Inclusion of Spotted Turtle *Clemmys guttata* in Appendix II

Proponent: United States of America

Summary: The Spotted Turtle *Clemmys guttata* is a small, semi-aquatic turtle found in wetlands in eastern North America, in Canada and the USA. The species occupies a wide range of at least 200 000 km^2, but is reported to occur in generally small, scattered populations. The total population in Canada is estimated at up to 2000 individuals. There is no reliable assessment for the US. The US population has been categorised as between 10 000 and one million individuals, the lower figure based on an estimate of there being at least 500 populations, each with a minimum average population size of 20 individuals. Spotted Turtles are long-lived: females mature between seven and 15 years of age and produce one or two clutches, generally of three to five eggs, in a breeding year. Many females do not breed every year. Individuals aggregate to hibernate and breed. Habitat has declined in quality and extent over the past century. However, an overall assessment in the USA in 2005 concluded the species was nationally and globally secure. The species was classified in 2011 as Endangered by IUCN, on the basis of a long generation time and inferred population declines.

Clemmys guttata is collected predominantly for the pet trade and collection for this purpose has apparently resulted in local extirpation in some areas. It is not clear what proportion of harvest in the USA is destined for international trade and how much for the domestic trade. Between 1999 and 2010, just under 8000 individuals were recorded as having been exported from the USA. Exports have shown an increasing trend, from about 400 per year for 1999–2001, to approximately 1100 per year for the period 2008–2010, to 1600 in 2011 and around 2000 for 2012 (data incomplete). The great majority of exports are now reported as being captive-bred or farmed, with fewer than 400 specimens reported as wild-collected or with undeclared origin since 2006. Most exports are destined for Asia, and surveys have found this species for sale in pet stores and markets there. Regulatory requirements generally prohibit the commercial export of this species from Canada.

Analysis: The Spotted Turtle is a widespread species that occurs in scattered populations in eastern US and south-eastern Canada. There are no reliable overall population estimates. The species is not considered rare but is believed to be declining slowly. It has a long lifespan and generally low productivity. It is exported from the USA for the international hobbyist trade, particularly to Asia. Exports have shown a rising trend in the past decade, although the great majority of recent exports are declared as captive-bred, with fewer than 100 per year declared as wild-collected or of unknown origin. If this is accurate, then it seems very unlikely that the harvest of specimens from the wild for international trade would reduce the wild population to a level at which its survival might be threatened by continued harvesting or other influences, or at which it might become eligible for inclusion in Appendix I in the near future.

Supporting Statement (SS)	Additional information
Taxonomy	
Synonyms: *Testudo guttata, T. anonyma, T. Punctata.*	
Range	
Canada, United States.	

Supporting Statement (SS)	Additional information
IUCN Global Category	
Endangered A2cde+4ce (Assessed 2011, Criteria version 3.1).	

Biological and trade criteria for inclusion in Appendix II (Res. Conf. 9.24 (Rev. CoP15) Annex 2 a)

A) Trade regulation needed to prevent future inclusion in Appendix I

The population in Canada is estimated at about 2000 individuals. *Clemmys guttata* currently occurs in moderate numbers in eastern and south-western Ontario. The species is known from only two records in Quebec; however, there are no records for the species in the province after 1992.	*The number of mature individuals in Canada is estimated at 1000–2000 and the total population is severely fragmented (COSEWIC, 2004).*
There is no population estimate for the entire US. *Clemmys guttata* generally occurs in small localised populations. Population sizes range from 30–1205 individuals, though most populations are believed to be small or tiny. One southern population was estimated to include 31-36 adults, at a density of 0.36 turtles per ha. Reported population densities vary widely across its range, from 0.05–79.1 per ha, though most populations average 1–10 turtle per ha. Despite the high variability in density across its range, *C. guttata* exhibits a lower overall density than other more common turtles.	*NatureServe (2012) categorised the population as somewhere in the range 10 000 to one million; the minimum figure was based on there being at least 500 populations range-wide, each with an assumed minimum population size of 20 individuals.* *The two records from Quebec are not reliable, thus it does not appear that the species occurs in this province (Litzgus,* in litt., *2012).* *A study which used population viability analysis to assess the risk of extirpation from a relatively pristine bay in Ontario projected an 18–60% probability of extirpation in 100 years (depending on which model was used). Extrapolating to all of Ontario, it was projected that the probability of six or more of the known nine populations becoming extirpated in 100 years was 26% (Enneson and Litzgus, 2009).*
Decreased genetic variability has already been documented in some populations. Increases in the size of *Clemmys guttata* populations occur only gradually and the species requires a lengthy period of time to recover from decline. Like most turtles, this species's life history traits of delayed sexual maturity, extended adult longevity, and high juvenile mortality make the species particularly vulnerable to the removal of even a few adults from the population. Juvenile survival is low, so populations contain few young turtles.	*Using data from Ontario, Enneson and Litzgus (2008) calculated that the average juvenile will contribute 2.3 times more to future generations as compared to eggs/hatchlings. In comparison, the average adult will contribute 28 times more to future generations as compared to eggs/hatchlings. This highlights the disproportionate impact the removal of adults will have on the population.* *Ernst (1976) estimated the average annual mortality for juveniles was 45%, whilst Enneson and Litzgus (2008) calculated annual juvenile survivorship to be 0.82.*
Males reach maturity between 7 and 13 years of age, and females between 7 and 15 years of age. Females produce one or two clutches of 3–5 eggs (with a range of 1–14). Up to half the female population may not be reproductive in a single breeding season and most females do not produce eggs every year. Generation time is in the order of 25–30 years. Longevity is at least 30 years, possibly as high as 65–110 years.	*Through most of the range, only one clutch per year is laid, not two (Meylan* in litt., *2012). Small clutch sizes contribute to the potentially low recruitment rate of this species (Litzgus* in litt.*, 2012). It seems unlikely a female would produce a clutch as large as 14 eggs (Litzgus,* in litt., *2012).*
The species is found in Canada (Ontario, Québec) and the US (Connecticut, Delaware - Presence Uncertain, Florida, Georgia, Illinois, Indiana, Maine, Maryland, Massachusetts, Michigan, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, Vermont, Virginia, West Virginia).	*NatureServe (2012) estimated the total range extent to be between 200 000 and 2.5 million km^2. The extent of occurrence in Canada is estimated at approximately 57 500 km^2 and is thought to be declining (COSEWIC, 2004). The total area of occupancy in Canada is likely to comprise less than 2000 km^2 of wetlands*

Supporting Statement (SS)	Additional information
	(COSEWIC, 2004).
Though the species is found across a wide area, it is patchy in distribution and, where it does occur, is found in low densities. As *Clemmys guttata* populations become more isolated, they are more vulnerable to human exploitation, predation and chance disturbance.	*The range of* Clemmys guttata *appears to be discontinuous with isolated populations occurring in many States within the range (Meylan, 2006). Presence of the species in Delaware is well established (see, for example, www.flickr.com/photos/matt_pics/6221079149 and White, 2011). NatureServe (2012) notes that six US States have ranked the species as secure or apparently secure within their jurisdictions; 10 as vulnerable or probably vulnerable; two as imperilled; and four as critically imperilled. Nationally and globally, it was classified as secure. This classification was last reviewed in 2005.*
Clemmys guttata is assessed as Endangered on the IUCN Red List in 2011 because it has undergone a population decline of more than 50% over three generations due to habitat destruction, invasive species introductions, over-exploitation, and vehicular mortality. Generalised population declines and local extirpations have occurred, especially in the Great Lakes portion of the range, and more recently in the eastern United States. The historic range of *Clemmys guttata* in Illinois likely included much of the Chicago metropolitan area (Cook County); no individuals have been discovered in Cook County since the early 1950s. In Maine, the species has disappeared (development) from historic range in southern Cumberland County. In New York, *C. guttata* was considered to be perhaps the most common turtle in the New York City area at the turn of the century, but today occurs in only a few isolated populations in protected areas. Of 104 populations documented in Ontario over the past 30 to 40 years, the species is now considered to be extirpated from 36 of these sites. The wetland habitat preferred by *Clemmys guttata* has been converted, degraded, or fragmented for agricultural, residential, and other human uses. Habitat trends are inextricably linked to this species' status. In Ohio, where 3–5% of original wetland habitat remains and the species is largely confined to marginal habitat, there are few remaining stable populations considered.	*Occurrence data from 104 locations in Ontario suggest that there has been a >35% decline over the past three generations (75 years). Of the 104 locations, 35% are considered historic or extirpated and 50% are ranked as D quality (non-viable). Most known populations are isolated and no population is known to have more than 200 individuals (COSEWIC, 2004).* *Brodman* et al. *(2002) found that in the Jasper-Pulaski Fish and Wildlife Area (Indiana),* Clemmys guttata *had declined from "common" in the 1930s to just one individual in the 1990s.* *Individuals show fidelity to certain habitat features and locations at certain times of the year, which causes individuals to aggregate in spring for mating and feeding (Litzgus,* in litt., *2012). A study in Ontario found almost half of the individuals monitored returned to the same hibernaculum for more than one winter (Litzgus* et al., *1999). The characteristic of aggregating for hibernation and mating makes the species susceptible to exploitation by pet trade collectors (COSEWIC, 2004).* Clemmys guttata *is thought to be fairly specialised in its habitat requirements and is not able to disperse/colonise very easily. This means habitat degradation, fragmentation and loss can cause the total loss of a population, while new opportunities, if any, are rarely colonised (van Dijk, 2011).The species requires a wetland mosaic and the ability to move between permanent and temporary wetlands in order to prosper (Meylan,* in litt., *2012).*
B) Regulation of trade required to ensure that harvest from the wild is not reducing population to level where survival might be threatened by continued harvest or other influences	
The overall population trend is decreasing due to habitat destruction, invasive species introductions, collection for the pet trade and vehicular mortality. The species is taken from the wild for international and national commercial trade, primarily destined for Asia. In Ontario, evidence suggests that this species is also harvested for the food industry and traditional medicinal uses. In Canada, declines are thought to be due to the deterioration of the habitat and the illegal collection of	*Exports from the US have shown an increase in 2011 and 2012, despite full records for November/December 2012 not being included (see figure below).Those importing the greatest number of* Clemmys guttata *were Hong Kong, Japan and Taiwan POC.*

Supporting Statement (SS)	Additional information

individuals.

Available data show that US exports of this species have steadily increased from nearly 350 per year in 1999 to about 1000 per year by 2010 (Table below). Data for the five-year period from 1996 to 2000 reported that a total of 1848 individuals were exported. This equates to about 370 individuals per year. The total exports for the 12-year period in Table (below) were 7881 specimens which average to 657 specimens per year. Thus, overall, annual U.S. exports are increasing.

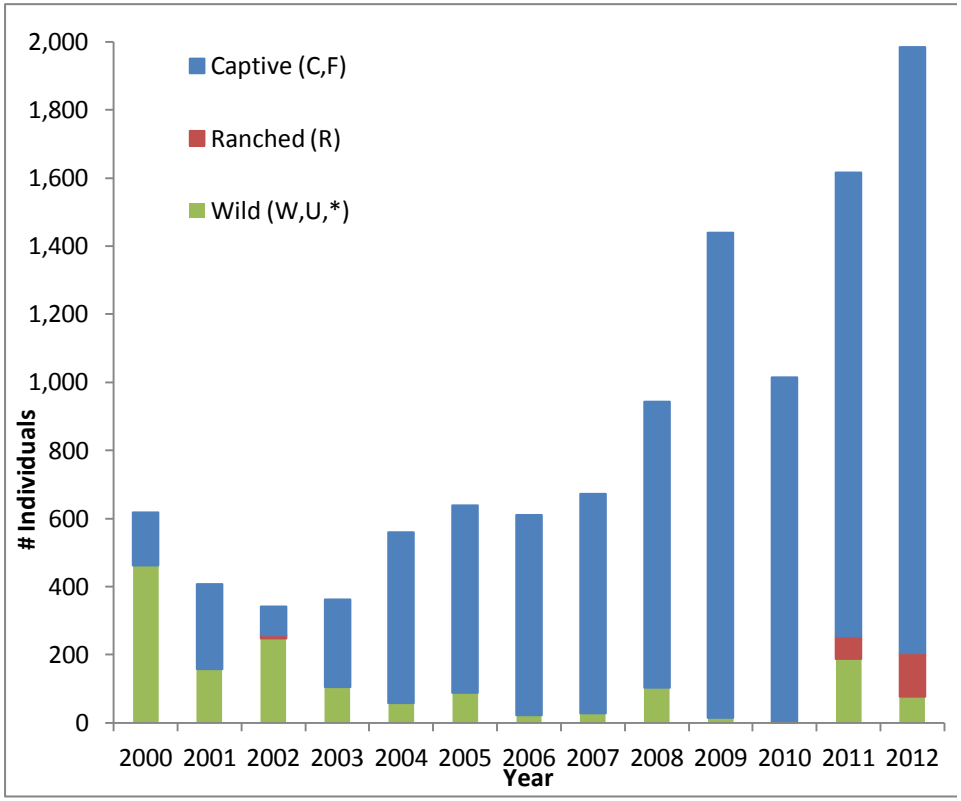
Table: US Exports of *Clemmys guttata;* 1999-2010

Year	#Individuals	#Shipments
1999	344	37
2000	617	66
2001	407	64
2002	342	52
2003	358	43
2004	537	74
2005	638	66
2006	611	61
2007	653	73
2008	943	64
2009	1442	72
2010	989	55

Between 1999 and 2010, approximately 16% of the exports in Table (above) were reported as wild and 80% were reported as captive-bred or farmed. This reportedly high level of captive breeding is quite different from an analysis of the 1996-2000 data; 57% of which were wild caught, 23% were unknown or undeclared, and 16% were captive born or bred.

In a survey in 2002 of US internet sites, 5 dealers were selling *Clemmys guttata* for an average price of USD148 (ranging from USD100-240). Based on the descriptions and sizes of animals provided by the sellers, it was estimated that 60% of the animals were wild-caught. A web survey of five dealers in 2011 showed an average

Figure: US Fish and Wildlife Service's trade database (LEMIS) Export Data for Clemmys guttata *2000–2012 for all purposes. Note data for 2012 are incomplete as they do not contain full records for November or December.*



Ernst and Lovich (2009) identified Clemmys guttata *as one of the species "hardest hit" by the illegal harvest of turtles.*

In North Carolina, 543 Clemmys guttata *were known to have been removed in a*

Supporting Statement (SS)	Additional information
price for juvenile *Clemmys guttata* of USD169 (ranging from USD100-250) and adult *Clemmys guttata* selling for USD386.47 (ranging from USD200-500). Thus, market prices are rising. In Ontario, there have been several convictions for the collection, transport, sale, and illegal aquaculture of freshwater turtle species, including *Clemmys guttata*. Their market value is considerably higher than other turtles because of their ornate markings as well as their rarity and difficulty to acquire legally.	*single year (Buhlmann and Gibbons, 1998).* *In South Carolina, in the early 2000s, one collector was known to possess nearly 200 wild-caught* Clemmys guttata *(Litzgus,* in litt., *2012).* *Between 1998 and 2002, 982 wild-caught individuals were exported from the USA, and Schlaepfer* et al. *(2005) identified* Clemmys guttata *as a species expected to be particularly vulnerable to commercial take, on the basis of its life-history characteristics, geographic distribution and levels of US trade.* *Of 62* Clemmys guttata *sold in Florida 1990–1991, eight and 16 were reported to be destined for Japan and Switzerland, respectively (Enge, 1993). The same study found that between 1990 and 1992, 20* Clemmys guttata *were captive-bred in Florida for sale in the pet trade. In comparison, during the same two-year period, 122 wild* Clemmys guttata *from outside Florida were brought into Florida and sold.* Clemmys guttata *was found for sale in the pet trade in Hong Kong markets between 2000 and 2003 (Cheung and Dudgeon, 2006).* *Shiau* et al. *(2006) found* Clemmys guttata *for sale in pet shops in southern Taiwan POC during the period 2004–2005.* *Ten* Clemmys guttata *were found for sale in Jakarta in 2010, whilst none were found in 2004 (Stengel* et al.*, 2011).* *A study by Auliya (2003) found that* Clemmys guttata *was recorded on price lists of wholesalers and retailers in Europe 1977–1999. Similarly, Arena* et al. *(2012) reported* Clemmys guttata *on display at the International Herpetological Society (IHS) (UK) and Expoterraria (Spain) reptile pet markets.* *In the unsuccessful proposal for inclusion in Appendix II at CITES CoP11 (CoP11 Proposal 11.37, 2000), the SS stated the following examples of impact upon wild populations: Dr. Carl Ernst (George Mason University) knew of three formerly large, healthy populations that had been extirpated by pet trade collectors in the past 20 years. One in Lancaster County, Pennsylvania, had 300–400 individuals in 1980, but none were found at the site in 1999. The other two populations, both about the same size as the Pennsylvania population, were in northern Virginia. One had had no records of* Clemmys guttata *since 1989, and the other had had only two since 1985. James Harding (Michigan State University Museum) had strong circumstantial evidence that collectors wiped out his study population of 20–25 Spotted Turtles in south-central Michigan in the early 1970s. Alvin Braswell (North Carolina State Museum) reported that Spotted Turtles were difficult to locate in Hyde and Tyrrell County, North Carolina, after a collector removed more than 1100 from the wild in 1993–94.*

Supporting Statement (SS)	Additional information
Inclusion in Appendix II to improve control of other listed species	
A) Specimens in trade resemble those of species listed in Appendix II under Res. Conf. 9.24 (Rev. CoP15) Annex 2 a or listed in Appendix I	
Clemmys guttata is a member of the Emydidae family. Similar species in this family that have overlapping ranges include the Bog Turtle *Glyptemys muhlenbergii*, which used to be considered the same genus as *Clemmys guttata*, and the Blanding's Turtle *Emydoidea blandingii*. Adult Blanding's turtles are substantially bigger than *Clemmys guttata*.	Glyptemys muhlenbergii *has been listed in CITES Appendix I since 1992.* Emydoidea blandingii *is also proposed for inclusion in CITES Appendix II (CoP16 Prop. 30).*
Other information	
Threats	
The overall population trend is decreasing due to habitat destruction, invasive species introductions, collection for the pet trade and vehicular mortality. Habitat destruction and degradation has led to fragmentation and isolation of remaining populations, and has increased their vulnerability to human exploitation. The wetland habitat preferred by *Clemmys guttata* has been converted, degraded, or fragmented for agricultural, residential, and other human uses. Habitat trends are inextricably linked to this' species status. The species's sensitivity to pollutants narrows the amount of available suitable habitat. Subsidised predators (that occur in unnaturally large populations near human population centres) such as raccoons, probably represent a further impact on eggs and juveniles, and likely reduce recruitment into existing populations.	*Primary threats to this species include grazing, draining and filling of wetlands, and artificial control of water levels (NatureServe, 2012).*
Conservation, management and legislation	
In Canada, *Clemmys guttata* was designated as Special Concern in 1991 and Endangered in 2004, under Schedule 1 of the Species at Risk Act, which makes it illegal to possess, collect, buy, sell or trade an individual of a species. Provincially, in Ontario, which is the primary range jurisdiction for this species, *Clemmys guttata* is listed as Endangered under the Ontario Endangered Species Act. *Clemmys guttata* are also protected under Ontario's Fish and Wildlife Conservation Act of 1997. In Quebec, *Clemmys guttata* nests are protected from disturbance, destruction or alteration by the *Loi sur la Conservation et la Mise en Valeur de la Faune*. *Clemmys guttata* are protected to varying degrees in all USA range States. Commercial harvest is not allowed in some US States within this species's range, and is allowed but restricted in others (see SS for full details).	

Supporting Statement (SS)	Additional information
The species occurs in a number of protected areas across its range, but those habitats may not be secure due to problems associated with pollution and illegal collection.	
Captive breeding/Artificial propagation	
Clemmys guttata is being bred by hobbyists but there have been no large scale breeding programmes. Headstarting of hatchlings is not recommended for this species, except in cases of severe species decline.	

Reviewers: J. Iverson, J. Litzgus, P. Meylan, C. Shepherd.

References:

Arena, P.C., Steedman, C. and Warwick, C. (2012). *Amphibian and reptile pet markets in the EU—An investigation and assessment.* http://faada.org/userfiles/ARPM2012_v122%5B2%5D.pdf. Viewed 7 November 2012.

Auliya, M. (2003). *Hot trade in Cool Creatures: A Review of the Live Reptile Trade in the European Union in the 1990s with a Focus on Germany.* TRAFFIC Europe, Brussels, Belgium.

Brodman, R., Cortwright, S. and Resetar, A. (2002). Historical changes of reptiles and amphibians of northwest Indiana fish and wildlife properties. *American Midland Naturalist* 147: 135-144.

Buhlmann, K.A. and Gibbons, J.W. (1998). Imperilled aquatic reptiles of the south-eastern United States: Historical review and current conservation status. *In*: Benz, G., and Collins, D.E. (Eds). *Conference on Aquatic Fauna in Peril: The Southeastern Perspective*. Southeast Aquatic Research Institute, Lenz Design & Communication, Decatur, GA, pp. 201-232.

Cheung, S. M. and Dudgeon, D. (2006). Quantifying the Asian turtle crisis: market surveys in southern China, 2000–2003. *Aquatic Conservation: Marine and Freshwater Ecosystems* 16: 751-770.

CoP11 Proposal 11.37 (2000). Convention on International Trade In Endangered Species of Wild Fauna And Flora Amendments to Appendices I and II of CITES. http://www.cites.org/eng/cop/11/prop/37.pdf. Viewed 4 December 2012.

COSEWIC (2004). *COSEWIC assessment and update status report on the spotted turtle* Clemmys guttata *in Canada*. Committee on the Status of Endangered Wildlife in Canada, Ottawa. www.cosewic.gc.ca/eng/sct1/searchdetail_e.cfm. Viewed 7 November 2012.

Enge, K. M. (1993). Herptile Use and Trade in Florida. Florida Game and Fresh Water Fish Commission Nongame Wildlife Program Final Performance Report. pp. 102 Tallahassee, FL.

Enneson, J.J. and Litzgus., J.D. (2008). Using long-term survey data and a stage-classified matrix to assess conservation strategies for an endangered turtle (*Clemmys guttata*). *Biological Conservation* 141: 1560-1568.

Enneson, J.J. and Litzgus., J.D. (2009). Stochastic and spatially explicit population viability analyses for an endangered freshwater turtle, *Clemmys guttata*. *Canadian Journal of Zoology* 87: 1241-1254.

Ernst, C.H. (1976). Ecology of the Spotted Turtle, *Clemmys guttata* (Reptilia, Testudines, Testudinidae), in south-eastern Pennsylvania. *Journal of Herpetology* 10: 25-33.

Ernst, C.H. and Lovich, J.E. (2009). *Turtles of the United States and Canada*. *Second edition*. Johns Hopkins University Press, Baltimore, USA.

Litzgus, J. (2012). In litt. to the IUCN/TRAFFIC Analyses Team, Cambridge, UK.

Litzgus, J.D., Costanzo, J.P., Brooks, R.J. and Lee Jr, R.E. (1999). Phenology and ecology of hibernation in spotted turtles (*Clemmys guttata*) near the northern limit of their range. *Canadian Journal of Zoology* 77: 1348-1357.

Meylan, P.A. (2006). *Clemmys guttata*—Spotted Turtle. In*:* Meylan, P.A. (Ed.). *Biology and Conservation of Florida Turtles.* Chelonian Research Monographs series, Number 3: 226-234.

Meylan, P.A. (2012). In litt. to the IUCN/TRAFFIC Analyses Team, Cambridge, UK.

NatureServe (2012). *NatureServe Explorer: An online encyclopaedia of life* [web application]. Version 7.1. NatureServe, Arlington, Virginia. www.natureserve.org/explorer. Viewed 7 November 2012.

Schlaepfer, M.A., Hoover, C. and Dodd Jr. C.K. (2005). Challenges in evaluating the impact of the trade in amphibians and reptiles on wild populations. *BioScience* 55: 256-264.

Shiau, T.W., Hou, P.C., Wu, S.H. and Tu, M.C. (2006). A survey on alien pet reptiles in Taiwan. *Taiwania* 51: 71-80.

Stengel, C.J., Shepherd, C.R. and Caillabet, O.S. (2011). *The Trade in Tortoises and Freshwater Turtles in Jakarta Revisited.* TRAFFIC Southeast Asia, Petaling Jaya, Selangor, Malaysia.

van Dijk, P.P. (2011). *Clemmys guttata*. In: IUCN 2012. IUCN Red List of Threatened Species. IUCN Red List of Threatened Species. Version 2012.2. Viewed 25 October 2012.

US Fish and Wildlife Service data reporting system: LEMIS (2000-2012).

White, J. (2011). The spotted turtle: a wetland jewel. *Working for wetlands. Newsletter of the Delaware Adopt-a-Wetland Program*. 16: 3.