WETLANDS, Vol. 23, No. 4, December 2003, pp. 921–940
© 2003, The Society of Wetland Scientists

CULTURAL PERCEPTIONS OF SMALL URBAN WETLANDS: CASES FROM THE HALIFAX REGIONAL MUNICIPALITY, NOVA SCOTIA, CANADA

Patricia M. Manuel
School of Planning, Faculty of Architecture and Planning
Dalhousie University
Halifax, Nova Scotia, Canada B3H 4R2
E-mail: patricia.manuel@dal.ca

Abstract: Urban wetlands, despite their imperfections, provide natural and aesthetic landscape diversity in the built environment. We are beginning to understand and document the ecological significance of this diversity and the management challenges presented by the urban context. The cultural significance of urban wetlands has not received similar attention. The research presented in this paper explores the relationship between people and wetlands in local neighborhood settings. We surveyed residents of three urban communities in the Halifax Regional Municipality, Nova Scotia, Canada for their knowledge about and perceptions of a small wetland in each of their respective neighborhoods. Results of the survey show that the study participants are aware of the wetlands in their midst but are not especially observant of or knowledgeable about 'their' sites, nor do they visit their wetlands regularly. Yet, despite this apparent disinterest, they readily identify the wetlands as part of their neighborhoods and as assets, especially as natural features and habitat for urban wildlife. The study participants do not consider these neighborhood wetlands nuisance environments or a waste of land. Instead, respondents revealed an appreciation of the aesthetic attributes and habitat value of wetlands in the city and of urban natural spaces.

Key Words: urban wetlands, urban habitat, wetland values, cultural values

INTRODUCTION

Wetland loss and degradation due to urban-industrial development is substantial, wide-spread and widely documented in the wetlands literature. Yet, despite the mechanisms of wetland loss, some wetlands do manage to persist in urban and suburban neighborhoods. Remnant urban wetlands tend to be very small (many are less than 2.0 ha and often much smaller) and are usually isolated from other wetlands and other natural systems. With our attention typically directed toward large, showy, 'productive' wetlands, the functions and values of small, remnant urban systems go unnoticed in our wetland research and protection efforts. We are only just now beginning to study and document the circumstances, ecology, and management needs of urban wetlands (Kusler 1990, Kentula 1995, Reinelt et al. 1998, Kentula and Magee 1999, Owen 1999, Ehrenfeld 2000, Azous and Horner 2001).

Attempts to conserve or protect small wetlands often meet with skepticism or disinterest by regulating authorities, planners, and developers. The few initiatives to protect wetlands in urban settings have usually involved little more than avoiding them while development occurs around them (Titton 1995). Small remnant wetlands are often too small, isolated, polluted, monotonous, or inconspicuous to fit neatly into wetland protection and management frameworks designed primarily for rural and wild environments (Bond et al. 1992, Ontario Ministry of Natural Resources 1992, 1993, Nova Scotia Department of Environment 1995, Canadian Wildlife Service 1998). Issues of size, 'unnatural' setting, degraded condition, origins and influences, 'land' value, and ownership all complicate our interpretation and response to urban wetlands.

Despite the low status of urban wetlands in wetland science and management, there is growing recognition of their contribution to enhancing and supporting urban environments (Smardon 1988, Chovanec 1994, Gosselin and Johnson 1995, Titton 1995, Girling and Helphand 1997, Ehernfeld 2000, Houck per. comm.). There is, for example, a growing literature documenting public support and direct action to protect or restore specific wetlands in a variety of settings (e.g., Dewitt 1981, Schneider 1995). Urban and suburban environments figure prominently among these reports where small, ''neighborhood,'' or ''community'' wetlands are the focus of stewardship and ''friends of'' programs (Gosselin and Johnson 1995, Environsphere Consultants 1996).

In municipal services, proponents of watershed planning, landscape ecology, and urban natural areas promote wetlands as integral components of both natural and constructed urban greenways (McGuckin

1995, Titton 1995, Cox et al. 1996, Galuzzi and Phlaum 1996, Girling and Helphand 1997). As part of urban greenways, wetlands are integrated into stormwater management, habitat enhancement, and open space amenity planning. The structure of a greenway, especially when used in urban stormwater management, may also ensure that small urban wetlands are linked to other natural environments, thereby avoiding the isolation that can lead to their deterioration and loss of function and value (Titton 1995).

Recognition of urban wetland value is also implicit in the creation and use of artificial wetlands for numerous and varied purposes in built-up environments ranging from inner city backyards to industrial parks (Hammer 1989, 1997, Kusler and Kentula 1990, Campbell and Ogden 1999, Kennedy and Myer 2002). Engineered or natural but altered, small, and medium-sized wetlands are increasingly included in innovative urban stormwater and wastewater management systems. In addition, where municipalities and their engineers are exploiting the hydrologic functions of wetlands, gardeners are now cultivating ponds and water gardens.

Citizen action to protect roadside ponds, linking natural structures and parkland in urban greenways, and introducing wetlands into the built-up environment for practical and aesthetic purposes demonstrate a growing appreciation of the value of wetlands in urban settings. It is therefore curious that we continue to tolerate, ignore, and often unwittingly encourage the loss of natural wetlands through urban planning, design, and development practices. It is also unfortunate that we know so little about what we are losing.

Remnant urban wetlands warrant study. First, they persist, usually despite enormous development pressures. Why they persist and, at least to casual observation, appear to be functional wetlands in some capacity could provide clues to integrating threatened wetlands into new residential, commercial, or industrial developments (Galuzzi and Pflaum 1999). Second, urban wetlands offer a range of nature-centered experiences that other city 'wildernesses' cannot. For town and city dwellers, and especially children, these small accessible places provide important intimate contact with nature's cycles and diversity. Protecting and using small urban wetlands may foster a life-long affinity for natural places in general and wetlands in particular. If we overlook small urban wetlands, we may be missing opportunities to increase our knowledge of both wetland ecology and cultural attitudes toward wetlands, information we could use to promote the wetland experience and improve our successes in wetland protection and restoration and also wetland creation in the built environment.

Cultural Perceptions and Values of Wetlands

Our acceptance of wetlands, especially of wetlands in rapidly developing areas, is key to timely and successful protection and management. Acceptance grows with understanding. We now have a well-developed science of the ecological functions of wetlands. We are seeing the benefits of translating this scientific knowledge into education about wetlands. We have federal and provincial legislation supporting wetland protection and many projects based on direct citizen participation. Our understanding of the culturally derived value of wetlands is, on the other hand, less developed. How and why we respond to wetlands—and hence value them—underlies our willingness to accept and advocate wetland protection.

The word 'wetland' names an extremely diverse category of natural features. It is quite easy to 'see' and therefore appreciate the value of large, productive wetlands with their great expanses of marsh 'hay' and water and their large, showy displays of wildlife. It is quite another matter to comprehend the value of a small, reedy, pond tucked between a shopping mall parking lot and a row of well-manicured suburban backyards. Yet, both types of wetland solicit culturally based responses that determine our behavior toward them.

Although not extensive, the literature exploring perceptions of and attitudes toward wetlands is diverse. It includes anecdotal reports, historical explorations, reflective essays, and some directed investigations (Fritznell 1978, Niering 1978, Reimold et al. 1980, Smardon 1983 and 1988, Bardecki 1984, Worley 1984, Johnson and Worley 1985, Kruetzwizer and Pietraszko 1986, Palmer and Smardon 1988, Bardecki et al. 1989, Steinhart 1990, Vileisis 1997). What emerges is a spectrum of responses to wetlands from disdain to apathy to enthrallment. On the whole, however, we find appreciation for the wetland experience through a blend of utilitarian, recreational, and aesthetic benefits. Utilitarian and recreational benefits are often intimately and specifically linked with wetland wildlife, while aesthetic appreciation is more ethereal, relating to qualities of openness, wildness, habitat diversity, and even perceptions of oddness, mystery, and common land that wetlands can impart to the landscape (Fritznell 1978, Niering 1978, Riemold et al. 1980, Worley 1984, Steinhart 1990). All of these studies report experiences of wetlands in rural or wilderness settings. Our understanding of the cultural experience and perceptions of urban wetlands is scarcely explored.

Urban wetlands have the potential to fulfill many of the same functions as wetlands in natural or rural landscapes. However, the factors that appear to contribute significantly to the recreational and aesthetic experi-

ence of rural wetlands—including size, structural diversity, productivity, and ambiance—are often compromised or perhaps not even relevant in an urban setting. Smardon (1988) and Palmer and Smardon (1988) identified some of the limitations of urban wetlands, in so far as providing a recreational experience is concerned, but they also suggested that the mere presence of a wetland in the built-up environment presents its own opportunities for aesthetic appreciation. They suggest that because of location, structure, and smaller size, urban wetlands may take on special significance as buffers against development (e.g., privacy) and may also provide habitat for isolated or relict flora and fauna. Their expectation is that cultural, especially aesthetic, experience may be the most important source of value of urban wetlands.

Contrary to some commonly held assumptions about attitudes toward small remnant wetlands in urban areas, a wetland's neighbors could be its best advocates and protectors. Local residents are, after all, those most likely to be familiar with the place; they may even be the only ones who know about it. Granted, people have concerns about the condition and upkeep of wetlands where they happen to be close to home, but when asked, they are also interested in opportunities to enjoy a wetland as a natural amenity (e.g., Hopkinson et al. 1997). Our own observations of people's behavior toward small, local wetlands, as well as documentation of urban wetland stewardship projects, suggests that town and city dwellers are interested in and responsive to these natural places. The degree of perceptiveness among those living close to these places, and the source and nature of any interest they hold in a wetland, is worth understanding. Knowing what makes a small, remnant wetland interesting or appealing or, alternatively, what makes it problematic may hold lessons for the successful, long-term protection, design, and management of wetlands in built-up environments.

Fortunately, some urban and suburban landscapes are still blessed with a relative abundance of naturally occurring wetlands. The Halifax Regional Municipality (HRM), on the Atlantic coast of Nova Scotia, Canada (Figure 1) offers excellent opportunities for studying naturally occurring wetlands in urban and suburban settings. Despite the usual pressures from development, the urban communities of the HRM still contain substantial areas of natural landscapes, including many wetlands. The area's diverse geology and glacial history give rise to similarly diverse wetland forms. Often no more than the size of a small suburban lot and in the midst of some very dense development, we still find remnant bogs and fens, innumerable cattail marshes, lush flood plains, seasonal and permanent ponds, and marshy lake shores.

APPROACH AND METHOD

Research Objective

In May 1996, we began a research project to examine the relationship between people and wetlands in the urban environment, focusing in particular on small, highly localized wetlands unlikely to satisfy most standard criteria for designation as 'valuable' natural spaces. Our research objective was to identify, document, and articulate the relationship between people and wetlands in urban or suburban neighborhoods—perceptions people have of wetlands in their neighborhood; their familiarity with these features; and local patterns of use. Our motivation was to increase our understanding of people's responses to and use of urban wetlands. Improved understanding of cultural responses will contribute to greater success when we attempt to integrate wetlands with the built-up environment. We chose to focus on remnant urban wetlands. In established neighborhoods with natural wetlands, the wetland and local residents have co-existed for a long period of time, likely as long as the human community has been there. Residents have had time to establish some level of familiarity and pattern of use with the local site. Furthermore, with the increasing use of constructed wetlands in urban settings, it is important to understand concerns people have about neighborhood-level wetlands and also the attributes that appeal to them. Small remnant wetlands offer an opportunity for such study. Their persistence in some unlikely settings indicates a degree of success in integrating with local urban hydrology, whether as overland flow catchments or as stormwater discharge receiving basins. Stormwater management is a common design function of constructed wetlands. The attitudes of people toward remnant natural wetlands, many serving the same purpose as constructed systems, can advise us on community concern and interest when constructing wetlands in urban settings.

Approach

We used a case study approach to investigate responses to urban wetlands and selected multiple sites with the intent of identifying similarities and differences among responses to different types of wetlands in different neighborhood settings. We chose three wetlands from an inventory of 18 candidate sites that satisfied the following criteria: less than 2.0 ha, visually distinct from adjacent or adjoining water systems, originating as a naturally occurring site and persisting under 'unmanaged' (although impacted) conditions, and situated in a readily identifiable urban or suburban residential neighborhood. We delineated neighborhood boundaries around each wetland to include residents

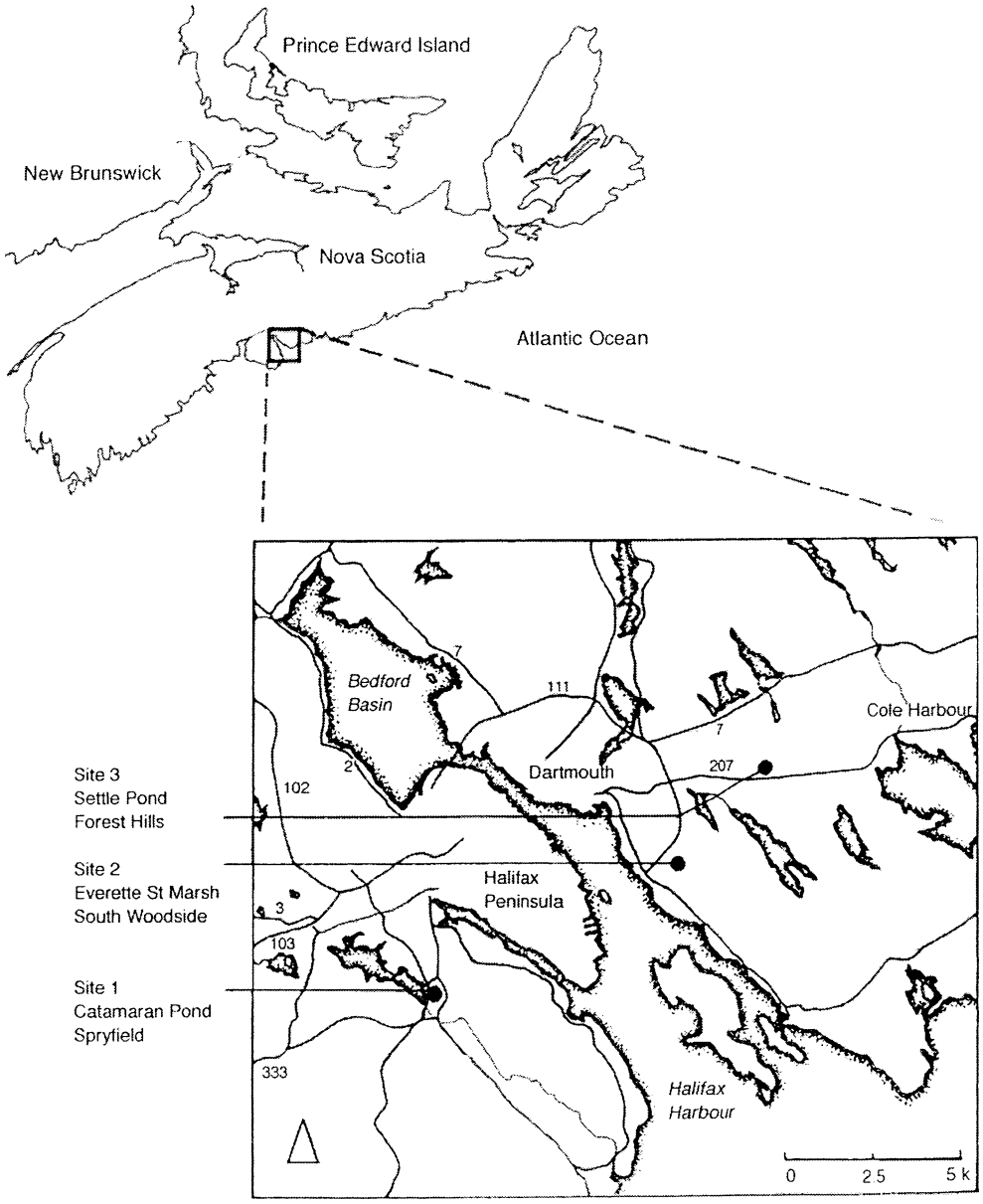


Figure 1. Halifax Region Urban Context Study Site Locations

who have reasonable opportunity for routine contact with the wetland. Each study site thus consisted of a wetland and a surrounding or adjacent neighborhood. The study sites are Catamaran Pond, 'Old' Spryfield (Site 1); Everette Street Marsh, South Woodside (Site 2); and Settle Pond, Forest Hills (Site 3).

Figure 1 locates the three study sites in the context of urban Halifax Regional Municipality. Table 1 summarizes the main characteristics of each wetland and its surrounding neighborhood. Figure 2 and Figures 3a to 3c illustrate the setting of the three study wetlands within their respective neighborhoods.

The study site wetlands are similar in that they are naturally occurring environments affected by the adjacent urban development. In each case, they are a remnant of the woods and wetlands that once dominated in the area. They differ in their size (although each is less than 2.0 hectares), structure, vegetation communities, and their 'institutional profile' or level of recognition in the municipality and beyond. Each wetland is located in an established neighborhood, but the neighborhoods differ in their development history, urban form, and socio-economic character.

Survey Method

The wetland 'neighborhoods' (Figure 3a to 3c) provided the study survey populations based on house-

Table 1. Neighborhood setting and wetland attributes.

Site Description	Site 1 Old Spryfield Catamaran Pond	Site 2 South Woodside Everette St. Marsh	Site 3 Forest Hills Settle Pond
Neighborhood Setting	—medium density mixed commercial-residential community of modest single-family homes, duplexes, apartments. —pre-war to 1980s. —adjacent Long Lake and park reserve lands.	—'working class' neighborhood adjacent oil refinery and port facilities. —modest single family homes, apartments, duplexes, trailer court. —1950s to mid-1980s. —community abuts large area of forest and wetland.	—1970s style middle-income suburban community of single family residences. —heritage farm property sits at entrance to subdivision. —neighborhood includes the Settle Lake–Settle Pond greenbelt.
Wetland Setting	—houses and roads developed to wetland edge on western perimeter. —woodland buffer on eastern and southern perimeter (to 30 m wide).	—regular geometry controlled by adjacent street, residential and industrial properties. —bordered by woodland on eastern edge.	—at lower end of stream and woodland greenbelt. —bordered on three sides by residential and commercial development. —heritage farm pasture slopes to pond on southeast perimeter.
Wetland Structure	—1.8 ha pond-marsh. —two ponds along a small watercourse, linked and partly encircled by emergent vegetation (*Typha, Scirpus, Pontedaria cordata* L.), and shrub swamp border (*Myrica gale* L., *Salix discolor* Muhl, *Alnus rugosa* DuRoi, *Acer rubrum* L.)	—0.25 ha marsh-shrub bog. —marshy (*Typha–Scirpus*) depression, with shallow puddle at culvert inflow, adjacent drier *Sphagnum* sp. hummocks supporting ericaceous shrubs, scattered small trees (*Betula populifolia* Marsh); meadow (*Carex–Iris versicolor* L.) patches.	—0.8 ha pond-marsh. —shallow pond ringed by *Typha* mat. Shrub swamp inflow (*Myrica gale, Salix discolor* Muhl, *Alnus rugosa* DuRoi, *Acer rubrum* L.)
Hydrology & Water Quality	—stormwater catchment. receives inflow via vegetated ditch. —discharges through culvert to regional stormwater collection network. —enriched by storm water drainage.	—receives drainage from oil tank farm via a culvert. —perimeter receives street runoff. —all drainage discharges through culvert at southeast corner to stormwater collector. —once part of larger wetland. —inflow is polluted by tank farm residue.	—receives drainage from Settle Lake to the north. —drains via culvert connecting to regional stormwater collection network. —enriched with runoff. —previously enriched by car wash drainage (now rerouted) and sewage plant effluent (removed in early 1980s).
Institutional Recognition	—assessed as 'good' habitat potential in the provincial wetland evaluation (modified Golet system).	none	—by association with Cole Harbor Heritage Farm Museum (boardwalk leads from farm to pond).

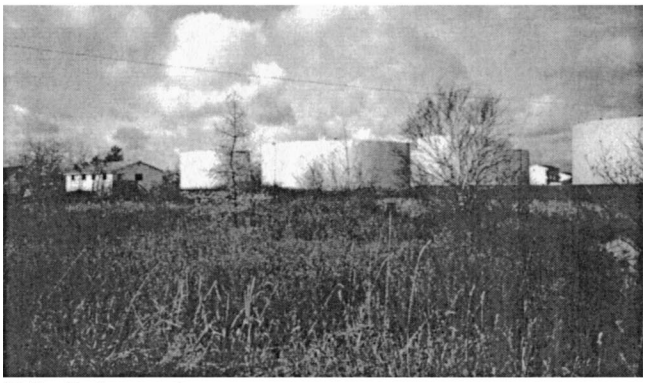
holds. These populations included 198 households for Old Spryfield (Catamaran Pond); 204 households for South Woodside (Everette Street Marsh); and 183 households for Forest Hills (Settle Pond). Random sampling using a civic directory gave us our sample populations of 65 households for each of the neighborhoods. Two interviewers administered survey questionnaires during the summer and late spring of 1996–97 using telephone and door-step interviews. Repeat phone calls at different times of day and some follow-up door-step visits resulted in 29 completed questionnaires for Old Spryfield and South Woodside (45 percent response rates for 15 and 14 percent samples, respectively) and 24 responses for Forest Hills (37 percent response rate, 13 percent sample). These small sample sizes yielded confidence levels of 90 percent ($p=0.1$) for the three sites but slightly higher when the households of the three sites are combined into one population treated as an aggregate group (households close to a small, urban wetland).

The survey questionnaire (provided in Appendix 1) contained 30 primary questions organized into four parts, using a combination of yes/no and category selections, open-ended questions and 'Likert'-scaled (1 to 5) responses to prescribed statements. The questionnaire queried participants about i) demographic information and household orientation to environmental issues and outdoor activities; ii) knowledge or perceptions of neighborhood boundaries, community character, and natural areas in the neighborhood; iii) wet-

Site 1 - Catamaran Pond, Spryfield

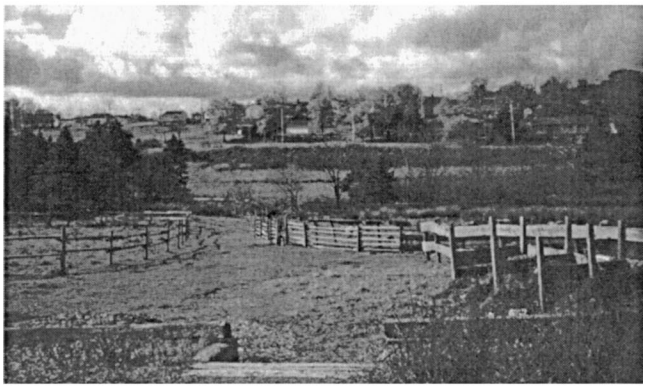
Wetland in foreground.

Site 2 - Everette Street Marsh, South Woodside



Wetland in foreground.

Site 3 - Settle Pond, Forest Hills



Wetland in middle ground.

Figure 2. Study area wetlands.

land site-specific information, including awareness, knowledge, and observation of the wetland, use of the wetland; perceived advantageous or disadvantages associated with the wetlands and attitudes toward or impressions about the wetland; and iv) general orientation to values of 'naturalness' and 'wetlandness' in an urban setting. The wording of some questions allowed respondents to include the experience of other household members in some answers. We restricted our questioning to one adult member of the household. The questionnaire took 15 minutes on average to administer, including a brief explanation of the project.

Data Analysis

Survey results were encoded and stored in Excel version 7.0 data base. Encoding was straightforward for responses to category selections, yes/no questions, and 'Likert scale' selections. Open-ended responses required text analysis, which involved a preliminary review of all responses to each open-ended question followed by interpretation and organization of the full content of responses for each question into themes and sub-themes. Each individual response was then encoded according to the established themes and sub-themes.

Survey design and encoding resulted in nominal and ordinal level data. Data analysis was undertaken using SPSS for Windows version 8.0. Analysis included generating descriptive statistics (frequency distributions, average Likert scores) and comparing the frequency distributions of responses between the three study groups using cross-tabulations and chi-square analysis (Pearson chi square statistic, the Pearson two-tail Exact test for small sample sizes, probability, and the Monte Carlo Estimate of $p = 0.05$). Categorical variables for cross-tabulations included responses (yes, no, not sure), Likert scale (1 to 5) reponses to prescribed statements, and presence/absence of themes and sub-themes in open-ended responses. We also generated frequency distributions and average Likert scores for the aggregated data ($n = 82$, the total data set of all respondents, questionnaire parts A, B and D, and $n = 72$, questionnaire part C).

Survey limitations included sample size (small for the individual sites but adequate for the aggregated sites) and timing of the survey. Small sample size suggests caution in interpreting the strengths of apparent differences between frequency distributions or in generalizing the interpretation to the larger population. Survey results based on small sample sizes can, however, suggest possible trends and provide a starting point for more in-depth investigation. Although the sample size is small, there is considerable detail in the responses, provided through the open-ended questions. The detail allows for a relatively rich articulation of perceptions and values, at least for the randomly selected participants in this study. With the survey conducted over two time periods (summer and late spring), some differences in responses may reflect seasonal influences rather than true differences in observation skills, interest, or general knowledge. For example, participants who took part in the survey in late spring might be more inclined than summer partici-

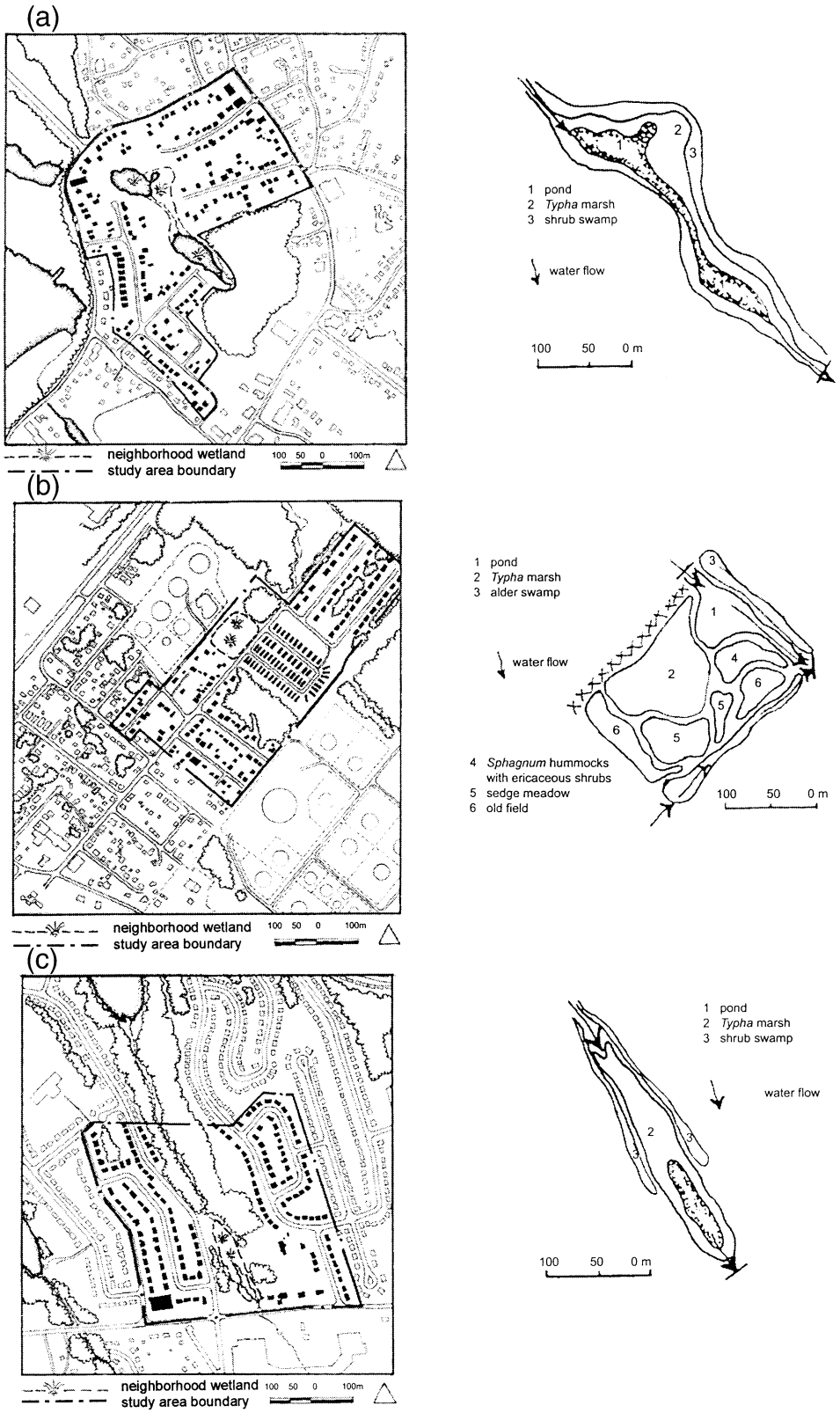


Figure 3a. Site 1: Old Spryfield—Catamaran Pond.
Figure 3b. Site 2: South Woodside—Everette Street Marsh.
Figure 3c. Site 3: Forest Hills—Settle Pond.

Table 2. Frequency distribution of likert scale responses to statements of household involvement with nature and the out-of-doors.

Descriptive Statements	Catamaran Pond n = 29				Everette St Marsh n = 29				Settle Pond n = 24				All Sites n = 82			
	"−"	"∼"	"+"	**Likert**	"−"	"∼"	"+"	**Likert**	"−"	"∼"	"+"	**Likert**	"−"	"∼"	"+"	**Likert**
Our household (is)	% Response			**avg§**	% Response			**avg§**	% Response			**avg§**	% Response			**avg§**
Interested in nature	10	28	62	**4**	7	10	83	**4**	0	25	75	**4**	6	21	73	**4**
Helps the environment*	0	62	38	**4**	0	41	59	**4**	0	12	88	**4**	0	40	60	**4**
Participates in outdoor recreation	21	21	58	**3**	10	21	69	**4**	12	38	50	**4**	15	25	60	**4**

* Significant difference between sites in frequency distributions of likert scale value selections ($p < 0.05$, details in Appendix 2). Likert Scores "−" disagree 1 (strongly) and 2, "∼" ambivalent (3), "+" agree 4 and 5 (strongly), § average score.

pants to identify spring wildlife. We did not control for this possibility, although an overview of the data did not reveal any obvious associations (for example, May participants were no more likely than August participants to identify northern spring peepers, *Hyla crucifer crucifer* Weid, as local wildlife).

RESULTS

The following tables present some of the illustrative and significant findings of the survey. Details of the statistical analysis (Pearson chi-square statistic, degrees of freedom, and probability) comparing the frequency distributions presented in the tables are provided in Appendix 2.

Results from the first two parts of the questionnaire (Parts A and B) established that the three study groups are more-or-less matched in household size and composition. Households average 2.3, 2.8, and 3.0 persons, and 35, 41, and 42 percent of households have children (Sites 1, 2 and 3, respectively). Age structure was more varied. The group at Old Spryfield was made up of younger families: 60 percent of households with children had preschoolers and adults in the survey households tended to be younger. The households in the survey groups in South Woodside and Forest Hills had older children and adults were also older. The study participants in all three neighborhoods considered themselves (and their households) to be interested in the environment and active out-of-doors (Table 2). They believe that they do their part to 'help the environment.' The participants were also satisfied with where they live (Table 3).

Perceptions of Neighborhood

Neighborhood descriptions provided in Part B of the questionnaire (Table 3) illustrated that the participants think well of their neighborhoods. They typically described them as 'friendly,' 'quiet,' and 'peaceful' (positive references to mood) or referred to their 'tidy' appearance or 'country-like' ambiance with 'lots of parkland.' Some respondents also described neighborhood age structure, housing form, and natural features such as woods, water, and wetlands, more typically, those participants living in the Settle Pond neighborhood.

When asked specifically about natural places, almost all respondents were able to identify or describe natural features in their neighborhoods. However, the frequency of references to woods and wetlands (features common to all three sites) differed between the study groups. Old Spryfield (Catamaran Pond) and Forest Hills (Settle Pond) participants more commonly included wetlands in naming natural areas, while South Woodside (Everette Street Marsh) respondents were more inclined to describe the woods in their area. The difference in frequency of responses was significant for both woods and wetlands ($p < 0.001$, Appendix 2).

Perceptions and Knowledge of Neighborhood Wetlands

The third part of the questionnaire (Part C) explored if and how respondents observed, visited, and used their neighborhood wetland and explored their general knowledge of the wetland as evident in descriptions of the wetland site, long-term and seasonal changes, and wildlife. Only respondents unambiguous in their identification of the study wetlands (as evident from their responses in Part B) were eligible to participate in this part of the questionnaire (n = 72).

Site visits, whether way-side (while on route elsewhere) or intentional, are not a regular habit of the majority of respondents or other household members in this study (Table 4). For example, although 70 percent of the Forest Hills respondents reported stopping at Settle Pond, the visits are rare or occasional for the most part. Only 43 percent of South Woodside respondents report the same behavior. Destination visits drew the same aggregated response rate as way-side visits. However, in comparing the three locations, Old

Table 3. Frequency distribution of references to attributes in neighborhood descriptions.

Descriptions include reference to. . .	Catamaran Pond n = 29 % Response	Everette St Marsh n = 29 % Response	Settle Pond n = 24 % Response	All Sites n = 82 % Response
Mood	93	83	92	69
Appearance*	17	31	58	34
Age structure	34	24	29	29
Natural features*	3	21	58	26
House form/land use	17	21	12	17
Character of comments*				
Positive	59	48	50	52
Negative	17	0	0	6
Neutral	24	52	50	42
Reference to natural areas				
Yes	100	97	88	66
woods*	41	97	58	66
wetlands*	24	52	50	42
Aware of study wetland*				
Yes	90	66	92	82
No	0	24	0	8
Not sure	10	10	8	10

* Significant difference between sites in frequency distributions of references (descriptions) and selection categories (character, awareness) ($p < 0.05$, details in Appendix 2).

Spryfield residents are more frequent visitors of their wetland than residents of the other two sites. Significantly, those living in Old Spryfield must make a point of going to Catamaran Pond if they want to see it. Local streets end at the wetland, and so it isn't possible to stop by the wetland on the way elsewhere. Participants in the Woodside neighborhood are the least likely to visit their local wetland.

Table 4. Frequency distribution of wetland visits and site-based activities.

Visiting Habits	Catamaran Pond nr§ % Response	Everette St Marsh n = 21 % Response	Settle Pond n = 23 % Response	All Sites n = 44 % Response
Stop at site on route*				
Yes	nr	43	70	57
regularly/occasionally	nr	19	22	21
rarely	nr	24	48	36
No (never)	nr	52	26	39
Not sure	nr	5	4	5
Visit site directly*	n = 28	n = 21	n = 23	n = 72
Yes	79	33	52	57
regularly/occasionally	47	19	35	35
rarely	32	14	17	22
No (never)	7	67	26	31
Not sure	14	0	22	12
Activities at site	**Catamaran Pond n = 22 % Response**	**Everette St Marsh n = 9 % Response**	**Settle Pond n = 12 % Response**	**All Sites n = 40 % Response**
Passive*	68	24	57	78
Active*	50	33	74	58

* Significant difference between sites in frequency distributions among the selection categories ($p < 0.05$, details in Appendix 2).
§ nr = way-side visits are not possible at Catamaran Pond (see figure 3a for site context).

Table 5. Frequency distribution of references to wetland attributes in participant wetland descriptions and description ratings.

Wetland descriptions contain reference to:	Catamaran Pond n = 27 % Response	Everette St Marsh n = 21 % Response	Settle Pond n = 23 % Response	All Sites n = 71 % Response
Wetland structure*	50	19	76	50
Wetland vegetation*	64	38	74	61
Upland vegetation	0	0	0	0
Wetland size	4	10	9	7
Drainage (inflow/outflow)*	0	14	39	17
Water quality	4	5	0	3
Wetland depth	7	0	4	4
Wildlife at site	14	19	17	17
Wetland setting*	0	5	26	10
Site conditions	39	24	22	29
Description ratings*				
Very good	0	0	0	0
Good	0	5	4	3
Satisfactory	11	0	35	15
Poor	41	19	39	34
Irrelevant	48	76	22	48

* Significant difference between sites in frequency distributions of references (wetland descriptions) and selection categories (ratings) ($p < 0.05$, see Appendix 2).

Frequency of visits not withstanding, visits are more common in spring and summer, followed by the winter, weekend is preferred to weekdays, and afternoon is more popular than morning or evening. Site visitors engage in both active and passive recreation. Skating was the most commonly mentioned activity, followed by children's play (catching frogs and tadpoles). Other pass-times identified were 'bird watching,' 'feeding the ducks,' 'relaxing,' 'listening to the frogs,' 'hanging out,' 'picking flowers,' and 'watching nature.'

Respondents or other family members visit and observe the study sites, but what do they actually 'see' and 'register' about their local wetlands? Analysis of answers to open-ended questions regarding site descriptions, long-term and seasonal changes, and wildlife suggest that the participants in this study are not particularly observant of or knowledgeable about the wetlands in their neighborhoods, or possibly not good at or interested in articulating their knowledge.

Wetland descriptions, provided by participants, were encoded, compared, and evaluated against a standard description for each site. The results (Table 5) reveal that most respondents did not competently describe their neighborhood wetland. Eighty-nine percent of the descriptions of Catamaran Pond and 95 percent of those for Everette Street Marsh were either 'poor' or 'irrelevant.' Forest Hills participants provided more competent descriptions of their wetland (Settle Pond): 39 percent were 'okay' or 'good' (one description). The difference in the quality of descriptions between the groups was significant ($p < 0.01$, Appendix 2).

Participants also described site changes (both long-term and seasonal) and identified wildlife using the site. Overall (aggregated results), 30 percent of respondents said they had observed some long-term changes to the wetland in their neighborhood, 40 percent did not believe that the wetland had changed, and 30 percent were uncertain or said that they didn't know. No common themes of long-term changes emerged (with only 22 of the 72 participants in this part of the survey reporting changes). Instead, there were a variety of observations, sometimes conflicting for the same site. Changes reported by participants included size increase and decrease (both for Everette Street Marsh); less water (drier) for Everette Street Marsh and Settle Pond; more vegetation (Catamaran Pond) and less vegetation (Everette Street Marsh and Settle Pond); and changing type of vegetation (Everette Street Marsh). Participants also described changes caused by people (in-filling and pollution).

Participants were more observant of seasonal changes, with 47 percent of respondents overall (from 38 percent for Everette Street Marsh to 65 percent for Settle Pond) describing changes they observe. The common observations were winter freeze-up and summer and fall vegetation changes. Interestingly, freeze-up was most commonly reported for Everette Street Marsh, where there is the least amount of surface water (seven of eight participants described this change), and Settle Pond (12 of 15 respondents) but was not common among the Old Spryfield group (only two of 13 descriptions); Catamaran Pond is the wetland with

Table 6. Frequency distribution of descriptions of advantages and disadvantages of neighborhood wetlands.

	Catamaran Pond n = 28 % Response	Everette St Marsh n = 21 % Response	Settle Pond n = 23 % Response	All Sites n = 72 % Response
Advantages*				
Yes	57	57	96	69
No	29	33	0	21
Not sure	14	10	4	10
Disadvantages				
Yes	14	14	0	10
No	75	76	83	78
Not sure	11	9	17	12

* Significant difference between sites in frequency distributions among the selection categories ($p < 0.05$, details in Appendix 2).

the largest surface-water area and the place where respondents most frequently identified skating as their wetland activity.

Despite the fact that all sites are northern spring peeper (*Hyla crucifer crucifer*) habitat and hence audibly come to life in April, only seven participants reported wildlife-related changes. Yet, when asked specifically if they had observed wildlife at their local wetland, 93 percent of participants (ranging from 81 percent at Everette Street Marsh to 100 percent at Catamaran Pond) said they had. Almost all respondents reported seeing ducks. Otherwise, they described a menagerie of crows (*Corvus brachyrhychos* Brehm), ravens (*Corvus corax* L.), song birds, frogs, water mammals (beaver, *Castor canadensis* Kahl and muskrat, *Ondatra zibethicus* L.) at Catamaran Pond, small land mammals (rodents) and fish (at Catamaran Pond), but none of these creatures in any profusion.

Most participants consider their local wetland to be a neighborhood asset. When asked directly to identify advantages and disadvantages of their neighborhood wetland, most participants offered advantages. Settle Pond respondents were especially enthusiastic. Almost all felt that Settle Pond was advantageous to their community (Table 6). The most commonly stated advantages related to nature and naturalness (e.g., 'nature in the city,' 'nature close to home,' natural habitat in the city, or studying or observing nature). Few people remarked on disadvantages, but for those who did, the common complaint was pollution (mainly litter).

Perceptions of Wetlands and Nature in the City

Previous questions gauging knowledge and impressions of the wetlands prompted the study participants to provide their own words and phrases. The last part of the questionnaire engaged participants in agreeing or disagreeing with prescribed words or statements while i) thinking about their neighborhood wetland, and ii) considering wild places and wetlands in the city generally.

The data in Table 7 show that a majority of respondents agree with positive (or pleasant) descriptors and

Table 7. Frequency distribution of likert scale responses to wetland descriptors.

Descriptors	Catamaran Pond n = 28				Everette St Marsh n = 29				Settle Pond n = 24				All Sites n = 82			
	"−"	"∼"	"+"	**Likert**	"−"	"∼"	"+"	**Likert**	"−"	"∼"	"+"	**Likert**	"−"	"∼"	"+"	**Likert**
Wetlands are (a)...	% Response			**avg§**	% Response			**avg§**	% Response			**avg§**	% Response			**avg§**
Wasteful use of land	75	11	14	**2**	81	14	5	**2**	96	4	0	**1**	83	10	7	**2**
Unsafe	82	14	4	**2**	86	14	0	**1**	96	4	0	**1**	88	11	1	**2**
Smelly	92	4	4	**1**	86	5	9	**2**	96	0	4	**1**	92	3	5	**1**
Nuisance	85	11	4	**1**	90	5	5	**2**	96	4	0	**1**	90	7	3	**1**
Messy	64	0	36	**2**	67	9	24	**2**	83	13	4	**1**	70	7	23	**2**
Mosquito (infested)	89	11	0	**1**	67	14	19	**2**	56	22	22	**2**	72	15	13	**2**
Mysterious	100	0	0	**1**	76	10	14	**2**	87	9	4	**2**	88	6	6	**1**
Undisturbed*	18	57	25	**3**	52	29	19	**2**	39	35	26	**3**	35	42	23	**3**
Open space*	7	71	22	**4**	29	38	33	**3**	13	22	65	**4**	15	46	39	**3**
Common property	11	21	68	**4**	43	14	43	**3**	9	22	69	**4**	20	19	61	**4**
Country in the city*	0	14	86	**4**	19	24	57	**4**	0	9	91	**5**	5	15	79	**4**
Part of neighborhood*	15	14	71	**4**	48	5	47	**3**	4	9	87	**4**	21	10	69	**4**
Peaceful*	0	11	89	**4**	19	29	52	**3**	0	9	91	**4**	6	15	79	**4**
Home for wildlife*	4	0	96	**5**	19	14	67	**4**	0	0	100	**5**	7	4	89	**4**
Place for wild nature*	4	7	89	**4**	19	29	52	**4**	13	22	65	**4**	11	18	71	**4**

* Significant difference between sites in frequency distribution of likert scale value selections ($p < 0.05$, see Appendix 2). Likert Scale "−" disagree 1 (strongly) and 2, "∼" ambivalent (3), "+" agree 4 and 5 (strongly), § average score.

Table 8. Frequency distribution of likert scale responses to nature in the city.

Descriptors	Catamaran Pond n = 29				Everette St Marsh n = 29				Settle Pond n = 24				All Sites n = 82			
	"−"	"∼"	"+"	**Likert avg§**	"−"	"∼"	"+"	**Likert avg§**	"−"	"∼"	"+"	**Likert avg§**	"−"	"∼"	"+"	**Likert avg§**
	% Response				% Response				% Response				% Response			
Nature in the city (is) (provides)...																
Needed wild space	0	10	90	**4**	0	10	90	**4**	0	25	75	**4**	0	15	85	**4**
Wildlife (adds to city)	0	7	93	**4**	3	3	94	**4**	0	4	96	**5**	1	5	94	**4**
Lowers property value	97	3	0	**1**	93	7	0	**1**	92	4	4	**1**	94	5	1	**1**
Unsafe*	94	3	3	**2**	90	10	0	**2**	92	4	4	**1**	91	6	2	**2**
Should be tidy*	30	35	35	**3**	45	14	41	**3**	63	4	33	**3**	45	18	37	**3**
Wetlands in the city																
Nice/enhance city	0	17	83	**4**	3	10	87	**4**	4	8	88	**5**	2	12	86	**4**
Should be filled/built	94	3	3	**1**	97	0	3	**1**	100	0	0	**1**	96	1	3	**1**
Learn about nature	3	42	55	**4**	3	55	42	**4**	0	17	83	**4**	2	39	59	**4**
Are unsafe	93	7	0	**2**	86	14	0	**1**	83	13	4	**1**	88	11	1	**2**
Increase property value*	0	14	86	**4**	14	38	48	**3**	8	58	34	**3**	7	36	57	**4**

* Significant difference between sites in frequency distribution of likert scale value selections ($p < 0.05$, see Appendix 2). Likert Scale "−" disagree 1 (strongly) and 2, "∼" ambivalent (3), "+" agree 4 and 5 (strongly), § average score.

disagree with negative (or unpleasant) descriptors in relation to their local wetland. Both frequency distributions and Likert average scores suggest that, when thinking of their local sites, study participants largely agreed with descriptors such as 'peaceful,' 'home for wildlife,' and 'country in the city' or agreed with or were ambivalent about neutral or ambiguous terms such as 'common property,' 'open space,' 'part of the neighborhood,' 'wild nature,' 'undisturbed,' or 'mysterious.' They did not believe that descriptors like 'smelly,' 'nuisance,' 'unsafe,' 'wasteful use of land,' or 'mosquitoes' reflect what they feel when applied to the wetland in their neighborhood. This general pattern held for each of the three study groups, but there were significant differences in the distribution of responses, primarily for the positive attributes (Table 7 and Appendix 2). The data also suggest a tendency toward ambivalence among the Everette Street Marsh participants, evident particularly in their responses to positive descriptors.

Table 8 shows the same pattern for responses to statements about natural places in the city (positive—agree, negative—disagree). Opinion was divided (and the differences among the groups significant) on the following statement: 'Wild natural places in the city should be kept tidy and maintained (raked, sprayed, mowed).' Forest Hills (Settle Pond) participants more clearly either disagreed (the majority) or agreed with this statement than did those in the other two groups. Opinion also differed around the statement 'Wetlands increase the value of city and suburban neighborhoods.' Those living near Catamaran Pond more clearly agreed with this sentiment than did participants in the other two neighborhoods.

DISCUSSION

The data suggest that participants in this study consider themselves to be interested in the environment and active in outdoor recreation, that they like their neighborhoods, and they take a positive view of urban nature generally and their local wetlands in particular. Yet, despite their positive self-assessments of environmental attentiveness and their agreement with the benefits of urban natural places, these people are neither particularly observant of (they can barely describe 'their' sites in a general way) nor overtly interested in the small wetlands in their midst (they do visit them, but seldomly). On the other hand, they are not entirely unobservant or unappreciative of them nor antagonistic toward the wetlands. General questions did result in vague answers lacking in detail or depth, but with their attention directed toward specific aspects of their neighborhood wetlands, almost all respondents could identify some aspect of wildlife use and almost half could describe seasonal changes. Those who report visiting the sites (approximately half of all participants) describe using them for a variety of purposes (skating, catching frogs, picking flowers, hanging out, or simply enjoying the presence of a natural place). They widely accept the wetlands as part of their neighborhoods and enjoy what the sites contribute to the local community ambiance. Whether or not they are active users of 'their' sites, the majority of the partic-

ipants in each of the three neighborhoods felt that these wetlands added to their communities: providing green space, nature, and a rural atmosphere amid the business of development; allowing opportunities for play and recreation close to home; and even increasing property values. There were few critics among the study participants and, for those who didn't or couldn't associate any advantages with the sites, they didn't complain about them either.

There were varying and sometimes significant differences in the distribution of responses between the three neighborhood groups to questions and statements gauging levels of awareness and use of the wetlands. Certainly, the more competent site descriptions came from the Forest Hills group, and almost all of the respondents at this location identified advantages of the wetland, while no one suggested disadvantages (compared to just over half recognizing advantages at the other two sites). This group, more so than the other two, more strongly agreed with the description of wetlands as 'part of the neighborhood.' In addition, more than three-quarters of the Forest Hills participants claimed visiting the wetland.

Some responses or attitudes do not seem, at first, to fit the situations from which they arise. For example, although the Old Spryfield respondents were less inclined than the other participants to report themselves as interested in matters of the environment, they were the most likely to visit their wetland and were as likely as those in Forest Hills (Settle Pond) to agree with descriptions of 'peaceful,' 'country in the city,' and a 'home for wildlife' in relation to 'their' wetland. In contrast, Everette Street Marsh (South Woodside) participants had the sturdiest view of themselves as interested in the environment and being active out-of-doors (Table 2), but they were the least likely of the three groups to visit their local wetland, and they could barely describe it when asked to do so. Furthermore, they demonstrated a greater ambivalence toward positive or neutral statements about wetlands (differences were significant).

Certain aspects of neighborhood setting and form might explain some of the differences. Wetland size, structure, and proximity to respondents' properties might explain others. Settle Pond, for example, is associated with the well-visited local heritage farm museum (located in the middle of this neighborhood). The pond's association with the farm might contribute to greater visibility and awareness of the site. The neighborhoods of South Woodside and Old Spryfield have more in common with one another (diversity of income levels and housing form) than either of them has with Forest Hills (a distinctly middle-income suburb). Their wetlands are also more obscure (particularly beyond the neighborhood level) than is Settle Pond in Forest Hills. However, Old Spryfield residents were overall more positive about the amenity value of their wetland and more frequent visitors of their site than were participants in South Woodside. Part of the ambivalence revealed by the South Woodside respondents might be reflected in the wetland setting. The oil refinery and tank-farm backdrop to the Everette Street Marsh contrasts with the relatively pastoral setting of Settle Pond (adjacent the heritage farm pasture) or the woodsy ambiance of Catamaran Pond. Perhaps they couldn't quite fully associate images of 'country in the city,' 'peaceful,' 'wild nature,' 'home for wildlife,' and 'open space' with the Everette Street Marsh, at least not to the same positive degree as respondents from the other neighborhoods.

Mahan et al. (2000) demonstrated the influence of wetland size, structure, and proximity on urban property values. In a study of wetland amenity value in Portland, Oregon, the authors showed that wetland proximity and size effect a property value increase: the greater the size of the wetland, the greater the value increase, although small wetlands also afford some benefit. Water, specifically an areal expanse of water (ponds), also enhances property value. The results of our study may be agreeing in general with those of Mahan et al. All three wetlands contain open water, but the pond in Everette Street Marsh shrinks markedly over the summer. Although it displays considerable structural diversity for its size, the Everette Street Marsh is also the smallest of the three wetlands. Catamaran Pond is the largest and has the largest expanse of open water. All three sites offer easy access, but Catamaran Pond shares a boundary with and is closer to a greater number of properties than do either of the other two sites. The larger size of Catamaran Pond may attract more attention than does the tiny marsh on Everette Street. The marsh's very small size, as well as its less than central location, might explain some of the ambivalence demonstrated toward it by the South Woodside group, particularly compared to the greater enthusiasm shown by Old Spryfield respondents for Catamaran Pond (even if their observations and descriptions of the wetland were just as poor). Re-analyzing the data by linking responses with site structure, with geographic position relative to the site, and exploring variables such as view planes and access might offer further insights on the within site variability in aesthetic sense and wetland awareness.

Another explanation might be found in household composition and age structure. A tendency toward ambivalence might be counterbalanced by the enthusiasm young children could bring to a household's perceptions of a neighborhood wetland. Households at South Woodside have older children; those in the Old Spryfield group are younger. Perhaps the presence of young

children makes a difference. It may also explain the higher rate of visiting at Catamaran Pond. The sample size is too small to test this hypothesis, but some of the results suggest it as a direction for further study. Using the data of the aggregated sites and linking household age structure with the potentially child-dependent variables (site visits, active recreation, statements involving nature play) is another opportunity for using the data.

Acknowledging that a certain level of ambivalence exists is important. Understanding the ambivalence that is there will be useful. The apparent ambivalence appears benign; it is not leading in the direction of disinterest or dislike for the sites, and it is not the prevailing attitude. On the contrary, even accounting for between-site differences, participants in each of the neighborhoods demonstrated an appreciation for their local wetland. Whether they actively used them or not, these small, less-than-perfect wetlands engendered a passive, but overall positive, acceptance.

The findings of our study are consistent with the general literature available on cultural values of wetlands, values usually associated with the 'softer' wetland services including passive recreation, nature study, education and research, and aesthetic experience (Reimold et al. 1980, Kennedy and Mayer 2002). For the many wetlands that can't and don't meet the high value criteria (such as ecological, resource, and recreational values) often associated with larger, structurally diverse sites, these passive aesthetic experiences may be important in establishing wetland value. Researchers and others considering cultural responses to rural wetlands do suggest that much of our appreciation of wetlands likely derives from the passive responses of pleasure and interest that come from perceptions of place, openness, wildness, diversity, oddness, mystery, fertility, and common land that wetlands may impart to a landscape (Fritzell 1978, Worley 1984, Johnson and Worley 1985, Steinhart 1990). Because rural wetlands often are soggy, low-lying mats surrounded by a tangle of swamp, they are not always easy to get to or into. They may be more easily viewed from a high point or appreciated from a distance; passive experience and appreciation become important.

Urban wetlands present their own barriers at a different scale: they are small, usually lack diversity, and may appear messy at the boundaries, even run-down. However, such conditions should not necessarily diminish their value. As suggested by Palmer and Smardon (1988), although size, structure, and location (which may affect access if bordering private yards and lots) do tend to restrict uses of urban wetlands to passive pursuits and reflective experiences, the fact that they are there, in an urban context, lends them significance (Ehrenfeld 2000). Mahan et al. (2000) appear to confirm this significance. While the literature suggests that people value the presence of wetlands or even the wetland experience, their appreciation is usually not overt and may at times be caught up in a general sense of community or place. Our response, like most wetlands themselves, is low-key. The results of our study confirm such a passive appreciation of small urban wetlands but not one that should be overlooked or underestimated. The people in three Halifax Regional Municipality neighborhoods, at least, do value these spots of nature in their midst.

CONCLUSION

With our focus on 'big' nature, we tend to forget that most of us live in very localized contexts—neighborhoods. Neighborhoods are the places where we should foster routine contact with nature and natural processes leading to a life-long appreciation of the natural world, wetlands included. Wetlands, with their four-season attributes, are very well-suited to the purpose and small wetlands are just as serviceable as large ones in this respect.

The appreciation of small wetlands, like the ones in our study, is usually very localized and is not highly expressive. Supporters of these sites are very small in number compared to the larger constituency of a municipality or a developer's interests. Without investigating and documenting a community's interest in local, small wetlands, one can anticipate that developers and regulators will interpret the lack of overt, demonstrated appreciation for and use of the site as no interest at all. Such an interpretation justifies (to the developer, planning office, or legislator) loss of small natural spaces because there is no insistence from the community to include such sites in contract development plans or to amend local plans to protect small, wild spaces generally and wetlands specifically. Each site lost represents a lost amenity, if the results of our study adequately reflect the local sentiment. Planners and legislators will not respond to the impacts of individual losses that they perceive to be small and insignificant, but they may respond to the collective value, and the impact of cumulative loss, of many small natural amenity environments in the urban landscape.

Our study illustrates and provides evidence of perceived amenity value and acceptance of small urban wetlands. With increased awareness of wetland ecological values, people's perceptions may be reinforced. The participants in our study already accept their local wetlands as part of their communities and view them favorably, despite their less than perfect natural condition. Our study suggests a cultural basis for successfully integrating small wetlands into urban developments.

ACKNOWLEDGMENTS

I thank Dr. Derek Davis for his valuable contributions to research design, site selection, and field work. I also thank my research assistant Jamal Ramjohn for his excellent assistance with the survey and constructing the database and Lisa Bulman and Heather Ternoway for their assistance with the figures. 'Datasmiths' (of Halifax) provided the statistical analysis. The research was funded in part by the Nova Scotia College of Art and Design (where I was employed at the time of the study) through allocation of general funds from the Social Sciences and Humanities Research Council.

LITERATURE CITED

Azous, A. L. and R. R. Horner (eds.). 2001. Wetlands and Urbanization. Lewis Publishers, Boca Raton, FL, USA.

Bardecki, M. J. 1984. Wetland Conservation Policies in Southern Ontario. A Delphi Analysis. Geographical Monographs 16. Department of Geography, Atkinson College, York University, Downsview, ON, Canada.

Bardecki, M. J., E. W. Manning, and W. K. Bond. 1989. The reality of valuing wetlands: the case of Greenock Swamp, Ontario, Canada. p. 81–90. *In* D. W. Fisk (ed.) Proceedings of the Symposium on Wetlands: Concerns and Success. American Water Resources Association, Bethesda, MD, USA.

Bond, W. K., K. W. Cox, T. Heberlein, E. W. Manning, D. R. Witty, and D. A. Young. 1992. Wetland Evaluation Guide. Final report of the wetlands are not wastelands project. North American Wetlands Conservation Council (Canada), Wildlife Habitat Canada, Environment Canada and Canadian Wildlife Service, Ottawa, ON, Canada. Issues Paper No. 1992–1.

Campbell, C. S. and M. H. Ogden. 1999. Constructed Wetlands in the Sustainable Landscape. Wiley and Sons, New York, NY, USA.

Canadian Wildlife Service. 1998. Wetlands Environmental Assessment Guidelines. Biodiversity Protection Branch, Canadian Wildlife Service, Environment Canada, Ottawa, ON, Canada.

Chovanec, A. 1994. Man-made wetlands in urban recreational areas: a habitat for endangered species. Landscape and Urban Planning 29:43–54.

Cox, J., C. Hendrikson, I. Skelton, and R. Suffling. 1996. Watershed planning for urbanization to avoid undesirable stream outcomes. Canadian Water Resources Journal 21:237–251.

Dewitt, C. B. 1981. Waubesa wetlands: a case study of wetlands preservation. p. 491–501. *In* B. Richardson (ed.) Selected proceedings of the midwest conference on wetland values and management. B. Richardson (ed.). Freshwater Society, St. Paul, MN, USA.

Ehrenfeld, J. 2000. Evaluating wetlands within an urban context. Ecological Engineering 15:253–256.

Envirosphere Consultants Limited. 1996. Report on an evaluation of information quality in reports produced by 'Frogwatch '95' participants. Nova Scotia Museum of Natural History, Halifax, NS, Canada.

Fritzell, P. A. 1978. American wetlands as cultural symbol: places of wetlands in American culture. p. 523–534. *In* P. E. Greeson, J. R. Clark, and J. E. Clark (eds.) Wetland Functions and Values: the State of our Understanding. American Water Resources Association, Minneapolis, MN, USA.

Galuzzi, M. and J. Pflaum. 1996. Integrating drainage, water quality, wetlands and habitat in a planned community development. Journal of Urban Planning and Development September, 1996:101–108.

Girling, C. L. and K. I. Helphand. 1997. Retrofitting suburbia: open space in Bellevue, Washington, USA. Landscape and Urban Planning 26:301–313.

Gosselin, H. and B. Johnson. 1995. The Urban Outback—Wetlands for Wildlife: a Guide to Wetland Restoration and Frog-friendly Backyards. Metro Toronto's Adopt-a-Pond Wetland Conservation Programme. Metro Toronto Zoo, Toronto, ON, Canada.

Hammer, D. A. (ed.). 1989. Constructed Wetlands for Wastewater Treatment: Municipal, Industrial, Agricultural. Lewis Publishers, Chelsea, MI, USA.

Hammer, D. A. 1997. Creating Freshwater Wetlands, second edition. Lewis Publishers, Boca Raton, FL, USA.

Hammitt, W. E. 1980. Managing bog environments for recreational experiences. Environmental Management 4:425–431.

Hopkinson, C., T. Crane, S. Gaborit, K. Horrigan, P. Jasinski, S. McLernon, M. McTavish, S. Pennington, S. Quon, L. Woo, and G. Mulamootil. 1997. An integrated approach to the planning and management of urban wetlands. The case of Betchel Park Wetland, Waterloo, Ontario. Canadian Water Resources Journal 22: 45–56.

Johnson, C. W. and I. A. Worley. 1985. Bogs of the Northeast. University Press of New England, Hanover, NH, USA.

Kennedy, G. and T. Mayer. 2002. Natural and constructed wetlands in Canada: an overview. Water Quality Research Journal of Canada 73:295–325.

Kentula, M. E. 1995. Wetlands restoration and loss in a rapidly urbanizing area of Portland, Oregon. Wetlands 15:336–345.

Kentula, M. E. and T. K. Magee. 1999. Forward. Wetlands 19:475–476.

Kreutzwiser, R. D. and L. J. Pietraszko. 1986. Wetland values and protection strategies: a study of landowner attitudes in Southern Ontario. Journal of Environmental Management 22:13–23.

Kusler, J. A. 1988. Urban wetlands and urban riparian habitat: battleground or creative challenge for the 1990s. p. 2–7. *In* J. A. Kusler, S. Daly and G. Brooks (eds.) Proceedings of the National Wetland Symposium, Urban Wetlands. Association of Wetland Managers, Berne, NY, USA.

Kusler, J. A. and M. E. Kentula (eds.). 1990. Wetland Creation and Restoration: the Status of the Science. Island Press, Washington, DC, USA.

Mahan, B., S. Polasky, and R. M. Adams. 2000. Valuing urban wetlands: a property price approach. Land Economics 76:100–113.

McGuckin, C. P. and R. D. Brown. 1995. A landscape ecological model for wildlife enhancement and stormwater management practices in urban greenways. Landscape and Urban Planning 33: 228–246.

Niering, W. A. 1978. Our wetland heritage: historic, artistic, and future perspectives. p. 505–522. *In* P. E. Greeson, J. R. Clark, and J. E. Clark (eds.) Wetland Functions and Values: the State of our Understanding. American Water Resources Association, Minneapolis, MN, USA.

Nova Scotia Department of Environment. 1995. Nova Scotia Department of Environment wetlands directive. The Environment Act, S. N. S. 1994–95, Government of Nova Scotia, Halifax, NS, Canada.

Ontario Ministry of Natural Resources. 1992. Manual of Implementation Guidelines for Wetland Policy. Ontario Ministry of Natural Resources, Toronto, ON, Canada.

Ontario Ministry of Natural Resources. 1993. Ontario Wetland Evaluation System, Southern Manual. NEST Technical Manual TM-002, third edition. Toronto, ON, Canada.

Owen, C. R. 1999. Hydrology and history: land use changes and ecological responses in an urban wetland. Wetlands Ecology and Management 6:209–219.

Palmer, J. F. and R. C. Smardon. 1988. Human use value of wetlands. An assessment in Juneau, Alaska. p. 108–114. *In* J. A. Kusler, S. Daly, and G. Brooks (eds.) Proceedings of the National Wetland Symposium Urban Wetlands. Association of Wetland Managers, Berne, NY, USA.

Reimold, J. R., M. A. Hardisky, and J. H. Phillips. 1980. Wetland values—a non-consumptive perspective. Journal of Environmental Management 11:77–85.

Reinelt, L., R. Horner, and A. Azous. 1998. Impacts of urbanization

on palustrine (depressional freshwater) wetlands—research and management in the Puget Sound. Urban Ecosystems 1998:219–235.
Schneider, D. 1995. Student Power. Nature Canada, spring 1995:13.
Smardon, R. C. 1983. The Future of Wetlands: Assessing Visual-Cultural Values. Allanheld, Osmun and Co., Totowa, NJ, USA.
Smardon, R. C. 1988. Aesthetic, recreational, landscape values of urban wetlands. p. 92–103. *In* J. A. Kusler, S. Daly, and G. Brooks (eds.) Proceedings of the National Wetland Symposium Urban Wetlands. Association of Wetlands Managers, Berne, NY, USA.
Steinhart, P. 1990. No net loss. Audubon July 1990:18–21.
Titton, D. L. 1995. Integrating wetlands into planned landscapes. Landscape and Urban Planning 32:205–209.
Vileisis, A. 1997. Discovering the Unknown Landscape: a History of American's Wetlands. Island Press, Washington, DC, USA.
Worley, I. 1984. Axiological and ethical factors in peatland preservation and use in the United States. p. 40–61. *In* Proceedings of the 7th International Peat Congress, Vol. 2. Dublin. Irish National Committee, International Peat Society, Dublin, Ireland and Helsinki, Finland.

Manuscript received 5 August 2002; revisions received 20 December 2002 and 12 May 2003; accepted 11 August 2003.

Appendix 1. Urban wetland survey questionnaire.

Interviewer: Date/time:

Wetland ID: Survey No.:

This is a four-part survey. It should take about 15 minutes to complete.

Part A

For the survey respondent note the following:

M _____ F _____ Age category: 18 to 29 _____ 30 to 49 _____ 50 to 64 _____ over 65 _____

I would like to ask you a few short questions about your household:

A1. How many adults are in your household (18 and over)? _____

How many adults are in the following age categories?
18–29_____ 30–49 _____ 50 to 64 _____ over 65 _____

A2. How many children (under 18) are in your household? _____

How many children are in the following age categories?
under 2 years old _____ 2 to 4 _____ 5 to 11 _____ 12 to 14 _____ 15 to 17 _____

For the respondent determine if s/he is:
parent/guardian of the above children _____ other _____

A3. On a scale of 1 to 5 (where 1 means no, not at all and 5 means yes, very) indicate how well the following statements describe your household. (*Circle the answer.*)

	not at all		unsure		very well
A3.1 Our household is interested in nature and the out-of-doors.	1	2	3	4	5
A3.2 Our household does things to help the environment (like recycling; walking or taking the bus instead of our car, etc.).	1	2	3	4	5
A3.3 Our household participates regularly in outdoor play and recreation?	1	2	3	4	5

A3.4 If you are not currently participating in outdoor recreation, did you use to take part in outdoor activities?
Yes _____ No _____ Not sure _____

A4. I am going to list a number of outdoor activities. Which of these activities do the people in your household regularly take part in?

Or (depending on answer to A3.4)

If you used to be active out of doors, but aren't any longer which activities did you use to regularly take part in?). *Check any applicable activities.*

kids outdoor play _____ bicycling _____ walking _____ hiking _____ camping _____ hunting _____ fishing _____ outdoor swimming _____ sailing _____ canoeing _____ rowing _____ power boating _____ ATV/snow-mobiling _____ tobogganning _____ outdoor skating _____ cross-country skiing _____ down-hill skiing_____ organized sports (baseball, soccer, etc.) _____ gardening _____ berry picking _____ nature photography/painting, etc. _____ other _____ (list)

Appendix 1. Continued.

Part B

I now want to ask a few questions about your neighborhood:

B1. How long have you lived in the area? (*Record the response in years*): _____

Check appropriate category
Less than 1 year _____ 1–5 _____ 6–10 _____ 11–20 _____ more than 20 years _____

B2. Describe the boundaries of this neighborhood (For example, what area do you consider to be your neighborhood?) (*Record the description*).

B3. Using a few words, please describe your neighborhood setting or character (*Record the description*).

B4. Can you identify or describe any natural areas in your neighborhood?
Yes _____ No _____ Not sure _____

(*If yes*) Please identify or describe these areas (*Record the description.*)

If the respondent identifies the wetland that we are studying, acknowledge it and go on to Part C. If the respondent did not identify the wetland, ask them:

B5. Do you know that there is a wet area located at _____ (*name/describe location*)?
Yes _____ No _____ Not sure _____

If yes, go on to Part C. If no, go on to Part D.

If not sure, explain what you are talking about. If that clears things up and the respondent now answers yes, go on to Part C. If the respondent is still unsure or still doesn't know, go to Part D.

Part C

I would now like to ask you some questions about the wet area located at _____ (*name the location*).

C1. Does the wetland at location _____ have a name?
Yes _____ No _____ Not sure _____

If yes, record the name. (*If the respondent provides a name or a description, refer to the site by that name or description*).

C2. Please describe the wetland (*Record the description.*)

I would now like to know how you know about the site:

C3. Can you see this site from your home?
Yes _____ No _____ Not sure _____

	no never		not sure		yes regularly
C4. (*If yes*), do you keep an eye on this site regularly and watch it?	*	*	*	*	*
C5. When going other places, do you or others in your household					
drive past the site?	*	*	*	*	*
cycle	*	*	*	*	*
jog	*	*	*	*	*
walk	*	*	*	*	*
other	*	*	*	*	*
C6. Do you or others in your household stop at the site on your way elsewhere?	*	*	*	*	*
C7. Do you or others in your household visit the site directly? (As a destination)	*	*	*	*	*

C8. Who in your household visits or stops at the site? (*Check all relevant categories*)
adults _____ children _____ adults more _____ children more _____ both equally _____ as a family _____ children alone _____ adults alone _____

C9. When do you or others in your household visit or stop at the site? (*Check all relevant categories*)
spring _____ summer _____ fall _____ winter _____ weekdays _____ weekends _____ morning _____ afternoon _____ evenings _____

C10. What do you or others in your household do at the site? (*Record the answer.*)

Appendix 1. Continued.

C11. Has the wetland been there as long as you have lived here?
Yes _____ No _____ Not sure _____
(*If no*), What was there before? (*Record the answer. Follow up with*) What in your opinion happened to create the wetland? (*Record the answer*)

C12. Has the wetland changed since you have lived here?
Yes _____ No _____ Not sure _____
(*If yes*), Describe the change. (*Record the answer.*)

C13. Do you notice any changes through the year (seasons)?
Yes _____ No _____ Not sure _____
(*If yes*), Describe the changes. (*Record the answer*).

C14. Have you seen wildlife (animals) use the wetland?
Yes _____ No _____ Not sure _____
(*If yes*), What kind of animals? (*Record the answer.*)

C15. To your knowledge, is this wetland part of any type of nature study or environmental, or education program?
Yes _____ No _____ Not sure _____
(*If yes*), What is the program? (*Record the answer.*)
Does your household participate? Yes _____ No _____ Not sure _____

C16. Are there any advantages to having this wetland in your neighborhood?
Yes _____ No _____ Not sure _____
(*If yes*), What are they? (*Record their response.*)

C17. Are there any disadvantages to having this wetland in your neighborhood?
Yes _____ No _____ Not sure _____
(*If yes*), What are they? (*Record the answer.*)

C18. Do you have any knowledge or observations of this wetland that we haven't asked you about, but that you think would be useful for our survey? (*Record their observations*).

C19. I am going to list 15 words or short phrases and I would like you to tell me, on a scale of 1 to 5, the extent to which each word or phrase reflects what you feel when you think of the wetland at _____ (*name the location*). '1' means does not at all reflect what you feel, '5' means strongly reflects what you feel. (*Circle the response.*)

	not at all		unsure		strongly
	1	2	3	4	5
common property	*	*	*	*	*
wasteful use of land	*	*	*	*	*
wild nature	*	*	*	*	*
mosquitoes	*	*	*	*	*
messy	*	*	*	*	*
peaceful	*	*	*	*	*
part of our neighborhood	*	*	*	*	*
smelly	*	*	*	*	*
home for wildlife	*	*	*	*	*
open space	*	*	*	*	*
nuisance	*	*	*	*	*
undisturbed	*	*	*	*	*
mysterious	*	*	*	*	*
unsafe	*	*	*	*	*
country in the city	*	*	*	*	*

Appendix 1. Continued.

PART D

I am going to make 10 short statements. On the scale of 1 to 5, indicate the extent to which you agree or disagree with what I say. 1 means strongly disagree, 5 means strongly agree. (*Circle the response.*)

		strongly disagree		Unsure		agree strongly
		1	2	3	4	5
D1.	City and suburban neighborhoods need wild natural places.	*	*	*	*	*
D2.	Wildlife adds to city living.	*	*	*	*	*
D3.	Wild natural places in the city are an eyesore and lower property values.	*	*	*	*	*
D4.	Wild natural places in the city are unsafe.	*	*	*	*	*
D5.	Natural places in the city should be kept tidy and maintained (raked, sprayed, mowed, etc).	*	*	*	*	*
D6.	Natural wetlands are attractive and add to city/suburban neighborhoods.	*	*	*	*	*
D7.	A city or suburban wetland would be more useful filled in and used as a building lot.	*	*	*	*	*
D8.	We can learn about nature from playing around wetlands.	*	*	*	*	*
D9.	Wetlands in the city or suburbs are unsafe.	*	*	*	*	*
D10.	Wetlands increase the value of city or suburban properties.	*	*	*	*	*

Appendix 2. Pearson chi-square statistic (χ^2), degrees of freedom (df) and probability (p) for cross-tabulations of frequency distributions presented in tables 2 to 8.

Table, descriptors, categories	χ^2	df	p
Table 2			
Our household (is)			
interested in nature	6.342	6	0.38589
helps the environment	19.706	4	0.00057
does outdoor recreation	9.621	8	0.29262
Table 3			
Descriptions			
mood	1.831	2	0.40041
appearance	10.054	2	0.00656
age structure	0.750	2	0.68738
natural features	21.335	2	0.00002
house form/land use	0.623	2	0.73235
Character of comments			
positive, negative, neutral	12.730	4	0.01267
Natural areas identified			
woods	14.851	2	0.00060
wetlands	18.529	2	0.00009
Awareness of wetlands			
yes, no, not sure	14.309	4	0.00637
Table 6			
Advantages of wetlands			
yes, no, not sure	11.798	4	0.01892
Disadvantages of wetlands			
yes, no, not sure	4.050	4	0.39931
Table 7			
Wetland are (a)			
wasteful use of land	12.659	8	0.12412
unsafe	7.899	6	0.24561
smelly	10.965	8	0.20369
nuisance	9.563	8	0.29705
messy	12.942	8	0.11388
mosquito infested	12.965	8	0.11305
mysterious	9.818	6	0.13255
undisturbed	17.887	8	0.02209
open space	18.831	8	0.01579
common property	13.012	8	0.11145
country in the city	15.516	8	0.04985
part of neighborhood	17.173	8	0.02836
peaceful	16.969	8	0.03043
home for wildlife	35.258	8	0.00002
place of wild nature	15.276	8	0.05400

Table, descriptors, categories	χ^2	df	p
Table 4			
Stop at site on route			
regularly, occasionally, rarely, never, not sure.	36.830	8	0.00001
Visit site directly			
regularly, occasionally rarely, never, not sure	30.168	8	0.00020
Activities at site			
passive	9.070	2	0.01073
active	9.676	2	0.00792
Table 5			
Wetland description			
wetland structure	15.421	2	0.00045
wetland vegetation	6.576	2	0.03733
upland vegetation	—	—	—
wetland size	0.753	2	0.68616
drainage	13.686	2	0.00107
water quality	1.705	2	0.42630
wetland depth	1.603	2	0.44868
wildlife at site	0.156	2	0.92473
wetland setting	10.382	2	0.00557
site conditions	3.243	2	0.19757
Description ratings			
very good (none), good, satisfactory, poor, irrelevant	21.299	6	0.00162
Table 8			
Nature in the city (is)			
needed wild space	3.074	4	0.54551
wildlife (adds to city)	3.393	6	0.75818
lowers property values	3.280	6	0.77293
unsafe	16.443	8	0.03646
should be tidy	18.387		0.01850
Wetlands in the city			
nice/enhance city	10.317	8	0.24349
should be filled/built	6.519	8	0.58928
learn about nature	11.625	6	0.07088
unsafe	7.703	6	0.26071
increase property value	21.459	8	0.00602