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## Information Sheet on Ramsar Wetlands (RIS)

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Designation date Site Reference Number

2. Date this sheet was completed/updated: 1 October 2002

3. Country: France

4. Name of the Ramsar site: Drugeon Basin

5. Map of site included:

(a) hard copy: yes  -or- no

(b) digital format: yes  -or- no

6. Geographical coordinates: 6° 10' East longitude - 46° 50' North latitude

7. General location:

The Drugeon Basin is located on secondary plateaux of the Jura massif in the Franche-Comté region, mostly in the southern part of the department of Doubs. It covers about 40 kilometres from the plain of Pontarlier (sub-prefecture and chef-lieu of the canton—19,000 inhabitants) up to the department of Jura. There are 6356 inhabitants in 12 communes, which are grouped in three cantons: Levier, Mouthe and Pontarlier.

8. Elevation: Between 809 metres and 1000 metres

9. Area: 6445 hectares (Natura 2000 site)

10. Overview: Located on the secondary plateaux of the Jura massif in the southern part of the department of Doubs, the basin of the Drugeon forms a peaty complex of very great ecological importance. Of post-glacial origin, this relatively high wetland is composed of about thirty different natural habitats, including dry meadows, alkaline fen, active or wooded bogs, ponds and lakes, which give it a rich flora (49 protected

species) and outstanding fauna (142 protected invertebrates and 9 protected vertebrates). This variety of natural habitats, flora and fauna, especially birds, justifies classifying the Drugeon Basin as a Natura 2000 site of European importance under the E.U. Directives on Habitats and Wild Birds.

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#### **11. Ramsar Criteria:** Criteria 2 and 3

Criterion 2 best characterizes the site.

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#### **12. Justification for the application of each Criterion listed in 11 above:**

Criterion 2: This wetland can be considered of international importance because it provides habitat for a large number of vulnerable species and endangered ecological communities. The biogeographic reference used for this criterion is that of the European Commission and, therefore, the habitats and species listed in the Directives on Habitats and Wild Birds:

**Vulnerable or endangered habitats:** Wet habitats listed in the E.U. Directive on Habitats (bold indicates priority habitats): aquatic vegetation in water courses (3260), hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp. (3140), hydrophilous tall herb fringe communities (6430), *Molinia* meadows (6410), **active raised bogs** (7110), depressions on peat substrata (7150), transition mires and quaking bogs (7140), bogs with *Sphagnum* (91D4), wooded bogs with *Pinus uncinata* (91D3), birch forests of with *Sphagnum* (91D1) and alluvial woods with alder and ash (91E0). The Vallée du Drugeon is also the largest group of bog complexes in France in the continental biogeographic zone as defined by the European Commission (980 hectares of bog habitat of community importance).

Vulnerable or endangered flora: Plant species listed on the E.U. Directive on Habitats: saxifrage œil de bouc (*Saxifraga hirculus*), liparis de loesel (*Liparis loeselii*), and hypne brillante (*Hamatocaulis vernicosus*). The site of the Vallée du Drugeon provides habitat for the last population in France of saxifrage œil de bouc. The following species figure in the Red Book of Endangered Species in France: bouleau nain (*Betula nana*), calmagrostide négligé (*Calmagrostis stricta*), laïche en touffe (*Carex cespitosa*), laïche à long rhizome (*Carex chordorrhiza*), laïche des marais (*Carex heleonastes*), potamot allongé (*Potamogeton praelongus*) and utriculaire jaunâtre (*Utricularia ochroleuca*).

**Vulnerable or endangered fauna:** Species listed in the E.U. Directives on Habitats and Wild Birds.

Nesting species directly linked to the wetland

Species	Legal status	Red list in France
Mute swan ( <i>Cygnus olor</i> )	N, DO2, BE3	Rare
Marsh hawk ( <i>Circus cyaneus</i> )	N, DO1, BE2	To be watched
Water rail ( <i>Rallus aquaticus</i> )	DO2, BE3	A préciser
Spotted crake ( <i>Porzana porzana</i> )	N, DO1, BE2	Endangered
Corncrake ( <i>Crex crex</i> )	N, DO1, BE2	Endangered
Common moorhen ( <i>Gallinula chloropus</i> )	DO2, BE3	No
Lapwing ( <i>Vanellus vanellus</i> )	DO2, BE3	In decline
Common snipe ( <i>Gallinago gallinago</i> )	DO2/3, BE3	Endangered
Kingfisher ( <i>Alcedo atthis</i> )	N, DO1, BE2	To be watched

N: National protection

DO1, DO2: Directive on Wild Birds (annex I or II)

BE: Bern Convention (annex x)

See the attached non-exhaustive list of species not listed in the E.U. Directive on Wild Birds.

#### Other animal species directly linked to the wetland

Amphibians	Legal status	Red list in France	Local status
Crapaud accoucheur ( <i>Alytes obstetricans</i> )	N, DH4, BE4	Undetermined	Endangered
Crapaud calamite ( <i>Bufo calamita</i> )	N, DH4		Very endangered
Grenouille rousse ( <i>Rana temporaria</i> )	DH5		Vague threat
Grenouille verte ( <i>Rana esculenta</i> )	DH5		Very common
Grenouille de lessona ( <i>Rana lessonae</i> )	DH5		Undetermined
Triton crête ( <i>Triturus cristatus</i> )	N, DH2/4, BE2	Vulnerable	Very endangered
Lepidoptera	Legal status	Red list in France	Local status
Damier de la succise ( <i>Euphydryas aurinia</i> )	N, DH2, BE2	Endangered	Very rare
Odonates	Legal status	Red list in France	Local status
Agrion de mercure ( <i>Coenagrion mercuriale</i> )	N, DH2, BE2	Endangered	Recorded
Leucorrhine à large thorax ( <i>Leucorrhinia pectoralis</i> )	N, DH2, BE2	Endangered	Recorded
Leucorrhine à large queue ( <i>Leucorrhinia caudalis</i> )	N, DH4, BE2	Endangered	Rare

N: national protection

DH2, DH4, DH5: Directive on Habitats (annexes II, IV, V)

BE: Bern Convention (annex x)

Criterion 3: This wetland can be considered of international importance because it provides habitat for important populations of animal and plant species for maintenance of biological diversity in France and especially in the Franche-Comté

region. The qualitative and quantitative importance of the overall bog area and this whole wetland, constitutes a fabulous source of biodiversity. The following important species are found there.

<i>Saxifraga hirculus</i>	The last population at the site
Common snipe	With almost 70 nesting couples, this is the most important nesting site in France and among the most southern and an important migratory stopover.
Spotted crane ( <i>Porzana porzana</i> )	More than 90 per cent of the sightings in Franche-Comté
<i>Coenagrion mercuriale</i>	Highest altitude at the national level, more than 50 per cent of the sightings in Franche-Comté
<i>Liparis loeselii</i>	This site constitutes an important reservoir of this species for Franche-Comté
Corncrake ( <i>Crex crex</i> )	More than 50 per cent of the population in Franche-Comté
<i>Euphydryas aurinia</i>	The highest densities of Franche-Comté
<i>Leucorrhinia pectoralis</i>	75 per cent of the sightings in Franche-Comté

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### 13. Biogeography:

(a) biogeographic region:

(b) biogeographic regionalisation scheme:

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### 14. Physical features of the site:

Geology, geomorphology, soils and origin: This valley lies on glacial deposits where more or less impermeable layers alternate, abandoned in mosaic during successive glaciations (-15,000 years) and colonized by a diversified vegetation. Located on the second Jura plateau in contact with the first folds of the Helvetic formation, the valley of the Dugeon is the origin of a Valanginien Cretaceous syncline whose bottom is encumbered by calcareous moraine material. Soil studies show two main types of soils: drained soils and hydromorphic soils without a direct relationship between geomorphologic position and level of drainage. Fens and bogs form in depressions where stagnant water still conserves a relationship with the Dugeon and its tributaries and the high marshes, or acidic bogs, develop in isolated depressions in relationship with the active basin of the Dugeon, including in the centre of fens.

Hydrography, watershed and water quality: The hydrogeological basin of the Dugeon, which extends over 170 square kilometres, is dominated in the south by Jurassic formations and in the north by Quaternary formations. The Dugeon (802–922 metres in elevation) is the main river that drains the valley along about 35 kilometres. It begins in the Malpas and Vaux-et-Chantegrue marshes and empties into the Doubs at Tout-Vent, north of Pontarlier. The hydrographic network includes an important network of tributaries fed by the wetlands. From the point of view of quality, data of the SDAGE (1996) classify water quality 1B (rather good-moderate pollution) upstream of Bonnevaux and of quality 2 downstream (medium to heavy pollution). The Dugeon is also affected by relatively important eutrophication with phenomena of pollution from domestic, agricultural and agro-alimentary sources. A water-treatment plant was inaugurated in October 2000 aimed at reducing the impact

of this waste. Following work to straighten out the river during 1960–1970, which caused a loss of nearly one fourth of its length, the Dugeon has been the object of rehabilitation work since 1997 through the creation of meanders.

Hydrology and hydrogeology: The area of bogs (Bouverans-Frasne-Bief du Fourg and Bonnevaux) feeds the catchment basin only seasonally, because there are losses of deep underground drainage towards the Ain Valley to the west and probably towards the Loue Valley to the north-east. These losses are estimated at more than one third of effective precipitation. The Laveron anticline, which borders on the alluvial plain of the Dugeon between Bonnevaux and Les Granges-Narboz, forms a sector of intermittent supply, active only during periods of high run-off. Losses recorded in an area between Sainte-Colombe and Les Granges-Narboz are the result of drainage through calcareous substratum of surface runoff from the slopes of the Laveron and marshes on the edge of the valley. There is an artesian water table in the area of the bogs on the plain of the Dugeon between the Etang de Frasne, Bonnevaux and the Etang Berthelot (Bruckert and Gaiffe, 1985). An important aquifer also exists at Vau-les-Aigues (commune of La Rivière-Dugeon). In the valley bottom, the Arlier glacial plain has a large aquifer. Average annual flow of the Dugeon measured at Vuillecin (downstream from the basin) is 3.3 cubic metres/second, with extreme variations between 0.15 and 70 cubic metres/second.

Depth, fluctuations and water permanence: The wetlands directly bordering the Dugeon and its tributaries are regularly flooded and play an important role for water storage. Except for the period of flooding, the environments are more or less saturated with water but not submerged.

Zones located upstream: The urban area of Pontarlier (communes of Dommartin, Houtaud and Vuillecin) benefits from the direct positive effects of restoration of meanders on the Dugeon. Important exchanges between the secondary and main beds at the time of flooding, promoted by the work on rehabilitation of the Dugeon, permit storage of large quantities of water in the wetland, the slowing of their transit downstream and, as a result, limitation of the impact of small and medium-sized floods on urban areas. This empirical finding, confirmed quantitatively downstream, has been measured at Bannans where the estimated height of flooding is decreased by nearly 10 centimetres as a result of the work of rehabilitation.

Climate: The climate is continental with hot summers. Winters are even harsher because the orientation of the anticline formed by this valley can accentuate the effects of the northerly winds. Average annual temperature is 7° C, and the thermal range can reach 50 degrees. Average monthly precipitation is that recorded at the Bonnevaux meteorological station between 1983 and 1998. This station was closed in 1998. Between 1983 and 1998, annual average precipitation was 1758 millimetres. Between 1950 and 1998, this same average was 1436 millimetres at Labergement-Sainte-Marie and 1469 millimetres at Pontarlier.

<b>1983/1998</b>	<b>Jan</b>	<b>Feb</b>	<b>Mar</b>	<b>Apr</b>	<b>May</b>	<b>Jun</b>	<b>Jul</b>	<b>Aug</b>	<b>Sep</b>	<b>Oct</b>	<b>Nov</b>	<b>Dec</b>
<b>mm</b>	146	139	118	147	166	164	113	115	164	151	164	169

Source: Météo France and DIREN Franche-Comté

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## 15. Physical features of the catchment area:

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**16. Hydrological values:** This site plays the following hydrological roles: storage of floodwater, supply of water at times of low water, supply of cool water in summer, recharging and discharging of groundwater, capture of sediments and fixation of organic pollution.

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**17. Wetland Types:**

**(a) presence:**

Inland wetlands

M - Permanent rivers/streams/creeks

O - Permanent freshwater lakes (more than eight hectares)

Tp - Permanent freshwater marshes/pools; ponds (fewer than eight hectares)

U - Non-forested peat lands

W - Shrub-dominated wetlands; shrub swamps, shrub-dominated freshwater marshes, shrub carr, alder thicket on inorganic soils.

Xf - Freshwater, tree-dominated wetlands

Xp - Forested peat lands

Zk - Karst and other subterranean hydrological systems, inland

Human-made wetlands

1 - Aquaculture ponds

2 - Ponds

4 - Seasonally flooded agricultural land

8 - Wastewater treatment areas

9 - Canals and drainage channels, ditches

**(b) dominance:** U, Xp, W, M, O, Tp, Xf, Zk and 4, 2, 1, 9, 8

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**18. General ecological features:** The Dugeon Basin, unique because of the important bog area that it forms, is also unique because of a mosaic of habitats that are found there. Several natural environments are found side by side: dry meadows, wet meadows, beds of sedge and reed, aquatic vegetation, fens, transition marshes, raised bogs or moors, wooded areas (a detail of the formations is annexed).

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**19. Noteworthy flora:** Three plant species of European interest give this site an outstanding characteristic: saxifrage œil de bouc (*Saxifraga hirculus*) (the Dugeon Basin is habitat for the last population in France), liparis de loesel (*Liapis loeselii*) and hypne brillante (*Hamatocaulis vernicosus*). Other species listed in the Red Book of Endangered Species in France are: the bouleau nain (*Betula nana*), calmagrostide négligé (*Calmagrostis stricta*), laïche en touffe (*Carex cespitosa*), laïche à long

rhizome (*Carex chordorrhiza*), laïche des marais (*Carex heleonastes*), potamot allongé (*Potamongeton praelongus*) and utriculaire jaunâtre (*Utricularia ochroleuca*).

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**20. Noteworthy fauna:** The basin of the Drugeon has a special importance for conservation of certain species of birds and insects whose national populations are in rapid decline or even extinction: water rail, spotted crake, common snipe (first nesting site in France), triton crêté, damier de la succise, agrion de mercure and leucorrhine à large thorax.

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**21. Social and cultural values:** Currently, there is little tourism, except on the Frasne bog where it has been made possible to cross the peat. In general, there is little pressure from tourism. Recreational activities include hunting and fishing. Associations and socio-professional organizations have been made aware of the importance of this environment, have been associated with the work of rehabilitation and management of wetlands and now participate actively in programmes of restoration and monitoring. Pressure of capture does not seem to endanger conservation of species. The important activity of harvesting *Rana temporaria* fits into a cultural context. Producers usually try to do everything possible to ensure optimum reproduction of the species. On the other hand, any disturbance produced by this activity can have a repercussion on the nesting of shore birds during this period.

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**22. Land tenure/ownership:** More than 50 per cent of the wetlands are communal property managed by the Syndicat Mixte de la Vallée du Drugeon.

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**23. Current land (including water) use:** There are 12 villages at the site with a total population of 6356 inhabitants. Land use is basically linked to economic use for agriculture and forestry.

**Agriculture:** This activity is oriented exclusively towards dairy farming. There are about one hundred farms covering all or part of the 2700 hectares of farmland at the site.

**Forestry:** Forests on about 1000 hectares of the site are exploited (chiefly spruce and beech). Forests are primarily communal property.

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**24. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land (including water) use and development projects:** The Drugeon Basin has been subjected to serious disturbance in the past (straightening of the stream, drainage, extraction of sand, tree plantations and pollution), which degraded the biological heritage. Farming practices over the past 50 years have gradually led to the drying-up of the wetlands as the result of drainage and channelling the entire hydrological network, the abandoning of extensive management of the wetlands and intensification of the use of some of the plots. The use of fertilizers has caused eutrophication in several formerly oligotrophic environments. Furthermore, traces of toxic pollutants from sawmills unfavourably affect the quality of the aquatic environment.

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**25. Conservation measures taken:** The Dugeon Basin has benefited from a European LIFE programme carried out by the Syndicat Mixte de la vallée du Dugeon from 1993 to 1997 that led to:

- Restoration of the Dugeon and its tributaries in order to conserve its biological interest and renew the basin's capacity to store water;
- Restoration of degraded bogs and marshes and provision for management of the wetlands;
- Conservation of the wetlands (approximately 1500 hectares);
- A programme for managing domestic pollution by construction of a treatment plant and the up-dating farm buildings;
- Use of wise farming practices in the natural environments.

Under the provisions of the E.U. Directives on Habitats and Wild Birds, this site has been proposed for designation as a site of community importance. In this context, the Syndicat Mixte de la Vallée du Dugeon has undertaken the following measures:

- Implementation of a programme to restore streams;
- Implementation of management programmes;
- Management and rehabilitation of the bog environments by the clearing of undergrowth, mowing and grazing
- Conservation;
- Study of conservation measures to be included in the Contrats territoriaux d'exploitation (CTE) for better farming practices.

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**26. Conservation measures proposed but not yet implemented:** Issue of an order for protection of the biotope is being considered to regulate activities in all the wetlands. Management measures have been announced and have been included in a management plan governing Natura 2000 contracts between environmental managers and the government from the end of 2002. Management measures concerning forestry are provided for in the document of aims to promote biodiversity and wise conservation of wet forest habitats, limit or even discontinue chemical treatment of wood in forests. A national-level working group will consider this subject for inclusion in Natura 2000 forestry contracts.

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**27. Current scientific research and facilities:**

- Research on pollutants and their impact on aquatic macro invertebrates downstream from sawmills;
- Scientific monitoring following restoration of the Dugeon: wildlife and structural dynamic studies, equipping of streams with thermal sensors, and piezometric monitoring of the water table;
- Annual or bi-annual monitoring of the populations of Rallidae (common snipe, curlew and lapwing);
- Annual or bi-annual monitoring of populations of butterflies and dragonflies of general interest;
- Monitoring of management of the flora and establishment of permanent survey blocks;
- Survey of existing flora through systematic prospecting;

- Monitoring of natural regeneration of the forest affected by the 1999 storm.

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**28. Current conservation education:**

About 20 annual vacations are organized by the Syndicat in order to publicize steps taken in the Dugeon Basin (university, schools, environmental professionals or other international socio-professional organizations). A biannual information letter (La lettre du Dugeon) is published on activities about the valley for the local population and all partners. Exhibits were held on the LIFE programme in 1997 and on Natura 2000 in 2002. Conferences are given regularly on the valley and water treatment plant. A nature club for school children in the valley has been organized for learning about their natural heritage. An Internet site ([www.val-dugeon.org](http://www.val-dugeon.org)) has been created. Several brochures and activity reports have been published.

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**29. Current recreation and tourism:** Recreational activities practised at the site are hunting, fishing, hiking and, in certain places, occasional cross-country skiing, ice skating and water skiing. There are no other structured activities because the wet environments are not readily accessible. Tourism is not an important activity in the valley, which is, nonetheless, an important transit area for winter and summer tourism in the Jura (Mont-d'Or, Lac de Saint-Point, Haut-Jura). The Frasne bog is the only site provided with a trail on floats that allows extensive visiting. This activity is not promoted and is not the object of publicity for tourists outside the site. There are only a limited number of visitors. The Syndicat envisages opening access to the bogs in the valley to the public, while conserving the fragility of these environments.

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**30. Jurisdiction:** The public authority with territorial jurisdiction is the government. The Ministère de l'Ecologie et du développement durable and the Ministère de l'Agriculture et de la Pêche are responsible for its functional jurisdiction.

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**31. Management authority:** The Syndicat Mixte de la Vallée du Dugeon et du Plateau de Frasne is responsible for local activities and for conservation programmes and management of the wetland. This structure will be transformed in the autumn of 2002 into a community of communes on the Plateau de Frasne and the Vallée du Dugeon.

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**32. Bibliographical references:**

# Annexes

## HABITATS OF THE VALLEE DU DRUGEON

There are several types of wet prairies: meadows with *trolle d'Europe* and *cirse des ruisseaux* in the flooded areas along the Dugeon where it provides a transition with the cultivated areas and secondly, the meadows with *trolle d'Europe* and *Molinia*, little or not at all modified and usually developed in contact with the marshes. This group is enhanced by a plant association of tall grasses located on wet and rich soils where the meadowsweet can reach a height and cover large areas.

The beds of sedge and reed are represented by the marshes with large sedges that develop hillocks and in certain areas mounds and invaded by reeds on the edges of streams. The reed beds of rushes and reeds occupy the shores of the Dugeon and descend even to the stream during drought. The beds of sedge form more or less overlapping belts back from the reed bed. They provide habitat for the *renoncule grande douve*, a protected species characteristic of paludal environments. These flooded environments have the highest productivity in the Vallée du Dugeon. The aquatic vegetation is characterized by several species with floating leaves covering more or less the surface of the open water: *nénuphar blanc*, *nénuphar jaune* and *potamot nageant*. The *grande utriculaire*, a carnivorous species, is abundant in the former peat bogs.

The fen produces little or no peat. Its existence is linked to the presence of springs and usually takes the aspect of very wet fields dominated by associations of *laîche de Davall*. This very rich association has an exceptional flora in which are found at least four protected plant species at the national level including a very rare *laîche étoile des marais*. The transitional marsh is an intermediary stage between the marsh and the moor. It includes exceptional associations and a relict boreal-Arctic flora that is unique in France: sedge *laîche à long rhizome*, *laîche des bourbiers* or more rarely the *saxifrage œil-de-bouc*. The raised marsh (moor) has oligotrophic vegetation (growing on soil very poor in nutrients, very acid and allowing only limited biological activity); not restricted to supplies of calcareous water springs, it is fed by only acid rain water and poor in nutrients. Certain bogs are active and continue to develop while producing peat. Others are inactive, having reached the end of their evolution; they no longer produce peat. Among them, certain are colonized by the *Pinus uncinata*, which the area of in the commune of Frasne is relatively exceptional at the national level. Given their importance, these bogs constitute outstanding reservoirs of biodiversity.

The forestations are plant associations dominated by a spontaneous or planted arboreal stratum. Spruce forest (*pessière*) and birch forest (*bétulaie*) on peat grow in a belt around the bogs. Groves of willows develop in the beds of sedge when the water table drops and on the edges of the Dugeon where it follows intermittently the stream. The mixed montane forest of beech and pine occupies large areas of the watershed and gives way, especially on the hill above Lac de l'Entonnoir at La Feuillée, to a forest on a slope rich in beech, a beech forest to lime tree or a beech forest to *seslérie* on the slope dominating the Cluse de Vaux-and-Chantegrue. The density of nesting birds of prey is very high.

The dry meadows are pure herbaceous formations usually used for agriculture. Natural meadows over calcareous bases with *sédum âcre* and *pâturin des Alpes* come into contact with the meadows with *gentiane printanière* and *brome dressé* that are found chiefly in the wooded meadows. In the Vallée du Dugeon, these meadows have considerably receded following intensification of farming, evolving towards eutrophic meadows (rich in nutrients), widely scattered about and composed of more banal plants. The meadows located on La Feuillée (Bonnevaux) are composed of *azuré du serpolet* and those of the Montée du Tremble (Sainte-Colombe), *azuré de la croisette*, both rare protected butterflies that are endangered in France (taken from the “Natura 2000” document, DIREN of Franche-Comté, April 2002).

## FLORA OF THE DRUGEON BASIN

The following list is incomplete. Only outstanding species or species with a protection status are listed. Protection status is based on the order of 20 January 1982 modified by the order of 31 August 1995 creating the list of protected plant species in France, order of 22 June 1992 creating the list of protected plant species in the Franche-Comté region, annexes II, IV and V of the Directive on Habitats (92/43/EEC) and annexes to the Bern Convention. Several hundred species have been recorded, of which 49 are protected.

### Plants

Plants	Legal protection	Red List	Regional status and remarks
Saxifrage œil-de-bouc ( <i>Saxifraga hirculus</i> )	N, DH2, 4, BE1	Endangered	One population
Liparis de Loesel ( <i>Liparis loeselii</i> )	N, DH2, 4, BE1	Vulnerable	Four populations
Hypne brillante ( <i>Hamatocaulis vernicosus</i> )	DH2, BE1	Endangered	One population
Laïche à long rhizome ( <i>Carex chordorhiza</i> )	N	Vulnerable	
Œillet superbe ( <i>Dianthus superbus</i> )	N		
Rossolis à feuilles rondes ( <i>Drosera rotundifolia</i> )	N		
Rossolis à feuilles longues ( <i>Drosera longifolia</i> = <i>anglica</i> )	N		
Rossolis à feuilles obovales ( <i>Drosera obovata</i> )	N		
Valériane grecque ( <i>Polemonium coeruleum</i> )	N		
Andromède ( <i>Andromeda polifolia</i> )	N		
Laïche des borbiers ( <i>Carex limosa</i> )	N		
Renoncule grande douve ( <i>Ranunculus lingua</i> )	N		
Laïche étoile des marais ( <i>Carex heleonastes</i> )	N	Vulnerable	
Utriculaire jaunâtre ( <i>Utricularia ochroleuca</i> )	N	Vulnerable	
Bouleau nain ( <i>Betula nana</i> )	N	Vulnerable	
Gagée jaune ( <i>Gagea lutea</i> )	N		On outside border of site
Scheuchzérie des marais ( <i>Scheuchzeria palustris</i> )	N		
Linaigrette grêle ( <i>Eriophorum gracile</i> )	N		
Dryopteris à crête ( <i>Dryopteris cristata</i> )	N	Endangered	
Prêle panache ( <i>Equisetum variegatum</i> )	R		One population
Théliptéris des marais ( <i>Thelypteris palustris</i> )	R		At least one population
Dryoptéris espacé ( <i>Dryopteris remota</i> )	R		
Hottonie des marais ( <i>Hottonia palustris</i> )	R		
Utriculaire intermédiaire ( <i>Utricularia intermedia</i> )	R		
Orchis de Trausteiner ( <i>Dactylorhiza trausteineri</i> )	R		
Potamot graminée ( <i>Potamogeton gramineus</i> )	R		
Rubanier mineur ( <i>Sparganium minimum</i> )	R		
Troscart des marais ( <i>Triglochin palustris</i> )	R		
Seneçon à feuilles en spatule ( <i>Senecio helenitis</i> )	R		
Grassette commune ( <i>Pinguicula vulgaris</i> )	R		
Gentiane des marais ( <i>Gentiana pneumonanthe</i> )	R		
Carex en touffes ( <i>Carex cespitosa</i> )	R	Vulnerable	

Géranium des marais ( <i>Geranium palustre</i> )	R		
Fritillaire pintade ( <i>Fritillaria meleagris</i> )	R		
Orchis musc ( <i>Herminium monorchis</i> )	R		
Cigüe vireuse ( <i>Cicuta virosa</i> )	R		
Calamagrostide négligée ( <i>Calamagrostis stricta</i> )	R	Vulnerable	
Stellaire des marais ( <i>Stellaria palustris</i> )	R		
Saxifrage granulé ( <i>Saxifraga granulata</i> )	R		Chiefly in the western part
Racine de corail ( <i>Corallorhiza trifida</i> )	R		
Circée intermédiaire ( <i>Circaea x intermedia</i> )	R		Two populations
Millepertuis de Richer ( <i>Hypericum richeri</i> )	R		At least three populations
Gesse de Bauhin ( <i>Lathyrus bauhinii</i> )	R		
Gesse à feuilles de deux formes ( <i>Lathyrus heterophyllus</i> )	R		Not rare along the railroad
Pédiculaire des forêts ( <i>Pedicularis sylvatica</i> )	R		
Potamot des Alpes ( <i>Potamogeton alpinus</i> )	R		
Potamot allongé ( <i>Potamogeton praelongus</i> )	R		Disappeared
Mousse sp. ( <i>Calliergon trifarium</i> )	R		
Mousse sp. ( <i>Cinclidium stygium</i> )	R		
Mousse sp. ( <i>Splachnum ampullaceum</i> )	R		
Rumex aquatique ( <i>Rumex aquaticus</i> )			Outstanding species
Véronique d'Autriche ( <i>Veronica austriaca dentata</i> )			Outstanding species (at least three populations)
Potamot à feuilles étroites ( <i>Potamogeton x zizii</i> )			Outstanding species (one population)
Potamot à feuilles obtuses ( <i>Potamogeton obtusifolius</i> )			Outstanding species
Lycopode à rameaux d'un an ( <i>Lycopodium annotinum</i> )			Outstanding species (many populations)
Catabrosa aquatique ( <i>Catabrosa aquatica</i> )			Outstanding species
Héléocharis à cinq fleurs ( <i>Eleocharis quinqueflora</i> )			Outstanding species (at least two populations)
Scrophulaire des ombrages ( <i>Scrophularia umbrosa</i> )			Outstanding species (many populations)
Goodyère rampante ( <i>Goodyera repens</i> )			Outstanding species (two populations)
Inule britannique ( <i>Inula britannica</i> )			Outstanding species for the Haut-Doubs (unique population)
Germandrée d'eau ( <i>Teucrium scordium</i> )			Etang de Bouverans
Mousse sp. ( <i>Bryum neodamense</i> )			Outstanding species
Calamagrostide blanchâtre ( <i>Calamagrostis canescens</i> )			Widespread in this area
<b>Total</b>	<b>17 (+1) N, 31 R, 3 DH2</b>	<b>3 endangered, 7 vulnerable</b>	<b>11 outstanding species</b>

Source: CREN F-C, 1994; Red Book of Endangered Species, 1995; DIR

EN F-C, 1999; Ferrez, 1999; André, 2000

N: protection national by ministerial order; R: Regional protection by ministerial order; DO\*: Directive on Wild Birds, various annexes; DH2: Directive on Habitats, annex 2; DH4: Directive on Habitats, annex 4; DH5: Directive on Habitats, annex 5; BE2: Bern Convention, annex 2; BE3: Bern Convention, annex 3

Red List: "Livre rouge de la flore menacée en France", Priority species, vol. 1 (Olivier et al., 1995, Muséum National d'Histoire Naturelle, IEGB, SPN, Ministère de l'Environnement, Paris)

## FAUNA OF THE DRUGEON BASIN

The following list is incomplete, and only outstanding species or species with a protection status are listed. An exhaustive list is provided in the annexe of the Natura 2000 document of aims.

Because of its large size, the Drugeon is still capable of furnishing rare natural habitats and, despite that, well related to each other. For this reason, it still harbours species that have become very rare at the national level. But, some species are in rapid decline both at the national level and the local level. The Drugeon is affected by this unprecedented erosion of its natural heritage, even if it sometimes takes on a slow and pernicious character. These are the reasons for which rigorous and meticulous management is required.

The following list of nesting or wintering birds in the wetlands. Order of 17 April 1981 creating lists of protected birds throughout France modified by the order of 5 March 1999, annexe I and other annexes of the Directive on Wild Birds (79/409/EEC) and annexes to the Bern Convention). The indication of local status is described based on Michelat (2000) (n, m, h, o). Out of 267 recorded species, 108 nesting (1980-1999). 79 protected, 33 migratory and wintering, 8 occasional species have been identified.

<b>Birds</b>					
<b>Birds</b>	<b>Legal protection</b>	<b>Red List</b>	<b>1972 fac</b>	<b>1994 gnfc</b>	<b>1999 gnfc/nlr (local status)</b>
Common teal ( <i>Anas crecca</i> )	DO*, BE3				h
Goosander ( <i>Mergus merganser</i> )	BE3				m h
Little grebe ( <i>Tachybaptus rufficollis</i> )	N, BE2		x		n
Crested grebe ( <i>Podiceps cristatus</i> )	N, BE3		x		n
Grey heron ( <i>Ardea cinerea</i> )	N, BE3		x		n
Mute swan ( <i>Cygnus olor</i> )	N, DO2, BE3	R	x		n
Mallard duck ( <i>Anas platyrhynchos</i> )	DO*, BE3		x		n
Garganey teal ( <i>Anas querquedula</i> )	BE3		x	x	n
Common pochard ( <i>Aythya ferina</i> )	BE3	D	x		n
Tufted pochard ( <i>Aythya fuligula</i> )	BE3	R	x		n
Marsh hawk ( <i>Circus cyaneus</i> )	N, DO1, BE2				n
Water rail ( <i>Rallus aquaticus</i> )	DO2, BE3	AP			n
Common moorhen ( <i>Gallinula chloropus</i> )	DO2, BE3		x		n
Common coot ( <i>Fulica atra</i> )	DO*		x		n
Little winged plover ( <i>Charadrius dubius</i> )	N, BE2				n
Lapwing ( <i>Vanellus vanellus</i> )	DO2, BE3	D		77 c	n (57 c)
Eurasian curlew ( <i>Numenius arquata</i> )	BE3			33 c	n (30 c)
Kingfisher ( <i>Alcedo atthis</i> )	N, DO1, BE2				n
Hirondelle de rivage ( <i>Riparia riparia</i> )	N, BE2				n
Pipit farlouse ( <i>Anthus pratensis</i> )	N, BE2				n
Grey wagtail ( <i>Motacilla cinerea</i> )	N, BE2				n
White wagtail ( <i>Motacilla alba</i> )	N, BE2				n
Cinle plongeur ( <i>Cinclus cinclus</i> )	N, BE2				n
Grive litorne ( <i>Turdus pilaris</i> )	DO2, BE3				n
Locustelle tachetée ( <i>Locustella naevia</i> )	N, BE2				n
Rousserole verderolle ( <i>Acrocephalus palustris</i> )	N, BE2				n
Rousserole effarvatte ( <i>Acrocephalus scirpaceus</i> )	N, BE3				n
Bruant des roseaux ( <i>Emberiza schoeniclus</i> )	N, BE2				n
Water rail ( <i>Crex crex</i> )	N, DO1, BE2	E		4 ch	n 2-3 c
Spotted crane ( <i>Porzana porzana</i> )	N, DO1, BE2	E	?	1 c	n 5 c
Common snipe ( <i>Gallinago gallinago</i> )	DO2/3, BE3	E	x	x	n 85 c
Short-eared owl ( <i>Asio flammeus</i> )	N, DO1, BE2				6 c en 93

Sources: Robert, Cretin and François (1967) 1972 in LTEP, 1980; Déforêt, 1999; Beraud et al, 1999; FDC 25 and 39; Michelat, 2000

N: National protection by ministerial order; N\*: Partial protection (by ministerial order or other); DO1: Directive on Wild Birds, annexe 1; DO2, DO\*: Directive on Wild Birds, annex 2 and other annexes; DH2: Directive on Habitats, annex 2; DH4: Directive on Habitats, annex 4; DH5: Directive on Habitats, annex 5; BE2: Bern Convention, annex 2; BE3: Bern Convention, annex 3.

Red List (extension SEOF and LPO for endangered birds, 2000)

E: Endangered (Red List); V: Vulnerable (Red List); R: Rare (Red List); D: In decline (Orange List); L: Localized (Orange List); AP: To be confirmed (Orange List); AS: To be observed; P: Patrimonial, NE: Not evaluated

<b>SPEC categories (Tucker and Heath, 1994)</b>	
SPEC 1	Endangered species at the world level
SPEC 2	Species with an unfavourable European status; the majority of the world population is in Europe
SPEC 3	Species with an unfavourable European status; the majority of the world population is outside Europe
SPEC 4	Species with favourable European status; the majority of the world population is in Europe
SPEC 5	Species with favourable European status; the majority of the world population is outside of Europe

Birds: c: couple; ch: song bird; ind: specimens

Local status: n: nesting bird; m: migratory bird; h: wintering bird; a: accidental; or: occasional

Red List: Based on the survey of endangered wildlife of the Secrétariat Faune Flore, 1994 (Maurin et al., 1994, Muséum National d'Histoire Naturelle, World Wildlife Fund, Nathan, Paris) (according to IUCN, Red List of Endangered Animals, 1990 and for birds, Birdlife, Tucker et al., adapted in France by LPO, 1990)

Mammals on the following list have a protection status. Order of 17 April 1981 creating lists of protected mammals throughout France modified by several orders (order of 30 May 1997, etc.), annexes II, IV, V of the Directive on Habitats (92/43/EEC) and annexes to the Bern Convention). Regional status of Chiroptera described by Roué, 2000 (Red List for Franche-Comté in preparation). A total of 47 species have been recorded at least once in the area under consideration (report made in 2000) and eleven protected species have been identified.

### Mammals

<b>Mammals</b>	<b>Legal protection</b>	<b>Red List</b>	<b>Regional status</b>
Hedgehog ( <i>Erinaceus europaeus</i> )	N, BE3		
Musaraigne couronnée ( <i>Sorex coronatus</i> )	BE3		
Crossope aquatique ( <i>Neomys fodiens</i> )	N, BE3	Undetermined	
Musaraigne musette ( <i>Crocidura russula</i> )	BE3		
Musaraigne alpine ( <i>Sorex alpinus</i> )		Rare	Endangered
Vespertillon de Daubenton ( <i>Myotis daubentoni</i> )	N, DH4, BE2		To watch
Vespertillon à moustaches ( <i>Myotis mystacinus</i> )	N		To watch
Sérotine commune ( <i>Epseticus serotinus</i> )	N, DH4, BE2		To watch
Sérotine de Nilsson ( <i>Epseticus nilssoni</i> )	N, DH4, BE2	Rare	Localized
Noctule commune ( <i>Nyctalus noctula</i> )	N, DH4, BE2	Vulnerable	Rare
Pipistrelle commune ( <i>Pipistrellus pipistrellus</i> )	N, DH4, BE2		To watch
Blaireau ( <i>Meles meles</i> )	BE2		
Martre des pins ( <i>Martes martes</i> )	DH5, BE3		
Fouine ( <i>Martes foina</i> )	BE3		

Belette ( <i>Mustela nivalis</i> )	BE3		
Hermine ( <i>Mustela erminea</i> )	BE3		
Putois ( <i>Mustela putorius</i> )	DH5, BE3	Undetermined	
Chat forestier ( <i>Felis sylvestris</i> )	N, DH4, BE2-3		
Lynx boréal ( <i>Lynx lynx</i> )	N*, DH2-4, BE3	Endangered	Occasional
Ecureuil roux ( <i>Sciurus vulgaris</i> )	N, BE3		
Loir gris ( <i>Glis glis</i> )	BE3		
Lérot ( <i>Eliomys quercinus</i> )	BE3		
Lièvre d'Europe ( <i>Lepus europaeus</i> )	BE3	Undetermined	
Wild boar ( <i>Sus scrofa</i> )	BE3		
Chevreuil ( <i>Capreolus capreolus</i> )	BE3		

Sources: LTEP, 1980; Roué, S.Y., 2000; SMVDPF, 2000; Michelat, 2000

Amphibians: Order of 22 July 1993 creating a list of amphibians and reptiles protected throughout France. Annexes II, IV, V of the Directorate on Habitats (92/43/EEC), annexes to the Bern Convention). Regional status and degree of threat described by Pinston et al., 2000. Eleven species were recorded in 2000 of which nine are protected.

### Amphibians

Amphibians	Legal protection	Red List	Regional status	Degree of threat
Crapaud accoucheur ( <i>Alytes obstetricans</i> )	N, DH4, BE2	Undetermined	Rather common	Endangered locally
Crapaud calamite ( <i>Bufo calamita</i> )	N, DH4		Rare	Very endangered
Crapaud commun ( <i>Bufo bufo</i> )	N		Very common	Not endangered
Grenouille rousse ( <i>Rana temporaria</i> )	DH5		Very common	Menace diffuse
Grenouille verte ( <i>Rana kl. esculenta</i> )	DH5		Very common	Not endangered
Grenouille de lessona ( <i>Rana lessonae</i> )	DH5		Common?	Undetermined
Salamandre tachetée ( <i>Salamandra salamandra</i> )	N		Common	Not endangered
Triton alpestre ( <i>Triturus alpestris</i> )	N, BE3	Vulnerable	Very common	Not endangered
Triton crêté ( <i>Triturus cristatus</i> )	N, DH2, 4, BE2	Vulnerable	Rather rare	Very endangered
Triton palmé ( <i>Triturus helveticus</i> )	N		Very common	Not endangered
Triton ponctué ( <i>Triturus vulgaris</i> )	N		Rather rare	Rather endangered

Sources: LTEP, 1980; Pinston et al., 2000

Reptiles: Order of 22 July 1993 creating the list of the amphibians and reptiles protected throughout France, annexes II, IV, V of the Directive on Habitats and annexes to the Bern Convention). Regional status and degree of threat described by Pinston et al., 2000. Six species recorded in 2000 of which five are protected.

### Reptiles

Reptiles	Legal protection	Red List	Regional status	Degree of threat
Vipère péliade ( <i>Vipera berus</i> )	N*, BE3	Undetermined	Rare and localized	Rather endangered
Coronelle lisse ( <i>Coronella austriaca</i> )	N		Rather common	Not endangered
Lézard des murailles ( <i>Podarcis muralis</i> )	N, DH4		Very common	Endangered locally
Lézard des souches ( <i>Lacerta agilis</i> )	N, DH4, BE2	Undetermined	Rather common	Not endangered
Lézard vivipare ( <i>Lacerta vivipara</i> )	N		Rather common	Not endangered
Orvet ( <i>Anguis fragilis</i> )	N		Very common	Diffused threat

Source: LTEP, 1980, Pinston et al., 2000

Fish: Order of 8 December 1988 creating the list of protected fish throughout France, annexes II, IV, V of the Directive on Habitats, annexes to the Bern Convention). Twelve species recorded in 1995.

## Fish

Fish	Legal protection	Red List	Local status	Populations
Brème bordelière ( <i>Blicca bjoerkna</i> )			r	xx
Brochet ( <i>Esox lucius</i> )	N*	Vulnerable	r	x
Chevaine ( <i>Leuciscus cephalus</i> )			r	xxx
Gardon ( <i>Leuciscus rutilus</i> )			r	xxx
Goujon ( <i>Gobio gobio</i> )			r	xxx
Loche franche ( <i>Nemacheilus barbatulus</i> )			r	xx
Perche ( <i>Perca fluviatilis</i> )			r	xx
Tanche ( <i>Tinca tinca</i> )			r	x
Truite fario ( <i>Salmo trutta fario</i> )	N*		r	xx
Vairon ( <i>Phoxinus phoxinus</i> )			r	xxx
Vandoise ( <i>Leuciscus leuciscus</i> )	N*		r	xx

Source: CSP, 1995

Invertebrates with a protection status: Order of 7 October 1992 creating the list of protected molluscs in metropolitan France, order of 24 April 1979 creating the list of snails for which harvesting can be prohibited or authorized, order of 22 July 1993 creating the list of the insects protected throughout France, order of 21 July 1983 concerning the protection of indigenous crawfish, annexes II, IV, V of the Directive on Habitats (92/43/EEC) and annexes to the Bern Convention). Local status described by Tissot et al.; Tissot and Lambert, 1999; Lambert et al., 2000.

## Invertebrates

Invertebrates	Legal protection	Red List	Local status
Ecrevisse à pattes blanches ( <i>Austropotamobius pallipes</i> )	N*, DH2, 5, BE3	Vulnerable	Probably disappeared
Escargot de Bourgogne ( <i>Helix pomatia</i> )	N*		

Source: Rousselet, 2000

Lepitoptera: Out of 42 species of Lepitoptera recorded in 1999/2000, five are protected.

## Lepidoptera

Lepidoptera	Legal protection	Red List	Local status	OPIE Atlas F-C	1997 cren	1999/2000 rnlr
Solitaire des tourbières ( <i>Colias palaeno</i> )	N	Endangered	Vulnerable			X 13 sites
Nacré de la canneberge ( <i>Boloria aquilonaris</i> )	N	Endangered	Very rare			X 2 sites
Damier de la succise ( <i>Euphydryas aurinia</i> )	N, DH2, BE2	Endangered	Rather common			x
Cuivré de la bistorte ( <i>Lycaena helle</i> )	N	Endangered				X 24 sites
Fadet des tourbières ( <i>Coenonympha tullia</i> )	N	Endangered	Rather common			X 27 sites
Azuré de la croisette ( <i>Maculinea rebeli</i> )	N		Rather common			x
Azuré du serpolet ( <i>Maculinea arion</i> )	N, DH4, BE2	Endangered	Rather rare			X 3 sites

Source: Tissot et al, 1999

Odonates: 52 species recorded of which 38 in 1999/2000 of which four are protected

## Odonates

Odonates	Legal protection	Red List	Local status	OPIE Atlas FC	1997 cren	1999/2000 rnlr
Agrion de Mercure ( <i>Coenagrion mercuriale</i> )	N, DH2, BE2	Endangered		x		X 11 sites
Agrion nain ( <i>Ischnura pumilio</i> )			Rare	x		X 4 sites
Aeschna subarctique ( <i>Aeshna subarctica</i> )			Rare	x		X 6 sites
Leucorrhine à large queue ( <i>Leucorrhinia caudalis</i> )	N, DH4, BE2	Endangered	Rare	x		
Leucorrhine douteuse ( <i>Leucorrhinia dubia</i> )			Rather rare	x		X 5 sites
Leucorrhine à large thorax ( <i>Leucorrhinia pectoralis</i> )	N, DH2, 4, BE2	Endangered		x		X 18 sites

Sympétrum strié ( <i>Sympetrum striolatum</i> )			Rare	x		x
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Sources: OPIE Atlas, Dumont and Perrinet, 2000; Tissot and Lambert, 1999; Lambert et al., 2000 (local status)

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