A LOST DECADE

REPORT ON THE STATE OF THE DOÑANA AQUIFER • JULY 2020

1. INTRODUCTION

On 5 April 2010, WWF Spain filed a formal complaint with the European Commission denouncing the abusive and unsustainable extraction of water in the Doñana area for the intensive cultivation of soft fruits. This activity was seriously damaging the aquifer as well as the protected habitats and species which were the reason this area was included in the Natura 2000 network.

The European Commission initiated infringement proceedings against Spain, which resulted in a reasoned opinion being issued on 28 April, 2016, for the obvious infringement of the Water Framework Directive, the Habitats Directive and the Birds Directive, and which, in view of the alarming situation of both the aquifer and the biodiversity, culminated in action against Spain in the EU Court of Justice in 2019.

The infringement of the Water Framework Directive was due to the drastic drop in groundwater and temporary surface water levels and the poor state of the water due to nitrate pollution from intensive soft fruit farming.

Furthermore, in the course of this decade, WWF has alerted international organisations including UNESCO, IUCN, the Ramsar Convention, the Council of Europe, and the European Union to the degradation of Doñana and the indifference of the central, regional and local authorities which, instead of prosecuting illegal activities, have tolerated them, perpetuating the situation through measures such as the approval of the diversion of water from the Tinto-Odiel-Piedras Basin to the Doñana area, which will only contribute to perpetuating the invasion and the unsustainability of the agricultural model in the vicinity of this Protected Natural Area.

In parallel with these actions, in the international sphere, WWF Spain requested specific measures from the national and Andalusian authorities (InfoDoñana Newsletter No. 89. June 2009: The Report "Environmental flows in the marsh of the National Park of Doñana and its area of influence"), which included:

"In addition, the results of the WWF Report demonstrate the need for the Andalusian Water Agency to officially declare the overexploitation of this aquifer, since only this environmental safeguard will lead to reduced water extraction...
For this reason, the WWF calls on the Guadalquivir River Basin Authority and the Andalusian Water Agency to ensure that the water management plan considers the water needs of Doñana in order to comply with the law. Specifically, the Water Framework Directive (WFD), the Natural Resources Management Plan (NRMP), the Use and Management Master Plan (UMMP), the RAMSAR

Convention, the Doñana Land-Use Management Plan (POTAD), the Water Management Plan, and the Habitats Directive...

- *In the area of groundwater, to provisionally declare the Almonte-Marismas aquifer system at risk of overexploitation and in the process of salinisation, as established in Articles 171 and 244 of the Regulations on the Public Hydraulic Domain (Royal Decree 849/1986 modified by Royal Decree 606/2003).*

- *To prepare a Water Extraction Management Plan for the Almonte-Marismas aquifer system, where:*

  - *The discharges from the aquifer required to maintain the environmental flow of the rivers and streams associated with it are defined (in line with the objective of achieving Good Quantitative Status of groundwater bodies in the terms defined by the Water Framework Directive). These discharge volumes would be comparable to the ecological flows proposed in this report and constitute the only way to ensure the environmental flow, for example, of the Arroyo de la Rocina.*

  - *The discharges necessary to maintain a Good Environmental Status of the wetlands associated with the aquifer are defined (again, in line with the objective of achieving Good Quantitative Status).*

  - *Based on the above values, the maximum water extraction from the aquifer system and the locations of the corresponding points should be defined.*

  - *The rules that define the Plan allow extractions to be regulated according to different management situations (prolonged drought, dry years, wet years, etc.), so that the management can respond to natural variability*

- *To the extent appropriate, to link the future "Special Management Plan of the Irrigation Zones located to the North of the Forest Crown of Doñana" to the extraction areas and volumes designated by the Management Plan for Water Extraction from the Almonte-Marismas aquifer system..."*

As we will analyse below, the measures adopted over the past decade by the authorities have been insufficient and those that are being implemented are slow and have resulted, according to official data, in the progressive deterioration of the Doñana aquifer (officially, MASb 05.51 "Almonte - Marismas"), ***since in 2016 this aquifer was divided into 5 MASb (Almonte, Marismas, Marismas de Doñana, Manto Eólico de Doñana and La Rocina).

2. THE "STRAWBERRY PLAN" AND THE DECLARATION OF "OVEREXPLOITATION" OF THE DOÑANA AQUIFER MAIN ACTIONS IMPLEMENTED.

a) Special Management Plan of the Irrigation Zones located to the North of the Forest Crown of Doñana.

Known colloquially as the "Strawberry Plan", this document was published in the Official Gazette of the Andalusian Government in December 2014, after 7 years of preparation (the agreement to formulate the plan was approved by the Governing Council on 4 December, 2007).

According to the Andalusian government, this plan *"aims to solve the problem of the unplanned irrigation and greenhouse expansion that has occurred in recent decades. This phenomenon has resulted in various environmental problems, including the narrowing of natural corridors and*

the proliferation of infrastructure on farms without considering cost rationalisation and environmental impact."

In the opinion of WWF Spain, the plan is being implemented very slowly and unevenly when considering the necessary recovery of the aquifer and the natural protected areas. For example, no action is yet known to be linked to the provisions of Article 15(1) of the Plan*: "Priority will be given to agricultural soils in Zones B or C that are isolated and surrounded by land belonging to Zone A being reverted to forestry use, and their consequent inclusion within Zone A".*

Nor is there any known progress with respect to the Extraction Management Plan (Articles 33 and 41), the demarcation and boundary marking of the water network (Article 34), the required environmental flow restoration of the river (Article 34), the quality control programme (Article 42), the good practices programme (Article 28), the measures to ensure ecological connectivity (Article 50 et seq.), or the intervention actions for degraded landscapes (Article 64), among other measures provided for in the plan or the programme of complementary measures.

Meanwhile, since the approval of the Special Plan, the area of soft fruit crops in an irregular situation has continued to grow uncontrollably and has increased to 1,653 hectares in 2019, according to the WWF Spain report *"Doñana under plastic: the soft fruit invasion advances"*. Furthermore, there is currently no evidence that a single illegal hectare has been eliminated by the Junta de Andalucía under the "Strawberry Plan".

What we have seen since its approval, however, are statements by political leaders concerning the modification of the plan to grant amnesty to illegal agribusinesses.

b) The acquisition of the "Los Mimbrales" estate (Almonte).

One of the few measures implemented so far that seems to have yielded any effective results has been the elimination of the legal extractions on the Los Mimbrales estate, located in the southern sector of La Rocina Stream, which was in a state of "ALARM" in 2014 and 2015.

Once the cropping finished, after the purchase of the farm, the levels have been steadily increasing since 2016, with the situation changing from "ALARM" to "NORMAL OR STABLE". For WWF, this is the most tangible proof that the closure of illegal wells and the elimination of illegal crops in Doñana would have an immediate and beneficial effect on the aquifer, although this measure will have to be complemented by others such as the introduction of better water-saving techniques on legal farms or effective control of the flows used.

c) The closure of illegal wells.

In the period 2019-2020, the Guadalquivir River Basin Authority has closed 77 illegal wells in Lucena del Puerto and 4 in the area of La Cañada in Almonte. In addition, it has notified to Lucena del Puerto Municipality of a new subsidiary round to close down another 51 illegal wells in this location.

However, these important steps taken by the Guadalquivir River Basin Authority are overshadowed by the existence in the Guadalquivir River Basin District of at least 1,170.6 hectares of irrigated land beyond the soils classified as "irrigable agriculture" by the "Strawberry Plan" and therefore illegal, as reflected in the WWF Spain report *"Doñana under plastic: the soft fruit invasion advances."* Of these 1,170.6 hectares, 552.5 were planted in the period 2015-2019, while the Plan was already in force.

WWF Spain has repeatedly called for preventive measures to be taken against new wells and illegal crops that are detected in order to avoid the problem getting worse and, while they are being closed definitively, they can be exploited with the consequent damage to the aquifer.

d) Three aquifer bodies declared at risk of not achieving good quantitative status.

The Guadalquivir River Basin Authority has been forced to take the most extreme measure that exists in Spanish water legislation regarding an aquifer in poor condition, declaring three of the five Doñana aquifer bodies as being at risk of not achieving good quantitative status - "El Rocío", "Almonte" and "Marismas".

This declaration, called for by the WWF on countless occasions, will allow greater control over the aquifer and, if the appropriate restrictive measures provided for in the regulations are applied, this could start the aquifers down the path to recovery. However, it also highlights the inaction of previous administrations which, despite repeated allegations and scientific evidence, have protected this extremely serious situation without acting, allowing crops to invade the region and wells to proliferate until the current limit situation has been reached where much more water is extracted than is recharged. As we have already explained, this inactivity also prompted the European Commission to take Spain to the EU Court of Justice for its failure to protect Doñana.

Without overlooking the two sectors that are currently in a good state, urgent and more forceful measures must be taken in the immediate surroundings of the Protected Natural Area and its catchment areas in order to restore the aquifer in these zones, which would have a swifter and more significant impact on Doñana. In addition, solutions must be found to the well-known local problems of the "coastal area" and "Doñana lagoons" sectors.

e) The water management plan measures.

Over the past decade, two water management plans have been implemented in the Guadalquivir River Basin District: the Water Management Plan approved by RD 225/2013 corresponding to the 2009-2015 planning cycle and the Guadalquivir River Basin District Water Management Plan, published in Royal Decree 1/2016 of 16 January corresponding to the 2016-2021 water management cycle.

These plans included measures that, in theory, would allow the poor state of the Doñana aquifer to be reversed, as asserted in the reports on the state of the aquifer that the Guadalquivir River Basin Authority presents each year to the Doñana Participation Council.

However, a reading of the reports from 2011 to 2019 reveals a different reality: the measures are simply transferred from report to report and the final conclusion is that the next plan will be the one that finally manages to solve the problem of water resource overexploitation in the aquifer (as shown in Table 1), essentially by implementing the measures included in the previous one, complemented by some new ones in the case of the report for the hydrological year 2018/2019: transferring water from the Tinto, Odiel and Piedras District; increasing the number of River Guards; supporting remote control and remote sensing techniques to ensure compliance with water use titles and rights; reviewing and comparing water use rights with existing uses; making significant investments in hydrogeological research; and improving the monitoring network in the most poorly covered areas.

There are several possible reasons for this:

1) they have not implemented the necessary measures even though they are scheduled in the Water Management Plan;
2) they have not been applied with the intensity required to solve the problems;
3) they have been applied, but are insufficient;

4) they missed their target;
5) or a combination of several of these factors.

In any case, the conclusion is the same, as the Guadalquivir River Basin District recognises in its reports and with the declaration that three of the five bodies of the Doñana aquifer are at *risk of not achieving a good quantitative status*, the aquifer is in a borderline situation and its survival is in great danger.

Table 1. ***Conclusions of the reports by the Guadalquivir River Basin Authority to the Participation Council on the state of the aquifer and the implementation of the Basin Plans*.**

2011/2012 Report	2013/2014 Report	2016/2017 Report	2018/2019 Report
"*By analysing the series of piezometric data, it can be seen that the decreases in piezometric levels are concentrated in certain areas subject to intense pressure and which, if maintained, could compromise the good status of the groundwater body and the terrestrial ecosystems that depend on it... Applying the new Water Management Plan for the District will make it possible to reverse this situation*... (This refers to the Water Management Plan approved by RD 225/2013 corresponding to the 2009-2015 planning cycle).	*"This analysis allows us to confirm that, if maintained, the current degree and mode of groundwater resource exploitation in a significant portion of the MAsb would compromise the good status of the groundwater body and the terrestrial ecosystems that depend on it... Applying the measures included in the District's Water Management Plan, published in Royal Decree 355/2013 of 17 May, may reverse this situation..."*	"*This analysis allows us to affirm that the current degree and mode of groundwater resource exploitation of the dendritic*** aquifer, if maintained, would ***compromise its good status*** as well as that of the terrestrial ecosystems that depend on it, which is reflected in the fact that three of the five MAsb comprising the system have not attained a good quantitative status... Implementing the Guadalquivir District's Water Management Plan, published in Royal Decree 1/2016 of 16 January, may reverse this situation...".*	"*This analysis allows us to affirm that the current degree and mode of exploitation of the groundwater resources in areas of the detritic aquifer, if maintained, would compromise its good condition and that of the terrestrial ecosystems that depend on it, which is reflected in the fact that three of the five MAsb comprising the aquifer system have not attained good quantitative status,* ***nor are they expected to do so by the time the Water Management Plan comes into effect, scheduled for January 1, 2022****..."*

Note. Sources: Guadalquivir River Basin District Reports 2011/2012, 2013/2014, 2016/2017 and 2018/2019

3. COMPARISON OF THE QUANTITATIVE STATUS INDEX (QSi) IN THE 16 SECTORS OF THE DOÑANA AQUIFER

Traditionally, the Doñana aquifer has been divided into 16 sectors for study: South of La Rocina Stream, Vera-Retuerta Ecotone, South of Villamanrique (confined), La Rocina Stream, Abalario, Coastal Area, Doñana Lagoons, Marismas, North of La Rocina Stream, Northern Area, South of Villamanrique (unconfined), North of El Rocío, North of La Rocina Headwaters, South of La Rocina Headwaters, Northern Ecotone and Intermediate Sector of El Rocío-South of Villamanrique.

To determine the quantitative status of these areas, the so-called "quantitative status index" (QSi) is used, which has a value of between 1 and 0. This index compares data from the same month of the year. In this case, the driest period of *low water* is used as a reference month, which for Doñana is "*between May and September as representative of low water, in order to locate the real minimum in the*

areas with maximum extraction in spring", as explained by the Guadalquivir River Basin Authority in its annual reports. The value 1 corresponds to the value of minimum water depth, 0.5 to the arithmetic measurement of the values and 0 to the value of maximum water depth.

The classification of the "quantitative state index" (QSi) is as follows:

QSi = 1 Maximum historical level
0.5 < QSi < 1 Normal or stable situation
0.3 < QSi <0.5 Pre-alert situation
0.15 < QSi < 0.3 Alert situation
0 < QSi 0.15 Alarm situation
QSi = 0 Minimum historical level

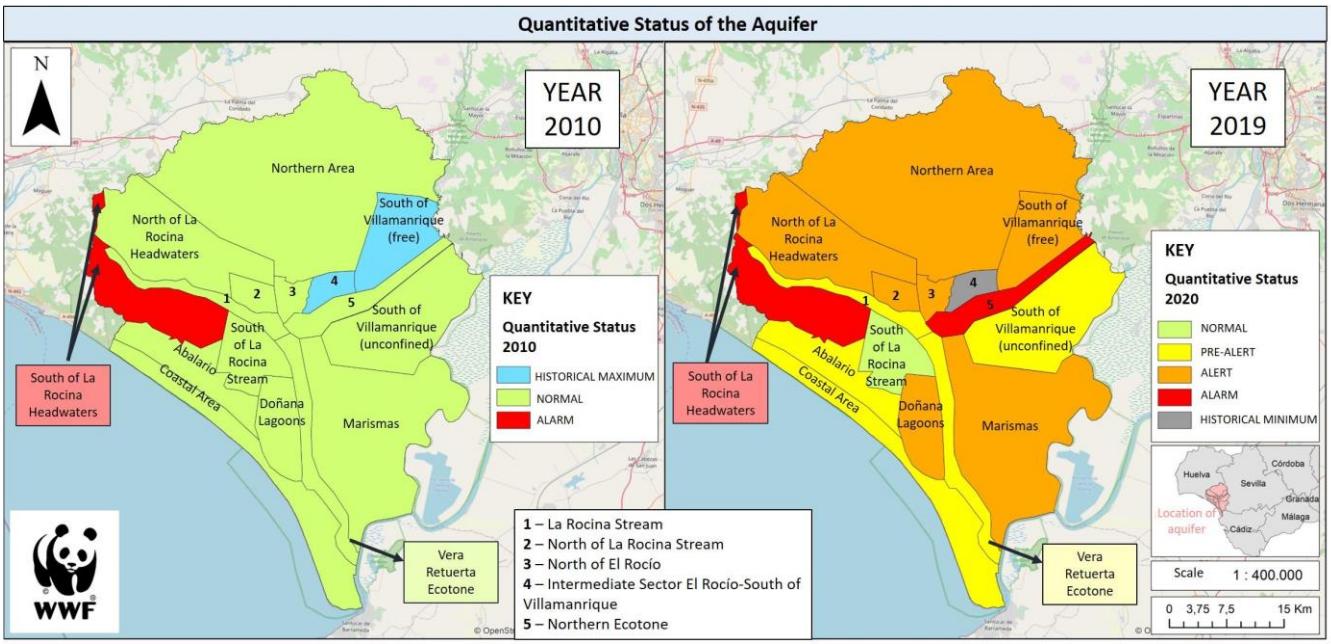
According to the data offered by the Guadalquivir River Basin District in Annex I of the "State of the Aquifers in the Doñana Environment 2018-2019 Report", the QSi for the 16 sectors of the aquifer in the years 2010 and 2019 and the district's evaluation are as shown in Table 2:

Table 2. ***State of the "QSi" for the Doñana aquifer in 2010 and 2019 and an evaluation of this*.**

Sector	QSi Situation 2010	QSi Situation 2019	Evaluation of QSi situation 2010-2019
South of Villamanrique (unconfined)	Historical maximum	Alert	
Intermediate Sector of El Rocío-South of Villamanrique	Historical maximum	Historical minimum	
South of La Rocina Stream	Normal	Normal	
La Rocina Stream	Normal	Pre-alert	
South of Villamanrique (confined)	Normal	Pre-alert	
Abalario	Normal	Pre-alert	
Vera-Retuerta Ecotone	Normal	Pre-alert	
Coastal Area	Normal	Pre-alert	
Northern Area	Normal	Alert	
North of La Rocina Headwaters	Normal	Alert	
North of La Rocina Stream	Normal	Alert	
North of El Rocío	Normal	Alert	
Doñana Lagoons	Normal	Alert	
Marismas	Normal	Alert	
Northern Ecotone	Normal	Alarm	
South of La Rocina Headwaters	Alarm	Alarm	

Improves or maintains the situation Worsens the situation

Figure 1. ***State of the "QSi" for the Doñana aquifer in 2010 and 2019 and an evaluation of this*****.**



As can be seen, of the 16 sectors analysed, only one has maintained or improved its situation with respect to 2010, the South of La Rocina Stream sector, which is precisely where the Mimbrales estate is located, which was purchased by the Guadalquivir River Basin Authority and from which the crops were removed in 2016.

In the rest of the aquifer there are some very serious scenarios, for example, in the North of La Rocina Stream sector in 6 of the past 10 years, the QSi has been less than 0.30 (Alert). The South of Villamanrique sector has experienced a sustained decrease this decade, reaching between 2 and 7 metres, depending on the area, with some peaks of up to 20 metres. The North of El Rocío sector has been in a state of alarm since 2012, never recovering its 2010 levels, while the South of La Rocina sector has had alarm status throughout the decade. The North of Rocina Headwaters and Northern Area sector has been progressively worsening since 2011, going from stable to alert.

Finally, it should be noted that in the Intermediate El Rocío-South Villamanrique sector the situation has changed from the highest historical level in a decade since data became available to the lowest historical level, with continuous worsening of the QSi which, according to the Guadalquivir River Basin Authority, "is interpreted as being *little influenced by natural cycles (wet and dry periods), suggesting unnatural or anthropic causes*".

4. CONCLUSIONS AND PROPOSALS

According to the data collected in the "Report on the State of the Aquifers in the Doñana Environment 2018-2019", **during the period 2010-2019 the aquifer has not recovered, in fact, each year its quantitative state worsens** despite the fact that the authorities have announced various measures, drawn up a management plan ("Strawberry Plan") and developed two water management plans. **This shows that the current water exploitation regime of the Doñana aquifer is totally unsustainable and leading to the ecological collapse of Doñana.**

In fact, the overall situation of the aquifer for the hydrological year 2018-2019 is worse than that for the period 2017-2018 according to data from the Guadalquivir River Basin Authority.

The system will not achieve a good quantitative status by the completion date of the current Guadalquivir Water Management Plan, a fact which has forced the Guadalquivir River Basin Authority to defer the aquifer recovery horizon to 2027, as part of the next plan.

In this regard, we should recall that the administration has been forced to declare three of the five MAsb comprising the aquifer system as not having a good quantitative status, **nor is it expected that they will be able to achieve this by the time the Water Plan comes into force, which is scheduled for 1 January, 2022**.

For all these reasons, WWF is calling for the urgent implementation of the following measures:

1. Absolutely no modifications must be made to the Special Plan for the Management of the Doñana Forest Crown as demanded by the illegal agribusinesses with the public support of some political parties.

2. **The measures included in the Special Management Plan** for the irrigated areas located to the north of the Doñana forest crown **should be implemented urgently**.

3. **Development of a Special Land Management Plan** beyond the scope of the Doñana Forest Crown Plan.

4. **Urgent application of the measures provided for in the Water Law for Overexploited Water Bodies** at risk of not attaining a good quality status.

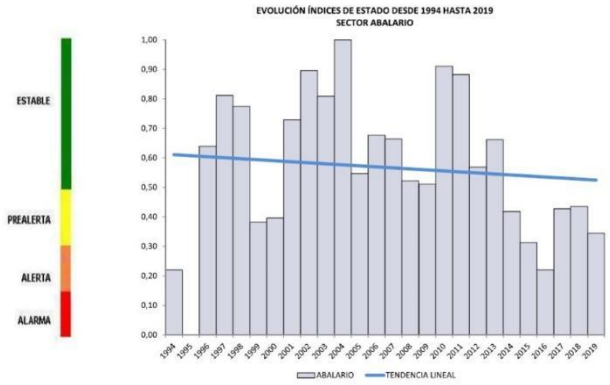
5. Preventive measures should be implemented to **prevent further illegal extraction** from the aquifer and illegal occupation of public space for cultivation purposes.

6. Compliance with the commitment to **approve and implement an annual plan of extractions from the aquifer** that, based on updated information, adjusts public and private allocations to the actual availability of water and limits its use, so as to comply with the water contribution regime required by the ecosystems.

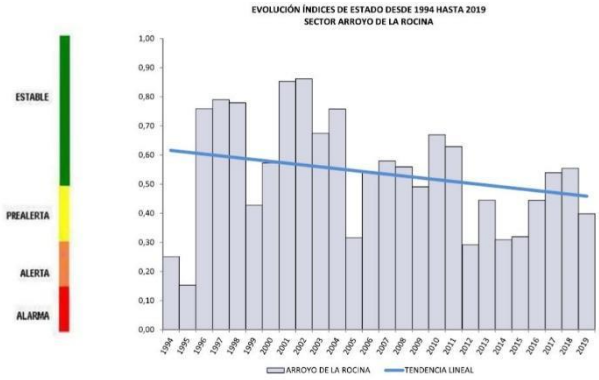
7. **Closure of illegal farms**. As an emergency measure, the Department of Agriculture of the Andalusian Government must be urged to immediately begin closing illegal farms and halt the use of infrastructure with no permits (extraction from watercourses, ponds, etc.), with the appropriate disciplinary or criminal proceedings being initiated, accordingly.

8. Before undertaking a transfer that WWF considers a waste of public money, perpetuating the problem of unsustainable water use in the Doñana area, and which may generate a "pull effect", **it is necessary to comply with the provisions of the legislation**: controlling water use; revising water rights; improving remote sensing techniques; implementing water-saving measures; and, of course, eliminating illegal farms and wells.

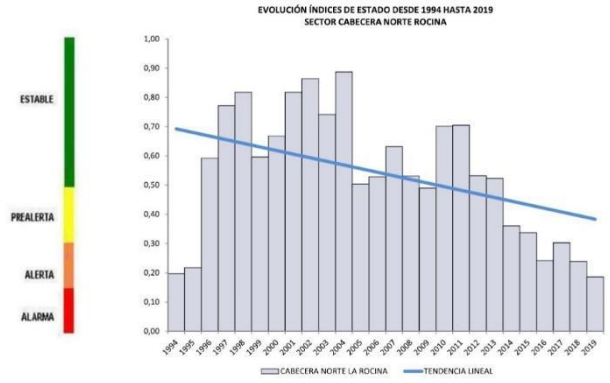
Annex: QSi trend for the period 1994-2019 in the 16 sectors of the Doñana aquifer



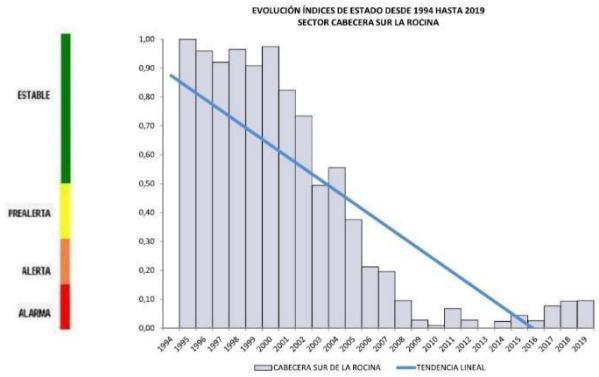
Abalario



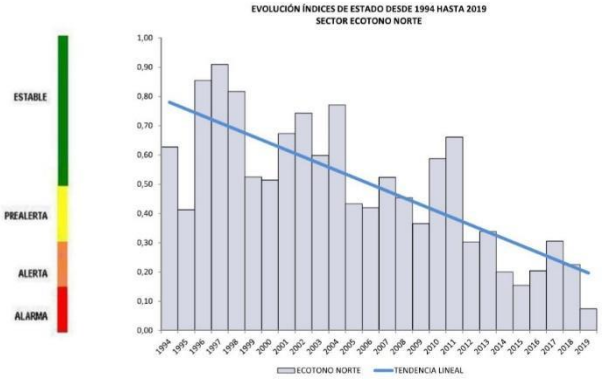
La Rocina Stream



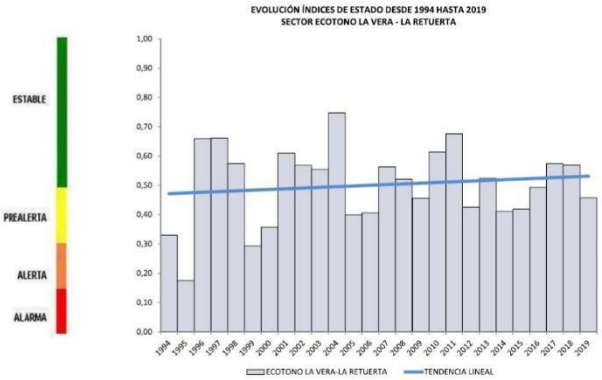
North of La Rocina Headwaters



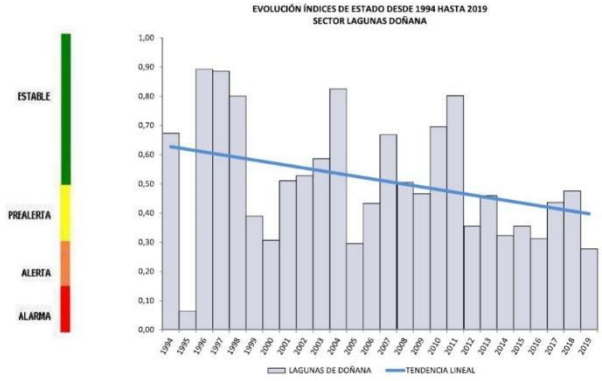
South of La Rocina Headwaters



Northern Ecotone

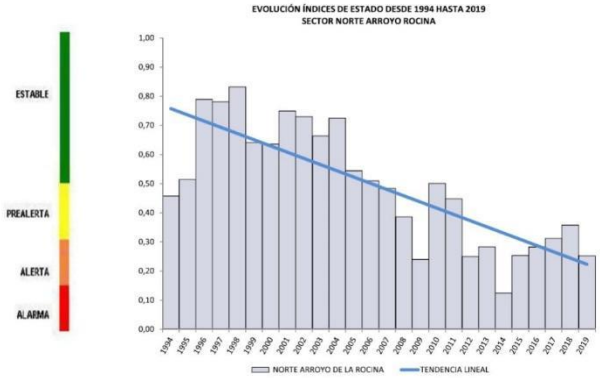


Vera-Retuerta Ecotone

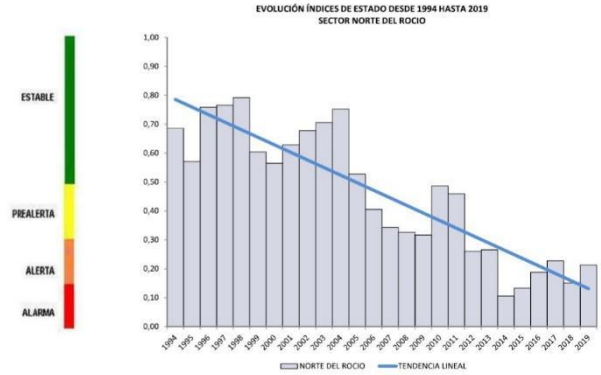


Doñana Lagoons

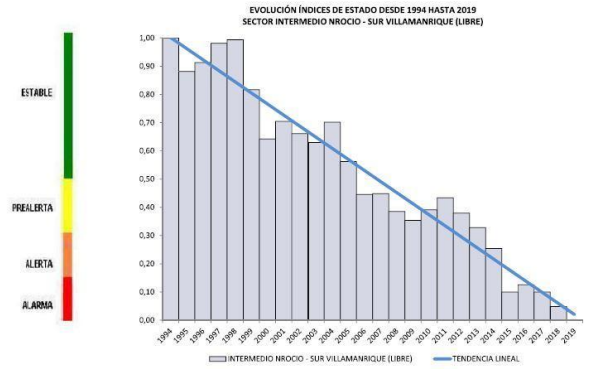
Marismas



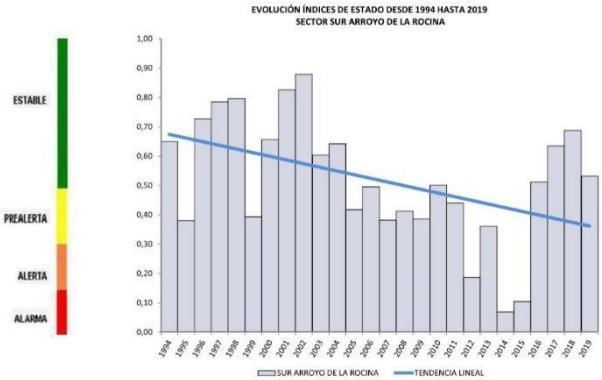
North of La Rocina Stream



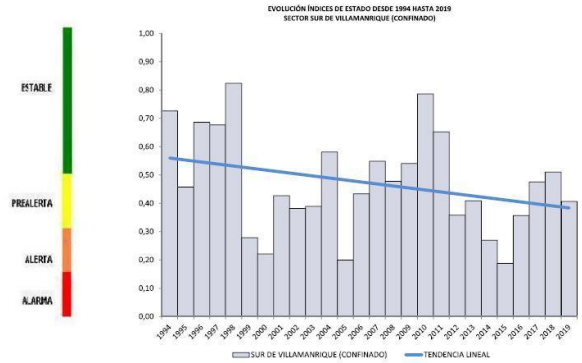
North of El Rocío



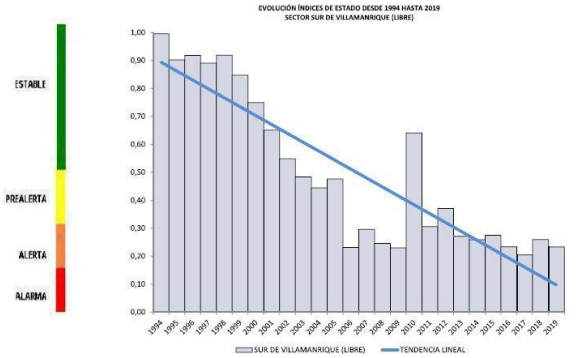
Intermediate sector North of El Rocío-South of Villamanrique



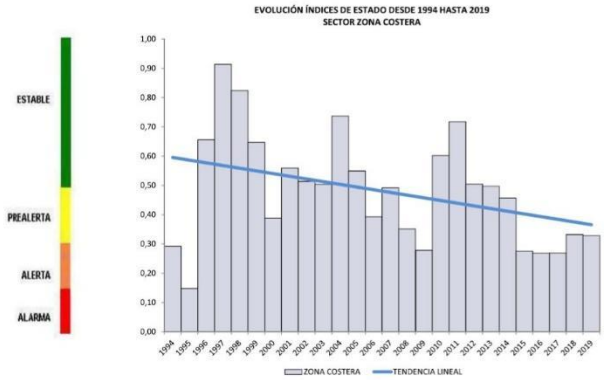
South of La Rocina Stream



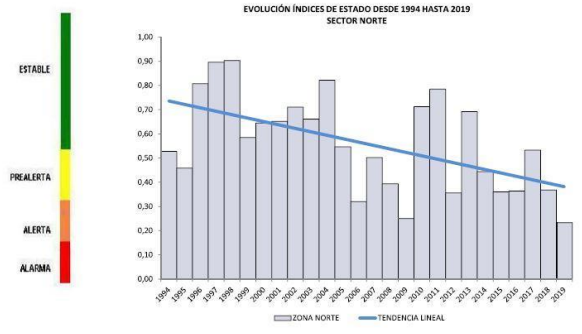
South of Villamanrique (confined)



South of Villamanrique (unconfined)



Coastal Area



Northern Zone

WWF Spain

Water Programme

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