

Extending Fisheries Statistics for Ecosystem-Based Management

Provides guidance on extending conventional fisheries statistics to support ecosystem-based management (EBM).

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OUTCOME

This Circular provides guidance on extending conventional fisheries statistics to support ecosystem-based management (EBM) – the coordination of human uses of an ecosystem so that the combined effects do not compromise its function, structure, and capacity to sustain services over time. For ocean accounting purposes, this Circular is specifically concerned with the provisioning-service accounts defined in the SEEA Ecosystem Accounting (SEEA EA) framework and with the EBM indicators that are derivable from those accounts (such as catch composition indices, resource-rent-based effort proxies, and stock-extent linkages). Broader fisheries-stock-assessment EBM frameworks (e.g., fishing mortality relative to F_{msy} , spawning stock biomass relative to SSB_{msy}) are not in scope here but are addressed in [TG-1.5 OA and Fisheries Management](#).

Section 3.8 sets out the fisheries data sources that feed the accounts – catch and landing statistics, stock assessment reports, vessel and licence registries, economic and employment surveys, trade statistics and the intergovernmental series – together with the accounting treatment and estimation of illegal, unreported and unregulated catch, and of subsistence and recreational removals. The management decisions those data support are in [TG-1.5 OA and Fisheries Management](#).

Conventional fisheries statistical systems are built around FAO FishStat capture-production reporting, national logbook and landings registers, and stock-assessment models. These systems are well established for tracking yield and effort, but they do not disaggregate catch to providing ecosystems, value the catch as an ecosystem service flow, or record parallel provisioning flows such as gleaning and aquaculture. By following the candidate workflows in this Circular, statistical compilers may extend their existing systems to deliver ecosystem-attributed catch quantities, and the cost and price series a resource rent calculation needs, at the granularity the provisioning-service accounts require. Those accounts – the physical supply table, the resource rent computation and the monetary supply table – are compiled in [TG-3.9 Aquaculture Accounts](#) and [TG-6.7 Fisheries Accounting: Integrating Stock Assessment](#), and support EBM decision use cases including allocation of access rights across competing provisioning flows and ecosystem-aware coastal investment.

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ABOUT THIS CIRCULAR

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DRAFT

¶1 ⓘ Framework Position

¶2 TG-4.10 sits within Section 4 (Data Methods) and addresses how conventional fisheries statistical systems – typically organised around stock assessment and landings reporting – may be extended to deliver the ecosystem-attributed catch, cost and price variables that provisioning-service accounting requires. It owns those variables and their attribution, tier and uncertainty; it does not own the supply table they populate, the resource rent computed from them, or the fisheries asset account, which are **TG-3.9 Aquaculture Accounts**, **TG-3.1 Asset Accounts** Section 3.3 and **TG-6.7 Fisheries Accounting: Integrating Stock Assessment** respectively. The circular covers four parallel workflows (wild capture, aquaculture cross-reference, gleaning, and wood/NTFP provisioning). EBM indicators derivable from these accounts are introduced in §3.1.

1. Outcome

¶1 This Circular provides guidance on extending conventional fisheries statistics to support **ecosystem-based management (EBM)** – the coordination of human uses of an ecosystem so that the combined effects do not compromise its function, structure, and capacity to sustain services over time. For ocean accounting purposes, this Circular is specifically concerned with the provisioning-service accounts defined in the SEEA Ecosystem Accounting (SEEA EA) framework¹ and with the EBM indicators that are derivable from those accounts (such as catch composition indices, resource-rent-based effort proxies, and stock-extent linkages). Broader fisheries-stock-assessment EBM frameworks (e.g., fishing mortality relative to Fmsy, spawning stock biomass relative to SSBmsy) are not in scope here but are addressed in **TG-1.5 OA and Fisheries Management**.

¶2 Section 3.8 sets out the fisheries data sources that feed the accounts – catch and landing statistics, stock assessment reports, vessel and licence registries, economic and employment surveys, trade statistics and the intergovernmental series – together with the accounting treatment and estimation of illegal, unreported and unregulated catch, and of subsistence and recreational removals. The management decisions those data support are in **TG-1.5 OA and Fisheries Management**.

¶3 Conventional fisheries statistical systems are built around FAO FishStat capture-production reporting, national logbook and landings registers, and stock-assessment models. These systems are well established for tracking yield and effort, but they do not disaggregate catch to providing ecosystems, value the catch as an ecosystem service flow, or record parallel provisioning flows such as gleaning and aquaculture. By following the candidate workflows in this Circular, statistical compilers may extend their existing systems to deliver ecosystem-attributed catch quantities, and the cost and price series a resource rent calculation needs, at the granularity the provisioning-service accounts require. Those accounts – the physical supply table, the resource rent computation and the monetary supply table – are compiled in **TG-3.9 Aquaculture Accounts** and **TG-6.7 Fisheries Accounting: Integrating Stock Assessment**, and support EBM decision use cases including allocation of access rights across competing provisioning flows and ecosystem-aware coastal investment.

2. Requirements

¶1 This Circular requires familiarity with:

- ¶2 **TG-0.1 General Introduction to Ocean Accounts** – for the conceptual framework
- ¶3 **TG-2.4 Environmental (including Ecosystem) Goods and Services** – for ecosystem service definitions and the indicator context within which provisioning-service accounts are interpreted
- ¶4 **TG-4.3 Administrative Data Sources** – for the use of agency landings, licensing, and logbook registers
- ¶5 **TG-4.5 Integrating Research Data into Official Statistics** – for the integration of fishery-independent research data into accounting systems

¶6 **Related Circulars:**

- ¶7 **TG-3.9 Aquaculture Accounts** – for the parallel cultivated-resource workflow. TG-4.10 provisioning-service supply tables feed into the broader accounts in TG-3.9
- ¶8 **TG-1.5 OA and Fisheries Management** – for the fisheries-management decision context and stock-assessment EBM frameworks
- ¶9 **TG-4.1 Remote Sensing and Geospatial Data** – for the upstream remote sensing methods that underpin habitat-extent data used in the §3.4 data matrix
- ¶10 **TG-6.7 Fisheries Accounting: Integrating Stock Assessment** – for the thematic methods that link the provisioning-service supply tables compiled here to full fisheries asset accounts

3. Guidance Material

3.1 Conceptual Framework

¶1 Conventional fisheries statistics report what was landed – catch by species, gear, and reporting area – and, in more developed systems, what biomass remains through stock assessment models. EBM and ecosystem accounting require two additional dimensions: where the catch came from in ecological terms (which providing ecosystem) and what economic value the providing ecosystem contributed (the resource rent attributable to the natural resource itself, distinct from labour and capital). The SEEA EA framework (Chapter 6) sets out the provisioning-service account structure that organises catch location and economic contribution¹.

¶2 Three related management frameworks use overlapping terminology that this Circular distinguishes. The **Ecosystem Approach to Fisheries (EAF)**, as defined by FAO, extends single-species management to consider interactions between target species, bycatch, and habitat². **Ecosystem-Based Fisheries Management (EBFM)**, as practised under frameworks such as the US Magnuson-Stevens Act, further integrates multi-species dynamics and socio-economic considerations into harvest strategies. **Ecosystem-Based Management (EBM)** is the broadest term, covering the full range of human uses of an ecosystem. This Circular adopts the EBM framing but focuses on the provisioning-service account extensions that support all three approaches, whilst the underlying accounting infrastructure remains the same regardless of which management framework a country employs.

¶3 The EBM indicators that are derivable from the extended accounts described in this Circular include (1) catch composition indices (the share of total provisioning supply attributable to each species group or providing ecosystem), (2) resource-rent trends as a proxy for fishing pressure relative to ecosystem capacity, and (3) cross-account consistency checks between provisioning-service use rates and ecosystem extent or condition accounts. FAO Code of Conduct for Responsible Fisheries principles on economic sustainability³ provide the normative context for interpreting these indicators.

¶4 The four workflows introduced in the Outcome section are detailed in Sections 3.3–3.6 respectively.

3.2 Extending Existing Statistical Systems

¶1 The starting point for most national compilers is an established FAO FishStat-aligned capture-production reporting system, supplemented by national landings registers, logbooks, port-sampling programmes, and (in better-resourced systems) stock-assessment models⁴. The base system may be extended in three directions: ecological attribution (§3.3), economic attribution (§3.3.2), and coverage extension (§§3.6–3.7). Figure 4.10.1 demonstrates how the three extensions compile into a single SEEA EA provisioning supply-use table, closed by an EBM consistency loop against extent and condition accounts.

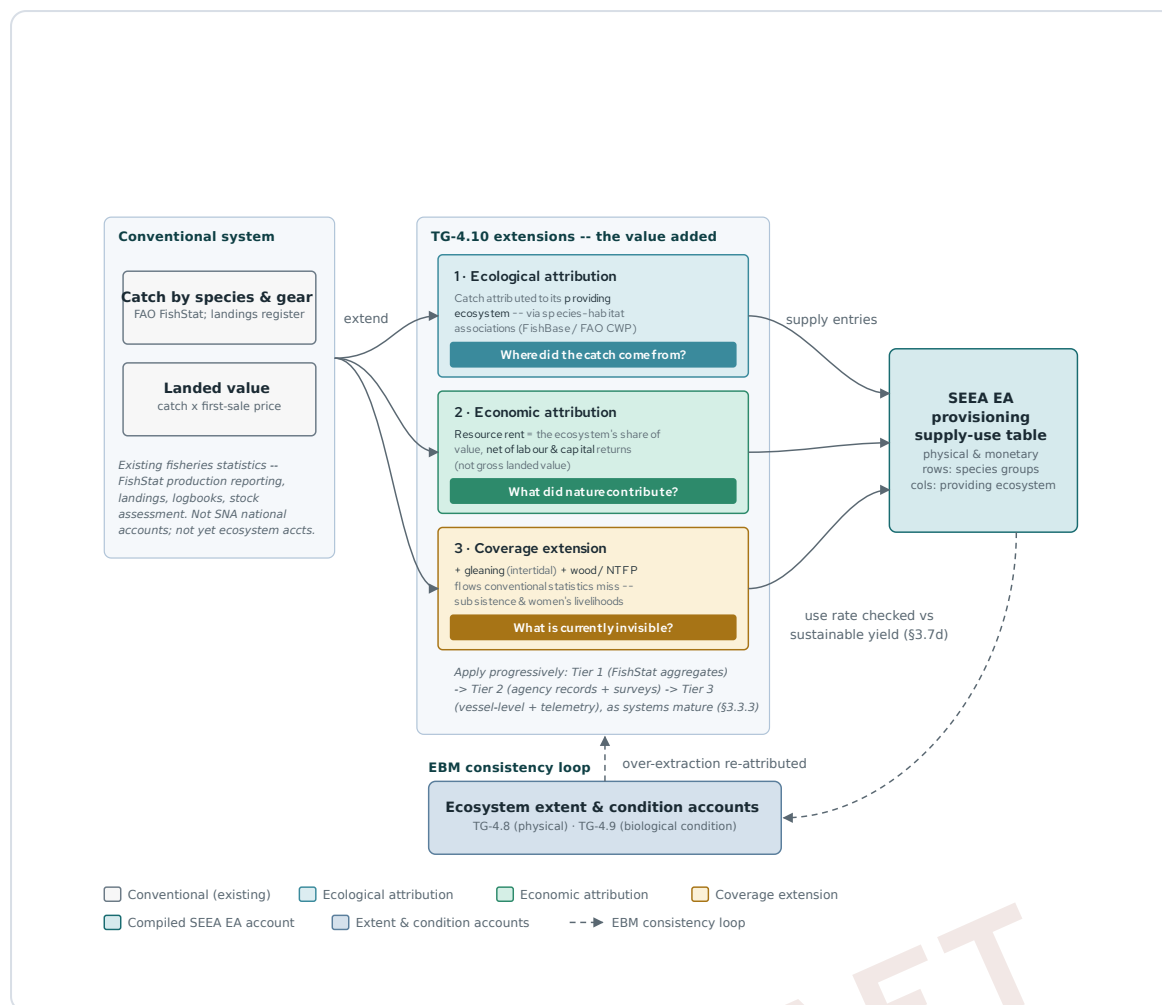


Figure 4.10.1 Fisheries statistics gain ecological and economic attribution plus coverage extension to compile a SEEA EA provisioning supply-use table. Dashed EBM loop checks use rates against extent and condition accounts.

Source: TG-4.10, §3.1 (conceptual framework -- ecological and economic attribution), §3.2 (extending existing statistical systems), §3.3.1 (species x providing-ecosystem physical supply table), §3.3.2 (resource-rent valuation), §3.3.3 (tiered implementation), §3.6 (gleaning), §3.7 (wood / NTFP, incl. §3.7d cross-account consistency), §3.8 (reporting and integration); TG-4.8 / TG-4.9 (extent and condition accounts); SEEA EA (2021) Chapter 6 (provisioning-service supply-use tables).

3.3 Wild-Capture Catch Data

¶1 This section covers the catch data an account needs and where they come from. The supply table those data populate, and the choice of valuation method applied to them, are compiled following **TG-3.2 Flows from Environment to Economy** Section 3.3 and **TG-3.9 Aquaculture Accounts** Section 3.7.2.

3.3.1 Assembling the catch series

¶1 a) Compile total annual landed catch (kg/yr) from the national fisheries authority landings register, FAO FishStat returns, and, where coverage is thin, structured fisher surveys.

¶2 b) Disaggregate by (i) species or species group; (ii) gear type – typical categories include pole-and-line, handline, gillnet, longline, trap, and trawl; and (iii) providing ecosystem, using species-habitat associations (standard sources include FishBase species-habitat associations⁵ and the FAO CWP Handbook of Fishery Statistical Standards habitat classifications⁶).

¶3 c) Where landings surveys cover only a fraction of total fishing trips, calibrate survey coverage against provincial or regional statistics to derive an extrapolation factor, and record the factor and its basis in metadata.

¶4 d) Map the spatial distribution of fishing effort using vessel monitoring data, logbooks, or structured fisher reporting.

¶5 The deliverable to the account is catch in kg/yr by species group and providing ecosystem, with its coverage, extrapolation factor and quality tier attached.

3.3.2 Cost data for resource rent

¶1 Resource rent is computed in the account, not here; the resource rent formula and its treatment of a negative residual are in **TG-3.1 Asset Accounts** Section 3.3. What this Circular specifies is the cost data the calculation consumes, which is usually the binding constraint:

- ¶2 Operational expenses (consumables, fuel, maintenance, repairs)
- ¶3 Labour costs, with regional agricultural wages as a documented proxy where direct fisher wage data are unavailable
- ¶4 Capital costs comprising vessel and gear depreciation plus a return on fixed capital at the national weighted-average cost of capital

¶5 Fisher cost surveys are typically run every three to five years rather than annually, so the cost side of the series is usually interpolated between survey years. State the interpolation in metadata.

3.3.3 Tiered implementation

Tier	Catch data	Ecosystem allocation	Cost data
Tier 1	National aggregate statistics (FAO FishStat)	Single global habitat-dependence fraction	Value transferred from comparable contexts
Tier 2	Landings by species and gear from agency records, validated against fisher surveys	Species-habitat literature with local species composition	Domestically sourced fisher cost surveys
Tier 3	Fishery-independent surveys plus logbook data	Acoustic telemetry, otolith microchemistry, or diel habitat use models	Vessel-level production accounts with site-specific capital stock valuation

¶1 Practitioners may begin at Tier 1 and progress as data systems mature. Value-transfer accuracy is limited, and Tier 1 entries should be flagged in metadata as indicative.

3.4 Data Requirements and Sources

¶1 The following matrix sets out the minimum data items required for each workflow, with typical source agencies, recommended update frequencies, and alternatives for data-poor contexts.

Variable	Unit	Source agency (typical)	Update frequency	Data-poor alternative
Wild-capture fisheries				
Catch by species / species group	kg/yr	National fisheries department; FAO FishStatJ	Annual	FAO-modelled estimates (FishStat global capture production); Sea Around Us reconstructions
Catch by gear type	kg/yr by gear	National logbook system; port-sampling programme	Annual	Gear-composition ratios from FAO CWP national statistics

Variable	Unit	Source agency (typical)	Update frequency	Data-poor alternative
Fishing effort (trips, vessel-days, hook-hours)	Vessel-days/yr, fishing trips/yr, or hook-hours/yr	National logbook system; VMS/AIS records	Annual	Regional effort proxies from RAM Legacy Stock Assessment Database
Catch per unit effort (CPUE) index	kg/vessel-day	Logbook system; scientific observer programme	Annual	Stock-status narrative from FAO SOFIA regional assessment
Stock biomass index	Index or t	Fishery-independent trawl survey; acoustic survey	Periodic (1–5 years)	RAM Legacy SSCOM/CMSY estimates; FAO stock-status categories
Discards and bycatch	kg/yr	Scientific observer programme; video monitoring	Annual	Regional discard fraction from FAO (2019) third global discard assessment
First-sale price by species group	USD/kg or local currency/kg	Fish landing-site price monitors; national statistics office	Annual	Regional price series from FAO GLOBEFISH
Fisher operating costs (fuel, labour, gear, maintenance)	USD/vessel/yr or % of gross revenue	Fisher cost survey; vessel production accounts	Periodic (3–5 years)	Value-transfer from comparable fleet cost studies in same region
Aquaculture				
Production by species and system type (ponds, cages, longlines)	t/yr	National aquaculture authority; national statistics office	Annual	FAO FishStatJ aquaculture-production database
Farm-gate price by species and system	USD/kg	Market price monitoring; national aquaculture authority	Annual	FAO GLOBEFISH aquaculture price series
EBM-relevant indicators				
Prey availability index	Index	Ecosystem monitoring survey; scientific observer programme	Periodic (1–5 years)	Regional forage-fish abundance indices from large marine ecosystem assessments
Predator abundance index (large pelagics, marine mammals)	Index or individuals/km ²	Biodiversity monitoring programme; OBIS records	Periodic (1–5 years)	IUCN Red List population trend data
Habitat extent (coral reef, seagrass, mangrove, pelagic zone)	km ²	TG-4.1 / TG-4.9 ; remote sensing	Periodic (3–5 years)	Global habitat databases (Global Mangrove Watch, Allen Coral Atlas)
Gleaning harvest by species group	kg/yr	Household survey; community monitoring	Periodic (2–5 years)	Spatial proxy model using household distance-to-shore and resource density estimates

Variable	Unit	Source agency (typical)	Update frequency	Data-poor alternative
Wood and NTFP extraction from coastal forests	m ³ /yr (wood); kg/yr (NTFP)	Household survey; community forestry records	Periodic (2–5 years)	Spatial proxy model calibrated against regional biomass extraction studies

¶2 **Notes on data-poor contexts.** Where national survey data are unavailable, practitioners should use the alternatives listed above as Tier 1 starting points, disclosing the source and any assumptions in metadata. The RAM Legacy Stock Assessment Database⁷ provides modelled reference points for a large number of assessed stocks. The Sea Around Us reconstruction methodology⁸ provides catch time series for countries with limited official reporting. FAO-modelled estimates are routinely used in official reporting contexts and are acceptable for Tier 1 compilation provided provenance is documented.

3.5 Aquaculture, Gleaning, and Wood and NTFP Provisioning

¶1 Three further provisioning flows share the coastal accounting area with capture fisheries, and a fisheries statistical system is usually the only instrument in a position to pick them up. Their compilation – physical measurement into the account, valuation method, and use-table allocation – is specified once, in **TG-3.9 Aquaculture Accounts** Section 3.7. This Circular covers only what the statistical system must deliver to those accounts.

¶2 **Aquaculture.** Compiled as a cultivated provisioning flow under TG-3.9 Sections 3.2–3.3. The statistical requirement here is reconciliation: cross-check aquaculture output recorded in production accounts against FAO FishStatJ national aquaculture-production figures⁹, and collect cultivated and wild-capture volumes on a common species and period basis so that the two can be recorded in adjacent columns of one supply table for trade-off analysis.

¶3 **Gleaning.** Hand-collection of molluscs, crustaceans, echinoderms and seaweeds from intertidal mudflats, reef flats and mangrove edges – a flow that both aquaculture and conventional fisheries statistics routinely miss, despite its weight in coastal household food security and in women's livelihoods. It will not appear in a landings register, so the statistical requirement is a household survey module (see **TG-4.2 Survey Methods**) estimating per-collector annual harvest by target species group, with a spatial proxy model to extrapolate where survey coverage is incomplete. Collect the collector's disposition of the catch – sold, consumed, gifted – because TG-3.9 Section 3.7.3 allocates gleaning distinctly in the use table and cannot do so without it.

¶4 **Wood and NTFP provisioning from coastal forests.** Where the accounting area includes mangroves, fuel wood, building poles, charcoal feedstock, honey, dye and traditional medicine continue to flow from the standing forest. The statistical requirement is per-household extraction, by survey where possible and otherwise by a spatial proxy model calibrated on distance to the mangrove edge, accessible deadwood stock and a literature-derived household demand parameter. Record the parameters and their sources: TG-3.9 Section 3.7.4 requires the implied use rate to be tested against a sustainable yield benchmark and reconciled with the mangrove extent account, which cannot be done from an aggregate volume alone.

3.6 Reporting and Integration

¶1 The four workflows above deliver a common record shape: catch quantity by species group and providing ecosystem, with the allocation parameters, tier and uncertainty attached, and the cost and price series alongside it where they exist. Delivering all four on that shape is what allows them to be assembled into a single provisioning-service supply and use table for the coastal accounting area. That assembly, and the resource rent computation and monetary valuation that go with it, are done in the compiling circulars named below.

¶2 The catch, cost and provisioning-flow data assembled under Sections 3.3–3.5 are direct inputs to the cultivated-resource accounts in **TG-3.9 Aquaculture Accounts** and the fisheries asset accounts described in **TG-6.7 Fisheries Accounting: Integrating Stock Assessment**. The provisioning-service flows also contribute to ecosystem service indicator analysis described in **TG-2.4 Environmental (including Ecosystem) Goods and Services**. Compilers should document in metadata:

- ¶3 Data sources, vintage, and coverage for each component
- ¶4 Allocation parameters and their sources (species-habitat literature, distance elasticity values, use rates)
- ¶5 Tier of implementation for each sub-procedure
- ¶6 Components flagged as data-deficient or indicative
- ¶7 Cross-account consistency checks performed

3.7 Data Quality and Limitations

Issue	Impact	See also
Limited cost-survey data or low response rates in artisanal contexts	Unreliable resource rent calculation	§3.3.2
Subsistence and gleaning catch poorly captured by formal statistics	Underestimates total provisioning supply	§3.5 (Gleaning)
Species-habitat allocations from regional literature may not reflect local conditions	Mis-attribution to providing ecosystems	§3.3.1
Spatial proxy parameters for wood and NTFP provisioning are literature-derived	Model outputs sensitive to elasticity and use-rate assumptions	§3.5 (Wood and NTFP provisioning)
Temporal mismatch between catch records and accounting period	Misaligned physical account	§3.3.1
Data-poor alternative sources (Sea Around Us, RAM Legacy) carry model uncertainty	Tier 1 entries may have wide confidence intervals	§3.4

3.8 Fisheries Data Sources and Compilation Considerations

3.8.1 Primary data sources

¶1 Compilation of fisheries accounts typically draws on:

¶2 **Catch and landing statistics:** Recorded by fisheries agencies, port authorities, or fish market operators. FAO collects and publishes global capture and aquaculture production data annually through **FishStatJ** (www.fao.org/fishery/statistics/software/fishstatj)¹⁰. FishStatJ covers capture production and aquaculture output for over 200 countries and territories, disaggregated by species group and FAO major fishing area, with time series typically updated annually with a one- to two-year lag. The database is the primary global benchmark for national catch reconciliation and is freely downloadable as a desktop application. Key limitations include: (a) data are reported at country level on the basis of declared landings and may not reflect unreported or illegal catch; (b) discards are not included in standard production tables and must be estimated separately using observer or logbook data; and (c) government subsidies to the sector are not captured within FishStatJ and require separate compilation from national budget sources or the OECD Fisheries Support Estimate database.

¶3 **Stock assessment reports:** Produced by national fisheries research institutions, regional fisheries management organisations (e.g., WCPFC, IOTC, CCSBT for tuna), or international bodies. The RAM Legacy Stock Assessment Database provides standardised stock assessment outputs.

¶4 **Vessel and licence registries:** Providing data on fishing capacity, effort, and fleet composition.

¶5 **Economic surveys:** Dedicated fisheries economic surveys or general business surveys covering fishing enterprises.

¶6 **Trade statistics:** Customs data on fish imports and exports, compiled according to the Harmonized System (HS) commodity classification.

¶7 **Employment surveys:** Labour force surveys or dedicated fisheries employment surveys.

3.8.2 Species classification

¶1 The Food and Agriculture Organization (FAO) Aquatic Sciences and Fisheries Information System (ASFIS) provides a standard species classification containing over 11,500 species. ASFIS is linked to the International Standard Statistical Classification of Aquatic Animals and Plants (ISSCAAP), which divides commercial species into 50 groups based on taxonomic, ecological, and economic characteristics. For accounting purposes, aquatic resources can be grouped into nine divisions:

1. ¶2 Freshwater fishes
2. ¶3 Diadromous fishes (species migrating between fresh and salt water)
3. ¶4 Marine fishes
4. ¶5 Crustaceans
5. ¶6 Molluscs
6. ¶7 Whales, seals and other aquatic mammals
7. ¶8 Miscellaneous aquatic animals
8. ¶9 Miscellaneous aquatic animal products
9. ¶10 Aquatic plants

3.8.3 Intergovernmental fisheries data sources

¶1 Intergovernmental organisations collect and harmonise fisheries data across countries. Key active sources and initiatives relevant to compiling ocean accounts for fisheries are summarised in Table 3.8.1 below¹¹.

¶2 **Table 3.8.1: Intergovernmental fisheries data sources and initiatives**

Source	Description
Coordinating Working Party on Fishery Statistics (CWP)	Coordinates global fishery statistical programmes and maintains standards for fishery data collection, processing, and dissemination.
Aquatic Sciences and Fisheries Abstracts (ASFA)	Comprehensive bibliographic database covering aquatic science and fisheries literature.
Fisheries and Resources Monitoring System (FIRMS)	A global partnership that provides access to information on the status and trends of marine resources and fisheries.
FishStatJ	FAO software for retrieving, analysing, and disseminating fishery and aquaculture statistical time series.
GLOBEFISH	FAO programme providing analysis and information on world fish trade, including market trends and price data.

3.8.4 Illegal, unreported and unregulated (IUU) fishing

¶1 IUU fishing presents measurement challenges. The accounting treatment differs depending on whether the illegal catch is by residents or non-residents, and compilers must apply these treatments separately.

¶2 **Illegal catches by residents** (domestic IUU) are still treated as production by the national fishing industry regardless of legality, per SEEA CF para 5.435. They are recorded as gross catch/extraction in the physical asset account and as output in the production account. Residence,

not legality, determines the production boundary. Where domestic IUU can be estimated, it should be added to reported landings in the gross catch row of the asset account.

¶3 **Illegal catches by non-residents** are recorded as “uncompensated seizures” in the asset account (a separate reductions line), distinguishing them from production by the country’s nationals. These represent a transfer of natural capital to foreign operators without compensation, per SEEA CF para 5.436.

¶4 Following these accounting principles, illegal catches by residents should still be recorded as production with income accruing to the fisher¹². The practical implication: resident IUU must be included in the gross catch figure that flows into the depletion calculation, whilst non-resident IUU appears in the separate “uncompensated seizure” line as shown in the worked example in **TG-1.5 OA and Fisheries Management** Section 3.4.2.

¶5 Estimates of IUU fishing are inherently uncertain but important for understanding true extraction levels and their impact on stock sustainability. Global IUU catch has been estimated at 11–26 million tonnes annually (Agnew et al., 2009), with wide regional variation.

¶6 Countries should develop national IUU estimation approaches appropriate to their data environment and fishery characteristics. Commonly used methods include (1) comparison of reported landings with independent estimates of total removals derived from port sampling, at-sea observer programmes, or vessel monitoring system (VMS) data, (2) stock assessment-based back-calculation, in which the difference between model-estimated total removals and reported catch provides an implied IUU component, (3) trade-based analysis, comparing declared domestic landings with apparent consumption (production plus imports minus exports) to identify discrepancies, and (4) aerial and satellite surveillance data, which can detect unreported fishing activity by matching vessel positions with licence registers. Regardless of the method chosen, IUU estimates should be presented with explicit uncertainty bounds and documented in the metadata accompanying the accounts. Where multiple methods yield different estimates, compilers should report a range and indicate the preferred central estimate¹³.

3.8.5 Subsistence and recreational fishing

¶1 Fisheries accounts should encompass all harvesting activity, not only commercial operations. Subsistence fishing for household consumption represents production for own final use. Recreational fishing, whilst not undertaken for commercial purposes, still removes fish from stocks and should be recorded¹⁴.

¶2 These non-commercial catches may require special estimation approaches based on:

- ¶3 Household surveys with questions on fishing activity and consumption
- ¶4 Recreational fishing licence data (where licensing exists)
- ¶5 Creel surveys at popular fishing locations
- ¶6 Proxy indicators based on boat ownership or coastal population

¶7 Small-scale and subsistence fisheries are of particular importance in developing countries and in many GOAP member countries in the Asia-Pacific region, where they may represent a substantial proportion of total catch and provide essential food security and livelihoods for coastal communities. In several Pacific Island States, for example, subsistence and artisanal catches may equal or exceed commercial catches in volume, yet remain largely unreported. Countries compiling fisheries accounts should assess the relative importance of non-commercial catches in their national context and allocate survey resources accordingly. Where full survey programmes are not feasible, countries may consider periodic benchmark surveys at representative landing sites combined with extrapolation methods, integration of fisheries questions into existing multi-purpose household surveys (such as Household Income and Expenditure Surveys), and use of food balance sheet data and per-capita fish consumption estimates to cross-check catch figures. The FAO Guidelines for

Securing Sustainable Small-Scale Fisheries provide an international framework that can inform the design of data collection strategies for this sector¹⁵.

¶8 These sources feed the physical and monetary asset accounts specified in **TG-3.1 Asset Accounts** Section 3.4.1 and **TG-6.7 Fisheries Accounting: Integrating Stock Assessment**, and the management decisions they support are set out in **TG-1.5 OA and Fisheries Management**.

4. Acknowledgements

¶1 **Authors:** [To be confirmed]

¶2 **Reviewers:** [To be confirmed]

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