

FRESHWATER ECOLOGICAL STATUS AND CONSERVATION VALUE OF A LARGE MEDITERRANEAN RIVER BASIN BASED ON FISH AND AQUATIC INSECTS

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1. INTRODUCTION

There is now a growing need for sensitive biological measures of aquatic ecosystem integrity as demonstrated in Europe with the implementation of the Water Framework Directive (WFD). The present status of European rivers must be based on four biotic elements, of which two are fish and aquatic insects.



240 sites were sampled for fish and aquatic insects on spring 2008 throughout the Guadalquivir river basin (SW Spain).

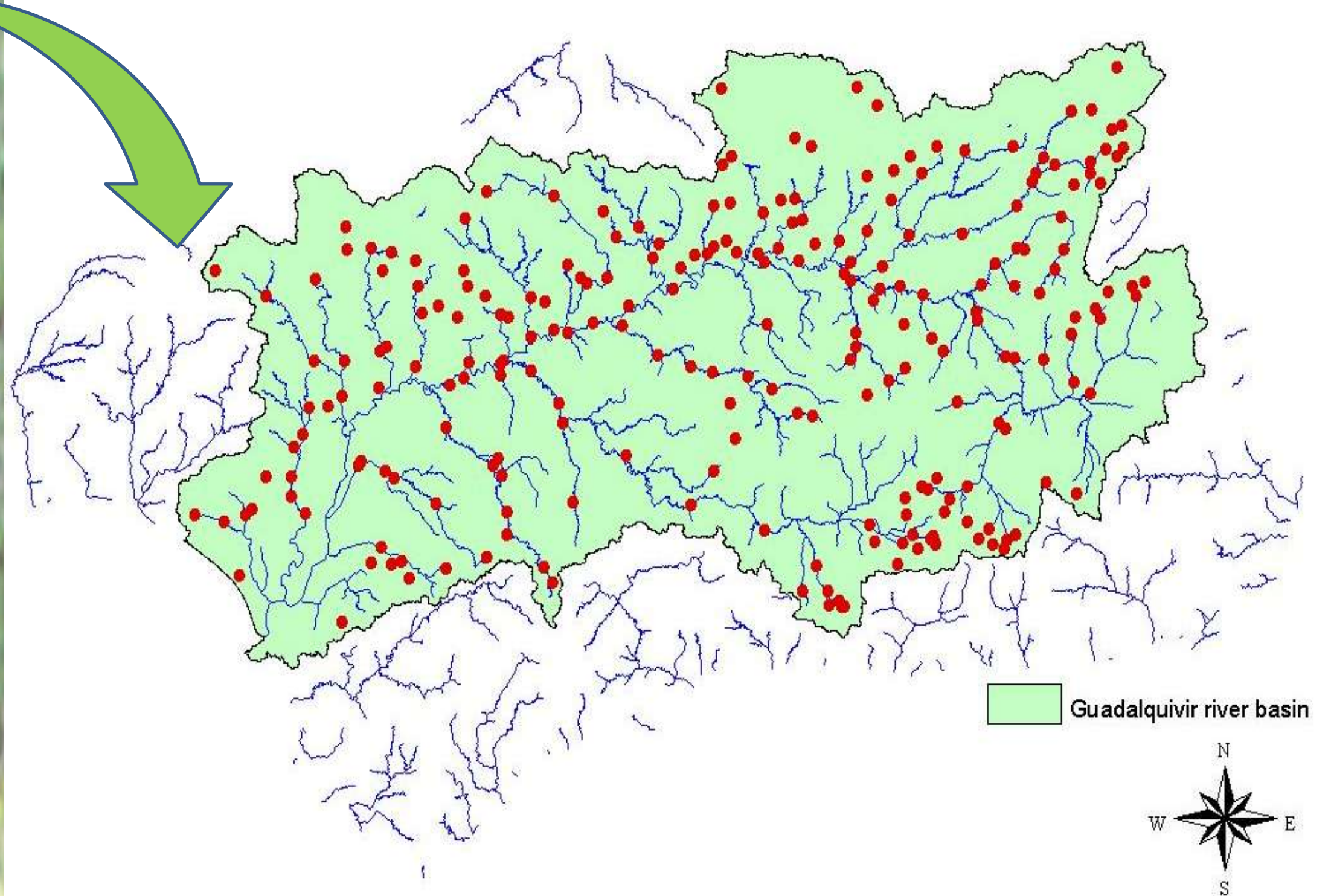
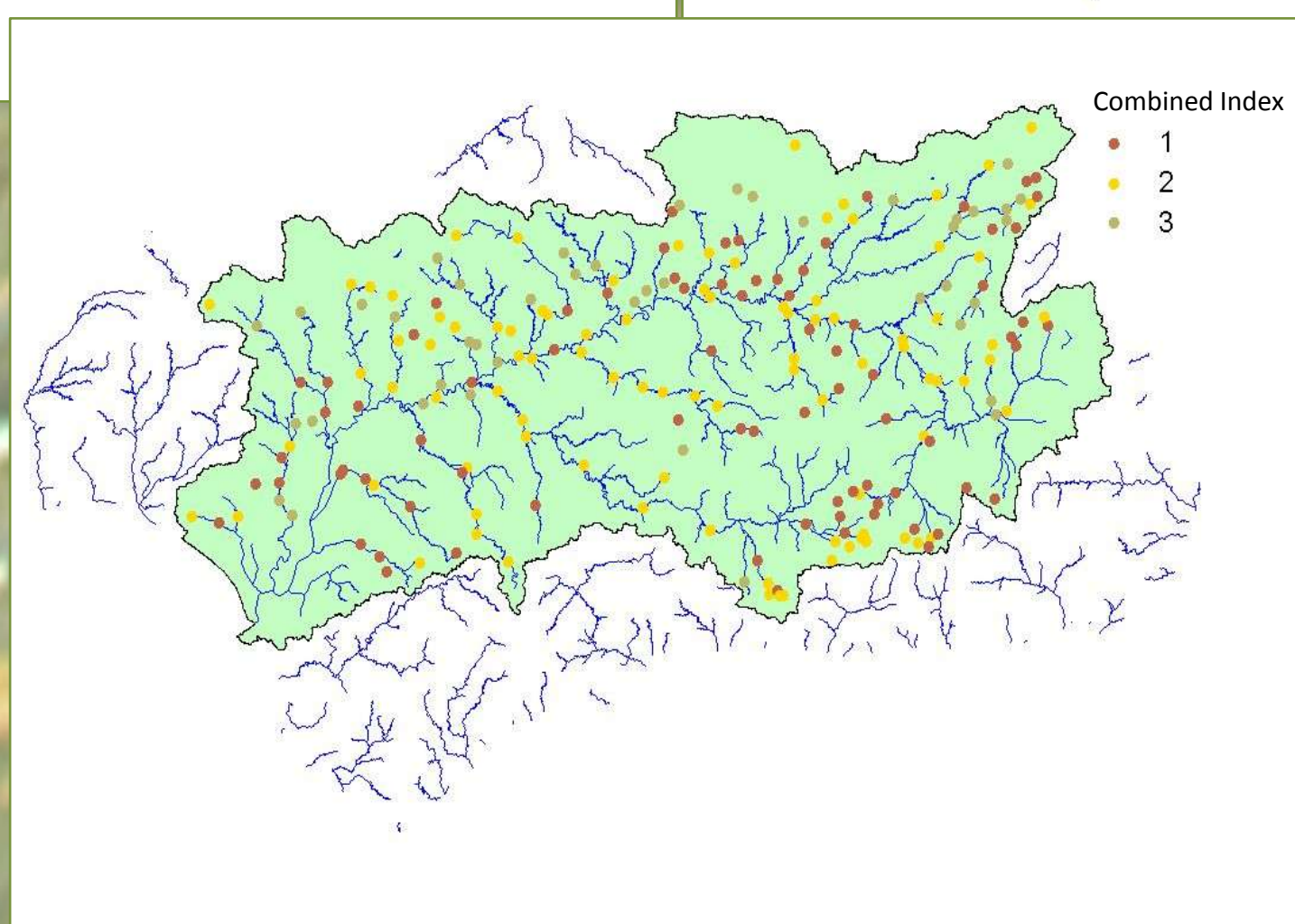
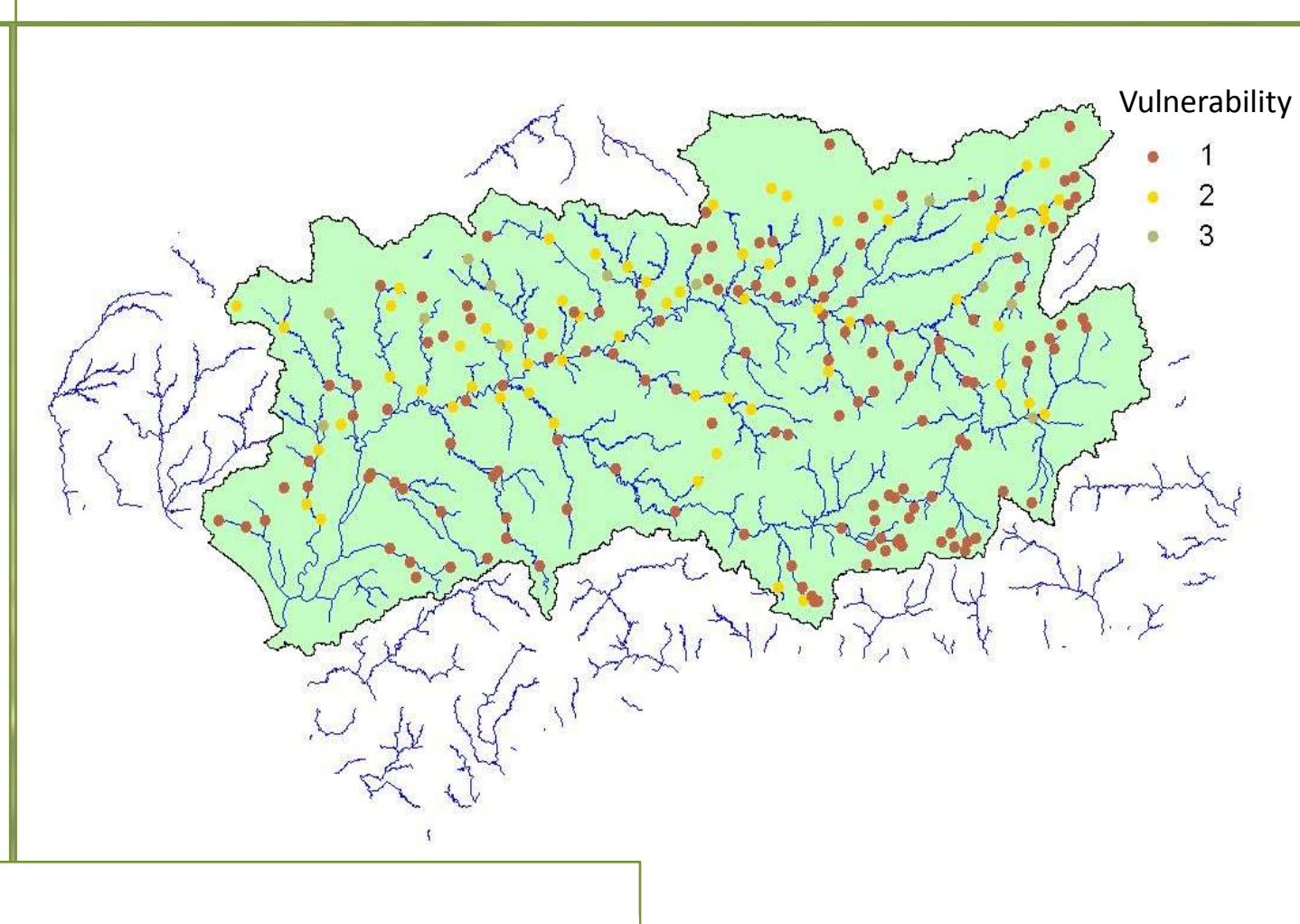
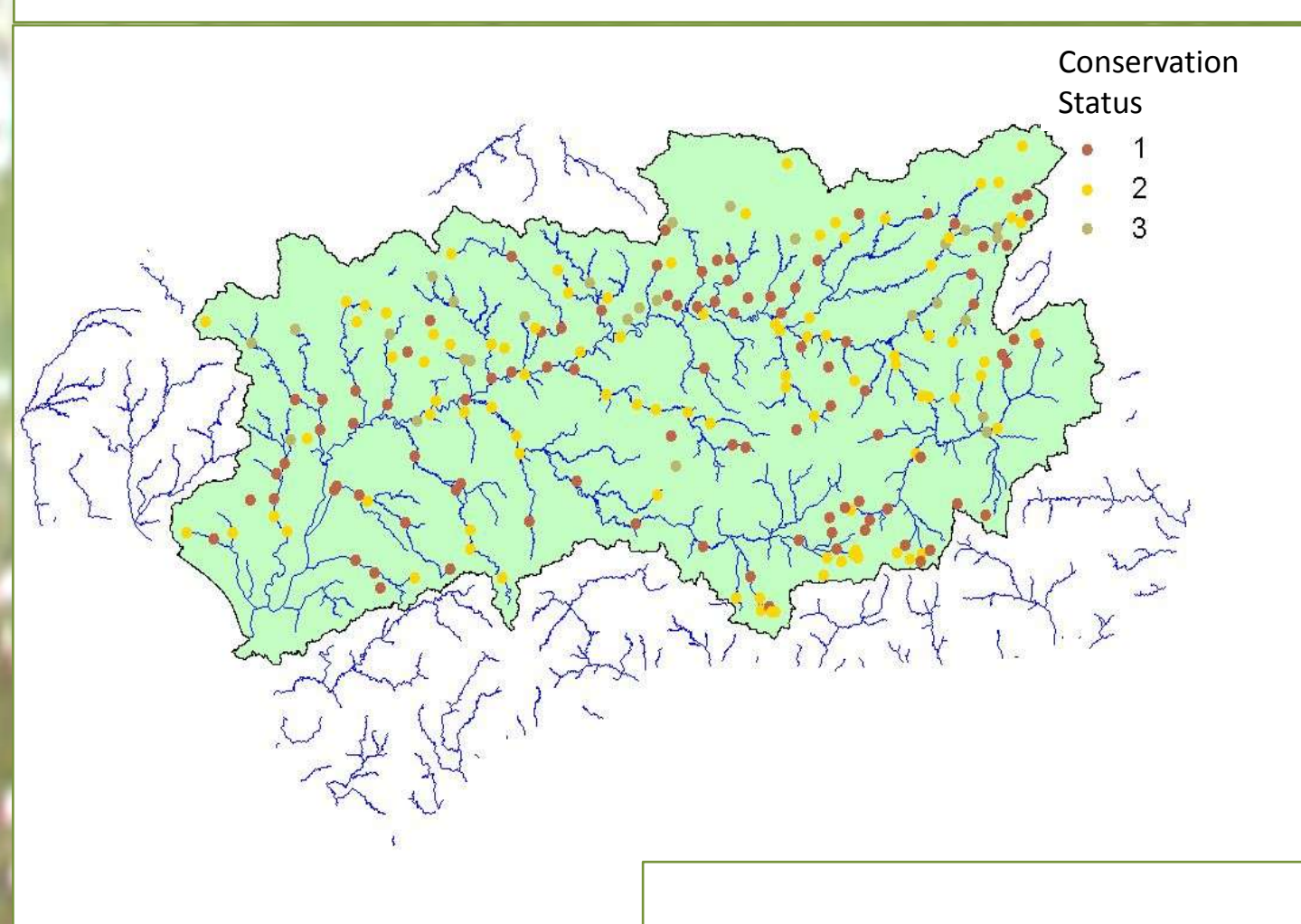
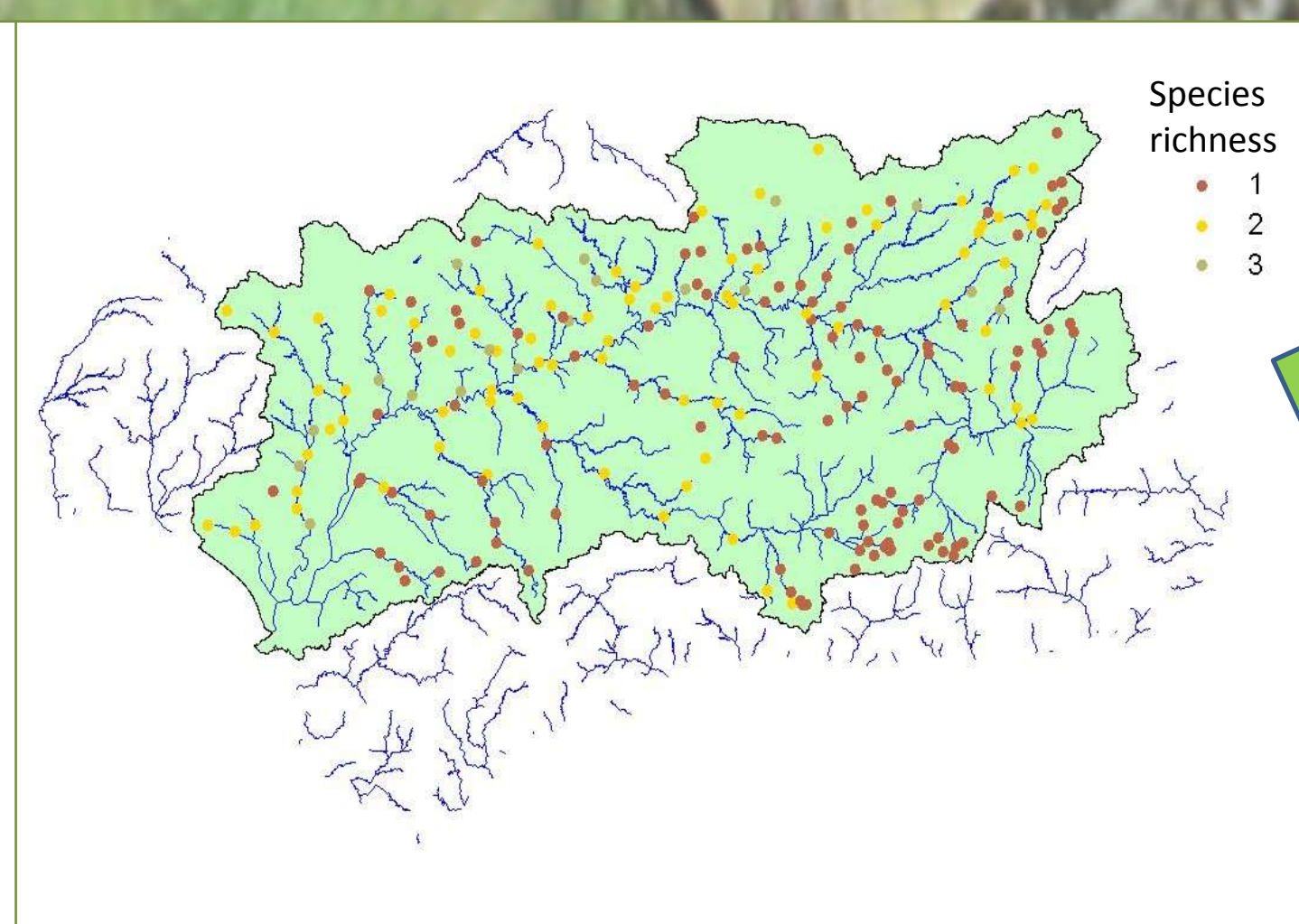
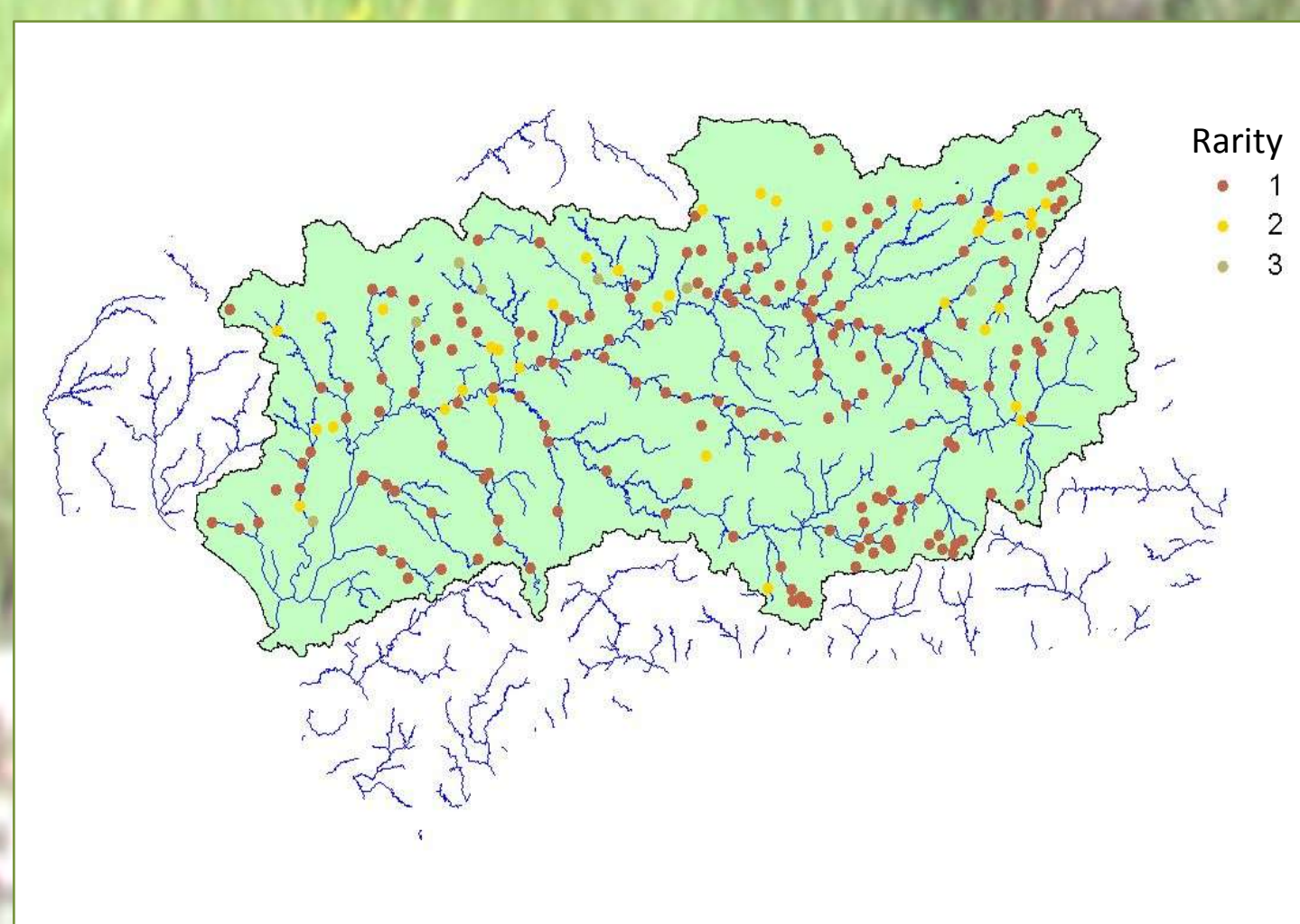
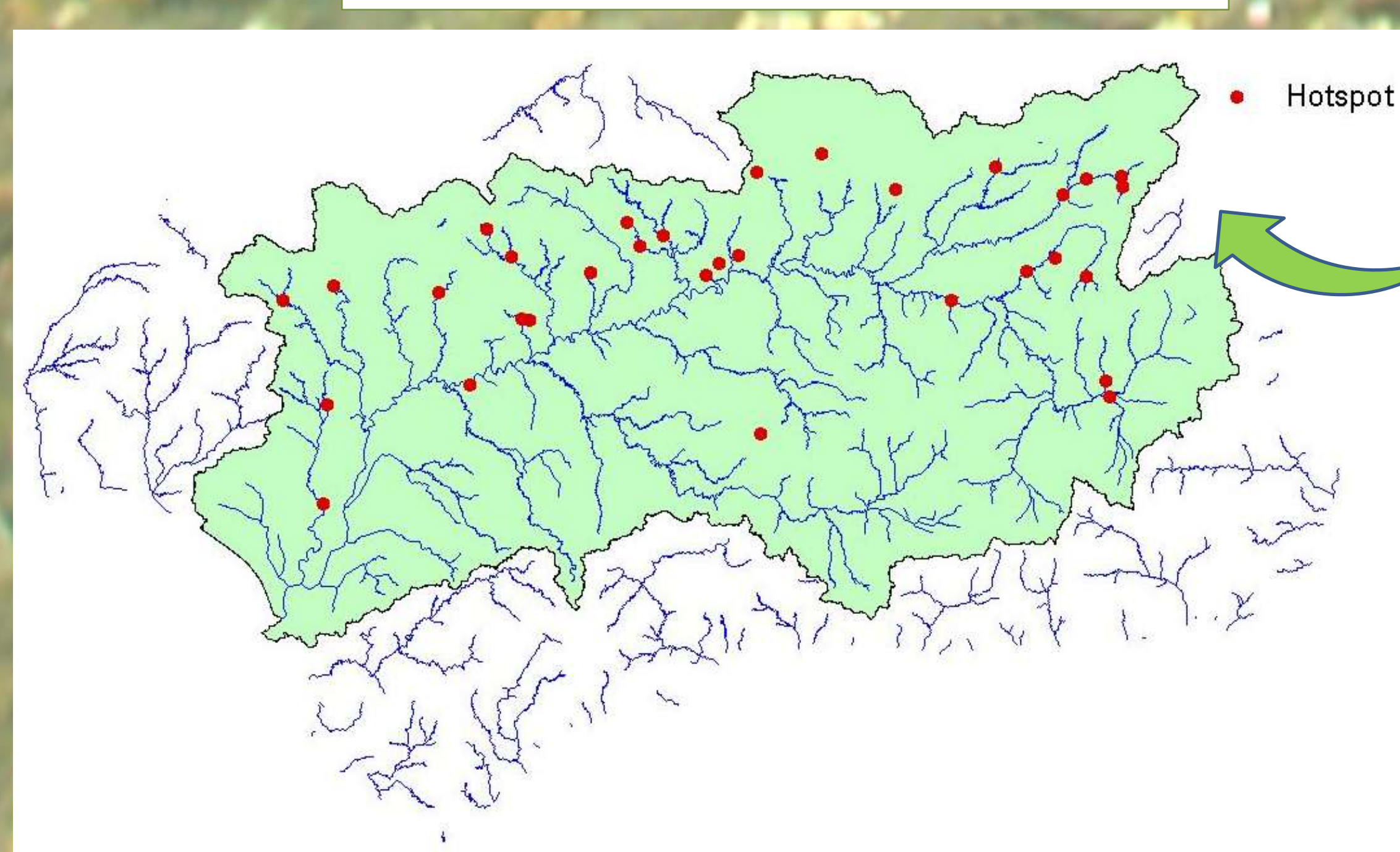


Fig.3) Sites of high Conservation Value		
INDEX		SCORES
Species richness	Number of species present in each site	0-1:1;2-4:2;4-6:3
Rarity	Sum of the abundance classes of the species present in each site	<5%:10; 5-25%:5; 25-50%:0
Vulnerability	Categories of Red Book of Spanish Vertebrates	NO EVALUATED (NE):0;LOWER RISK (LR):1; VULNERABLE(VU):2;ENDANGERED(EN):3;
Conservation status	Conservation value inspired by Conservation Values of Doadrio <i>et al</i> (1991)	EXOTIC Cyprinids and small size species : -1 Depredator species <30 cm:-2 Depredator species > 30 cm: -3 NATIVE: EN:3; VU:2; LR:1
Combined Index	Sum of the values for each criteria.	-6-0:1; 1-11:2; >14:3



We have considered areas of high-value diversity those cells within the upper 15% of ranked values for the various criteria



2. OBJETIVE

To Examine the relationships between ecological status and community conservation status of rivers to assess if tools derived from the WFD are adequate to guarantee the protection of aquatic biodiversity.

3. DATA ANALYSIS

Data fish were collected using electric fishing or fyke nets. The fish community conservation status was assessed using native individuals proportion (Fig.1) and an Iberian Monitoring Working Party index (IBMWP)(Fig.2) was calculated for aquatic insects according to WFD. On the other hand, areas of high conservation value were calculated (HOTSPOT) using five criteria (Fig.3).

Fig.1a)

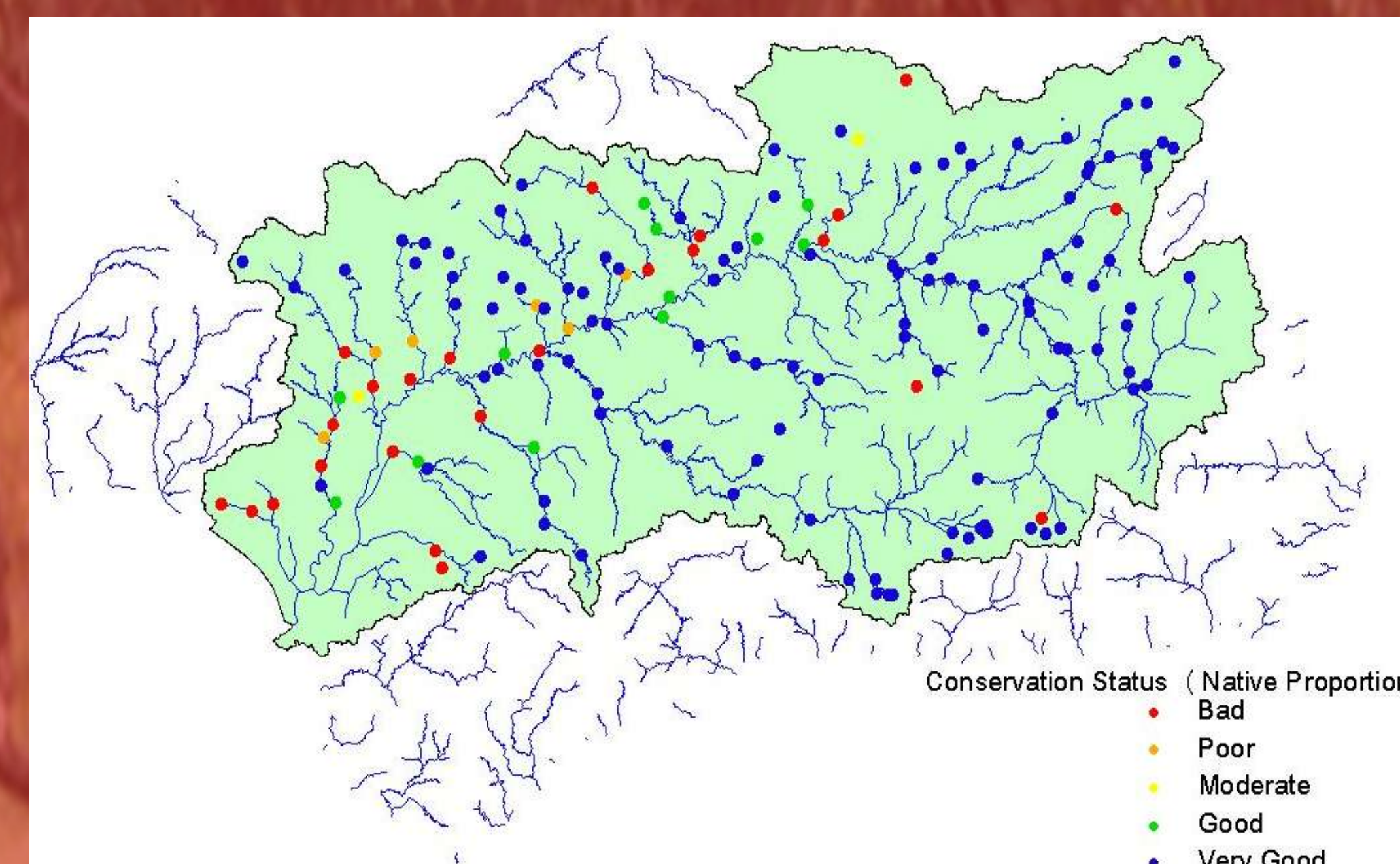
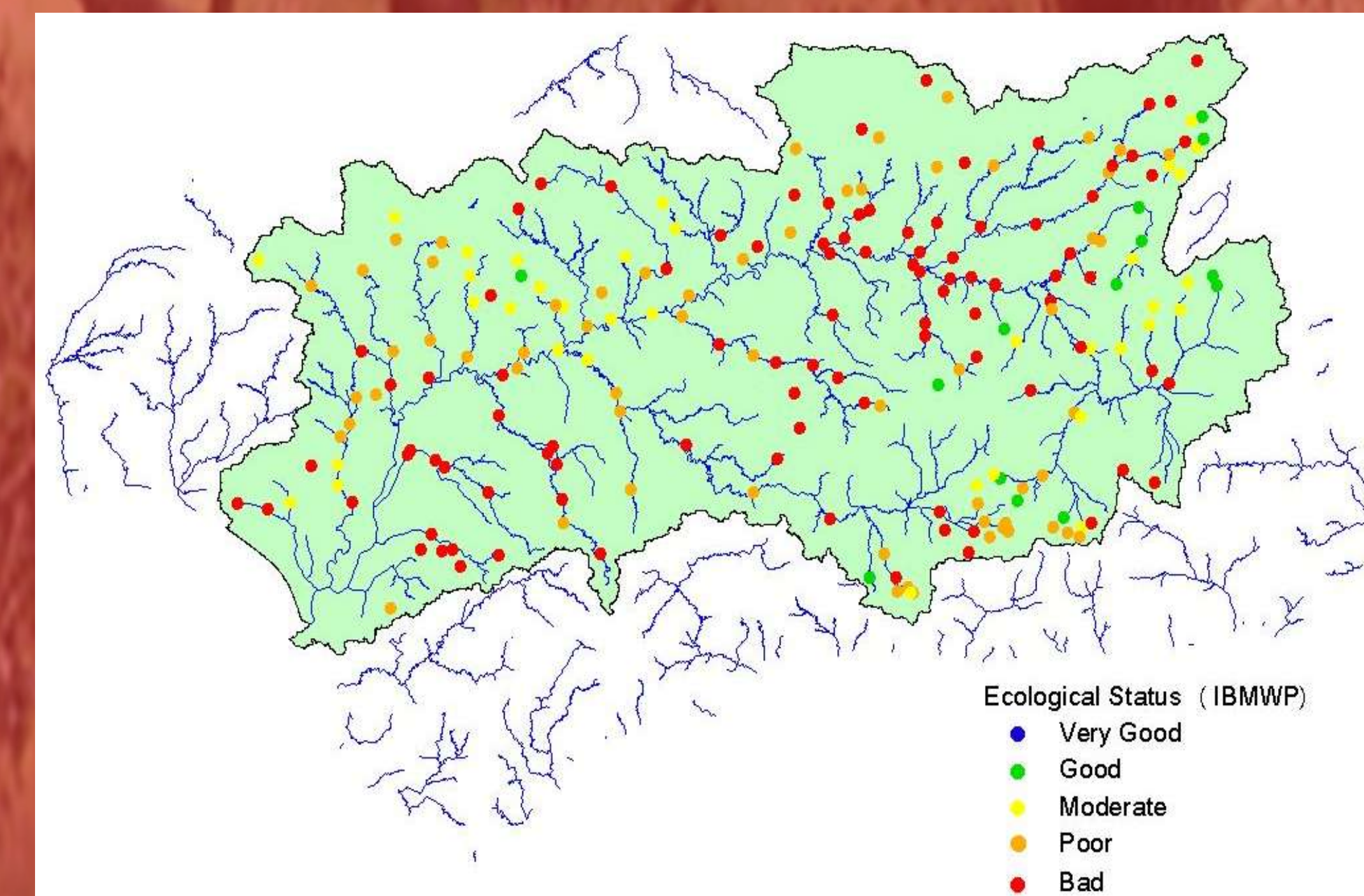


Fig.2a)



We examined the relationships between five criteria by Spearman correlations (n=216, p-level =0.000000)

		Spearman	t(N-2)
RAR	& RIQ	0,725417	15,41737
RAR	& VUL	0,939714	40,20004
RAR	& VC	0,824473	21,31293
RAR	& I.COMB	0,932172	37,66827
RIQ	& VUL	0,850356	23,64020
RIQ	& VC	0,471850	7,82890
RIQ	& I.COMB	0,662512	12,93864
VUL	& VC	0,829730	21,74611
VUL	& I.COMB	0,950033	44,52267
VC	& RIQ	0,471850	7,82890
VC	& I.COMB	0,933396	38,05065

The combined index of biodiversity was significantly correlated with the other four criteria

4. RESULTS

- Hotspots don't coincide with sites of highest ecological status by IBMWP.
- Hotspots coincide with sites of high community conservation status by native individuals proportion but this index includes more sites (32 hotspot and 112 sites with very good conservation status)
- Only 15.6% of hotspots are in natural protected areas .
- Using the combined index of biodiversity had the best performance, capturing over 37.5% of the species

5. DISCUSSION

- Tools derived from the WFD aren't adequate to guarantee the protection of aquatic biodiversity because don't coincide with sites of highest aquatic diversity. Consequently , the inclusion of hotpost in the studies of freshwater conservation status result necessary.
- Natural protected areas occupy only a fraction of areas of high-value diversity. All natural protected areas must be surveyed in order to strengthen nature conservation.