 0.08^a
FCR (%)	22.74 ± 1.51^a	24.35 ± 3.23^a	30.18 ± 1.62^b	26.46 ± 6.73^a	24.37 ± 2.67^a
K	1.06 ± 0.07^a	1.11 ± 0.05^a	1.24 ± 0.15^a	1.16 ± 0.14^a	1.11 ± 0.02^a
SR (%)	61.67 ± 7.07^a	60.00 ± 0.01^a	68.33 ± 7.07^a	70.00 ± 9.43^a	65.00 ± 11.78^a





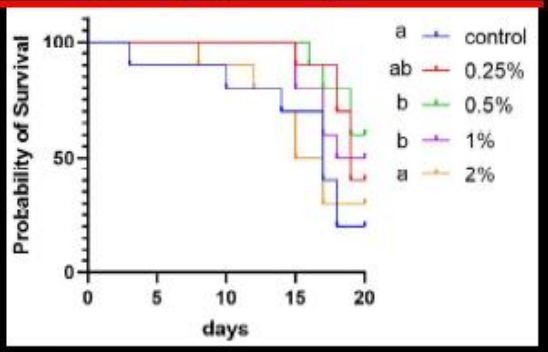
Lin et al. 2023 Aquaculture Reports

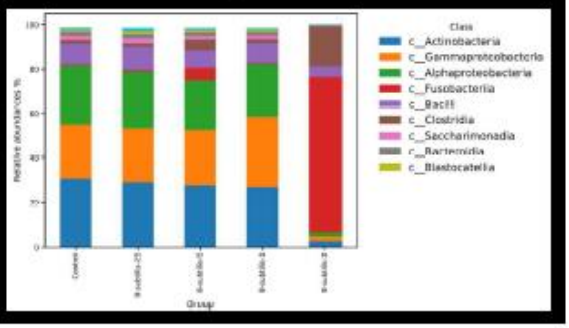
Effects of adding Bacillus subtilis natto NTU-18 in paste feed on growth, intestinal morphology, gastrointestinal microbiota diversity, immunity, and disease resistance of *Anguilla japonica* glass eels

Effects of dietary *B. subtilis natto* NTU-18 on the growth performance of *Anguilla japonica*.

	Control	0.25 %	0.5 %	1 %	2 %
Initial TL (mm)	59.89 ± 0.81^a	60.00 ± 0.45^a	60.12 ± 0.83^a	60.06 ± 0.78^a	59.89 ± 0.46^a
Final TL (mm)	94.07 ± 17.1^a	99.75 ± 8.7^b	103.19 ± 12.4^b	104.60 ± 10.1^b	101.85 ± 9.4^b
IBW (mg)	184.9 ± 7.2^a	185.6 ± 9.5^a	187.9 ± 0.7^a	186.4 ± 0.9^a	187.7 ± 12.1^a
FBW (mg)	687.6 ± 39.3^a	832.0 ± 61.0^b	933.4 ± 72.4^c	954.7 ± 32.7^c	854.8 ± 63.5^b
SGR (%)	1.87 ± 0.43^a	2.14 ± 0.25^b	2.29 ± 0.31^c	2.33 ± 0.37^c	2.16 ± 0.31^b
PWG (%)	271.8 ± 38.4^a	348.2 ± 52.1^b	396.8 ± 43.7^c	412.2 ± 57.1^c	355.8 ± 65.2^b
FE (%)	62.39 ± 14.2^a	72.58 ± 16.5^b	81.27 ± 16.3^c	84.32 ± 11.4^c	74.34 ± 14.7^b
FCR	1.60 ± 0.14^a	1.38 ± 0.16^b	1.23 ± 0.13^c	1.19 ± 0.07^c	1.35 ± 0.18^b
SR (%)	98.75 ± 0.01^a	98.75 ± 0.01^a	98.75 ± 0.01^a	98.75 ± 0.01^a	100 ± 0.00^a
Final K	0.83 ± 0.11^a	0.84 ± 0.10^a	0.85 ± 0.07^a	0.83 ± 0.10^a	0.85 ± 0.12^a

TL: total length; BW: body weight; SGR: specific growth rate; PWG: percentage weight gain; FE: feeding efficiency ratio; FCR: feed conversion ratio; SR: survival rate; K: condition factor.





Lin et al. 2024 Fish & Shellfish Immunol.

Outlines

-Longterm catch of the Japanese glass eel in Taiwan

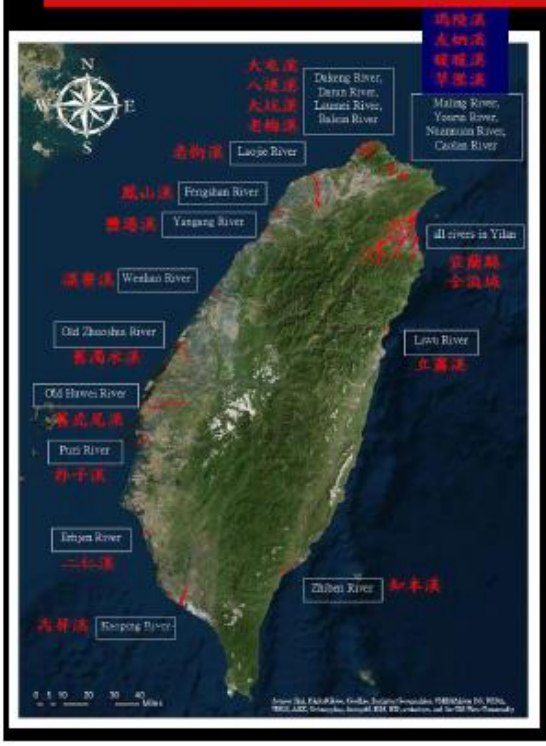
-The scientific research of the eel in Taiwan

- Suggested eel management plan in Taiwan

Eel Management plan in Taiwan

1. Limit catch time / aquaculture amounts of glass eel
2. Set up eel protection rivers to increase spawners
3. Continue eel stock releasing activity
4. Prevent river pollution, build wetland and eel ladder

Eel protection rivers in Taiwan

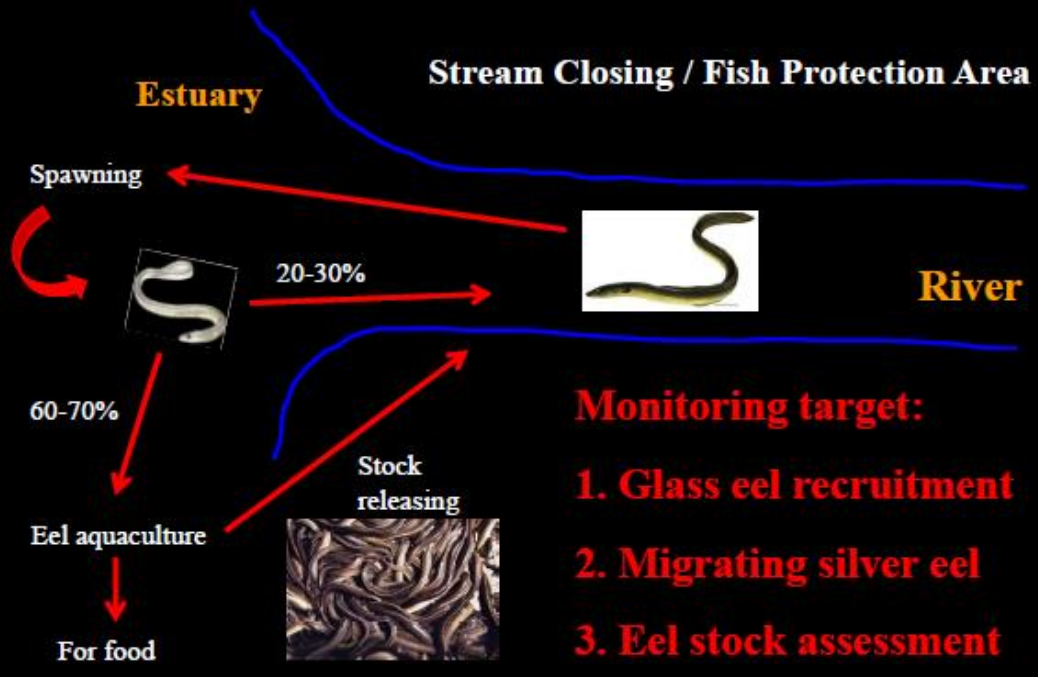


*At least 1 eel protection river is assigned for each County of Taiwan since year 2013. In these rivers, wild eels larger than 8 cm are not allowed to be caught

*Should be applied to all East Asia rivers.

Source : Taiwan Fisheries Agency

Suggested eel management plan



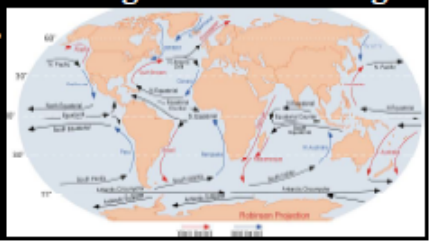
Monitoring target:

1. Glass eel recruitment
2. Migrating silver eel
3. Eel stock assessment

Eel stock assessment in Taiwan

***The possible influencing factors of the distribution and resource changes in *A. japonica* are very diverse, including the population dynamics, environmental conditions during the spawning season, and so on. Furthermore, the changes in *A. japonica* stocks are affected by several factors, both natural/environmental and anthropogenic . The consequences of global warming and changes in the climate regime, such as weakening of seasonal atmospheric circulations and equatorial trade winds, may affect the distribution and migration of eels worldwide.**

*** Therefore, more in-depth analyses and observations are required to more accurately identify the association between the changes in the ocean current patterns caused by global climate changes and the fishing grounds and conditions for eels in the future.**



Thank you

附件 10 Resource assessment and management of Japanese eel (Speaker: Mita Kaigisho)

SM03 Doc.12

SM03/Doc13: Resource assessment and management of Japanese eel

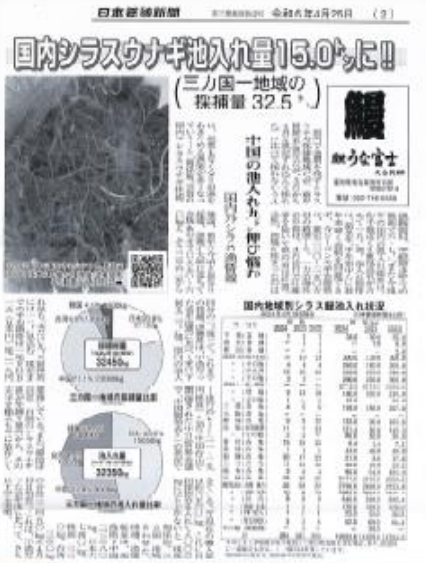
The 3rd Scientific Meeting on Japanese Eel and Other Relevant Eels, Mita Kaigisho, Tokyo, Japan, June 3–4, 2024

Hiroshi Hakoyama

June 3, 2024

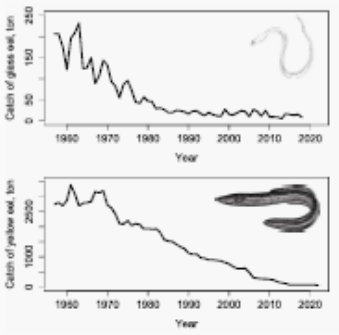
hiroshi-hakoyama@nagano.ac.jp
Institute of Freshwater Biology, Nagano University

Total glass eel catch and pond input of Japanese eel in 2024 (as of April 19)



- This year's East Asian glass eel catch was 32.5 tons, lower than last year's poor catch
- In Japan, 15 tons of glass eel were ponded against a quota of 21.7 tons; since the quota was set in 2014, fishing has been poor and there has not been a single year in which the quota has been met. This suggests that the maximum, highly incentivized catch has continued for the past 10 years.

Japanese eel populations are declining



Catches in Japan

- Eel farms still depend on the catches of glass eels
- The population of Japanese eel is drastically declining
- It was categorized as Endangered by IUCN using Criteria A: decline in abundance index and area occupancy

Resource Management Needs The Japanese eel fishery is clearly depleted and requires appropriate resource management.

Endangered? However, the need for resource management does not necessarily correspond to the magnitude of the extinction risk.

The Japanese eel is NOT assessed as an endangered species when evaluated under the E criterion

The IUCN listed the Japanese eel as Critically Endangered primarily on the basis of a significant decline in a population index, catch (Criterion A).

I re-evaluated the extinction risk with accurate data using population viability analysis (Criterion E): estimating the probability of extinction under a stochastic model.

As a result, I concluded that the Japanese eel is neither ranked as CR nor EN.

A detailed explanation is not given here, but Criterion A, which considers only population declines, always overestimates the extinction probability of large populations such as marine species.

We should NOT use Criterion A for large populations of marine species.

Population dynamics model: the Wiener process with drift

A stochastic differential equation with population size N at time t:

$$dN = rNdt + \sigma NdW$$

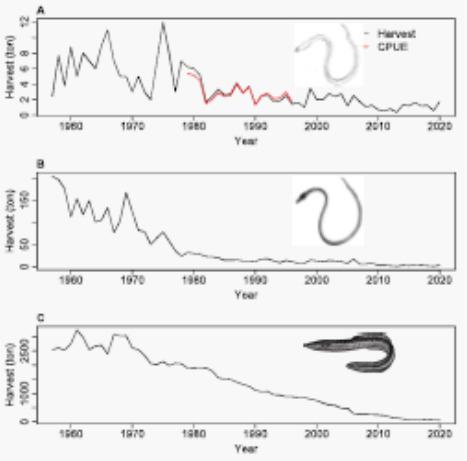
Let X be $\ln N$. From Itô's lemma,

$$dX = \mu dt + \sigma dW$$

Malthus growth Environmental variance

$r = \mu + 0.5\sigma^2$: growth rate, σ^2: environmental variance, $W(t)$: Wiener process

3 time-series for the extinction risk assessment: glass, elver, and yellow eel catches (1957–2020)



- Catch time-series of 3 developmental stages in local populations:
- Glass eels in Shizuoka prefecture
- Glass and Elver eels in the inland waters of Japan
- Yellow and Silver eels in the inland waters of Japan

Results: Estimates of the 'upper limit' of extinction risk

Estimates of the extinction risk with 95% CIs in parentheses.

	Growth rate	Variance	#	CR	EN	VU
Time-series	$\widehat{\mu}$	$\widehat{\sigma^2}$	$\widehat{x_0}$	CR: $\widehat{\Pr}[T \leq 25.5]$	EN: $\widehat{\Pr}[T \leq 40]$	VU: $\widehat{\Pr}[T \leq 100]$
Glass eel	-0.0054 (-0.15, 0.14)	0.33 (0.24, 0.49)	16.0	5×10^{-8} $(4 \times 10^{-12}, 1 \times 10^{-4})$	1×10^{-5} $(3 \times 10^{-9}, 0.008)$	0.007 $(7 \times 10^{-7}, 0.51)$
Grass and elver eel	-0.07 (-0.17, 0.04)	0.17 (0.12, 0.26)	12.4	3×10^{-7} $(5 \times 10^{-11}, 3 \times 10^{-4})$	2×10^{-4} $(1 \times 10^{-7}, 0.03)$	0.11 $(1 \times 10^{-4}, 0.90)$
Yellow and silver eel	-0.059 (-0.089, -0.029)	0.014 (0.010, 0.020)	12.6	2×10^{-79} $(2 \times 10^{-109}, 3 \times 10^{-52})$	5×10^{-44} $(2 \times 10^{-62}, 1 \times 10^{-28})$	5×10^{-9} $(5 \times 10^{-17}, 1 \times 10^{-3})$

- Not classified as CR or EN in all stages. The CIs were narrow.
- Not classified as VU from point estimates, but some CIs were wide. So, no conclusion was derived from the data for VU.

Why does the result differ between the criteria A and E?
⇒ It is because the criteria A overestimates the extinction risk of large populations, like fish stocks.

Resource management requires knowledge of resource trends: time series of population trend indices

Time series of population indices

1. Time series of fishery data (catch, CPUE)
2. Time series of glass eel survey data (CPUE)
3. Time series of effective population size (Ne) from DNA data

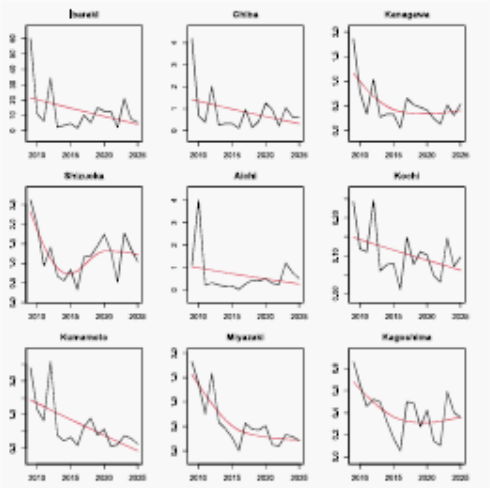
Time-series data from fisheries are the most important information for eel management

Statistical population models are basically constructed using catch data. It is important to obtain time series data for each region because a spatio-temporal model that takes into account the local populations of each habitat is effective for Japanese eel stock management. ⇒ **Task Team 1's international collaboration**

Time series of non-fishery trend data (surveys and Ne) can complement catch data: Surveys can provide information outside the fishing season; Ne derived from DNA provides backward information at different time scales.

Glass eel CPUE data by prefecture in Japan (2006–2022): time series and decomposed trend (red line)

Only 9 major prefectures were analyzed. A decreasing trend in CPUE can be seen.



Analysis of glass eel CPUE data by Prefecture in Japan: Multivariate model

$$y_{i,t} = \beta_i^{(0)} + \beta_i^{(2)} t + \epsilon_{i,t}, \tag{1}$$

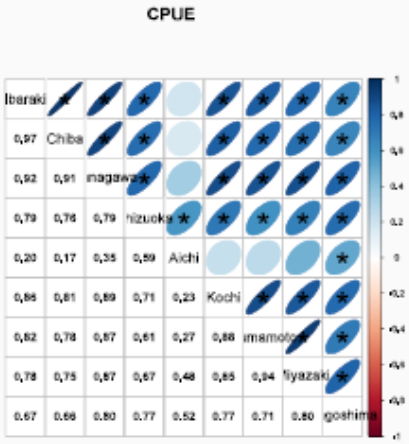
$$\boldsymbol{\epsilon}_{\cdot,t} = \begin{bmatrix} \epsilon_{1,t} \\ \vdots \\ \epsilon_{9,t} \end{bmatrix} \sim N(\mathbf{0}, \boldsymbol{R}), \quad \boldsymbol{R} = \begin{bmatrix} \sigma_1^2 & \sigma_{12} & \cdots & \sigma_{19} \\ \sigma_{12} & \sigma_2^2 & \cdots & \sigma_{29} \\ \vdots & \vdots & \ddots & \vdots \\ \sigma_{19} & \sigma_{29} & \cdots & \sigma_9^2 \end{bmatrix}, \tag{2}$$

where $y_{i,t}$ is the catch of ith region in year t, $\beta$is a coefficient of fixed effect, and $\boldsymbol{R}$is the Variance-covariance matrix of the residuals.

Results

- Time trend of CPUE was significant (decreasing trend for all prefectures)
- Correlation matrix was significant

Analysis of glass eel CPUE data by Prefecture in Japan: Correlation matrix estimated by the multivariate model



The time series of the glass eel CPUE tend to be synchronized.

Time series of CPUE data show that glass eel arrivals have decreased over the past decade.

Statistical analysis using time series data of population trends contributes to scientific stock management

As the preliminary analysis presented here shows, spatio-temporal CPUE data allow statistical inferences to be made about declining stock trends and patterns of correlation between regions, which can serve as a basis for scientific stock management.

Management of initial inputs to aquaculture ponds

Joint Statement of 4 participants on September, 2014:

1. Actions to restrict initial input of glass eels (80% of the 2013-2014 level)
2. Monitoring initial input of eel seeds into aquaculture ponds and aquaculture production
3. Collecting statistics on trade of aquaculture eels and eel products

Current status in Japan in response to the Joint Statement

1. Initial input management: the limit on the supply of seed for aquaculture is 21.7 ton (= 80% of the 2013-2014 level)
2. The limit is restricted by a law (the Inland Water Fishery Promotion Act, 2014).

Since the quota was set in 2014, fishing has been poor and there has not been a single year in which the quota has been met. This suggests that the maximum, highly incentivized catch has continued for the past 10 years.

Importance of Input Management

Input Management is important

Input Management is the basis of international resource management of Japanese eel agreed upon as a result of informal consultations. Since the catch of glass eel is almost for seedlings in aquaculture ponds, Input Management may enable the sustainable use of Japanese eel by optimizing the scale of aquaculture.

While the arrival of glass eels is generally synchronized as I have shown, there is some regional variation in poor and good catches every year. Through international imports and exports (as well as domestic), input management can mitigate regional poor and good catches and meet regional demand.

Importance of Fisheries Management

Fisheries Management is also important

Of course, fisheries management in each region is also important. Catch limits in conjunction with ponded catch are necessary. Only through proper fisheries management and fisheries monitoring can we reliably obtain the most important spatiotemporal catch data for resource management. It is necessary to make the glass eel trade more transparent, keeping track of the amount of fish input into aquaculture ponds and the amount of fish caught in each region. A system of enforceable legal regulations and fisheries monitoring is needed for fishing bans and import bans when the maximum pond input limit is reached.

Scientific Input Management

Issues

There is no reasonable grounds to set the current limits (e.g., 21.7 ton in Japan).

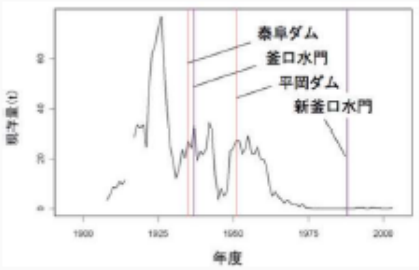
How to scientifically determine the amount of ponding?

1. Empirical method for estimating past ponding amounts
2. **Adaptive management**
3. Population model based (currently not very promising)

Adaptive management of pond inputs

Adaptive management could be used to adjust inputs to the ponds based on glass eel catches. If catches were poor, inputs would be further reduced. Such management measures would be 'better' than the current fixed targets, but it is not clear that they would theoretically achieve a stable fishery. More research and discussion is needed.

Habitat fragmentation by river structures



The figure shows the estimated amount of yellow eel in Lake Suwa in the upper reaches of the Tenryu River in Japan, which used to be over 60 tons in 1925, but has been reduced to almost zero due to the construction of dams.

Fish passage in rivers is totally inadequate; eel ladders need to be installed.

Importance of Conservation of habitats and Protected Areas

Importance of habitats

In addition to input management and fisheries management, it is also important to conserve the rivers and estuaries that are the habitat of the Japanese eel.

Expanding protected areas would also be effective

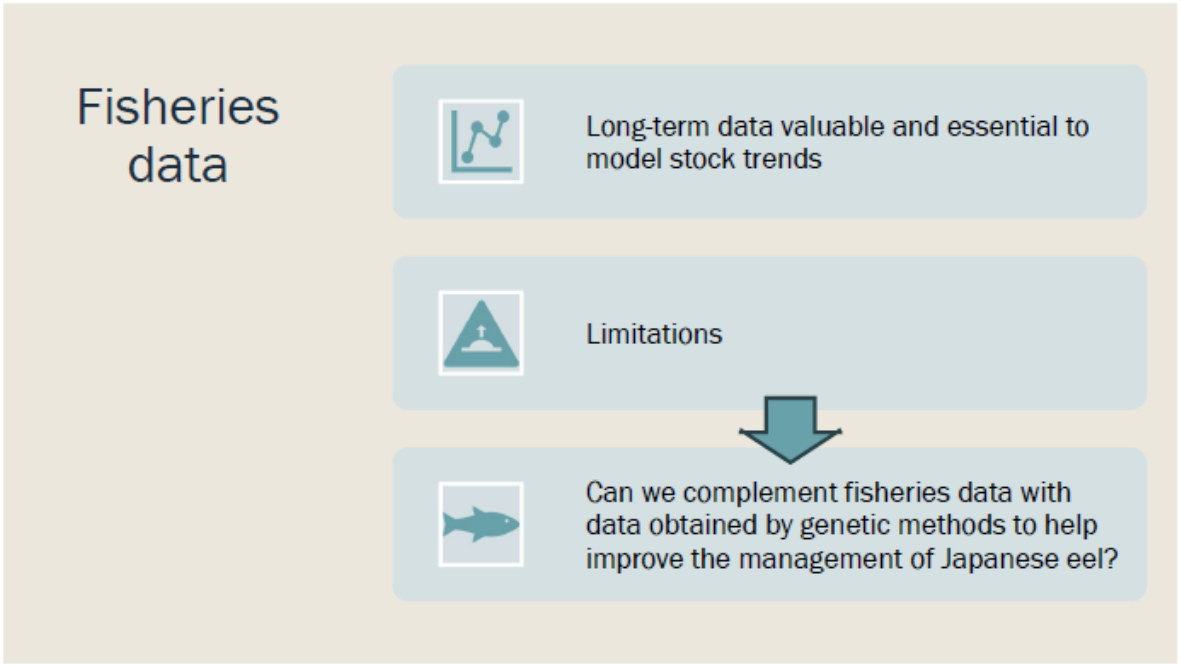
As has already been pointed out by Prof. Han, the creation of protected areas in various regions is effective. China's efforts to establish protected areas is very good. Enforceable legal regulations and a system of fisheries monitoring are also needed in protected areas.

Summary

- I updated the extinction risk assessment and trend analysis with the latest data.
- Understanding stock trends and assessing extinction risk are essential for stock management. The most important data for this purpose are spatio-temporal fishery data (time-series of catch and CPUE). Informal consultations and task teams1 have begun to work on the development of catch data under international collaboration. Survey and DNA data will supplement fisheries time-series data.
- Input management is an important part of international resource management of Japanese eel and should be combined with regional fisheries management and trade transparency efforts. Fisheries management requires enforceable regulations.
- In addition to resource management, conservation of rivers, lakes, and coastal habitats is also needed. Expansion of protected areas would also be effective for conservation.

Thank you very much for listening!

附件 11 Fisheries independent indices of population trends estimating Ne from genomic data (Speaker: Leanne Faulks)



Genetic tools have a long history of contributing to fisheries management

1987

1.
Genetics And Fishery Management
Past, Present, and Future
Fred W. Allendorf, Nils Ryman, and Fred M. Utter

2012

A review of the application of molecular genetics for fisheries management and conservation of sharks and rays

C. L. DUDGEON*†‡, D. C. BLOWER*†, D. BRODERICK*†, J. L. GILES*†, B. J. HOLMES*†, T. KASHIWAGI*†, N. C. KRÜCK*†, J. A. T. MORGAN*†, B. J. TILLETT†§ AND J. R. OVENDEN*†

2016

The role of genetics in fisheries management under the E.U. common fisheries policy[a]

J. CASEY*, E. JARDIM AND J. TH. MARTINSOHN

What is the effective population size (Ne) of Japanese eel and how has it changed over time?

What is Ne, anyway? Waples 2022 Journal of Heredity

N

- Census population size
- Physical entity
- Ecological processes depend on N
- E.g., competition, predation, growth rates, disease transmission

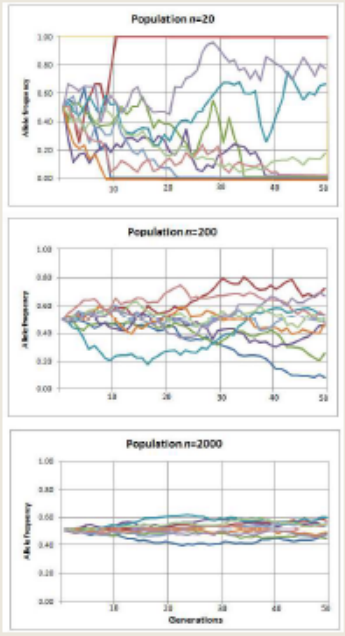
Ne

- Effective population size
- Conceptual
- Evolutionary process depend on Ne
- E.g., loss of genetic diversity, effectiveness of selection

Determines genetic drift

Ne, genetic drift, and fisheries management

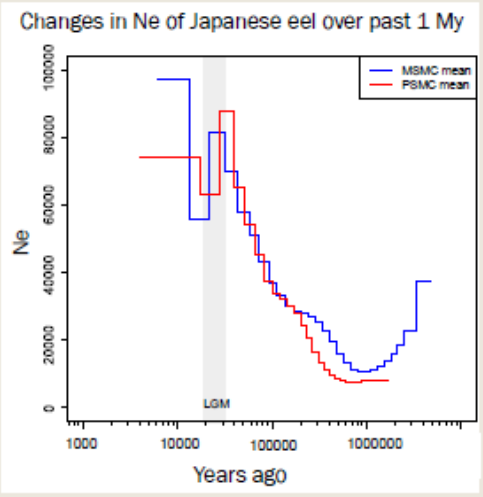
- Ne greater than 500 genetically 'safe'
  - *Many species on IUCN Red List, Ne < 50*
- Thus, Ne helpful parameter to measure for conservation and management



Simulations of genetic drift (Prof Marginalia). Image shared under CC BY-SA 3.0 license

Measuring Ne of Japanese eel

- Previous studies provide information on changes in Ne over an evolutionary time scale
- What about recent time scale?



(Faulks et al 2022)

Genomic Methods

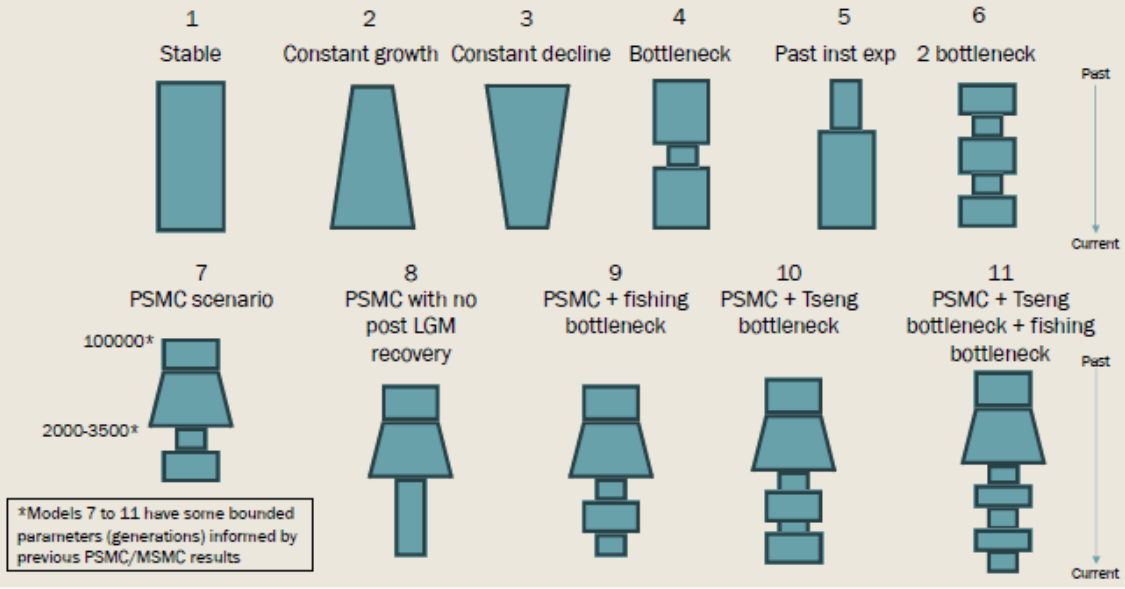
- Sampling every year from 2019, also some historical samples from 1988-1996
- Standard genomic pipeline: ddRAD library construction, sequencing, SNP detection, filtering, and data analysis

- Estimates of recent changes in Ne (demographic inference)
  - *Fastsimcoal (based on allele frequency spectrum, prior models)*
  - *IBDNe (based on patterns of identity by descent, no prior models)*

- Estimates of current Ne each year via the LD (linkage disequilibrium) and temporal methods
  - *NeEstimator*

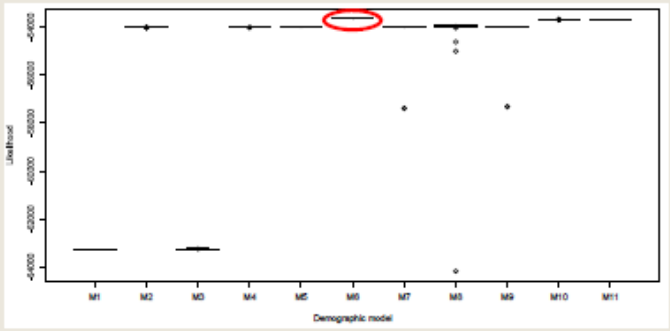
Modeling recent changes in Ne - Fastsimcoal

Possible demographic scenarios



*Models 7 to 11 have some bounded parameters (generations) informed by previous PSMC/MSMC results

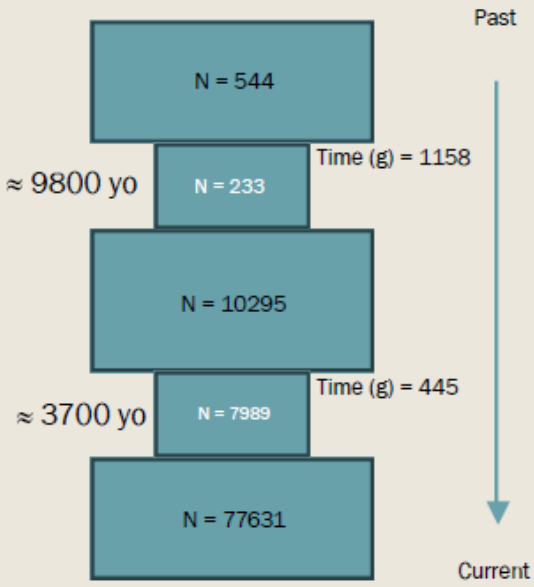
Several scenarios have similar likelihoods



Model selection based on AIC and LZC as well as distribution of likelihoods suggested that the best scenario is model 6

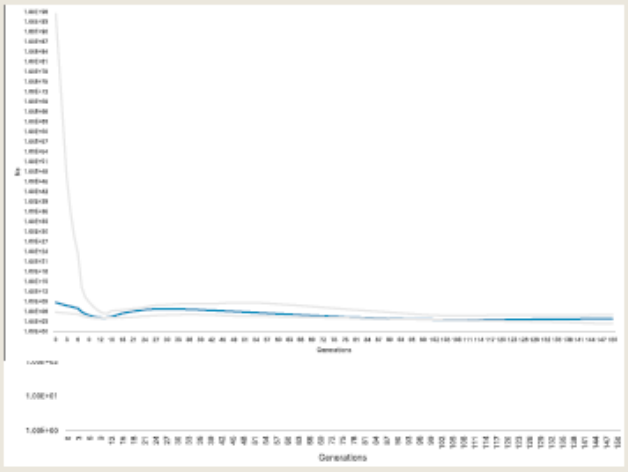
Two bottlenecks in the Holocene

- Holocene bottlenecks could be due to changes in flow of Kuroshio Current (Ujiie & Ujiie 1999)
  - *Break up of Ryukyu Island Shelf 10 kya*
  - *Pulleniatina minimum event 3–4.5 kya*



Modeling recent changes in Ne – IBDNe

Most recent generations uncertain… Population decline since 1800s

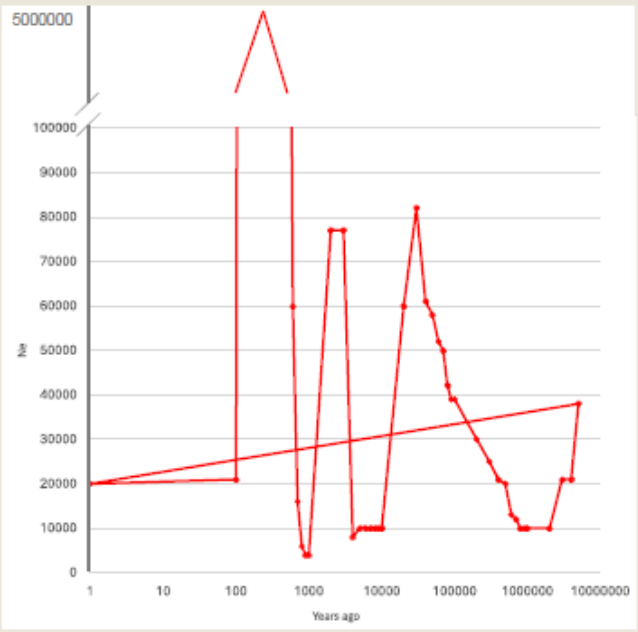


Current Ne ≈ 20,000

Year	Sample size	Ne (LD method, 31308 SNPs)
1988	46	10674
1989	33	18350
1992	33	7047
1996	29	infinite
2019	35	10142
2020	35	22458
2021	40	10447

- Estimates have large CI (incl. infinite) – larger sample sizes likely required
- Temporal method – similar results
- Alternative dataset (recent samples, larger n, fewer SNPs):
  - *Ne ≈ 20,000 (CI 11,000-45,000)*

Overall inference of demographic history



Compilation of MSMC, Fastsimcoal, IBDNe & NeEstimator analyses. Based on generation time 8.5 years

Conclusions

> "Accurate inference of recent demographic events requires a combination of large sample sizes and small effective population sizes, which make it possible to estimate recent coalescent rates."
> Fournier et al 2023 Nature Communications

- Ne seems large and stable (>500)
- But overall demographic history suggest recent decline and relatively low Ne
- Comparative studies?

附件 12 American eel US Management, landings, indices, and assessments (Speaker: Kristen Anstead)

SM03 Doc.14

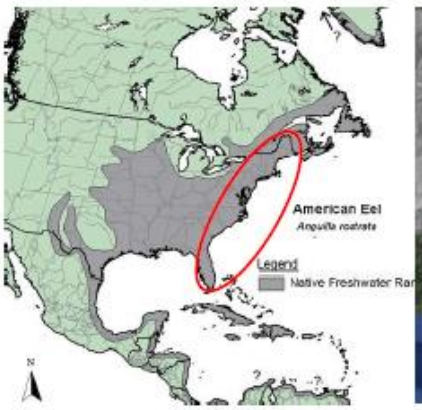
American Eel: US Management, Landings, Indices, & Assessments

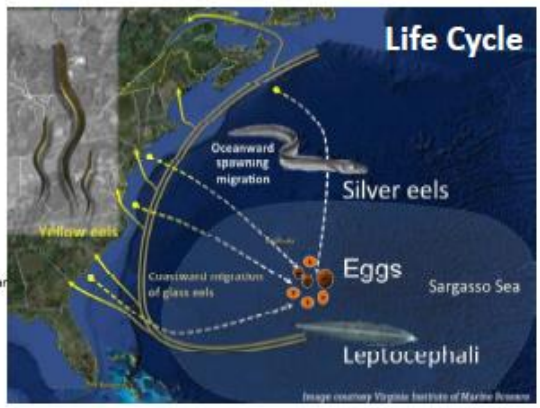
Kristen Anstead, Atlantic States Marine Fisheries Commission

Meeting on Japanese Eel and Other Relevant Eels
June 3-4, 2024

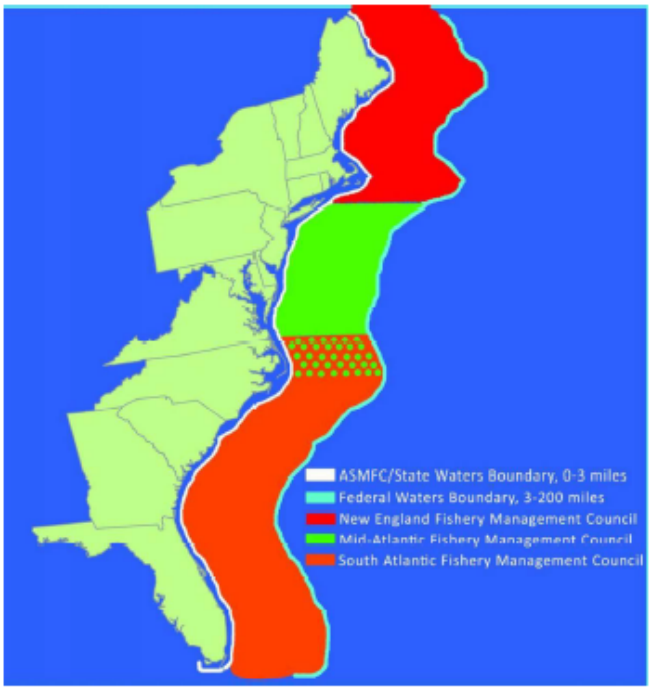
Life History

- Stock Definition
  - Single panmictic stock with one spawning population





US Atlantic States



U.S. Management of American Eel

- No federal legislation specific to domestic management
- No fisheries in U.S. federal waters
- Federal agencies involved in trade, conservation, and research projects
  - U.S. Fish & Wildlife Service: CITES representatives, Eel Passage Projects
  - U.S. Geological Survey: Habitat Assessment
- State-by-state management
  - Fisheries occur in estuarine rivers and bays
  - Primarily Atlantic coast states; lesser extent Gulf of Mexico and Great Lakes states
  - Atlantic States Marine Fisheries Commission (ASMFC)

ASMFC Management

- All states/jurisdictions implement YOY survey
- Minimum size, possession limit
- Commercial regulations for all life stages, including minimum size limits
- Coastwide Cap
  - 2014: Coastwide cap ~~907,671 lbs~~ 411.71 mt, YOY quota ~~9,688 lbs~~ 4.39 mt
  - 2018: Increased cap to ~~916,473 lbs~~ 415.70 mt
  - 2024: Decreased cap to ~~518,281 lbs~~ 235.19 mt
- ~~200 lb~~ 0.09 mt aquaculture provision

Assessment Challenges

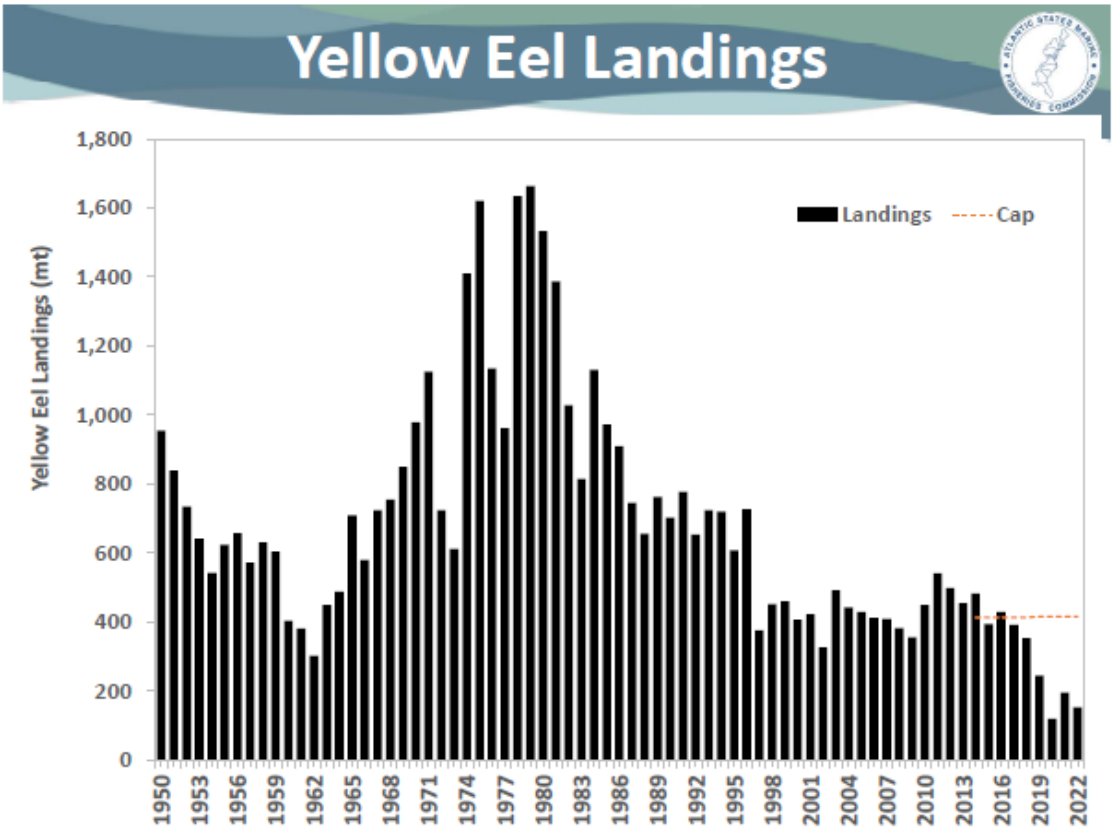
- Navigate through and reside in range of habitats
  - Sargasso Sea, coastal estuaries, inland FW systems
- Distribution from Brazil to Canada
- Several management authorities
  - International, federal, state, ASMFC, inland, Gulf of Mexico
- Life history characteristics vary
- Other potential population Impacts:
  - Habitat fragmentation due to dams
  - Climate change
  - Swim bladder parasite
- Inability to model and produce reference points

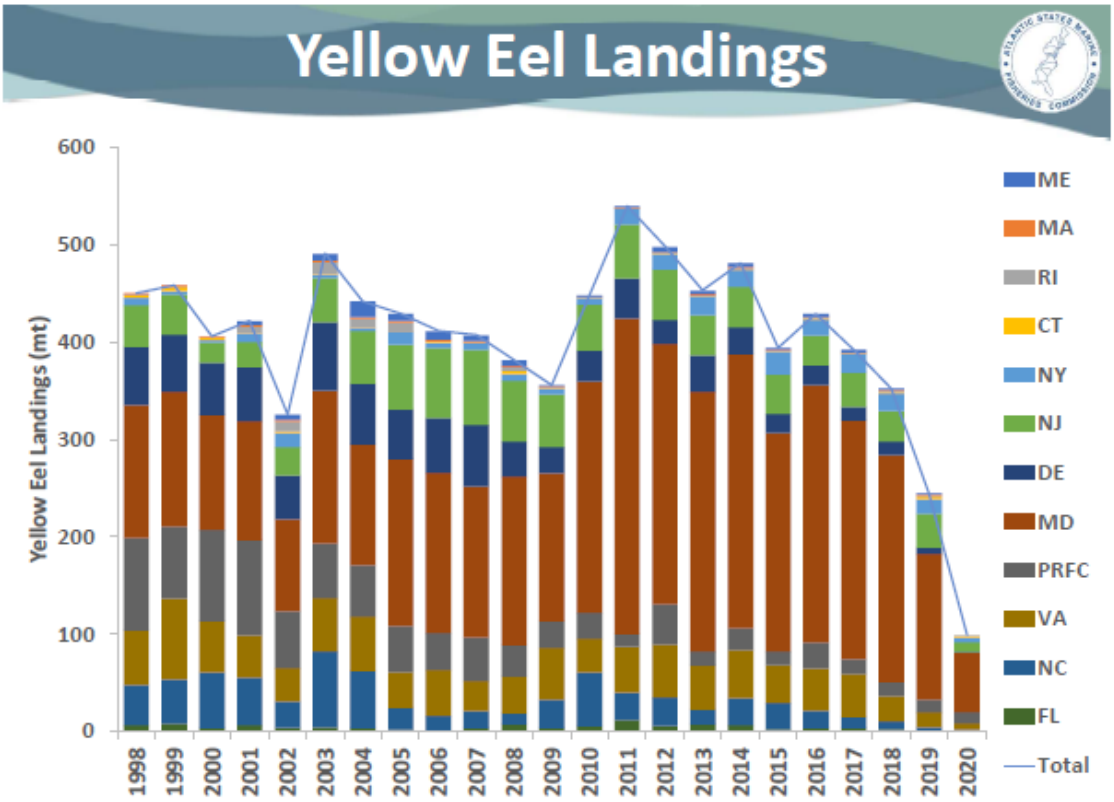
Previous Stock Assessments

- 2005: Not accepted for management
  - Sufficient shortcomings
- 2012: Benchmark stock assessment
  - Analyses indicated stock decline
  - Several modeling approaches and trend analyses
  - Reference points from model not accepted
  - Depleted status
- 2017: Stock assessment update
  - Extended time series, trend analyses
  - Depleted status

2023 Assessment

- Issues not resolved
- Attempted models and approaches recommended from previous peer review
  - Delay-difference model, reference points
  - Further explore surplus production model, traffic light analysis
- Other approaches
  - USGS GIS-based habitat analysis
  - Revised indices, trend analyses
  - Data-poor methods to give management advice
- Used a trend analysis to determine depleted status


Yellow Eel Landings
Yellow Eel Landings (mt)
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
Landings
Cap
1950
1953
1956
1959
1962
1965
1968
1971
1974
1977
1980
1983
1986
1989
1992
1995
1998
2001
2004
2007
2010
2013
2016
2019
2022


Yellow Eel Landings
Yellow Eel Landings (mt)
600
500
400
300
200
100
0
ME
MA
RI
CT
NY
NJ
DE
MD
PRFC
VA
NC
FL
Total
1998
1999
2000
2001
2002
2003
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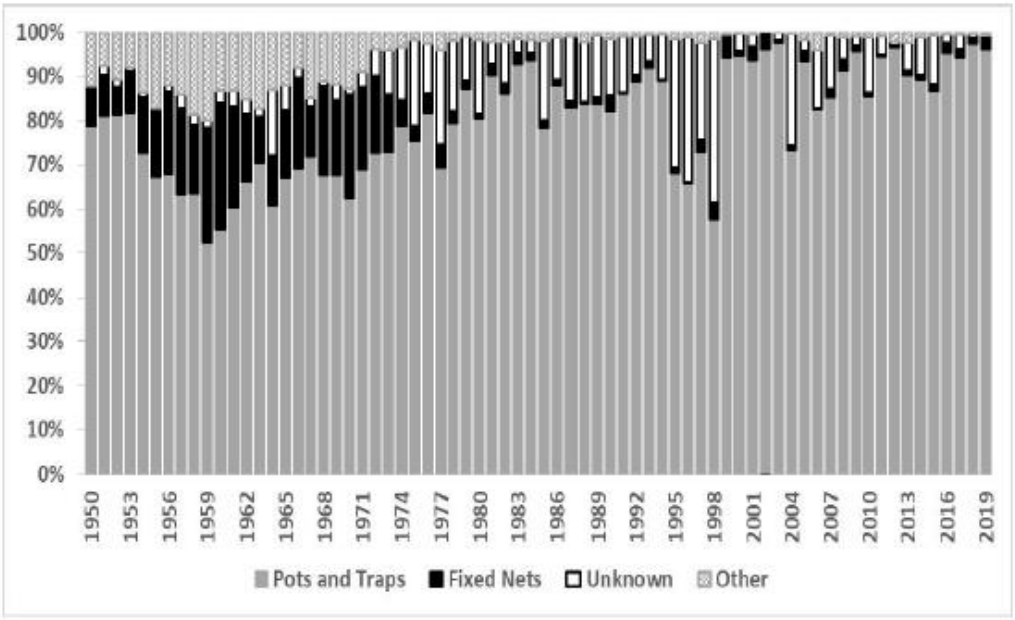
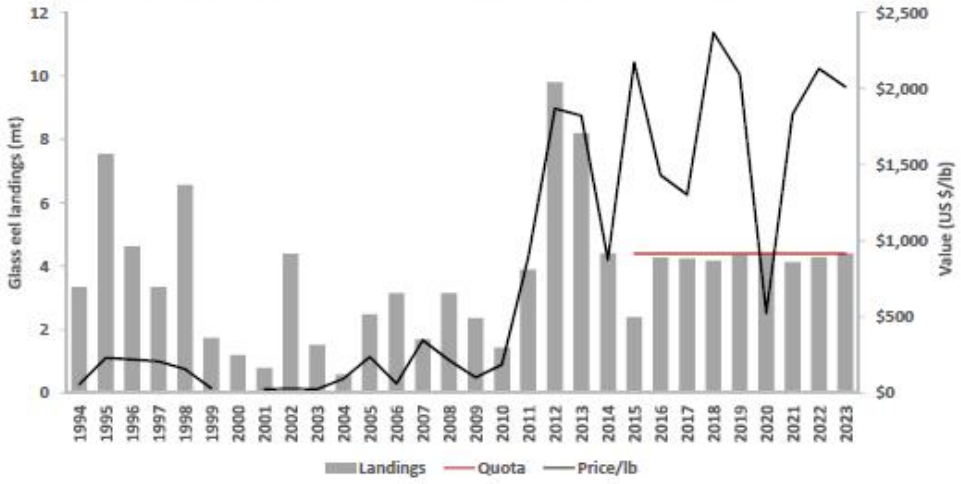
2013
2014
2015
2016
2017
2018
2019
2020

Gear



Glass Eel Fishery

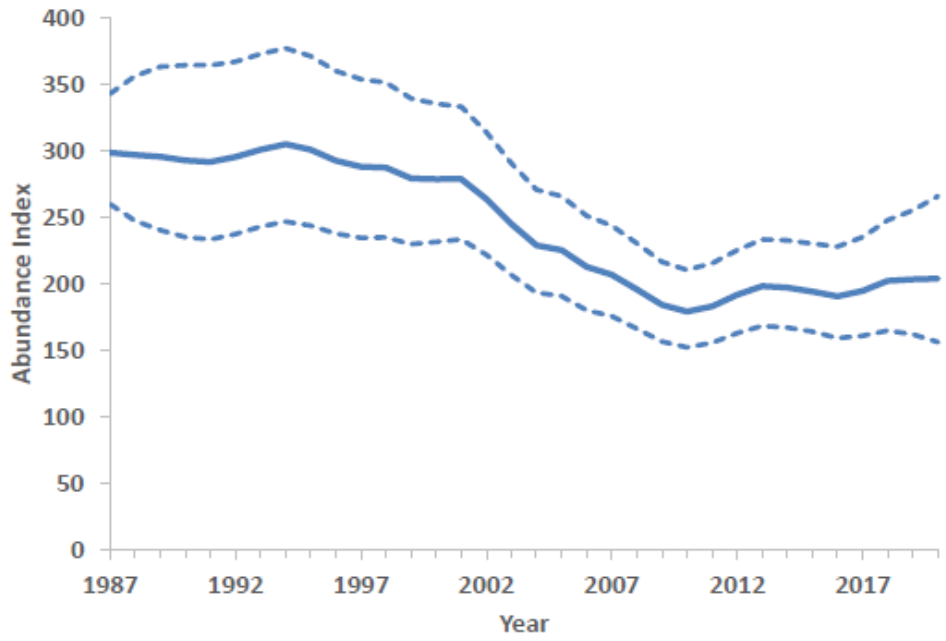
- Prohibited in all states but Maine and SC
- Addendum IV (2014): Maine quota of ~4.39 mt
- SC landings confidential, <0.34 mt since 2015



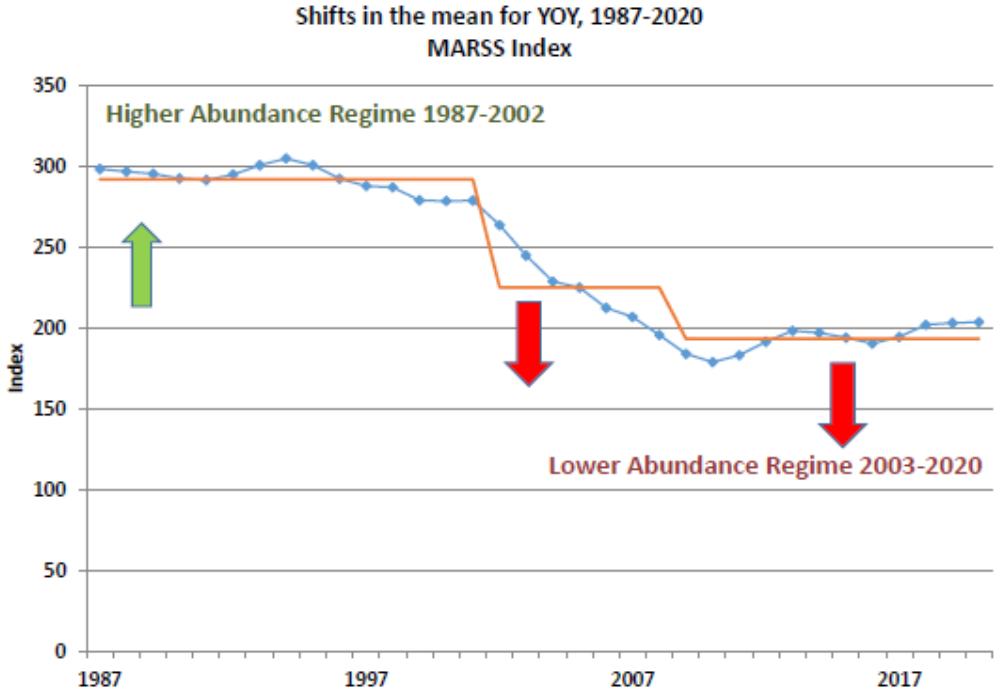
Fishery-Independent Indices

- Over 80 datasets evaluated for 2023 assessment
- Criteria for retention
  - Time Series: at least 10 years long
  - Survey Design: statistical design preferred
  - Gear Type: capable of catching eel
  - Timing & Location: time/place where eel are available
  - Methods: consistent or changes standardized
- Datasets retained
  - 25 YOY
  - 10 Elver
  - 16 Yellow Eel

Coastwide YOY Index



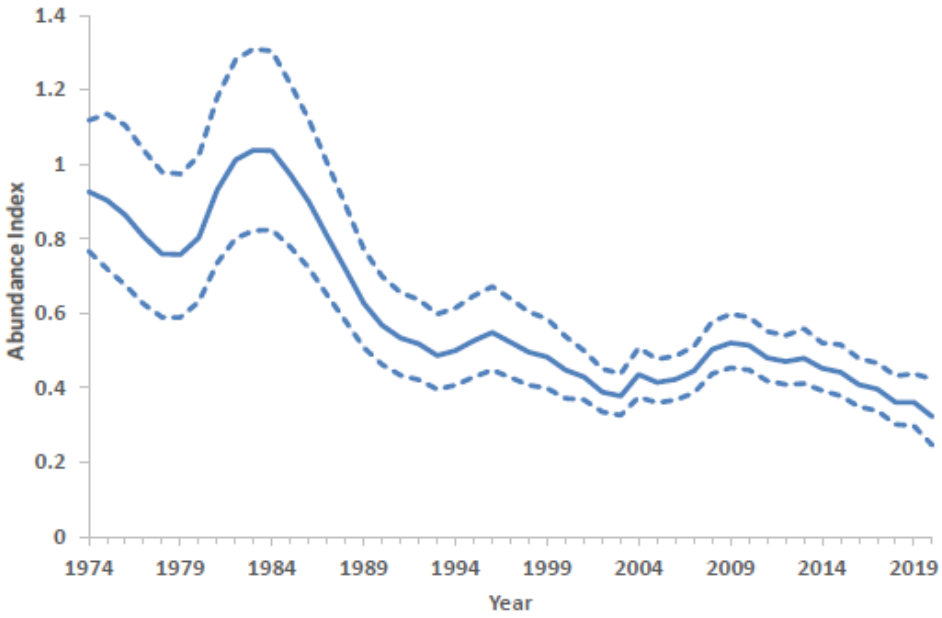
Regime Shift: YOY



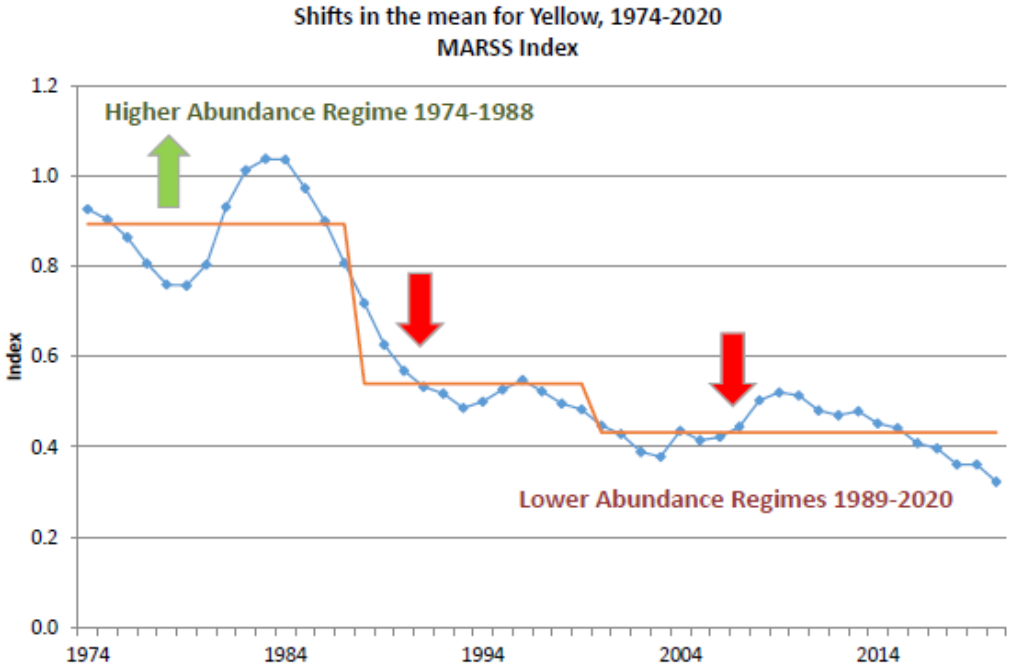
Yellow Eel Indices

State	Site	Gear	Model	Years of Survey	Trend
NH	Rainbow Smelt Fyke Net Survey	Fyke Net	NB GLM year+temp+river	2010-2020	NS
MA	Rainbow Smelt Fyke Net Survey	Fyke Net	NB GLM year+temp+offset(effort)	2004-2019	NS
CT	Farmill River	Electrofishing	Population estimate	2001-2012, 2014	NS
CT	Eightmile River	Electrofishing	Population estimate	2001-2003, 2005-2017, 2019	NS
NY	HRE Monitoring	Epibenthic sled & tucker trawl	Quasi-poisson GLM year+temp+river mile+water volume	1974-2017	↓
NY	Hudson Juvenile Alosine	Beach Seine	NB GLM year+station+temp	1985-2019	↓
NY	Hudson Juv Striped Bass	Beach Seine	NB GLM year+station+temp	1980-2019	↓
NJ	Delaware River Seine	Seine	NB GLM year+station+temp	1998-2019	NS
DE	Delaware Juvenile Trawl	Trawl	Nominal index with delta distribution	1980-2019	NS
PA	Delaware River Area 6	Electrofishing	Nominal	2005-2020	↓
MD	Sassafras River	Pot	Nominal	2006-2019	↑
VA	VIMS Trawl Survey	Trawl	NB GLM year+salinity+offset(effort)	1996-2019	NS
VA	VIMS Seine Survey	Seine	NB GLM year+salinity	1989-2019	↑
SC	Rediversion canal	Aluminum ladder	Quasi-poisson GLM year+temp+gear condition	2003, 2005-2007, 2009-2020	NS
SC	SC DNR Electrofishing	Electrofishing	NB year+stratum+offset(effort)	2001-2019	↓

Coastwide Yellow Eel Index

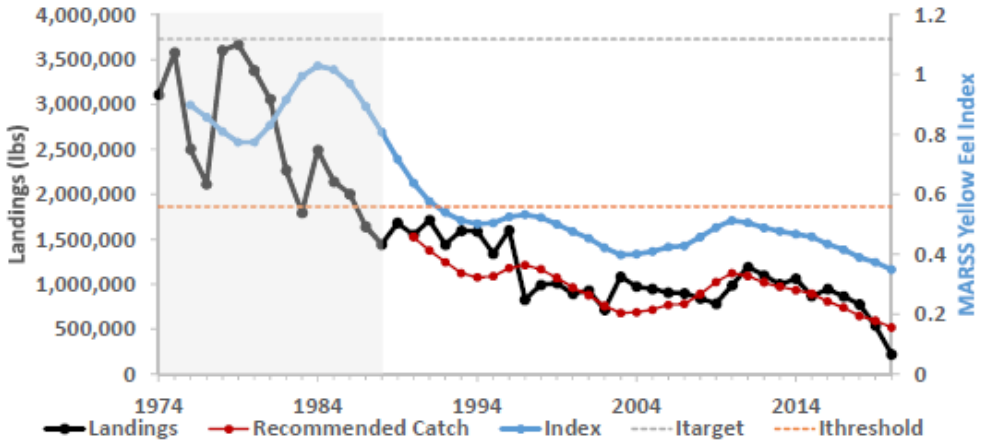


Regime Shift: Yellow Eel



I_{TARGET}

- Index based method proposed by Geromont & Butterworth (2015) and included in NEFSC (2020)
- Catch determined by comparing recent index to some target based on a reference period



Other Data

- Ages
  - Otolith exchange and workshop in 2018
    - Samples from multiple states
  - Sectioning otoliths more accurate method
    - Whole otoliths difficult to age past age 7
  - Age data for assessment from MD, NJ, DE & GA
  - https://asmfc.org/files/Science/AmericanEelAgeingReport_May2017.pdf

USGS Habitat Analysis

- ASMFC & USGS collaboration during assessment
- Pilot habitat-based model to assess eel stock
  - Initial assessment focused on data-rich Chesapeake and Delaware Bay watersheds
  - Compared eel occurrence/abundance to GIS based predictors
  - Spatial models for eel occurrence can be constructed with existing data (1995-2019)
  - Habitat fragmentation from dams – major factor
  - Modelling Limitations
    - Lack of historical data to understand impact of habitat restrictions from dams on population
    - Lack of current eel collections in other geographic regions

WGAMEEL

- For 2022-2024, Canada and the US collaborating on an ICES expert workgroup for American eel
- Tasked with evaluating data and methods for assessing the species
  - Exploring data on abundance, distribution, habitat, biology
  - Identify potential models or management approaches
  - Integrating indigenous knowledge systems
  - Searching for previously unused data
- Produced a report in 2022, final report late 2024

Questions?

附件 13 The catching status of eel larvae in the Yangtze River Estuary and considerations for their conservation and utilization (Speaker: Sikai Wang)

SM03 Doc.15

The catching status of eel larvae in the Yangtze River Estuary and considerations for their conservation and utilization

Sikai Wang

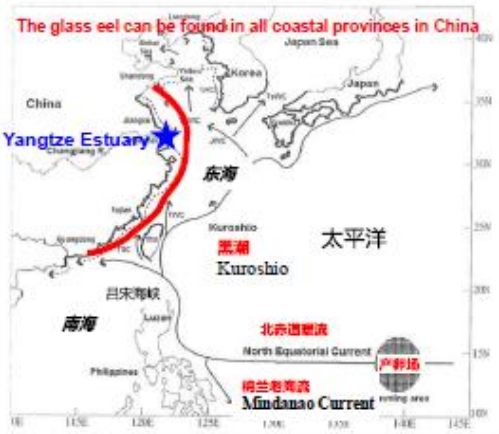
East China Sea Fisheries Research Institute,
Chinese Academy of Fishery Sciences
Email: wangsk@ecsf.ac.cn

目录

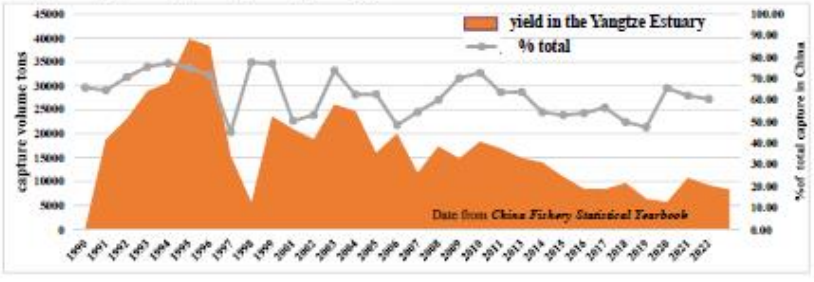
Contents

The catching status of eel larvae in the Yangtze River Estuary

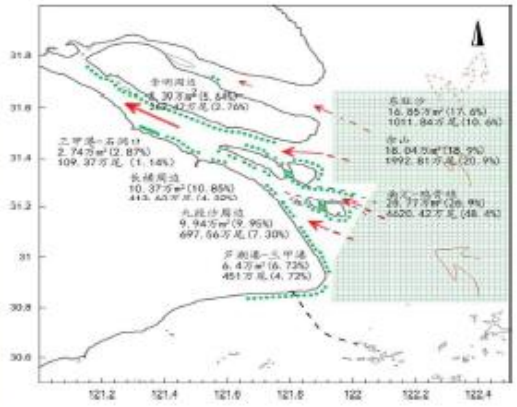
Eel larvae in the Yangtze Estuary

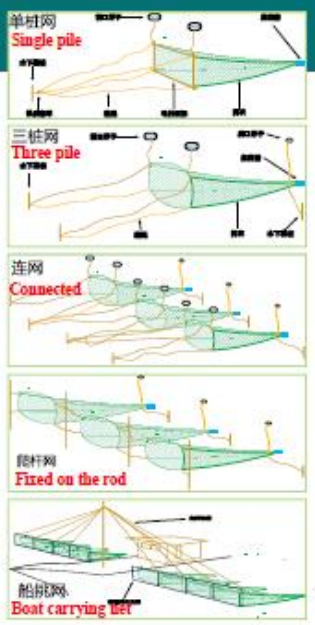


- ✓ The Yangtze River estuary is on the key migratory route of Japanese eel, a large number of glass eel appear in the area from January to May.
- ✓ The capture volume of glass eel accounting for more than 60% of the total in China.
- ✓ The catch of eel showing a continuous downward trend.



The overfishing eel larvae in the Yangtze River Estuary

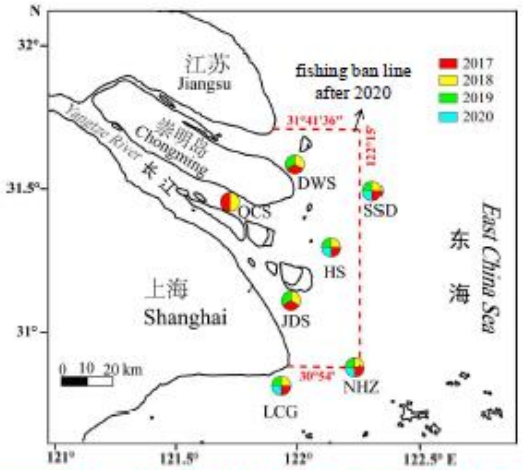




The total area of the operation net is near 1 million square meters, in 2014

5

Monitoring of eel larvae fishing in the Yangtze Estuary



survey stations at the Yangtze River estuary from 2017 to 2020

获取不同站位每艘调查船的网具数量、每日鳗苗捕捞数量、销售单价等数据。

sites survey

the number of nets, daily eel larvae catch,sales unit price for each survey vessel at different stations.
A standardized catch per unit effort (CPUE)

visiting survey

We conducted a questionnaire survey of fisheries in the Yangtez estuarine areas
the number of eel fishing vessels, types and quantities of nets, distribution, and output value.

Characteristics of Fishing Season in the Yangtze Estuary

Fishing time

The fishing season is generally from January to May

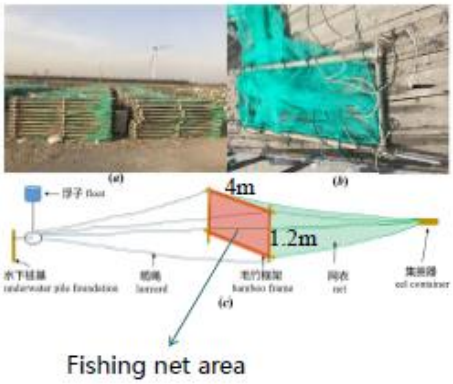
Fishing Catch

Has obvious fluctuations in different years

Peak period

February to March being the peak period.

Fishing effort



Fishing net area

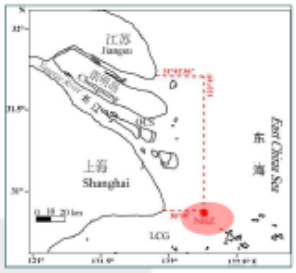
Total area=sigle area × the number of fish net

Total area of fishing net in different sites of the Yangtze estuary from 2017 to 2020 ($\times 10^4$ m^2)

年份 Year	东旺沙 DWS	佘山岛 SSD	南汇嘴 NHZ	九段沙 JDS	青草沙 QCS	横沙 HS	芦潮港 LCG	Total $\times 10^4$m^2
2017	16.32	15.84	25.92	8.64	0.48	8.16	3.36	78.72
2018	18.72	17.28	26.40	7.20	0.24	6.91	4.22	80.97
2019	12.00	11.52	29.76	3.36	0	6.72	6.24	69.60
2020	0	10.08	26.40	0	0	4.32	9.60	50.40

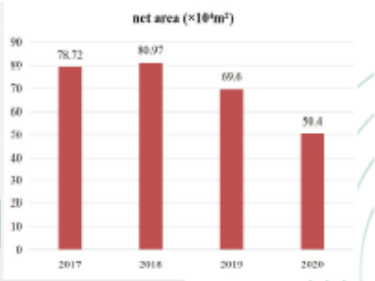
Fishing effort

Main regions



Cconcentrated in the *Nanhuizui* area, with a net area accounting for over 33%.

Overall trend



Downward trend,
with a total net area of 50.4 thousand m^2 in 2020, a decrease of 39% compared to the peak in 2018.

The peak period varies in different years

The average monthly CPUE (ind./100 m^2) during the capture season

The highest average monthly CPUE

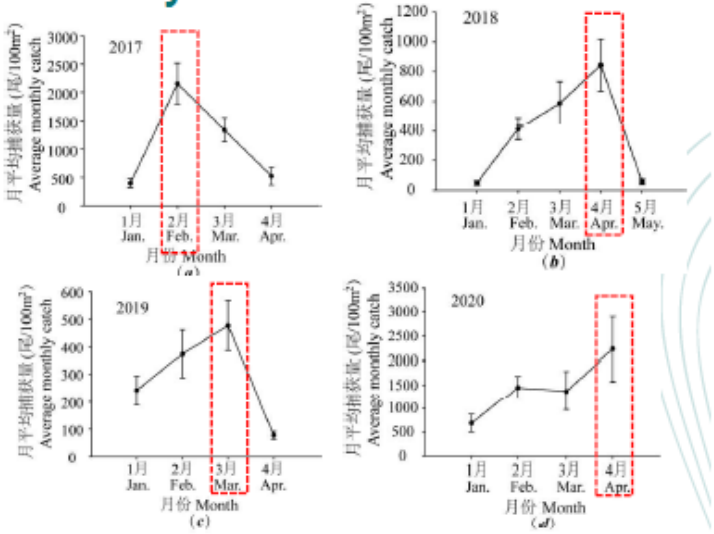
2017: February

2018: April

2019: March

2020: April

Has obvious fluctuations in different years



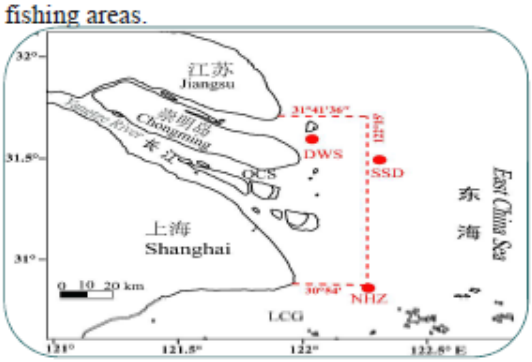
2017—2020年不同月份平均捕获量情况

Average monthly CPUE for eel from 2017 to 2020

Spatial differences

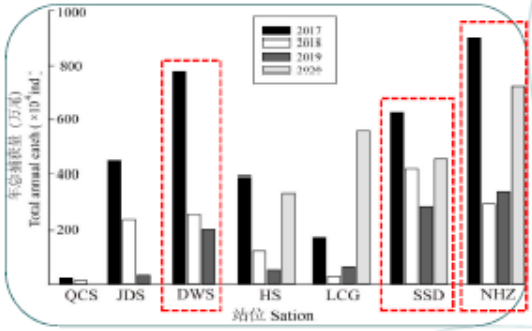
High fishing Areas

The waters near *Nanhuizui (NHZ)*, *Sheshan dao (SSD)*, and *Dongwangsha (DWS)* are the main fishing areas.



Fishing volume

From 2017 to 2020, the fishing volume in the three regions accounted for 69%, 71%, 84%, and 57% of the total fishing volume, respectively.



Differences in spatiotemporal distribution

01
The peak period varies in different years

The catch season for eel larvae in the Yangtze River Estuary is generally from January to May, with a peak period from February to March, but there are differences among different years.

02
Spatial differences in fishing yield

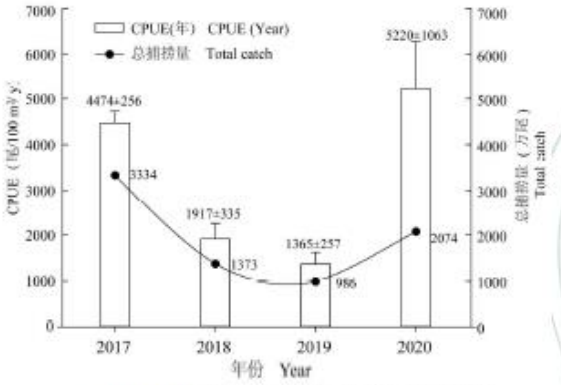
Due to the influence of fishery management policies, the distribution of fishing nets has become the biggest factor limiting the amount of eel larvae caught.

CPUE and Total catch in different years

We calculated the annual CPUE (100 m^2 net area) and total catch during the whole capture season

Annual CPUE

2017: 4474±256 ind./100 m^2·y;
2018: 1917±335 ind./100 m^2·y;
2019: 1365±257 ind./100 m^2·y;
2020: 5220±1063 ind./100 m^2·y; but, due to low fishing efforts, the total catch is still lower than in 2017



2017—2020年长江口鳗苗汛期捕捞量变动情况
Yield fluctuation of eel in the Yangtze estuary from 2017 to 2020

Total output value

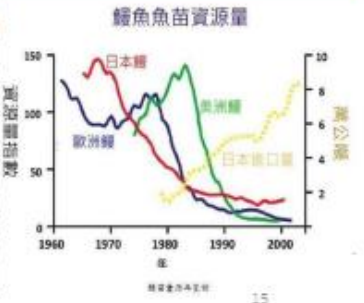
01 2017
Total catch 33.34 million ind.; 10.97 yuan/ind.;
total output value **366 million yuan**

02 2018
Total catch 13.73 million ind.; 27.27 yuan/ind.;
total output value **374 million yuan**

03 2019
Total catch 9.86 million ind.; 23.50 yuan/ind.;
total output value **232 million yuan**

04 2020
Total catch 20.74 million ind.; 8.12 yuan/ind.;
total output value **168 million yuan**

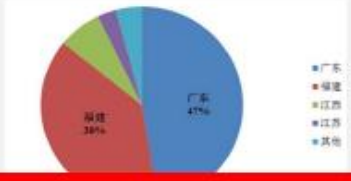
Thoughts on eel resources conservation and utilization



15

Major conflicts
主要矛盾

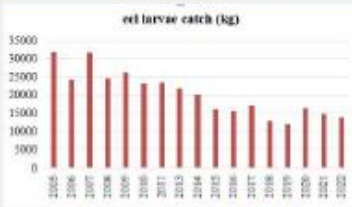
China is a major country in eel farming



Eel larvae are a bottleneck restricting industrial development
鳗鲡苗种成为制约产业发展的瓶颈!

Since 2005, the total production of eel farming has always accounted for more than **80% of the global** production, forming a mature entire industry chain including eel farming, feed production, eel processing, and export trade. The annual output value reaches over **70 billion yuan**, and there are more than **200 000 related employees.**

Scale of eel industry in China



The catch of eel larvae in China

16

Major conflicts
主要矛盾

"保护"与"利用"是生物多样性概念中固有的矛盾

"Conservation" and "utilization" are inherent contradictions

人类要生存发展，依赖于自然中生物多样性的长久支持，对自然"利用"是必须的

Humans depend on the long-term support of nature's biodiversity, and the "use" of nature is necessary

How to build a balanced relationship between conservation and utilization?
如何在保护与利用之间构建平衡的关系?

What kind of utilization is a reasonable utilization?
怎样的利用是合理的利用?

科学保护、合理利用

不能导致物种灭绝

Pursue:

- Scientific Protection, Rational Utilization
- Avoid leading to species extinction

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Target principles
目标原则

Overall goal: to strengthen the protection of eel resources and achieve sustainable utilization
总体目标：加强鳗鲡资源保护，实现可持续利用

Basic principles: conservation first, aiming for rational utilization, science and technology development, cooperation and sharing
基本原则：保护优先，合理利用、科技先行、合作共享

Conservation first **保护优先**	Deepen the eco-friendly development, prioritize the eel conservation and ensure the protection measures are well complied. 深化环保理念，将鳗鲡天然资源的保护作为重点工作，确保保护措施落实到位
Rational utilization **合理利用**	With a dynamic balance of eel resources, develop a scientific development and utilization plan to support the development of eel aquaculture industry 在鳗鲡天然资源动态平衡的前提下，制定科学合理的开发利用方案，支持鳗鲡养殖业的发展，实现保护和利用双赢
Science and technology support **科技先行**	Strengthen scientific research on resources, breeding, etc., to provide scientific and technological support for the conservation 针对鳗鲡生活史复杂、洄游路线长的特点，强化研究手段开展资源、繁育等研究，为鳗鲡的保护提供科技支撑
Cooperation and sharing **合作共享**	Engage multi-stakeholders, to promote cooperation, information sharing among eel protection, fishery management, research and industry. 整合鳗鲡保护相关力量，推动鳗鲡保护管理、研究、产业之间的通力合作，实现保护管理、科技资源、产业信息的共享

18

Key work

1、Establish a sound protection system and mechanism

1	完善鳗鲡保护管理体系	Improve the eel protection and management system

- Covering fisheries regulatory authorities, industry associations, etc
- Establish eel monitoring network and information technology platform
- Establish an eel conservation alliance and form a multi-party eel conservation network

2	健全鳗鲡保护管理制度	Establish a sound eel protection and management system

- Quota fishing system for eel and strengthen fishing control
- Permit system for eel farming, controlling the total amount of entry into the pond, and strengthening utilization control
- Ecological compensation policies for the utilization of eel resources

19

Key work

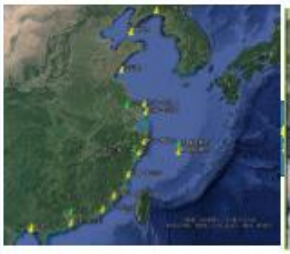
2、Strengthen scientific research

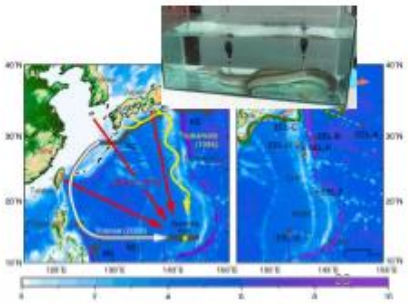
3	Carry out special investigation of eel 开展鳗鲡专项调查监测

- Changes in resources and habitats and their influencing factors
- Based on the characteristics of life history, propose protection areas and countermeasures
- Evaluate maximum sustainable catch of eel fry

4	Strengthen research on migration habits 加强生殖洄游习性研究

- logo tracking technology
- migratory habits and key habitat factors
- parental cultivation and artificial breeding





Key work

3、Coordinate protection and utilization

6 Promote quota fishing
探索推进限额捕捞

- Exploring the implementation of a quota fishing system for eel under the current fishing ban
- Establish a pilot program for quota fishing at the Yangtze Estuary, summarize and improve relevant systems, operational management mechanisms, and safeguard measures

7 Scientific planning of aquaculture
科学规划养殖利用

- Medium - and long-termplans for development and utilization standardizing the eel aquaculture industry
- Promote the aquaculture licensing system, formulate aquaculture operating procedures and technical standards
- Conduct technical specification certification for eel breeding farms, establish a traceable system for full supervision

21

Key work

4、Strengthen resource proliferation and protection

8 Establish stock enhancement system
建立鳗鲡增殖放流体系

- Research and development of eel stock enhancement, evaluation of release effects
- Plan and construct a stock enhancement system
- carry out stock enhancement work in Yangtze River

9 Protection of Eel Habitat
推进鳗鲡栖息生境保护

- identify key habitats and migration pathways, propose key protected water areas, and carry out habitat restoration
- formulate protection and management strategies for eel habitats, and ensure habitat needs at different stages of life history

22

Key work

5、Promoting international cooperation

10 Deepening international cooperation
深化国际合作与交流

- Carry out protection and management cooperation with countries where eel resources are distributed
- Actively participate in the formulation and improvement of decisions on eel by international organizations such as CITES, and make due contributions to the protection of eel

The EU has lifted export quotas for European eel
欧盟取消了欧洲鳗苗出口配额，加大了打击鳗苗走私行为

Japan implements strict quota management on the amount of eel caught and raised, and formulates eel export licensing system
日本对其本国的鳗苗捕捞和养殖投苗量进行严格的配额管理，制订鳗苗出口许可制度

The management of American eel resources is very strict in countries such as the United States and Canada, with fishing and export quotas set
美国和加拿大等美洲国家对美洲鳗苗资源的管理十分严格，设定捕捞和出口配额

23

Key work

Exploring the Sustainable Development and Utilization of Japanese Eel
扩大合作——探讨日本鳗鲡可持续发展利用

Thanks for your attention

Email: wangsk@ecsf.ac.cn

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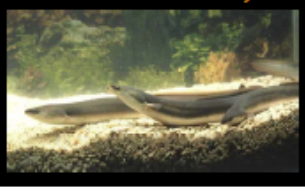
附件 14 Tracking Japanese eels and revealing their distribution in Taiwanese rivers by environmental DNA Analysis (Speaker: Yu-San Han)

The 3rd Scientific Meeting on Japanese Eel and Other Relevant Eels, Tokyo, Japan, June 3-4, 2024

Tracking Japanese eels and revealing their distribution in Taiwanese rivers by environmental DNA analysis

Dr. Yu-San Han

Professor, Institute of Fisheries Science & Department of Life Science, National Taiwan University, Taiwan
E-mail: yshan@ntu.edu.tw



1

Content

1. Eel on the edge
2. Resource status of Japanese eels in Taiwanese rivers by traditional fishing
3. Resource status of Japanese eels in Taiwanese rivers by eDNA technique

2

Japanese eel was listed in IUCN 2014 Red List

Anguilla interioris
Anguilla megastoma
Anguilla obscura
Anguilla marmorata
Anguilla mossambica
Anguilla nebulosa
Anguilla bicolor
Anguilla celebesensis
Anguilla luzonensis
Anguilla borneensis
Anguilla japonica
Anguilla rostrata
Anguilla anguilla

CITES 2007
IUCN 2010

IUCN 2014

Japanese eel: Critically endangered species in Taiwan

Main aquaculture eel species in the world

3

Satellite remote analysis of Japanese eel habitat loss in East Asia

USGS

Chronological Landsat image analysis

4

Japanese eel habitats in East Asia is in danger


Estuarine, Coastal and Shelf Science 151 (2014) 301–308

Contents lists available at ScienceDirect

Estuarine, Coastal and Shelf Science

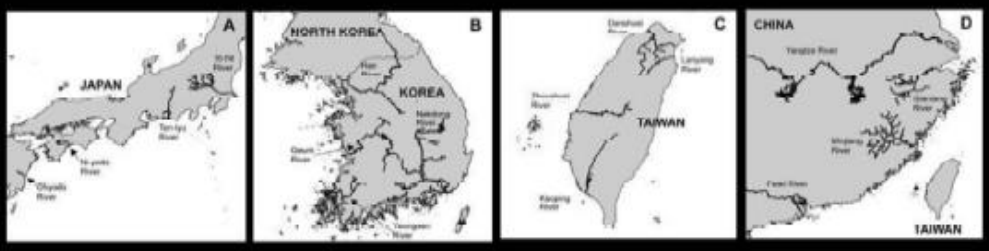
journal homepage: www.elsevier.com/locate/ecss

Impact of long-term habitat loss on the Japanese eel Anguilla japonica

Jian-Ze Chen [a], Shiang-Lin Huang [b], Yu-San Han [a, *]

[a] Institute of Fisheries Science, College of Life Science, National Taiwan University, Taipei, Taiwan
[b] The Swire Institute of Marine Science, School of Biological Sciences, The University of Hong Kong, Cape d'Aguilar, Shek O, Hong Kong

East Asia long-term eel river habitat quality decline > 75%



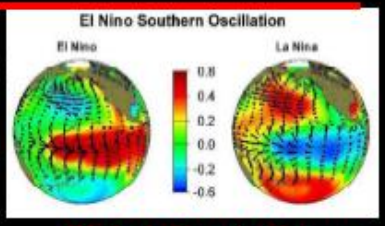
5

Chen et al. 2014 ECSS

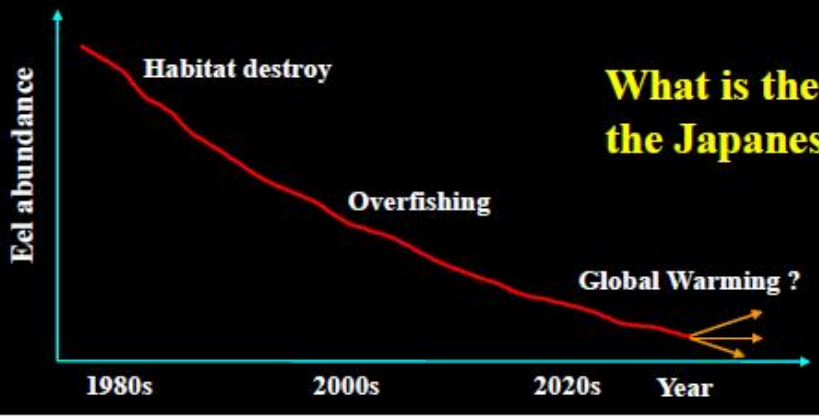
Why does eel resource decline ?


Habitat destruction


Overfishing



Global climate change



What is the fate of the Japanese eel ?

6

Content

1. Eel on the edge
2. Resource status of Japanese eels in Taiwanese rivers by traditional fishing
3. Resource status of Japanese eels in Taiwanese rivers by eDNA technique

7

Monthly recruitment monitoring of Japanese glass eel since 2010-

Ilan River estuary

Movable fyke net

8

Abundances of Anguillid eels in Taiwan


Species	Glass eel	Adult eel
A. japonica	14270	Common
A. marmorata	13889	Common
A. bicolor pacifica	1187	Rare
A. luzonensis	206	Very Rare
A. celebesensis	2	Not found
A. interioris	1	Not found
A. borneensis	1	Not found

Data between 2010-2024 from Ilan, Taiwan

Han, unpublished

9

Historical distribution records of *A. japonica* and *A. marmorata* in Taiwan rivers

30 years ago, the *A. japonica* was far more abundant than *A. marmorata* in Taiwan rivers

Data source:
1. TaiBIF;
2. Water Resources Agency, MOEA

10

Can we save the time and labor cost for the eel survey??

11

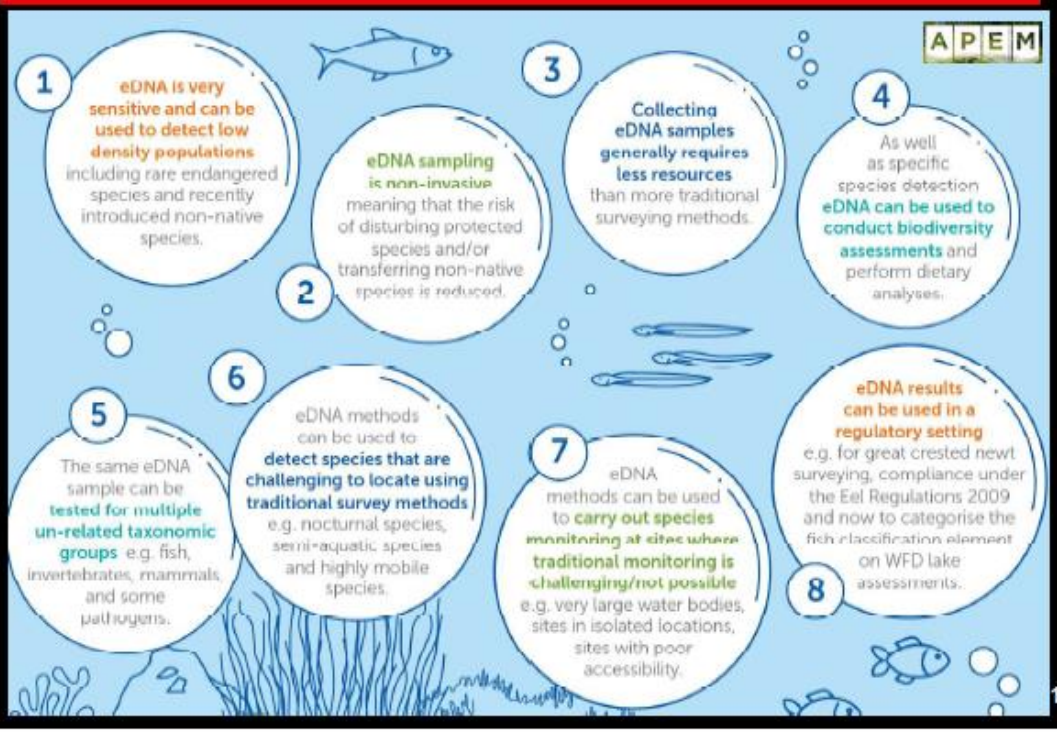
Applications of eDNA technique

https://www.wellsreserve.org/blog/finding-fish-with-edna

All fish can release DNA into water through slime, scales, epidermal cells, and feces to form the environmental DNA (eDNA).

12

The advantages of eDNA technique



13

Content

1. Eel on the edge
2. Resource status of Japanese eels in Taiwanese rivers by traditional fishing
3. Resource status of Japanese eels in Taiwanese rivers by eDNA technique

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eDNA technique for detecting river eels

Water sampling

Water filtering

eDNA extraction

Real-time qPCR

Table 1. Japanese eel-specific primer pair of mitochondrial cytb for real-time PCR (F: forward; R: reverse).

Species	Primer Sequences	Amplicon Size (bp)	PCR Efficiency
A. japonica	AJ-F: 5'–ATGGATGATTCATCCGAAAT–3' AJ-R: 5'–GTGTAGGTAGAGGCAGATAAAG–3'	65	98.5%

PCR primer sets
SYBR Green dye

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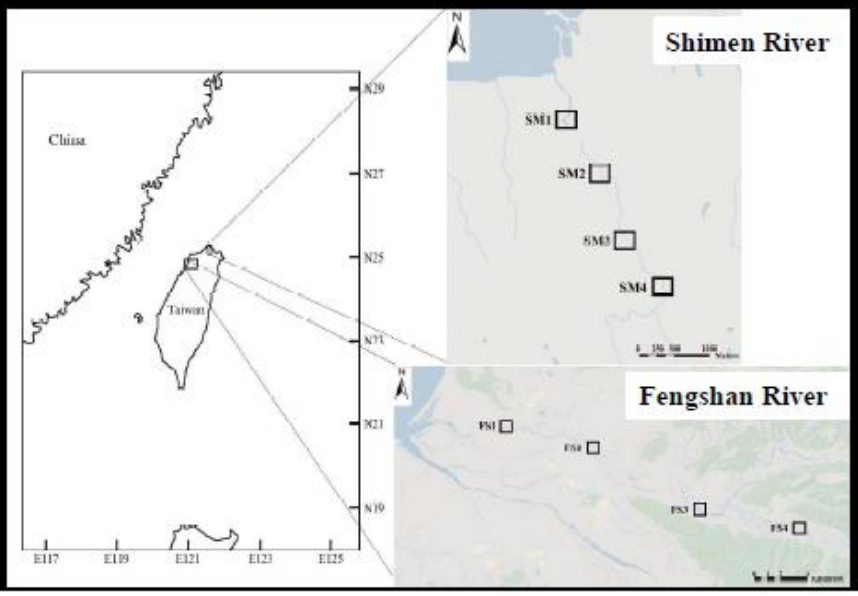
eDNA technique for detecting river eels

Simultaneously conducting the electrofishing and eDNA analysis.



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Hsu et al. 2023 fishes

eDNA technique for detecting river eels

Table 2. The number of captured Japanese eels and the data of eDNA detection at the study sites in the Fengshan and Shimen Rivers.

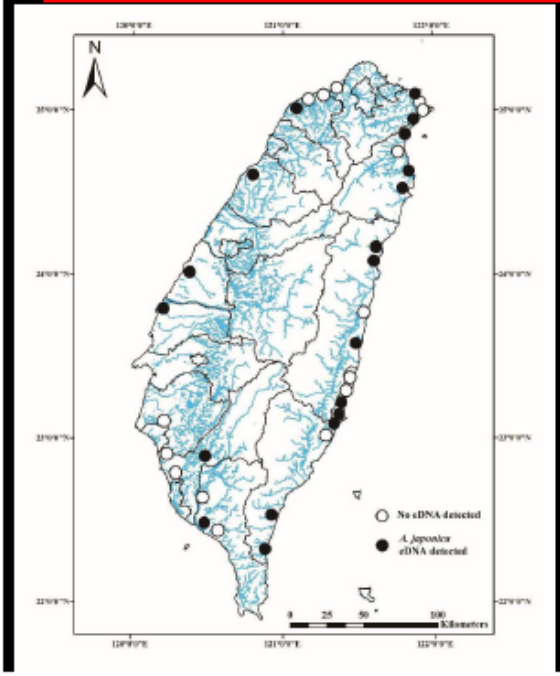
Study Site	Date	Japanese Eel	
		eDNA (Cq)	Captures
FS1	December 2021	+, (30.3 ± 0.4)	2
FS2		−, (N/A)	0
FS3		−, (N/A)	0
FS4		−, (N/A)	0
FS1	January 2022	+, (30.5 ± 0.3)	3
FS2		−, (N/A)	0
FS3		+, (28.4 ± 0.4)	2
FS4		−, (N/A)	0
FS1	February 2022	+, (32.1 ± 0.3)	5
FS2		−, (N/A)	0
FS3		+, (31.8 ± 0.2)	3
FS4		−, (N/A)	0
SM1	December 2021	+, (32.7 ± 0.3)	3
SM2		+, (31.5 ± 0.4)	0
SM3		−, (N/A)	0
SM4		−, (N/A)	0
SM1	January 2022	+, (28.7 ± 0.4)	4
SM2		+, (30.2 ± 0.2)	5
SM3		−, (N/A)	0
SM4		−, (N/A)	0
SM1	February 2022	+, (28.7 ± 0.5)	12
SM2		+, (32.1 ± 0.4)	12
SM3		−, (N/A)	0
SM4		−, (N/A)	0

"+": positive detection; "−": negative detection; "N/A": no Cq value.

eDNA technique is effective for detecting the distribution of Japanese eels in rivers.

Hsu et al. 2023 fishes 17

The distribution of the Japanese eel in Taiwanese rivers based on eDNA



Japanese eel eDNA was detected in 19 of 34 Taiwanese rivers.

Japanese eels are distributed widely across Taiwan, but with low abundance.

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Water pollution vs. eel eDNA signal

Table 3. Cq values of Japanese eel eDNA and RPI values of waters at the sampling sites of 36 target rivers in this study.

Name of River	eDNA Detection of Japanese Eel	RPI Value	Level of Pollution
Beihlikeng River	+, 35.0 ± 0.4	N	N
Hemei River	–	N	N
Jingshawan River	–	N	N
Dazi River	+, 27.2 ± 0.3	1	non/mildly polluted
Gengjiang River	+, 29.8 ± 0.3	N	N
Dazikou River	–	3.75	moderately polluted
Xinchen River	+, 28.9 ± 0.2	1	non/mildly polluted
Dongao North River	+, 27.8 ± 0.3	1	non/mildly polluted
Liwu River	+, 34.6 ± 0.4	1	non/mildly polluted
Sanzhan River	+, 31.5 ± 0.4	1	non/mildly polluted
Shuliao River	–	N	N
Xingulnan River	+, 38.1 ± 0.2	3.25	moderately polluted
Ninggu River	–	N	N
Dabin River	–	N	N
Duwei River	+, 32.3 ± 0.2	N	N
Fujia River	+, 31.3 ± 0.3	1.25	non/mildly polluted
Hsinkang River	+, 33.3 ± 0.2	N	N
Mawu River	–	1.25	non/mildly polluted
Tamsui River	+, 30.2 ± 0.3	N	N
Anshuo River	+, 35.9 ± 0.4	N	N
Nanwan River	–	N	N
Nankan River	–	4	moderately polluted
Shuangdikou River	–	N	N
Xinwu River	+, 36.0 ± 0.3	2.25	lightly polluted
Zhonggang River	+, 32.5 ± 0.3	2	non/mildly polluted
Oldzhuoshui River	+, 34.5 ± 0.3	2.25	lightly polluted
Newhuwei River	+, 31.4 ± 0.2	4.25	moderately polluted
Yanshui River	–	6.25	severely polluted
Erren River	–	4.75	moderately polluted
Tianliao River	+, 31.1 ± 0.2	N	N
Dianbao River	–	7.25	severely polluted
Gaoping River	–	3.25	moderately polluted
Donggang River	+, 37.9 ± 0.3	3.5	moderately polluted
Linbian River	–	1.5	non/mildly polluted
Fengshan River	+, 30.5 ± 0.3	2.25	lightly polluted
Shimen River	+, 28.7 ± 0.3	N	N

"+": positive detection; "–": negative detection; "N": no RPI value or unknown pollution level.

Based on river RPI, a high correlation between the RPI values and the occurrence of Japanese eel eDNA were found.

Rivers with severe pollution had no Japanese eel eDNA detected.

Hsu et al. 2023 fishes

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Improved eDNA detecting technique

Water sampling

Water filtering

eDNA extraction

Real-time qPCR

Using TaqMan probe and new primer sets to enhance the specificity and sensitivity

Species	Primer and probe sequences	Amplicon size (bp)
A. japonica	AJ-F: 5'-CCTTACAGGATTATTCCTAGCA-3'	194
	AJ-R: 5'- TGTAAAGGTATGAGCCGTAGT -3'	
	AJ-P: 5'-FAM-ATGGATGATTCATCCGAAATTTACATGC-BHQ1-3'	

Ct values

⬇

eDNA concentration

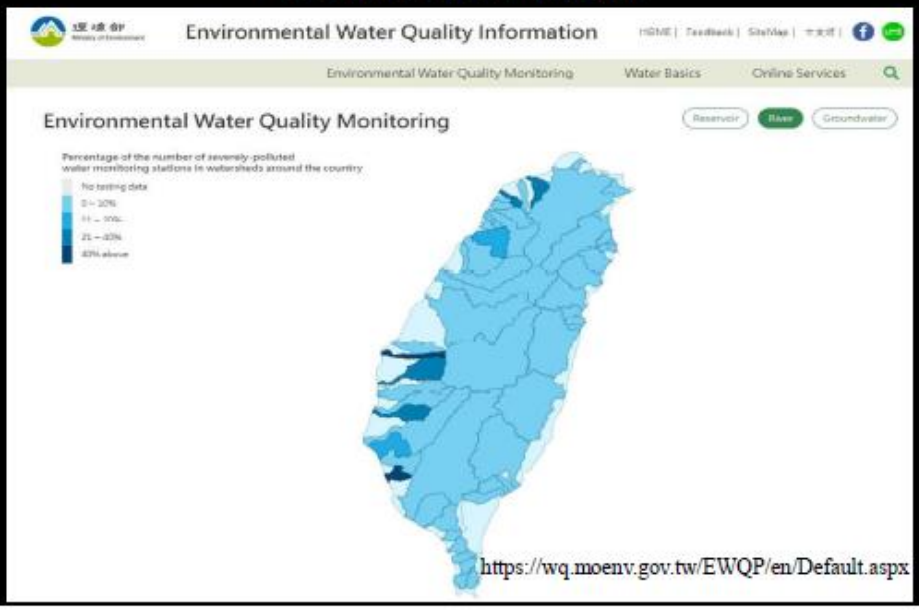
⬇

eel biomass in rivers

20

Survey of the resource status of Japanese eel in rivers of Taiwan

Screening target rivers (no / low-polluted rivers) based on river RPI values



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Survey of the resource status of Japanese eel in rivers of Taiwan

New Taipei City

22

Survey of the resource status of Japanese eel in rivers of Taiwan

New Taipei City

23

Survey of the resource status of Japanese eel in rivers of Taiwan

Yilan

24

Ongoing and future work

- Analyzing the eDNA from the water samples of rivers around Taiwan.
- Establishing a correlation between eel biomass and eDNA concentrations.
- Collaborate with eel scientists of East Asia to collect more river water samples for eDNA analysis.

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Hope eel come back again !

Thank You

HAN'S EEL LAB
韓玉山鰻魚實驗室

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附件 15 Research on eel resource management and conservation in Korea (Speaker: Shin-Kwon Kim)

I

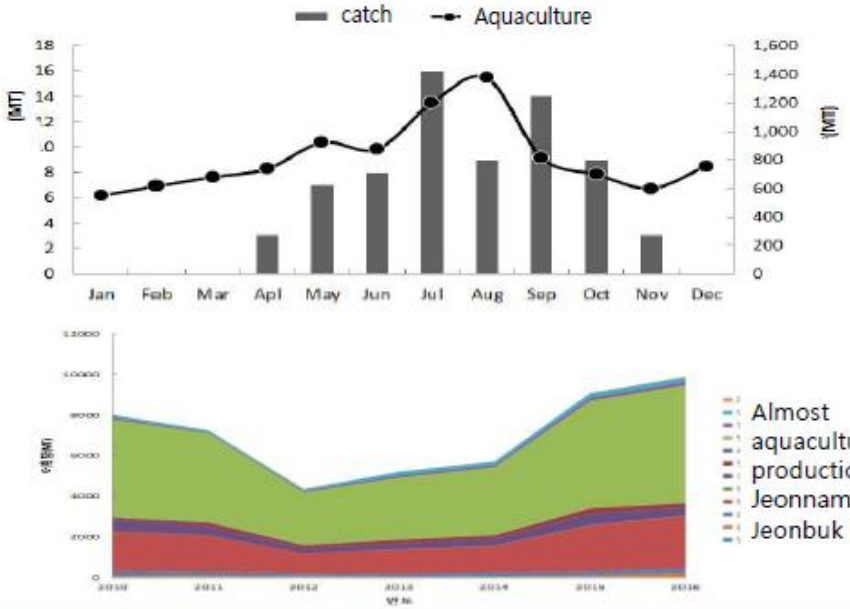
State of eel monitoring program in Korea

Pre-Survey for *Anguilla japonica* in Korean inland water

- **Survey periods**
  - Sept. 2014 ~ Nov. 2016
- **Survey area**
  - 2 River estuary(Han river, Geum river)
  - 3 reservoirs
  - 2 streams
- **Result from survey**
  - Catch data(by fishery, region)
  - Length composition
  - Age determination
  - Maturity
  - Habitat

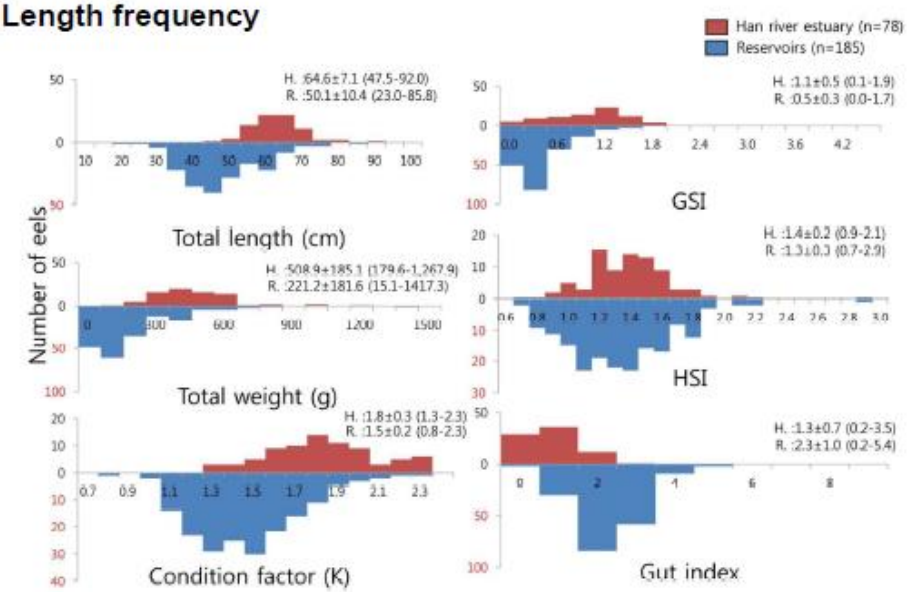
Pre-Survey for *Anguilla japonica* in Korean inland water

- **Catch data**



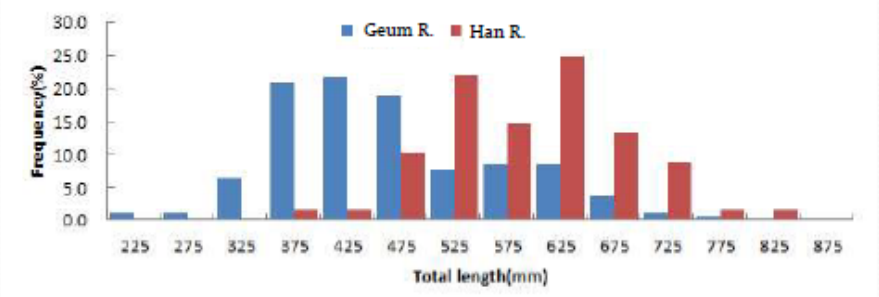
Pre-Survey for *Anguilla japonica* in Korean inland water

- **Length frequency**



Current state of eel monitoring in Korea

- Sampling period : 2015~2017, monthly
- Sampling sites : Estuary, stream and lakes
- Investigation : length, weight, sex ratio, GSI, otolith etc.



Frequency distributions of total length of the *Anguilla japonica* collected in Geum river estuary and Han river estuary, Korea

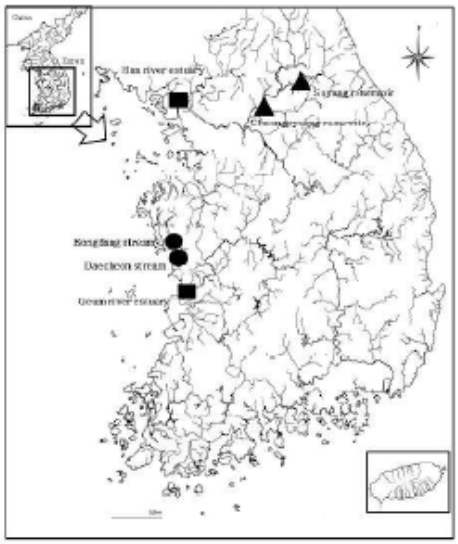


Fig. 1. Map of the study area in Korea, showing the location of sampling sites. The diagram indicates Reservoir (black triangle), Estuary (black rectangle) and Stream (black circle). Scale bar indicate 50 km.

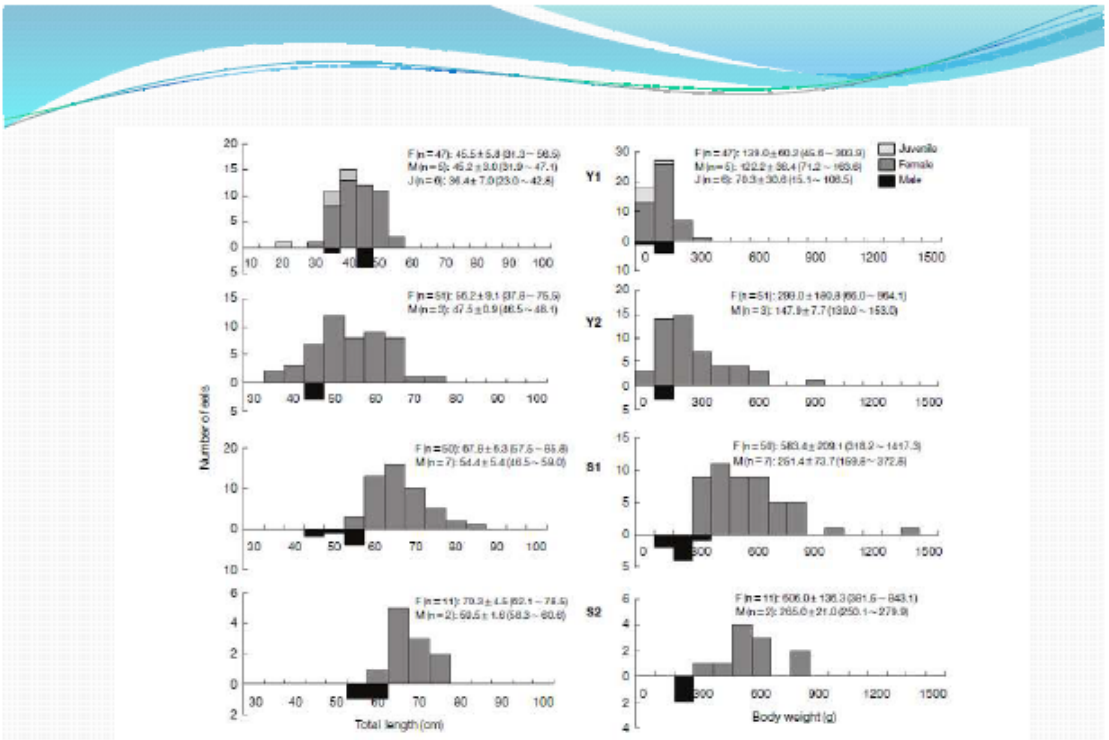


Fig. 3. Frequency distributions of total length and body weight in the four stages of the *Anguilla japonica* collected in Korea. F: female, M: male, J: juvenile.

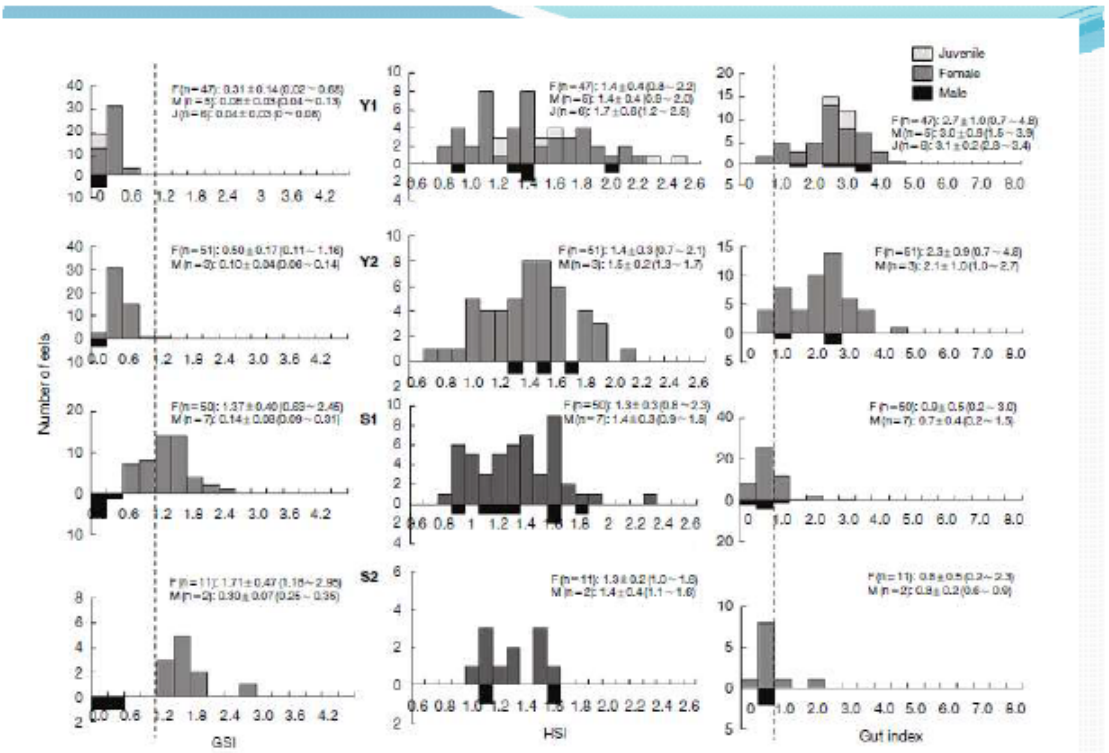


Fig. 4. Frequency distributions of gonado-somatic index (GSI), hepato-somatic index (HSI) and gut index (GI) in the four stages of the *Anguilla japonica* collected in Korea. F: female, M: male, J: juvenile.

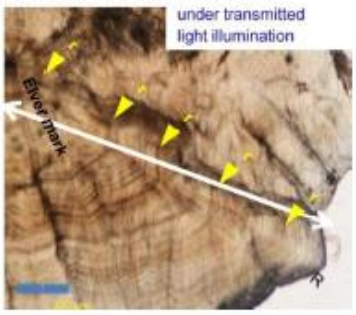
Ⅱ

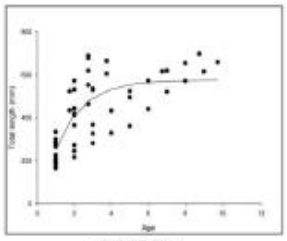
Ecological Study

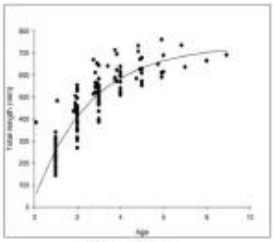
Ecological study for *Anguilla japonica*

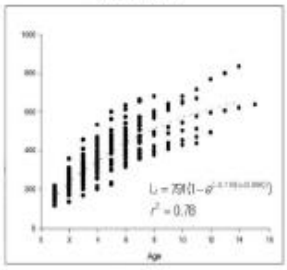
- **Age and growth(precautionary result)**

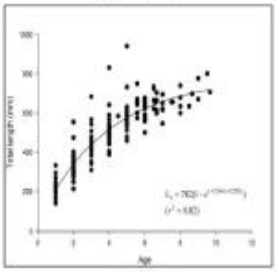
In Geum River Estuary on Sept. 25 2014
♀, 670 mmTL , R: total radius, r_6: elver mark,




(금강하구:담수)

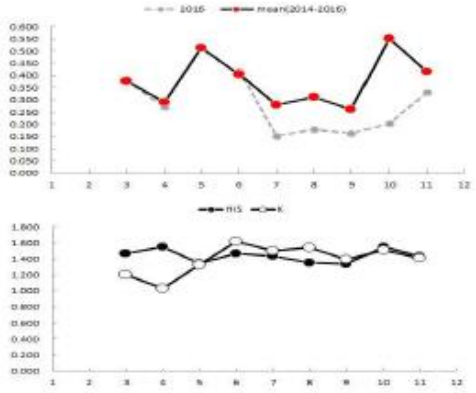

(금강하구:기수)

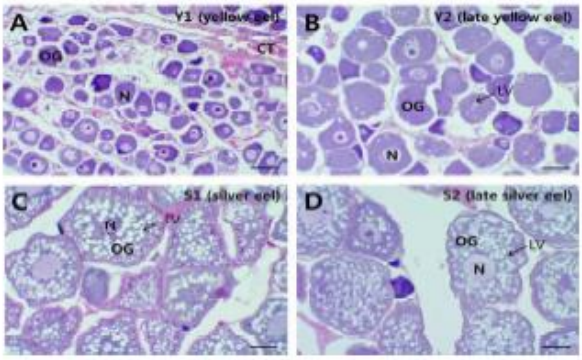

(소양호)


(한강하구)

Ecological study for *Anguilla japonica*

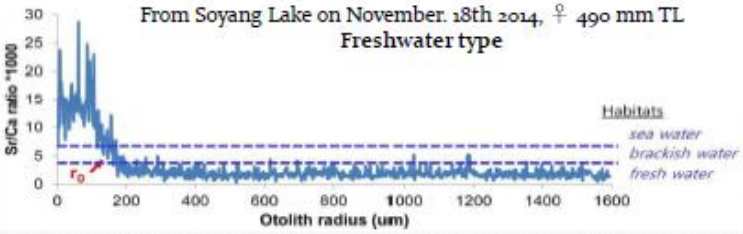
- **Maturity (precautionary result)**



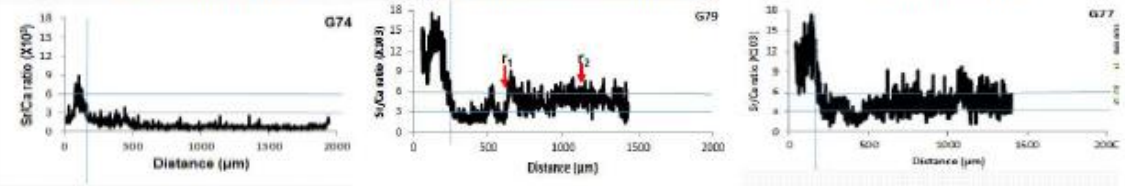


A comparative study on habitat movement through elemental analysis of eel otolith

Laser scan line on sagittal plane of otolith after LAICPMS analysis



Freshwater type | Freshwater-estuarine type | Estuaries type



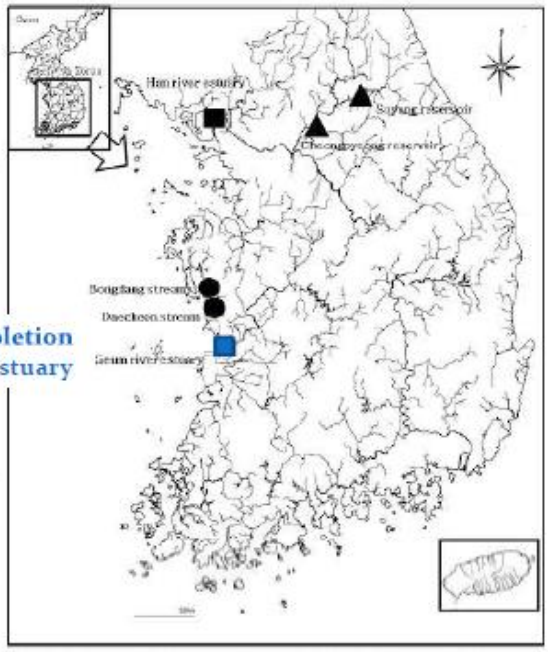
Sr/Ca ratio (x 10^{-3}) from the core to the margin in otoliths of eels collected from the Geum River estuary.
Horizontal lines indicate the Sr/Ca ratios of 3 x 10^{-3} and 6 x 10^{-3}. Vertical dotted line indicates the elver mark (r=~160 μm).

Ⅲ

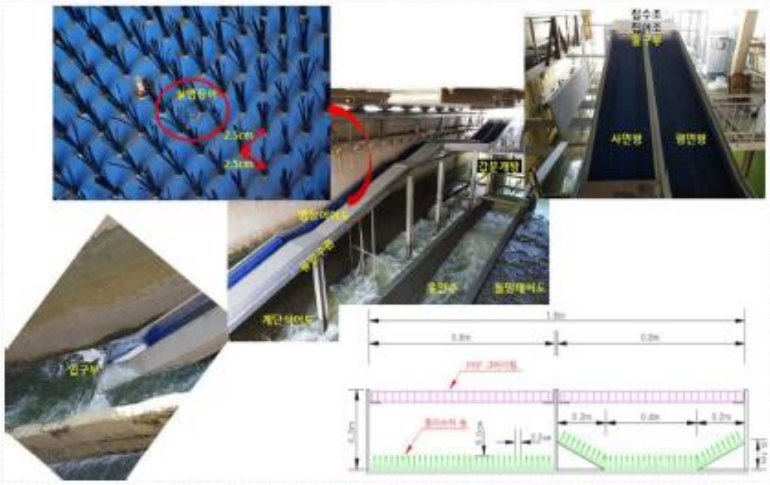
Eel fishway development and monitoring

1st Eel fishway and monitoring

'18.6.15. completion
Geum river estuary



1st Eel fishway and monitoring

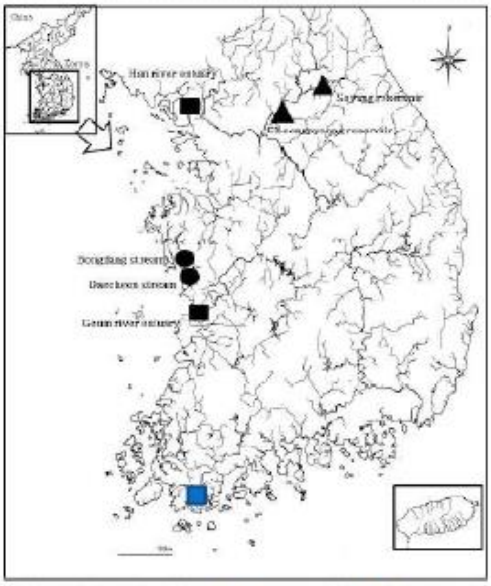


2018. 6. 15. eel fishway completion in Geum River estuary

Upstream migration eels (No. of individuals), '19. 6. 5. – '19. 8. 20.

Total	glass eel	elver	TL (cm)	BW (g)
63	56	7	5.0~10.4	0.08~1.15

2nd Eel fishway in Korea



2019. 12. 23. eel fishway completion in Yeongam breakwater

2nd Eel fishway in Korea




2019. 12. 23. eel fishway completion in Yeongam breakwater

Management for Anguilla japonica

- **Prohibit periods & Length**

Regulations prohibiting capture and collection of inland fishery resources

해양수산부

Enforcement Decree of inland fisheries Act 17('17.7.1)

1 Species	Prohibit length	Prohibit periods	area
eel	15-45cm	April 1 ~ September 30	

Thank you for your attention!

Ministry of Oceans and Fisheries
National Institute of Fisheries Science

附件 16 Freshwater ecology and conservation the importance of local river habitats and its restoration (Speaker: Kazuki Matsushige)

Contents

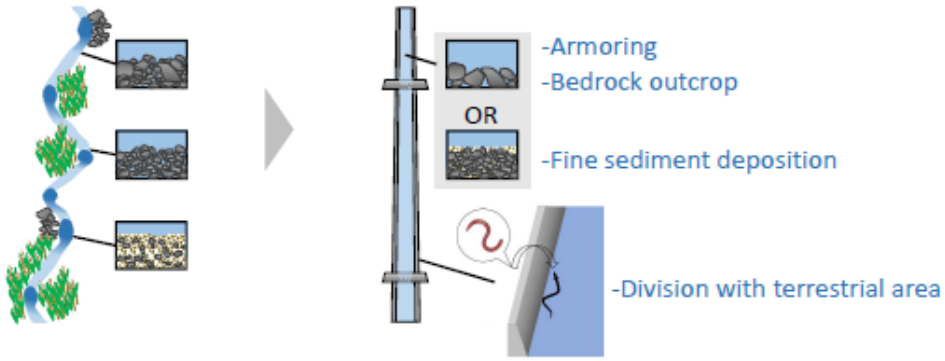
Freshwater Ecology and Conservation
The importance of local river habitats and its restoration

1. Current conditions of riverine habitats (Background)
2. Research on habitat use in rivers
3. Habitat restoration methods
   - #1: Ishikura-net
   - #2: riverbed cultivation
4. Conclusions

1. Background

River habitats have been degraded

- **Substrates have become monotonous** due to modifications in flow and sediment supply
- **Shorelines have been covered by concrete revetments**, leading to decreased food availability, eel abundance, and condition factor †



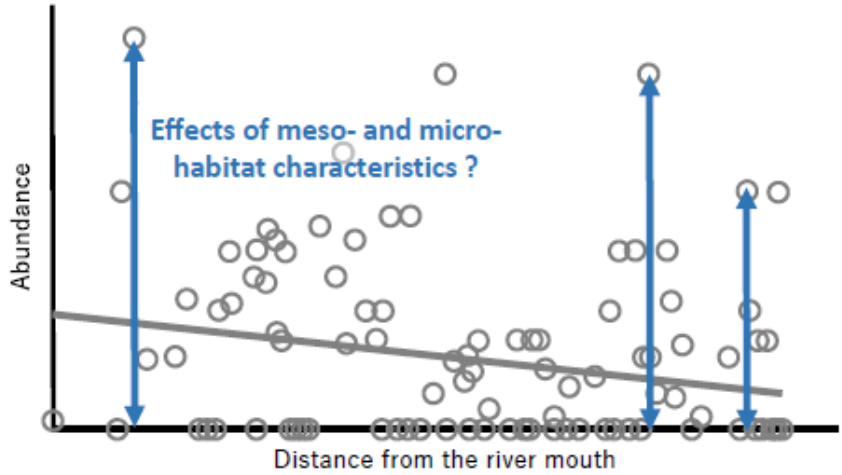
A better understanding of eel ecology is needed to consider impacts and habitat restoration measures

† Itakura et al. 2015 *Environ. Biol. Fish.*

2. Habitat use

What is preferred habitat of Japanese eels?

- Eel abundance slightly decreases with distance from river mouth
- It is also affected by other **meso- and micro-habitat characteristics**
- Examining habitat use at fine spatial scales would reveal preferred habitat characteristics



Yokouchi et al. 2008 *Ecol. Freshw. Fish*

2. Habitat use

Yellow eels: Substrate is one of the key factors

- Wading and electrofishing were conducted in small rivers
- Factors associated with yellow eel habitat use were determined
- **Substrate at the channel-unit scale** was found as a key factor for any reaches and body size

Environmental factors associated with the distribution of yellow eels

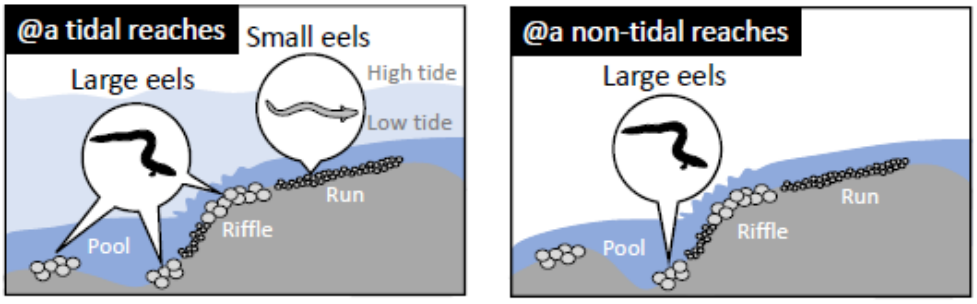
Spatial scale	Tidal reaches		Non-tidal reaches
	Small eels (Less than 255 mm)	Large eels (Over 255mm)	Large eels (Over 255 mm)
Reach	Riverbed gradient	Shoreline revetment	Riverbed gradient
Channel-unit	**Substrate** Water depth Current velocity	**Substrate**	**Substrate** Water depth

Matsushige et al. 2020 *Ichthyol. Res.*

2. Habitat use

Yellow eels: Substrate is one of the key factors

- Small & Large eels preferred gravel & rock substrates, respectively
- Such substrates may be a suitable refuge for eels
- It suggests **the importance of preserving/creating preferable substrate environments**



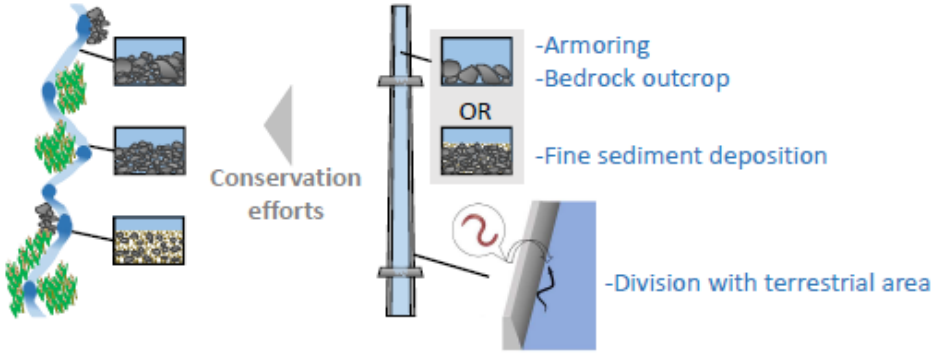
Matsushige et al. 2020 *Ichthyol. Res.*

3. Habitat restoration methods

Two approaches to habitat conservation

- Preserving/creating substrate environments can be ultimately achieved through **riparian works (1st approach)**
- However, riparian works require much time and costs
- **Emergency measures by fishers (2nd approach)** are required

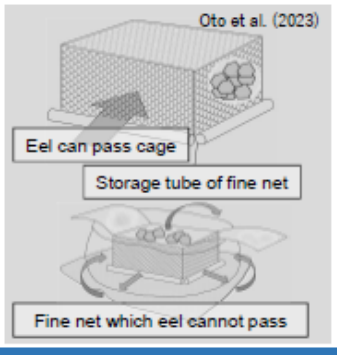
  #1: Ishikura-net #2: Riverbed cultivation



3. Habitat restoration methods

#1: Ishikura-net

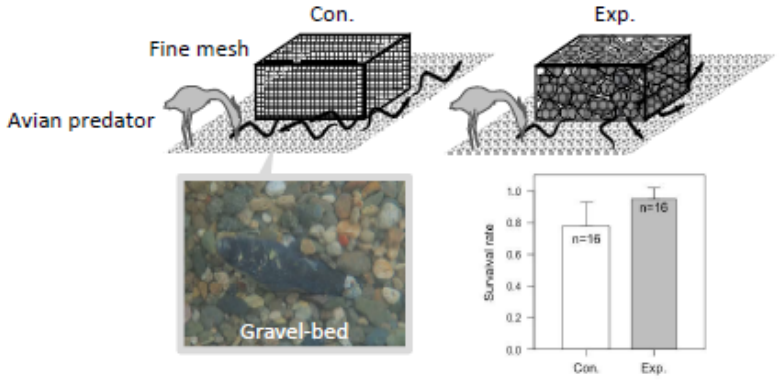
- Ishikura-net is a cage (1 × 1 × 0.5 m) wherein dozens to hundreds of stones, which **can provide refuges for eels**
- It can also be a monitoring tool for eels and prey animals in stone pile
- We have examined **the effects of Ishikura-net installation on eels** by monitoring and experiments



3. Habitat restoration methods

Shelter effect of Ishikura-net

- Eels were released in outdoor experimental ponds where avian predators fly
- Con. ponds: eels could burrow and hide in gravel-bed
- Exp. ponds: eels could also hide in Ishikura-net
- The survival rate after 7 days was **significantly higher in Exp. ponds**



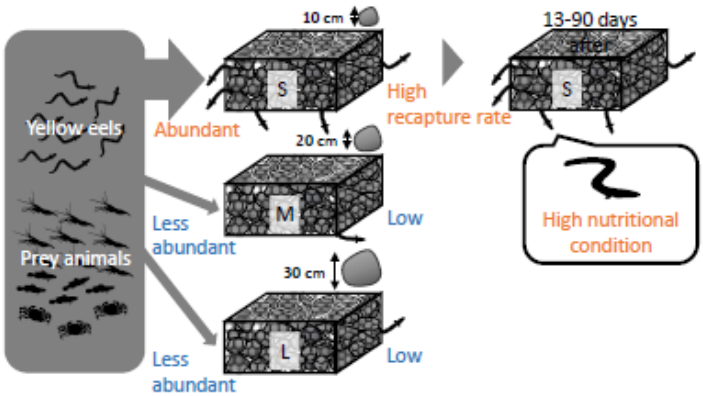
Sakanoue et al. 2021 *Nippon Suisan Gakkaishi*

3. Habitat restoration methods

Improvement of nutritional condition

- Monitoring was conducted every 2 weeks at an urban river estuary
- **More eels and potential prey animals hide** in Ishikura-net filled with small-grain stones than medium/large stones
- In small-stone Ishikura-net, **more eels settled and improved their nutritional status** through their settlements in Ishikura-net

Study site at low tide

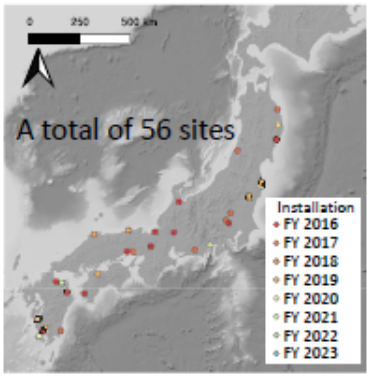


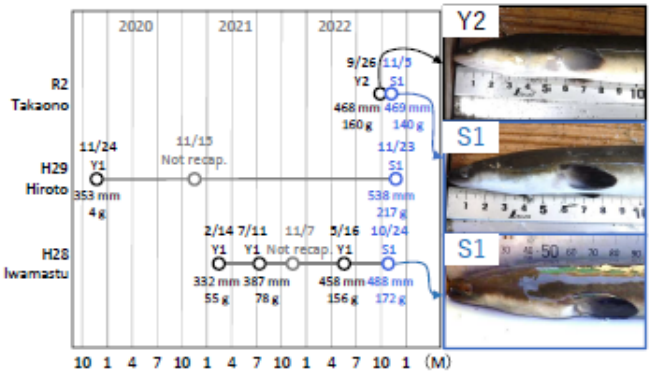
Oto et al. 2022 *Nippon Suisan Gakkaishi*, 2023 *Estual. Coast.*

3. Habitat restoration methods

Ishikura-net monitoring in Japan

- Ishikura-nets have been installed in rivers & lakes from 2016 as a conservation efforts
- Monitoring has been conducted by local fishers from 2016 to 2023
- Yellow eels settled within Ishikura-nets **until they metamorphose into silver eels** in some rivers

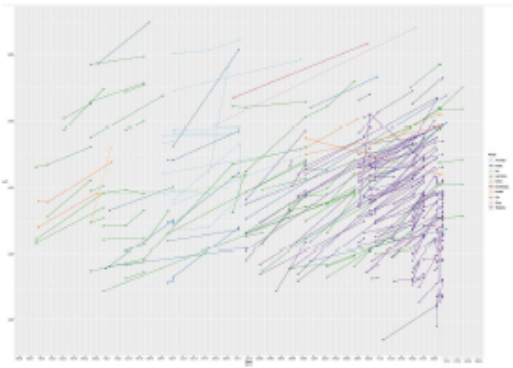




3. Habitat restoration methods

Other role of Ishikura-net monitoring

- In addition to habitat restoration, Ishikura-net monitoring has an important role to **accumulate fishery-independent ecological data**
- **Abundance, TL, BW, Girth length, and developmental stage** have been recorded by mark-recapture survey
- (Unfortunately, the monitoring project by the Fisheries Agency of Japan ended in March 2023)

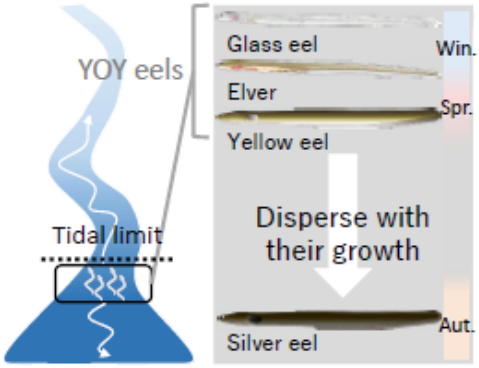


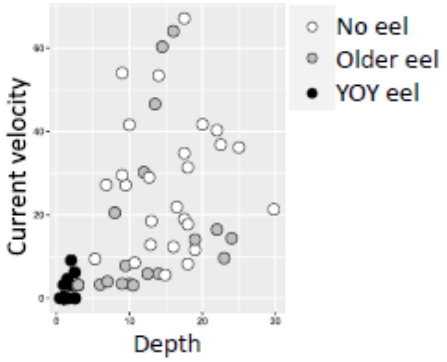
← TL-Date relationship of recaptured individuals

3. Habitat restoration methods

#2: Riverbed cultivation

- Conservation target is **YOY eels at upper tidal reaches**
- They are **source of the young eels** recruiting to the coastal and inland growth habitats†
- Ishikura-net does not appear to create preferrable habitat for YOY eels, so another method, **riverbed cultivation**, is required‡



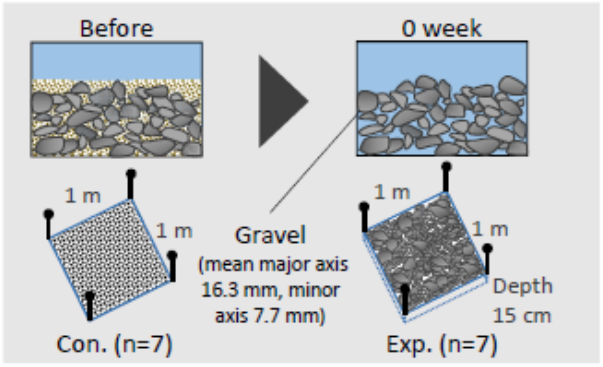


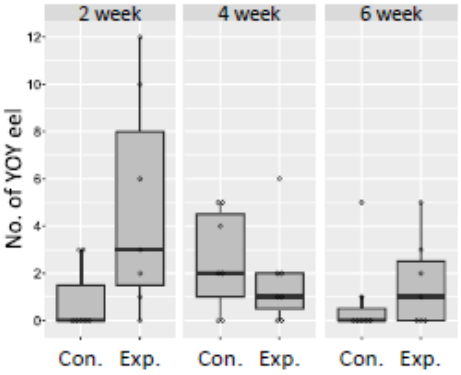
†Kaifu et al. 2010 *Environ. Biol. Fish.*; Wakiya et al. 2020 *J. Fish Biol.* ‡Matsushige et al. in press

3. Habitat restoration methods

Effect of riverbed cultivation

- Riverbed cultivation and monitoring were conducted at an upper tidal reach
- **High abundance was maintained at least 2 weeks** after cultivation
- Appropriate season and area should be examined by future studies





Matsushige & Mochioka unpubl data

4. Conclusion

Freshwater Ecology and Conservation

The importance of local river habitats and its restoration

1. River habitats have been degraded by anthropogenic activities
2. Substrate is one of the key factors for habitat restoration
3. Habitat restoration methods

   #1: Ishikura-net

   (Shelter effect, Improvement of nutritional condition,

   fishery-independent ecological data)

   #2: riverbed cultivation

   (Improvement of YOY eel habitat?)

附件 17 Spawning adult survey and otolith analysis of Japanese eels (Speaker: Nobuto Fukuda)

2024.6.3–4
3rd Scientific meeting on
Japanese eels and relevant eels

SM03 Doc.19

Spawning adult survey and otolith analysis of Japanese eels

Nobuto Fukuda, Kazuki Yokouchi, Hiroaki Kurogi, Toshihiro Yamamoto, Makoto Okazaki, Seinen Chow, Noritaka Mochioka

History of surveys of Japanese eel spawning area

1967 First capture of eel larvae in eastern Taiwan
Matsui et al. (1968)

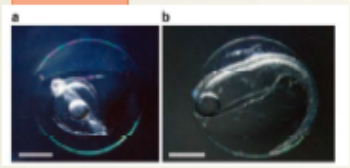
1991 Identification of approximate location of Spawning area (West Mariana Sea area) Tsukamoto (1992)

2005 First catch of hatched preleptocephali
Tsukamoto (2006)

2008 Discovery of spawning Japanese eels
Chow et al. (2009), Kurogi et al. (2011)

2009 First catch of eel eggs
Tsukamoto et al. (2011)

Eel egg

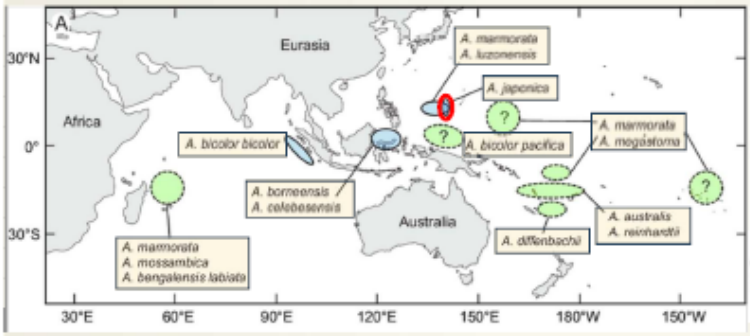


Tsukamoto et al. (2011) Nat Comm 2:179

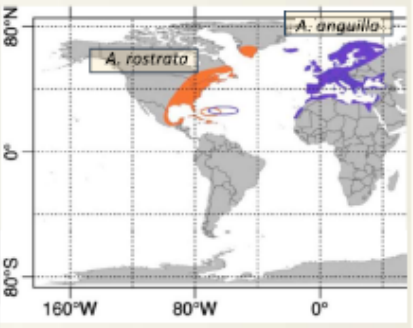
Spawning adult eels

Chow et al. (2009) Fish Sci 75:257–259
Kurogi et al. (2011) Fish Sci 77:199–205

Anguillid eel spawning area



Modified from Miller and Tsukamoto. 2016

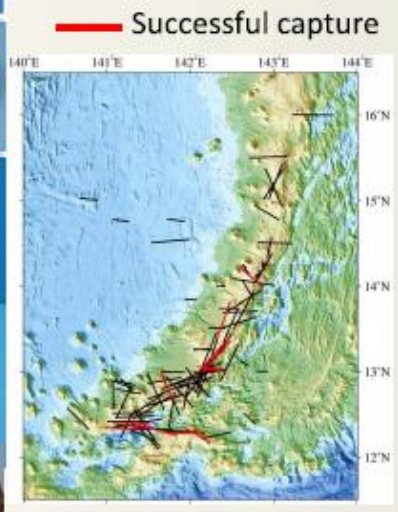


Modified from Drouineau et al. 2017

In the world, **only** the waters west of the Western Mariana Ridge have been **directly identified as an eel spawning site** (Japanese eels and giant mottled eels).

A total of 18 mature Japanese eels collected in the past cruises

Year	N	Photo
2008	2 males 2 females	
2009	4 males 4 females	
2010	1 male	
2013	1 male 4 females	



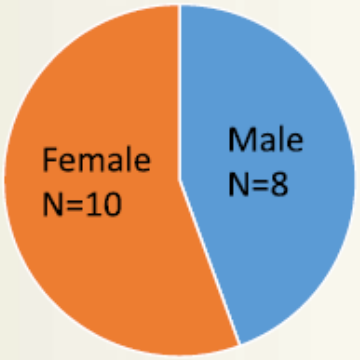
What can we know from collections of mature eels?

Eel populations spread over a wide area,
then congregate to spawn in one place
→ From samples of mature adults, the growth history of the reproducing population of eels can be determined.

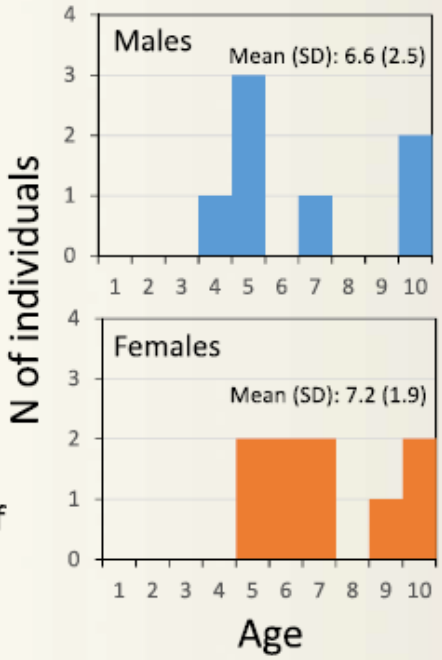
- Age
- Sex ratio
- Relative importance of growth habitats (area, salinity)
- Contribution of restocking individuals

→Useful to understand the biology of reproductive eels

Sex ratio and age of repruductive eels



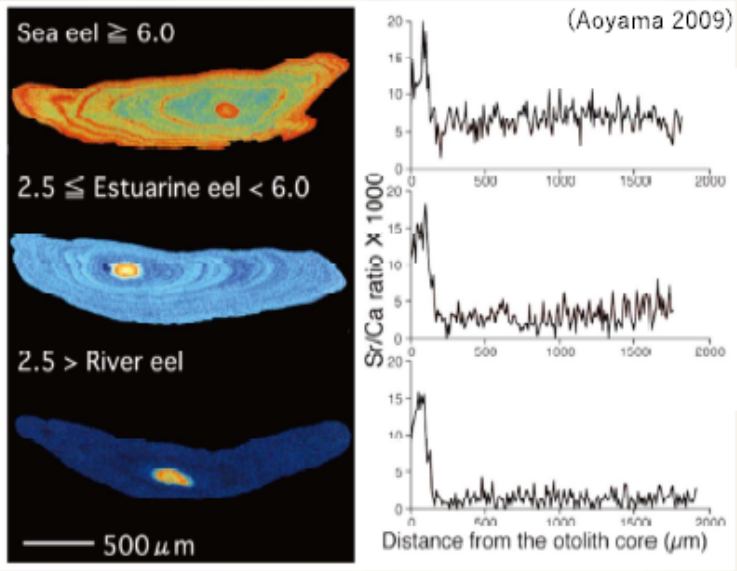
Sex ratio

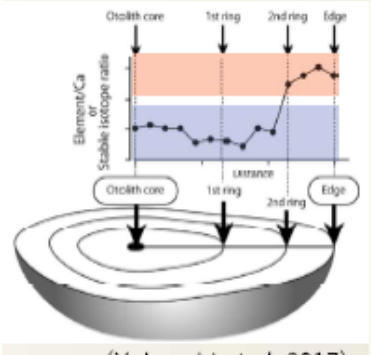


Information on the sex ratio and age of reproductive populations has gradually become available.

Reconstruction of salinity environment experienced by eels

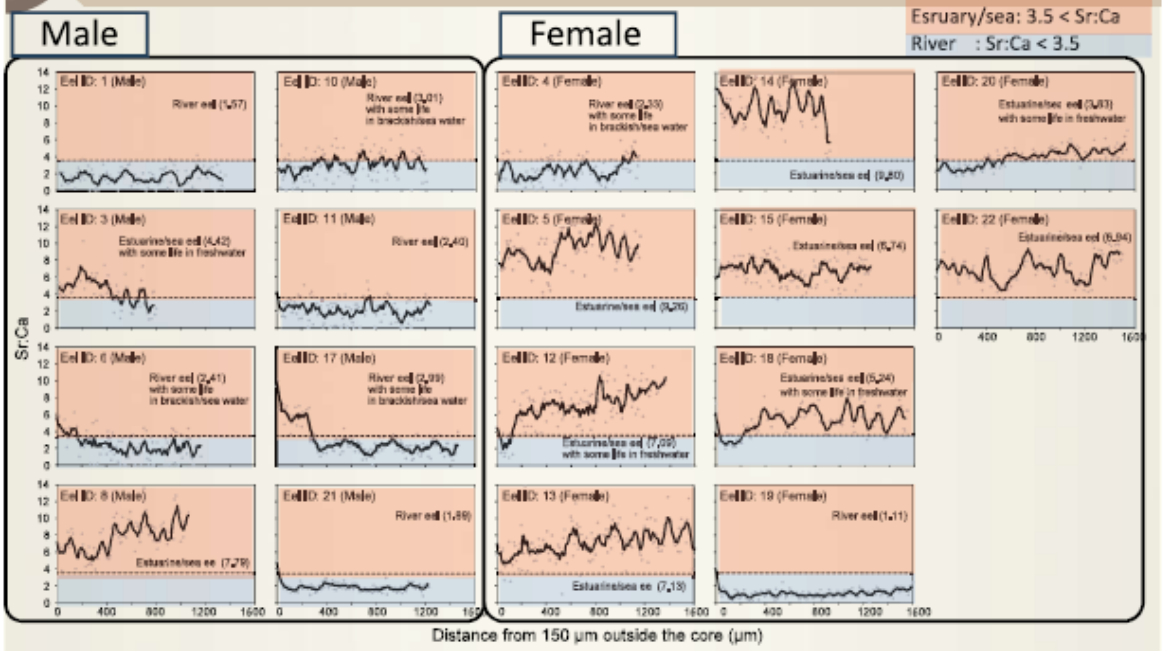
Otolith Sr/Ca used to reconstruct salinity environment





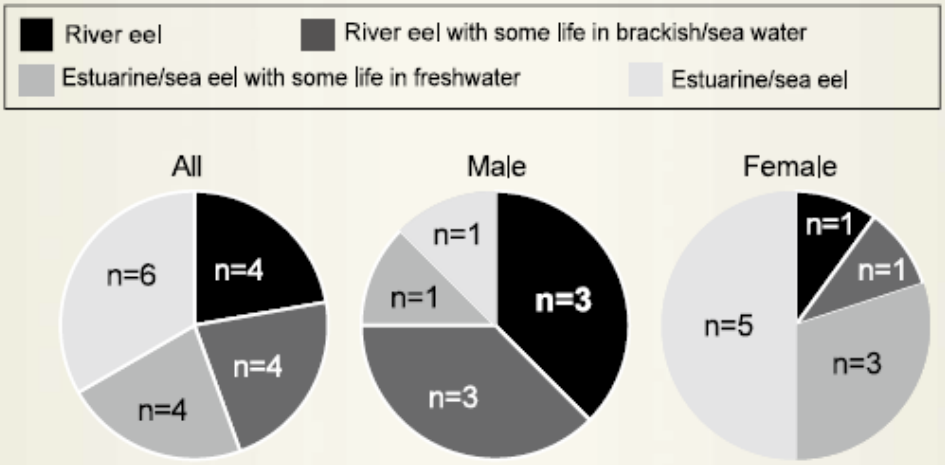
(Yokouchi et al. 2017)

Diverse salinity environment experienced by reproductive eels



Habitat use largely varied among individuals.

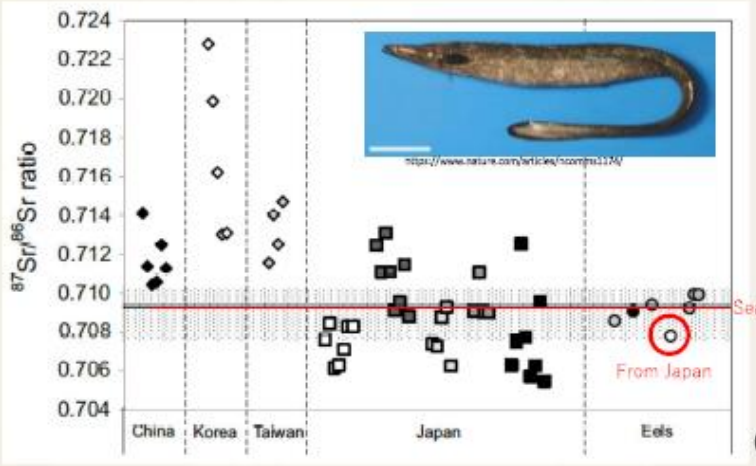
Salinity experience of males and females during growth



Males : favoring rivers during growth
Females : favoring estuarine and marine habitats

Possible identification of growth areas

Analysis of Sr isotope ratios in otoliths of mature Japanese eels showed that one individual was originated from Japan.



(Otake et al. 2019)

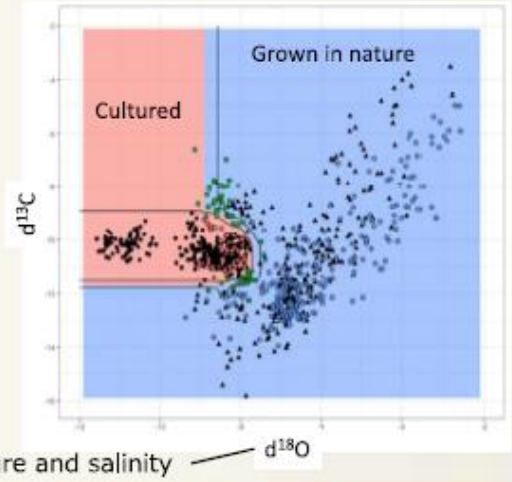
Further progress in origin identification technology
→ Understanding of the origin of spawning eels

Possible application of determining restocked eel

Discrimination of restocked eels by stable isotope ratios of carbon and oxygen in otoliths.

Otolith

Reflects food and habitat waters



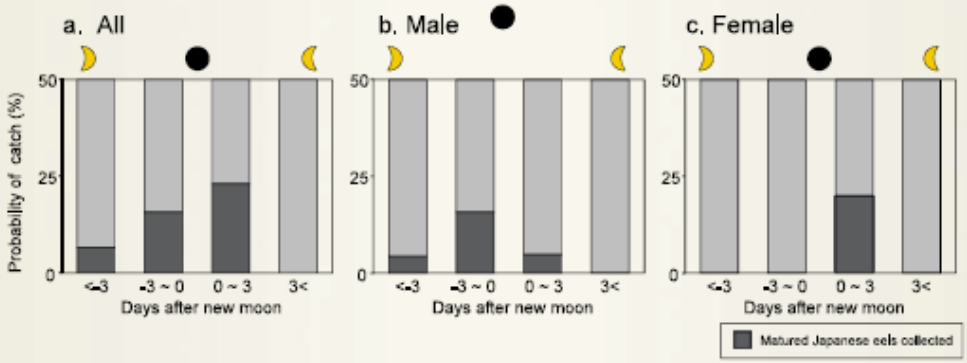
Reflects temperature and salinity

This discrimination technology is currently underway to be applied to repruductive adult eels

Other information also can be obtained from surveys in spawning area

Behaviors of reproductive eels in the spawning area

Instance ① Capture timing differs between sexes



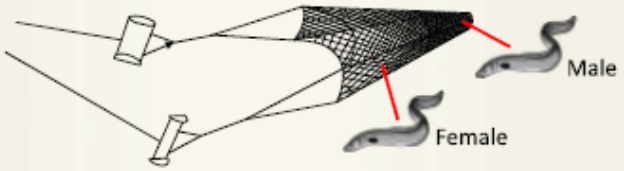
Males : captured before the new moon
Females : captured after the new moon

Possible sexual differences in reproductive ecology

Instance ② Capture situation differs between sexes

- Many females were caught in coarse-meshed side nets, while males were captured at the cod-end

-> implying sexually different behavour



- Multiple (2–3) females were caught in a single tow on three occasions, but males were always caught alone.

-> implying females congregating in high density.

Problems to be solved in mature eel capture surveys

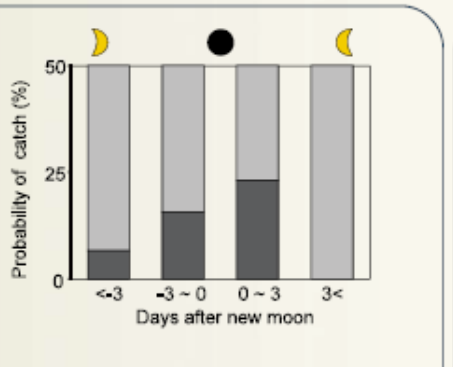
Important data can be obtained from mature eel surveys, but no data since 2013

（Not collected when cruising in 2018 and 2021）

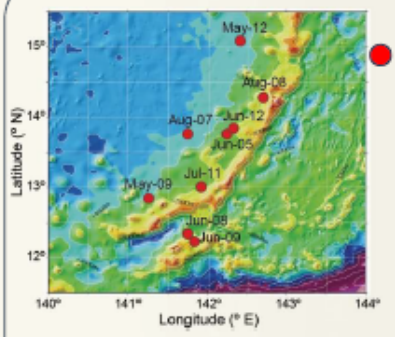
The problem is the low capture efficiency

To establish monitoring of reproductive eels, catch efficiency must be improved.

To improve capture efficiency



Capture probability around the new moon is clearly higher



Collection point of egg or prelarva

(Tsukamoto 2006, Tsukamoto et al. 2011, Aoyama et al. 2015, Unpubl.data)

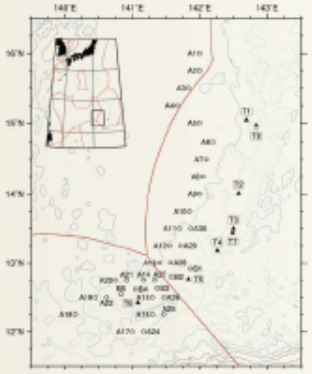
However, difficulty in concentrating new moon collection efforts on spawning sites. Because aggregation site moves with each spawning event.

Precise estimation of the spawning site before the new moon will be effective in increasing capture efficiency.

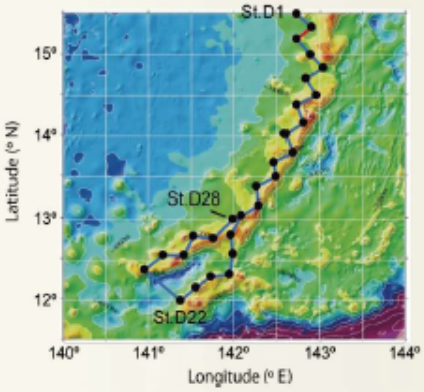
Potential use of environmental DNA: pre-spawning identification of aggregation

Eel environmental DNA of Japanese eels has been reported.
(Takeuchi et al. 2019)

Kaiyo-Maru cruise in June 2018
(No positives)



Kaiyo-Maru cruise in July 2021
(One positive was detected)



We are carrying out the eDNA surveys and developing more efficient ways to detect spawning sites before new moon .

Summary

- The spawning adult survey in the west Mariana ridge (mainly Japanese eel) is only successful among anguillid eels in the world
- Spawning adult collections can provide very important information for Japanese eel reproductive populations
  (such as age, sex ratio, growth habitat, restocked or not)
- Spawning ground surveys also provide their mysterious reproductive ecology
- To establish monitoring spawning eels, more efficient ways to collect them should be developed

附件 18 第 3 次科學家會議總結報告

IC17 Doc.10

Summary Report of the 3rd Scientific Meeting on Japanese Eel and Other Relevant Eels

Date: June 3 and 4, 2024

Venue: Tokyo, Japan

Item 1: Opening of the meeting

1. The Chair of the meeting, Prof. Nobuyuki Yagi (Graduate School of Agricultural and Life Sciences, University of Tokyo) welcomed participants and declared the opening of the meeting.

2. Prof. Hiroshi Hakoyama (University of Nagano) delivered an opening address as the host Member of the meeting).

3. The Secretariat introduced participants from China, Japan, Korea, and Chinese Taipei (hereafter, Members) (SM03 Doc.04).

Item 2: Meeting arrangement

4. The interim Secretariat, the Fisheries Agency of Japan and the Global Guardian Trust, explained the meeting arrangements (SM03 Doc.01 and 05).

Item 3: Adoption of Agenda

5. The provisional agenda was adopted without any modification (SM03 Doc.02 and 03).

Item 4: Overview of Japanese eel catch and scientific activities

6. Scientists from each Member reported the overview of Japanese eel catch and scientific activities.

[China]

7. Prof. Jianyi Liu (China) made a presentation regarding the industry and scientific research on Japanese eels (SM03 Doc.07).

8. A participant from Japan asked whether they had identified species of eggs collected from the ocean in the survey conducted in 1994 as there might be a possibility of similar eel species. Prof. Liu answered that they had not identified species due to an immature level of the molecular biological techniques at the time of the survey, and that there might have been such a possibility.

9. Prof. Hakoyama made a comment that each Member's resources are devoted to the aquaculture and thus, it may be valuable to establish another forum for the aquaculture. The Chair replied that it could be discussed in the Information Consultation.

10. A participant from Japan made two questions: (1) whether China has information relevant to eDNA and (2) whether China has updated information on cultivation and breeding since 2009. Prof. Liu responded to the first question that due to a low concentration of Japanese eels in the Yangtze River, it is difficult to apply eDNA techniques (not applied yet). He responded to the second question that they are now developing a smarter monitoring system (which does not disturb eel populations) to monitor breeding behaviour of Japanese eels.

11. The Chair inquired whether the area of the fishing ban in the Yangtze River includes Jiangsu province. Prof. Liu answered that it is covered in the inland and estuary areas, and that migratory path is under a stricter law.

[Japan]

12. Prof. Hakoyama (Japan) delivered a presentation regarding the overview of Japanese eel catch and scientific activities in Japan (SM03 Doc.08).

13. The Chair asked why Wakayama Prefecture had larger catch than other prefectures in 2020 and whether it was because of the Kuroshio Current. Prof. Hakoyama replied that a difference in catch among prefectures might be due to environmental factors including the Kuroshio Current, and that catch and CPUE data were showing similar trends.

14. A participant from China inquired whether Prof. Hakoyama compared data from two sources (fisheries and non-fisheries data), and whether he thinks that data from fisheries can reflect real trends of eel resources. Prof. Hakoyama responded that fisheries and non-fisheries data were not necessarily consistent, and that they showed several different points. He then continued that non-fisheries data are complementary (as a sample size was not large enough, and data showed large fluctuations and errors) and thus, main data are fisheries data while acknowledging that fisheries data are not perfect.

[Korea]

15. Dr. Shin-Kwon Kim (Korea) gave a presentation regarding the overview of Japanese eel catch and scientific activities in Korea (SM03 Doc.09).

16. A participant from Chinese Taipei asked whether the fishing ban between April 1 and September 30 is for eels at all life stages. Dr. Kim answered that this measure is for all life stages of eels.

17. Dr. Leanne Faulks, inquired whether returning eels migrating downstream had been observed. Dr. Kim replied that in rivers with dams, returning eels had been observed with other fish species when dams had opened.

[Chinese Taipei]

18. Dr. Yu-San Han and Dr. Ching-Hsien Ho (Chinese Taipei) (presenter in the Scientific Meeting: Dr. Han) made a presentation regarding the overview of Japanese eel catch and scientific activities in Chinese Taipei (SM03 Doc.10).

19. Dr. Faulks asked whether there is an area-based protection measure for glass eels. Dr. Han responded that it has upper limits of catch for glass eels, but it does do not have such spatial plan.

20. A participant from Japan inquired whether data of the eel size had been collected as such data are important for determining the survival rate of eels. Dr. Han answered that both glass and silver eels had been released to rivers, and that some silver eels had moved downstream successfully although their survival rate had not been revealed yet.

21. A participant from China asked how the size of eels for the fishing ban (larger than eight centimetres) had been determined and whether the survival rate of glass eels had been studied. Dr. Han replied that glass eels caught in estuaries are usually less than seven centimeters, and that once glass eels enter rivers, they grow to 8 cm; that is how the size had been determined. Regarding the second part of the question, he replied that while there is not mortality information available, he is pretty certain that the mortality rate would be higher than 90%.

22. A participant from Japan inquired whether probiotics are used for the eel aquaculture. Dr. Han responded that eel aquaculture farmers use probiotics. The type of probiotics may vary from farmer to farmer. He also stated that he and his colleagues are attempting to conduct research to reveal which one is good and which one is not.

23. Prof. Hakoyama posed a question regarding the eel management plan proposed by Dr. Han's presentation how the recruitment rate of 30% can be estimated. Dr. Han answered that although he does not have scientific data to estimate the recruitment rate, he needs to test the carrying capacity of the river in the case of releasing glass eels, and then estimate the number of glass eels

to release. He then continued that when releasing silver eels, the carrying capacity of the river is not necessary to be considered as they migrate to the ocean.

Item 5: Report of the intersessional activities

(1) Task Team 1

24. The Task Team 1 leader, Dr. Faulks, reported its intersessional activities between the second and third Scientific Meetings (SM03 Doc.11).

(2) Task Team 2

25. The Task Term 2 leader, Prof. Hakoyama, also reported its intersessional activities between the second and third Scientific Meetings (SM03 Doc.11).

26. There was no question raised to the task team leaders during the Scientific Meeting.

Item 6: Emerging Science and practical solutions in the management of Japanese eel resource in the Northeast Asian region

27. Prof. Hakoyama (Japan) delivered a presentation regarding the resource assessment and management of Japanese eels (SM03 Doc.12).

28. The Chair asked whether the extinction risk assessment had been published. Prof. Hakoyama answered that this study is under preparation.

29. Dr. Faulks inquired whether Prof. Hakoyama had included a column for the population size for the extinction risk assessment and whether he had confirmed the detection level used (whether it is possible to assess the assessment method and how the initial input population size needs to be classified as endangered). Prof. Hakoyama replied to the first part of question that he had used data of the local population size, not the entire population (which is usually larger) and thus, results and conclusions (Japanese eels not classified as critically endangered or endangered) from such data should be conservative. He then furthered that his conservative results should represent results of the entire population. Regarding the second part of question, Dr. Faulks suggested continuing discussion later.

30. A participant from China offered cooperation to further reveal the extinction risk of eels and suggested sharing their data and cooperatively utilize models with Prof. Hakoyama. Prof. Hakoyama appreciated the offer.

31. Dr. Faulks and Dr. Masashi Sekino (Japan) (presenter in the Scientific Meeting: Dr. Faulks) gave a presentation regarding the effective population size (*Ne*), and recent trends of *Ne* of Japanese eels based on models (SM03 Doc.13).

32. A participant from Japan questioned the availability of information on *Ne* size of eel species other than Japanese eels. Dr. Faulks responded that she was uncertain of the availability of such data.

33. A participant from Chinese Taipei asked why two species (Japanese eels and *Anguilla marmorata*) showed similar patterns although the former is a temperate species whereas the latter is tropical. Dr. Faulks answered that something related to the Kuroshio Current might have affected patterns of the two species, but reasons for similar patterns had not been identified yet.

34. Dr. Kristen Anstead (ICES) made a presentation regarding American eels (*Anguilla rostrata*), the management of this species, and several modeling approaches to estimate the eel abundance and challenges in each approach (SM03 Doc.14).

35. The following six questions were raised to Dr. Anstead, and participants saw the answers as recorded:

- Question 1 I would like to know the definitions for "YOY" and "elvers" shown in the slide for the fishery-independent indices and what is the purpose of using these stages differently;
- Question 2 How was the "elver" index, that is not shown in the slide;
- Question 3 What factors have caused the decline of American eel resources over the last decade?;
- Question 4 Has the regime shift been observed in other eel species? What factor could cause the regime shift on eel species?;
- Question 5 We would also like to ask what kind of future work is planned for the age-structured model for the American eel.
- Question 6: Has there been any discussion of the use of genetic techniques for ageing American eel? Also are there any plans to start incorporating eDNA surveys and their results into the stock assessment?

36. Dr. Sikai Wang (China) delivered a presentation regarding results of the survey in the Yangtze River and the fisheries management strategy for Japanese eels (SM03 Doc.15).

37. Dr. Faulks inquired whether there is monitoring on glass eels in the Yangtze River since the fishing ban, whether there is a study to reveal trends of recovery, and how long it might take for recovery to be evident. Dr. Wang replied that he and his colleagues had continued monitoring, and after continuing monitoring, there had been a clear sign of recovery for other species, but

recovery is not yet known for eel species. He then continued that data collected this year had shown poor production of glass eels and thus, the effectiveness of the fishing ban is still uncertain.

38. Dr. Han (Chinese Taipei) gave a presentation regarding tracking Japanese eels and revealing their distribution in Taiwanese rivers by environmental DNA Analysis (SM03 Doc.16).

39. Dr. Faulks asked whether there were any specific pollutants assessed or whether only general pollution was surveyed. Dr. Han answered that only general pollution (nitrogen and SSD) was investigated.

40. A participant from Japan inquired what had caused the abundance of *Anguilla marmorata* to surpass that of Japanese eels over the past 30 years. Dr. Han replied that 30 years ago, the ratio of Japanese eels to *Anguilla marmorata* was 10 to 1. He then pointed out that a significant decline in Japanese eels.

41. Dr. Kim (Korea) made a presentation regarding the monitoring program on eels, ecological study of eels, and development of eel fishways (SM03 Doc.17).

42. A participant from Japan asked whether there had been more ladders developed since 2019. Dr. Kim responded that there are plans for constructing new ladders, but they are not complete yet.

43. The Chair inquired why other rivers far from Seoul had not been investigated. Dr. Kim answered that they had not been surveyed due to a limited human resources and budget and that he was wishing future research for other rivers as glass eels also inhabit there.

44. Dr. Kazuki Matsushige delivered a presentation regarding current conditions of eel habitats, research on habitat use by eels, and habitat restoration methods (SM03 Doc.18).

45. Dr. Faulks made a comment, saying that riverbed cultivation seems to require more maintenance. Dr. Matsushige replied that if riverbed cultivation is done for large areas, it is beneficial in that pebbles of the Ishikura net are less likely to be buried quickly, and it is the same for non-rainy seasons.

46. A participant from Japan asked participants whether similar efforts, such as the Ishikura net or riverbed cultivation are implemented in members outside Japan, and the Chair asked them to give examples if there are any and any additional information was not provided.

47. Prof. Hakoyama inquired whether the Ishikura net is effective for other species. Dr. Matsushige responded that he and his colleagues had monitored eels and other species, but the effectiveness for other species had not been examined.

48. Dr. Nobuto Fukuda gave a presentation regarding the survey on spawning adult eels and the analysis of Japanese eels' otoliths. He explained that the Western Mariana Ridge is the only site identified as a spawning site of eel species through direct samples. He then highlighted the importance of collecting spawning adults to reveal reproductive populations of Japanese eels and their reproductive ecology while noting a need to improve sampling methods in their efficiency (SM03 Doc.19).

49. A participant from Chinese Taipei proposed sampling in new moon days in June or July to improve catch efficiency of spawning eels. Dr. Fukuda answered that he agrees with his opinion.

50. Dr. Faulks asked whether Dr. Fukuda had considered releasing tagged silver eels to spawning grounds so that they lead researchers to have a specific aggregation area. Dr. Fukuda replied that spawning eels indeed do not aggregate into one place.

51. A participant from Chinese Taipei inquired about the speed at which nets were towed to sample eels. Dr. Fukuda responded that the speed is about three to four knots.

52. Prof. Hakoyama cautioned that there needs to be a careful discussion in estimating the sex differences in habitat use due to small sample sizes. Dr. Fukuda agreed with his comment and responded that more samples need to be accumulated.

53. A participant from China asked whether June or July is the best spawning season, or the water quality affects the spawning season. Dr. Fukuda answered that it is still unclear that why new moon days in June and July are the peak spawning season, but he stated that the water quality does not anything to do with the spawning season supposedly. Additionally, Dr. Kazuki Yokouchi explained that the seasonality is also another factor that may determine the spawning season.

54. The Chair asked from which ocean areas spawning eels originated. Dr. Fukuda replied that as for female eels, they inhabit areas near coastal areas and thus, samples are originated from areas not far from the coast.

55. Prof. Jun Aoyama stressed the importance of Dr. Fukuda's and his colleagues' research in that the spawning ecology of eels is still a "black box" despite the necessity of studying both glass eels for recruitment and siler eels for spawning.

Item 7: Discussion on the Japanese eel and other relevant eels at the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

56. The Fisheries Agency of Japan explained the basic information of CITES, results of the discussion on the thirty-second meeting of the Animal Committees and seventy-seventh meeting of the Standing Committee, the status of deliberations on eel species, and schedules of eel-relevant meetings (SM03 Doc.20).

57. The Chair clarified the meaning of terms "genus level resolution" shown in slides. A participant from Japan responded that all *Anguilla* species are subject to discussion in CITES.

58. Prof. Hakoyama stated that CITES need to make a distinction between exploitation and extinction. Prof. Aoyama made a comment, saying that it may be valuable to make a consensus that Japanese eels are not endangered based on Prof. Hakoyama's research. Prof. Hakoyama, together with the Chair and Dr. Yokouchi expressed that such a consensus needs to be made based on a published result.

59. A participant from Chinese Taipei discussed that we had moved from one species to another once one species had become exploited and thus, there is a need for more regulations on Japanese eel resources to prevent further decreases of eel species. A participant from China also made a comment, highlighting the importance of long-term eel protection. A participant from Korea then briefly explained that CITES awarded the EUROPOL for arresting illegal European eel traders, indicating unclear conditions of European eels. He then continued that considering such conditions, we need to have more specific discussion.

60. A participant from Japan argued that it is important to collect examples of the non-detriment finding (NDF). The Secretariat answered that the NDF is encouraged to be uploaded on the CITES's website and that they would check it.

Item 8: Revised workplan of scientific activities/collaboration in 2024-2025

8-1 Updated Workplan for Scientific Activities and Collaborative Research on Japanese Eel and Other Relevant Eels (2024-25)

61. Dr. Faulks proposed revisions to the Workplan for Scientific Activities and Collaborative Research on Japanese Eel and Other Relevant Eels (2024-25) (SM03 Doc.21).

62. A participant from Japan suggested deleting the purpose and activities sections as they are the same as those of Terms of Reference for Task Team 1 & 2 and retain the attachment in the Workplan.

63. The revised Workplan was confirmed among Members without objection.

64. A participant from Chinese Taipei asked Prof. Hakoyama whether his team could be involved in the Task Team 2. Prof. Hakoyama welcomed his suggestion.

8-2 Draft terms of Reference for the Scientific Meeting of Japanese Eel and Other Relevant Eels

65. The Secretariat explained the Draft Terms of Reference for the Scientific Meeting of Japanese Eel and Other Relevant Eels (SM03 Doc.22).

66. The Draft Terms of Reference was adopted without objection.

8-3 Draft Terms of Reference for Task Team 1 & 2 of Scientific Activities and Collaborative Research on Japanese Eel Established under the Scientific Meeting

67. The Secretariat explained the revised Draft Terms of Reference for Task Team 1 & 2 of Scientific Activities and Collaborative Research on Japanese Eel Established under the Scientific Meeting (SM03 Doc.23).

68. The revised Draft Terms of Reference was confirmed among Members without objection.

Item 9: Date and venue of the next Informal Consultation and Scientific Meeting

69. Secretariat explained that dates for the next Scientific Meeting will be discussed in this coming Information Consultation.

70. The Fisheries Agency of Japan suggested adding a new agenda item "scientific advice to the Informal Consultation". The Chair responded that the final adoption of the agenda will be made in next Scientific Meeting.

71. No comments were made on this proposal.

72. The Secretariat asked participants what kind of experts need to be invited for the next Scientific Meeting. Prof. Hakoyama answered that resource management experts need to be invited again.

Item 10: Other matters

73. No other matter was raised by the participants.

Item 11: Adoption of the summary report of the meeting

74. The participants adopted the summary report of the Scientific Meeting with modifications.

Item 12: Closing of the meeting

75. The Chair expressed appreciation to all the participants for their exchange of useful information and comments, and closed the meeting.

附件 19 第 17 屆鰻魚國際非正式會議議程草案

IC17 Doc.01 rev.1

(Draft)

The Seventeenth Meeting of the Informal Consultation on International Cooperation for Conservation and Management of Japanese Eel Stock and Other Relevant Eel Species

Date: June 6-7, 2024
Venue: Tokyo, Japan

Agenda

1. Opening of the meeting
2. Meeting arrangement
3. Adoption of agenda
4. Opening statements
5. Main points of the 3rd Scientific Meeting on the Japanese Eel and Other Relevant Eels
6. Review of the updated eel statistics including the 2023-2024 season
7. Conservation and management measures for eels
8. Discussion on the Japanese eel and other relevant eels at the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
9. Consideration of the possible establishment of an international legal framework for eels
10. Terms of Reference of the Scientific Meeting on the Japanese Eel and Other Relevant Eels
11. Workplan in 2024-2025
12. Date and venue of the next Scientific Meeting and Informal Consultation
13. Finalization of the joint press release
14. Adoption of summary report
15. Other matters
16. Closing of the meeting

附件 20 各國開幕致詞

IC17 Doc.06

Opening Statement

Chairman and distinguished attendees,

Good morning, everyone. I'm Jiang Keji from the East China Sea Fisheries Research Institute of the Chinese Academy of Fishery Sciences. It's a great honor to participate in this informal consultation meeting on the conservation and management of Japanese eel and other related eel populations, and to represent the Chinese delegation to speak.

As one of the pivotal fishery species in East Asia, the survival and population size of the Japanese eel have significant implications for the sustainable development of fisheries and ecological balance in this region. In recent years, there has been a notable decline in natural eel resources, attributed not only to human activities but also to the increasingly pronounced impact of climate change. Protecting eel resources has thus emerged as a crucial and urgent issue.

The Chinese government is committed to sustainable development and places great emphasis on ecological conservation and fisheries resource management. On one hand, China has strengthened the formulation of laws and regulations, enacting a series of fisheries management policies and measures, including fishing license systems, protected area planning, and fishing moratoriums, etc. Rigorous supervision and law enforcement efforts have been employed to ensure the effective

implementation of these measures and policies. Notably, significant results of the Yangtze River conservation policy and the ten-year fishing ban in the Yangtze River implemented in recent years have been observed. The efforts have effectively mitigated the overfishing of glass eel, ensured the unhindered migration routes of Japanese eel, while protecting and restoring the ecological environment and aquatic resources of the Yangtze River basin. On the other hand, China has conducted systematic and comprehensive surveys of Japanese eel resources, aiming to promote science-based conservation and effective management strategies for this species. Furthermore, fishing enterprises are encouraged to enhance self-discipline and adopt scientific aquaculture and refined management practices to ensure the sustainability of Japanese eel farming. Civil societies, including Chinese environmental conservation organizations and fishery associations, are encouraged to actively participate in eel conservation and management efforts.

Additionally, public awareness of environmental conservation is being strengthened, and the public engagement in Japanese eel conservation are being encouraged through public communication activities. At the same time, support for scientific research is provided to deepen understanding of the ecological characteristics, population dynamics, and reproductive biology of Japanese eel, thereby informing the formulation of effective conservation measures.

We believe this conference serves as an excellent communication platform, and we are committed to actively supporting and participating in its agenda. We also hope to collaborate closely with all participants through this conference mechanism to enhance the conservation and management of eel resources.

We recommend further enhancing sustainable and effective communication mechanisms to ensure comprehensive exchange and sharing of information. Additionally, we call on all parties to unite and vigorously combat the smuggling of glass eel, and establish a coordinated trade mechanism to ensure the legality of eel trade.

Finally, we extend our gratitude to the organizers for their meticulous organization and thoughtful arrangements, and we wish the conference every success. Thank you very much.

OPENING REMARKS BY JAPAN AT THE SEVENTEENTH MEETING OF THE INFORMAL CONSULTATION ON INTERNATIONAL COOPERATION FOR CONSERVATION AND MANAGEMENT OF THE JAPANESE EEL STOCK AND OTHER RELEVANT EEL SPECIES OF 6th -7th JUNE 2024

It is my great pleasure to be here today to host the 17th Meeting of the Informal Consultation on International Cooperation for Conservation and Management of the Japanese Eel Stock and Other Relevant Eel Species.
I cordially welcome all the representatives of Members of Northeast Asian region to this meeting.

The Japanese eel is historically important fisheries stock here in Japan. Japanese people have been eating it from ancient times. I am sure that this valuable species has been utilized widely in the members of the Northeast Asian region. However, in the long-term, the Japanese eel stock remains at a low level, and there is still global concern about the stock status. In such a situation, the four Members of the Northeast Asian region that share the Japanese eel resource are called upon to take responsible actions for the sustainable use of this valuable aquatic resource.

The Japanese eel is a catadromous species and is considered as a single stock in the Northeast Asian region. We recognize that the sustainable use of this species is our common mission, which can only be achievable through our cooperation and collaboration. Japan believes that it is particularly important to strengthen scientific cooperation and collaborative research on the Japanese eel among the Members, as outlined in the Workplan for Scientific Activities and Collaborative Research agreed upon at the Scientific Meeting.

We look forward to discussing the appropriate management of the Japanese eel for sustainable use with the participants in this meeting, and hope that meaningful exchange of views will be made toward the establishment of official framework for the resources management of the Japanese eel in the Northeast Asian region.

Thank you again for your participation and cooperation.

Mr. Chair,

Distinguished delegations

First of all, I would like to express my thanks to the government of Japan for hosting this meeting, once again, in Tokyo. It is great to visit this city again. I would also like to thank the Secretariat for their hard work and efforts for arranging and preparing the meeting.

As you are aware, the eel species are getting more attention from the International Community as the stocks have been decreased over years. The CITES last year at its Standing Committee meeting agreed to establish a Working Group on all species including the Japanese eel. This must be something we should pay close attention to as the result of discussions of the Working Group could hugely impact the destiny of the eel species that we all hold dear.

It is good to see that we now have scientists involving in our work through the Scientific meeting, which could provide advice and evidence that would help us make better decisions based on the best, or better at least, scientific evidence available. So, taking this opportunity, I would like to thank all the scientists for their hard work and would also like to ask them to continue their efforts, which I believe will definitely contribute to better management of the eel species.

As I said last year, the eel species hold a vast cultural value in the North East Asia, especially for the countries that are present at this venue today. We gather once again to talk about how to better protect and manage them, so we should make the best use of this opportunity.

Korea thanks other Members for their conservation and management efforts. Your contributions have always been appreciated. So, I will close my statement by thanking the delegates of the fellow Members for being here once again to continue our work on eels.

I look forward to fruitful discussions.

Thank you

Chairman _____ and distinguished attendees,

Good morning everyone!
On behalf of our team, I would like to express our gratitude for the opportunity to participate in this informal meeting in Japan. We sincerely appreciate the thoughtful planning and arrangements made by Japan, which have enabled the smooth proceedings of the 17th informal meeting.

As stakeholders in the eel resource utilization, we have been committed to promoting conservation and management measures for eel resources, as outlined in the Joint Statement issued during the 7th informal meeting in 2014. These measures include controls on juvenile eel fishing seasons, limits on stocking, traceability systems, restoration of inland river habitats (through river closure for eel protection), and stocking efforts. We have also kept ourselves informed about the latest developments in the international industry, resources, and scientific research.

We extend our gratitude to Japan for hosting the eel task team online workshop in April and the 3rd Japanese Eel and Other relevant eels Scientists Meeting in Tokyo in June. By participating in the scientific conference, we have further enriched our understanding of the scientific basis for resource management.

We deeply recognize that the importance of resource management extends beyond national borders and has become a global challenge. Therefore, we firmly believe that effective resource management measures can only be developed through international cooperation. We are committed to adjusting our resource management and conservation measures in

accordance with international trends.

Today, our focus of discussion revolves around the sustainable utilization of eel resources. As a crucial economic resource, eels have garnered significant attention worldwide. We acknowledge that finding a balance for the sustainable utilization of eel resources can only be achieved through sharing experiences and exchanging opinions based on sound scientific principles.

Our goal is to achieve a harmonious balance between resource preservation and the stable development of the industry. We believe that through collaborative efforts among industry, government, and academia, we can find effective solutions that ensure the sustainable utilization of eel resources while fostering sustainable social and economic development.

During this informal meeting, we look forward to further exchanges and collaborations with all the delegates. We hope to collectively explore innovative resource management strategies and apply them in practice, making positive contributions to the global resource management endeavors.

Wishing you a successful and fruitful informal meeting.

Thank you all!

附件 21 第 17 屆鰻魚國際非正式會議出席名單

IC17 Doc.03

The Seventeenth Meeting of the Informal Consultation
on International Cooperation for Conservation and Management of Japanese Eel Stock and Other Relevant Eel Species
Participants List

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China

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22	Observer	Mr.	Kouji	Yamamoto	President	All Japan Association for Sustainable Eel Aquaculture Incorporated	-
23	Observer	Mr.	Yuki	Kinoshita	Vice-President	All Japan Association for Sustainable Eel Aquaculture Incorporated	-

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4	Member	Mr	Jae-woong	Yoon	Deputy Director	National Institute of Fisheries Science, MOF	sautreee@korea.kr
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10	Member	Dr.	ChingHsien	Ho	Associate Professor	National Kaohsiung University of Science and Technology	CCHO@nkust.edu.tw

附件 22 科學家會議職權範圍(Terms of Reference)

Terms of Reference for the Scientific Meeting of Japanese Eel and Other Relevant Eels

The Bureau of Fisheries of People's Republic of China, the Fisheries Agency of Japan, the Ministry of Oceans and Fisheries of the Republic of Korea and the Fisheries Agency of Chinese Taipei (hereinafter referred to as "Members"),

Recalling the Joint Statement of the Bureau of Fisheries of People's Republic of China, the Fisheries Agency of Japan, the Ministry of Oceans and Fisheries of the Republic of Korea and the Fisheries Agency of Chinese Taipei on International Cooperation for Conservation and Management of Japanese Eel Stock and Other Relevant Eel Species, which was issued in September 2014;

Recognizing the Joint Press Release of the Fourteenth Meeting of the Informal Consultation on International Cooperation for Conservation and Management of Japanese Eel Stock and Other Relevant Eel Species (hereinafter referred to as "Informal Consultation"), which was released in July 2021;

Have decided the following:

1. The purpose of the Scientific Meeting of Japanese Eel and Other Relevant Eels is to:

(a) provide a forum for scientific consultation and cooperation on the Japanese eel and other relevant eels among Members;
(b) promote and collaborate on scientific research;
(c) share scientific knowledge and experience; and
(d) provide scientific advice for conservation and management measures to the Informal Consultation.

2. The functions of the Scientific Meeting are to:

(a) collect, analyze and exchange relevant scientific knowledge and experience, including eel statistics submitted by members to the Informal Consultation, on the Japanese eels and other relevant eels.
(b) establish an effective mechanism for international cooperation to encourage and promote scientific activities that can contribute to the conservation of the Japanese eel and other relevant eels;
(c) develop and implement a research plan for scientific activities and

collaborative research on the Japanese eel and other relevant eels;

(d) endeavor to conduct a stock assessment of the Japanese eel to identify appropriate measures for its conservation and management;

(e) provide scientific advice on conservation and management measures for the Japanese eel and other relevant eels; and

(f) prepare a report for consideration and endorsement by the Informal Consultation; and

(g) consider any other matters requested by the Informal Consultation.

附件 23 科學家會議下任務分組 1 及任務分組 2 職權範圍(Terms of Reference)

Terms of Reference
for Task Team 1 & 2 of Scientific Activities and Collaborative Research on Japanese Eel Established under the Scientific Meeting

The Bureau of Fisheries of People's Republic of China, the Fisheries Agency of Japan, the Ministry of Oceans and Fisheries of the Republic of Korea and the Fisheries Agency of Chinese Taipei (hereinafter referred to as "Members"),

Recalling the Joint Statement of the Bureau of Fisheries of People's Republic of China, the Fisheries Agency of Japan, the Ministry of Oceans and Fisheries of the Republic of Korea and the Fisheries Agency of Chinese Taipei on International Cooperation for Conservation and Management of Japanese Eel Stock and Other Relevant Eel Species, which was issued in September 2014;

Recognizing the Joint Press Release of the Fourteenth Meeting of the Informal Consultation on International Cooperation for Conservation and Management of Japanese Eel Stock and Other Relevant Eel Species (hereinafter referred to as "Informal Consultation"), which was released in July 2021;

Noting the paragraph 46 of the Summary Report of the 2ndt Scientific Meeting on Japanese Eel and Other Relevant Eels held from 29th (Mon) to 30th (Tue) May, 2023 as well as the Terms of Reference for the Scientific Meeting on Japanese Eel and Other Relevant Eels and the rule 7 of the Basic Rules of Meeting Procedure for the Scientific Meeting;

Have decided the following:

PURPOSE

1. Task Teams are established under the Scientific Meeting on Japanese Eel and Other Relevant Eels for the efficient implementation of the tasks.

2. The Task Teams aim at promoting scientific activities and collaborative research on the Japanese eel to provide the best available scientific data and information to the Scientific Meeting.

TERMS OF REFERENCE

3. The Task Teams focus on the following activities and research:

   (1) Develop close relationship among scientists in Northeast Asian region and collect/organize long-term time-series data, including fishery-independent data such as environmental DNA on Japanese eel and other relevant eels, in order to understand and forecast the stock trend of Japanese eel in the Northeast Asian region (Task Team 1); and

   (2) Exchange information on tracking techniques in order to track migration paths of Japanese eel and other relevant eels from rivers to spawning grounds in Northeast Asia and other regions, and analyze and evaluate tracking data (Task Team 2).

4. Team leaders are nominated for each of the Task Team as follows:

   Task Team 1: Dr. Leanne Faulks, Researcher/Guest Associate Professor, Nagano University; and

   Task Team 2: Prof. Hiroshi Hakoyama, Nagano University.

5. The team leaders lead their task teams and carry out their duties in email correspondence or by hosting virtual meetings.

6. Each Member registers scientists/researchers as team members for the two task teams, respectively.

7. Team members work in coordination and cooperation with others to ensure the efficient execution of the team's mission.

8. The Task Teams prepare and present an interim report for each task team.

OTHERS

9. Subject to resource constraints, the Interim Secretariat of the Scientific Meeting shall provide support and guidance to the Task Teams.

10. Insofar as they are applicable, the Basic Rules of Meeting Procedure for the Scientific Meeting shall apply mutatis mutandis to the proceedings of the Task Teams.

【Revised Standard Working Formats for Eel Statistics (2024)】 Members：China

Format 1：Data on Catch of Japanese Eel (Data is limited to taken from the wild)

Item	Unit	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
Catch of glass eel	kg	28000.0	19500.0	55000.0	20500.0	21000.0	26500.0	16000.0	14500.0	50000.0	38000.0	29500.0	40450.0	24,300.0
Catch of eel fry (kuroko)	kg											-	-	
Catch of wild adult eel	kg or tons											-	-	

【Notes】:

1. The catch data of Japanese eel are entered by glass eel, eel fry and wild adult eel, respectively.
2. Unit for catch of glass eel and eel fry should be weight in kilograms. Unit for adult eel should be weight in metrc tons.
3. When there are no relevant data or data is not available, "-" should be entered. When data is identified as zero, "0" should be entered.
4. The statistic period of the data related to glass eel and eel fry (catch of glass eel and eel fry) should be the fishing season of glass eel and eel fry ("20XX-XX+1"means the input season which starts from 1st Novemver, 20XX to 31st October, 20XX+1.), while that for "wild adult eel data" should be the calendar year.

○Comments by Members：

Format 2：Data on Fishing effort on Japanese eel

Item	Unit	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
Fishing effort on glass eel	number of licences (or fishermans, fishing vessels)											-		
Fishing effort on eel fry (kuroko)	number of licences (or fishermans, fishing vessels)											-	-	
Fishing effort on wild adult eel	number of licences (or fishermans, fishing vessels)											-	-	

【Notes】:

1. The data of fishing effort on Japanese eel are entered by glass eel, eel fry and adult eel, respectively.
2. Examples of unit for fishing effort may include the number of licenses, the number of fishermen or the number of fishing vessels.The unit can be chosen in accordance with each domestic legislations.
3. When there are no relevant data or data is not available, "-" should be entered. When data is identified as zero, "0" should be entered.
4. The statistic period of the data related to glass eel and eel fry (fishing effort on glass eel and eel fry) should be the fishing season of glass eel and eel fry ("20XX-XX+1"means the input season which starts from 1st Novemver, 20XX to 31st October, 20XX+1.), while that for "wild adult eel data" should be the calendar year.

○Comments by Members：

Format 3: Input of eel seeds (glass eels and eel fry (kuroko)) into aquaculture ponds

Species	Unit	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
japonica	kg	8000.0	7000.0	45000.0	9300.0	8200.0	16500.0	3500.0	3000.0	36000.0	33000.0	18000.0	20000.0	9,000.0
domestic catch	kg				9300.0	8200.0	16500.0	3500.0	3000.0	36000.0	33000.0	18000.0	20000.0	9,000.0
imports	kg											-	-	-
Other eel species	kg	14500.0	20000.0	32000.0	35500.0	39500.0	36000.0	33000.0	33500.0	35000.0	29000.0	28,000.0	34000.0	30,000.0
bicolor	kg	5,500.0	7,000.0	13,500.0	3,500.0	8,000.0	3,000.0	0.0	0.0	0.0	0.0	0.0	3000.0	0.0
anguilla	kg	0.0	0.0	0.0	0.0	4,500.0	5,000.0	4,000.0	2,500.0	2,000.0	0.0	0.0	0.0	0.0
rostrata	kg	9,000.0	13,000.0	18,500.0	32,000.0	27,000.0	28,000.0	29,000.0	31,000.0	33,000.0	29,000.0	28,000.0	31000.0	30,000.0
marmorata	kg											-	-	-
mossambica	kg											-	-	-
Total	kg	22500.0	27000.0	77000.0	44800.0	47700.0	52500.0	36500.0	36500.0	71000.0	62000.0	46000.0	54000.0	39,000.0

【Notes】:

1. Inputs of eel seeds (glass eels and eel fry) into aquaculture ponds are entered by japonica and other eel species, respectively
2. The data of japonica are entered by domestical catched seeds and imported seeds, respectively
3. However, eel seeds which transferred by other countries and regions are not included in the data of input of eel seeds.
4. Unit for catch of glass eel and eel fry should be weight in kilograms.
5. When there are no relevant data or data is not available, "-" should be entered. When data is identified as zero, "0" should be entered.
6. The statistic period of the data related to eel seeds (input of glass eel and eel fry) should be the fishing season of glass eel and eel fry ("20XX-XX+1"means the input season which starts from 1st Novemver, 20XX to 31st October, 20XX+1.).

○Comments by Members:

Format 4: Aquaculture production

Species	Unit	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2022-23	2023-24
japonica	kg or tons	8,000.0	12,000.0	11,000.0	14,000.0	16,000.0	16,000.0	18,000.0	14,000.0	14,000.0	28,000.0	-	-	-
Other eel species	kg or tons	32000.0	30000.0	35000.0	42000.0	50000.0	52000.0	57000.0	65000.0	68000.0	64000.0	-	-	-
bicolor	kg or tons	1,000.0	2,000.0	2,000.0	3,000.0	1,000.0	1,000.0					-	-	-
anguilla	kg or tons	22,000.0	15,000.0	16,000.0	15,000.0	13,000.0	12,000.0	12,000.0	8,000.0	5,000.0	3,000.0	-	-	-
rostrata	kg or tons	9,000.0	13,000.0	17,000.0	24,000.0	36,000.0	39,000.0	45,000.0	57,000.0	63,000.0	61,000.0	-	-	-
marmorata	kg or tons											-	-	-
mossambica	kg or tons											-	-	-
Total	kg or tons	40000.0	42000.0	46000.0	56000.0	66000.0	68000.0	75000.0	79000.0	82000.0	92000.0	120000.0	145800.0	-

【Notes】:

1. The data of aquaculture production are entered by japonica and other eel species, respectively
2. Unit for aquaculture production should be weight (kilograms or metrc tons) as far as possible.
3. When there are no relevant data or data is not available, "-" should be entered. When data is identified as zero, "0" should be entered.
4. Aquaculture production data should be the calendar year.

○Comments by Members:

Format 5: Other data on aquaculture

Item	Unit	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2022-23	2023-24
Scale of aquaculture industry	number of aquaculture operators	465	558	687	696	772	797	830	868	918	925	1004	1100	1280

【Notes】:

①Unit for scale of aquaculture industry may include the number of aquaculture operator or the dimensions of aquaculture ponds.

②When there are no relevant data or data is not available, "-" should be entered. When data is identified as zero, "0" should be entered.

○Comments by Members:

Format 6: Import of eel seeds (glass eels and eel fry)

Species	Type/Size	Unit	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
japonica	glass eel	kg											-	-	-
	eel fry (kuroko)	kg											-	-	-
Total		kg											-	-	-
Other eel species	glass eel	kg	14,500.0	20,000.0	32,000.0	35,500.0	39,500.0	36,000.0	33,000.0	33,500.0	35,000.0	29,000.0	28,000.0	34000	30,000.0
	eel fry (kuroko)	kg											-	-	-
Total		kg	14,500.0	20,000.0	32,000.0	35,500.0	39,500.0	36,000.0	33,000.0	33,500.0	35,000.0	29,000.0	28000.0	34,000.0	30,000.0

【Notes】:

1. The data of import of eel seeds (glass eels and eel fry) are entered by japonica and other eel species, respectively
2. The statistic period of the data related to eel seeds (import of glass eel and eel fry) should be the fishing season of glass eel and eel fry ("20XX-XX+1"means the input season which starts from 1st Novemver, 20XX to 31st October, 20XX+1.).
3. When there are no relevant data or data is not available, "-" should be entered. When data is identified as zero, "0" should be entered.
4. Unit for catch of glass eel and eel fry should be weight in kilograms.

○Comments by Members:

Format 7: Import of eel and eel products

Species	Type/Size	Unit	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2022-23	2023-24
japonica	live eel	kg or tons													
	broiled eel	kg or tons													
Other eel species		kg or tons													
		kg or tons													
Total		kg or tons													

【Notes】:

①The data of import of eel and eel products are entered by japonica and other eel species, respectively

②Examples of type/size of import of eel and eel product may include live eel, frozen eel, chilled eel or broiled eel.

③When there are no relevant data or data is not available, "-" should be entered. When data is identified as zero, "0" should be entered.

④Unit for import of eel and eel products should be weight (kilograms or metrc tons) as far as possible.

Comments by Members:

Format 8: Export of eel seeds (glass eels and eel fry)

Species	Type/Size	Unit	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
japonica	glass eel	kg	19000.0	14000.0	9500.0	10000.0	11200.0	12800.0	10000.0	11500.0	8000.0	5000.0	12000.0	13300	15,000.0
	eel fry (kuroko)	kg											-	-	-
Total		kg	19000.0	14000.0	9500.0	10000.0	11200.0	12800.0	10000.0	11500.0	8000.0	5000.0	12000.0	13,300.0	15,000.0
Other eel species	glass eel	kg													
	eel fry (kuroko)	kg													
Total		kg													

【Notes】:

1. The data of export of eel seeds are entered by japonica and other eel species, respectively
2. The statistic period of the data related to eel seeds (export of glass eel and eel fry) should be the fishing season of glass eel and eel fry ("20XX-XX+1"means the input season which starts from 1st Novemver, 20XX to 31st October, 20XX+1.).
3. When there are no relevant data or data is not available, "-" should be entered. When data is identified as zero, "0" should be entered.
4. Unit for catch of glass eel and eel fry should be weight in kilograms.

Comments by Members:

Format 9: Export of eel and eel products

Species	Type/Size	Unit	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2022-23	2023-24
japonica	live eel	kg or tons													
	broiled eel	kg or tons													
Other eel species		kg or tons													
		kg or tons													
Total		tons	36,398.0	33,917.0	35,001.0	40,295.0	41,426.0	42,357.0	/	46,732.0	52,432.0	69,917.0	64,200.0	66,660.0	-
japonica/Other eel species (Data on Japanese eel and other eels are	live eel	tons	3,846.0	5,295.0	5,818.0	5,562.0	6,219.0	6,781.0	/	7,508.0	9,630.0	10,107.0	14,100.0	17,159.0	-
	broiled eel	tons	32,552.0	28,622.0	29,183.0	34,733.0	35,207.0	35,576.0	/	39,224.0	42,802.0	59,810.0	50,100.0	49,501.0	-

【Notes】:

1. The data of export of adult eel and eel products are entered by japonica and other eel species, respectively
2. Examples of type/size of export of eel and eel product may include live eel, frozen eel, chilled eel or broiled eel.
3. When there are no relevant data or data is not available, "-" should be entered. When data is identified as zero, "0" should be entered.
4. Unit for export of eel and eel products should be weight (kilograms or metrc tons) as far as possible.

○Comments by Members:

6. Fishing effort on wild adult eel	There is no catch of adult eel in China.
7. Input of eel seeds into aquaculture ponds	The data is based on the information from local eel farming association of the major eel production provinces.
8. Aquaculture production	The data is based on the information from local eel farming association of the major eel production provinces.
9. Scale of aquaculture industry	The data is based on the information from local eel farming association of the major eel production provinces.
10. Import of eel seeds	The data is based on the information from customs, fishery statistics and relevant industry associations.
11. Import of eel and eel products	The data is based on the information from customs, fishery statistics and relevant industry associations.
12. Export of eel seeds	The data is based on the information from customs, fishery statistics and relevant industry associations.
13. Export of eel and eel products	The data is based on the information from customs, fishery statistics and relevant industry associations.
14. Mean value of wight and length of Japanese eel	

【Revised Standard Working Formats for Eel Statistics (2024)】 Members：Japan IC17 Doc.11

Format 1：Data on Catch of Japanese Eel (Data is limited to taken from the wild)

Item	Unit	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
Catch of glass eel	tons(~2014-15), kg(2015-16~)	9.0	5.2	17.4	15.3	13625.2	15442.4	8967.5	3670.1	17112.4	11333.9	10344.7	5660.2	5628.6(*1)
Catch of eel fry (kuroko)(*2)	kg	-	-	-	-	-	-	-	-	-	-	-	-	-
Catch of wild adult eel (*3)	tons	165	135	112	70	71	71	69	66	66	63	59	-	-

【Notes】:

1. The catch data of Japanese eel are entered by glass eel, eel fry and wild adult eel, respectively.
2. Unit for catch of glass eel and eel fry should be weight in kilograms. Unit for adult eel should be weight in metrc tons.
3. When there are no relevant data or data is not available, "-" should be entered. When data is identified as zero, "0" should be entered.
4. The statistic period of the data related to glass eel and eel fry (catch of glass eel and eel fry) should be the fishing season of glass eel and eel fry ("20XX-XX+1"means the input season which starts from 1st Novemver, 20XX to 31st October, 20XX+1.), while that for "wild adult eel data" should be the calendar year.

○Comments by Members:

*1 The 2023-2024 season data of catch of glass eel is from 1st November to 31st March temporarily.
*2 There are no relevant data of "Catch of eel fry (kuroko)".
*3 The latest data available for "Catch of wild adult eel" is 2021-2022 season.

Format 2：Data on Fishing effort on Japanese eel

Item	Unit	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
Fishing effort on glass eel (*4)	number of licences (or fishermans, fishing vessels)	6,669	6,781	6,617	4,698	4,398	4,790	5,874	5,898	5,762	5723	4467	4382	-
Fishing effort on eel fry (kuroko)(*5)	number of licences (or fishermans, fishing vessels)	-	-	-	-	-	-	-	-	-	-	-	-	-
Fishing effort on wild adult eel(*6)	number of licences (or fishermans, fishing vessels)	-	-	-	-	-	-	-	-	-	-	-	-	-

【Notes】:

1. The data of fishing effort on Japanese eel are entered by glass eel, eel fry and adult eel, respectively.
2. Examples of unit for fishing effort may include the number of licenses, the number of fishermen or the number of fishing vessels.The unit can be chosen in accordance with each domestic legislations.
3. When there are no relevant data or data is not available, "-" should be entered. When data is identified as zero, "0" should be entered.
4. The statistic period of the data related to glass eel and eel fry (fishing effort on glass eel and eel fry) should be the fishing season of glass eel and eel fry ("20XX-XX+1"means the input season which starts from 1st Novemver, 20XX to 31st October, 20XX+1.), while that for "wild adult eel data" should be the calendar year.

○Comments by Members:

*4 The latest data available for "Fishing effort on glass eel" is 2022-2023 season.
*5 There are no relevant data of "Fishing effort on eel fry (kuroko)".
*6 There are no relevant data of "Fishing effort on wild adult eel".

Format 3: Input of eel seeds (glass eels and eel fry (kuroko)) into aquaculture ponds

Species	Unit	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24(*8)
japonica	kg	15.9	12.6	27.1	18.3	19716.2	19590.4	14178.5	15175.1	20131.4	18285.9	16187.7	16204.2	13623.6
domestic catch	kg	9.0	5.2	17.4	15.3	13625.2	15442.4	8967.5	3670.1	17112.4	11333.9	10344.7	5660.2	5628.6
imports	kg	6.9	7.4	9.7	3.0	6091	4148	5211	11505	3019	6952	5843	10544	7995
Other eel species(*7)	kg													18.0
bicolor	kg													18.0
anguilla	kg	0.43	1.30	3.50	0.05	175.4	94.8	34.9	51.6	58.5	59.9	74.6	55.5	0.0
rostrata	kg													0.0
marmorata	kg													0.0
mossambica	kg													0.0
Total	kg	16.3	13.9	30.6	18.3	19891.6	19685.2	14213.4	15226.7	20189.9	18345.8	16262.3	16259.7	13641.6

【Notes】:

1. Inputs of eel seeds (glass eels and eel fry) into aquaculture ponds are entered by japonica and other eel species, respectively
2. The data of japonica are entered by domestical catched seeds and imported seeds, respectively
3. However, eel seeds which transferred by other countries and regions are not included in the data of input of eel seeds.
4. Unit for catch of glass eel and eel fry should be weight in kilograms.
5. When there are no relevant data or data is not available, "-" should be entered. When data is identified as zero, "0" should be entered.
6. The statistic period of the data related to eel seeds (input of glass eel and eel fry) should be the fishing season of glass eel and eel fry ("20XX-XX+1"means the input season which starts from 1st Novemver, 20XX to 31st October, 20XX+1.).

○Comments by Members:

*7 The species-specific data of "Other eel species" has been available since 2022-2023 season.
*8 The 2023-2024 season data of catch of glass eel is from 1st November to 31st March temporarily.

Format 4: Aquaculture production(*9,10)

Species	Unit	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
japonica	kg or tons	17,377	14,204	17,627	20,119	18,907	20,979	15,111	17,071	16,806	20,673	19,167	-	-
Other eel species	kg or tons													
bicolor	kg or tons													
anguilla	kg or tons													
rostrata	kg or tons													
marmorata	kg or tons													
mossambica	kg or tons													
Total	kg or tons	17,377	14,204	17,627	20,119	18,907	20,979	15,111	17,071	16,806	20,673	19,167	-	-

【Notes】:

1. The data of aquaculture production are entered by japonica and other eel species, respectively
2. Unit for aquaculture production should be weight (kilograms or metrc tons) as far as possible.
3. When there are no relevant data or data is not available, "-" should be entered. When data is identified as zero, "0" should be entered.
4. Aquaculture production data should be the calendar year.

○Comments by Members:

*9 Total data of aquaculture production is entered, as it is not possible to provide species-specific data.
*10 The latest data available for "Aquaculture production" is 2022 temporarily.

Format 5: Other data on aquaculture

Item	Unit	2012(*11)	2013	2014(*11)	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Scale of aquaculture industry	number of aquaculture operators	-	384	-	439	441	463	460	456	442	436	433	431	425

【Notes】:

①Unit for scale of aquaculture industry may include the number of aquaculture operator or the dimensions of aquaculture ponds.

②When there are no relevant data or data is not available, "-" should be entered. When data is identified as zero, "0" should be entered.

○Comments by Members:

*11 The data source for 2013 is "Census of Fisheries"published by the Ministry of Agriculture, Forestry and Fisheries every five years. The data from 2015 to 2024 are the total number of japonica-farming operators who are granted licenses issued by the Ministry of Agriculture, Forestry and Fisheries under the licensing system inaccordance with the Inland Water Fishery Promotion Act, which entered into force in June 2015. There are no relevant data of 2012 and 2014.

Format 6: Import of eel seeds (glass eels and eel fry)(*12)

Species	Type/Size	Unit	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24(*13)
japonica	glass eel	tons(~2014-15), kg(2015-16~)	9.2	10.7	12.5	3.6	7,585	4,827	5,303	12,563	3,999	10,177	8,193	13,517	9,135
	eel fry (kuroko)														
Other eel species	glass eel														
	eel fry (kuroko)														
Total		tons(~2014-15), kg(2015-16~)	9.2	10.7	12.5	3.6	7,585	4,827	5,303	12,563	3,999	10,177	8,193	13,517	9135

【Notes】:

1. The data of import of eel seeds (glass eels and eel fry) are entered by japonica and other eel species, respectively
2. The statistic period of the data related to eel seeds (import of glass eel and eel fry) should be the fishing season of glass eel and eel fry ("20XX-XX+1"means the input season which starts from 1st Novemver, 20XX to 31st October, 20XX+1.).
3. When there are no relevant data or data is not available, "-" should be entered. When data is identified as zero, "0" should be entered.
4. Unit for catch of glass eel and eel fry should be weight in kilograms.

○Comments by Members:

*12 It is not possible to provide type/size-specific and species-specific data. Therefore, a new row "Grand Total" was inserted for the total data of import of eel seeds (glass eels and eel fries) for all the species.

*13 The 2023-2024 season data of import of eel seeds (glass eels and eel fries) is from 1st November to 31st March temporarily.

Format 7: Import of eel and eel products

Species	Type/Size	Unit	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024(*15)
japonica	live eel	kg or tons													
	broiled eel	kg or tons													
Other eel species		kg or tons													
		kg or tons													
Total		kg or tons	19,660.9	18,257.7	20,213.7	31,156.1	31,469.3	32,293.5	33,236.3	31,409.8	34,342.8	42,366.8	38,580.7	33,930.7	8456.7
japonica/Other eel species (*14)	live eel	tons	4,677.6	4,789.2	4,781.1	7,066.7	7,276.1	6,815.7	8,812.7	6,733.2	5,441.1	7,034.5	8,267.4	7,402.8	1890.9
	broiled eel	tons	14,983.3	13,468.5	15,432.7	24,089.4	24,193.2	25,477.8	24,423.6	24,676.6	28,901.7	35,332.3	30,313.2	26,527.8	6565.7

【Notes】:

①The data of import of eel and eel products are entered by japonica and other eel species, respectively

②Examples of type/size of import of eel and eel product may include live eel, frozen eel, chilled eel or broiled eel.

③When there are no relevant data or data is not available, "-" should be entered. When data is identified as zero, "0" should be entered.

④Unit for import of eel and eel products should be weight (kilograms or metrc tons) as far as possible.

○Comments by Members:

*14 It is not possible to provide species-specific data. Therefore, a new row "japonica/Other eel species" was inserted for the data of import of all the species in live and broiled types seprately.

*15 The 2024 data of import of eel and eel products is from 1st January to 31st March temporarily.

Format 8: Export of eel seeds (glass eels and eel fry)

Species	Type/Size	Unit	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
japonica	glass eel(*16)	tons(~2020-21), kg(2021-22)	-	-	-	-	-	-	-	-	-	0.1359	19.96	0	-
	eel fry (kuroko)(*17)	tons(~2020-21), kg(2021-22)	5.713	1.622	6.7	1.3	0.4	0.9	2.6	10.1	23.6	9.076	4818.78	5044.6	-
Total		tons(~2020-21), kg(2021-22)	5.7	1.6	6.7	1.3	0.4	0.9	2.6	10.1	23.6	9.2	4,838.7	5,044.6	-
Other eel species	glass eel	kg	-	-	-	-	-	-	-	-	-	0	0	0	-
	eel fry (kuroko)	kg	0.0	0.0	0.0	0.0	0	0	0	0	0	0	0	0	-
Total		kg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-

【Notes】:

1. The data of export of eel seeds are entered by japonica and other eel species, respectively
2. The statistic period of the data related to eel seeds (export of glass eel and eel fry) should be the fishing season of glass eel and eel fry ("20XX-XX+1"means the input season which starts from 1st December, 20XX to 31st Novemver, 20XX+1.).
3. When there are no relevant data or data is not available, "-" should be entered. When data is identified as zero, "0" should be entered.
4. Unit for catch of glass eel and eel fry should be weight in kilograms.

○Comments by Members:

*16 The "glass eel" is the eels in 13g or less that have never been farmed in domestic aquaculture ponds. It is not possible to provide the data up to 2019-20, as the export of such "glass eel" was prohibited.The latest data available for glass eel is 2022-2023 season.

*17 The "eel fry (kuroko)" is the eels in 13g or less that have been farmed in domestic aquaculture ponds.The latest data available for eel fry (kuroko) is 2022-2023 season.

Format 9: Export of eel and eel products

Species	Type/Size	Unit	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2022-23	2023-24(*19)
japonica	live eel	kg or tons													
	broiled eel	kg or tons													
Other eel species		kg or tons													
		kg or tons													
Total		kg or tons	31.6	32.1	69.6	59.6	71.0	112.2	66.5	80.4	135.2	85.9	81.2	41.0	8.4
japonica/Other eel species (*18)	live eel	tons	10.4	2.2	38.8	20.7	25.8	45.6	7.4	17.8	44.8	17.0	9.3	8.5	1.4
	broiled eel	tons	21.2	30.0	30.9	38.9	45.2	66.6	59.1	62.6	90.4	68.9	71.9	32.5	7

【Notes】:

1. The data of export of adult eel and eel products are entered by japonica and other eel species, respectively
2. Examples of type/size of export of eel and eel product may include live eel, frozen eel, chilled eel or broiled eel.
3. When there are no relevant data or data is not available, "-" should be entered. When data is identified as zero, "0" should be entered.
4. Unit for export of eel and eel products should be weight (kilograms or metrc tons) as far as possible.

○Comments by Members:
*18 It is not possible to provide species-specific data. Therefore, a new row "japonica/Other eel species" was inserted for the data of export of all the species in live and boiled types seprately.
*19 The 2024 data of export of eel and eel products is from 1st January to 31st March temporarily.

Format 10. Mean value of wight and length of Japanese eel

	Unit	When catching(*20)	When inputing into aquaculture ponds(*21)	When importing(*22)	When exporting(*23)
glass eel	weight (g)	0.2g	-	-	～13g
	body length (cm)	6cm	-	-	-
eel fry	weight (g)	0.2g～13g	-	-	～13g
	body length (cm)	6cm～20cm	-	-	-
adult eel	weight (g)	300g～	-	-	-
	body length (cm)	50cm～	-	-	-

【Notes】:
1. The data of weight and length of Japanese eel into aquaculture ponds are entered by glass eel, eel fry and adult eel, respectively.
2. The data entered can be either mean value or figures in certain ranges (e.g., XX – YYg or cm). If mean value is available, it should be clearly mentioned in the comments by Members that the mean value of weight and length figures are based on biological or administrative standards or figures obtained from industry associations, etc.
3. When there are no relevant data or data is not available, "-" should be entered. When data is identified as zero, "0" should be entered.
4. "Body length" is the length of a fish measured from the tip of the snout to the posterior end of the last vertebra.

○Comments by Members:
*20 The data of each "when catching" is estimated based on actual measurement values of weight and total length at each life stage of Japanese eel.
*21 There are no relevant data of "When inputing into aquaculture ponds".
*22 There are no relevant data of "When importing".
*23 There are no relevant data of total length because the glass eel and eel fry(kuroko) are administrated with "weight" in accordance with Export Trade Control Order when

●Data Sources and/or Methods to collect or estimate the data
(* Please fill in data sources and/or methoods to collect or estimate the data entried in from format 1 to format 14 respectively.)

1. Catch of glass eel	The data is estimated in every fishing period (from November of previous year to May) by deducting the amount of import of glasseels (calculated from the Trade Statistics every fishing period) from the amount of input of glass eels into aquaculture ponds which reported by eel-farming operators.
2. Catch of eel fry (kuroko)	–
3. Catch of wild adult eel	The data is from "Annual Statistics on Fisheries and Aquaculture Production" compiled and published by the Ministry of Agriculture,Forestry and Fisheries. The data contained in this statistics are derived from questionnaires on catch and aquaculture production sentto fisheries cooperatives covering main rivers and lakes as well as aquaculture operators all around the country.
4. Fishing effort on glass eel	The index of fishing effort on glass eels is the total number of licenses submitted by each prefecture which has the mandate to issuelicenses.
5. Fishing effort on eel fry (kuroko)	–

6. Fishing effort on wild adult eel	–
7. Input of eel seeds into aquaculture ponds	The data is from the amount of input of glass eels into aquaculture ponds which reported by eel-farming operators.The data of eel seeds domestically captured is estimated by deducting the amount of input of glass eels into aquaculture ponds which reported by eel-farming operators from the amount of import of glasseels (calculated from the Trade Statistics). .The data of imported eel seeds is calculated from the Trade Statistics every fishing period.
8. Aquaculture production	The data is from "Annual Statistics on Fisheries and Aquaculture Production" compiled and published by the Ministry of Agriculture,Forestry and Fisheries.
9. Scale of aquaculture industry	The index of scale of aquaculture industry is the number of aquaculture operators. The data for 2013 is from "Census of Fisheries"published by the Ministry of Agriculture, Forestry and Fisheries every five years. The data from 2015 is the total number of eel-farming operators who are granted licenses issued by the Ministry of Agriculture, Forestry and Fisheries under the licensing system inaccordance with the Inland Water Fishery Promotion Act, which entered into force in June 2015.
10. Import of eel seeds	The data is from "Trade Statistics" compiled and published by the Ministry of Finance. The statistic code is 03.01.92.100 (live fish -eels (Anguilla spp.) - fry for fish culture).
11. Import of eel and eel products	The data is from "Trade Statistics" compiled and published by the Ministry of Finance. The statistic codes are 03.01.92.000 (live fish- eels (Anguilla spp.)) and 1604.17.000 (prepared or preserved fish, caviar and caviar substitutes prepared from fish eggs - eels).The amount of broiled eel is calculated as body of fish, dividing the amount of products by 0.6.
12. Export of eel seeds	The data is from the custom records and the reports submitted by exporters on eel seeds actually exported.
13. Export of eel and eel products	The data is from "Trade Statistics" compiled and published by the Ministry of Finance. The statistic codes are 03.01.92.000 (live fish- eels (Anguilla spp.)) and 1604.17.000 (prepared or preserved fish, caviar and caviar substitutes prepared from fish eggs - eels).The amount of broiled eel is calculated as body of fish, dividing the amount of products by 0.6.
14. Mean value of wight and length of Japanese eel	The value of weight of glass eel and eel fry(kuroko) when exporting are from Export Trade Control Order.The data of weight and total length of glass eel, eel fry(kuroko) and adult eel are estimated based on actual measurement values of wight and total length.

【Revised Standard Working Formats for Eel Statistics (2024)】 Members：Korea IC17 Doc.11

Format 1：Data on Catch of Japanese Eel (Data is limited to taken from the wild)

Item	Unit	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
Catch of glass eel	kg	1,530	1,002	5,489	4,725	1,830	2,717	973	649	4,500	3,228	2,512	2,165	1,330
Catch of eel fry (kuroko)	kg	-	-	-	-	-	-	-	-	-	-	-	-	-
Catch of wild adult eel	tons	102	73	80	85	70	48	56	60	59	84	9	55	-

【Notes】:

1. The catch data of Japanese eel are entered by glass eel, eel fry and wild adult eel, respectively.
2. Unit for catch of glass eel and eel fry should be weight in kilograms. Unit for adult eel should be weight in metrc tons.
3. When there are no relevant data or data is not available, "-" should be entered. When data is identified as zero, "0" should be entered.
4. The statistic period of the data related to glass eel and eel fry (catch of glass eel and eel fry) should be the fishing season of glass eel and eel fry ("20XX-XX+1"means the input season which starts from 1st Novemver, 20XX to 31st October, 20XX+1.), while that for "wild adult eel data" should be the calendar year.

Comments by Members：

Format 2：Data on Fishing effort on Japanese eel

Item	Unit	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
Fishing effort on glass eel	number of licences (or fishermans, fishing vessels)	-	-	-	-	-	-	-	-	-	-	-	-	-
Fishing effort on eel fry (kuroko)	number of licences (or fishermans, fishing vessels)	-	-	-	-	-	-	-	-	-	-	-	-	-
Fishing effort on wild adult eel	number of licences (or fishermans, fishing vessels)	-	-	-	-	-	-	-	-	-	-	-	-	-

【Notes】:

1. The data of fishing effort on Japanese eel are entered by glass eel, eel fry and adult eel, respectively.
2. Examples of unit for fishing effort may include the number of licenses, the number of fishermen or the number of fishing vessels.The unit can be chosen in accordance with each domestic legislations.
3. When there are no relevant data or data is not available, "-" should be entered. When data is identified as zero, "0" should be entered.
4. The statistic period of the data related to glass eel and eel fry (fishing effort on glass eel and eel fry) should be the fishing season of glass eel and eel fry ("20XX-XX+1"means the input season which starts from 1st Novemver, 20XX to 31st October, 20XX+1.), while that for "wild adult eel data" should be the calendar year.

Comments by Members：As number of licences is not managed by species in Korea, relevant data is not available.

Format 3: Input of eel seeds (glass eels and eel fry (kuroko)) into aquaculture ponds

Species	Unit	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
japonica	kg	3,595	2,992	13,927	6,707	9,380	10,596	5,234	2,524	9,502	8,149	8,185	10,214	7,806
domestic catch	kg	1,530	1,002	5,489	4,725	1,830	2,717	973	649	4,500	3,228	2,512	2,165	1,330
imports	kg	2,065	1,990	8,438	1,982	7,550	7,879	4,261	1,875	5,002	4,921	5,673	8,049	6,476
Other eel species	kg	5,628	13,987	3,166	5,145	3,004	657	3,690	2,959	692	1,297	1,914	1,987	193
bicolor	kg	3,508	5,908	2,668	4,986	2,937	590	3,405	393	542	714	880	588	153
anguilla	kg	75	0	0	0	0	0	0	0	0	0	0	0	0
rostrata	kg	1,726	5,520	498	159	35	35	168	0	5	8	28	0	0
marmorata	kg	294	439	0	0	32	32	117	2,566	145	575	1,006	1,399	40
mossambica	kg	25	2,120	0	0	0	0	0	0	0	0	0	0	0
Total	kg	9,223	16,979	17,093	11,852	12,384	11,253	8,924	5,483	10,194	9,446	10,099	12,201	7,999

【Notes】:

1. Inputs of eel seeds (glass eels and eel fry) into aquaculture ponds are entered by japonica and other eel species, respectively
2. The data of japonica are entered by domestical catched seeds and imported seeds, respectively
3. However, eel seeds which transferred by other countries and regions are not included in the data of input of eel seeds.
4. Unit for catch of glass eel and eel fry should be weight in kilograms.
5. When there are no relevant data or data is not available, "-" should be entered. When data is identified as zero, "0" should be entered.
6. The statistic period of the data related to eel seeds (input of glass eel and eel fry) should be the fishing season of glass eel and eel fry ("20XX-XX+1"means the input season which starts from 1st Novemver, 20XX to 31st October, 20XX+1.).

Comments by Members:

Format 4: Aquaculture production

Species	Unit	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2022-23	2023-24
japonica	kg or tons	-	-	-	-	-	-	-	-	-	-	-	-	-
Other eel species	kg or tons	-	-	-	-	-	-	-	-	-	-	-	-	-
bicolor	kg or tons	-	-	-	-	-	-	-	-	-	-	-	-	-
anguilla	kg or tons	-	-	-	-	-	-	-	-	-	-	-	-	-
rostrata	kg or tons	-	-	-	-	-	-	-	-	-	-	-	-	-
marmorata	kg or tons	-	-	-	-	-	-	-	-	-	-	-	-	-
mossambica	kg or tons	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	tons	4,259	5,149	5,631	9,009	9,836	11,095	10,530	10,885	9,724	15,678	18,131	16,045	2,048

【Notes】:

1. The data of aquaculture production are entered by japonica and other eel species, respectively
2. Unit for aquaculture production should be weight (kilograms or metrc tons) as far as possible.
3. When there are no relevant data or data is not available, "-" should be entered. When data is identified as zero, "0" should be entered.
4. Aquaculture production data should be the calendar year.

Comments by Members:

Format 5: Other data on aquaculture

Item	Unit	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2022-23	2023-24
Scale of aquaculture industry	number of aquaculture operators	524	532	536	564	542	555	558	572	592	616	589	646	646

【Notes】:

①Unit for scale of aquaculture industry may include the number of aquaculture operator or the dimensions of aquaculture ponds.

②When there are no relevant data or data is not available, "-" should be entered. When data is identified as zero, "0" should be entered.

Comments by Members:

Format 6: Import of eel seeds (glass eels and eel fry)

Species	Type/Size	Unit	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
japonica	glass eel	kg	2,065	1,990	8,438	1,982	7,550	7,879	4,261	1,875	5,002	4,921	5,673	8,049	6,021
	eel fry (kuroko)	kg	0	225	5,605	4,499	2,523	2,309	9,062	8,361	2,077	23,120	8,136	4,406	0
Total		kg	2,065	2,215	14,043	6,481	10,073	10,188	13,323	10,236	7,079	28,041	13,809	12,455	6,021
Other eel species	glass eel	kg	5,628	13,987	3,166	5,145	3,004	657	3,690	2,959	692	1,297	1,914	1,987	163
	eel fry (kuroko)	kg	1,208	37,717	1,842	10,223	19,078	4,751	14,631	12,727	3,601	4,267	981	1,325	834
Total		kg	6,836	51,704	5,008	15,368	22,082	5,408	18,321	15,686	4,293	5,564	2,895	3,312	997

【Notes】:

1. The data of import of eel seeds (glass eels and eel fry) are entered by japonica and other eel species, respectively
2. The statistic period of the data related to eel seeds (import of glass eel and eel fry) should be the fishing season of glass eel and eel fry ("20XX-XX+1"means the input season which starts from 1st Novemver, 20XX to 31st October, 20XX+1.).
3. When there are no relevant data or data is not available, "-" should be entered. When data is identified as zero, "0" should be entered.
4. Unit for catch of glass eel and eel fry should be weight in kilograms.

Comments by Members:

Format 7: Import of eel and eel products

Species	Type/Size	Unit	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2022-23	2023-24
Anguilla sp.	live eel	tons	137.7	837.0	1,358.8	799.2	615.9	740.6	1,011.9	574.7	2,539.2	1,337.4	2,891	4,489.0	782.6
	freeze	tons	26.9	43.2	38.3	26.1	63.7	42.1	71.8	55.5	25.3	25.3	125.6	23.6	0
	cold storage	tons	0.1	0.0	0.1	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0
	broiled eel	tons	69.2	66.7	69.6	183.9	308.8	583.9	757.8	784.6	906.9	1,257.3	1,441.3	1,530.9	169
	Total	tons	233.9	946.9	1,466.8	1,009.2	988.4	1,366.6	1,841.8	1,414.8	3,471.4	2,620.0	4,457.9	6,043.5	951.6

【Notes】:

①The data of import of eel and eel products are entered by japonica and other eel species, respectively

②Examples of type/size of import of eel and eel product may include live eel, frozen eel, chilled eel or broiled eel.

③When there are no relevant data or data is not available, "-" should be entered. When data is identified as zero, "0" should be entered.

④Unit for import of eel and eel products should be weight (kilograms or metrc tons) as far as possible.

Comments by Members: Relevant data is not available by species.

Format 8: Export of eel seeds (glass eels and eel fry)

Species	Type/Size	Unit	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
Anguilla sp.	glass eel	kg	0	0	50	0	0	0	0	0	4,560	3,072	0	1,260	0
	eel fry (kuroko)	kg	0	0	3,262	0	138	0	0	0	0	0	0	0	0
	Total	kg	0	0	3,312	0	138	0	0	0	4,560	3,072	0	1,260	0

【Notes】:

1. The data of export of eel seeds are entered by japonica and other eel species, respectively
2. The statistic period of the data related to eel seeds (export of glass eel and eel fry) should be the fishing season of glass eel and eel fry ("20XX-XX+1"means the input season which starts from 1st Novemver, 20XX to 31st October, 20XX+1.).
3. When there are no relevant data or data is not available, "-" should be entered. When data is identified as zero, "0" should be entered.
4. Unit for catch of glass eel and eel fry should be weight in kilograms.

Comments by Members:Relevant data is not available by species. Glass eel: below 0.3g & for aquaculture. Eel fry : between 0.3g to 50g & for aquaculture

Format 9: Export of eel and eel products

Species	Type/Size	Unit	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2022-23	2023-24
Anguilla sp.	live eel	tons	79.9	2.3	0.1	0.4	0.0	19.4	0.2	0.0	5.2	3.1	0.0	0.0	0
	freeze	tons	11.1	1.1	0.0	0.1	2.1	23.8	25.2	0.3	1.0	1.0	0.3	1.4	1
	cold storage	tons	0.1	0.0	0.0	0.1	0.0	0.0	0.6	0.0	0.2	1.0	0.1	0.3	0
	broiled eel	tons	0.1	7.3	0.3	1.4	3.3	1.1	4.2	5.9	4.7	42.3	89.2	43.2	0
	Total	tons	91.2	10.7	0.4	2.0	5.4	44.3	30.2	6.2	11.1	47.4	89.6	44.9	1

【Notes】:

1. The data of export of adult eel and eel products are entered by japonica and other eel species, respectively
2. Examples of type/size of export of eel and eel product may include live eel, frozen eel, chilled eel or broiled eel.
3. When there are no relevant data or data is not available, "-" should be entered. When data is identified as zero, "0" should be entered.
4. Unit for export of eel and eel products should be weight (kilograms or metrc tons) as far as possible.

Comments by Members: Relevant data is not available by species.

Format 10. Mean value of wight and length of Japanese eel

	Unit	When catching	When inputing into aquaculture ponds	When importing	When exporting
glass eel	weight (g)	0.2g	0.2g	below 0.3g	below 0.3g
	body length (cm)	5~7cm	5~7cm	-	-
eel fry	weight (g)	0.3g~199g	-	between 0.3g to 50g	between 0.3g to 50g
	body length (cm)	8~59cm	-	-	-
adult eel	weight (g)	above 200g	-	-	-
	body length (cm)	above 60cm	-	-	-

【Notes】:

1. The data of weight and length of Japanese eel into aquaculture ponds are entered by glass eel, eel fry and adult eel, respectively.

2. The data entered can be either mean value or figures in certain ranges (e.g., XX – YYg or cm). If mean value is available, it should be clearly mentioned in the comments by Members that the mean value of weight and length figures are based on biological or administrative standards or figures obtained from industry associations, etc.

3. When there are no relevant data or data is not available, "-" should be entered. When data is identified as zero, "0" should be entered.

4. "Body length" is the length of a fish measured from the tip of the snout to the posterior end of the last vertebra.

Comments by Members: The data is calculated based on materials submitted by Fresh Water Eel Culture Fisheries Cooperative, not stipulated in national laws.

●Data Sources and/or Methods to collect or estimate the data

(* Please fill in data sources and/or methoods to collect or estimate the data entried in from format 1 to format 14 respectively.)

1. Catch of glass eel	Fresh Water Eel Culture Fisheries Cooperative and Fisheries Monotoring Center of Korea Maritime Institute
2. Catch of eel fry (kuroko)	Not Applicable
3. Catch of wild adult eel	Survey of recent trends in fishery production' by Statistics Korea
4. Fishing effort on glass eel	Not Applicable
5. Fishing effort on eel fry (kuroko)	Not Applicable
6. Fishing effort on wild adult eel	Not Applicable
7. Input of eel seeds into aquaculture ponds	Fresh Water Eel Culture Fisheries Cooperative and Fisheries Monotoring Center of Korea Maritime Institute
8. Aquaculture production	Survey of recent trends in fishery production' by Statistics Korea (not managed by species)
9. Scale of aquaculture industry	Local government
10. Import of eel seeds	National Fishery Products Quality Management Service (NFQS)
11. Import of eel and eel products	수산정보포탈시스템(www.fips.go.kr)
12. Export of eel seeds	수산정보포탈시스템(www.fips.go.kr)

13. Export of eel and eel products	수산정보포탈시스템(www.fips.go.kr)
14. Mean value of wight and length of Japanese eel	Fresh Water Eel Culture Fisheries Cooperative and Fisheries Monotoring Center of Korea Maritime Institute

【Revised Standard Working Formats for Eel Statistics (2024)】 Members：Chinese Taipei IC17 [illegible]Doc.11

Format 1：Data on Catch of Japanese Eel (Data is limited to taken from the wild)

Item	Unit	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24(*1)
Catch of glass eel	kg	1,912	960	8,250	1,100	3,060	4,500	1,100	2,751	5,244	6,005	1,607	1,850	1,300
Catch of eel fry (kuroko)(*2)	kg	-	-	-	-	-	-	-	-	-	-	-	-	-
Catch of wild adult eel (*2)	kg or tons	-	-	-	-	-	-	-	-	-	-	-	-	-

【Notes】:

1. The catch data of Japanese eel are entered by glass eel, eel fry and wild adult eel, respectively.
2. Unit for catch of glass eel and eel fry should be weight in kilograms. Unit for adult eel should be weight in metrc tons.
3. When there are no relevant data or data is not available, "-" should be entered. When data is identified as zero, "0" should be entered.
4. The statistic period of the data related to glass eel and eel fry (catch of glass eel and eel fry) should be the fishing season of glass eel and eel fry ("20XX-XX+1"means the input season which starts from 1st Novemver, 20XX to 31st October, 20XX+1.), while that for "wild adult eel data" should be the calendar year.

Comments by Members：

*1 The catch of glass eel 2023-2024 season is preliminary data.

*2 There are no available statistics for eel fry and wild adult eel fishing fisheries in Chinese Taipei.

Format 2：Data on Fishing effort on Japanese eel

Item	Unit	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
Fishing effort on glass eel	number of licences (or fishermans, fishing vessels)	-	213	232	250	245	251	272	311	363	374	364	322	301
Fishing effort on eel fry (kuroko)(*3)	number of licences (or fishermans, fishing vessels)	-	-	-	-	-	-	-	-	-	-	-	-	-
Fishing effort on wild adult eel(*3)	number of licences (or fishermans, fishing vessels)	-	-	-	-	-	-	-	-	-	-	-	-	-

【Notes】:

1. The data of fishing effort on Japanese eel are entered by glass eel, eel fry and adult eel, respectively.
2. Examples of unit for fishing effort may include the number of licenses, the number of fishermen or the number of fishing vessels.The unit can be chosen in accordance with each domestic legislations.
3. When there are no relevant data or data is not available, "-" should be entered. When data is identified as zero, "0" should be entered.
4. The statistic period of the data related to glass eel and eel fry (fishing effort on glass eel and eel fry) should be the fishing season of glass eel and eel fry ("20XX-XX+1"means the input season which starts from 1st Novemver, 20XX to 31st October, 20XX+1.), while that for "wild adult eel data" should be the calendar year.

Comments by Members：

*3 There are no available statistics for eel fry and wild adult eel fishing fisheries in Chinese Taipei.

Format 3: Input of eel seeds (glass eels and eel fry (kuroko)) into aquaculture ponds(*4)

Species	Unit	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24(*5)
japonica	kg	2,210	1,510	12,500	2,800	3,600	7,300	1,030	834	8,144	4,558	887	776	82
domestic catch	kg	-	-	-	-	-	-	-	-	-	-	-	-	-
imports	kg	-	-	-	-	-	-	-	-	-	-	-	-	-
Other eel species	kg	5,500	10,000	1,450	200	80	100	50	141	124	114	70	52	0
bicolor	kg	-	-	-	-	-	-	-	-	-	-	-	-	-
anguilla	kg	-	-	-	-	-	-	-	-	-	-	-	-	-
rostrata	kg	-	-	-	-	-	-	-	-	-	-	-	-	-
marmorata	kg	-	-	-	-	-	-	-	-	-	-	-	-	-
mossambica	kg	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	kg	7,710	11,510	13,950	3,000	3,680	7,400	1,080	975	8,267	4,672	957	828	82

【Notes】:

1. Inputs of eel seeds (glass eels and eel fry) into aquaculture ponds are entered by japonica and other eel species, respectively
2. The data of japonica are entered by domestical catched seeds and imported seeds, respectively
3. However, eel seeds which transferred by other countries and regions are not included in the data of input of eel seeds.
4. Unit for catch of glass eel and eel fry should be weight in kilograms.
5. When there are no relevant data or data is not available, "-" should be entered. When data is identified as zero, "0" should be entered.
6. The statistic period of the data related to eel seeds (input of glass eel and eel fry) should be the fishing season of glass eel and eel fry ("20XX-XX+1"means the input season which starts from 1st Novemver, 20XX to 31st October, 20XX+1.).

Comments by Members:

*4 Because the eel culture industry in Chinese Taipei has some characteristics, such as several breeding stages and longer seed stocking time, the data would be expressed in total statistics.

*5 The input of glass eel into aquaculture ponds 2023-2024 season is preliminary data from 1st November to 12th April.

Format 4: Aquaculture production(*6)

Species	Unit	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023(*7)	2024
japonica	tons	2,244	1,500	1,675	5,187	4,658	3,665	4,204	3,521	1,693	5,044	3,471	2,664	-
Other eel species	tons	-	404	228	394	154	81	106	142	155	219	152	46	-
bicolor	tons	-	-	-	-	-	-	-	-	-	-	-	-	-
anguilla	tons	-	-	-	-	-	-	-	-	-	-	-	-	-
rostrata	tons	-	-	-	-	-	-	-	-	-	-	-	-	-
marmorata	tons	-	-	-	-	-	-	-	-	-	-	-	-	-
mossambica	tons	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	tons	2,244	1,904	1,903	5,581	4,812	3,746	4,310	3,663	1,848	5,263	3,623	2,710	-

【Notes】:

1. The data of aquaculture production are entered by japonica and other eel species, respectively

2. Unit for aquaculture production should be weight (kilograms or metrc tons) as far as possible.

3. When there are no relevant data or data is not available, "-" should be entered. When data is identified as zero, "0" should be entered.

4. Aquaculture production data should be the calendar year.

Comments by Members:

*6 The eel aquaculture production statistics in Chinese Taipei, which are divided into two categories 'Japanese eel' and 'other eel species', are reported by local governments. Thus, the data would be expressed in total statistics.

*7 The aquaculture production in 2023 is preliminary data.

Format 5: Other data on aquaculture

Item	Unit	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023(*8)	2024
Scale of aquaculture industry	number of aquaculture operators	449	305	456	391	392	409	341	241	317	391	330	284	-

【Notes】:

①Unit for scale of aquaculture industry may include the number of aquaculture operator or the dimensions of aquaculture ponds.

②When there are no relevant data or data is not available, "-" should be entered. When data is identified as zero, "0" should be entered.

Comments by Members:

*8 The hectares of aquaculture area in 2023 is preliminary data.

Format 6: Import of eel seeds (glass eels and eel fry)(*9)

Species	Type/Size	Unit	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24(*10)
japonica	glass eel	kg	1,319	664	2,044	631	352	688	2,270	127	2,232	518	433	423	56
	eel fry (kuroko)	kg	508	708	4,286	60	764	1,950	91	55	7,853	1,273	563	536	-
Total		kg	1,827	1,372	6,330	691	1,116	2,638	2,361	182	10,085	1,791	996	959	56
Other eel species(*11)	glass eel	kg	-	-	-	-	-	-	-	-	-	-	-	-	-
	eel fry (kuroko)	kg	-	-	-	-	-	-	-	-	-	-	-	-	-
Total		kg	-	-	-	-	-	-	-	-	-	-	-	-	-

【Notes】:

1. The data of import of eel seeds (glass eels and eel fry) are entered by japonica and other eel species, respectively
2. The statistic period of the data related to eel seeds (import of glass eel and eel fry) should be the fishing season of glass eel and eel fry ("20XX-XX+1"means the input season which starts from 1st Novemver, 20XX to 31st October, 20XX+1.).
3. When there are no relevant data or data is not available, "-" should be entered. When data is identified as zero, "0" should be entered.
4. Unit for catch of glass eel and eel fry should be weight in kilograms.

Comments by Members:

*9 The CCC(Import and Export Commodity Classification of Chinese Taipei) codes are 3019220109[Glass eel (over 5,000 pcs per Kg)], 3019220207[Eel fry (501-5,000 pcs per Kg)] and 3019220305[Young eel (11-500 pcs per Kg)].

*10 The data of import of eel seeds 2023-24 is from 1st January to 31st Mar.

*11 According to the statistic of Customs Administration, Ministry of Finance and the CCC(Import and Export Commodity Classification of Chinese Taipei) codes, there are no available statistics for other eel species.

Format 7: Import of eel and eel products(*12)

Species	Type/Size	Unit	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024(*13)
japonica	live eel	tons	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	broiled eel	tons	0.0	0.0	0.0	0.0	0.1	6.5	0.0	0.0	188.6	37.7	1.0	0.4	0.0
Other eel species(*14)		tons	10.7	7.7	28.3	4.1	0.6	3.3	2.2	4.2	0.0	0.0	0.0	0.0	0.0
		tons	-	-	-	-	-	-	-	-	-	-	-	-	-
Total		tons	11.0	7.7	28.3	4.1	0.9	14.1	2.2	4.2	314.3	62.9	1.7	0.6	0

【Notes】:

①The data of import of eel and eel products are entered by japonica and other eel species, respectively

②Examples of type/size of import of eel and eel product may include live eel, frozen eel, chilled eel or broiled eel.

③When there are no relevant data or data is not available, "-" should be entered. When data is identified as zero, "0" should be entered.

④Unit for import of eel and eel products should be weight (kilograms or metrc tons) as far as possible.

Comments by Members:

*12 Since 2016 Taiwan has adopted the general trade system, which includes bonded warehouses, logistics centers, and free trade zones in the commodity trade statistics.

*13 The data of import of eel and eel products 2024 is from 1st January to 31st Mar.

*14 According to the statistic of Customs Administration, Ministry of Finance and the CCC(Import and Export Commodity Classification of Chinese Taipei) codes, there are no available statistics for broiled eel of other eel species.

Format 8: Export of eel seeds (glass eels and eel fry)(*15)

Species	Type/Size	Unit	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24(*16)
japonica	glass eel	kg	869	93	150	0	0	0	260	0	0	228	168	0	0
	eel fry (kuroko)	kg	399	21	10	0	101	0	2,886	68	1,062	5,390	974	991	0
Total		kg	1,268	114	160	0	101	0	3,146	68	1,062	5,618	1,142	991	0
Other eel species(*17)	glass eel	kg	-	-	-	-	-	-	-	-	-	-	-	-	-
	eel fry (kuroko)	kg	-	-	-	-	-	-	-	-	-	-	-	-	-
Total		kg	-	-	-	-	-	-	-	-	-	-	-	-	-

【Notes】:

1. The data of export of eel seeds are entered by japonica and other eel species, respectively
2. The statistic period of the data related to eel seeds (export of glass eel and eel fry) should be the fishing season of glass eel and eel fry ("20XX-XX+1"means the input season which starts from 1st Novemver, 20XX to 31st October, 20XX+1.).
3. When there are no relevant data or data is not available, "-" should be entered. When data is identified as zero, "0" should be entered.
4. Unit for catch of glass eel and eel fry should be weight in kilograms.

Comments by Members:

*15 The CCC(Import and Export Commodity Classification of Chinese Taipei) codes are 3019220109[Glass eel (over 5,000 pcs per Kg)], 3019220207[Eel fry (501-5,000 pcs per Kg)] and 3019220305[Young eel (11-500 pcs per Kg)].
*16 The data of Export of eel seeds 2023-24 is from 1st January to 31st Mar.
*17 According to the statistic of Customs Administration, Ministry of Finance and the CCC(Import and Export Commodity Classification of Chinese Taipei) codes, there are no available statistics for other eel species.

Format 9: Export of eel and eel products

Species	Type/Size	Unit	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024(*18)
japonica	live eel	tons	1,362.7	866.8	891.6	2,845.1	2,544.4	2,030.4	2,396.4	1,862.3	1,009.1	1,417.3	1,654.1	954.5	146.9
	broiled eel	tons	370.4	176.0	153.4	561.7	230.2	135.3	162.8	94.4	56.7	238.9	132.3	107.2	30.8
Other eel species	live eel	tons	95.0	18.6	19.8	13.6	0.0	18.1	48.0	12.9	0.0	0.0	0.0	0.0	0.0
	broiled eel (*19)	tons	-	-	-	-	-	-	-	-	-	-	-	-	-
Total		tons	1,828.1	1,061.4	1,064.8	3,420.4	2,774.6	2,183.8	2,607.2	1,969.7	1,065.9	1,656.2	1,786.4	1,061.7	177.7

【Notes】:

1. The data of export of adult eel and eel products are entered by japonica and other eel species, respectively
2. Examples of type/size of export of eel and eel product may include live eel, frozen eel, chilled eel or broiled eel.
3. When there are no relevant data or data is not available, "-" should be entered. When data is identified as zero, "0" should be entered.
4. Unit for export of eel and eel products should be weight (kilograms or metrc tons) as far as possible.

Comments by Members:

*18 The data of Export of eel and eel products 2024 is from 1st January to 31st Mar.
*19 According to the statistic of Customs Administration, Ministry of Finance and the CCC(Import and Export Commodity Classification of Chinese Taipei) codes, there are no available statistics for broiled eel of other eel species.

Format 10. Mean value of wight and length of Japanese eel(*19,20)

	Unit	When catching	When inputing into aquaculture ponds	When importing	When exporting
glass eel	weight (g)				
	body length (cm)				
eel fry	weight (g)				
	body length (cm)				
adult eel	weight (g)				
	body length (cm)				

【Notes】:

1. The data of weight and length of Japanese eel into aquaculture ponds are entered by glass eel, eel fry and adult eel, respectively.

2. The data entered can be either mean value or figures in certain ranges (e.g., XX – YYg or cm). If mean value is available, it should be clearly mentioned in the comments by Members that the mean value of weight and length figures are based on biological or administrative standards or figures obtained from industry associations, etc.

3. When there are no relevant data or data is not available, "-" should be entered. When data is identified as zero, "0" should be entered.

4. "Body length" is the length of a fish measured from the tip of the snout to the posterior end of the last vertebra.

Comments by Members:

*19 Because the eel culture industry in Chinese Taipei has some characteristics, such as several breeding stages and longer seeds stocking time, there are no available statistics for mean value of weight and length of Japanese eel.

*20 According to the statistic of Customs Administration, Ministry of Finance, the CCC(Import and Export Commodity Classification of Chinese Taipei) codes are 3019220109[Glass eel (over 5,000 pcs per Kg)], 3019220207[Eel fry (501-5,000 pcs per Kg)] and 3019220305[Young eel (11-500 pcs per Kg)].

●Data Sources and/or Methods to collect or estimate the data

(* Please fill in data sources and/or methoods to collect or estimate the data entried in from format 1 to format 14 respectively.)

1. Catch of glass eel	The data of catch of glass eel originates from the Taiwan Fisheries Statistical Yearbook. The local governments collect the data through regional fisherman's associations and report to Fisheries Agency seasonally. If there is any unreasonable point found, Fisheries Agency will request the local governments recheck and reconfirm. Besides, Japanese eel is the majority of species (Anguilla spp) but it may possibly cover a little of other eel species. The original unit for catch of glass eel is PCs and it has been conversed to weight by the rate of 5,000 PCs/ Kg. Besides, the fishing periods year has been adopted from 2011.Hence, it might be difficult to retrace the original condition, so only reasonable data are provided. The data of 2013 is estimated number, which could be adjusted after confirmed.
2. Catch of eel fry (kuroko)	There are no available statistics for eel fry fishing fisheries in Chinese Taipei.
3. Catch of wild adult eel	There are no available statistics for wild adult eel fishing fisheries in Chinese Taipei.
4. Fishing effort on glass eel	The number of fishing vessel, which is authorized to catch glass eel.
5. Fishing effort on eel fry (kuroko)	There are no available statistics for eel fry fishing fisheries in Chinese Taipei.
6. Fishing effort on wild adult eel	There are no available statistics for wild adult eel fishing fisheries in Chinese Taipei.

7. Input of eel seeds into aquaculture ponds	The data of Japanese eel and other eel are compiled by Taiwan eel farming industry development foundation based on the reports from its member on input.
8. Aquaculture production	The eel aquaculture production statistics in Chinese Taipei, which are divided into two categories 'Japanese eel' and 'other eel species', are reported by local governments. Thus, the data would be expressed in total statistics.
9. Scale of aquaculture industry	The scale of aquaculture is measured by aquaculture area (hectare). The data of aquaculture area originate from the Taiwan Fisheries Statistical Yearbook. The local governments collect the data through the oral questionnaire surveyed by the offices of village, town, or district, and report to Fisheries Agency seasonally. If there is any unreasonable point found, Fisheries Agency will request the local governments recheck and reconfirm. The data of 2013 is estimated number, which could be adjusted after confirmed.
10. Import of eel seeds	The data of importation is derived from the statistic of Customs Administration, Ministry of Finance. The CCC(Import and Export Commodity Classification of Chinese Taipei) code are 3019220109[Glass eel (over 5,000 pcs per Kg)], 3019220207[Eel fry (501-5,000 pcs per Kg)] and 3019220305[Young eel (11-500 pcs per Kg)].
11. Import of eel and eel products	The data of exportation is derived from the statistic of Customs Administration, Ministry of Finance. The CCC(Import and Export Commodity Classification of Chinese Taipei) code are 03019210101(Live Japanese eel), 16041700125(Roasted eel),16041700116(Prepared eel), 03019210904(*Anguilla* spp.),03019210307(*Anguilla australis*) and 03019210209(*Anguilla marmorata*). Besides, since 2013, the CCC code of Prepared eel has been changed as 16041700116 and Roasted eel as 16041700125.
12. Export of eel seeds	The data of exportation is derived from the statistic of Customs Administration, Ministry of Finance. The CCC(Import and Export Commodity Classification of Chinese Taipei) code are 3019220109[Glass eel (over 5,000 pcs per Kg)], 3019220207[Eel fry (501-5,000 pcs per Kg)] and 3019220305[Young eel (11-500 pcs per Kg)].
13. Export of eel and eel products	The data of exportation is derived from the statistic of Customs Administration, Ministry of Finance. The CCC(Import and Export Commodity Classification of Chinese Taipei) code are 03019210101(Live Japanese eel), 16041700125(Roasted eel),16041700116(Prepared eel), 03019210904(*Anguilla* spp.),03019210307(*Anguilla australis*) and 03019210209(*Anguilla marmorata*). Besides, since 2013, the CCC code of Prepared eel has been changed as 16041700116 and Roasted eel as 16041700125.
14. Mean value of wight and length of Japanese eel	The data of exportation is derived from the statistic of Customs Administration, Ministry of Finance. The CCC(Import and Export Commodity Classification of Chinese Taipei) codes are 3019220109[Glass eel (over 5,000 pcs per Kg)], 3019220207[Eel fry (501-5,000 pcs per Kg)] and 3019220305[Young eel (11-500 pcs per Kg)].

附件 25 秘書處更新日本及韓國自中國大陸進口玻璃鰻數據

張雅棻

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副本: 小川 太輝(OGAWA Taiki); 小野田 希史(ONODA Kifumi)
主旨: [外部郵件]RE: (Summary Report)RE: Document share: the Seventeenth Meeting of Informal Consultation on Eels (June 6-7, 2024)

郵件標幟: 待處理
標幟狀態: 已標幟

Dear colleagues from China, Japan, Korea, and Chinese Taipei,

As per the request from China during the last Informal Consultation, the Secretariat is writing to circulate the information of the glass eel import from China to Korea and Japan provided by each member.

Please find the table below.

【Korea】

Glass Eel Import from China to Korea (kg)

2022.11～23.10

Total Amount

7,350

China

35

Hong Kong

7,315

【Japan】

Glass Eel Import from China to Japan* (kg)

2022.11～23.10

Note

Total Amount

10,394

China

0

Japan Ministry of Finance trade statistics

Hong Kong

10,394

Japan Ministry of Finance trade statistics

*This might contain a very small amount of eel fries

Kind regards,

附件 26 各國鰻魚資源保育措施

Summary Table of Conservation and Management Measures for Eels（China）

Eel aquaculture		Description
Condition of eel aquaculture business	none/license required	
Ground for license, etc. ※	Legistlation/Other scheme	Name of Legislation/other scheme requiring licenses: Decree of the Ministry of Agriculture of the People's Republic of China "Measures for License Issuance and Registration of Aquaculture in Water Areas and Tidal Flats"
Management body	Fisheries Agency	
Contents of management measures		
① Upper limit for the number of licenses	Central/By local authority/None	License holders: company/facility/others (　) Data not available
② Upper limit for scale of facilities	Yes/No	
③ Upper limit for input of *Anguilla japonica*	Central/By local authority/By individual/None	This measure will be further considered for future Informal Consultations including complementary measures, possibly taking into account scientific advice from the Scientific Meeting.
④ Upper limit for input of other eels	Central/By local authority/By individual/None	This measure will be further considered for future Informal Consultations including complementary measures , possibly taking into account scientific advice from the Scientific Meeting.
⑤ Size limit for input glass eels	Central/By local authority/None	Description of regulation:
⑥ Time closure of glass eels input	Central/By local authority/None	Description of regulation:
⑦ Other regulation	Central/By local authority/None	Description of regulation:
⑧ Body to manage and monitor input of glass eels	Prefectural or provincial eel association	Monitoring measure: Farmers shall report their input amount to the prefectural or provincial eel association by the end of glass eel input.
⑨ Body to manage and monitor production amount	Prefectural or provincial eel association	Monitoring measure: Farmers shall report their production amount to the prefectural or provincial eel association every year.
⑩ Penalty	Yes/No	Penalty for aquaculture operation without licenses: Prohibition of aquaculture
Voluntary measures by industry		

Glass eel fishery		Description
Condition of glass eel fishery	none/license required	
Ground for license, etc. ※	Legislation/Other scheme	Name of Legislation/other scheme requiring licenses: Notice on strengthening the management of eel fry fishing in the Yangtze Estuary no catch management zone and adjacent waters in 2022
Management body	Local authority	
Contents of management measures		License holders: individual/association/others( ): From January 1, 2021, the issuance of special fishing licenses for eel fry in the waters within the Yangtze River Estuary has been ceased. At the same time, it is stipulated that in the fishable waters, the number of special fishing licenses for glass eel in 2022 shall not exceed that of 2021, the number of net gear per license shall not exceed 100, and the number of net openings per net gear shall not exceed 1.
① Upper limit for the number of licenses	Central/By local authority/None	Description of regulation: From January 1, 2021, the issuance of special fishing licenses for eel fry in the waters within the Yangtze River Estuary has been ceased. At the same time, it is stipulated that in the fishable waters, the number of special fishing licenses for glass eel in 2022 shall not exceed that of 2021.
② Regulation on fishing gear	Yes/No	Description of regulation: The number of net gear per license shall not exceed 100, and the number of net openings per net gear shall not exceed 1.
③ Upper limit for catch	Central/By local authority/By individual/None	Description of limit:
④ Size limit	Central/By local authority/None	Description of limit:
⑤ Time closure of glass eel catch	Central/By local authority/None	Description of regulation: In several coastal fishing provinces, fishing is allowed from the beginning of November to the end of April of the next year.
⑥ Body to manage and monitor catch amoun	Local authority	Monitoring measures: Fishers shall report catch data to the local authority and local authorities may report data to the Fishery and Fisheries Administration of the Ministry of Agriculture and Rural Areas.
⑦ Penalty	Yes/No	Penalty for fishing operation without licenses: In case of gross violation (using the net with a mesh size less than 2.5 cm), criminal responsibility will be investigated according to the law， less than 3 years of imprisonment.
Voluntary measures by industry		

Adult eel fishery		Description
Condition of adult eel fishery	(none)/license required	
Ground for license, etc. ※	Legislation/Other scheme	Name of Legislation/other scheme requiring licenses:
Management body	Local authority	
Contents of management measures	Yes/(No)	License holders: individual/association/others( ) Total number of licenses issued: Number of fishers:
① Upper limit for the number of licenses	Central/By local authority/(None)	Description of regulation:
② Regulation on fishing gear	Yes/(No)	Description of regulation:
③ Upper limit for catch	Central/By local authority/By individual/(None)	Description of limit:
④ Size limit	Central/By local authority/(None)	Description of limit:
⑤ Time closure	Central/By local authority/(None)	Description of regulation:
⑥ Body to manage and monitor catch amount		Monitoring measures:
⑦ Penalty	Yes/(No)	Penalty:
Voluntary measures by industry		

Additional information

Summary Table of Conservation and Management Measures for Eels (Japan)

Eel aquaculture		Description
Condition of eel aquaculture business	none/license required	
Ground for license, etc. ※	Legistlation/Other scheme	Name of Legislation/other scheme requiring licenses: Inland Water Fishery Promotion Act enacted on June 27. 2014 and Order for enforcement of Inland Water Fishery Promotion Act established on October 1st 2014. Establishment date: June 27, 2014
Management body	Fisheries Agency	
Contents of management measures		
① Upper limit for the number of licenses	Central/By local authority/None	License holders: company/facility/others ( ) Total number of Licenses issued: 448 for *A. japonica* , 103 for eels other than *A. japonica* (November 2023 - October 2024, as of November 1, 2023)
② Upper limit for scale of facilities	Yes/No	Description of regulation: total area of aquaculture ponds written in a permit.
③ Upper limit for input of *Anguilla japonica*	Central/By local authority/By individual/None	The quota for each individual farmer is set within the total upper limit. Total upper limit for *A. japonica* is 21.7 tons.
④ Upper limit for input of other eels	Central/By local authority/By individual/None	The quotat is set for each individual farmer within the total upper limit. Total upper limit for eels other than *A. japonica* is 3.5 tons.
⑤ Size limit for input glass eels	Central/By local authority/None	Description of regulation:
⑥ Time closure of glass eels input	Central/By local authority/None	Description of regulation:
⑦ Other regulation	Central/By local authority/None	Description of regulation: - When farmers sell their farmed eels to other farmers' aquaculture operation, sellers shall provide the document about trade records to buyers. - In case farmers conduct aquaculture operation of eels other than A. japonica, they are prohibited to release the eels to waters outside of their facility. The farmers shall take necessary measures to prevent their escape.
⑧ Body to manage and monitor input of glass eels	Fisheries Agency	Monitoring measure: Farmers shall report their input amount to the Fisheries Agency every month.
⑨ Body to manage and monitor production amount	Fisheries Agency	Monitoring measure: Farmers shall report their production amount to the Fisheries Agency every month.
⑩ Penalty	Yes/No	Penalty for aquaculture operation without licenses: Less than 3 years of imprisonment or a penalty of less than 2 million yen
Voluntary measures by industry		

Glass eel fishery		Description
Condition of glass eel fishery	none/license required	
Ground for license, etc. ※	Legislation/Other scheme	Name of Legislation/other scheme requiring licenses: Prefectural Fisheries Coordination Regulation based on the Fisheries Act and the Act on the Protection of Fisheries Resources
Management body	Local authority	
Contents of management measures		License holders: individual/association/others ( ) Total number of licenses issued: 7,320 Number of fishers: 15,398 (2022-2023 fishing season)
① Upper limit for the number of licenses	Central/By local authority/None	Description of regulation: License holders are limited to Fisheries Associations, members of Fisheries Associasions, eel farmers and so on.
② Regulation on fishing gear	Yes/No	Description of regulation: Limitation of fishing gears and fishing types are introduced in each prefecture.
③ Upper limit for catch	Central/By local authority/By individual/None	Description of limit: Catch quota is set based on historical catch amount, area of aquaculture pond and so on.
④ Size limit	Central/By local authority/None	Description of limit: Size limit is introduced in each prefecture.
⑤ Time closure of glass eel catch	Central/By local authority/None	Description of regulation: In many fishing grounds, fishing is allowed from December to April in the following year.
⑥ Body to manage and monitor catch amoun	Local authority	Monitoring measures: Fishers shall report catch data to the local authority and local authorities may report data to the Fisheries Agency.
⑦ Penalty	Yes/No	The penalty for catching glass eels without a fishing permit will be an imprisonment of up to 3 years or a fine of not more than 30 million yen.
Voluntary measures by industry		

Adult eel fishery		Description
Condition of adult eel fishery	none/license required	
Ground for license, etc. ※	Legislation/Other scheme	Name of Legislation/other scheme requiring licenses: Prefectural Fisheries Coordination Regulation and other regulations based on the Fisheries Act and the Act on the Protection of Fisheries Resources
Management body	Local authority	
Contents of management measures	Yes/No	License holders(individual/association/others( ) Total number of licenses issued: Number of fishers:
① Upper limit for the number of licenses	Central/By local authority/None	Description of regulation:
② Regulation on fishing gear	Yes/No	Description of regulation: Limitation of fishing gears and fishing types are introduced in each Prefectures.
③ Upper limit for catch	Central/By local authority/By individual/None	Description of limit:
④ Size limit	Central/By local authority/None	Description of limit: Size limit is introduced in each prefecture. Lower size limit is 20cm - 30cm in most regions.
⑤ Time closure	Central/By local authority/None	Description of regulation: Time closure is introduced in each prefecture, mainly from October to March when eels migrate from river to sea for spawning.
⑥ Body to manage and monitor catch amount		Monitoring measures:
⑦ Penalty	Yes/No	Penalty: Less than 6 months of imprisonment or a penalty of less than 100,000 yen for violation of Regional Fisheries Coordination Regulation. Less than 1 year of imprisonment or a penalty of less than 500,000 yen for violation of Instruction by Fisheries Adjustment Commission.
Voluntary measures by industry		In July 2018, National Federation of Inland Waters Fishing Ground Management Commissions and National Federation of Inlandwater Fisheries Cooperatives jointly adopted the resolution on promoting nationwide conservation of eels migrating from river to sea for spawning.

Additional information

Summary Table of Conservation and Management Measures for Eels (Korea)

Eel aquaculture		Description
Condition of eel aquaculture business	none/license required	Article 43 of the Aquaculture Industry Development Act (Authorization of farming) stipulates that eel farming is subject to authorization (enacted on August 27, 2019 and took effect on August 27, 2020)
Ground for license, etc. ※	Legislation/Other scheme	Article 43 of the Aquaculture Industry Development Act (Authorization of farming) stipulates that eel farming is subject to authorization (enacted on August 27, 2019 and took effect on August 27, 2020)
Management body	System management: Inland Fishery Industry Team, Aquaculture Industry Division, Ministry of oceans and	Acceptance of a report: Local authority
Contents of management measures		
① Upper limit for the number of licenses	Central/By local authority/None	License holders: company/facility/others (Individual) Total number of reports: 646 as of 2023
② Upper limit for scale of facilities	Yes/No	Description of regulation:
③ Upper limit for input of *Anguilla japonic*	Central/By local authority/By individual/None	Fresh Water Eel Culture Fisheries Cooperative composed of eel farmers self-regulates the input: Upper limit for *A. japonica* input is set at 11.1 tons.
④ Upper limit for input of other eels	Central/By local authority/By individual/None	Fresh Water Eel Culture Fisheries Cooperative composed of eel farmers self-regulates the input: Upper limit for input of eels other than *A. japonica* is set at 14.0 tons in total.
⑤ Size limit for input glass eels	Central/By local authority/None	Description of regulation: Fisheries Resource Management Act article 35, Enforcement Decree article 18, Enforcement Regulation article 17 / a glass eel to weigh below 0.3 grams
⑥ Time closure of glass eels input	Central/By local authority/None	Description of regulation:
⑦ Other regulation	Central/By local authority/None	Description of regulation:
⑧ Body to manage and monitor input of glass eels	Fresh Water Eel Culture Cooperatives	Monitoring measure: Fresh Water Eel Culture Fisheries Cooperative investigate by farm
⑨ Body to manage and monitor production amount	Fresh Water Eel Culture Cooperatives	Monitoring measure: legislation to be enacted through amendment of "Fishery products distribution management and support Act" (2 Dec 2016) and Enforcement regulations (Jun 2017) to distribute eels at designated locations, Enforcement Regulation article 7.2(2 July 2018)
⑩ Penalty	Yes/No	Penalty for aquaculture operation without license: penalty of maximum 5 million won Penalty for excess of input limit: None If not distributed at the designated place: imprisonment of 2 years or less or fine of 20 million won or less
Voluntary measures by industry		Compliance with the "Joint Statement" agreed by the Informal Eel meeting partipants

Glass eel fishery		Description
Condition of glass eel fishery	none/license required	Approval required/ Inland Water Fishery Act, Fisheries Act
Ground for license, etc. ※	Legislation/Other scheme	Name of Legislation/other scheme requiring licenses: Fisheries Act Article 41.3 (glass eel stow-net fishery), Inland Water Fishery Act Article 9(Inland Water seed harvest approval) Establishment date or estimated date to be established: Fisheries Act enforced 23 Apr 2010, Inland Water Fishery Act enforced 29 Jul 2000 (approval required since Inland Water Fisheries Development Promotion Act(09 Jul 1976))
Management body	System Management: Inland Fishery Industry Team, Aquaculture Industry Division, Ministry of oceans and	Approval: Local authority
Contents of management measures		License holders: individual/association/others( ) Total number of licenses issued: Number of approval: 517(the total number including not only glass eel but all other seed capture) as of 2022
① Upper limit for the number of licenses	Central/By local authority/None	Description of regulation:
② Regulation on fishing gear	Yes/No	Description of regulation: glass eel stow-net fishery(Enforcement Decree of the Fisheries Act Article 23)
③ Upper limit for catch	Central/By local authority/By individual/None	Description of limit:
④ Size limit	Central/By local authority/None	Description of limit:
⑤ Time closure of glass eel catch	Central/By local authority/None	Description of regulation:
⑥ Body to manage and monitor catch amou	Central and local authority	Monitoring measures: controlling unauthorized captures of glass eels
⑦ Penalty	Yes/No	Penalty for fishing operation without licenses: Less than 1 years of imprisonment or a penalty of less than 10 million
Voluntary measures by industry		

※ Attach the legal text, if there is an English version.

Adult eel fishery		Description
Condition of adult eel fishery	none/license required	Approval required
Ground for license, etc. ※	Legislation/Other scheme	Name of Legislation/other scheme requiring licenses: Inland Water Fishery Act Article 6, 9 and 11 Establishment date or estimated date to be established: Inland Water Fishery Act(29 Jul 2000)
Management body	System Management: Inland Fishery Industry Team, Aquaculture Industry Division, Ministry of oceans and	Approval: Local authority
Contents of management measures		License holders: individual/association/others( ) Total number of licenses issued: Number of fishers: Approval is issued not by fish species but by type of fishing gears, thus, the exact number cannot be
① Upper limit for the number of licenses	Central/By local authority/None	Description of regulation:
② Regulation on fishing gear	Yes/No	Description of regulation: pound net, longline, fish trap
③ Upper limit for catch	Central/By local authority/By individual/None	Description of limit:
④ Size limit	Central/By local authority/None	Description of limit: 15cm~45cm
⑤ Time closure	Central/By local authority/None	Description of regulation: six months closure(1 October ~ 31 March)
⑥ Body to manage and monitor catch amou	Central and local authority	Monitoring measures: controlling unauthorized captures of adult eels
⑦ Penalty	Yes/No	Penalty for fishing operation without licenses: Less than 1 years of imprisonment or a penalty of less than 10 million
Voluntary measures by industry		

※ Attach the legal text, if there is an English version.

Additional information

Summary Table of Conservation and Management Measures for Eels（Chinese Taipei）

Eel aquaculture		Description
Condition of eel aquaculture business	none/license required	
Ground for license, etc. ※	Legislation/Other scheme	Name of Legislation/other scheme requiring licenses：Regulations for Input Management of Eel Aquaculture Establishment date or estimated date to be established：November 14, 2014
Management body	Ministry of Agriculture	
Contents of management measures		
① Upper limit for the number of licenses	Central/By local authority/None	License holders: company/facility/others (Eel farmer) Total number of Licenses issued: 364 licenses in 2023-
② Upper limit for scale of facilities	Yes/No	Description of regulation:
③ Upper limit for input of *Anguilla japonica*	Central/By local authority/By individual/None	
④ Upper limit for input of other eels	Central/By local authority/By individual/None	
⑤ Size limit for input glass eels	Central/By local authority/None	Description of regulation:
⑥ Time closure of glass eels input	Central/By local authority/None	Description of regulation:
⑦ Other regulation	Central/By local authority/None	Description of regulation:
⑧ Body to manage and monitor input of glass eels	Fisheries Agency/ Local authority/Taiwan Eel Farming Industry Development Foundation/Local eel	Monitoring measure: The eel farmer should report the input amount of eel within 10 days after inputting eel.
⑨ Body to manage and monitor production	Fisheries Agency/ Local authority/Taiwan Eel Farming Industry Development Foundation/Local eel	Monitoring measure: The eel farmer's production should not exceed the input amount.
⑩ Penalty	Yes/No	Penalty for aquaculture operation without licenses:A fine of between NTD$ 30,000 and NTD$ 150,000. Penalty for excess of input limit: A fine of between NTD$ 30,000 and NTD$ 150,000.
Voluntary measures by industry		

Glass eel fishery		Description
Condition of glass eel fishery	none/license required	Most of the catching glass eels are from fishing vessel, so main management measures are for vessel.Vessels approved by
Ground for license, etc. ※	Legislation/Other scheme	Name of Legislation/other scheme requiring licenses：Fisheries Act/Regulations on the Restricted Fishing Seasons for Elvers/ Directions of the coastal Elvers Fishing Establishment date or estimated date to be established：Existing legislation/September 9, 2013/ November 27,
Management body	Ministry of Agriculture/Local government	
Contents of management measures		License holders: individual/association/others（Vessel） Total number of licenses issued:301 Number of
① Upper limit for the number of licenses	Central/By local authority/None	Description of regulation:Vessels approved by the central or municipal competent authorities for operating the "fishing fry" fishery are allowed to use fishing gear such as scraping nets and stow nets to catch glass eelseels(Fisheries Act Article 6 and 9).
② Regulation on fishing gear	Yes/No	Description of regulation:Scraping nets and stow net driven by vessel.
③ Upper limit for catch	Central/By local authority/By individual/None	Description of limit:
④ Size limit	Central/By local authority/None	Description of limit:
⑤ Time closure of glass eel catch	Central/By local authority/None	Description of regulation:Between March 1 and October 31 every year.
⑥ Body to manage and monitor catch amount	By local authority and local fishermen's association	Monitoring measures:The glass eel fishermen are advised to report the catch amount to local fishermen's association.
⑦ Penalty	Yes/No	Penalty for fishing operation in time closure: A fine of between NTD$ 30,000 and NTD$ 150,000.
Voluntary measures by industry		

※ Attach the legal text, if there is an English version.

Adult eel fishery		Description
Condition of adult eel fishery	none/license required	
Ground for license, etc. ※	Legislation/Other scheme	Name of Legislation/other scheme requiring licenses："Fishing bans and closed seasons"area Establishment date or estimated date to be established：Since 2013
Management body	Local authority	
Contents of management measures		License holders: individual/association/others(　　)　Total number of licenses issued:　　Number of fishers:
① Upper limit for the number of licenses	Central/By local authority/None	Description of regulation:
② Regulation on fishing gear	Yes/No	Description of regulation:According to each management measures of"fishing bans and closed seasons" area, it is forbidden to catch aquatic animals in any way or with nets.
③ Upper limit for catch	Central/By local authority/By individual/None	Description of limit:
④ Size limit	Central/By local authority/None	Description of limit: Excess of the length of 8cm elver
⑤ Time closure	Central/By local authority/None	Description of regulation: The entire year in closed eel fishing area.
⑥ Body to manage and monitor catch	By local authority	Monitoring measures: Prohibited the catch of young and adult eels in 41 rivers in Taiwan.
⑦ Penalty	Yes/No	Penalty for fishing operation in "fishing bans and closed seasons" area:A fine of between NTD$ 30,000 and NTD$ 150,000.
Voluntary measures by industry		

※ Attach the legal text, if there is an English version.

Additional information

附件 27 日本水產流通適正化法內涵及規定

Act on Ensuring the Proper Domestic Distribution and Importation of Specified Aquatic Animals and Plants

6th June 2024

Fisheries Agency of Japan
Fisheries Processing Industries and Marketing Division

Content

1 Background and Objective of Japan's scheme

- Illegal, Unreported, and Unregulated (IUU) fishing
  ~ serious threat to sustainable use of fishery resources
- Preventing IUU catches from entering supply chains
  ~ an effective measure against IUU fishing

Japan's new legislation, ***Act on Ensuring the Proper Domestic Distribution and Importation of Specified Aquatic Animals and Plants (the Act)***, aims to stop flow of IUU catches into and from Japanese market, and thereby to contribute to the prevention of illegal fishing and to the sustainable use of fishery resources

→ Contributing to the global efforts to combat IUU fishing

1 Background and Objective of Japan's scheme

- The Act entered into force on **December 1, 2022**.

- Two separate measures to regulate IUU catches:

  Class Ⅰ : Regulation on Japanese domestic market *

  Class Ⅱ : Import Regulation

* The domestic measure does not require foreign countries to take any additional procedures.

2 Regulation on Japanese domestic market

2 Regulation on Japanese domestic market

2 Regulation on Japanese domestic market
Class I Designated Fish Species / Class I Fishery Products

【Class I designated fish species】

Sea cucumber, Abalone, Glass eel*

*Glass eel is scheduled to be applied from Dec 2025 as Class I

【Class I fishery products】

Fishery products that are or made of/from above fish species

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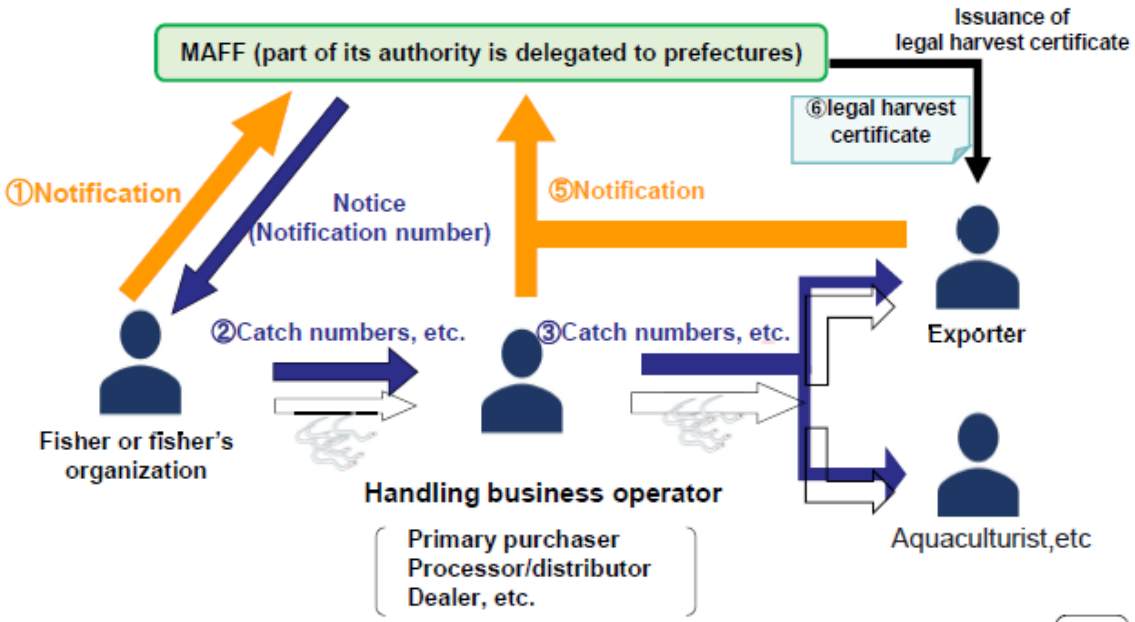
2 Regulation on Japanese domestic market



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附件 28 日本鰻及其他鰻於 CITES 討論概況

IC17 Doc.13

Discussion on the Japanese eel and other relevant eels at the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

Fisheries Agency of Japan

June 2024

Table of contents

1. Basic information of the CITES

3

(1) What is CITES?

- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

- Purpose: "Ensure that international trade in specimens of wild animals and plants does not threaten their survival"

  - 184 member countries (including EU)
  - Conference of the Parties (CoP) : Every 2 or 3 years.
  - CoP 19 : Panama, 14-25 November 2022
  - CoP 20 : Geneva, Autumn 2025 (TBD)

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(2) CITES Appendices

- Appendix I includes species threatened with extinction which are or may be affected by trade.

⇒Any commercial trades are prohibited.

- Appendix II includes species not necessarily threatened with extinction, but whose trade must be strictly regulated in order to avoid utilization.

⇒Any commercial trades require an export permit from national CITES authority.

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(3) Listing proposals of aquatic species since CoP11 (2000)

◇Listing to Appendices I and II in support of two-thirds majority of Parities presenting and voting at CoP.

	# of proposals	Percentage (%)
Sharks	18	49
Rays	8	22
Other fishes	8	22
Precious coral	2	5
Bivalves	1	3
Total	37	100

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(4) Results of the deliberations on aquatic species in CITES・COP19

- In CITES・COP19 in the November 2022, **blue shark**, a commercially-exploited aquatic species was proposed to be included in Appendix II and approved by voting in the two-third majority.

- **Blue shark** was proposed to be listed together with other 53 shark species in the same family Carcharhinidae (Requiem Shark).

- **Blue shark** was proposed for listing as **a look-alike species**, although its stock status is good in all oceans.

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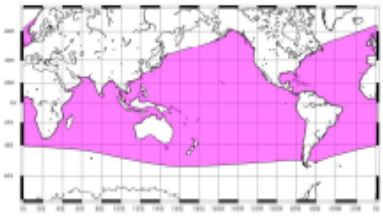
【Blue Shark: Overview】

Blue Shark (*Prionace glauca*)

●Table: Stock status of Blue Shark (*Prionace glauca*)

Management area	Year	Stock status*	Assessment institution
North/South Pacific	North:2022 South:2022	Good	North: ISC South: SPC/WCPFC
Indian Ocean	2021	Good	IOTC
North/South Atlantic	2023	North : Good South : Not over fished	ICCAT

Note: *Good" denotes the latest stock status is not likely overfished and overfishing is not likely occurred, given the MSY-based reference points.



●Management of Blue Shark in the Atlantic Ocean by ICCAT*

・52 Contracting Parties including Panama

North Atlantic
- Total Allowable Catch (TAC) : 30,000 t

South Atlantic
- Total Allowable Catch (TAC) : 27,711 t

- Maximum catch limit for contracting parties

North Atlantic	
EU	24,797 t
Japan	3,055 t
Morocco	1,253 t
UK	25 t
Total	29,130 t

South Atlantic	
EU	17,405 t
Brazil	3,481 t
Namibia	3,238 t
Japan	1,520 t
Chinese Taipei	867 t
Total	26,511 t

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*ICCAT: International Commission for the Conservation of Atlantic Tunas

(5) Status of European eel listed in Appendix II

European eel (***Anguilla anguilla***), which was already listed in Appendix II in 2007, has been treated in CITES as follows:

- CITES requires **range states, trading states and importing states** of European eel to;
  (1)strengthen measures to improve **traceability, enforcement, and assessment of "Legal acquisition findings (LAF)"**, and
  (2)consider and report on ways to issue a **"Non-detriment findings (NDF)"** upon export, taking into account the differences between glass eel, eel fry and other live eels.
- EU has prohibited all trade of European eel with outside the region as its own measure.
- ICES (The International Council for the Exploration of the Sea), an Atlantic scientific organization, has recommended a ban on the harvest of European eel in all habitats.

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2. Discussion of the thirty-second meeting of the Animals Committee

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Recommendations from the Animals Committee

- 19-23 June 2023, Geneva (Switzerland).
- **The Committee agreed recommendations including the followings.**

Encouraged Parties to:

- Record species-specific/growth-stage-specific statistics;
- Share experiences with any challenges and benefits regarding species identification techniques;
- Conduct research to increase the understanding of the basic biology and life histories of anguillid eel species; conduct joint programmes of work, experience knowledge and best practice; and manage their Anguilla resources in a sustainable manner;
- Collaborate and share experiences on the making of non-detriment findings; and
- Establish monitoring programmes of different life stages of Anguilla species.

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Mandate of the intersessional working group

- **The Committee established an intersessional working group on eels with the mandate to:**

- Review the summary of the responses to the Notification No. 2021/018 (summary of responses are SMJE-3/INF/6) and 2023/062 regarding the management measures on eel species including any updates provided under Decision 19.218;
- Review the potential use of source code R (ranching) for specimens of European eel (*A. anguilla*) from aquaculture production systems and the potential risks and benefits of reintroducing seized, live European eels to the wild; and;
- Make draft recommendations on the conservation and management of European eel for consideration by the Animals Committee at its 33rd meeting.

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3. Discussion of the seventy-seventh meeting of the Standing Committee

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Mandate of the intersessional working group

- 6-10 November 2023, Geneva (Switzerland).
- **The Committee established an intersessional working group with the following mandate:**

- Review the summary of the responses to the Notification No. 2021/018 and 2023/062 regarding the management measures on eel species including any updates provided under Decision 19.218
- Consider the recommendations of the Animals Committee;
- Consider the applicability of developing a specific Resolution on European eel; and;
- Make draft recommendations to improve the implementation of the Convention for European eel for consideration by the Standing Committee at its 78th meeting.

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Outstanding points during the Standing Committee

- It was suggested that the mandate of the intersessional working group could be **expanded to consider the applicability of developing a genus-level resolution for Anguilla** by the US, the UK, the IUCN and the Zoological Society of London (*ZSL*).
- The IUCN and the ZSL also pointed that **American eel stock has been declining since 2017 and that secure stock assessment is needed**.

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4. Status of deliberations on eel species

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Status of deliberations on eel species

The following points should be noted regarding the status of deliberations in CITES.

- The illegal trade of eels, including European eel, has been highlighted, and other eel species including Japanese eel are also under international scrutiny.
- Japanese eel, American eel and other eels might be proposed for listing in Appendix II at the next COP20 in 2025 as look-alike species because of the decline of European eel and American eel and/or international illegal trades in international markets.
- If Japanese eel and other eels are listed in Appendix II, range states/ trading states/ importing states of Japanese eel and other eels will be required to take the same restrictions as European eel.

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5. Schedule of the future meetings

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Schedule of the future meetings

Meeting	Date and Venue
The 33rd meeting of the Animals Committee	12-19 July 2024, Geneva (Switzerland)
The 78th meeting of the Standing Committee	3-8 February 2025, Geneva (Switzerland)
The 20th meeting of the Conference of the Parties	2025 Autumn (TBD), Geneva (Switzerland)

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附件 29 針對鰻魚建立具法律約束力之國際/區域性管理組織的可能性

1. Objective

Long-term conservation and sustainable use of eel resources, including aquaculture control, through cooperation among parties concerned.

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2. Target Species

i. Japanese eel

ii. Eel species belonging to Genus Anguilla other than Japanese eel
- *Anguilla anguilla*
- *A. bicolor*
- *A. rostrata*
- *A. marmorata*
- *A. mossambica etc.*

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3. Status of the possible international / regional framework

	Forum	Examples	Establishment of an Organization.	Legally Binding Measures	Obligatory Contribution
Regional Fishery Bodies (RFBs)	Regional Fisheries Management Organizations (RFMOs)	NPFC, WCPFC, NPAFC, etc.	✓	✓	✓
	Regional Fisheries Management Arrangement (RFMAs)	CCBSP, etc.		✓	
	Regional Fisheries Advisory Bodies (RFABs)	WECAFC, APFIC, SEAFDEC, etc.	✓		
Informal Consultation on International Cooperation for Conservation and Management of the Japanese Eel Stock and Other Relevant Eel Species					

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4. Other points

4.1 Secretariat

4.2 Regionality of the Framework

4.3 Governing Body and Subsidiary Bodies

4.4 Cooperative Organization

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附件 30 未來工作計畫

IC17 Doc.16

(Draft)

Work Plan for the Informal Consultation in the 2024-2025 season

By the end of April 2025
- Submission of data on catch and input of glass eels in 2023-2024 input season
- Submission of data and information in accordance with the Standard Working Formats for Eel Statistics
- Submission of revised summary table of conservation and management measures for eels

May-June 2025 (TBD)
The 4th Scientific Meeting

May-June 2025 (TBD)
The 18th meeting of the Informal Consultation

【Reference: other related international events】

1. Intersessional working group on eels established under CITES Animal Committee with the mandate to:
- review the summary of the responses to Notification to the Parties No. 2021/018 and Notification to the Parties No. 2023/062 on eels, including any updates provided under Decision 19.218 and any recommendations from the Secretariat;
- review the potential use of source code R (ranching) for specimens of European eel (*A. anguilla*) from aquaculture production systems and the potential risks and benefits of reintroducing seized, live European eels to the wild; and
- make draft recommendations on the conservation and management of European eel for consideration by the Animals Committee at its 33rd meeting.

2. The 33rd meeting of the CITES Animals Committee in Geneva on July 15-19, 2024

3. Intersessional working group on eels established under CITES Standing Committee with the mandate to:
- review the Secretariat's summary of the responses to Notification to the Parties No. 2021/018 and Notification to the Parties No. 2023/062 on eels, including any updates provided under Decision 19.218 and any recommendations from the Secretariat to improve the implementation of the Convention for European eels;
- consider the recommendations of the Animals Committee;
- consider the applicability of developing a specific Resolution on European eel; and
- make draft recommendations to improve the implementation of the Convention for European eel for consideration by the Standing Committee at its 78th meeting.

4. The 78th meeting of CITES Standing Committee in Geneva on February 3-8, 2025

5. The 20th meeting of the CITES Conference of the Parties (CoP) in Geneva in late 2025

附件 31 聯合新聞稿

Draft Joint Press Release

June 7th, 2024

On the occasion of the Seventeenth Meeting of the Informal Consultation on International Cooperation for Conservation and Management of Japanese Eel Stock and Other Relevant Eel Species (Informal Consultation),

Fisheries Management and Scientific Research Departments of the People's Republic of China, the Fisheries Agency of Japan, the Ministry of Oceans and Fisheries of the Republic of Korea and the Fisheries Agency of Chinese Taipei (hereinafter referred to as "Participants"),

Recalling that People's Republic of China, Japan, the Republic of Korea and Chinese Taipei are all Asia-Pacific Economic Cooperation (APEC) Economies;

Recognizing that the 2014 Joint Statement issued at the Seventh Meeting serves as a stepping stone towards further cooperation in the East Asian region,

Recalling every effort towards sustainable use of eel species after 2014 including the limit on eel seeds input into aquaculture ponds and proposal on the establishment of the Alliance for Sustainable Eel Aquaculture (ASEA),

Noting the decisions 19.218 to 19.221 of the 19th Conference of the Parties to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES COP19),

Noting also the eel relevant documents (AC32 Sum.2 and SC77 Summary record) adopted at the 32nd Meeting of CITES Animals Committee (AC32) and the 77th Meeting of CITES Standing Committee (SC77) respectively,

Sharing the view on importance of cooperating towards the 33rd meeting of the Animals Committee (AC33), 78th meeting of CITES Standing Committee (SC78) and the 20th Meetings of CITES COP,

Mindful that Participants are willing to cooperate under the Framework of APEC Ocean and Fishery Working Group (OFWG);

Have reaffirmed the following common views:

(1) Participants have cooperated on the conservation and management measures of Japanese eel stock and other relevant eel species as follows:

- reviewed input, output and trade statistics of glass eels during the season 2023-2024 and noted input amount of glass eels of Japanese eel into aquaculture ponds in all Participants was lower than the upper limit stated in the 2014 Joint Statement;
- shared information on international and domestic circumstances related to eel species;
- reviewed and endorsed the Summary Report of the 3rd Scientific Meeting on Japanese Eel and Other Relevant Eels (3rd-4th June, 2024; hereafter referred to as "the 3rd Scientific Meeting"), including the Draft Workplan for Scientific Activities and collaborative Research on Japanese eel; and adopted the Terms of Reference for Scientific Meeting on Japanese Eel and Other Relevant Eels; and revised the Terms of Reference for Task Team 1 & 2 of Scientific Activities and Collaborative Research on Japanese Eel Established under the Scientific Meeting.
- shared information on the domestic conservation and management measures that each Participant has taken since 2014 joint statement as follows;

China:

China calls on all localities to further strengthen the export management of glass eel, strengthen law enforcement and supervision, strengthen industry self-discipline, severely crack down on the smuggling of glass eel, and optimize the process and management system of international trade of glass eel. The Yangtze River Estuary and the Yangtze River Basin are the most important producing areas of glass eel in China. In order to conserve the glass eel and other fisheries resources in the Yangtze River, from January 1, 2021, the issuance of special fishing licenses for glass eel in the waters within the fishing ban management area of Yangtze River has been ceased. Moreover, China has established a special non-fishing zone in the Yangtze River Estuary, in order to ensure the successful migration of glass eels to the Yangtze River. At the same time, it is stipulated that in the fishable waters, the policies had been issued to limit the scale of eel fry fishing, such as Zhejiang stipulates that the total amount of eel fry fishing should be controlled, and the scale of fishing should not exceed that of the previous year. Shanghai stipulates the number of special fishing licenses for glass eel in 2023-2024 fishing season shall not exceed that of 2022-2023,. In addition, China's coastal waters enter into summer fishing moratorium from May 1st, with almost all of the coastal fisheries closed for about 4 months. Besides, China has carried out the stock enhancement and release of Japanese eel. The above measures will help restore the number of parent eel populations and wild glass eel resources, and promote the sustainable development of eel industry.

Japan:

Catch of glass eels is subject to licenses to be issued by the prefectural governments and duration

of fishing season is limited. Catch of adult eels using certain fishing gears is subject to licenses to be issued by the prefectural governments. Variety of additional measures, such as gear restriction, upper limit of harvest for individual and time closure, have been introduced and implemented for catch of both glass and adult eels considering unique situation in each Prefecture. In June 2015, the licensing system was introduced to eel aquaculture, under the Inland Water Fishery Promotion Act. The amount of initial input of eel seeds is restricted by eel species and allocated for each individual farmer under this Act. In April 2020, the total input of eel seeds in Japan getting close to the upper limit, the Fisheries Agency of Japan directed prefectural governments to halt the catch of glass eels. Since 2006, continuous efforts have been made for the purpose of the creation and conservation of a favorable riverine environment, based on the concept of "Nature-oriented river works" representing conservation and regeneration of the environment as habitat, growing and spawning grounds that rivers intrinsically have, which has become a basic idea for management of river.

The number of prefectures which prohibit the catch of silver eel is increasing, bearing in mind the resolution taken by National Federation of Inland Waters Fishing Ground Management Commissions and National Federation of Inland water Fisheries Cooperatives in 2018 take measures for conservation of silver eels in all prefectures as soon as possible. In 2019, the Fisheries Agency of Japan launched a project in order to improve a traceability of Japanese eel from a catch of glass eel through to an input into aquaculture pond as well as a research project including resource trend analysis and spawning migration tracking with the goal of future development of a Japanese eel stock assessment. In accordance with the amendment of the Fishery Act in December 2020, the government of Japan considerably strengthened the penal provisions in order to prevent poaching by giving great disadvantage to offenders. After December 2023, the penalty for catching glass eels without a fishing permit is an imprisonment of up to 3 years or a fine of not more than 30 million Japanese yen. In December 2020, Act on Ensuring the Proper Domestic Distribution and Importation of Specified Aquatic Animals and Plants was enacted to prevent the distribution of illegally harvested, unregulated and unreported aquatic animals and plants by requiring the communication of handling information among distributors and traders, the preparation and preservation of transaction records, and the attachment of documents attesting that the product was harvested legally when it is imported or exported. The distribution of domestically harvested glass eel will also be subject to the obligations under this law from December 2025. Japan implements the Regulations on Export Approvals for Glass Eels to promote the sustainable use of eel species under international cooperation. In accordance with the Regulations, before an export approval, the Fisheries Agency of Japan confirms appropriateness of the export of glass eels for conservation and management of eel species, including all international agreements and arrangements that Japan has participated in are fully complied.

Republic of Korea:

Time closure and size limit of catch were introduced by the government in January 2017 and have been in force since July 2017 for the management of eel stocks. Eel fishery is prohibited from 1

October to 31 March in the following year. And the catch of eels between 15cm and 45cm is prohibited all year long. Korea also changed the administrative system for eel aquaculture operation from the "reporting system" to a "permission system." The relevant legislation that provided a legal background for this change was established on August 27, 2019 and took effect as from August 28, 2020.

In 2018, Korea developed and installed "fishway (pathway or ladders)" for eels in some of the artificial structures such as estuary banks and sea walls which prevent or block the natural migration of eels, in order to provide more favorable environments to eels. These pathways have been in good use ever since. Korea plans to install additional fish ladders in the mid-to-long term. Korea will continue this research or initiative in 2024 and remains committed to exploring possible conservation and management options for eels. The medium to long-term plans also include the improvements in relevant systems and designation of specialized research agencies so that eel stock assessments can be undertaken nation-wide, in order to conserve and protect the Japanese eel stock.

Chinese Taipei:

With regard to the glass eel fishing, although the traditional fishing season for glass eel is from October to April, glass eel fishing is only permitted from November to February in accordance with the 2013 Regulations on the Restricted Fishing Seasons for Elvers, subject to adjustment based on annual migrant pattern and/or for scientific purposes. A license system has also been introduced to vessels fishing for glass eel.

With a view to protect the habitats of eels, the catch of young and adult eels is managed by local governments, and the fishing for eels has been prohibited in 41 rivers. For example, Yilan County, the traditional major glass eel harvest region, has prohibited the catch of young and adult eels in all its rivers so as to conserve eel species.

As for the export control, based on the Foreign Trade Act and the regulations established pursuant to this Act, export of glass eels is prohibited from November to March.

With regard to the control of eel farming activities, the Regulations for Input Management of Eel Aquaculture has been promulgated since November 2014 and amended as appropriate to enhance the control of eel farming activities. As per these Regulations, the Fisheries Agency will review the relevant requirements and announce the input amount of glass eels annually, and each eel farmer is subject to the control and management of license system and individual input limit. For Japanese eel and other relevant eel species, the total upper limit for glass eel input are both set at 10 metric tons per year.

For stock enhancement, the release of Japanese eel larvae was from the confiscated glass eels to rivers, and the part of those eels was also used for scientific research.

(2) Participants renewed their commitments to make the utmost efforts as follows;

- to further strengthen conservation and management measures of Japanese eel stock and other relevant

eel species and closely work together in this regard;
- to promote and collaborate on scientific research on Japanese eel in line with Terms of References for Scientific Meeting as well as in line with Terms of References for Task Team 1 & 2 of Scientific Activities and Collaborative Research on Japanese Eel Established under the Scientific Meeting;
- to hold the 4th Scientific Meeting in 2025 spring season, in order to share scientific knowledge and experience, as well as to provide scientific advice for conservation and management measures of the species;
- to adopt either of the following measure(s), but not limited to one measure if situation allows: to enhance conservation on key habitat of Japanese eel and/or to decrease the capture and utilization of wild Japanese eel;
- to restrict initial input of glass eels and eel fries of Japanese eel taken from the wild into aquaculture ponds in 2024-2025 and 2025-2026 input season up to 80% of that of the 2013-2014 input season;
- to take every possible measure not to increase the amount of initial input of seeds of eel species other than Japanese eels from the level stated in the 2014 Joint Statement;
- to consider complementary measures intersessionally for the discussion and the adoption at the next Informal Consultation, possibly taking into account scientific advice from the Scientific Meeting;
- to make continued efforts individually and/or jointly to improve traceability and transparency in domestic and international eel trade, taking into consideration of the outcomes of the CITES-COP 19, AC32 and SC77;
- to closely cooperate with other international instruments;
- to consider possible establishment of a legally binding framework, such as regional or subregional fisheries management organization or arrangement;
- to further cooperate towards AC33, SC78, CITES-COP20; and
- to encourage voluntary actions to be taken by the private sector in line with the above-mentioned measures.

Attachment:
- Eel Statistics on catch and input of glass eels and trade of any stages of eels compiled from the Standard Working Formats for statistics of glass eel, eel fry and adult eel on each stage, and
-Summary table of conservation and management measures for eels.