

OA and Fisheries Management

Provides guidance on using Ocean Accounts to inform fisheries management decisions.

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OUTCOME

This Circular sets out how Ocean Accounts inform fisheries management decisions: which account entries and indicators bear on a quota decision, how to read them, and what the data behind them will and will not support. Compilation of the aquatic resource accounts is treated in [TG-3.1 Asset Accounts](#) and [TG-6.7 Fisheries Accounting: Integrating Stock Assessment](#), and the data sources in Section 4, to which this Circular refers rather than restating.

Decision use cases. Four management functions are supported. Quota setting compares total removals against sustainable yield at current biomass, and stock biomass against B_{MSY}, to establish whether depletion is occurring and what TAC response follows; the decision framework is Table 3.4.1 and is worked through in Section 3.4.2. MSY verification tests whether a management plan is achieving its stated objective of maintaining stocks at levels capable of producing maximum sustainable yield. Subsidy reform links government support to stock status, revealing whether support is contributing to overcapacity, in line with SDG 14.6. SDG 14.4.1 reporting draws directly on the asset accounts for the proportion of stocks within biologically sustainable levels.

What a manager needs to know about the accounts. Section 3.1 sets out four points that determine how the numbers should be read: wild capture and aquaculture are different assets accounted differently; natural mortality is not depletion; the stock assessment data tier limits what the accounts can support, so that at the lowest tier they give a direction of travel and not an absolute biomass; and shared stocks are attributed rather than observed. Section 3.5 adds the two source limitations that most often change a conclusion – unestimated IUU catch, and uncounted subsistence and recreational removals – both of which make a depletion figure a lower bound.

These use cases connect to the fiscal framing in [TG-1.1 OA and National Budget Processes](#), where fisheries depletion enters natural capital budgeting.

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ABOUT THIS CIRCULAR

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DRAFT

1. Outcome

¶1 This Circular sets out how Ocean Accounts inform fisheries management decisions: which account entries and indicators bear on a quota decision, how to read them, and what the data behind them will and will not support. Compilation of the aquatic resource accounts is treated in **TG-3.1 Asset Accounts** and **TG-6.7 Fisheries Accounting: Integrating Stock Assessment**, and the data sources in Section 4, to which this Circular refers rather than restating.

¶2 **Decision use cases.** Four management functions are supported. **Quota setting** compares total removals against sustainable yield at current biomass, and stock biomass against B_{MSY} , to establish whether depletion is occurring and what TAC response follows; the decision framework is Table 3.4.1 and is worked through in Section 3.4.2. **MSY verification** tests whether a management plan is achieving its stated objective of maintaining stocks at levels capable of producing maximum sustainable yield. **Subsidy reform** links government support to stock status, revealing whether support is contributing to overcapacity, in line with SDG 14.6. **SDG 14.4.1 reporting** draws directly on the asset accounts for the proportion of stocks within biologically sustainable levels.

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¶4 These use cases connect to the fiscal framing in **TG-1.1 OA and National Budget Processes**, where fisheries depletion enters natural capital budgeting.

2. Requirements

• ¶1 **TG-0.1 General Introduction**

¶2 **Related Circulars:**

- ¶3 **TG-3.1 Asset Accounts** – General methodology for physical and monetary asset accounts
- ¶4 **TG-3.2 Flows from Environment to Economy** – Treatment of fish harvest as natural resource input
- ¶5 **TG-3.9 Aquaculture** – Distinguishing cultivated from natural aquatic resources
- ¶6 **TG-6.7 Fisheries Accounting: Integrating Stock Assessment** – Detailed thematic methodology for linking stock assessment to accounts

¶7 Readers approaching Section 1 for the first time should begin with **TG-1.0 Ocean Accounting and the Blue/Ocean Economy**, the framing circular for the section, which sets out the ocean economy terminology used throughout, what an ocean account can and cannot certify about a blue economy claim, and the map from a policy question to the circular that answers it. It is recommended reading, not a prerequisite.

3. Guidance Material

3.1 How the fishery enters the accounts

¶1 A fisheries manager does not compile the aquatic resource accounts, but needs to know enough about their construction to interpret and defend the numbers they produce. Four points carry most

of that weight; each is specified in full elsewhere.

¶2 **Wild capture and aquaculture are different assets, accounted differently.** Natural aquatic resources – wild stocks whose growth and regeneration occur without direct management – are non-produced biological assets outside the SNA production boundary until harvest, and are therefore subject to depletion accounting when extraction exceeds sustainable yield. Cultivated resources in aquaculture facilities are inside the production boundary and are not. The classification is set out in **TG-3.1 Asset Accounts** Section 3.4.1, with aquaculture in **TG-3.9**. A manager arguing that a fishery is being drawn down is making a claim about the first category only.

¶3 **The physical asset account separates extraction from everything else.** Opening stock, natural growth, gross catch, natural mortality, other volume changes and closing stock are recorded separately (TG-3.1 Section 3.4.1). Only extraction flows enter the depletion test: **natural mortality is not depletion**, however large. Confusing the two is the most common error in reading a fisheries asset account, and it materially overstates the case for intervention.

¶4 **Stock assessment supplies the account entries, and its data tier limits what can be said.** The correspondence between assessment outputs and account entries – biomass to opening and closing stock, recruitment to natural growth, natural mortality to normal losses, fishing mortality to extraction, MSY to sustainable yield, retrospective revisions to reappraisals – is set out in **TG-6.7 Fisheries Accounting: Integrating Stock Assessment** Sections 3.1 to 3.3, together with the tiered approach for countries without full age-structured assessments. The practical consequence for management is in Section 3.4.1 below: at the lowest data tier the accounts support a direction of travel but not an absolute biomass, and a quota decision has to be framed accordingly.

¶5 **Shared stocks are attributed, not observed.** Where a stock migrates in and out of the EEZ, biomass is attributed on the country's agreed RFMO allocation share, or in its absence on the estimated stock fraction present at a mid-year survey date, with the method documented and the double-counting risk flagged (TG-3.1 Section 3.4.1; **TG-4.12 Transboundary Data Sharing**). RFMO assessment outputs – WCPFC, IOTC, CCSBT in the Asia-Pacific – are the primary input where domestic assessments do not exist. A national quota argument that rests on an attributed share is only as strong as the allocation agreement behind it.

¶6 Species are classified using FAO ASFIS and ISCAAP (TG-3.1 Section 3.4.1; **TG-4.10 Extending Fisheries Statistics**), which is what makes national accounts comparable with FAO series and with neighbouring states.

3.2 Economic performance indicators

¶1 The economic indicators for the fisheries sector – gross output, intermediate consumption, gross value added, net value added after depreciation and depletion, employment, compensation of employees, and trade in fishery products – are defined and compiled under **TG-2.5 Structure and Function of the Ocean Economy** and **TG-3.3 Economic Activity Relevant to the Ocean**. Three fisheries-specific points determine whether those indicators answer a management question.

¶2 **Disaggregation is what makes them useful.** A single sector GVA figure supports almost no management decision. The disaggregations that do are: by type of fishing (commercial, artisanal and small-scale, recreational, subsistence); by gear type; by target species or stock; by fishing ground; and by enterprise size. A management measure almost always falls on one of these groups and not the others, and the distributional consequence is the question a minister will ask.

¶3 **Small-scale fisheries are systematically undercounted.** Small-scale operations employ an estimated 90 per cent of the world's capture fishers and fish workers, yet are routinely missed by labour force surveys because the work is informal, seasonal or part-time.¹ Where the accounts are compiled from standard surveys alone, the employment figure will understate the sector, and it will understate it precisely in the group most exposed to a quota reduction. Coverage methods – fisheries modules in household surveys, landing-site frame surveys, key-informant validation, and proxy

estimation from vessel registries – are set out in **TG-4.2 Survey Methods** and **TG-4.10**. A manager should establish which were used before citing an employment number in a distributional argument.

¶4 **National resource and national fleet are different questions.** Catches from national aquatic resources regardless of who takes them, and catches by national fishing operations regardless of where they fish, are distinct measures. The first tracks the national asset; the second tracks the national industry. Stock rebuilding arguments turn on the first, industry adjustment arguments on the second, and conflating them produces a case that does not hold.

3.3 Sustainability Indicators

3.3.1 Stock Status Indicators

¶1 Physical asset accounts provide the foundation for key stock status indicators:

¶2 **Stock biomass relative to reference points:** Comparing current estimated biomass (B) to biological reference points such as:

- ¶3 B_{MSY}: Biomass at which MSY is achieved
- ¶4 B₀: Unfished (virgin) biomass
- ¶5 B_{lim}: Limit reference point below which recruitment is impaired

¶6 **Fishing mortality relative to reference points:** Comparing current fishing mortality rate (F) to:

- ¶7 F_{MSY}: Fishing mortality that produces MSY
- ¶8 F_{0.1}: Precautionary proxy for F_{MSY}
- ¶9 F_{lim}: Limit above which stock decline is expected

¶10 **Proportion of stocks within biologically sustainable levels:** SDG indicator 14.4.1 measures the percentage of fish stocks that are within biologically sustainable levels, defined as stocks with abundance at or above the level that can produce MSY².

3.3.2 Depletion-Adjusted Income Measures

¶1 The 2025 SNA now treats depletion of natural resources as a cost of production alongside depreciation, which gives greater prominence to net income measures that account for the using up of natural capital (SNA 2025 Annex 4, para A4.59)³. Countries that have not yet transitioned to SNA 2025 can compile depletion-adjusted income measures as supplementary or satellite account entries consistent with SNA 2008. The SEEA Central Framework provides a version-neutral basis for these calculations (SEEA CF Section 5.8). That basis allows countries at any stage of SNA transition to produce depletion-adjusted indicators. For fisheries, this means:

¶2 **Net fishing income:** Gross value added from fishing less the value of depletion. This measure reflects the genuine contribution of fisheries to national income after accounting for any reduction in the fish stock asset.

¶3 **Sustainable net income:** Income that could be earned indefinitely if harvesting were limited to sustainable yield levels. Operationally, sustainable net income can be approximated as: $SNI = GVA \times (SY / \text{gross catch})$, where SY is the sustainable yield at current biomass and gross catch is actual extraction for the period. This scaling approach assumes that costs and revenues are proportional to catch volume. Where unit cost data are available, a more precise formulation is: $SNI = SY \times (\text{average price per tonne} - \text{average cost per tonne})$. For a numerical illustration, see the companion monetary example in Step 1b of Section 3.4.2. More detailed methodology, including treatment of multi-species fisheries and long-run price assumptions, is covered in **TG-6.7 Fisheries Accounting: Integrating Stock Assessment**.

¶4 When depletion occurs (extraction exceeds sustainable yield), the difference between gross income and sustainable net income represents income generated by depleting capital rather than genuine sustainable returns.

3.3.3 SDG 14 Alignment

¶1 Ocean Accounts support monitoring of several SDG 14 targets related to fisheries⁴:

¶2 **SDG 14.4:** “By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics.”⁵

- ¶3 Indicator 14.4.1: Proportion of fish stocks within biologically sustainable levels
- ¶4 Asset accounts directly provide data on stock status relative to MSY benchmarks. SDG 14.4.1 uses an unweighted stock-count method: each assessed stock is counted equally, and the indicator equals the number of stocks at or above B_{MSY} divided by the total number of assessed stocks. Where a country's fisheries data are already disaggregated by species or stock in pre-existing fisheries data systems, those disaggregated stock records feed directly into the count without further aggregation. Compilers should follow FAO's indicator methodology note (FAO 2020, footnote 34) for official SDG reporting. Alternative weightings by catch volume or landed value may be informative for national monitoring purposes but should not replace the FAO un-weighted method for official SDG submissions.

¶5 **SDG 14.6:** “By 2020, prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing, eliminate subsidies that contribute to illegal, unreported and unregulated fishing and refrain from introducing new such subsidies.”

- ¶6 Environmental subsidy accounts can track government support to the fisheries sector
- ¶7 Analysis can assess whether subsidies enhance or undermine sustainability

¶8 **SDG 14.7:** “By 2030, increase the economic benefits to small island developing States and least developed countries from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture and tourism.”

- ¶9 Indicator 14.7.1: Sustainable fisheries as a proportion of GDP in small island developing States, least developed countries and all countries
- ¶10 Directly derived from economic accounts measuring fisheries GVA

¶11 **SDG 14.b:** “Provide access for small-scale artisanal fishers to marine resources and markets.”

- ¶12 Indicator 14.b.1: Degree of application of a legal/regulatory/policy/institutional framework which recognizes and protects access rights for small-scale fisheries
- ¶13 Disaggregated accounts can track the distribution of fisheries benefits across scales of operation

3.4 Practical Applications

3.4.1 Informing Total Allowable Catch Decisions

¶1 Fisheries managers commonly set Total Allowable Catch (TAC) limits based on biological stock assessments. Ocean Accounts enhance this process by:

- ¶2 Providing a systematic framework for recording and updating stock information
- ¶3 Enabling comparison of catch levels against sustainable yield benchmarks
- ¶4 Tracking the cumulative impact of harvesting decisions on stock levels over time
- ¶5 Integrating economic information to assess the costs and benefits of different TAC options⁶

¶6 The following decision framework illustrates how data from physical asset accounts and stock assessments can be combined to guide TAC decisions. By cross-referencing the current stock status (expressed as the ratio of biomass to the biomass at maximum sustainable yield, B/B_{MSY}) with recorded catch relative to sustainable yield (SY), managers can identify the appropriate management response. Figure 1.5.1 presents this as a two-by-two matrix. Each combination of stock status

and catch level maps to one of four management outcomes and routes to its corresponding physical- and monetary-asset account entries.

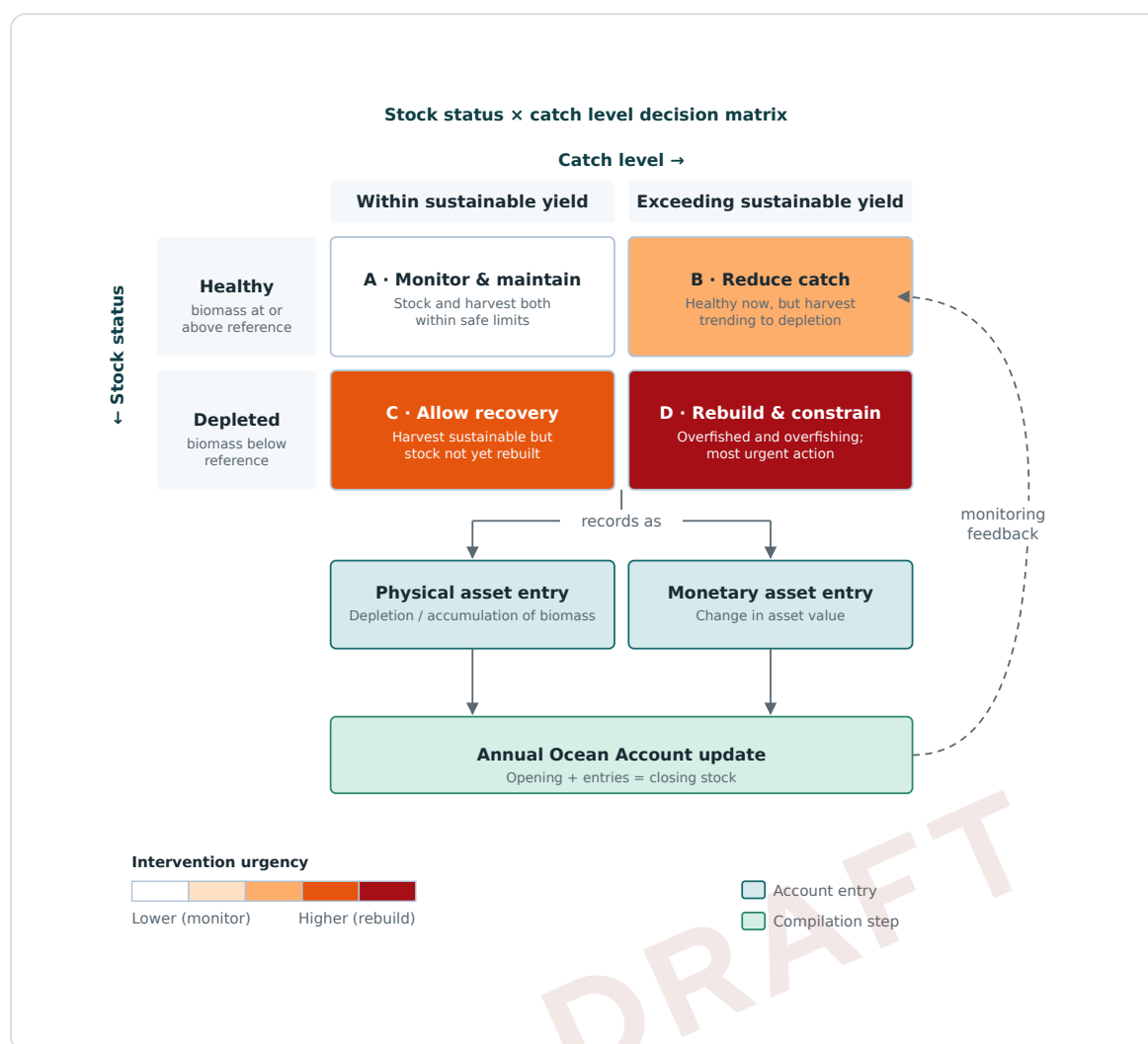


Figure 1.5.1 Stock status crossed with catch relative to sustainable yield yields four management outcomes linked to physical and monetary asset entries. [a] Cell shade = intervention urgency (ordinal, not quantitative). [b] Dashed edge = monitoring feedback.

Source: TG-1.5 draft v6, Section 3.5, Table 3.5.1 (four-outcome stock × catch matrix).

Adapted from: SEEA EA 2024 §6.32-6.45 (fisheries asset accounts); FAO SOFIA 2024 stock-status reporting categories.

¶7 *Table 3.4.1: Sustainable yield decision framework for fisheries management*

Stock Status (B/B _{MSY})	Catch Relative to SY	Depletion Recorded	Management Implication
>= 1.0 (healthy)	Catch <= SY	No	Maintain current TAC
>= 1.0 (healthy)	Catch > SY	Yes	Reduce TAC
< 1.0 (depleted)	Catch <= current SY	No	Stock stabilises at current level; active rebuilding requires catch below SY
< 1.0 (depleted)	Catch > current SY	Yes	Urgent TAC reduction

¶8 This decision matrix translates accounting outputs into management guidance. When a stock is healthy ($B \geq B_{MSY}$) and catch does not exceed sustainable yield, no depletion is recorded and the current TAC can be maintained. When catch exceeds sustainable yield even for a healthy stock, depletion is recorded in the asset account, and the TAC should be reduced to prevent the stock

from falling below its MSY benchmark. For depleted stocks, even catch levels at the current (reduced) sustainable yield merely stabilise the stock at its depleted level rather than rebuilding it. Active rebuilding requires catch below sustainable yield. Catch exceeding sustainable yield for a depleted stock represents the most urgent case for TAC reduction. Managers should interpret these categories together with the precautionary reference points set out in **TG-6.7** Section 3.1, and with due regard for uncertainty in stock assessment estimates⁷. Table 3.4.1 is the normative statement of this decision framework for the publication; TG-6.7 Section 3.7 records the corresponding depletion-recording rule from the compiler's side.

¶9 **Estimating current SY for depleted stocks:** For the two depleted rows in Table 3.4.1 ($B/B_{MSY} < 1.0$), "current SY" is the sustainable yield at the stock's actual (reduced) biomass, which is lower than MSY. The method depends on the data tier in use, and is specified in **TG-6.7** Sections 3.1 and 3.3. At the lowest tier only a linear approximation is available, $SY_{current} = MSY \times (B/B_{MSY})$, which is indicative only and, below B_{MSY} , gives a lower yield than the symmetric Schaefer curve ($MSY \times x(2 - x)$, with $x = B/B_{MSY}$); at higher tiers the assessment model supplies a current-biomass-conditional yield estimate directly and the approximation should not be substituted for it. The management consequence is that a quota set at the lowest tier carries a wider error band than the single number implies, and should be paired with a more conservative buffer.

3.4.2 Worked Example: Using Asset Account Data to Inform Quota Decisions

¶1 This worked example demonstrates how a fisheries management agency can use asset account data to assess stock status and adjust Total Allowable Catch quotas, using synthetic data for a hypothetical coastal demersal fishery.

¶2 **Scenario description:** The Coastal Demersal Fishery Management Authority oversees a commercially important snapper species within the national EEZ. The fishery is managed using annual TAC quotas allocated through an Individual Transferable Quota (ITQ) system. Stock assessment scientists conduct annual assessments using age-structured models calibrated to catch data, fishery-independent trawl surveys, and commercial CPUE indices. The authority compiles physical asset accounts for the snapper stock, integrated with the stock assessment process.

¶3 Step 1: Compile physical asset account

¶4 The authority compiled the following physical asset account for snapper stock for the accounting year 2024, based on the 2024 stock assessment:

Account Entry	Value (tonnes)	Data Source
Opening stock (1 Jan 2024)	42,900	Stock assessment biomass estimate
Additions to stock		
Natural growth (recruitment + growth)	14,300	Stock assessment recruitment and growth models
Upward reappraisals	0	No model revisions this year
Total additions	14,300	
Reductions in stock		
Gross catch (commercial fisheries)	10,500	Verified landing records + discard estimates
Normal losses (natural mortality)	5,800	Stock assessment natural mortality estimate
Catastrophic losses	0	No mass mortality events recorded
Uncompensated seizure (IUU fishing)	300	Surveillance-based IUU estimate
Total reductions	16,600	
Closing stock (31 Dec 2024)	40,600	Stock assessment biomass estimate
Derived measures		

Account Entry	Value (tonnes)	Data Source
Sustainable yield at current biomass	8,500	Estimated from surplus production curve at B = 40,600t
B _{MSY} (reference biomass)	55,000	Stock assessment MSY reference point
B/B _{MSY} ratio	0.74	40,600 / 55,000
Total removals (gross catch + IUU)	10,800	10,500 + 300
Depletion (total removals - sustainable yield)	2,300	10,800 - 8,500

¶5 Note: Sustainable yield is stock-dependent and varies with biomass. At the current depleted biomass of 40,600 tonnes (B/B_{MSY} = 0.74), the estimated sustainable yield of 8,500 tonnes represents the harvestable surplus above natural mortality: the quantity that can be removed by human harvest without reducing stock biomass below its current level. Depletion is therefore measured as total removals (gross catch plus all IUU extraction, whether by residents or non-residents) minus that harvestable surplus: 10,800 - 8,500 = 2,300 tonnes. Natural mortality of 5,800 tonnes is recorded separately in the reductions block as a stock-biological process distinct from the harvest-based depletion test, and it does not enter the depletion calculation. As the stock rebuilds toward B_{MSY}, sustainable yield will increase toward its maximum.

¶6 Step 1b: Compile monetary asset account

¶7 Using a unit resource rent approach (SEEA CF paras 5.441-5.452), the authority monetises the physical account. All figures are illustrative.

Monetary Account Entry	Basis	Value (USD)
Average landed price	USD 1,200/tonne	–
Average extraction cost (incl. normal profit)	USD 800/tonne	–
Unit resource rent	1,200 – 800	USD 400/tonne
Opening stock value	42,900t × USD 400	USD 17,160,000
Closing stock value	40,600t × USD 400	USD 16,240,000
Depletion value	2,300t × USD 400	USD 920,000
Resource rent from fishing	10,500t × USD 400	USD 4,200,000
Net fishing income (resource rent – depletion)	4,200,000 – 920,000	USD 3,280,000
Sustainable net income (SY × unit resource rent)	8,500t × USD 400	USD 3,400,000

¶8 The depletion value of USD 920,000 represents stock capital eroded in 2024. Net fishing income of USD 3,280,000 is the resource rent that remains after accounting for this capital draw-down. These monetary measures provide the inputs for depletion-adjusted GDP as described in Section 3.3.2.

¶9 Step 2: Assess stock status against decision framework

¶10 The authority applies the decision framework from Table 3.4.1:

- ¶11 **Stock status:** B/B_{MSY} = 0.74, indicating the stock is below MSY benchmark (depleted)
- ¶12 **Catch relative to sustainable yield:** Total removals (10,800) > sustainable yield (8,500), so depletion is recorded (2,300 tonnes)
- ¶13 **Decision category:** "< 1.0 (depleted)" AND "Catch > current SY" → **Urgent TAC reduction**

¶14 Step 3: Calculate TAC adjustment

¶15 The management authority determines that the TAC should be reduced to allow stock rebuilding. Two scenarios are considered:

¶16 *Scenario A: Reduce catch to current sustainable yield level*

- ¶17 Set TAC for 2025 at 8,500 tonnes (equal to current sustainable yield at present biomass)
- ¶18 This prevents further depletion but does not actively rebuild the stock
- ¶19 At this catch level, stock biomass would stabilise near the current level (approximately 40,600 tonnes), remaining below B_{MSY}

¶20 *Scenario B: Reduce catch below sustainable yield to enable rebuilding*

- ¶21 Set TAC for 2025 at 7,000 tonnes (below sustainable yield by 1,500 tonnes)
- ¶22 Stock expected to increase by approximately 1,500 tonnes per year
- ¶23 Rebuilding target: return to B_{MSY} (55,000 tonnes) within 10 years
- ¶24 Required annual rebuilding increment: $(55,000 - 40,600) / 10 = 1,440$ tonnes/year
- ¶25 TAC of 7,000 tonnes achieves this rebuilding trajectory

¶26 The authority selects Scenario B, setting the 2025 TAC at 7,000 tonnes, representing a 33% reduction from 2024 gross catch.

¶27 **Step 4: Communicate decision using asset account framework**

¶28 The authority publishes the decision with the following justification, grounded in asset accounting concepts:

"The 2024 physical asset account for snapper stock records closing biomass of 40,600 tonnes, 26% below the B_{MSY} reference level of 55,000 tonnes. Total removals of 10,800 tonnes (gross catch 10,500 plus IUU 300) exceeded sustainable yield of 8,500 tonnes, resulting in depletion of 2,300 tonnes of stock capital. To reverse this trajectory and rebuild the stock asset to sustainable levels within 10 years, the 2025 Total Allowable Catch is set at 7,000 tonnes. This reduction allows net stock growth of approximately 1,500 tonnes per year. Continued monitoring through annual asset accounts will track rebuilding progress, and the TAC will be adjusted as the stock approaches the MSY target."

¶29 **Step 5: Monitor rebuilding through subsequent accounts**

¶30 Monitoring actions for each assessment tier are set out in Table 3.4.1.

3.4.3 Evaluating Fisheries Subsidies

¶1 Governments provide various forms of support to fisheries, including fuel subsidies and vessel construction programmes. Ocean Accounts enable systematic assessment of:

- ¶2 The magnitude and composition of fisheries subsidies
- ¶3 Whether subsidies enhance capacity (potentially harmful) or improve sustainability (beneficial)
- ¶4 The distributional effects of subsidies across different types of fishing operations
- ¶5 Alignment with international commitments under SDG 14.6 and WTO fisheries subsidies disciplines⁸

3.4.4 Assessing Recovery Programs

¶1 For depleted stocks, recovery programmes aim to rebuild populations to sustainable levels. Ocean Accounts support:

- ¶2 Baseline measurement of stock status at programme initiation
- ¶3 Tracking of stock recovery through periodic asset accounts
- ¶4 Assessment of economic impacts during rebuilding periods (short-term costs)
- ¶5 Evaluation of long-term benefits from restored sustainable harvesting⁹

3.4.5 Quota Valuation and Management

¶1 Individual Transferable Quotas (ITQs) are an increasingly common approach to fisheries management. When quotas are freely traded, their market prices can inform the valuation of fish stocks¹⁰. Ocean Accounts support:

- ¶2 Recording quota values as assets (permits to use environmental assets under SEEA CF para 4.178)
- ¶3 Tracking changes in quota values over time
- ¶4 Distinguishing between the value of quotas and the value of underlying fish stocks
- ¶5 Assessing the equity implications of quota allocation systems

¶6 When using ITQ market prices to estimate the value of fish stock assets, compilers should be aware that quota prices may not fully reflect the underlying resource value. Quota markets are often thin (few transactions), geographically segmented, and subject to regulatory constraints on ownership concentration and foreign participation that can distort prices. In addition, quota prices reflect private expectations of future harvesting returns, which may diverge from the social value of the resource. Where quota markets exist, their prices can serve as a useful cross-check against net present value estimates derived from resource rent approaches. The primary reference for ITQ treatment as environmental assets is SEEA CF paras 4.178–4.180, which establish the asset classification for permits to use environmental assets. The valuation method (resource rent and net present value approaches) is provided in SEEA CF paras 5.441–5.452. Quota prices should not be treated as the sole basis for monetary asset valuation without careful assessment of market conditions¹¹.

3.4.6 Climate Change Adaptation

¶1 Climate change is affecting fish stock distribution, productivity, and sustainable yield levels. Ocean Accounts can support climate adaptation by:

- ¶2 Tracking shifts in stock distribution across spatial accounting units
- ¶3 Monitoring changes in condition indicators that may signal climate impacts
- ¶4 Adjusting sustainable yield estimates to account for changing environmental conditions
- ¶5 Informing adaptive management responses to climate-driven changes¹²

3.4.7 Community-level Fishery Accounting

¶1 The ocean accounting framework can be applied at both national and community scale to capture the economic contributions of small-scale and subsistence fishing that are often missed in standard economic surveys. The International Institute for Environment and Development (IIED) developed survey tools and toolkits examining subsistence and recreational supply of ocean-related natural inputs relevant to small-scale fisheries, with a focus on understanding how coastal communities depend on and contribute to ocean resources¹³. In a complementary effort, the Environmental Defense Fund (EDF) undertook community-level fisheries accounting work in Baja California, Mexico. That work demonstrated that accounting principles derived from the SEEA Central Framework and Ocean Accounts methodology could be operationalised at local scales to inform cooperative fisheries management.

¶2 These initiatives illustrated that structured accounting approaches can render visible the economic value of artisanal and subsistence catches: value that conventional national accounts frequently undercount or omit entirely. By capturing household-level resource flows and linking them to ecosystem condition indicators, community-scale accounts provide a bridge between national statistical frameworks and local management needs. The IIED/EDF framework (2015–2019) remains the most recent published methodology at the time of writing, and no formal superseding guidance has been published.

Case illustration: Community Fishery Accounts in Baja California (2015–2019)

Work by the International Institute for Environment and Development (IIED) on survey methodologies and toolkits for small-scale fisheries, together with efforts by the Environmental Defense Fund (EDF) beginning in 2015 in Baja California, Mexico, demonstrated that ocean accounting frameworks can be applied at the community scale. The EDF programme compiled fishery accounts for remote fishing villages, capturing the economic contributions of small-scale and subsistence fishing that are typically missed in standard economic surveys. These efforts highlight the potential for community-level accounts to complement national-level compilations, particularly for capturing non-market and subsistence ocean economy contributions¹⁴.

3.5 Where the data come from, and what that means for a decision

¶1 Fisheries account data sources – catch and landing statistics, stock assessment reports, vessel and licence registries, economic and employment surveys, trade statistics – and the intergovernmental series that complement them are set out in **TG-4.10 Extending Fisheries Statistics for Ecosystem-Based Management** Section 3.8 and **TG-4.3 Administrative Data Sources**. Two source limitations change what a manager can conclude, and should be established before a decision rests on the numbers.

¶2 **Reported landings are not total removals.** Illegal, unreported and unregulated catch sits outside the reported series, and the accounting treatment differs by who takes it: illegal catch by residents is still production by the national industry and belongs in gross catch, whilst illegal catch by non-residents is recorded as an uncompensated seizure – a transfer of national natural capital without compensation. Both enter total removals and therefore the depletion test, but only the first enters the production account. Estimation methods and their uncertainty are covered in TG-4.10 Section 3.8.4. Where no IUU estimate exists, a depletion figure computed from reported landings alone is a lower bound, and a quota set from it will be too generous by an unknown margin.

¶3 **Subsistence and recreational catch are often the missing block.** Both remove fish from the stock and both belong in the accounts, yet neither appears in commercial landing records. In several Pacific Island States subsistence and artisanal catch may equal or exceed commercial catch by volume whilst remaining largely unreported. A stock assessment and a quota built on the commercial series alone will misstate total removals in exactly those fisheries where food security is the binding consideration. Coverage approaches – benchmark landing-site surveys, fisheries modules in household income and expenditure surveys, food balance sheet cross-checks – are in TG-4.10 and **TG-4.2 Survey Methods**.

¶4 In both cases the decision-relevant question is not how the estimate is made but whether one exists at all, and what the accounts assume where it does not.

4. Acknowledgements

¶1 **Authors:** [To be confirmed]

¶2 **Reviewers:** [To be confirmed]

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