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First Flood Risk Management Plans - Member State: Sweden

Accompanying the document

REPORT FROM THE COMMISSSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL

on the implementation of the Water Framework Directive (2000/60/EC) and the Floods Directive (2007/60/EC)
Second River Basin Management Plans
First Flood Risk Management Plans

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Acronyms

APSFR	Areas of Potential Significant Flood Risk
EEA	European Environment Agency
FD	Floods Directive
FHRM	Flood Hazard and Risk Map
FRMP	Flood Risk Management Plan
NWRM	Natural Water Retention Measures
PFRA	Preliminary Flood Risk Assessments
RBD	River Basin District
RBMP	River Basin Management Plan
SEA	Strategic Environmental Assessment
UoM	Unit of Management
WFD	Water Framework Directive
WISE	Water Information System for Europe

Introduction

The Floods Directive (FD) (2007/60/EC) requires each Member State to assess its territory for significant risk from flooding, to map the flood extent, identify the potential adverse consequences of future floods for human health, the environment, cultural heritage and economic activity in these areas, and to take adequate and coordinated measures to reduce this flood risk. By the end of 2011, Member States were to prepare Preliminary Flood Risk Assessments (PFRAs) to identify the river basins and coastal areas at risk of flooding (Areas of Potential Significant Flood Risk – APSFRs). By the end of 2013, Flood Hazard and Risk Maps (FHRMs) were to be drawn up for such areas. On this basis, Member States were to prepare Flood Risk Management Plans (FRMPs) by the end of 2015.

This report assesses the FRMPs for Sweden[1]. It assesses the FRMPs and Member States reporting to the European Commission in 2016. Its structure follows a common assessment template used for all Member States. The report draws on two main sources:

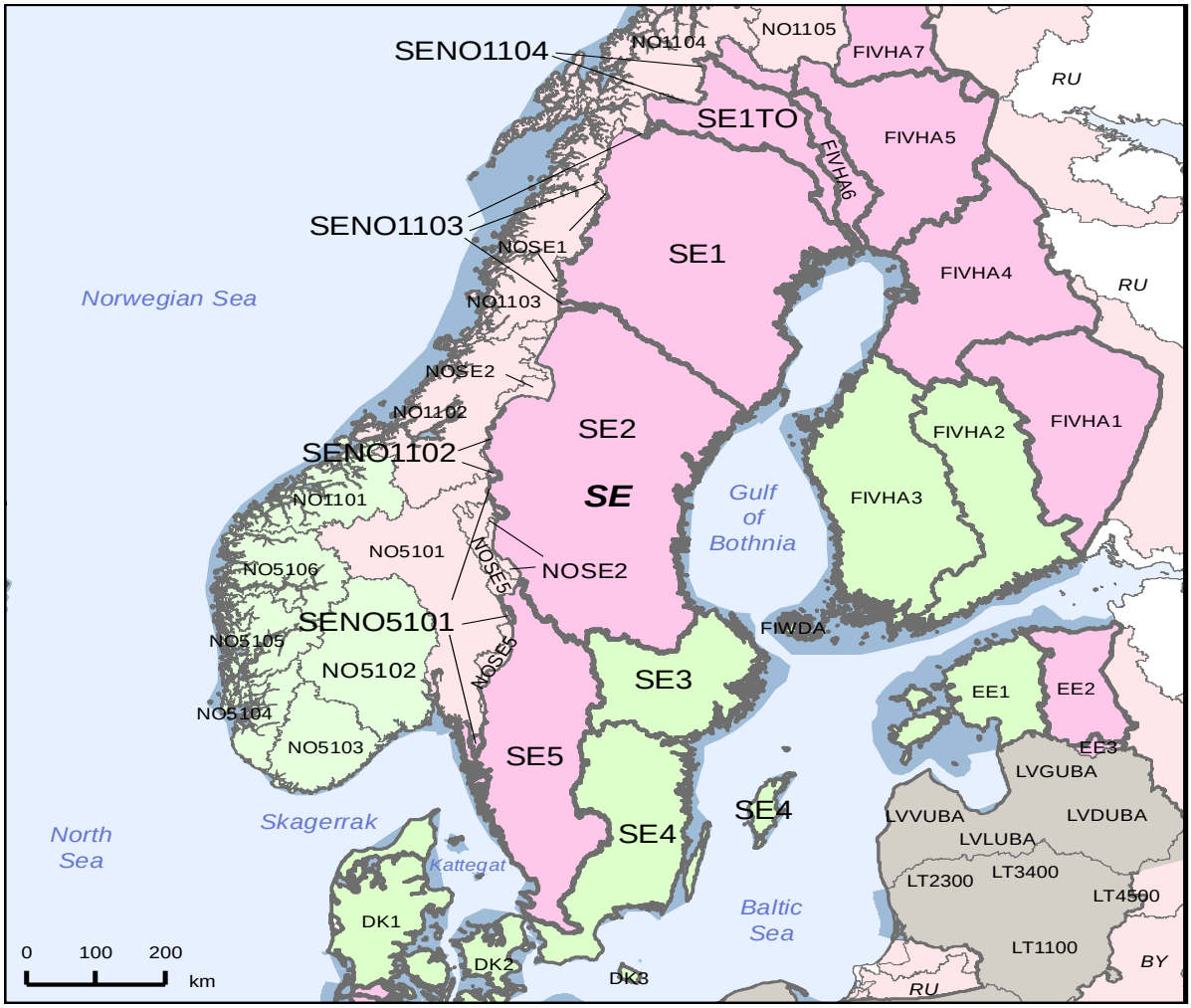
- Member State reporting to the European Commission on the FRMPs[2] as per Articles 7 and 15 of the FD: this reporting provides an overview of the plans and details on their measures
- Selected FRMPs: Sweden has reported 18 FRMPS, one for each APSFR. Five FRMPs have been selected for the assessment to provide geographical coverage across the country. The following APSFR and Units of Management (UoMs) are covered in the assessment of Sweden:
    - Älvsbyn (SE1A8932) in the Bothnian Bay UoM (SE1);
    - Falun (SE2A6504) in the Bothnian Sea UoM (SE2);
    - Stockholm (SE3A0336) in the North Baltic Sea UoM (SE3);
    - Kristianstad (SE4A2980) in the South Baltic Sea UoM (SE4);
    - Karlstad (SE5A5704) in the Skagerrak and Kattegat UoM (SE5).

[1] The present Member State assessment reports reflect the situation as reported by each Member State to the Commission in 2016 or 2017 and with reference to FRMPs prepared earlier. The situation in the MSs may have altered since then.

[2] Referred to as "Reporting Sheets" throughout this report. Data must be reported in a clear and consistent way by all Member States. The format for reporting was jointly elaborated by the Member States and the Commission as part of a collaborative process called the "Common Implementation Strategy": http://ec.europa.eu/environment/water/water-framework/objectives/implementation_en.htm
Whereas a key role of the Commission is to check compliance with EU legislation, the Commission also seeks information to allow it to determine whether existing policies are adequate. It also requires certain information to create a European-wide picture to inform the public.

Overview

Figure 1 Map of Units of Management/River Basin Districts



International River Basin Districts (within European Union)
International River Basin Districts (outside European Union)
National River Basin Districts (within European Union)
Countries (outside European Union)
Coastal Waters

Source: WISE, Eurostat (country borders) as presented in the 2012 RBMP assessment reports

Sweden has designated ten UoMs under the FD. These ten UoMs correspond to the ten River Basin Districts (RBDs) that Sweden designated under the Water Framework Directive (WFD). Of these ten UoMs, five have large territories with exclusively national jurisdiction, and five are smaller transboundary UoMs of which four are joint UoMs with Norway and one with

Finland[3]. The transboundary UoMs have a limited number of inhabitants, and, with the exception of the Torne River UoM (SE1TO), do not have any APSFRs.

Sweden has designated 18 Areas of Potentially Significant Floods Risk (APSFRs) across six UoMs. Sweden prepared 18 FRMPs, one for each APSFR. The FRMPs were prepared by the county administrations in which the APSFR is located. All FRMPs in Sweden were established as regional plans by the County Administrative Boards[4] by 22 December 2015[5].

The Swedish Civil Contingencies Agency (MSB) oversaw a process of national coordination for the FRMPs; however, there are differences in the approach to the plans[6] – for example in terms of number and structure of objectives, detail provided on measures and extent of active involvement of stakeholders – across the County administrations.

The table below gives an overview of all UoMs in Sweden, including the UoM code, the name, and the number of APSFRs reported. It also shows if all documents required for each UoM were submitted to European Environment Agency's (EEA) WISE[7] – the FRMP as a PDF and the reporting sheet as an XML.

Table 1 Overview of UoMs in Sweden

UoM	Name	Number of APSFRs	XML reported	PDF Reported
SE1	BOTHNIAN BAY	2	Yes	Yes
SE1TO	BOTHNIAN BAY (INTERNATIONAL DISTRICT)	1	Yes	Yes
SE2	BOTHNIAN SEA	4	Yes	Yes
SE3	NORTH BALTIC SEA	4	Yes	Yes
SE4	SOUTH BALTIC SEA	2	Yes	Yes
SE5	SKAGERRAK AND KATTEGAT	5	Yes	Yes
SENO1102	BOTHNIAN SEA (INTERNATIONAL DRAINAGE BASIN TRONDELAGSFYLKENE - SWEDEN)	-	No	No
SENO1103	BOTHNIAN BAY (INTERNATIONAL DRAINAGE BASIN NORDLAND - SWEDEN)	-	No	No

[3] Under the WFD, the equivalent five transboundary RBDs are administered under the five large national RBDs.
[4] The Administrative Boards that head the Counties are appointed by the national government.
[5] As per the *Förordning (2009:956) om översvämningsrisker*, the national Flood Risk Regulation.
[6] Sweden subsequently informed that this is due to the many naturally different geographic regions and differences in how populated these are: Some areas are very scarcely populated and some areas are densely populated.
[7] http://rod.eionet.europa.eu/obligations/603/deliveries?id=603&tab=deliveries&d-4014547-p=1&d-4014547-o=2&d-4014547-s=3

UoM	Name	Number of APSFRs	XML reported	PDF Reported
SENO1104	BOTHNIAN BAY (INTERNATIONAL DRAINAGE BASIN TROMS - SWEDEN)	-	No	No
SENO5101	SKAGERRAK AND KATTEGAT (INTERNATIONAL DRAINAGE BASIN GLOMMA - SWEDEN)	-	No	No
TOTAL		18		

The FRMPs can be downloaded from the following web page:

- https://www.msb.se/sv/Forebyggande/Naturolyckor/Oversvamning/Oversvamningsdirektivet/Steg-3-Riskhanteringsplaner/

Overview of the assessment

The table below gives an overview of the evidence found during the assessment of the FRMPs. The following categorisation was used for the column concerning evidence:

- **Evidence to the contrary**: An explicit statement was found stating that the criterion was not met.
- **No evidence**: No information found to indicate that the criterion was met.
- **Some evidence**: Reference to the criterion is brief and vague, without a clear indication of the approach used for the criterion. Depending on the comment in the adjacent column, "some evidence" could also be construed as "weak evidence".
- **Strong evidence**: Clear information provided, describing an approach followed in the FRMP to address the criterion.

Table 2 Overview of the evidence found during the assessment of the FRMPs

Criterion	Evidence	Comments
FRM objectives have been established	Strong evidence	Sweden has set four national objectives. The FRMPs have then set more detailed objectives of three types: specific, measure-oriented and knowledge objectives (not all FRMPs assessed have set all three types, however).
FRM objectives relate to...		
...the reduction of potential adverse consequences	Strong evidence	Sweden's four national objectives address the potential adverse consequences of floods.

Criterion	Evidence	Comments
...to the reduction of the likelihood of flooding	No evidence	No objectives to reduce the likelihood of flooding were identified among the national objectives or the objectives of the five FRMPs assessed (though measures in the FRMPs address this)[8].
...to non-structural initiatives	Strong evidence	Three of the five FRMPs assessed include knowledge objectives to improve the information base on flood risks.
FRM objectives consider relevant potential adverse consequences to...		
...human health	Strong evidence	One of the four national objectives states that human health shall not be significantly affected by floods.
...economic activity	Strong evidence	One of the four national objectives states that economic activities of major societal value shall not be exposed to long disruption caused by floods.
...environment	Strong evidence	One of the four national objectives states that the environment and natural values shall not be affected by floods.
...cultural heritage	Strong evidence	One of the four national objectives states that cultural heritage shall be protected from floods.
Measures have been...		
...identified	Strong evidence	Sweden has reported 138 individual measures and 210 aggregated measures, for a total of 348 measures, across all six

[8] Sweden subsequently informed that it is relying on renewable energy and hydropower produced in large rivers is a part of its renewable energy mix. Also, in general for "regulated" rivers, the regulation strategy is crucial for reducing the likelihood of floods and has been used extensively for decades by the power industry to reduce the likelihood for spring flood events. Sweden further informed that for Stockholm, a large and important measure to reduce flood risk (including likelihood) in the area is not included in the FRMP since it is relevant to the whole area around lake Mälaren and will take a long time (more than the execution of the FRMP) to build: "Project Slussen" is a project to build a new sluice/floodgate to partly reduce the flood risk in Stockholm; the cost will be approx. EUR 700 m. Financial costs are shared by the municipality, the region and the state. The new sluice will, according to the plan, be finished in 2025. Further, for Vännäs the likelihood of flooding and consequences have been assessed in the action programmes under the Civil Protection Act and the risk and vulnerability assessment that must be performed. There was also a regional risk and vulnerability assessment performed. In general, likelihood has been assessed for the flood hazard mapping. Moreover, for Vännäs, measures are in place to improve dykes. In addition, for Uppsala, a measure will carry out a pilot study to examine the possibility of retaining water upstream of Uppsala. In Karlstad, a measure includes cooperation with hydropower plant owners and other stakeholders to find methods to reduce the probability of flooding.

Criterion	Evidence	Comments
		UoMs where FRMPs were prepared. All five FRMPs assessed have identified measures.
...prioritised	Some evidence	Sweden has reported the priority for over 90 % of its measures (320 of 348 measures). Two of the five FRMPs assessed (for Falun and Älvsbyn) refer to the prioritisation of measures, and the Plan for Älvsbyn provides information on the methods used for prioritisation[9].
Relevant aspects of Article 7 have been taken into account such as...		
...costs & benefits[10]	Some evidence	Only one of the five FRMPs assessed – the plan for Älvsbyn – refers to cost-benefit analysis; however, this FRMP only makes a brief reference without indicating if or at what stage such an analysis was carried out.
...flood extent	Strong evidence	Flood extent was considered in the PFRA and FHRM stages, which were used in the preparation of FRMPs assessed.
...flood conveyance	No evidence	No reference was found in the five FRMPs assessed of consideration of flood conveyance[11].
...water retention[12]	Some evidence	One of the five FRMPs assessed has an objective that refers to wetlands for water retention. Across the FRMPs, however, few measures for natural water retention

[9] Sweden subsequently informed that the national guidance document for the production of FRMPs calls for prioritisation to be made among the goals for the measures and describes how prioritisation should be made. Sweden moreover noted that in other FRMPs beyond those assessed here, such as the plans for Örebro and Lindesberg, the measures are prioritised and the FRMPs contain brief descriptions of the method used.

[10] Sweden recalled subsequently that according to Art. 7 and Annex A.5 of the FD, a cost-benefit-analysis is not mandatory. It is a question of subsidiarity, if the Member states consider C/B analysis at the level of measures as a relevant aspect. Further, Sweden recalled that according to the FD and the reporting documents, cost and benefits are not compulsory information to report. In the Swedish guidance document on how to produce the FRMPs, costs and benefits are on a voluntary basis, except for the international plan for the APSFR Haparanda, which is an area shared with Finland.

[11] Sweden subsequently noted that for the Karlstad FRMP (one of the FRMPs assessed), the topography and geometry of river Klarälven make it hard to use this method except for protection of specific objects of high value. This is often the case, according to Sweden, due to distinct and narrow topography and geometry of river valleys. Sweden also noted that a method for flood conveyance is provided in the Göteborg FRMP.

[12] Sweden subsequently stated that the benefits of natural retention measures are so far uncertain when it comes to significant floods, which are the focus of the FD.

Criterion	Evidence	Comments
		measures (NWRM) were identified, notably in the one for Älvsbyn[13].
...environmental objectives of the WFD	Some evidence	In at least two of the five FRMPs assessed, the environmental objectives of the WFD were considered.
...spatial planning/land use	Some evidence	Three of the five FRMPs assessed include measures for spatial planning: one example is a guidance document to be prepared for planning in proximity to flood-prone rivers[14].
...nature conservation	Some evidence	Two of the five FRMPs assessed indicate that nature conservation was considered in the measures (though one FRMP states that no major negative impacts were identified); moreover, reducing adverse consequences to the environment is one of the four national objectives[15].
...navigation/port infrastructure	Some evidence	One FRMP, for Falun, refers to consideration of navigation and port infrastructure in a measure.
...likely impact of climate change	Some evidence	Sweden incorporated climate impacts in the APSFR and FHRM stages, which were

[13] Sweden subsequently informed that for the Karlstad FRMP (one of the FRMPs assessed), there is a very large basin, and the topography of the river makes it hard to use these methods except in the northern and southern parts, where natural flood areas reduce water speed and resulting levels. In the FRMP for Vännäs, NWRM are not possible measures as the river is a Natura 2000 protected river (also protected by Environmental Act 1998:808). For the Örebro and Lindesberg FRMPs, on semi-large and large rivers and for the more severe floods, there is limited support for the idea that wetlands can help to a large extent. Sweden moreover noted that for the Jönköping and Värnamo FRMPs, natural retention measures have been considered but not deemed to be sufficient enough to reduce the likelihood and consequences of significant floods. For the Uppsala FRMP, they are considered relevant in the future: at this stage, the focus has been on information and knowledge and measures include a mapping of green infrastructure and an investigation of possibilities to increase the retention of water upstream.

[14] Sweden subsequently noted that the Örebro and Lindesberg FRMPs have both objectives and measures for spatial planning. Sweden also noted that the Göteborg FRMP refers to a thematic supplement to the guidance for the regional/comprehensive plan on flood management. (These FRMPs were not assessed.)

[15] Sweden subsequently informed that the FRMP for Edsbyn discusses the implications of a Natura 2000 site within its area, and a specific measure for this is proposed. Moreover, in the FRMP for Vännäs there are some measures regarding environment, for example that flood risk management measures should not affect the ability to comply with environmental quality standards for water, that the environment and natural values in the area should not be polluted in a flood and that flooding should not have far-reaching or extensive environmental consequences. The FRMPs for Lindesberg and Örebro both cover areas where nature reserves are found in the downstream parts of APSFRs: these have been taken into account, but they are mostly wetlands; consequently, floods are not a major issue as long as severe pollution is prevented. (These FRMPs were not assessed.)

Criterion	Evidence	Comments
		used to develop the objectives and measures of the FRMPs. Nonetheless, the FRMPs assessed provide limited information on potential climate change impacts on floods[16].
Coordination with other countries ensured in the RBD/UoM	Some evidence	Sweden has good cooperation with Finland and Norway on water management. In one UoM, Sweden worked with Finland on joint mapping (for the transboundary APSFR on Torne River). The FRMPs assessed, however, provide few details on international coordination[17].
Coordination ensured with WFD	Some evidence	The five FRMPs assessed provide limited information on coordination with the WFD.[18]
Active involvement of interested parties	Some evidence	All five FRMPs assessed included mechanisms to ensure the active involvement of stakeholders. The information provided, however, varies[19].

Good Practices

The assessment identified the following good practices in the Swedish FRMPs assessed.

[16] Sweden subsequently noted that for Kristianstad (one of the FRMPs assessed), information can be found in the Regional action plan for climate change (*Regional handlingsplan för klimatanpassning för Skåne 2014 – Insatser för att stärka Skånes väg mot ett robust samhälle)*. For the Örebro and Lindesberg FRMPs, the accompanying Environmental Assessments both refer to the regional action plan for climate change adaption (*Handlingsplan för klimatanpassning i Örebro län*) in their introductions.

[17] Sweden subsequently noted that for the Haparanda FRMP, annual meetings are held and a public information booklet has been prepared jointly with Finland: https://www.lansstyrelsen.se/download/18.276e13411636c95dd932cc8/1526893006643/Oversvamningsguide_Tornedalen.pdf

[18] Sweden subsequently informed that at the time when the decisions on the FRMPs were taken there was a delay in the decisions about the RBMPs, creating uncertainty about the final content of the RBMP.

[19] Sweden subsequently informed that river coordination groups established in the mid-1990s, involving many stakeholders, have been consulted during the whole FD process. Sweden also noted that for the Örebro and Lindesberg FRMPs, early consultations took place on the draft Plans with each municipality in 2014. These were held in order to get input regarding, for example, objectives. In summer and autumn 2015, the FRMPs were sent for consultation to all stakeholders and were made available to the public online. A small questionnaire was added to the message to receive more feedback. The FRMPs were also presented at the public meeting that was part of the consultation of the WFD in Örebro, held in February 2015.

Table 3 Good practices in the Swedish FRMPs

Topic area	Good practices identified
Integration of previously reported information in the FRMPs.	Sweden has good cooperation with neighbouring Finland and Norway on water management and carried out joint mapping with Finland for a shared APSFR.
Setting of objectives for the management of flood risk.	Sweden has an articulated system of objectives, with four overarching objectives set at national level and three types of objectives – specific, measure-oriented and knowledge objectives – set in the FRMPs. The objectives in the FRMPs contain specific and measurable elements.
Planning/implementing of measures and their prioritisation for the achievement of objectives.	One of the five FRMPs assessed provides specific and measurable elements for its measures, such as specific locations. Whereas it is not clear if the 'specific' objectives set in the FRMPs will be achieved when the measures linked to them are completed, across all five FRMPs assessed, measures are linked to objectives.
Public consultation	While the information available on consultation and active involvement of stakeholders varies, it is clear that the preparation of the FRMP for Karlstad included a variety of mechanisms for outreach, including the creation of Joint Flooding Cooperation Groups, for the involvement of a wide range of stakeholders. Four of the five FRMPs assessed provide information on the impacts of public consultation and active involvement of stakeholders on the final plans.

Areas for further development

The assessment identified the following areas for further development in the Swedish FRMPs assessed.

Table 4 Areas for further development in the Swedish FRMPs

Topic area	Areas for further development identified
Integration of previously reported information in the FRMPs.	While all five FRMPs assessed provide summary maps and text of their APSFRs and FHRMs, not all provide internet links to more detailed online maps; moreover, some of the links provided do not work[20]. The FRMPs refer only to fluvial floods (these were the only type addressed in the prior steps of the cycle).
Planning/implementation of measures and their	The five FRMPs assessed lack information on the cost of measures and only one provides information on funding sources[21].

[20] Sweden subsequently noted that all FHMs are available on the Floods Portal on the web site of the Swedish Civil Contingencies Agency (MSB): https://gisapp.msb.se/Apps/oversvamningsportal/index.html.

Topic area	Areas for further development identified
prioritization for the achievement of objectives.	The FRMPs assessed provide little information on natural water retention measures and few discuss interactions between their measures and nature conservation in noticeable extent. Although Sweden has reported priorities for over 90 % of its measures, the FRMPs themselves provide little information on prioritisation and do not indicate the method used to determine priorities.
Use of cost-benefit analysis in the FRMPs assessed.	Only one of the five FRMPs assessed refers to the use of cost-benefit analysis, without indicating if indeed or at what stage this was used.
Consideration of climate change in the FRMPs assessed.	The FRMPs provide little information on potential climate impacts and to a very limited extent describe how such potential impacts were considered in the selection and design of their measures. Coordination with national climate change policy does not appear to have taken place systematically.
Flood risk governance.	Three of the five FRMPs assessed do not indicate if a Strategic Environmental Assessment was undertaken[22]. Four of the five FRMPs assessed provide limited information on coordination with the WFD and with Sweden's River Basin Management Plans (RBMPs).[23] The five FRMPs assessed vary in terms of the types of objectives set, extent of information on measures, and the extent of public consultation and active involvement of stakeholders.

Recommendations

Based on the reported information and the FRMPs assessed, the following recommendations are made to enhance flood risk management (not listed in any particular order):

- To be able to assess progress, the FRMPs should provide specific and measurable information on their measures.
- Information on estimated costs and funding sources[24], information on priorities across measures and the methods used for prioritisation should be provided in the FRMPs.

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[21] Sweden subsequently noted that for the Örebro and Lindesberg FRMPs, each measure will be funded by the stakeholder in charge of it.

[22] For Kristianstad there is information available on the internet:
http://www.ebhportalen.se/Sv/Inventeringsrapporter/Inventering%20av%20L%C3%A5ngebro%20industriomr%C3%A5de%20i%20Kristianstad%202007.pdf
and
https://www.kristianstad.se/sv/naringsliv-och-arbete/tillstand-regler-och-tillsyn/fororenade-omraden/sanering-av-kemtvatt-langebro/

[23] Sweden subsequently informed that at the time when the decisions on the FRMPs were taken there was a delay in the decisions about the RBMPs, creating uncertainty about the final content of the RBMP.

[24] Sweden subsequently informed that knowledge and funding gaps have led to many measures to increase the knowledge and estimate the cost (and investigate the funding) of larger measures.

- Consider making greater use of natural water retention measures across its FRMPs.
- The FRMPs should indicate how the costs and benefits of measures were considered in the selection and prioritisation of methods.
- All FRMPs should undergo a Strategic Environmental Assessment (SEA) procedure, if relevant, information on the results should be provided in the final Plans;
- Sweden should reinforce coordination between its FRMPs and RBMPs.
- Sweden should promote the use of common approaches across the FRMPs where this adds value[25], e.g. in areas including the prioritisation of measures, the identification of specific and measurable information on measures, coordination and synergy with the preparation of the RBMPs and the approach to public consultation and active involvement of stakeholders.
- Pluvial and coastal flooding should be addressed in the next FRMPs depending on the findings of the second PFRA.
- It will be important to ensure that FRMPs, APSFRs, and FHRMs refer to each other as appropriate and that they are continuously available to all concerned and the public in an accessible format, including digitally.
- How potential impacts of climate change were considered should be reflected stronger in the second cycle, including systematic coordination with national climate change adaptation strategies.

[25] Sweden subsequently cited the example of cooperation between the County administrations in the North Baltic Sea RBD, where throughout the work for the FRMPs (and also prior to that) this cooperation led to common ideas and approaches regarding objectives, public consultations, etc.

1. Scope of the assessment and sources of information for the assessment

1.1 Reporting of the FRMPs

Sweden has reported 18 FRMPs, each prepared by a County administration. Each FRMP covers a single APSFR. Sweden did not report any overarching plan or policy document.

Sweden did not make use of Article 13.3 of the FD, which allowed Member States to make use of previous FRMP for the first cycle (provided their content is equivalent to the requirements set out in the Directive).

1.2 Assessment of the FRMPs

Sweden has reported 18 FRMPS, of which five have been assessed: the FRMPs for assessment were chosen to provide geographic coverage across the UoMs.

The following FRMPs were assessed:

Table 5 UoMs assessed in Sweden

UoM code	UoM Name	FRMP assessed (and APSFR code)
SE1	BOTHNIAN BAY	Älvsbyn (SE1A8932)
SE2	BOTHNIAN SEA	Falun (SE2A6504)
SE3	NORTH BALTIC SEA	Stockholm (SE3A0336)
SE4	SOUTH BALTIC SEA	Kristianstad (SE4A2980)
SE5	SKAGERRAK AND KATTEGAT	Karlstad (SE5A5704)

Note: the name of the FRMP refers to the name of the main urban area addressed by the plan, not the County whose County Administrative Board prepared the plan.

2. Integration of previously reported information

2.1 Conclusions drawn from the preliminary flood risk assessment

All five FRMPs assessed present the conclusions of the Preliminary Flood Risk Assessment (PRFA) as a summary map showing areas of potential significant flood risk (APSFRs). All FRMPs assessed also contain a textual description which includes tables listing the APSFRs and an overview of the methodology employed and the results of previous steps.[26]

Four of the five FRMPs assessed provide additional, more detailed maps showing flood extent. The FRMP for Falun (SE2A6504) contains maps showing flood extent for 50, 100 and 200-year floods. The FRMPs for Älvsbyn (SE1A8932), Stockholm (SE3A0336) and Karlstad (SE5A5704) all contain additional detailed 100 year flood maps showing sites exposed to flooding.[27]

The APSFRs and other flood maps can be viewed on a web portal provided by the Swedish Civil Contingencies Agency (MSB)[28] [29]:

https://gisapp.msb.se/Apps/oversvamningsportal/index.html (a link to this site was not, however, found in the FRMPs themselves[30]).

No reference to conveyance routes was found in the FRMPs assessed[31]. The FRMPs indicate that climate change impacts were modelled and incorporated in the PFRA (see section 5).

2.1.1 Coordination with neighbouring Member States on shared RBDs/UoMs

Sweden has strong bilateral coordination on water management with its neighbours, Finland and Norway[32]. Sweden carried out a joint project with Finland on mapping of risk areas along the Torne River in the Bothnian Bay (International District) UoM (SE1TO): this was carried out as part of an Interreg IV A project, Detailed inundation planning in the lower part of

[26] FRMP Älvsbyn (SE1A8932); FRMP Falun (SE2A6504); FRMP Stockholm (SE3A0336); FRMP Kristianstad (SE4A2980); FRMP Karlstad (SE5A5704).

[27] FRMP Älvsbyn (SE1A8932); FRMP Falun (SE2A6504); FRMP Stockholm (SE3A0336); FRMP Kristianstad (SE4A2980); FRMP Karlstad (SE5A5704).

[28] Viewed in June 2018. It appears that the current maps show 100 and 200-year floods and an 'estimated maximum' for a worst possible scenario, roughly estimated as a 10,000-year flood. Only the FRMP for Karlstad (SE5A5704) provided a working link to this portal.

[29] Sweden informed subsequently that the county administration boards' websites have been changed recently and old internet links do not work since May 29th, 2018. The Swedish Civil Contingencies Agency (MSB) plans to incorporate the links into the Floods Portal available on the MSB website in the 4th quarter of 2018.

[30] Sweden explained subsequently that this portal was produced to facilitate the work of the European Commission.

[31] Sweden subsequently informed that for the Karlstad FRMP, the topography and geometry of river Klarälven makes it hard to use this method except for protection of specific objects of high value. (This is often the case in Sweden due to distinct and narrow topography and geometry of river valleys.) Sweden also noted that a method for flood conveyance is provided in the Göteborg FRMP.

[32] See the RBMP assessment for Sweden.

Tornio River[33]. Sweden does not have joint APSFRs with Norway, and neither the FRMPs assessed nor Sweden's reporting sheets provide information on coordination at the PFRA stage with Norway[34].

2.1.2 Information how the PFRA was used in the development of the FHR maps

The FRMPs indicate that the PFRA was used to develop the FHR maps, which also drew on further modelling, including of climate change. Both processes were coordinated by the Swedish Civil Contingencies Agency, which produced overall reports for both the PFRA and the FHRMs[35].

2.2 Presentation of Flood Hazard and Risk Maps (FHRMs) in the FRMPs

The flood hazard and flood risk maps are presented in all of the five FRMPs assessed in maps for each APSFR showing fluvial flood risks.

In none of the FRMPs assessed do the FHRMs present risks from pluvial floods, seawater floods, groundwater floods, floods originating from artificial water bearing structures, or floods from no specific sources or more than one source of flooding. According to the assessment of Sweden's FHRMs, pluvial and coastal floods were not assessed in the FHRMs, separate maps for floods from artificial water bearing structures were produced but these were not included in the FHRMs, and groundwater floods were assessed as not relevant for Sweden[36].

Links to the flood hazard and flood risk maps have been provided in four of the five FRMPs assessed[37]: those for Älvsbyn (SE1A8932); Falun (SE2A6504); Karlstad (SE5A5704) and

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[33] The river is spelled Torne in Swedish and Tornio in Finnish. For the joint project, see: http://2007-2013.interregnord.com/en/projects/north/3-regional-functionality-and-identity/detailed-inundation-planning-in-the-lower-part-of-tornio-river.aspx

[34] Sweden informed subsequently that Sweden and Norway have established since 1995 a river coordination group for the River Klarälven and any issues are discussed within the group. Meetings are taking place two times per year, or ad hoc if the situation calls for it. The flood situation and the FD implementation is discussed continuously. There is a yearly cooperation and coordination when it comes to the spring flood situation. A report is produced each week in order to be able to handle and monitor the spring flood situation.

[35] Identifiering av områden med betydande översvämningsrisk Steg 1 i förordningen (2009:956) om översvämningsrisker – preliminär riskbedömning (Identification of areas with significant flood risk Step 1 of the Flood Risk Regulation (2009: 956) - Preliminary Risk Assessment): https://www.msb.se/Upload/Nyheter_press/Pressmeddelanden/Slutrapport_PFRA_MSB.pdf
And *Framställning av hotkartor enligt förordningen (2009:956) om översvämningsrisker* (Preparation of risk maps according to the Flood Risk Regulations (2009: 956)): https://www.msb.se/Upload/Forebyggande/Naturolyckor_klimat/oversvamning/PM_hotkartor.pdf

[36] European Commission, Assessment of Flood Hazard and Flood Risk Maps – Member State Report: SE – Sweden, November 2014. Available at: http://ec.europa.eu/environment/water/flood_risk/pdf/fhrm_reports/SE%20FHRM%20Report.pdf

[37] FRMP Älvsbyn (SE1A8932), Section 12, Översvämningskartering utmed Piteälven; FRMP Falun (SE2A6504), p.14; FRMP Stockholm (SE3A0336), p.5; FRMP Karlstad (SE5A5704), p.45.

Stockholm (SE3A0336). As for maps of the APSFRs, some of these links no longer work[38]. The MSB's web portal provides online FHRMs:

- https://gisapp.msb.se/Apps/oversvamningsportal/index.html.

2.2.1 Maps for shared flood risk areas

As described above, Sweden carried out joint mapping with Finland for the shared APSFR in the Torne UoM (SETO1).

2.2.2 Conclusions drawn from the flood hazard and flood risk maps

The five FRMPs assessed[39] and Sweden's reporting sheets indicate that the FHRMs were used to develop the FRMPs:

- The FHRMs were used to set priorities for flood risk management (including locations and economic activities for protection);
- Specific objectives on flood risk reduction were defined based on the FHRMs;
- In one FRMP assessed (Stockholm), measure types and locations were defined based on the FHRM.

The FHRMs were also presented as part of the public consultation process (see section 7).

2.3 Changes to the APSFRs or other Flood Risk Areas

The FRMP assessment looked for information on changes in the identification of APSFRs since December 2011, or in the FHRMs since December 2013, indicated in the FRMP. The FRMPs did not indicate any changes. For the second cycle, however, Sweden has reviewed and updated the APSFRs[40].

2.4 Areas for further development in the earlier assessment of the FHRMs

The FHRM assessment identified the following areas for further development for Sweden[41]:

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[38] Same situation as for APSFR links, see earlier foot note.

[39] FRMP Älvsbyn (SE1A8932); FRMP Falun (SE2A6504); FRMP Stockholm (SE3A0336); FRMP Kristianstad (SE4A2980); FRMP Karlstad (SE5A5704).

[40] According to documents for the second cycle of the FD: Revision for upcoming period, available at: https://www.msb.se/sv/Om-MSB/Nyheter-och-press/Nyheter/Nyheter-fran-MSB/25-omraden-med-betydande-oversvamningsrisk-har-identifierats/.

[41] Based on: European Commission, Assessment of Flood Hazard and Flood Risk Maps – Member State Report: SE – Sweden, November 2014. The report notes that Swedish authorities explained that the methodology and information base for pluvial and coastal flooding was not complete. Available at: http://ec.europa.eu/environment/water/flood_risk/pdf/fhrm_reports/SE%20FHRM%20Report.pdf

- Flood sources: risks of pluvial and coastal floods are not included. After the assessment of the maps was completed, the Swedish authorities explained that pluvial and coastal floods will be taken into consideration for the second cycle of implementation of the FD.
- Consequences on the environment: Sweden did not report clearly on what the adverse consequences on the environment would be in the mapping of the risk from low probability floods.

The second area for further development is partly addressed within the FRMPs assessed:

- As noted above, none of the five FRMPs referred to pluvial and coastal floods and it appears that these had not been incorporated in the FHRMs at the time of the preparation of the plans.
- The five FRMPs assessed have addressed the lack of mapping of adverse consequences on the environment. This has been done with respect to protected areas such as Natura 2000 sites and to contaminated sites (and thus pollution risks), though the information provided varies among the five FRMPs.

2.5 Good practices and areas for further development in the FRMPs regarding integration of previously reported information

The following **good practice** was identified:

- Sweden has good cooperation with neighbouring Finland and Norway on water management and carried out joint mapping with Finland for a shared APSFR.

The following **areas for further development** were identified:

- While all five FRMPs assessed provide summary maps and text of their APSFRs and FHRMs, not all provide more detailed maps or internet links to more detailed online maps; moreover, some of the links provided do not work.
- The FRMPs refer only to fluvial floods, as these were the only type addressed in the prior steps.

3. Setting of Objectives

3.1 Focus of objectives

The Swedish Civil Contingencies Agency (MSB) set four overarching, nationally defined objectives that have been used as the basis for objective setting in the five FRMPs examined. These objectives are:

- Human health shall not be significantly affected by floods;
- The environment and natural values shall not be significantly affected by floods;
- Cultural heritage shall be protected so that valuable objects and knowledge are not lost by floods;
- Economic activities of major societal value shall not be exposed to long disruption caused by floods.

The MSB recommended that FRMPs refine these four national objectives in more detailed objectives across three major types: specific objectives that are measurable and concrete; measure-oriented objectives that specify specific actions to be taken to support the specific objectives; and knowledge objectives that address key uncertainties, also supporting the specific objectives.

Table 6 Types of objectives in the Swedish FRMPs

FRMP	Number of objectives	Specific objectives	Measure-oriented objectives	Knowledge objectives
Falun	30	✓	✓	✓
Älvsbyn	9	✓		
Karlstad	16	✓		✓
Kristianstad	17	✓	✓	✓
Stockholm	14	✓		

The five FRMPs assessed structure their objectives in terms of the four national objectives. The FRMPs use the structure of three objective 'types' in different ways (see Table 6 above):

- The FRMP for Älvsbyn defines nine specific objectives;
- The FRMP for Falun differentiates the four overarching thematic objectives into 30 objectives, including specific, measure-oriented and knowledge objectives;
- The FRMP for Karlstad presents 16 specific and knowledge objectives but no measure-oriented objectives;
- The FRMP for Kristianstad differentiates the four overarching thematic objectives into 17 objectives, including specific, measure-oriented and knowledge objectives;

- The FRMP for Stockholm defines 14 specific objectives.

Based on both the national objectives and the objectives defined in the FRMPs assessed[42]:

- The objectives aim to reduce the adverse consequences of floods in all five FRMPs assessed;
- The objectives refer to measures that will be implemented in some but not all FRMPs;
- The objectives refer to non-structural measures[43] in some but not all FRMPs.

3.2 Specific and measurable objectives

All five FRMPs define 'specific objectives' (using Swedish terminology) that contain specific and measurable elements. Examples include the following objectives from the FRMP for Älvsbyn:

- No cultural heritage objects or areas classified as cultural heritage of national interest shall be permanently damaged due to a flood;
- Electricity distribution installations should not be affected by floods with a 100-year return time.

The FRMPs for Falun and Kristianstad also include 'measure-oriented' objectives that are linked to measures. For example, the FRMP for Falun has an objective that: by 2018, Falun municipality has established forms of cooperation on flow regulation and preventive measures in the smaller streams of the municipality (examples of preventive measures may be preservation of wetlands and maintenance of streams).

The 'knowledge' objectives found in the Falun, Karlstad and Kristianstad FRMPs also can be linked to measures. For example, the Karlstad FRMP contains the following objective: There is detailed knowledge of which flow levels in Klarälven and water levels in Vänern that can lead to serious flooding consequences for cultural heritage.

All the FRMP objectives set specific aims or actions that can be measured; however, the year of achievement is lacking for almost all objectives[44], the exception being measure-oriented and knowledge objectives in FRMP Falun[45].

[42] These categories are included in Art. 7 of the Floods Directive.

[43] Non-structural measures include measures such as flood forecasting and raising awareness of flooding as well as land use planning, economic instruments and insurance.

[44] Sweden informed subsequently that the objectives should be achieved within the period 2016-2021, which is the period covered by the first FRMPs.

[45] Sweden subsequently commented that for measures, the year of achievement is understood as the end of 2021 by when the revision of the FRMPs should be made.

3.3 Objectives to reduce adverse consequences from floods

Sweden's four national objectives aim to reduce the adverse consequences from floods on human health, cultural heritage, the environment and economic activity.

3.4 Objectives to address the reduction of the likelihood of flooding

None of the objectives at national level address the reduction of the likelihood of flooding or flood risk[46], and none of the objectives in the five FRMPs assessed directly address these either[47]. Yet, indirectly the FRMP Falun addresses this in one objective that aims to increase the knowledge about coordinated regulation of the river discharges at the municipally owned dams.

3.5 Process for setting the objectives

The Swedish Civil Contingencies Agency coordinated the identification of the national objectives and, as indicated, provided recommendations for the identification of FRMP objectives.

The five FRMPs assessed vary in terms of the extent of information provided on the development of their objectives. The FRMP for Karlstad, notably, refers to the involvement of representatives of municipalities and private stakeholders, as well as academic experts, in the development of the plan, including the objectives. For all five FRMPs, objectives were part of the draft plans provided for public consultation (see section 7).

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[46] The assessment adopts the generally accepted definition of risk as a product of consequence times likelihood, thereby also in alignment with Art. 7(2) of the FD.

[47] Sweden subsequently informed that in general for regulated rivers, the regulation strategy is crucial for reducing the likelihood of floods and has been used extensively for decades by the power industry to reduce the likelihood for spring flood events. Sweden also explained that the first cycle of the Floods Directive in Sweden and as such most of the objectives and measures are focused on knowledge gaps rather than structural measures to reduce flood risk. In guidance documents, objectives are set to reduce the likelihood of flooding in work related to the FD.
Sweden also noted that many measures in the FRMPs and the general national strategies on river flow regulation consider flood risks and the reduction of the likelihood and the consequences of flooding. For Stockholm, a large and important measure to reduce flood risk (including likelihood) in the area is not included in the FRMP since it is relevant to the whole area around lake Mälaren and will take a long time (more than the execution of the FRMP) to build: "Project Slussen" is a project to build a new sluice/floodgate to partly reduce the flood risk in Stockholm; the cost will be approx. EUR 700 m. Financial costs are shared by the municipality, the region and the state. The new sluice will, according to the plan, be finished in 2025. Further, for Vännäs the likelihood of flooding and consequences have been assessed in the action programmes under the Civil Protection Act and the risk and vulnerability assessment that must be performed. There was also a regional risk and vulnerability assessment. In general, likelihood has been assessed as part of the flood hazard mapping. Moreover, for Vännäs, measures are in place to improve dykes. In addition, for Uppsala, a measure will carry out a pilot study to examine the possibility of retaining water upstream of Uppsala. In Karlstad, a measure includes cooperation with hydropower plant owners and other stakeholders to find methods to reduce the probability of flooding.

In the modelling of flood for the FHRMs, climate change impacts were included and consequently climate considerations are incorporated in the objectives set.

3.6 Good practices and areas for further development regarding setting objectives

The following **good practices** were identified:

- Sweden has an articulated system of objectives, with four overarching objectives set at national level and three types of objectives – specific, measure-oriented and knowledge objectives – set in the FRMPs.
- The objectives in the FRMPs contain specific and measurable elements.

4. Planned measures for the achievement of objectives

Sweden has reported 138 individual measures and 210 aggregated[48] measures, for a total of 348 measures[49], across all six UoMs where FRMPs were prepared (please see tables A1 to A4 in Annex A for further details). The five FRMPs assessed do not provide a definition of individual and aggregated measures.

The measures cover all four aspects of flood risk management. Across all six UoMs where FRMPs were prepared:

- 162 measures (47 % of the total 348 measures) are for prevention;
- 41 measures (12 %) are for protection;
- 137 measures (39 %) are for preparedness;
- six measures (2 %) are for recovery and review.

In addition, Sweden reported two 'other' measures (less than 1 % of the total).

The number distribution of measures across the four aspects varies among the UoMs. For example:

- For the North Baltic UoM (SE3), 54 of 79 measures are for prevention (68 % of the total), five are for protection (6 %), 19 are for preparedness (24 %) and one is for recovery and review (1 %)
- For the Bothnian Sea UoM (SE2), 13 of 48 measures (27 % of the total) are for prevention, five are for protection (10 %), 27 are for preparedness (56 %), one is for recovery and review (2 %) and two are other measures (4 %)

4.1 Cost of measures

The FRMPs assessed do not provide information on the budget.

4.2 Funding of measures

Only one of five FRMPs assessed provides information on funding: the FRMP for Karlstad provides indications of funding sources for each measure. The most common description is

[48] The Reporting Guidance mentions "Measures can be reported as individual measures (recommended for major projects) or aggregated measures,…" and also notes that measures may be comprised of "many individual projects". European Commission, Guidance for Reporting under the FD (2007/60/EC), 2013, pp. 54-58.

[49] The information reported to WISE was the starting point for the assessment in this section. The majority of the statistics presented are based on processing of information reported to WISE. Assuming that the Member States accurately transferred the information contained in their FRMPs to the reporting sheets (the sheets are the same for all Member States and are not customisable) and barring any undetected errors in the transfer of this information to WISE arising from the use of interfacing electronic tools, these statistics should reflect the content of the FRMPs.

"Within existing budget frames" as most measures refer to actions by the Värmland County administration, which is in charge of the FRMP (costs or budget amounts are not provided, however) [50] [51].

Table 7 Funding of measures

	Karlstad SE5A5704
Distribution of costs among those groups affected by flooding	
Use of public budget (national level)	
Use of public budget (regional level)	✓[52]
Use of public budget (local level)	
Private investment	
EU funds (generic)	
EU Structural funds	
EU Solidarity Fund	
EU Cohesion funds	
EU CAP funds	
International funds	

Source: FRMPs

4.3 Measurable and specific (including location) measures

One of the five FRMPs assessed – the plan for Stockholm (SE3A0336) – provides a clear and explicit description of the measures with regard to:

- What they are trying to achieve,
- Where they are to be achieved,
- How they are to be achieved, and
- By when they are expected to be achieved.

This FRMP identifies facilities and sites of societal concern (such as cultural heritage sites, municipal buildings, utilities, key roads and nature reserves) and sets out measures to address their flood risks: one measure, for example, develops a vulnerability analysis for the impact of flooding on a school building in Huddinge Municipality. The other FRMPs, however, provide less detail.

The following table lists all the locations indicated for Swedish measures:

[50] Sweden subsequently informed that knowledge and funding gaps have led to many measures that in turn aim to increase the knowledge and investigate the cost and funding of larger measures.

[51] Sweden subsequently noted that for the Örebro and Lindesberg FRMPs, each measure will be funded by the stakeholder in charge of it.

[52] Sweden subsequently informed that also budgets at the national and local levels will be mobilised for the funding of measures.

Table 8 Location of measures

	Älvsbyn SE1A8932	Falun SE2A6504	Karlstad SE5A5704	Kristianstad SE4A2980	Stockholm SE3A0336
International					
National					
RBD/UoM					
Sub-basin					
APSFR or other specific risk area	✓	✓	✓	✓	✓
Water body level	✓	✓	✓		✓
Object level	✓		✓		✓

Source: FRMPs

4.4 Measures and objectives

In all the FRMPs assessed, each measure is linked to one of the FRMP's objectives. As noted in section 3, some of the FRMPs assessed have set measure-oriented objectives and knowledge objectives: for these, the objectives should be achieved when the related measures are carried out. It is not clear, however, if the 'specific' objectives set in the FRMPs will be achieved when the measures linked to them are completed.

4.5 Geographic coverage/scale of measures

Sweden has reported the location of all 348 measures across the six UoMs with FRMPs (see Tables A5 and A6 in Annex A). This information has been aggregated into the following categories:

- The majority of measures, 197 out of the 348 reported, are located at APSFR level (57 % of the total);
- 93 of the 348 measures (27 %) are at local level;
- 40 measures (11 %) are in a specific location such as a specific facility or part of a river;
- eight measures (2 %) are at river catchment level;
- And for 10 measures (3 %), another location is given.

The FRMPs assessed also provide varying degrees of detail on the location of measures. For example, the FRMP for Stockholm provides detailed maps to indicate the location of some measures.

4.6 Prioritisation of measures

Sweden has reported the priority for 320 of its 348 measures (see Table A7 in Annex A):

- 20 measures (6 % of the total) are reported as having critical priority;
- 61 measures (18 %) have very high priority;
- 139 measures (40 %) have high priority;
- 88 measures (25 %) have moderate priority;
- 12 measures (3 %) have low priority;
- For 28 measures (8 %), no priority is indicated.

Only one of the five FRMPs, however, clearly refers to a prioritisation of measures. The FRMP for Falun includes a section on priorities. Neither this FRMP nor the other four assessed provides information on how the prioritisation of measures was established[53].

Sweden has reported the timetable for all 348 measures (see Table A9 in Annex A). This information has been used to identify the completion dates for the measures:

- 66 measures (19 % of the total) are indicated as ongoing;
- one measure (less than 1 %) is indicated as being completed in 2015;
- 40 measures (11 %) are indicated for 2016;
- 54 measures (16 %) for 2016;
- 43 measures (12 %) for 2018;
- 38 measures (11 %) for 2019;
- 17 measures (5 %) for 2020;
- 74 measures (21 %) for 2021;
- 4 measures (1 %) for dates beyond 2021 (either 2026 or 2028);
- 11 measures (3 %) have other or unclear dates indicated;

Four of the five FRMPs assessed provide information on the timetable for the implementation of the measures:

- The FRMPs for Falun and Karlstad indicate the timetables provided for all measures, with completion dates that range from 2017 to 2021 (the FRMPs indicate that the completion dates vary according to the size and complexity of the measures)
- The FRMP for Stockholm provides a timetable and completion dates for some measures (for most of the measures where a completion date is indicated, it is 2019)
- A timetable is provided in the FRMP for Älvsbyn as well, yet with most measures specified as "ongoing"

[53] Sweden subsequently informed that the national guidance document for the FRMPs calls for prioritisation to be made among the goals for the measures and describes how prioritisation should be made. In Falun, prioritisation was based on the expert knowledge in the organisations concerned. Sweden moreover noted that in other FRMPs, beyond those assessed here, such as the plans for Örebro and Lindesberg, the measures are prioritised and the FRMPs contain brief descriptions of the methods used.

No information on the timetable was found in the FRMPs of Kristianstad[54].

As the FRMPs are at APSFR level, while Sweden's reporting is at UoM level, it has not been possible to compare the timetables of the two.

4.7 Authorities responsible for implementation of measures

Sweden has indicated the level of responsibility for all 348 measures reported (see Table A11 in Annex A):

- For the great majority of measures (298 out of 348, 86 %), either municipal or county governments are responsible;
- For 20 measures (6 % of the total), a private company is responsible (a chemicals company and utility companies are mentioned);
- For 20 measures (6 %), a transport authority is responsible;
- For seven measures (2 %), other types of authorities are responsible.

In the FRMPs assessed, the County Administrative Boards themselves are generally indicated as main authority responsible for implementation of most measures. The FRMPs to a smaller or larger extent also include measures under the responsibility of municipalities or municipal companies and state authorities, such state transport authorities. As an example of the smaller extent, the FRMP Kristianstad indicates that it focuses on "actions undertaken within the county administrative board's own organisation"; still, this plan includes some measures under the responsibility of Kristianstad municipality. As an example of a larger extent, FRMP Karlstad includes measures under the responsibility of municipalities, companies and other actors as well as measures to be carried out by the County Board itself. For the Falun FRMP, the municipality and the municipal Water and Sanitation Company are responsible for most of the measures.

4.8 Progress of implementation of measures

Sweden has reported the progress of implementation for all measures (see Annex Table A13):

- The great majority of measures reported – 217 out of 348 (62 %) – were indicated as not started;
- The remaining measures, 131 (38 %) were indicated as progress ongoing.

Two of the five FRMPs assessed provide some information on the progress of their measures. The FRMP for Karlstad indicates the progress of many measures: for example, a series of

[54] Sweden subsequently informed that other FRMPs contain timetable information, for instance, the FRMP for Vännäs describes by when measures are expected to be achieved, for example December 2021 or December 2027.

measures carried out by the Karlstad Municipality were ongoing, including measures launched under a municipal flood preparedness plan in 2010. This FRMP also indicated that other municipalities had measures ongoing. Likewise, the FRMP for Kristianstad indicates measures undertaken by the Municipality of Kristianstad as ongoing.

4.9 Measures taken under other Community Acts

Member States have been asked to report on other Community Acts under which each measure has been implemented. While Sweden has provided information for 20 measures, it appears that many of these entries refer to Swedish legislation; nonetheless, it appears that seven measures are associated to the implementation of the Seveso Directive (see Annex A).

The five FRMPs assessed also provide references to other EU legislation: The FRMP for Älvsbyn includes references to the Habitats Directive and the WFD; the FRMPs for Karlstad and Falun include references to the WFD; the FRMP for Stockholm cites the Bathing Water Directive and the WFD. All five FRMPs assessed refer to the Seveso Directive, though only two the FRMPs for Älvsbyn and Karlstad, indicate that it is relevant for flood measures.

4.10 Specific groups of measures

Spatial planning/land use measures are included in three of the FRMPs assessed: those for Falun, Karlstad and Älvsbyn. For example, the FRMP for Falun includes a measure to develop a guidance document for planning in proximity of flood prone rivers in the county[55].

Few references to **NWRM** were found in the five FRMPs assessed, though as noted in section 3, the FRMP for Falun includes a measure-oriented objective that mentions wetlands as an example of prevention measures, and the FRMP for Älvsbyn includes some NWRM emanating from the Programme of Measures of the RBMP which are also positive for flooding. Moreover, the FRMP for Älvsbyn notes that NWRMs are a useful approach to address moderate floods.

In Sweden's reporting to WISE for all UoMs, only one measure for type M31 on natural flood management[56] (a measure in the Skagerrak and Kattegat UoM, SE5) is indicated (see Annex A)[57].

[55] Sweden subsequently noted that the Örebro and Lindesberg FRMPs have both objectives and measures for spatial planning. Sweden also noted that the Göteborg FRMP refers to a thematic supplement to the guidance for the regional/comprehensive plan on flood management. (These FRMPs were not assessed.)

[56] M31 Protection Natural flood management / runoff and catchment management, Measures to reduce the flow into natural or artificial drainage systems, such as overland flow interceptors and / or storage, enhancement of infiltration, etc and including in-channel, floodplain works and the reforestation of banks, that restore natural systems to help slow flow and store water.

Measures that specifically consider nature conservation. Only the FRMP for Älvsbyn indicates that nature conservation has been considered in the development of measures, as negative effects might occur. In FRMP for Falun, nature conservation was considered but no significant negative impact has been identified[58].

One FRMPs assessed, FRMP Falun, makes a brief reference that a measure shall take into consideration **navigation and port infrastructure**, a plan to renovate and improve a quay along the Faluå River.

No reference has been found in the five FRMPs assessed to **dredging** to increase the river channel capacity and its ability to convey water for flood alleviation purposes.

4.11 Recovery from and resilience to flooding

The role of insurance policies is not discussed in any of the five FRPMs assessed[59].

4.12 Monitoring progress in implementing the FRMP

Four out of five FRMPs assessed indicate that implementation will be monitored. The FRMP for Karlstad states that all County administrations responsible for FRMPs will report yearly to the MSB on progress of implementation.[60] The development of the revised FRMPs for the second cycle will include an evaluation of the progress towards the achievement of objectives.

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[57] Sweden subsequently informed that it extensively relies on dams for hydro-electric power production; the dams can during seasonal periods (spring) also function as flood protection. The benefits of natural retention measures are so far uncertain when it comes to significant floods. Sweden also noted that for the Jönköping and Värnamo FRMPs, natural retention measures have been considered but not deemed to be sufficient enough to reduce the likelihood and consequences of significant floods. For the Uppsala FRMP, they are considered relevant in the future: at this stage, the focus has been on information and knowledge and measures include a mapping of green infrastructure and an investigation of possibilities to increase retention of water upstream the city of Uppsala. Sweden subsequently informed that for the Karlstad FRMP, there is a very large basin, and the topography of the river makes it hard to use these methods except in the northern and southern parts, where natural flood areas reduce water speed and resulting levels. In the FRMP for Vännäs, NWRM are not possible measures as the river is protected river under the Environmental Act. For the Örebro and Lindesberg FRMPs, on semi-large and large rivers and for the more severe floods, there is limited support for the idea that wetlands can help to a large extent.

[58] Sweden subsequently informed that the FRMP for Edsbyn discusses the implications of a Natura 2000 site within its area, and a specific measure for this is proposed. Moreover, in the FRMP for Vännäs there are some measures regarding environment, for example that flood risk management measures should not affect the ability to comply with environmental quality standards for water, that the environment and natural values in the area should not be polluted in a flood and that flooding should not have far-reaching or extensive environmental consequences. The FRMPs for Lindesberg and Örebro both cover areas where nature reserves are found in the downstream parts of APSFRs: these have been taken into account, but they are mostly wetlands; consequently, floods are not a major issue as long as severe pollution is prevented. (These FRMPs were not assessed.)

[59] Sweden subsequently informed that insurance policies are not a regional issue and therefore not included in the FRMPs (which are regional in nature).

[60] Sweden subsequently informed that all FRMPs are monitored yearly by the Swedish Civil Contingencies Agency (MSB). The monitoring reports are published on the authority's webpage: https://www.msb.se/sv/Forebyggande/Naturolyckor/Oversvamning/Oversvamningsdirektivet/Steg-3-Riskhanteringsplaner/

The FRMPs assessed do not, however, refer to a baseline against which progress will be monitored and evaluated.[61]

4.13 Coordination with the Water Framework Directive

The table below shows how the development of the FRMP has been coordinated with the development of the second RBMP of the WFD.[62]

Table 9 Coordination of the development of the FRMP with the development of the second RBMP of the WFD

	Älvsbyn SE1A8932	Falun SE2A6504	Karlstad SE5A5704	Kristianstad SE4A2980	Stockholm SE3A0336
Integration of FRMP and RBMP into a single plan					
Joint consultation of draft FRMP and RBMP [63]					
Coordination between authorities responsible for developing FRMP and RBMP [64]	✓				
Coordination with the environmental objectives in Art. 4 of the WFD		✓	✓		
The objectives of the FD were considered in the preparation of the RBMPs [a]					
Planning of win-win and no-regret measures in the FRMP	✓	✓			
The RBMP Programme of Measures includes win-win measures in terms of achieving the objectives of the WFD and FD, drought management and NWRM [a]					
Permitting or consenting of flood		✓			

[61] FRMP Falun (SE2A6504), Section 9, "Uppföljning"; FRMP Älvsbyn (SE1A8932), Section 11, "Beskrivning av uppföljning av planen och MKB:n"; FRMP Stockholm (SE3A0336) Section 10, "Beskrivning av uppföljning av planen och MKB:n"; FRMP Karlstad (SE5A5704) Section 11, "Beskrivning av uppföljning av planen och MKB:n". Although similar information was not found in the FRMP for Kristianstad, the information in the other four plans indicates that this is the common approach for monitoring of all FRMPs in Sweden.

[62] Sweden subsequently informed that at the time when the decisions of the FRMPs were taken there was a delay in the decisions about the RBMPs. The outcome of the RBMPs was uncertain and could therefore not be referred to.

[63] Sweden subsequently remarked for the Uppsala FRMP that early consultation was organised together with the RBMP. There was ongoing dialogue during the work for the RBMP and the FRMP.

[64] Sweden subsequently informed that for the Falun FRMP, when preparing the plan, cooperation and coordination with RBMP/WFD authorities was undertaken in order to discuss measures from both sides within the geographic area.

	Älvsbyn SE1A8932	Falun SE2A6504	Karlstad SE5A5704	Kristianstad SE4A2980	Stockholm SE3A0336
risk activities (e.g. dredging, flood defence maintenance or construction) requires prior consideration of WFD objectives and RBMPs					
Natural water retention and green infrastructure measures have been included	✓	✓			
Consistent and compliant application of WFD Article 4(7) and designation of heavily modified water bodies with measures taken under the FD e.g. flood defence infrastructure					
The design of new and existing structural measures, such as flood defences, storage dams and tidal barriers, have been adapted to take into account WFD Environmental Objectives [a]					
The use of sustainable drainage systems, such as the construction of wetland and porous pavements, have been considered to reduce urban flooding and also to contribute to the achievement of WFD Environmental Objectives					

Notes: [a] based on reporting under the WFD

County administrations work on both RBMPs and FRMPs: however, while five County Administrative Boards are designated as Competent Authorities within their UoMs for the RBMPs (which may cover the territory of other County Administrations), others may work on the FRMPs depending on the location of APSFRs.

In general, the FRMPs provide limited information on coordination with the WFD. One exception is the FRMP for Älvsbyn: an assessment of the effect of RBMP measures on flooding was carried out, identifying positive synergies for three RBMP measures and neutral effects for the others.[65] [66]

[65] FRMP Älvsbyn (SE1A8932), section 8.1; FRMP Falun (SE2A6504), section 6.1; FRMP Karlstad (SE5A5704), section 9.

[66] Sweden subsequently informed that for the Falun FRMP, measures under both the FD and WFD have been discussed and coordinated so as not to interfere with each other. Heeding the WFD's environmental quality standards was a prerequisite for the discussions.

4.14 Good practices and areas for further development with regard to measures

The following **good practices** were identified:

- One of the five FRMPs assessed provides specific and measurable elements for its measures, such as specific locations.
- Across all five FRMPs assessed, measures are linked to objectives.

The following **areas for further development** were identified:

- The five FRMPs assessed lack information on the cost of measures, and only one provides information on funding sources.
- The FRMPs assessed provide little information on natural water retention measures and few discuss interactions between their measures and nature conservation.
- Although Sweden has reported priorities for over 90 % of its measures, the FRMPs themselves provide little information on prioritisation and do not indicate the method used to determine priorities.
- The FRMPs provide limited information on coordination with the WFD and with Sweden's RBMPs.

5. Consideration of climate change

Climate change[67] was addressed at the APSFR stage in Sweden: climate impacts were calculated for 16 regional climate scenarios to 2050 and further scenarios up to 2098. The results were then adapted to the hydrological modelling.

Climate impacts were also considered in the preparation of the objectives for the FRMPs. Nonetheless, despite the extensive analytical work, the FRMPs assessed provide few references to possible impacts of climate change on flood risks. The FRMP for Karlstad indicates that pluvial floods might become more important in the near future. The FRMP for Stockholm states that in the future, water levels in lakes could increase and aggravate fluvial floods.[68] The FRMP for Falun refers to climate change impacts on water discharges and on floods and landslides.

The FRMPs do not refer to Sweden's national climate change adaption strategy, which was integrated into the 2009 Integrated Climate and Energy Strategy[69], nor the subsequent regional action plans for climate change, which address adaptation[70] [71].

No consideration of climate change is included in the measure description of structural measures in the FRMPs assessed. Nonetheless, as noted above, modelling was used to incorporate climate change into the APSFR maps and consequently the FHRMs – and these stages were in turn used to develop the objectives and measures of the FRMPs.

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[67] Sweden subsequently informed that the issue of climate change is generally an ongoing one and Sweden continues work in many processes. Almost all Swedish measures in the FRMPs are an important part of the adaptation to climate change. However, Sweden continues, because the FD has a cycle of six years, measures might not always be reported as adaptation measures. Consideration of climate change will probably be expressed in clearer terms in the next FRMPs. Further, the Swedish National Strategy for Climate Change Adaptation was adopted in spring 2018. The 2009 report is a "precursor" to the now adopted National Strategy. Regional plans about climate change adaptation were generally produced and adopted simultaneously with the FRMPs. Regional plans are available at all regions and produced by all twenty one County Administrative Boards These are the same regional governmental organisations that are implementing the FD. (http://www.klimatanpassning.se/roller-och-ansvar/vem-har-ansvaret/regionala-handlingsplaner-for-klimatanpassning-1.77455).

[68] FRMP Karlstad, p.26; FRMP Stockholm, p.159. The prior steps and FRMPs largely do not address pluvial flooding. This appears to be a gap, as this has been mentioned in other reports and documents as an issue in several parts of Sweden including Stockholm. See for example: Stockholms stad, The City of Stockholm's Environmental Work, 2017, available at: http://www.stockholm.se/PageFiles/278257/mfv082-miljoarbete_enGB.pdf

[69] Link available at the EEA's Climate-Adapt Platform: https://climate-adapt.eea.europa.eu/countries-regions/countries/sweden

[70] See:http://www.klimatanpassning.se/roller-och-ansvar/vem-har-ansvaret/regionala-handlingsplaner-for-klimatanpassning-1.77455

[71] Sweden subsequently noted that the Environmental Assessments for the FRMPs for Lindesberg and Örebro (not among the five FRMPs chosen for assessment here) refer to the regional action plan for climate change adaption for the Örebro county.

5.1 Good practices and areas for further development concerning climate change

The following **good practice** was identified:

- Sweden used advanced and detailed modelling to incorporate climate change into its APSFRs and FHRMs, which in turn were used to prepare the objectives and measures of the FRMPs.

The following **area for further development** was identified.

- The FRMPs provide little information on potential climate impacts and to a very limited extent describe how such potential impacts were considered in the selection and design of their measures.
- Coordination with national climate change policy does not appear to have taken place systematically.

6. Cost-benefit analysis

Only one of the five FRMPs assessed – the plan for Älvsbyn – refers to cost-benefit analysis; however, this FRMP only makes a brief reference without indicating if or at what stage such an analysis was carried out. The Älvsbyn FRMP moreover mentions that some measures were not pursued following the consultation due to their low cost-effectiveness, but information on how this was assessed is not provided. This and other FRMPs indicate that certain measures are considered cost-effective but do not explain whether this is based on an analysis[72, 73].

6.1 Good practices and areas for further development

The following **area for further development** was identified:

- Only one of the five FRMPs assessed refers to the use of cost-benefit analysis, but without providing details on if or at what stage this was used.

[72] See for example: FRMP Alvsbyn, p.28; Else, p.30 and p.43.

[73] Sweden subsequently noted that in the Swedish national guidance document on how to produce FRMPs, costs and benefits are on a voluntary basis, except for the international plan for the APSFR Haparanda, which is an area shared with Finland where for example, it has been carried out for the enlargement of a dyke in Haparanda. Sweden subsequently also noted that for the Falun FRMP, C/B-analysis has not been deemed to be necessary for the types of measures that are proposed in the first FRMP; however, these are part of the investigations needed to achieve the knowledge based objectives. Sweden also noted that in the Vännäs FRMP (not among the five assessed here), the most cost-effective measures have been prioritised, and in particular low or no cost measures were considered in this FRMP.

7. Governance including administrative arrangements, public information and consultation

7.1 Competent authorities

Based on the FRMPs and the information provided in the reporting sheets, the Competent Authorities and the UoMs identified for the FD have not changed. Sweden has not reported new information to WISE since 2010.

7.2 Public information and consultation

The table below shows how the public and interested parties were **informed** in the five UoMs assessed concerning the draft FRMPs. Information on how the consultation was actually carried out and which stakeholders participated is presented in the rest of the section:

Table 10 Methods used to inform the public and interested parties of the FRMPs

	Älvsbyn SE1A8932	Falun SE2A6504	Karlstad SE5A5704	Kristianstad SE4A2980	Stockholm SE3A0336
Media (papers, TV, radio)	✓		✓		
Internet	✓	✓	✓	✓	✓
Digital social networking					
Printed material			✓		
Direct mailing	✓	✓	✓	✓	✓
Invitations to stakeholders	✓		✓		✓
Local Authorities					✓
Meetings [74]					
Other					

Source: FRMPs

Based on information in the reporting sheets and the FRMPs, all five FRMPs assessed refer to the provision of information via the Internet, though all five refer to direct contacts with stakeholders, including mailing and (for three) invitations. Two of the FRMPs assessed refer to the use of media, such as newspaper.[75]

The table below shows how the actual **consultation** was carried out:

[74] Sweden subsequently informed that for the Stockholm FRMP, Stockholm authorities took an active part in information seminars for the public together with the hearings for the WFD. Similar events took place for some other FRMPs: For the Örebro and Lindesberg FRMPs, the draft plans were presented at a public meeting that was part of the consultation for the WFD, held in Örebro in February 2015.

[75] FRMP Älvsbyn (SE1A8932), Section 10; FRMP Falun (SE2A6504), Section 10; FRMP Stockholm (SE3A0336), Section 9; FRMP Kristianstad (SE4A2980), Page 23; FRMP Karlstad (SE5A5704) Section 8.2.

Table 11 Methods used for the actual consultation

	Älvsbyn SE1A8932	Falun SE2A6504	Karlstad SE5A5704	Kristianstad SE4A2980	Stockholm SE3A0336
Via Internet	✓	✓	✓		
Via digital social networking					
Direct invitation	✓	✓	✓	✓	✓
Exhibitions[76]					
Workshops, seminars or conferences	✓	✓	✓		✓
Telephone surveys					
Direct involvement in drafting FRMP		✓			✓
Postal written comments		✓			
Other					

Source: FRMPs

The consultations were carried out through direct invitation to public consultation and written responses, and through different types of meetings held for the FRMPs for Älvsbyn, Falun, Stockholm and Karlstad. (The stakeholders attending these meeting were additionally expected to formulate their views in a written response.)[77]

The table below shows how the **documents** for the consultation were provided:

Table 12 Methods used to provide the documents for the consultation

	All UoMs assessed
Downloadable	✓
Direct mailing (e-mail)	✓
Direct mailing (post) [78]	
Paper copies distributed at exhibitions [79]	
Paper copies available in municipal buildings (town hall, library etc.) [80]	
Paper copies at the main office of the competent authority	
Paper copies available at meetings [81]	

Source: FRMPs

[76] Sweden subsequently informed that this method was used for the public.
[77] FRMP Älvsbyn (SE1A8932), Section 10; FRMP Falun (SE2A6504), Section 10; FRMP Stockholm (SE3A0336), Section 9; FRMP Kristianstad (SE4A2980), Page 23; FRMP Karlstad (SE5A5704) Section 8.2.
[78] Sweden subsequently indicated that this was the practice for all FRMPs assessed.
[79] Sweden subsequently indicated that this was the practice for all FRMPs assessed.
[80] Sweden subsequently indicated that this was the practice for all FRMPs assessed.
[81] Sweden subsequently indicated that this was the practice for all FRMPs assessed.

Generally speaking, the FRMPs were distributed as downloadable documents through the internet site of the CA[82], or as email attachments.[83]

7.3 Active involvement of Stakeholders

The table below shows the groups of **stakeholders** that have been actively involved in the development of the five FRMPs assessed:

Table 13 Groups of stakeholders

	Älvsbyn SE1A8932	**Falun SE2A6504**	**Karlstad SE5A5704**	**Kristianstad SE4A2980**	**Stockholm SE3A0336**
Civil Protection Authorities such as Government Departments responsible for emergency planning and coordination of response actions	✓	✓	✓		✓
Flood Warning / Defence Authorities			✓		
Drainage Authorities					
Emergency services			✓		
Water supply and sanitation	✓	✓	✓		
Agriculture / farmers					
Energy / hydropower	✓	✓	✓		
Navigation / ports					
Fisheries / aquaculture					
Private business (Industry, Commerce, Services)			✓		
Non-governmental organisations including nature protection, social issues (e.g. children, housing)			✓		
Consumer Groups					
Local / Regional	✓	✓	✓	✓	✓
Academia / Research			✓		

[82] Sweden clarified that the MSB is the only competent authority appointed for the implementation of the Floods Directive.

[83] FRMP Älvsbyn (SE1A8932), Section 10; FRMP Falun (SE2A6504), Section 10; FRMP Stockholm (SE3A0336), Section 9; FRMP Kristianstad (SE4A2980), Page 23; FRMP Karlstad (SE5A5704) Section 8.2.

	Älvsbyn SE1A8932	Falun SE2A6504	Karlstad SE5A5704	Kristianstad SE4A2980	Stockholm SE3A0336
Other *	✓	✓	✓		✓

Notes: * Other in Sweden refers to road and railroad authorities (in all four FRMPs identified) and to cultural heritage authorities in Karlstad as well as a museum in Falun.

Based on the information found in the reporting sheets and the FRMPs, there was a high degree of variability in the involvement of stakeholders across the plans, with a broad range of organisations identified as involved for the FRMP for Karlstad[84]. Moreover, for this FRMP, the office responsible for the FRMP also coordinated with County offices not directly involved in water management, such as the Cultural Heritage section[85]. For Kristianstad, information was found only on the involvement of municipality of Kristianstad.[86]

The table below shows the **mechanisms** used to ensure the active involvement of stakeholders:

Table 14 Mechanisms used to ensure the active involvement of stakeholders

	Älvsbyn SE1A8932	Falun SE2A6504	Karlstad SE5A5704	Kristianstad SE4A2980	Stockholm SE3A0336
Regular exhibitions					
Establishment of advisory groups			✓		
Involvement in drafting		✓	✓		
Workshops and technical meetings	✓	✓	✓	✓	✓
Formation of alliances					
Information days					

Source: FRMPs

[84] Sweden informed that river coordination groups (established more than 20 years before the FD was adopted) involving many stakeholders have been consulted during the whole FD process. For example, for the Vännäs FRMP, the River Coordination Group of Ume- and Vindelälven was informed and the FRMP discussed.
Sweden also noted subsequently that for the Örebro and Lindesberg FRMPs, early consultations took place on the draft Plans with each municipality in 2014. These were held to receive input regarding, for example, objectives and delineations for continued work. In summer and autumn 2015, the FRMPs were sent for consultation to all stakeholders and were made available to the public online. A small questionnaire was added to the message in to receive more feedback. The FRMPs were also presented at the public meeting that was part of the consultation of the WFD in Örebro, held in February 2015.

[85] Sweden subsequently informed that, for all FRMPs in Sweden, all sectors (e.g. planning, nature conservation, agriculture, cultural heritage) in the County Administrative Boards were involved and consulted when the plans were produced.

[86] FRMP Älvsbyn (SE1A8932), Section 10; FRMP Falun (SE2A6504), Section 10; FRMP Stockholm (SE3A0336), Section 9; FRMP Kristianstad (SE4A2980), Page 23; FRMP Karlstad (SE5A5704) Section 8.2.

The extent of information reported on mechanisms for active involvement varies across the five FRMPs assessed. For all five plans, workshops and technical meetings were held with stakeholders.

In Karlstad, as indicated above, a broad range of stakeholders were involved, and the County administration organised an initial "cooperation meeting" in 2014 with stakeholder representatives to discuss objectives. For this FRMP, the County administration maintained regular dialogue with the municipality of Karlstad; moreover, a group of stakeholders – including the Swedish Armed Forces, Hammarö Municipality, Karlstads Power Network Ltd, Karlstad Municipality and the Swedish Transport Agency – were invited to participate in Joint Flooding Cooperation Groups.[87]

7.4 Effects of consultation

The table below shows the **effects** of consultation:

Table 15 Effects of consultation

	Älvsbyn SE1A8932	**Falun SE2A6504**	**Karlstad SE5A5704**	**Kristianstad SE4A2980**	**Stockholm SE3A0336**
Changes to selection of measures	✓	✓	✓		✓
Adjustment to specific measures	✓	✓	✓		✓
Addition of new information	✓	✓	✓		✓
Changes to the methodology used					
Commitment to further research					
Commitment to action in the next FRMP	✓		✓		✓
Comments and results of the consultation "were considered in the formulation of the plan"		✓			

Source: FRMPs

According to information provided in the FRMPs, public consultation and the active involvement of stakeholders led to changes in the selection of measures, adjustments to specific measures and addition of new information for four of the five plans assessed (and for

[87] FRMP Älvsbyn (SE1A8932), Section 10; FRMP Falun (SE2A6504), Section 10; FRMP Stockholm (SE3A0336), Section 9; FRMP Kristianstad (SE4A2980), Page 23; FRMP Karlstad (SE5A5704) Section 8.2.

three of these, there was commitment to action in the next FRMP cycle. For example, for the FRMP for Älvsbyn, two measures proposed were moved and four new measures were introduced (on flood risk exercises, flood management through cooperation with Non-Governmental Organisations, an inventory of environmentally hazardous activities and contaminated areas within the APSFR, and an investigation of infrastructure measures to reduce flood risk). Information was not found, however, on changes to the FRMP for Kristianstad.[88]

7.5 Strategic Environmental Assessment

Two of the five FRMPs assessed – those for Älvsbyn and Falun – indicated that a Strategic Environmental Assessment was undertaken.

No information was found on SEA for the other three FRMPs assessed[89].

7.6 Good practices and areas for further development regarding Governance

The following **good practices** were identified:

- While the information available on consultation and active involvement of stakeholders varies, it is clear that the preparation of the FRMP for Karlstad included a variety of mechanisms for outreach and the strong involvement of a wide range of stakeholders.
- Four of the five FRMPs assessed provide information on the impacts of public consultation and active involvement of stakeholders on the final plans.

The following **area for further development** was identified:

- Three of the five FRMPs assessed do not indicate if a Strategic Environmental Assessment procedure was undertaken.

[88] FRMP Älvsbyn (SE1A8932), Section 10; FRMP Falun (SE2A6504), Section 10; FRMP Stockholm (SE3A0336), Section 9; FRMP Kristianstad (SE4A2980), Page 23; FRMP Karlstad (SE5A5704) Section 8.2.

[89] Sweden subsequently informed that other FRMPs have gone through an SEA procedure. For Kristianstad, information on the SEA is available online: http://www.ebhportalen.se/Sv/Inventeringsrapporter/Inventering%20av%20L%C3%A5ngebro%20industriomr%C3%A5de%20i%20Kristianstad%202007.pdf, and https://www.kristianstad.se/sv/naringsliv-och-arbete/tillstand-regler-och-tillsyn/fororenade-omraden/sanering-av-kemtvatt-langebro/.
For the Örebro and Lindesberg FRMPs, a joint SEA was carried out.

Annex A: Supplementary tables and charts on measures

This Annex gives an overview of the data on measures provided by Sweden in the reporting sheets. These tables and charts were used for the preparation of section four on measures.

Background & method

This document was produced as part of the assessment of the FRMPs. The tables and charts below are a summary of the data reported on measures by the Member States and were used by the Member State assessor to complete the questions on the Flood measures. The data are extracted from the XMLs (reporting sheets) reported by Member States for each FRMP, and are split into the following sections:

- **Measures overview** – Tabulates the number of measures for each UoM;
- **Measure details: cost** – Cost & Cost explanation;
- **Measures details: name & location** – Location & geographic coverage;
- **Measure details: authorities** – Name of responsible authority & level of responsibility;
- **Measure details: objectives** – Objectives, Category of priority & Timetable;
- **Measure details: progress** – Progress of implementation & Progress description;
- **Measure details: other** – Other Community Acts.

On the basis of the reporting guidance (which in turn is based on the FD)[90], not all fields are mandatory, and, as such, not all Member States reported information for all fields.

Some of the fields in the XMLs could be filled in using standardised answers – for example, progress is measured via the categories set out in the Reporting Guidance. This means that producing comprehensive tables and charts required little effort. For many fields, however, a free data format was used. For some Member States, this resulted in thousands of different answers, or answers given in the national language.

In such situations, tables and charts were developed using the following steps:

- A first filter is applied to identify how many different answers were given. If a high number of different answers are given, Member States assessors were asked to refer to the raw data when conducting the assessment, and this Annex does not reflect these observations.
- If a manageable number of answers are given, obvious categories are identified, and raw data sorted.

[90] http://icm.eionet.europa.eu/schemas/dir200760ec/resources

- Measures missing information may be assigned categories based on other fields (for example, if the level of Responsibility Authority is missing, the information may be obvious from the field "name of Responsible Authority").
- Measures where obvious categories cannot be defined based on other available information (as in the example above on the name of the Responsible Authority), are categorised as "no information".

Types of measures used in reporting

The following table[91] is used in the reporting on the types of measures. Each type of measures is coded as an M-number. Measures are grouped in an 'aspect'.

NO ACTION M11: No Action	**PREPAREDNESS** M41: Flood Forecasting & Warning M42: Emergency response planning M43: Public Awareness M44: Other preparedness
PREVENTION M21: Avoidance M22: Removal or relocation M23: Reduction M24: Other prevention	**RECOVERY & REVIEW** M51: Clean-up, restoration & personal recovery M52: Environmental recovery M53: Other recovery
PROTECTION M31: Natural flood management M32: Flow regulation M33: Coastal and floodplain works M34: Surface Water Management M35: other protection	**OTHER MEASURES** M61: Other measures

[91] Guidance for Reporting under the Floods Directive (2007/60/EC): https://circabc.europa.eu/w/browse/a3c92123-1013-47ff-b832-16e1caaafc9a

List of Annex A tables & figures

Measures overview

Table A1 - Total number of measures

Number of individual measures	138
Number of individual measures including measures which have been allocated to more than one measure type	138
Number of aggregated measures	210
Number of aggregated measures including measures which have been allocated to more than one measure type	210
Total number of measures	348
Total number of measures including measures which have been allocated to more than one measure type	348
Range of number of measures between UoMs including measures which have been allocated to more than one measure type (Min-Max)	13-137
Average number of measures across UoMs including measures which have been allocated to more than one measure type	58

Table A2 - Number of individual measures per measure type and UoM

	Prevention				**Protection**					**Preparedness**				**Recovery and Review**	**Other**	**Grand Total**
	M21	**M22**	**M23**	**M24**	**M31**	**M32**	**M33**	**M34**	**M35**	**M41**	**M42**	**M43**	**M44**	**M52**		
SE1	2		4	2			5									13
SE1TO				2			1									3
SE2		1	1				1		1		2					6
SE3		1	3	21						2	3	7		1		38
SE4	1			8		1			5	1	4	6	7			33
SE5	1		3	9	1		6	3	1		3	8	9	1		45
Grand Total	**4**	**2**	**11**	**42**	**1**	**1**	**13**	**3**	**7**	**3**	**12**	**21**	**16**	**2**	**0**	**138**
Average per UoM	**<1**	**<1**	**2**	**7**	**<1**	**<1**	**2**	**<1**	**1**	**<1**	**2**	**4**	**3**	**<1**	**0**	**23**

Table A3 - Number of aggregated measures per measure type and UoM

	Prevention		Protection				Preparedness				Recovery & Review		Other	Grand Total
	M21	M24	M32	M33	M34	M35	M41	M42	M43	M44	M51	M52	M61	
SE1	4	1					5	3	5		1			19
SE1TO	2	2					3	2	1					10
SE2	3	8	1	1		1	4	10	4	7	1		2	42
SE3	5	24			1	4		2	4	1				41
SE4		3							3					6
SE5	9	42				8	2	8	14	7		2		92
Grand Total	**23**	**80**	**1**	**1**	**1**	**13**	**14**	**25**	**31**	**15**	**2**	**2**	**2**	**210**
Average per UoM	**4**	**13**	**<1**	**<1**	**<1**	**2**	**2**	**4**	**5**	**3**	**<1**	**<1**	**<1**	**35**

Table A4 - Total number of measures (aggregated and individual) per measure type and UoM

	Prevention		Prevention Total	Protection		Protection Total	Preparedness		Preparedness Total	Recovery and review		Recovery and review Total	Other	Other Total	Grand Total
	Agg.	Indiv.		Agg.	Indiv.		Agg.	Indiv.		Agg.	Indiv.		Agg.		
SE5	51	13	64	8	11	19	31	20	51	2	1	3			137
SE4	3	9	12		6	6	3	18	21						39
SE3	29	25	54	5		5	7	12	19		1	1			79
SE2	11	2	13	3	2	5	25	2	27	1		1	2	2	48
SE1TO	4	2	6		1	1	6		6						13
SE1	5	8	13		5	5	13		13	1		1			32
Grand Total	**103**	**59**	**162**	**16**	**25**	**41**	**85**	**52**	**137**	**4**	**2**	**6**	**2**	**2**	**348**
Average per UoM	**17**	**10**	**27**	**3**	**4**	**7**	**14**	**9**	**23**	**<1**	**<1**	**1**	**<1**	**<1**	**58**

The information in Table A4 is visualised in Figures A1 and A2 below:

Figure A1 - Number of total measures (individual and aggregate) by measure aspect

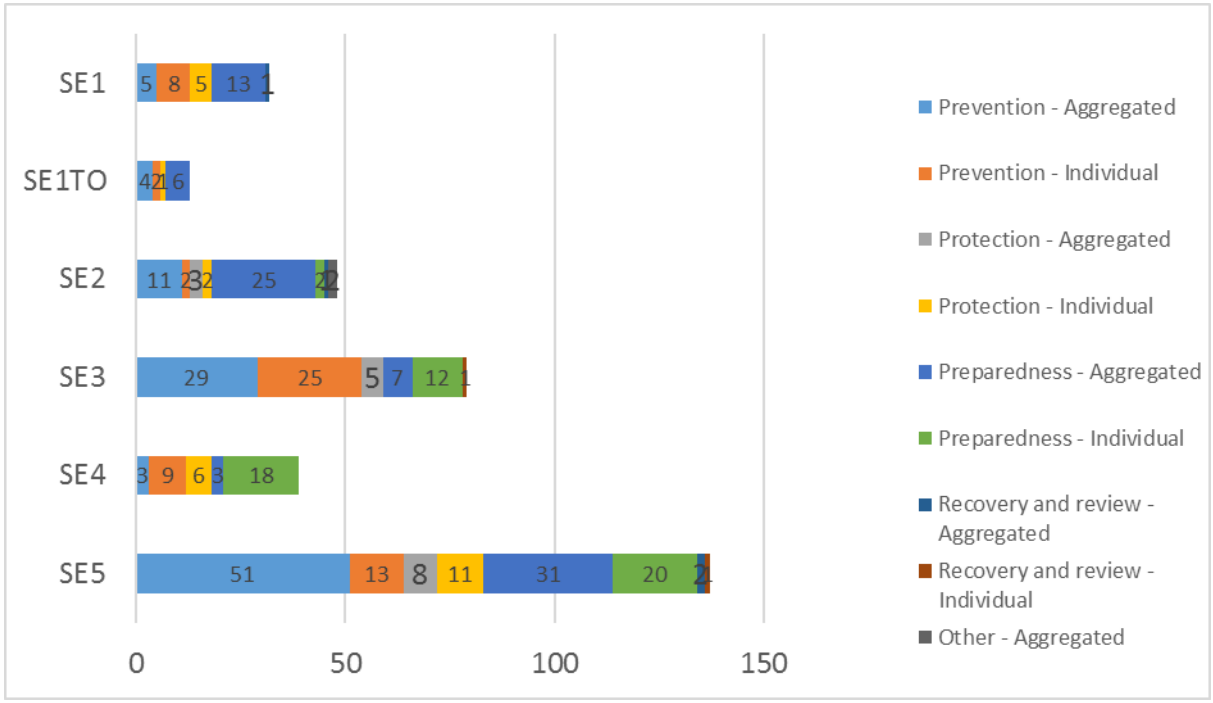
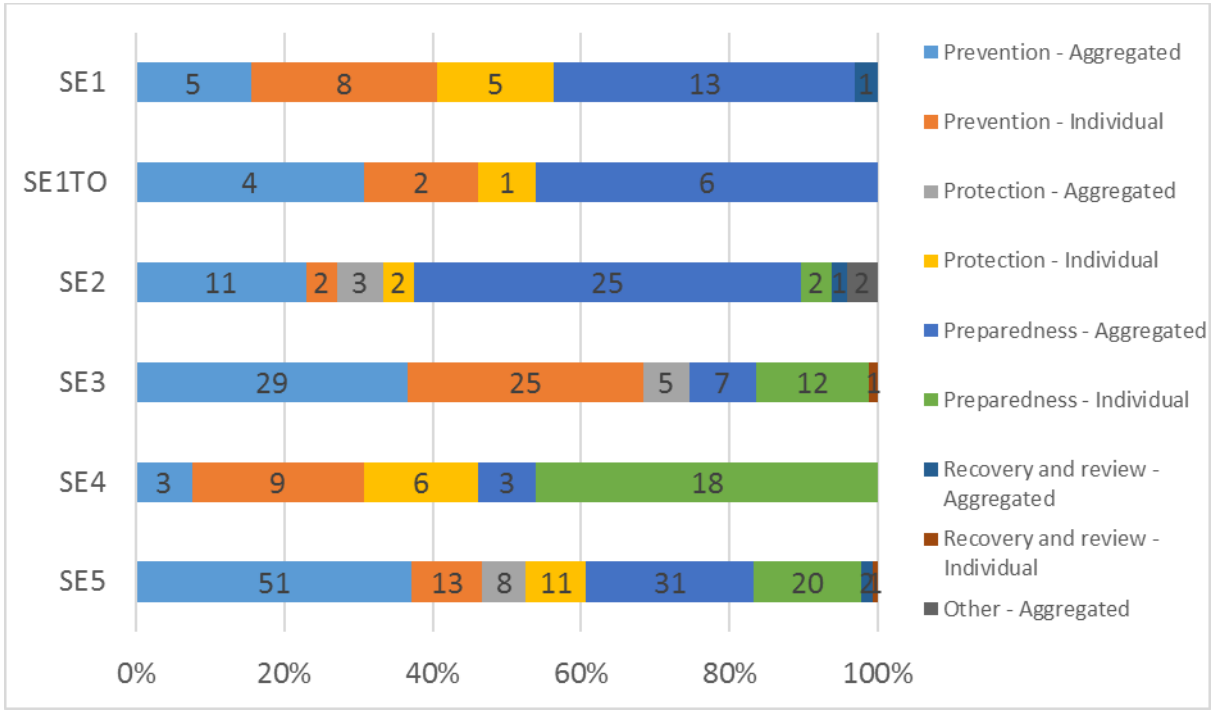


Figure A2 - Share of total measures (aggregated and individual) by measure aspect



Measure details: cost

Member States were requested to report information on:

- Cost (optional field);
- Cost explanation (optional field).

Sweden did not provide any information regarding the costs of each measure in the reporting sheets.

Measure details: name & location

Member States were requested to report information on the following:

- Location of implementation of measures (mandatory field);
- Geographic coverage of the impact of measures (optional field).

Location of measures

SE gives information in Swedish. The answers have been categorised into the following:

- Specific location: e.g. a river, a waste treatment plant, a hospital, a cemetery
- Catchment
- APSFR: Area of Potential Significant Flood Risk
- Local: e.g. county, municipality
- National
- Other location

Table A5 - Location of implementation by measure aspect

	Specific location	Catchment	APSFR	Local	National	Other Location	Grand Total
Prevention	15	4	88	46	2	7	162
Protection	7		21	11		2	41
Preparedness	16	4	80	33	3	1	137
Recovery & Review			3	3			6
Other	2						2
Grand Total	**40**	**8**	**192**	**93**	**5**	**10**	**348**

Figure A3 - Visualisation of Table A5: Location of implementation by measure aspect

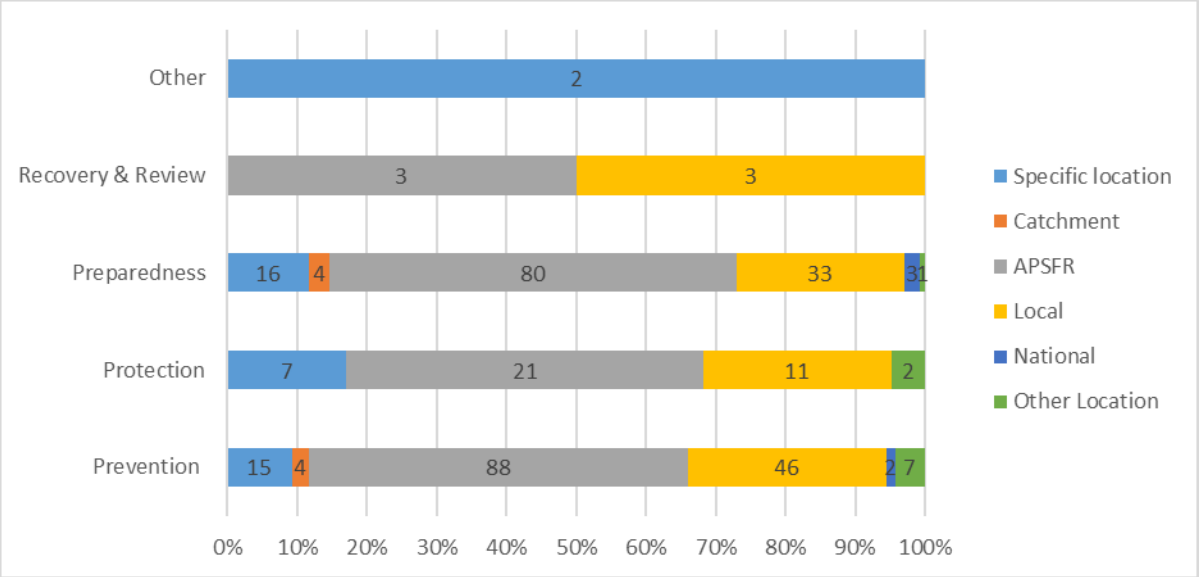
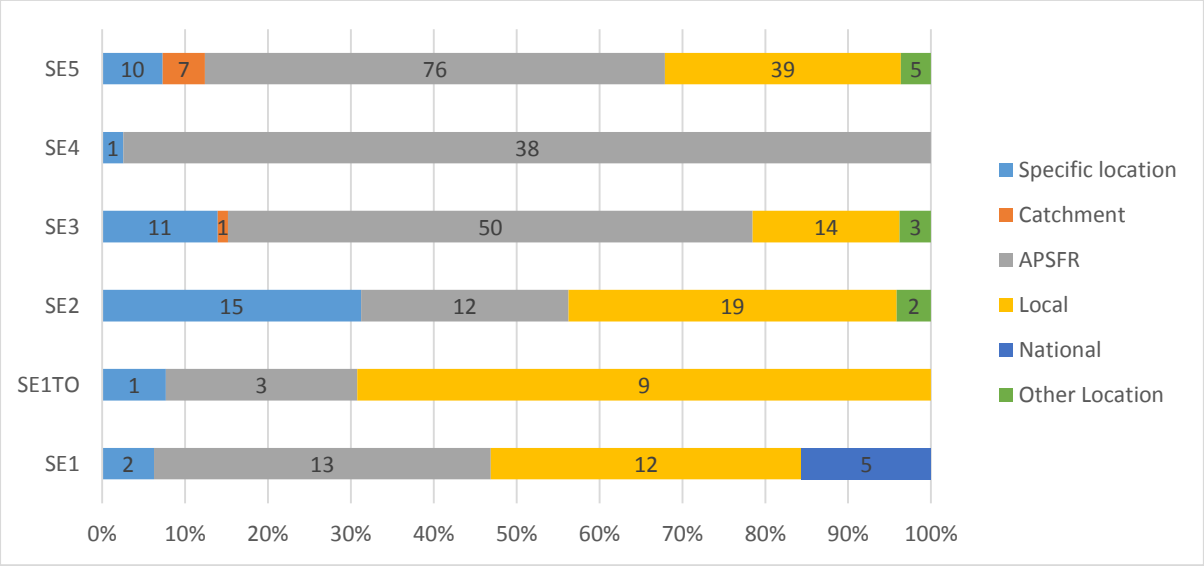


Table A6 - Location of implementation by UoM

	Specific location	Catchment	APSFR	Local	National	Other Location	Grand Total
SE1	2		13	12	5		32
SE1TO	1		3	9			13
SE2	15		12	19		2	48
SE3	11	1	50	14		3	79
SE4	1		38				39
SE5	10	7	76	39		5	137
Grand Total	**40**	**8**	**192**	**93**	**5**	**10**	**348**
Average per UoM	**7**	**1**	**32**	**19**	**1**	**2**	**58**

Figure A4 - Visualisation of Table A6: Location of implementation by UoM



Geographic coverage

Sweden did not provide any information on the geographic coverage in the reporting sheets

Measure details: objectives

Member States were requested to report information on:

- Objectives linked to measures (optional field, complementary to the summary provided in the textual part of the XML);
- Category of priority (Conditional, reporting on either 'category of priority' or 'timetable' is required);
- Timetable (Conditional, reporting on either 'category of priority' or 'timetable' is required).

Objectives

Sweden did not provide any information on the objectives of measures in the reporting sheets

Category of priority

Sweden provided information for the priority of all measures except for 28 measures (all in SE5). The following categories are used in the reporting sheet:

- Critical;
- Very high;
- High;
- Moderate;

- Low.

Table A7 - Category of priority by measure aspect

	Critical	Very high	High	Moderate	Low	No information	Grand Total
Prevention	4	37	67	38	7	9	162
Protection	3	8	12	8		10	41
Preparedness	12	16	57	41	3	8	137
Recovery & Review	1		3		1	1	6
Other				1	1		2
Grand Total	**20**	**61**	**139**	**88**	**12**	**28**	**348**

Figure A5 - Visualisation of Table A7: Category of priority by measure aspect

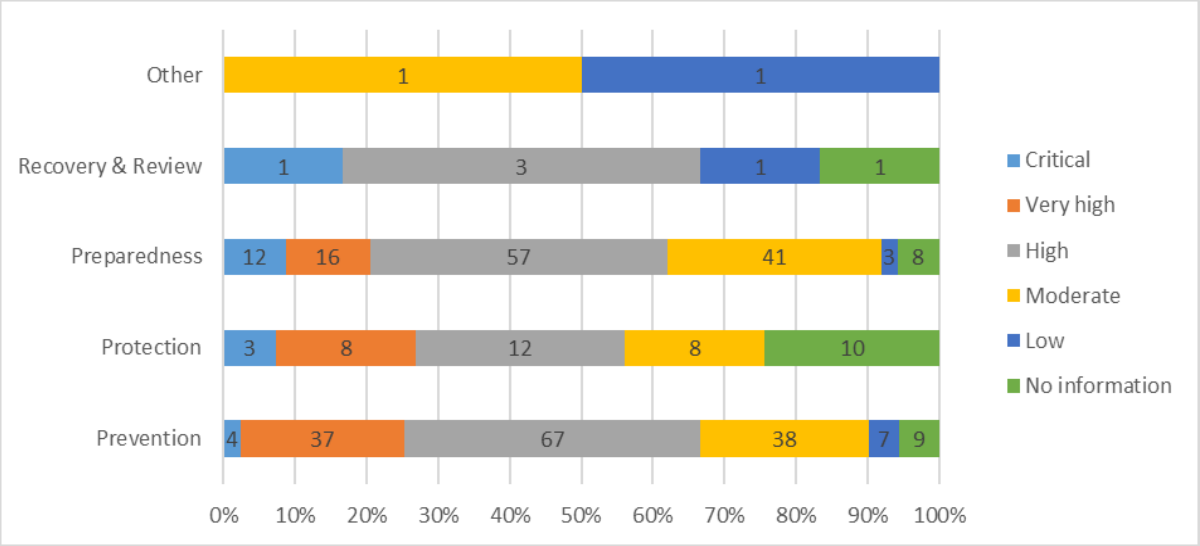
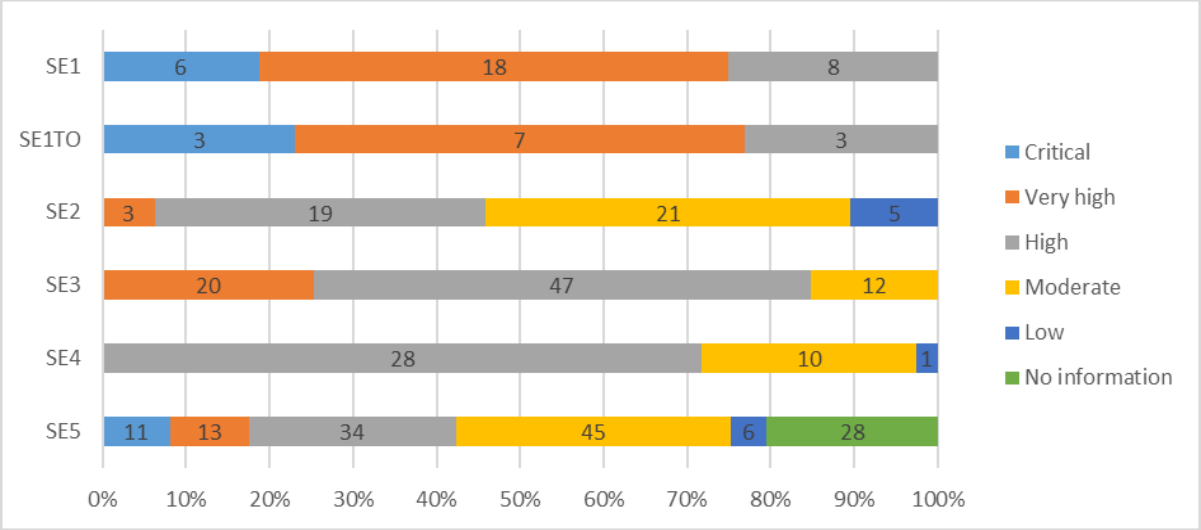


Table A8 - Category of priority by UoM

	Critical	Very high	High	Moderate	Low	No information	Grand Total
SE1	6	18	8				32
SE1TO	3	7	3				13
SE2		3	19	21	5		48
SE3		20	47	12			79
SE4			28	10	1		39
SE5	11	13	34	45	6	28	137
Grand Total	**20**	**61**	**139**	**88**	**12**	**28**	**348**
Average per UoM	**3**	**10**	**23**	**4**	**2**	**5**	**58**

Figure A6 - Visualisation of Table A8: Category of priority by UoM



Timetable

Information on the timetable is given for every measure as either a timespan, a single year, or a textual description. It is assumed that those single dates are completion dates, and the remaining measures have been categorised appropriately. Five measures have information on the timeline, but it is unclear when they will be completed. Six measures do not have dates ("other timeline") and include measures which are only implemented when needed (e.g. in a flood).

Table A9 - Timetable by measure aspect

	Ongoing	2015	2016	2017	2018	2019	2020	2021	2026	2028	Other	Unclear	Grand Total
Prevention	27	1	13	29	16	26	12	33	3		1	1	162
Protection	4		5	7	2	4	1	13		1	1	3	41
Preparedness	32		22	18	23	6	4	28			3	1	137
Recovery & Review	3				1	1					1		6
Other					1	1							2
Grand Total	**66**	**1**	**40**	**54**	**43**	**38**	**17**	**74**	**3**	**1**	**6**	**5**	**348**

Figure A7 - Visualisation of Table A9: Timetable by measure aspect

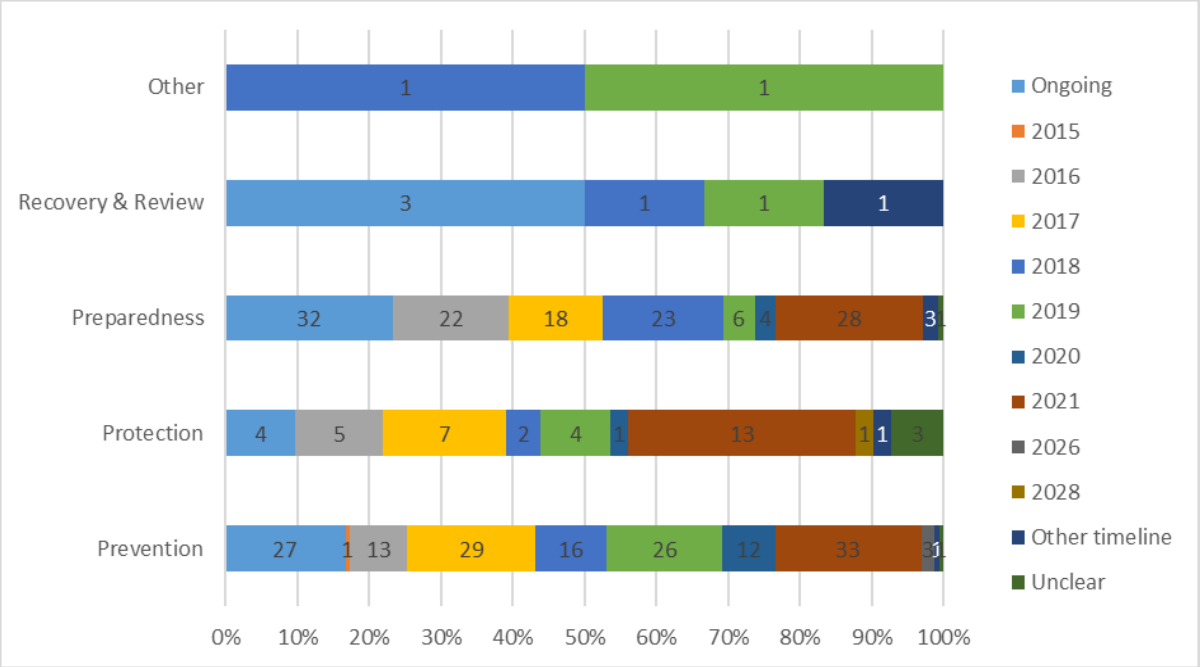
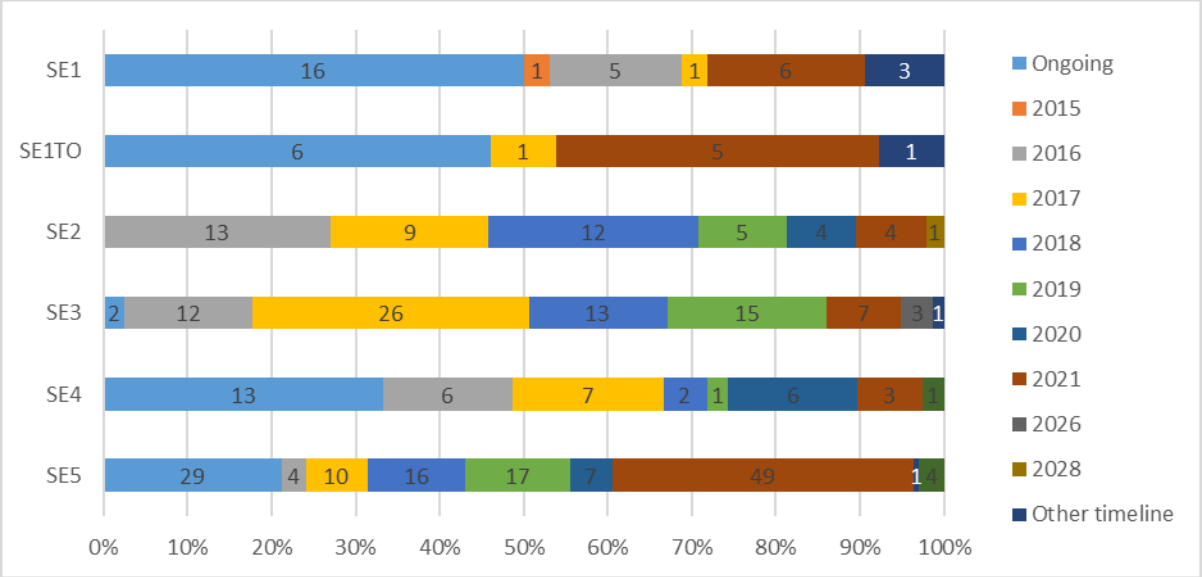


Table A10 - Timetable by UoM

	Ongoing	2015	2016	2017	2018	2019	2020	2021	2026	2028	Other	Unclear	Grand Total
SE1	16	1	5	1				6			3		32
SE1TO	6			1				5			1		13
SE2			13	9	12	5	4	4		1			48
SE3	2		12	26	13	15		7	3		1		79
SE4	13		6	7	2	1	6	3				1	39
SE5	29		4	10	16	17	7	49			1	4	137
Grand Total	**66**	**1**	**40**	**54**	**43**	**38**	**17**	**74**	**3**	**1**	**6**	**5**	**348**
Average per UoM	**13**	**<1**	**7**	**9**	**7**	**6**	**3**	**12**	**<1**	**<1**	**1**	**1**	**58**

Figure A8 - Visualisation of Table A10: Timetable by UoM



Measure details: authorities

Member States were requested to report information on:

- Name of the responsible authority (optional if 'level of responsibility' is reported);
- Level of responsibility (optional if 'name of the responsible authority' is reported).

Sweden reported no information for the level of Responsible Authority for any measure. However, the name of the Responsible Authority allows for the following categorisation:

- Local: including municipalities and counties
- Private: private company, for example Akzo Nobel Pulp and Performance Chemicals or utility companies
- Local/Private: where local authorities and private companies with joint responsibility
- Transport authority: including those at national and at local levels
- Other: including Lantmännen AB, a farming cooperative, and the Civil Protection and Emergency Agency

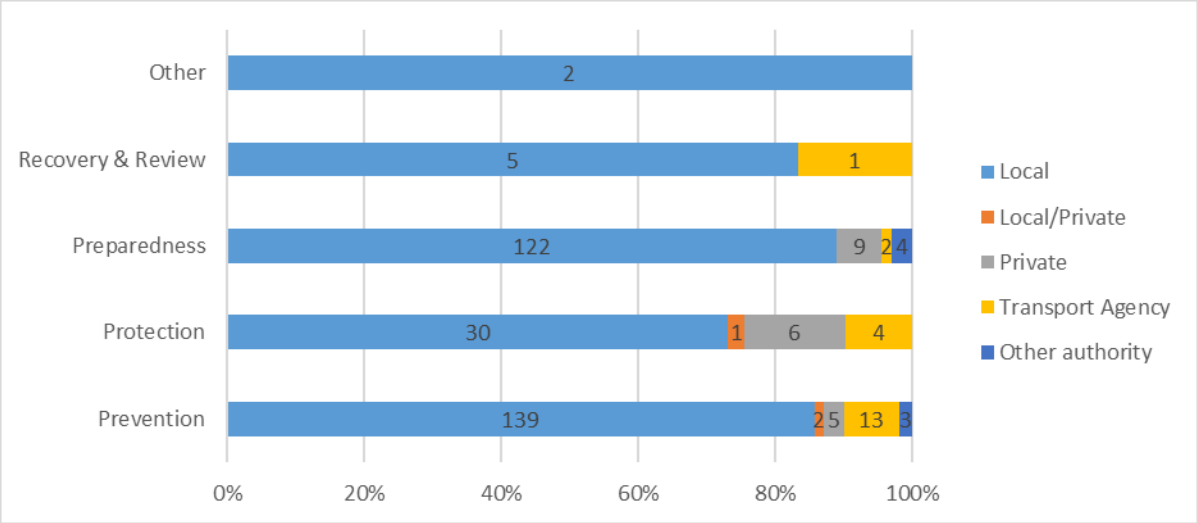
Note that for many measures there are more than one Responsible Authority, however there were no instances of double-counting of measures.

Table A11 - Level of responsibility by measure aspect

	Local	Joint Local/ Private	Private company	Transport authority	Other authority	Grand Total
Prevention	139	2	5	13	3	162
Protection	30	1	6	4		41
Preparedness	122		9	2	4	137
Recovery & Review	5			1		6
Other	2					2
Grand Total	**298**	**3**	**20**	**20**	**7**	**348**

Notes: Measures with more than one responsible authority have only been categorised once, usually based on the level of most of the Responsible Authorities (e.g. if there are two local level authorities and one private, then the measure would fall under "local"). Exception is where there are only two authorities (e.g. those categorised "local/private")

Figure A9 - Visualisation of Table A11: Level of responsibility by measure aspect



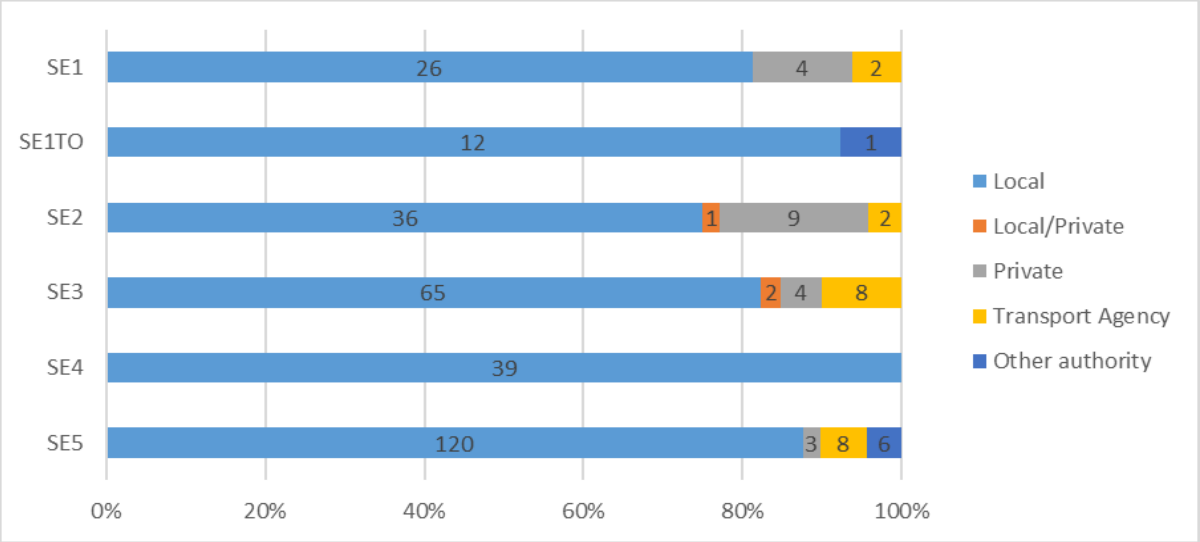
Notes: Measures with more than one responsible authority have only been categorised once, usually based on the level of most of the Responsible Authorities (e.g. if there are two local level authorities and one private, then the measure would fall under "local"). Exception is where there are only two authorities (e.g. those categorised "local/private")

Table A12 - Level of responsibility by UoM

	Local	Local/ Private	Private	Transport Agency	Other authority	Grand Total
SE1	26		4	2		32
SE1TO	12				1	13
SE2	36	1	9	2		48
SE3	65	2	4	8		79
SE4	39					39
SE5	120		3	8	6	137
Grand Total	**298**	**3**	**20**	**20**	**7**	**348**
Average per UoM	**50**	**<1**	**3**	**3**	**1**	**58**

Notes: Measures with more than one responsible authority have only been categorised once, usually based on the level of most of the Responsible Authorities (e.g. if there are two local level authorities and one private, then the measure would fall under "local"). Exception is where there are only two authorities (e.g. those categorised "local/private")

Figure A10 - Visualisation of Table 12: Level of responsibility by UoM



Notes: Measures with more than one responsible authority have only been categorised once, usually based on the level of most of the Responsible Authorities (e.g. if there are two local level authorities and one private, then the measure would fall under "local"). Exception is where there are only two authorities (e.g. those categorised "local/private")

Measure details: progress

Member States were requested to report information on:

- Progress of implementation of measures (mandatory field) – this is a closed question whose responses are analysed below;
- Progress description of the implementation of measures (optional field) – this is an open text question for which not all Member States reported and whose answers are not analysed here.

Sweden reported information about the progress of implementation of the measures. The progress of implementation was reported as[92]:

- COM (completed);
- OGC (ongoing construction);
- POG (progress ongoing);
- NS (not started).

A full definition of these terms can be found at the end of this section.

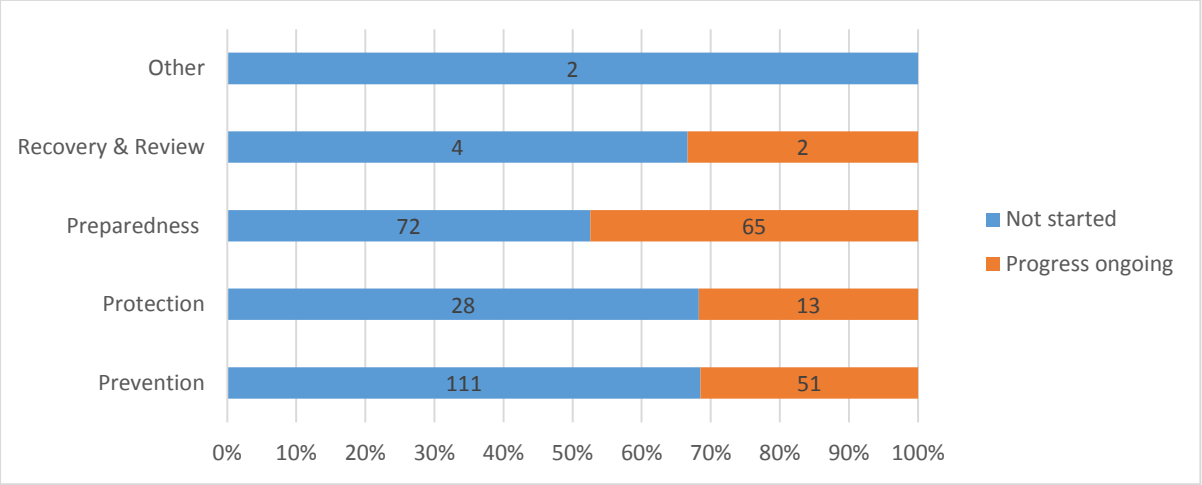
Table A13 – Progress of implementation by measure aspect

	Not started	Progress ongoing	Grand Total
Prevention	111	51	162
Protection	28	13	41
Preparedness	72	65	137
Recovery & Review	4	2	6
Other	2		2
Grand Total	**217**	**131**	**348**

Notes: Sweden did not report any measures as Completed or Ongoing Construction

[92] Guidance for Reporting under the Floods Directive (2007/60/EC): https://circabc.europa.eu/w/browse/a3c92123-1013-47ff-b832-16e1caaafc9a

Figure A11 - Visualisation of Table A13: Progress of implementation by measure aspect



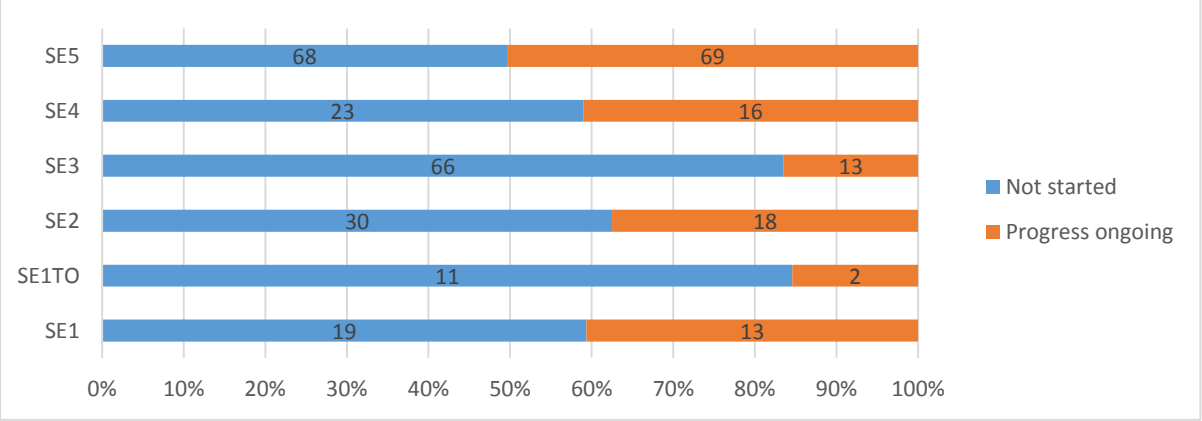
Notes: Sweden did not report any measures as Completed or Ongoing Construction

Table A14 – Progress of implementation by UoM

	Not started	Progress ongoing	Grand Total
SE1	19	13	32
SE1TO	11	2	13
SE2	30	18	48
SE3	66	13	79
SE4	23	16	39
SE5	68	69	137
Grand Total	**217**	**131**	**348**
Average per UoM	**36**	**22**	**58**

Notes: Sweden did not report any measures as Completed or Ongoing Construction

Figure A12 - Visualisation of Table A14: Progress of implementation by UoM



Notes: Sweden did not report any measures as Completed or Ongoing Construction

The categories describing the progress of measures are defined in the EU Reporting Guidance Document on the FD.

For **measures involving construction or building works** (e.g. a waste water treatment plant, a fish pass, a river restoration project, etc.):

- Not started (NS) means the technical and/or administrative procedures necessary for starting the construction or building works have not started.
- Progress on-going (POG) means that administrative procedures necessary for starting the construction or building works have started but are not finalised. The simple inclusion in the RBMPs is not considered planning in this context.
- On-going construction (OGC) means the construction or building works have started but are not finalized.
- Completed (COM) means the works have been finalised and the facilities are operational (maybe only in testing period in case e.g. a waste water treatment plant).

For **measures involving advisory services** (e.g. training for farmers):

- Not started (NS) means the advisory services are not yet operational and have not provided any advisory session yet.
- Progress on-going (POG) means the advisory services are operational and are being used. This is expected to be the situation for all multi- annual long/mid-term advisory services that are expected to be operational during the whole or most of RBMP.
- On-going construction (OGC): Not applicable
- Completed (COM) means an advisory service that has been implemented and has been finalised, i.e. is no longer operational. This is expected only for advisory services that are relatively short term or one-off, and which duration is time limited in relation to the whole RBMP.

For **measures involving research, investigation or studies**:

- Not started (NS) means the research, investigation or study has not started, i.e. contract has not been signed or there has not been any progress.
- Progress on-going (POG) means the research, investigation or study has been contracted or started and is being developed at the moment.
- On-going construction (OGC): Not applicable
- Completed (COM) means the research, investigation or study has been finalised and has been delivered, i.e. the results or deliverables are available (report, model, etc.).

For measures involving administrative acts (e.g. licenses, permits, regulations, instructions, etc.):

- Not started (NS) means the administrative file has not been opened and there has not been any administrative action as regards the measure.
- Progress on-going (POG) means an administrative file has been opened and at least a first administrative action has been taken (e.g. requirement to an operator to provide information to renew the licensing, request of a permit by an operator, internal consultation of draft regulations, etc.). If the measure involves more than one file, the opening of one would mean already "ongoing".
- On-going construction (OGC): Not applicable
- Completed (COM) means the administrative act has been concluded (e.g. the license or permit has been issued; the regulation has been adopted, etc.). If the measure involves more than one administrative act, "completed" is achieved only when all of them have been concluded.

Measure details: other

Member States were requested to provide information on:

- Other Community Acts associated to the measures reported (optional field);
- Any other information reported (optional field).

Sweden has provided information on other legislation for 20 measures:

- Enligt Plan- och bygglagen (Planning and Building Act);
- Förordning (2006:942) om krisberedskap och höjd beredskap (Emergency preparedness rules);
- Lag (2003:778) om skydd mot olyckor (Law on protection against accidents);
- Lagen (2006:544) om kommuners och landstings åtgärder inför och vid extraordinära händelser i fredstid och höjd beredskap (Act on the actions of municipalities and county councils extraordinary events);
- Plan- och bygglagen (Planning and Building Act);
- Sevesoanläggning (Seveso construction);
- Sevesoverksamhet (Seveso operations);
- Vattenverksamhet enligt 11 kap Miljöbalken (Water activities under Chapt. 11 of the Environment Code).

Seven measures appear to refer to the Seveso Directive.

Sweden did not report any information in the field “other”.

Annex B: Definitions of measure types

Table B1 Types of flood risk management measures[93]

	No Action
M11	No Action, No measure is proposed to reduce the flood risk in the APSFR or other defined area,
	Prevention
M21	Prevention, Avoidance, Measure to prevent the location of new or additional receptors in flood prone areas, such as land use planning policies or regulation
M22	Prevention, Removal or relocation, Measure to remove receptors from flood prone areas, or to relocate receptors to areas of lower probability of flooding and/or of lower hazard
M23	Prevention, Reduction, Measure to adapt receptors to reduce the adverse consequences in the event of a flood actions on buildings, public networks, etc...
M24	Prevention, Other prevention, Other measure to enhance flood risk prevention (may include, flood risk modelling and assessment, flood vulnerability assessment, maintenance programmes or policies etc...)
	Protection
M31	Protection Natural flood management / runoff and catchment management, Measures to reduce the flow into natural or artificial drainage systems, such as overland flow interceptors and / or storage, enhancement of infiltration, etc and including in-channel , floodplain works and the reforestation of banks, that restore natural systems to help slow flow and store water.
M32	Protection, Water flow regulation, Measures involving physical interventions to regulate flows, such as the construction, modification or removal of water retaining structures (e.g., dams or other on-line storage areas or development of existing flow regulation rules), and which have a significant impact on the hydrological regime.
M33	Protection, Channel, Coastal and Floodplain Works, Measures involving physical interventions in freshwater channels, mountain streams, estuaries, coastal waters and flood-prone areas of land, such as the construction, modification or removal of structures or the alteration of channels, sediment dynamics management, dykes, etc.
M34	Protection, Surface Water Management, Measures involving physical interventions to reduce surface water flooding, typically, but not exclusively, in an urban environment, such as enhancing artificial drainage capacities or though sustainable drainage systems (SuDS).
M35	Protection, Other Protection, Other measure to enhance protection against flooding, which may include flood defence asset maintenance programmes or policies
	Preparedness
M41	Preparedness, Flood Forecasting and Warning, Measure to establish or enhance a flood forecasting or warning system
M42	Preparedness, Emergency Event Response Planning / Contingency planning, Measure to establish or enhance flood event institutional emergency response planning
M43	Preparedness, Public Awareness and Preparedness, Measure to establish or enhance the public awareness or preparedness for flood events
M44	Preparedness, Other preparedness, Other measure to establish or enhance preparedness for flood events to reduce adverse consequences

[93] Guidance for Reporting under the Floods Directive (2007/60/EC): https://circabc.europa.eu/w/browse/a3c92123-1013-47ff-b832-16e1caaafc9a

	Recovery & Review
M51	Recovery and Review (Planning for the recovery and review phase is in principle part of preparedness), Individual and societal recovery, Clean-up and restoration activities (buildings, infrastructure, etc), Health and mental health supporting actions, incl. managing stress Disaster financial assistance (grants, tax), incl. disaster legal assistance, disaster unemployment assistance, Temporary or permanent relocation , Other
M52	Recovery and Review, Environmental recovery, Clean-up and restoration activities (with several sub-topics as mould protection, well-water safety and securing hazardous materials containers)
M53	Recovery and Review, Other, Other recovery and review Lessons learnt from flood events Insurance policies
	Other
M61	Other

Catalogue of Natural Water Retention Measures

NWRM cover a wide range of actions and land use types. Many different measures can act as NWRM, by encouraging the retention of water within a catchment and, through that, enhancing the natural functioning of the catchment. The catalogue developed in the NWRM project represents a comprehensive but non prescriptive wide range of measures; other measures, or similar measures called by a different name, could also be classified as NWRM.

To ease access to measures, the catalogue of measures hereunder is sorted by the primary land use in which it was implemented: Agriculture; Forest; Hydromorphology; Urban. Most of the measures however can be applied to more than one land use type.

Table B2 List of NWRM

Agriculture	Forest	Hydro Morphology	Urban
A01 Meadows and pastures	F01 Forest riparian buffers	N01 Basins and ponds	U01 Green Roofs
A02 Buffer strips and hedges	F02 Maintenance of forest cover in headwater areas	N02 Wetland restoration and management	U02 Rainwater Harvesting
A03 Crop rotation	F03 Afforestation of reservoir catchments	N03 Floodplain restoration and management	U03 Permeable surfaces
A04 Strip cropping along contours	F04 Targeted planting for 'catching' precipitation	N04 Re-meandering	U04 Swales
A05 Intercropping	F05 Land use conversion	N05 Stream bed re-naturalization	U05 Channels and rills
A06 No till agriculture	F06 Continuous cover forestry	N06 Restoration and reconnection of seasonal streams	U06 Filter Strips

Agriculture	Forest	Hydro Morphology	Urban
A07 Low till agriculture	F07 'Water sensitive' driving	N07 Reconnection of oxbow lakes and similar features	U07 Soakaways
A08 Green cover	F08 Appropriate design of roads and stream crossings	N08 Riverbed material renaturalisation	U08 Infiltration Trenches
A09 Early sowing	F09 Sediment capture ponds	N09 Removal of dams and other longitudinal barriers	U09 Rain Gardens
A10 Traditional terracing	F10 Coarse woody debris	N10 Natural bank stabilisation	U10 Detention Basins
A11 Controlled traffic farming	F11 Urban forest parks	N11 Elimination of riverbank protection	U11 Retention Ponds
A12 Reduced stocking density	F12 Trees in Urban areas	N12 Lake restoration	U12 Infiltration basins
A13 Mulching	F13 Peak flow control structures	N13 Restoration of natural infiltration to groundwater	
	F14 Overland flow areas in peatland forests	N14 Re-naturalisation of polder areas	

Source: www.nwrm.eu