

COSEWIC
Status Appraisal Summary

on the

Banded Cord-moss
Entosthodon fascicularis

in Canada

SPECIAL CONCERN
2015

COSEWIC
Committee on the Status
of Endangered Wildlife
in Canada



COSEPAC
Comité sur la situation
des espèces en péril
au Canada

COSEWIC status appraisal summaries are working documents used in assigning the status of wildlife species suspected of being at risk in Canada. This document may be cited as follows:

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COSEWIC Assessment Summary

Assessment Summary – May 2015

Common name

Banded Cord-moss

Scientific name

Entosthodon fascicularis

Status

Special Concern

Reason for designation

This rare moss is largely restricted to southwestern British Columbia in Canada, with most occurrences in the threatened Garry Oak habitat. One past collection was made in the Kootenay region in southeastern British Columbia, but whether the species still persists there is unknown. Should habitat destruction and degradation continue, the species will become increasingly vulnerable.

Occurrence

British Columbia

Status history

Designated Special Concern in May 2005. Status re-examined and confirmed in May 2015.



COSEWIC Status Appraisal Summary

Banded Cord-moss

Entosthodon fascicularis

Range of occurrence in Canada: British Columbia

Entosthodon fasciculé

Status History:

Designated Special Concern in May 2005. Status re-examined and confirmed in May 2015.

Evidence (indicate as applicable):

Wildlife species:

Change in eligibility, taxonomy or designatable units:

yes ☐ no ☒

Explanation:

There have been no changes in the species' taxonomy. Currently all of the Canadian subpopulations for this species occur in British Columbia. Contrary to the 2005 reason for designation Banded Cord-moss is not endemic to western North America but occurs also in Europe.

Range:

Change in Extent of Occurrence (EO):

yes ☐ no ☒ unk ☐

Change in Index of Area of Occupancy (IAO):

yes ☐ no ☐ unk ☒

Change in number of known or inferred current locations*:

yes ☐ no ☐ unk ☒

Significant new survey information

yes ☐ no ☒

Explanation:

The 2005 status report reported a total of 15 occurrences for Banded Cord-moss (COSEWIC 2005). The 2011 management plan included four new occurrences (3 on Salt Spring Island, and Bear Hill near Victoria) giving 19 occurrences for this species (Parks Canada Agency 2011). Three new occurrences found in 2006 and 2010 bring the current number of occurrences to 22 based on an occurrence being separated from other occurrences by >1km (Table 1). One new occurrence was located on Vancouver Island, the second on Salt Spring Island, and the third in the Fraser Valley; the latter is not unexpected because the species is known from the Kootenay area of eastern British Columbia (Table 1). The EO is 27,130 km² and the IAO is 88 km² (Figure 1). The large differences between these values and those reported in the 2005 status report (COSEWIC 2005) result from changes in the methodology used to calculate them. In fact, the EO is only slightly increased. The AO value used was not based on the 2x2km grid but was an estimate of the biological area of occupancy. Although the number of occurrences has increased by 7, the current IAO does not differ significantly from the AO value published previously.

* Use the IUCN definition of "location"

Population Information:

Change in number of mature individuals:

yes ☐ no ☐ unk ☒

Change in population trend:

yes ☐ no ☐ unk ☒

Change in severity of population fragmentation:

yes ☐ no ☐ unk ☒

Change in trend in area and/or quality of habitat:
Significant new survey information

yes ☐ no ☐ unk ☒
yes ☐ no ☒

Explanation:

Based on During (1979) Banded Cord-moss can be classified as an annual shuttle species, which is characterized by a high sexual reproductive effort, large spores, an open turf or rarely a short turf growth form, and a life span of 1-2 years. Because the Banded Cord-moss is a very small, short-lived species it is difficult to determine the exact number of individuals in a colony.

Following IUCN recommendations, however, each moss colony (i.e., "patches") is considered an individual. Data on population size for each occurrence are either dated or incomplete (Table 1). The 2005 status report (COSEWIC 2005) reported one small patch and a few small patches for two of the subpopulations and did not give data for the other 13 occurrences. The 2011 management plan (Parks Canada Agency 2011) reports data for 8 of the 22 occurrences with colony size ranging from $< 1\text{m}^2$ to a few cm^2 . Using the data from the most recent surveys of each occurrence, the number of colonies currently known is about 34. However, this number is a minimum estimate as at some occurrences the colonies were not counted (as previously noted), and the colony counts at others require updated numbers. It is also possible that the species no longer exists at some occurrences; in these cases up-to-date surveys are necessary to determine their status.

At most occurrences where colonies were located, only 1-2 colonies were seen; only at two sites (EO 8-Site 2, EO 9-Site 1) were numerous colonies found at any time. At two occurrences where the species was recorded, it was not seen during later surveys (EO 1, EO3).

Threats:

Change in nature and/or severity of threats:

yes ☐ no ☐ unk ☒

Explanation:

Parks Canada Agency (2011) listed the threats to this species. The most important are housing development, road construction and recreational activities. Housing development is anticipated at one occurrence (EO 9, Channel Ridge) with habitat loss or degradation the main threat. Road construction is anticipated at one occurrence (EO11, Malahat) with habitat loss or degradation by widening the roadway. Recreational activities are anticipated at three occurrences (EO1, Uplands Park; EO20, Mt. Maxwell; EO21, Sumas Mtn) with habitat loss and degradation caused by extensive hiking and off-leash dog walking. Competition from invasive alien plant species may be a potential threat as the species occupies wet habitats that are favoured by alien plants (Parks Canada Agency 2011).

The Parks Canada Agency Report (2011) did not list threats based on occurrences. Table 2 summarizes the known threats (in COSEWIC 2005 and Parks Canada Agency 2011) and the potential threats for each occurrence, based on information from both the management plan (Parks Canada Agency 2011) and the original status report (COSEWIC 2005) as well as the report writer's knowledge of the area. Not including occurrences for which there are no data, there are 16 locations based on the assumption that the threats affecting each occurrence act independently from one another.

Protection:

Change in effective protection:

yes ☐ no ☒

Explanation:

A management plan for Banded Cord-moss was issued by Parks Canada in August 2011 (Parks Canada Agency 2011). Four occurrences are found in provincial parks, protected areas or ecological reserves and are afforded protection by the *British Columbia Parks Act*, the *Protected Areas of British Columbia Act*, and the *Ecological Reserve Act*. The populations that occur on federal lands are known to the land managers. Private

land owners on Salt Spring Island have been made aware of the need to protect this species.

Rescue Effect:

Change in evidence of rescue effect: yes ☐ no ☒

Explanation:

It is unlikely that this species could be rescued from the existing populations in the United States because the nearest subpopulation in Washington state has not been recently relocated. Additional locations in the United States are listed as Oregon, Idaho, California and Arizona (NatureServe 2013) and Texas (Miller and Miller 2007).

Quantitative Analysis:

Change in estimated probability of extirpation: yes ☐ no ☐ unk ☒

Details:

No quantitative analysis has been completed for this species.

Summary and Additional Considerations:

A management plan for Banded Cord-moss was prepared by the British Columbia Bryophyte Recovery Team and Garry Oak Ecosystems Recovery Team (2010) and was issued by Parks Canada in August 2011 (Parks Canada Agency 2011). There has been little to no implementation of any aspect of the plan. This is particularly evident when examining the most recent survey dates for both occurrences and their threats: most predate the plan by 5 or more years.

Acknowledgements and authorities contacted:

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Information sources:

- British Columbia Bryophyte Recovery Team and Garry Oak Ecosystems Recovery Team. 2010. Management plan for banded cord-moss (*Entosthodon fascicularis*) In British Columbia. Prepared for the B.C. Ministry of Environment, Victoria, BC. 14 pp.
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- Parks Canada Agency. 2011. Management plan for Banded Cord-moss (*Entosthodon fascicularis*) in Canada. Species at Risk Act Management Plan Series. Parks Canada Agency. Ottawa. iii + 25 pp.

Additional Sources of Information:

- British Columbia Bryophyte Recovery Team and Garry Oak Ecosystems Recover Team. 2010. Management plan for banded cord-moss (*Entosthodon fascicularis*) In British Columbia. Prepared for the B.C. Ministry of Environment, Victoria, BC. 14 pp.
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TECHNICAL SUMMARY

Entosthodon fascicularis

Banded Cord-moss

Entosthodon fasciculé

Range of occurrence in Canada: British Columbia

Demographic Information

Generation time (usually average age of parents in the population; indicate if another method of estimating generation time indicated in the IUCN guidelines(2008) is being used) Based on During (1979) Banded Cord-moss can be classified as an annual shuttle species, which is characterized by a high sexual reproductive effort, large spores, an open turf or rarely a short turf growth form, and a life span of less than 3 years.	1-2 years or less
Is there an [observed, inferred, or projected] continuing decline in number of mature individuals?	Unknown but suspected
Estimated percent of continuing decline in total number of mature individuals within [5 years or 2 generations]	Unknown
[Observed, estimated, inferred, or suspected] percent [reduction or increase] in total number of mature individuals over the last [10 years, or 3 generations].	Unknown
[Projected or suspected] percent [reduction or increase] in total number of mature individuals over the next [10 years, or 3 generations].	Unknown
[Observed, estimated, inferred, or suspected] percent [reduction or increase] in total number of mature individuals over any [10 years, or 3 generations] period, over a time period including both the past and the future.	Unknown
Are the causes of the decline clearly reversible and understood and ceased?	Possibly
Are there extreme fluctuations in number of mature individuals?	Unknown but suspected

Extent and Occupancy Information

Estimated extent of occurrence	27 130 km ²
Index of area of occupancy (IAO) (Always report 2x2 grid value).	88 km ²
Is the population severely fragmented?	Possibly
Number of locations* Based on the number of occurrences with known or potential threats.	16?
Is there an [observed, inferred, or projected] continuing decline in extent of occurrence?	No
Is there an [observed, inferred, or projected] continuing decline in index of area of occupancy?	No
Is there an [observed, inferred, or projected] continuing decline in number of populations?	No
Is there an [observed, inferred, or projected] continuing decline in number of locations*?	No

* See Definitions and Abbreviations on [COSEWIC website](#) and [IUCN 2010](#) for more information on this term.

Is there an [observed, inferred, or projected] continuing decline in [area, extent and/or quality] of habitat?	Possibly
Are there extreme fluctuations in number of populations?	No
Are there extreme fluctuations in number of locations*?	No
Are there extreme fluctuations in extent of occurrence?	No
Are there extreme fluctuations in index of area of occupancy?	No

Number of Mature Individuals (in each population)

Population	N Mature Individuals
This is based on # of colonies counted in the most recent surveys. It is likely a minimum estimate because colony counts were not made at several occurrences.	34+
Total	34+

Quantitative Analysis

Probability of extinction in the wild is at least [20% within 20 years or 5 generations, or 10% within 100 years].	Unknown
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Threats (actual or imminent, to populations or habitats)

Threats to this species include: housing development, road construction, recreational activities, especially for the populations that occur in and around Victoria. Competition from invasive plant species may present a threat at some sites. Park management activities such as trail or infrastructure construction may be a threat at some sites.
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Rescue Effect (immigration from outside Canada)

<p>Status of outside population(s)? The Banded Cord-moss is ranked G4/G5, with a rounded rank of G4, apparently secure. In the United States Banded Cord-moss is ranked S1 in Oregon and Washington, and is not ranked in Arizona, California, and Texas (NatureServe 2013). In Ireland it is ranked as Near Threatened and is ranked as Least Concern in Europe (Lockhart <i>et al.</i> 2012).</p>	
Is immigration known or possible?	Unlikely
Would immigrants be adapted to survive in Canada?	Possibly
Is there sufficient habitat for immigrants in Canada?	Possibly
Is rescue from outside populations likely?	No

Data Sensitive Species

Is this a data sensitive species? No

Status History

Designated Special Concern in May 2005. Status re-examined and confirmed in May 2015.

* See Definitions and Abbreviations on [COSEWIC website](#) and [IUCN 2010](#) for more information on this term.

Status and Reasons for Designation

Status: Special Concern	Alpha-numeric Code: Not applicable
Reasons for Designation: This rare moss is largely restricted to southwestern British Columbia in Canada, with most occurrences in the threatened Garry Oak habitat. One past collection was made in the Kootenay region in southeastern British Columbia, but whether the species still persists there is unknown. Should habitat destruction and degradation continue, the species will become increasingly vulnerable.	

Applicability of Criteria

Criterion A (Decline in Total Number of Mature Individuals): Not applicable. There is no data on population decline.
Criterion B (Small Distribution Range and Decline or Fluctuation): Not applicable. No evidence of fluctuation, data not available for continuing decline.
Criterion C (Small and Declining Number of Mature Individuals): Not applicable.
Criterion D (Very Small or Restricted Population): IAO exceeds thresholds for Threatened (actual = 88 km ²) and number of locations exceeds 5. Population size estimates are underestimated and outdated.
Criterion E (Quantitative Analysis): No quantitative analyses done.

Table 1. Occurrences of Banded Cord-moss in Canada, of all new and previously known sites, including patch size when known. Data sources: COSEWIC 2004, BC Conservation Data Centre 2013, Steve Joya pers. comm. 2013. * EO is based on occurrences/populations separated by >1km (NatureServe 2004). **Sites are based on BC Conservation Data Centre database (BC Conservation Data Centre 2013). UTM information for these sites is available at the COSEWIC Secretariat.

<i>Entosthodon fascicularis</i>				
EO*	Site name	Year found	Year revisited	Size of colony
EO 1: Victoria, Uplands Park	Site 1	6 April 1982		No estimates given in previous reports
			8 July 2001	No estimates given in previous reports
			2002	About 30 plants in a small (<1m ²) area
			June 2004	No estimates given in previous reports
EO 2: Victoria, Cedar Hill Municipal Park, Kings Pond	Site 1	May 1961		No estimates given in previous reports
			2002	A few sterile plants in a few cm ² area (1 patch?)
EO 3: Observatory Hill, Victoria	Site 1	2000		2-3 small patches under a protective rock ledge
			14 Mar 2004	No estimates given in previous reports
			24 May 2009	No estimates given in previous reports
			19 May 2009	No estimates given in previous reports

<i>Entosthodon fascicularis</i>				
EO*	Site name	Year found	Year revisited	Size of colony
EO 4: Victoria, Swan Lake- Christmas Hill Nature Sanctuary	Site 1	13 May 2004		One small patch
EO 5: Victoria, Skirt Mtn. Goldstream Park	Site 1	2004		No estimates given in previous reports
EO 6: Harmac, Nanaimo	Site 1	8 April 2004	8 April 2004	One small patch
EO 7: Salt Spring Island, Isabella Point	Site 1	10 April 2005		One small patch (2 cm ²)
EO 8: Salt Spring Island, Vesuvius Landing	Site 1	19 April 2005		1 small patch, > 2 cm x 2 cm
	Site 2	19 April 2005		Less than ten small patches, ranging from 4 cm ² to 50 cm ²
EO 9: Salt Spring Island, E. of Parminter Point (Channel Ridge)	Site 1	19 April 2005		< 15 small patches, ranging from 4 cm ² (2 cm x 2 cm) to 1200 cm ² (40 cm x 30 cm)
	Site 2	2 May 2006		1 diffuse patch, (3 cm x 2 cm) of about 10 fruiting plants (some sterile)
	Site 3	2 May 2006		2 small patches, 4 cm ² and 1 cm ²
	Site 4	2 May 2006		1 patch, 2 cm x 15 cm.
	Site 5	2 May 2006		1 patch 2 cm x 1 cm
EO 10: Victoria, Trial Island	Site 1	1 April 1982	1 April 1982	No estimates given in previous reports
EO 11: Summit of Malahat Hwy.	Site 1	29 April 1982		No estimates given in previous reports
			2002	No plants were found
EO 12: Nanoose Hill, Nanaimo	Site 1	13 May 1969		No estimates given in previous reports
			5 May 1975	No estimates given in previous reports
			5 May 1976	No estimates given in previous reports
			4 May 1993	No estimates given in previous reports
EO 13: Old Baldy Mountain, Duncan	Site 1	12 May 1970		No estimates given in previous reports
			1999	No estimates given in previous reports
EO 14: Elisa Point, Sooke	Site 1	21 May 1969		No estimates given in previous reports
EO 15: Saturna Island, Mount Warburton Pike	Site 1	21 May 1997		No estimates given in previous reports

<i>Entosthodon fascicularis</i>				
EO*	Site name	Year found	Year revisited	Size of colony
EO 16:, South of Yahk, Kootenay	Site 1	27 Aug. 1978		No estimates given in previous reports
EO 17: Hornby Island, Helliwell Prov. Park.	Site 1	2003		No estimates given in previous reports
EO 18: Eagle Heights near Duncan 1 km west of Koksilch River	Site 1	14 May 1999		No estimates given in previous reports
EO 19: Bear Hill, North Saanich	Site 1	2005		Numerous small patches
EO 20: Salt Spring Island, Mount Maxwell	Site 1	12 May 2006		Small patch
EO 21: 3 km NE of Kilgard, Sumas Mt.	Site 1	6 Feb. 2010		One smallish patch
EO 22: Rathtrevor Beach Prov. Park, near Parksville, Vancouver Island	Site 1	3 May 2006		No data

Table 2. Threats to each Element Occurrence, based on the threats listed in the 2011 Parks Canada Management Plan for (*Entosthodon fascicularis*) in Canada and the Element Occurrence Records from the B.C. Conservation Data Centre.

EO	Name of EO	Threats
EO 1	Victoria, Uplands Park	Recreational activities such as bicycling, hiking, and off-leash dog walking and the potential for trail or other infrastructure construction.
EO 2	Victoria, Cedar Hill Municipal Park, Kings Pond	The potential for trail or other infrastructure construction.
EO 3	Victoria, Observatory Hill	The potential for trail or other infrastructure construction
EO 4	Victoria, Swan Lake-Christmas Hill Nature Sanctuary	The potential for trail or other infrastructure construction
EO 5	Victoria, Skirt Mtn. Goldstream Park	The potential for trail or other infrastructure construction
EO 6	Nanaimo, Harmac	The potential for urban or highway development.
EO 7	Salt Spring Island, Isabella Point	Unknown
EO 8	Salt Spring Island, Vesuvius Landing	The potential for roadwork activities.
EO 9	Salt Spring Island, E. of Parminter Point, (Channel Ridge)	This site may be affected by housing development if they continue to develop this location.
EO 10	Victoria, Trial Island	Unknown
EO 11	Summit of Malahat Hwy.	This site may be affected at some point by roadwork activities.

EO	Name of EO	Threats
EO 12	Nanaimo, Nanoose Hill	Possible recreational activities?
EO 13	Duncan, Old Baldy Mountain	Unknown
EO 14	Sooke, Elisa Point	This was found in an uncultivated field, thus agricultural activities may affect this site.
EO 15	Saturna Island, Mount Warburton Pike	The potential for trail or other infrastructure construction.
EO 16	Kootenay, South of Yahk	Unknown
EO 17	Hornby Island, Helliwell Prov. Park	The potential for trail or other infrastructure construction.
EO 18	1 km west of Koksilch River	Unknown
EO 19	North Saanich, Bear Hill	Unknown
EO 20	Salt Spring Island, Mount Maxwell	Recreational activities such as hiking.
EO 21	Sumas Mt., 3 km NE of Kilgard	Recreational activities such as hiking.
EO 22	Rath Trevor Beach Prov. Park, near Parksville	The potential for trail or other infrastructure construction.

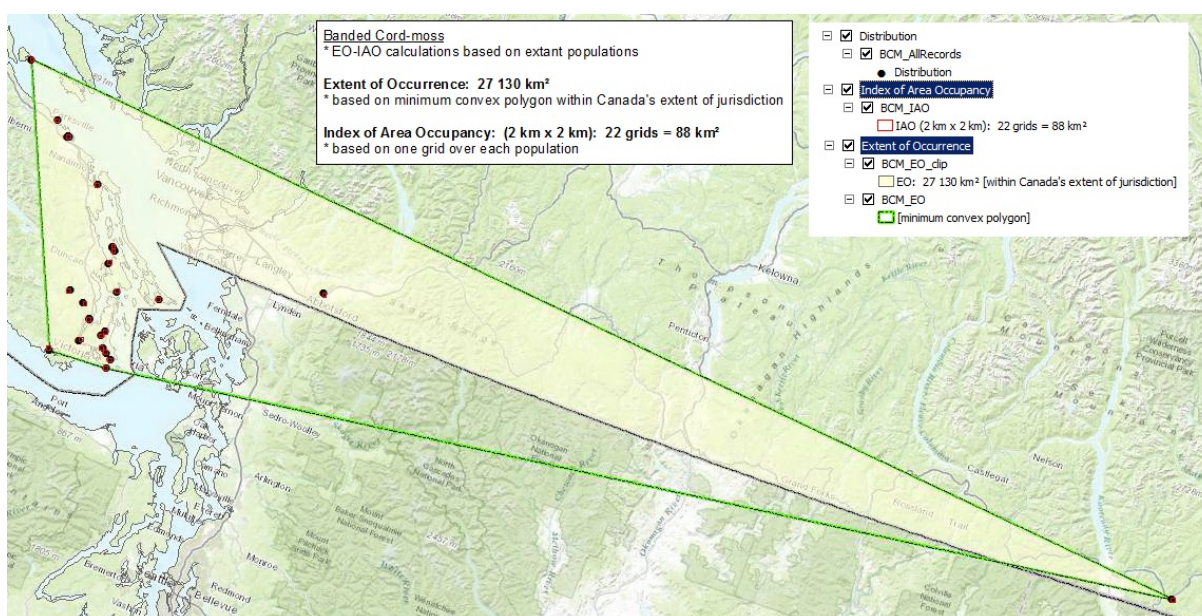


Figure 1. Canadian distribution of *Entosthodon fascicularis* (map courtesy of Jenny Wu, COSEWIC Secretariat).



COSEWIC HISTORY

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was created in 1977 as a result of a recommendation at the Federal-Provincial Wildlife Conference held in 1976. It arose from the need for a single, official, scientifically sound, national listing of wildlife species at risk. In 1978, COSEWIC designated its first species and produced its first list of Canadian species at risk. Species designated at meetings of the full committee are added to the list. On June 5, 2003, the *Species at Risk Act* (SARA) was proclaimed. SARA establishes COSEWIC as an advisory body ensuring that species will continue to be assessed under a rigorous and independent scientific process.

COSEWIC MANDATE

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assesses the national status of wild species, subspecies, varieties, or other designatable units that are considered to be at risk in Canada. Designations are made on native species for the following taxonomic groups: mammals, birds, reptiles, amphibians, fishes, arthropods, molluscs, vascular plants, mosses, and lichens.

COSEWIC MEMBERSHIP

COSEWIC comprises members from each provincial and territorial government wildlife agency, four federal entities (Canadian Wildlife Service, Parks Canada Agency, Department of Fisheries and Oceans, and the Federal Biodiversity Information Partnership, chaired by the Canadian Museum of Nature), three non-government science members and the co-chairs of the species specialist subcommittees and the Aboriginal Traditional Knowledge subcommittee. The Committee meets to consider status reports on candidate species.

DEFINITIONS (2015)

Wildlife Species	A species, subspecies, variety, or geographically or genetically distinct population of animal, plant or other organism, other than a bacterium or virus, that is wild by nature and is either native to Canada or has extended its range into Canada without human intervention and has been present in Canada for at least 50 years.
Extinct (X)	A wildlife species that no longer exists.
Extirpated (XT)	A wildlife species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A wildlife species facing imminent extirpation or extinction.
Threatened (T)	A wildlife species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)*	A wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.
Not at Risk (NAR)**	A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.
Data Deficient (DD)***	A category that applies when the available information is insufficient (a) to resolve a species' eligibility for assessment or (b) to permit an assessment of the species' risk of extinction.

* Formerly described as "Vulnerable" from 1990 to 1999, or "Rare" prior to 1990.

** Formerly described as "Not In Any Category", or "No Designation Required."

*** Formerly described as "Indeterminate" from 1994 to 1999 or "ISIBD" (insufficient scientific information on which to base a designation) prior to 1994. Definition of the (DD) category revised in 2006.



Environment
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