APPENDIX 3.1

River Status Assessment

Ecological Status

Ecological Status was assessed directly for approximately 1600 river water bodies in the initial three-year cycle of river monitoring for the WFD. Assessment of status follows the 'one-out all-out' approach required by the WFD. The process of assessing ecological status is shown in Figure A3.1. In terms of quality elements used in the initial round of monitoring physico-chemical quality parameters and macroinvertebrates were the most important – more than 2,500 sites for macroinvertebrates, and macrophytes, over 130 for fish with 180 at which diatoms and hydromorphology were assessed and over 1,400 operational and surveillance sites were used for supporting physico-chemical parameters (Table A3.1). Five status categories for ecological status are defined under the WFD – High, Good, Moderate, Poor and Bad. Figure A3.1 illustrates the manner in which the various quality elements are used to define final ecological status and Figure A3.2 illustrates the use of ecological quality ratios comparing observed status to an ideal or close to pristine reference conditions.

Table A3.1

Numbers of sites assessed per quality element for Irish rivers, 2007-2009.

Quality Element	Number of Sites
Ecological Status	
• **Macroinvertebrates**	2515
• **General Physico-Chemical Parameters**	1414
• **Macrophytes**	2547
• **Diatoms**	180
• **Fish**	133
• **Hydromorphology**	180
Chemical Status	
• **Priority Substances (Annex X)**	180

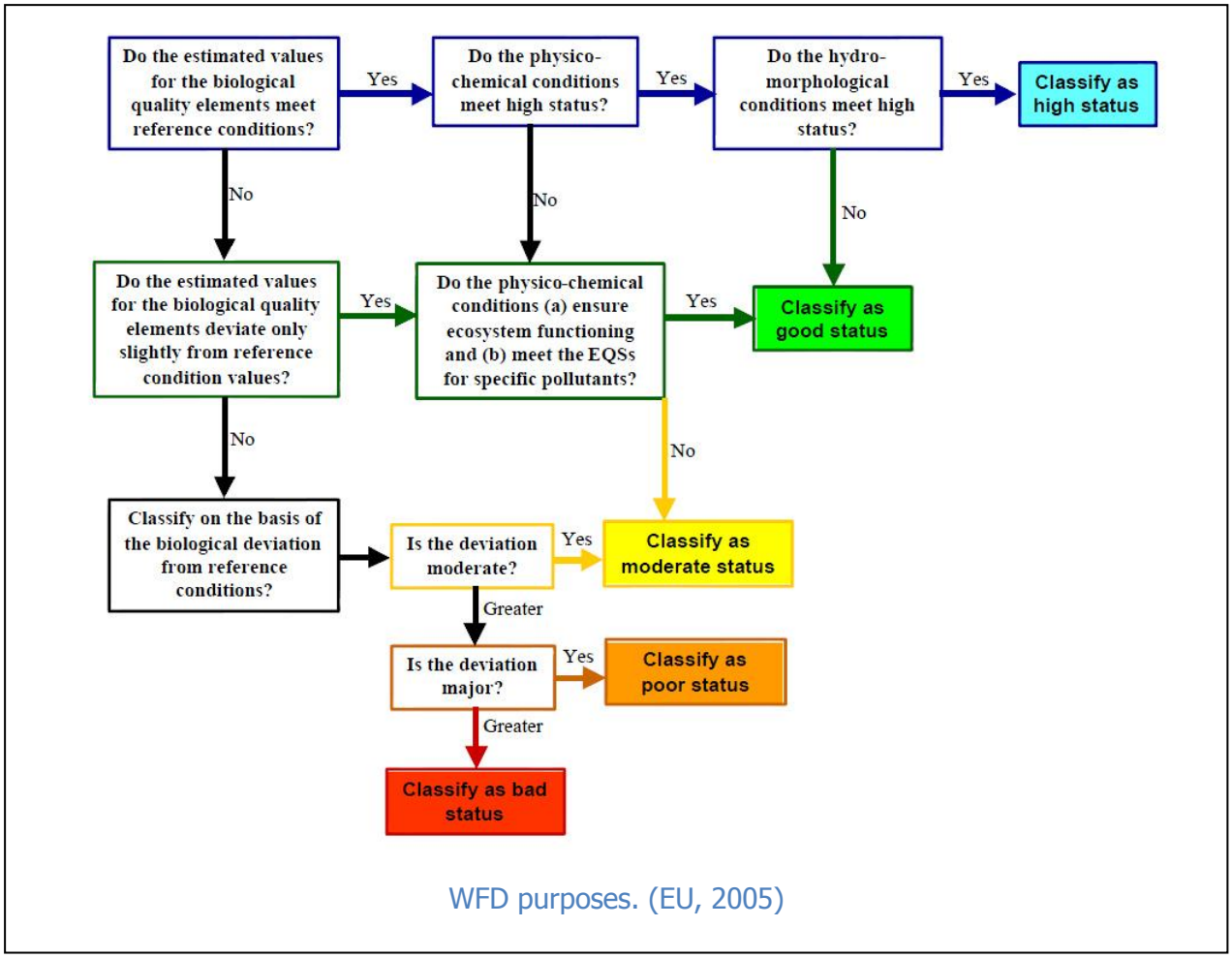

Figure A3.1. The role of different quality elements in the assessment of ecological status.

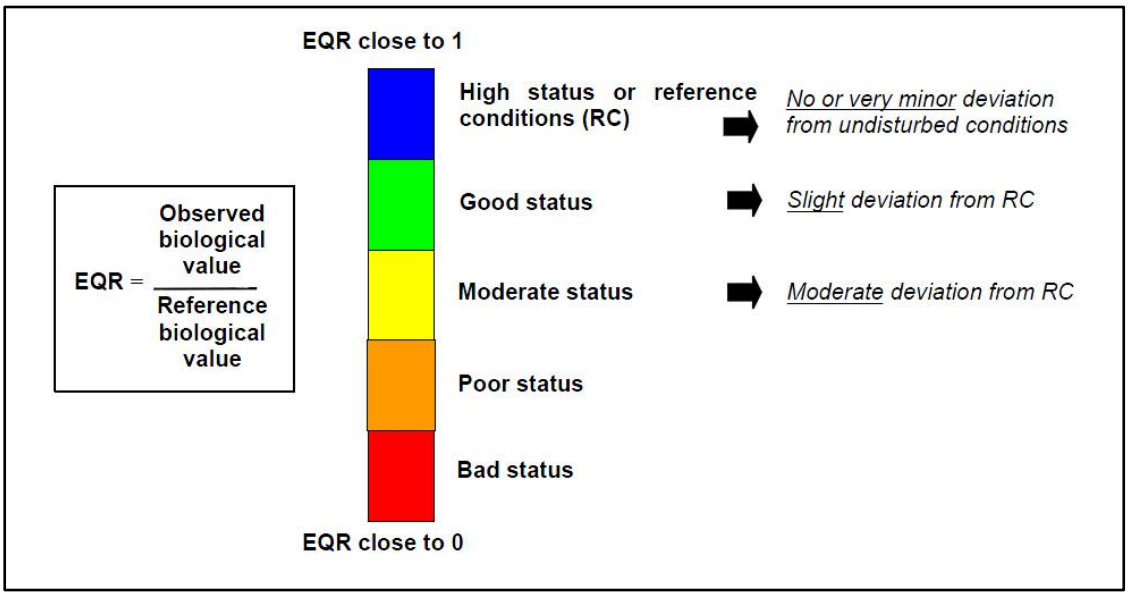

Figure 3.2A. Basic principles for classification of ecological status based on Ecological Quality Ratios. (CIS, 2005)

The ecological status of rivers is based primarily on biological quality elements – macroinvertebrates, aquatic plants and fish – and in particular how far they depart from the expected pristine 'reference conditions'. Other supporting quality elements such as general physico-chemical parameters indicative of, for example, nutrient and oxygenation conditions and general hydromorphological condition of the river are also taken into account. The five categories for ecological status are broadly defined in the text of the WFD (Annex V) and a subsequent guidance document (CIS 13, 2005). The important boundaries separating high status and good status and that between good status and moderate status have been further refined following a series of intercalibration exercises across Europe in which Irish scientists have also participated. These exercises have resulted in the publication of a formal EU Decision defining these boundaries (European Commission, 2008). In Ireland a set of regulations has been signed into law defining ecological quality standards for high and good status for a range of biological and physico-chemical quality standards (S.I. No. 272 of 2009).

The requirement to use a 'one-out all-out' approach to assessing ecological status means that the quality element with the lowest status at a site effectively decides the final status for a river water body Figure A3.1. This approach is based on the precautionary principle in that the most sensitive element to what may potentially be a wide range of pressures impacting on water quality is used to define the final status. Thus, for surveillance sites where a full range of biological and supporting physical and hydromorphological quality elements are assessed the final ecological status will depend primarily on whichever of macroinvertebrates, aquatic plants or fish has the lowest quality but also taking factors such as organic enrichment and hydromorphology into account. Hydromorphology can result in an otherwise 'high' status site being brought down to just 'good' status (see Figure A3.1). The general physico-chemical quality elements allow classification into high, good and moderate status.

For river water bodies the one-out all-out approach has also been applied at a geographical level in the sense that within water bodies that have more than one sample station the site with the lowest ecological status will determine the final status for that water body.

While the Irish river monitoring programme has a relatively high spatial density of sampling stations in comparison with many other European countries, many smaller water bodies will not have any monitoring data as it is not possible to monitor all small streams and tributaries of the main-stem rivers.

Chemical Status

Separate to Ecological Status rivers may be assessed for the presence of those priority substances listed in Annex X of the WFD and assigned a 'chemical status' of pass or fail. This assessment is done primarily for the 180 surveillance river monitoring sites at which a full suite of Annex , IX and X substances has been assessed over 2007-2009 together with specific pollutants from Annex VIII. The occurrence of priority substances in Irish rivers is discussed in a separate section in Chapter 3 of the main report.

'Water Quality' vs 'Ecological Status'

In the past, the triennial reports have assessed 'water quality' and will continue to do so. Under the WFD, however, the scope of the assessment has been broadened with the addition of supporting quality elements such as hydromorphology and the explicit recognition of a wider range of biological quality elements to be assessed in their own right relative to their expected 'reference conditions' to be expected when at or close to pristine condition. Thus, whereas previously the emphasis was on water pollution *sensu strictu* the WFD requires a broader ecological approach. An example of this broader approach would be, for example, if a species disappeared from a water body for reasons

that were not strictly related to 'pollution', the ecological status of the water body may be downgraded even though the water itself may still be perfectly adequate for, say, drinking water or industrial abstraction purposes. The introduction of alien species or physical modifications to the water body – barriers preventing fish migration, for example, may cause the ecological status to be adversely impacted while not necessarily impacting on 'water quality' *per se*. Thus, the crucial importance of biodiversity and general ecosystem services is recognised by the WFD. Nonetheless, it is apparent that traditional issues concerning water quality impacts such as organic pollution, eutrophication, acidification and toxic substances will continue to be extremely important issues and programmes of measures aimed at restoring ecological status and protecting the beneficial uses of surface waters will still emphasise the traditional water quality issues.