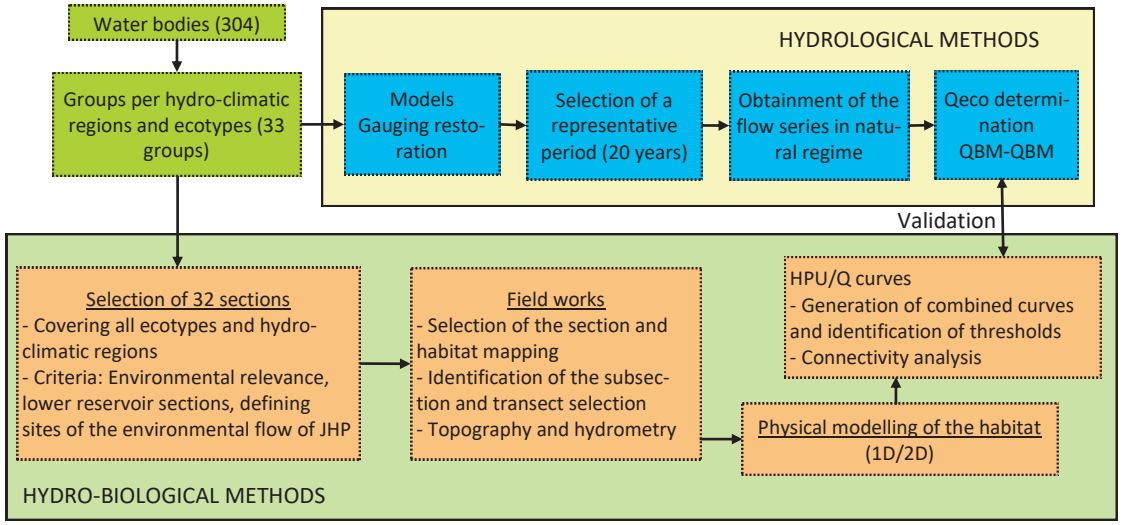
7. ECOLOGICAL FLOWS

Definition of ecological flows

As for to ecological flows, these could be defined as the minimum and maximum ecological flows and exchange rates that allow to maintain a sustainable functionality and structure, both in aquatic ecosystems and in the terrestrial ecosystems associated therewith, thus contributing to achieving the good status or ecological potential.

Minimum flows of the ecological flow regime have been determined by means of the application of hydrological methods and habitat modelling methods of different fish species. This has been carried out by selecting homogeneous and representative periods depending on the hydrological nature of the water body and on the biological cycles of indigenous species, as indicated in the Hydrological Planning Instruction (HPI) and in the methodological scheme shown in the following figure.



Scheme of the methodologies used to determine the minimum flow regime

In the first planning cycle (2009-2015), regimes of ecological flows were established in 39 monitoring sites located in 37 water bodies. In the second cycle (2016-2021), the component of minimum tides of the ecological flow regime has expanded to all water bodies of river type of the District, except for the bodies of river-reservoir type and the bodies called “without water at sampling”. This change has involved moving from 37 to 185 water bodies where, on a regulatory basis, minimum flow is established.

Minimum flows defined increase during some months of the year depending on a seasonal modulation factor of the hydro-region where the water body is located.

Hydro-region group	Unified hydrological regions	Month number											
		10	11	12	1	2	3	4	5	6	7	8	9
1	Mijares-Cenia	1	1	1	1	1	1	1.2	1.2	1	1	1	1
2	Upper Júcar river-Middle Júcar river-Eastern La Mancha-S.Alcaraz -Upper Turia River-Alfambra	1	1	1	1.2	1.2	1.2	1.2	1.2	1	1	1	1
3	Almansa-Lower Júcar river- Lower Turia River-Palancia	1	1	1	1.2	1.2	1	1	1	1	1	1	1
4	Serpis river-Marina Alta-Marina Baja-Vinalopó-Alacanti	1	1.2	1.2	1.2	1.2	1	1	1	1	1	1	1

Seasonal modulation factor of the hydro-region

With regards to prolonged drought situations, minimum flows have been defined as established in the HPI, which allows to decrease these minimum flows under this circumstance. However, the ecological flow regime associated with prolonged drought situations, as established in the HPI, does not apply in the course sections included in areas of the Natura 2000 network. In addition, and as established in the Hydrological Plan, it does not apply either in special protection areas or in natural river reserves. For all these reasons, only in 1% of the bodies the drought flow is lower than the flow in normal situation.

In addition, a maximum flow regime and exchange rates have also been included in the regulatory text of the plan at the most relevant sites with the objective of minimising the effects caused by the large regulation infrastructures on river ecosystems.

Image: Alfambra River in Teruel
Pictures: Brook trout, chub and Mediterranean barbel

Brook trout, chub and Mediterranean barbel are some of the target native species used in the habitat modelling methods for the achievement of ecological flows.

These methods are based on hydraulic simulation, attached to the use of preference curves of the physical habitat for the target species, obtaining curves that relate the useful potential habitat with the flow in the river sections selected.

These sections were selected by prioritising water bodies with a higher environmental importance or that were located downstream from large dams or important diversions and that may condition the allocations and reserves of resources of the RBMP.

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Brook trout. *Salmo trutta*. Linnaeus, 1758

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Chub. *Squalius pyrenaicus*. Günther, 1868

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Mediterranean barbel. *Luciobarbus guiraonis.* Steindachner, 1866

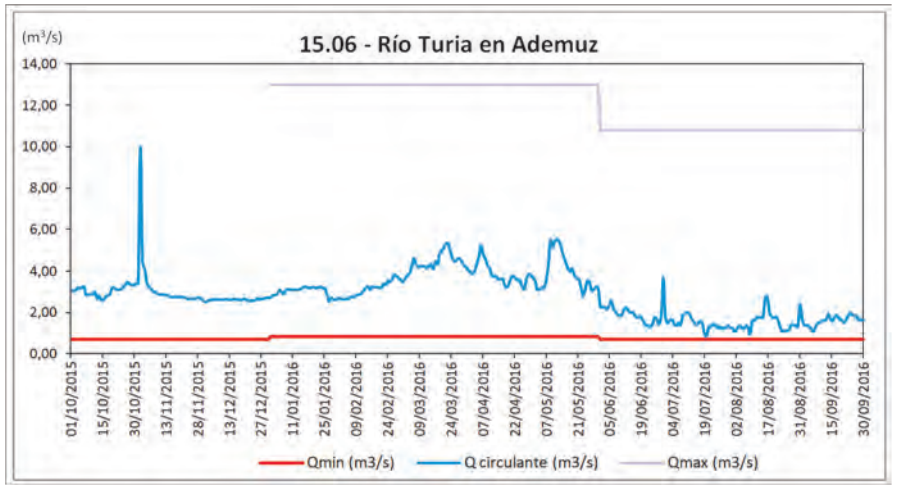
7. ECOLOGICAL FLOWS

Follow-up and compliance with the ecological flow regime

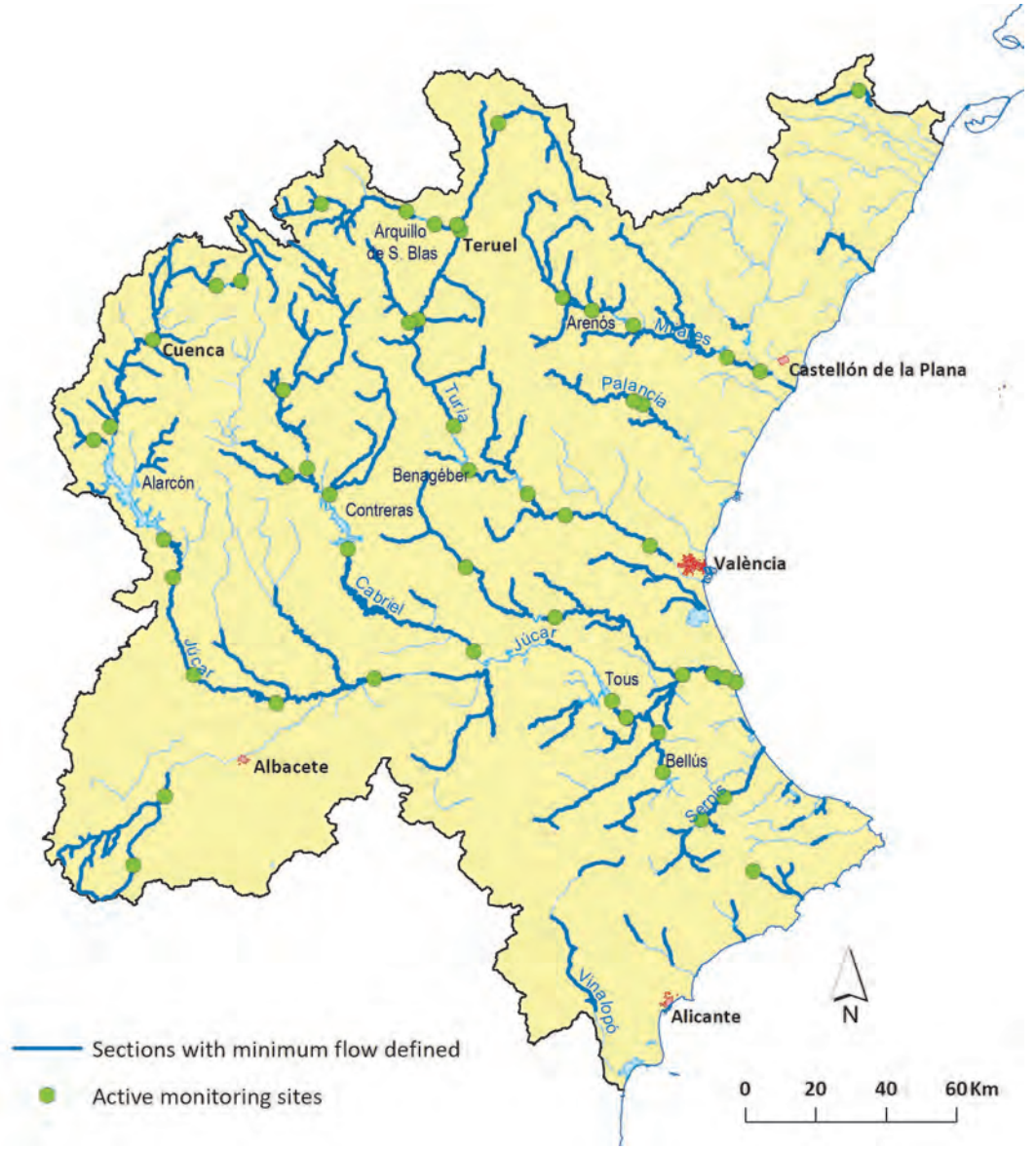
The Hydrological Plan establishes that the follow-up of the flow regime will be conducted by the River Basin Organisation. This follow-up will be conducted, at the very least, at the gauging stations that belong to the Official Gauging Stations Network and to the Automated Hydrological Information System Network. The follow up may also be conducted in the bodies located downstream of a reservoir with the drainage structures of the dam. Additionally, the River Basin Organisation may assess the compliance of the ecological flow regimes by means of specific gauging campaigns or other procedures. In order to be able to conduct the follow-up at the sites that currently lack a gauging station, some specific measures have been included in the Programme of Measures.

In general terms, minimum tides exceeding the natural existing regime at each time should not be enforceable. In addition, water release flows shall ensure the compliance with minimum flow regime at the monitoring sites located downstream from the reservoirs, and minimum water release flows that exceed the contributions to the reservoir in natural regime should not be enforceable.

The chart below shows and example of the follow up of the ecological flow regime in Turia River.



Monitoring and follow-up chart of the ecological flow regime in Turia River in Ademuz



Sections with minimum flow defined and active monitoring sites

Image: Los Frailes gauging station in the Júcar River in Albacete

Nowadays there are 51 monitoring sites of the minimum flow regime, which are located at gauging stations that belong to the Official Gauging Stations Network (OGSN) and to the Automated Hydrological Information System Network (AHIS) or at the drainage structures of the dams.