

Detailed SWOT Analysis - Monitoring

Example monitoring options	Strengths	Weaknesses	Opportunities	Threats
<p>Electronic Monitoring (EM)</p> <p>Use of electronic monitoring to measure cetacean bycatch on small scale vessels in the Netherlands.</p> <p><i>Marije Siemensma, Marine Science & Communication</i></p>	<ul style="list-style-type: none"> Space efficient Visual confirmation Captures detailed information 	<ul style="list-style-type: none"> Trust in data use (science vs compliance) Analysis capability to interpret data Lack of privacy Bulky on small vessels 	<p><u>EM could be used to:</u></p> <ul style="list-style-type: none"> provide proof of sustainability (e.g. premium products) verify fisher-reporting check for cetaceans dropping out the net/behaviour in net 	<ul style="list-style-type: none"> Obstruction or issues with cameras Unsuccessful if low buy-in from the fishing industry. Lack of consistent policy commitment
<p>Real-time reporting</p> <p>Use of technology to upload, share and monitor real-time bycatch of salmon in west coast US. <i>Tara Marshall, University of Aberdeen</i></p>	<ul style="list-style-type: none"> Industry led Real-time information Preventative measure to avoid bycatch Saves time & inconvenience of bycatch 	<ul style="list-style-type: none"> Sharing commercially sensitive information Requires incentives to work Requires verification 	<p><u>Real-time reporting could be used to:</u></p> <ul style="list-style-type: none"> Enhance collaboration from the fishing industry 	<ul style="list-style-type: none"> Lack of incentives: works well where there are incentives or a rights-based management regime in place
<p>Observers</p> <p>SMRU run a dedicated marine mammal bycatch observer scheme <i>Allen Kingston, SMRU</i> Cefas run a general bycatch observer scheme as mandated by the EU Data Collection Framework (DCF) <i>Cefas</i></p>	<ul style="list-style-type: none"> Programme ongoing High quality data Builds relationships with fishermen Adaptive programme 	<ul style="list-style-type: none"> Resource intensive Sub-sample of fishing fleet Low representation of the inshore fleet Observer bias Observer effect 	<p><u>Observers could:</u></p> <ul style="list-style-type: none"> train in bycatch release interview fishers on experience of by-catch undertake 6-month intensive programme to validate other monitoring e.g. fisher self-reporting 	<ul style="list-style-type: none"> Resources: requires continuous investment and training Limit to what observers can cover in one trip
<p>Apps & Technology</p> <p>Smart phone apps for fisher-reporting (<i>AST, David Davies</i>) and open-source software or hardware for recording, analysis & integration (<i>Octophin Digital, Filip Hnizdo</i>)</p>	<ul style="list-style-type: none"> Low overheads of Apps Use of photographs to help species identification Integrate with GSM Open source software: can be more effective and efficient 	<ul style="list-style-type: none"> Integrity of data – requires validation 	<p><u>Technology & App dev. could:</u></p> <ul style="list-style-type: none"> involve user in design reduce duplication of data entry help to integrate data and link different organisations promote transparency 	<ul style="list-style-type: none"> Reluctance to share data Reluctance to use open source (stipulate in funding criteria that software is open-source?) Lack of resources to develop
<p>Fisher interviews</p> <p>Information on whale entanglements over the past 10</p>	<ul style="list-style-type: none"> Increased information on something that is under-reported Builds relationship and trust with fishermen 	<ul style="list-style-type: none"> Resource/time-heavy Subjective view of interviewee 	<p><u>Fisher interviews could be used to:</u></p> <ul style="list-style-type: none"> Promote best practice Discuss industry-led solutions Increase bycatch reporting 	<ul style="list-style-type: none"> Risk to fishermen of sharing information that can be used negatively Funding

years has been captured in 90+ interviews in Scotland.	<ul style="list-style-type: none"> • Easy to replicate 		<ul style="list-style-type: none"> • Lead to development of reporting app 	<ul style="list-style-type: none"> • Low participation could result in false outcomes
<p>Stranding Programme</p> <p>30-year programme collecting cetacean strandings and conducting necropsies determining cause of death and range of ancillary data. Rob Deaville, ZSL</p>	<ul style="list-style-type: none"> • Longevity of data set- year round monitoring • Data standards integrated across the EU • Monitors multiple pressures beyond bycatch e.g. shipstrike, pollution etc; and collects ancillary data e.g. stomach contents/life history etc • Supports public engagement 	<ul style="list-style-type: none"> • Resource intensive • Biases in dataset (only subset of mortality and strandings) • Uneven effort across parts of the UK 	<p><u>Strandings data could be:</u></p> <ul style="list-style-type: none"> • Integrated with other monitoring streams • Used to validate sightings data • Help increase engagement at a local level 	<ul style="list-style-type: none"> • Need to integrate with other monitoring streams • Consistency of funding • Relies on a small number of individuals in programme
<p>Drift Modelling</p> <p>Models developed for the UK and French coast using strandings data and tagging experiments to estimate bycatch rates and hotspot areas.</p>	<ul style="list-style-type: none"> • Uses strandings data to estimate bycatch levels and identify fisheries/ areas with high bycatch • Independent from fishing data • Promotes engagement with fishermen through tagging dead bycatch to evaluate the model 	<ul style="list-style-type: none"> • Depends on an existing strandings scheme • Fine tuning needed on correcting factors & drift duration • Limited to certain areas 	<p><u>Drift modelling could:</u></p> <ul style="list-style-type: none"> • Be expanded to include other areas • Fine-tuned through more tagging experiments (of bycatch) • Turn a negative into a positive by collecting useful data from accidental capture of a cetacean • Integrate with observer bycatch rates 	<ul style="list-style-type: none"> • Lack of modelling capacity to expand work into new regions • Misinterpretation if correction factors not accurate
<p>Hydrophones</p> <p>Use of hydrophones to monitor interaction between dolphins and porpoises with gill net and purse seine fishing in Hong Kong. Lindsey Porter, St Andrews University</p>	<ul style="list-style-type: none"> • Passive monitoring • Assesses level of fishing and cetacean overlap • At-source monitoring by fishermen • Understand cetacean behaviour 	<ul style="list-style-type: none"> • Only useful for species that vocalise frequently • Requires validation • Detects presence but not quantity or currently bycatch (unless able to distinguish distress signals) 	<p><u>Hydrophones can be used:</u></p> <ul style="list-style-type: none"> • On autonomous vehicles or to validate other monitoring • To gather information on other fish and sources of noise • To develop maps of cetacean presence overlapped with fishing effort that can be shared with fishermen • Potential to project an acoustic signal to deter cetaceans, as well as listen 	<ul style="list-style-type: none"> • Misidentification of species • High upfront costs • Selecting appropriate equipment
<p>Satellites</p> <p>Testing the use of satellites to monitor whales, Hannah Cubaynes, Cambridge University</p>	<ul style="list-style-type: none"> • Covers large areas • Used to reach inaccessible areas 	<ul style="list-style-type: none"> • Poor weather obscures images • Only visible for large animals: whales • Requires large data processing capability 	<p><u>Satellites could be used:</u></p> <ul style="list-style-type: none"> • To complement data on cetacean sightings from ships • Provide automated data on whale distribution 	<ul style="list-style-type: none"> • Competition for satellite time in good weather • Early stages of development

<p>Remote Operating Vehicles (ROVs)</p> <p>Review of how autonomous vehicles can be used in monitoring marine fauna.</p> <p><i>Ursula Verfuss, SMRU Consulting</i></p>	<ul style="list-style-type: none"> • Can reach inaccessible areas • Reduces risks to humans 	<ul style="list-style-type: none"> • Requires large data processing capability • Requires verification • No previous use for monitoring bycatch 	<p><u>ROVs could be used for:</u></p> <ul style="list-style-type: none"> • Underwater monitoring: behaviour in nets and reasons for bycatch • Calculating abundance estimates through automated surveys 	<ul style="list-style-type: none"> • Regulations may hinder use if permits for ROVs cannot be secured • Selecting appropriate equipment
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Detailed SWOT Analysis - Mitigation

Mitigation Option	Strengths	Weaknesses	Opportunities	Threats
<p>Sound</p> <p><i>Acoustic Deterrent Devices (ADD) or Pingers</i></p>	<ul style="list-style-type: none"> • Works well with some species & reduces gear damage • Fits well on nets • Fishers willing to use if they agree it works • Scalability • Technology improving • Cost reducing • Legislative driver is an incentive 	<ul style="list-style-type: none"> • Does not work well for all species (e.g. bottle nose dolphin) • Dinner bell effect for species that depredate • Reduces but does not eliminate bycatch • Requires maintenance & enforcement • Can increase bycatch if not deployed correctly • Not applicable to Creel fishery 	<ul style="list-style-type: none"> • Make an alternating acoustic signal so animals don't habituate • Undertake a broad range of trials: different species, populations, habitats, gears & seasons to determine what works best where • Use existing trials to enable decision-making around trials e.g. check list or decision tool • Research into acoustic reflectors • Research into inducing a startled reflex or producing a distress signal. 	<ul style="list-style-type: none"> • Concerns over cumulative noise pollution and habituation
<p>Light</p> <p><i>Lights based on species-specific wavelengths</i></p>	<ul style="list-style-type: none"> • Could complement existing methods (e.g. use for bottle nose dolphin together with pingers for other species such as harbour porpoise) • Species specific – targeted • Support from fishermen for trials • If increased target catch could reduce soak time (and therefore cetacean bycatch) 	<ul style="list-style-type: none"> • Need different lights for different species • No current evidence that light reduces cetacean bycatch • Reduced effectiveness in turbid water • Needs maintenance 	<ul style="list-style-type: none"> • Assess how applicable to different gears & species • Chance to influence design as in R&D phase • Assess costs vs pingers 	<ul style="list-style-type: none"> • Concerns this detracts from other measures with a greater evidence base • Unknown cumulative impact • May attract bycatch in certain circumstances
<p>Spatial & Temporal Management</p> <p><i>Fixed and non-fixed closures during certain times or places</i></p>	<ul style="list-style-type: none"> • Seasonal & Dynamic (not just MPAs) • Can be flexible (without boundaries) • Adaptable on a case-by-case basis • Public support 	<ul style="list-style-type: none"> • Fixed closed areas (MPAs) not effective for cetacean bycatch • Can displace effort • Difficult to design for highly mobile species 	<ul style="list-style-type: none"> • Fixed closed areas (MPAs) provide opportunities to test new gear • Use within identified hot-spots rather than closing entire fishery • Use with real-time monitoring to make closures targeted and brief 	<ul style="list-style-type: none"> • Relies on good compliance and enforcement or closed areas attract illegal fishing • Relies on large amount of evidence to design well.

	<ul style="list-style-type: none"> • Can benefit wider ecosystems 	<ul style="list-style-type: none"> • Need to understand species behaviour to design appropriately 		
<p>Gear Modifications</p> <p><i>Changes to type, design or deployment of gear</i></p>	<ul style="list-style-type: none"> • Modification of gear or its deployment can reduce bycatch • Changes to gear requires no changes to fishers' routines • Potential options: Different strengths and colours of rope, twine and mesh 	<ul style="list-style-type: none"> • Cost implications • Difficulty in changing culture if requires a signifiant change in gear deployment • Other gear types not effective for target catch • Information on alternatives not necessarily reaching fishermen 	<ul style="list-style-type: none"> • Trial using different types of gears in different areas to reduce bycatch • Trial optimal deployment: soak time, location, tension on risers • Involve fishermen in designing innovations • Understand interactions that do not lead to bycatch 	<ul style="list-style-type: none"> • Gear change or modification may impact another species/ecosystem (need to consider the ecosystem as a whole) • Regulatory conflict • Significant changes to gear without evidence leads to unnecessary burdens on fishermen