

ACT! STEWARDSHIP ACTION PLANS

ANCASTER, CHEDOKE & TIFFANY CREEKS

Part of the Spencer Creek Stewardship Action Plans



1958 • Celebrating 50 Years of Conservation • 2008

Endorsed by the Hamilton Conservation Authority Board of Directors April 3, 2008

ACT! STEWARDSHIP ACTION PLANS: Ancaster, Chedoke and Tiffany Creeks Part of the Spencer Creek Stewardship Action Plans Final March 2008

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The Hamilton Conservation Authority would like to extend its thanks to the individuals and organizations that made up the ACT Stakeholders Advisory Committee. These individuals guided and provided valuable input into the development of these plans.

Representation	Position (if applicable)
Field and Stream Rescue Team	Project Manager
Private landowner	
City of Hamilton, Strategic and Environmental Planning Division	Intern
Bay Area Restoration Council	Executive Director
Hamilton Harbour Remedial Action Plan	Coordinator
Hamilton Conservation Authority, Watershed Planning & Engineering Division	Acting Ecologist
Hamilton-Wentworth Stewardship Council (Ministry of Natural Resources)	Coordinator
Private citizen	
Hamilton Conservation Authority, Lands Management	Superintendent, Dundas Valley Office
Green Venture	Executive Director
Hamilton-Halton Watershed Stewardship Program (Hamilton Conservation Authority)	Coordinator
Fisheries and Oceans Canada	Fish Habitat Biologist
City of Hamilton, Strategic and Environmental Planning Division	Project Manager, Watershed Management
Royal Botanical Gardens	Aquatic Ecologist
Hamilton Harbour Remedial Action Plan	
	RepresentationField and Stream Rescue TeamPrivate landownerCity of Hamilton, Strategic and Environmental Planning DivisionBay Area Restoration CouncilHamilton Harbour Remedial Action PlanHamilton Conservation Authority, Watershed Planning & Engineering DivisionHamilton-Wentworth Stewardship Council (Ministry of Natural Resources)Private citizenHamilton Conservation Authority, Lands ManagementGreen VentureHamilton-Halton Watershed Stewardship Program (Hamilton Conservation Authority)Fisheries and Oceans CanadaCity of Hamilton, Strategic and Environmental Planning DivisionRoyal Botanical GardensHamilton Harbour Remedial Action Plan

ACT STAKEHOLDERS ADVISORY COMMITTEE MEMBERS

Fisheries and Oceans Canada is equally thanked for their generous financial contributions towards the development of these plans.

Without the support and continued commitment to the Spencer Creek watershed from the above-noted individuals and organizations, these plans would not be possible and the implementation of these plans would not become a reality.

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EXECUTIVE SUMMARY

Environmental organizations in the subwatersheds of Spencer Creek have a growing need for a clear direction and a coordinated effort among all stakeholders to implement stewardship activities. Stewardship is the act of managing our natural environment in a sustainable manner, to maintain it in a healthy state for today and for future generations.

Numerous organizations have been working diligently within these watersheds for decades without complementary workplans, measurable targets or a coordinated implementation effort. In the absence of a coordinated effort, each of the organizations will continue working without capitalizing on their collective potential to effect positive environmental change on the landscape.

Local stakeholders have jointly developed comprehensive Stewardship Action Plans for the Ancaster, Chedoke and Tiffany (ACT) Creek subwatersheds of Spencer Creek. These plans will serve as a guide for local partners in the implementation of stewardship actions, capitalizing on the strengths of existing partner agencies. The coordinated effort to develop and to implement these plans will ensure efficient and effective action on the part of all organizations involved.

The Plans include detailed:

- characterizations of each subwatershed,
- descriptions of environmental stresses and associated Stewardship Actions,
- subwatershed maps depicting the specific locations of stresses,
- maps of existing and potential ecological linkages and eco-tourism opportunities, and
- ecological and water quality monitoring data for each catchment.

Stakeholder input and Geographic Information Systems (GIS) analysis yielded the identification of environmental stresses, both natural and human-induced, within the study area.

- 15 stresses were identified as impacting our natural environment on a subwatershed scale.
- 215 site-level stresses were identified, 75 of which are in Ancaster Creek, 82 in Chedoke Creek and 58 in Tiffany Creek. Refer to the 'Site-Specific Stresses Identified' tables on pages ii iii for statistics on the types and numbers of each stresses identified within each subwatershed.
- Inventories of the local stresses identified in each subwatershed are outlined in the Tables 1 through 3 on pages 3 and 4 of this summary. The stresses are listed in descending order from the most prevalent to the least prevalent. Storm-sewer outfalls, terrestrial habitat fragmentation, urban development, erosion, stormwater management, eco-tourism, and detachment from nature are commonly ranked as the most prevalent stresses in all three subwatersheds.
- 76 Stewardship Actions have been identified to mitigate the impacts of these stresses, including education and outreach opportunities, special study opportunities and restoration opportunities. Refer to the Stewardship Actions for Ancaster, Chedoke and Tiffany Creeks Subwatersheds Summary Table on pages v – xiii for detailed descriptions of each Stewardship Action.

Partners identified in the Ancaster, Chedoke and Tiffany Creeks Stewardship Action Plans are encouraged to join the Implementation Team where they will use new and existing programs to undertake the Stewardship Actions identified in the plans. The Implementation Team will be an ongoing coordinating body for the implementation of the Stewardship Action Plans for the entire Spencer Creek watershed as they are completed on a subwatershed basis over a five year period.

ANCASTER CREEK 75 SITE-SPECIFIC STRESSES IDENTIFIED

DESCRIPTION OF STRESS	CODE	INVENTORY
Storm Sewer Outfalls / CSOs	SO	13
Terrestrial Habitat Fragmentation &	HR	11
Riparian Buffers		
Erosion	ER	10
Development	DV	9
Eco-tourism Related Degradation	ET	7
On-line Ponds / Culverts	PC	7
Detachment from Nature	DT	5
Storm Water Mismanagement	SW	5
Channelized / Buried Streams	CB	2
Pesticide Use	PS	2
Plowed Watercourses	PW	2
Phosphorus Loading	PL	1
Water Contamination through	TC	1
Transportation Corridors		
Debris Jams	DJ	
Encroachment	EN	

CHEDOKE CREEK 82 SITE-SPECIFIC STRESSES IDENTIFIED

DESCRIPTION OF STRESS	CODE	INVENTORY
Storm Sewer Outfalls / CSOs	SO	19
Terrestrial Habitat Fragmentation &	HR	16
Riparian Buffers		
Eco-tourism Related Degradation	ET	14
Development	DV	12
Channelized / Buried Streams	CB	6
Encroachment	EN	3
Erosion	ER	3
Storm Water Mismanagement	SW	3
Water Contamination through	TC	3
Transportation Corridors		
On-line Ponds / Culverts	PC	1
Phosphorus Loading	PL	1
Pesticide Use	PS	1
Debris Jams	DJ	
Detachment from Nature	DT	
Plowed Watercourses	PW	

TIFFANY CREEK 58 SITE-SPECIFIC STRESSES IDENTIFIED

DESCRIPTION OF STRESS	CODE	INVENTORY
Detachment from Nature	DT	12
Erosion	ER	9
Storm Water Mismanagement	SW	9
Development	DV	8
Terrestrial Habitat Fragmentation & Riparian Buffers	HR	7
Storm Sewer Outfalls / CSOs	SO	4
On-line Ponds / Culverts	PC	3
Channelized / Buried Streams	CB	2
Eco-tourism Related Degradation	ET	2
Plowed Watercourses	PW	1
Water Contamination through Transportation Corridors	тс	1
Debris Jams	DJ	
Encroachment	EN	
Phosphorus Loading	PL	
Pesticide Use	PS	

EXECUTIVE SUMMARY

STEWARDSHIP ACTIONS FOR ANCASTER, CHEDOKE AND TIFFANY CREEKS SUBWATERSHEDS - SUMMARY

STRESS	STEWARDSHIP ACTIONS		
OTREGG	Awareness Opportunity	Special Study Opportunity	Restoration Opportunity
Channelization / Buried Streams (CB)	 <u>2008-2012</u>: Utilize workshops, information sessions, literature, webpages, interpretive signage & direct landowner contact to create awareness regarding the detrimental effects of channelized and buried streams; Partners: DFO / HCA / MNR / Ont. Stewardship Council / HHWSP 	 By 2010: Identify sites for undertaking buried stream "daylighting" projects in the subwatershed; Partners: HCA / CITY / MNR / post-sec. schools / HHWSP 	 <u>2011-2012</u>: Focus riparian zone rehabilitation to areas downstream of channelized sites, to reduce flow velocities, erosion and sedimentation, with a goal of two projects per year; Partners: CITY / DFO / FSRT / HCA / Ont. Stewardship Council / landowners & citizens / HHWSP
		 <u>By 2010:</u> Assess landowner motivation for contributing to natural channel design; Partners: HCA / MNR / post-sec. schools / HHWSP 	 By 2012: Work with private landowners to undertake one "daylighting" / natural channel design project; Partners: CITY / DFO / FSRT / HCA / Ont. Stewardship Council / landowners & citizens / HHWSP
		 <u>By 2012:</u> Inventory illegal sewer hookups by building on the Cross Connections of Sanitary Services into Storm Sewers study undertaken in 2003; Partners: HCA / MNR / post-sec. schools 	
Debris Jams (DJ)	 2008-2012: Utilize workshops, information sessions, literature, webpages, interpretive signage & direct landowner contact to create awareness regarding the environmental impacts of debris jams as fish barriers & flooding hazards; Partners: HCA / MNR / Ont. Stewardship Council / HHWSP 	 By 2010: Complete an assessment of creek/instream flow barriers that are prone to debris jams and cause barriers to fish migration, including the prioritization of barriers to be removed; Partners: HCA / MNR / post-sec. schools / HHWSP By 2010: Assess landowner motivation for contributing to barrier removal projects; Partners: HCA / MNR / post-sec. schools / HHWSP 	 <u>2011-2012</u>: Remove debris jams based on the barrier removal project recommendations; Partners: CITY / DFO / FSRT / HCA / Ont. Stewardship Council / landowners & citizens / HHWSP

STRESS STEWARDSHIP	HIP ACTIONS		
Awareness Opp	portunity	Special Study Opportunity	Restoration Opportunity
Detachment from Nature (DT) 2008-2012: Initial with watershed is targeted audient information sess direct landowne regarding urban significance of n • Partners: BA Venture / I 2008-2012: Erect corridor signage • Partners: BA Venture / H WPN 2008-2012: Impl communities wh possible; • Partners: BA HCA / sche / HHWSP 2008-2012: Con Steward Award I • Partners: BA HCA / sche / HHWSP	ate a community greening project partners to deliver messaging to ces. Utilize workshops, sions, literature, webpages & r contact to create awareness BMPs and the ecological hatural features; RC / CITY / FSRT / Green HCA / Ont. Stewardship Council ct creek crossing & ecological along roadways; RC / CITY / FSRT / Green HCA / Ont. Stewardship Council / lement Adopt-a-Creek projects in ere Friends of groups are ARC / Environment Hamilton / bol boards / landowners & citizens tinue to implement the Watershed Program; RC / Environment Hamilton / bol boards / landowners & citizens	 By 2011: Utilize citizen groups to conduct local watershed monitoring & reporting projects (including water quality, naturalization projects & litter hotspots); Partners: BARC / Environment Hamilton / HCA(P&E) / school boards / landowners & citizens 	 By 2010: Initiate a minimum of one volunteer-based program to complete restoration projects on private & public lands with local landowners including schoolyard naturalization, litter clean up, removal of encroaching material, etc.; Partners: FSRT / HCA / Ont. Stewardship Council / school boards landowners & citizens / HHWSP

STRESS STEWARDSHIP ACTIONS			
STREES	Awareness Opportunity	Special Study Opportunity	Restoration Opportunity
Development (DV)	2008-2012: Host annual training sessions for City staff & developers to create awareness regarding the incorporation of development related BMPs into planning applications (i.e. pervious pavement, green rooftops, storm water management, road-salt alternatives, snow-piling, erosion & sediment control measures, compliance & enforcement,	 2008-2012: Continue to complete ecological surveys (using the Ecological Land Classification system) to ensure species at risk habitat or rare ecological areas are not disrupted; Partners: CITY / HCA(Ecology) / post-sec. schools 	 <u>2008-2012</u>: Use the terrestrial habitat and ecological linkages identified in this plan to preserve & rehabilitate these areas as part of new Greenfield developments in the subwatershed; Partners: HCA(P&E) / CITY
	etc.); • Partners: BARC / CITY / DFO / FSRT / Green Venture / HCA(P&E) / MTO	 <u>2008-2012</u>: Continue to incorporate downstream assessments of creek conditions, with recommendations for improvement, as part of the overall subwatershed studies conducted as part of new Greenfield development planning; Partners: CITY / HCA / post-sec. schools 	 <u>2008-2012</u>: Enhance groundwater recharge by ensuring that 70% of all land, post construction must remain pervious as a condition for development application approval; Partners: HCA / CITY
	 <u>2008-2012</u>: Apply Yellow Fish Road to all catchbasins on streets and in parking areas to educate private landowners post-development; Partners: BARC / CITY / DFO / FSRT / Green Venture / HCA / MTO 	 2008-2012: HCA staff to develop an internal mechanism to ensure that BMP's and Stewardship Actions to preserve and enhance habitat are addressed in development application prior to construction; Partners: BARC / CITY / DFO / FSRT / Green Venture / HCA(P&E, Ecology) / MTO 	 2008-2012: Implement the fish habitat buffer requirements for warm and coldwater streams as outlined in the HCA Planning and Regulations Policy and Guidelines document (30m setback for coldwater systems and 15m setback for warmwater systems); Partners: HCA(P&E) / CITY

STRESS	STEWARDSHIP ACTIONS			
o IREGO	Awareness Opportunity	Special Study Opportunity	Restoration Opportunity	
Encroachment (EN)	 2008-2012: Utilize workshops, information sessions, literature, webpages, signage & direct landowner contact to create awareness regarding encroachment impacts to terrestrial habitat as well as the ecological significance of riparian buffers & natural areas (public lands); Partners: CITY / HCA(Lands) / Ont. Stewardship Council / RBG / local nurseries & landscaping co.'s / HHWSP 	 2009-2012: Utilize citizen groups to monitor restored sites on an annual basis to ensure mitigation of encroachment on public lands remains effective & to encourage neighbour-to-neighbour mentoring; Partners: HCA(Ecology) / landowners & citizens / HHWSP / CITY / RBG 	 <u>2008-2012</u>: Continue to work with neighbours to encourage community events to remove existing encroachments on public lands; Partners: FSRT / HCA(Lands) / Ont. Stewardship Council / landowners & citizens / HHWSP/ RBG / CITY 	
	 <u>2008-2012</u>: Utilize workshops, information sessions, literature, webpages, interpretive signage & direct landowner contact to create awareness regarding encroachment impacts to terrestrial habitat as well as the ecological significance of riparian buffers & natural areas (private lands); Partners: CITY / HCA / Ont. Stewardship Council / RBG / local nurseries & landscaping co.'s / HHWSP <u>By 2010</u>: Work with local nurseries & landscaping co.'s to educate / encourage landowners to use native plants; Partners: CITY / HCA / Ont. Stewardship Council / RBG / Green Venture / local nurseries & landscaping co.'s / HHWSP 			

STRESS	S STEWARDSHIP ACTIONS		
SINESS	Awareness Opportunity	Special Study Opportunity	Restoration Opportunity
Erosion (ER)	 2008-2012: Host training sessions for City staff and developers to create awareness regarding BMPs & importance of properly maintained erosion / sediment control measures & enforcement; Partners: CITY / DFO / HCA(P&E) / Ont. Stewardship 	By 2010: Complete field study of stream morphology, determining erosion hotspots & associated causes; • Partners: CITY / HCA / post-sec. schools	 2008-2012: Utilize enforcement scheme to enforce maintenance of erosion / sediment control measures on new development sites; Partners: DFO / CITY / HCA / Ont. Stewardship Council / landowners & citizens
			 2008-2012: Reduce erosion and promote awareness through the completion of a streambank stabilization / natural channel design demonstration project; Partners: DFO / CITY / HCA / Ont. Stewardship Council / landowners & citizens / HHWSP
	 <u>2008-2012</u>: Utilize workshops, information sessions, literature, webpages, interpretive signage & direct private & public landowner contact to create awareness regarding the importance of riparian buffers & proper land management practices; Partners: CITY / DFO / HCA / Ont. Stewardship Council / HHWSP 		 2008-2012: Undertake a minimum of one riparian buffer project on private & public lands to reduce erosion. Promote no mow zones a minimum of 3m from top of bank on public and private lands; Partners: DFO / CITY / HCA / Ont. Stewardship Council / landowners & citizens / HHWSP
Eco-tourism Related Degradation (ET)	 <u>2008-2012</u>: Provide signage noting the environmental significance of natural areas & BMPs for eco-tourists; Partners: CITY / HCA(Lands) / Ont. Stewardship Council / RBG 	 <u>2009-2012</u>: When undertaking master planning exercises, consider developing trails through ecological linkages noted in study area; Partners: BTA / CITY / HCA(Lands) / RBG 	 <u>2010-2012</u>: Develop trails to meet guidelines set in HCA's Planning & Regulation Policies & Guidelines; Partners: BTA / CITY / HCA(Lands) / RBG

STRESS	STEWARDSHIP ACTIONS			
	Awareness Opportunity	Special Study Opportunity	Restoration Opportunity	
Terrestrial Habitat Fragmentation & Lack of Riparian Buffers (HR)	 <u>2008-2012</u>: Meet with public landowners to create working relationship for land stewardship on public lands; Partners: HCA / Ont. Stewardship Council / HHWSP 	 2008-2009: Develop How Much Habitat is Enough targets & potential restoration sites for each subwatershed, as well as specific areas to connect using eco-link recommendations in catchment summaries & determine specific species habitat to target; Partners: CITY / HCA (Ecology) / post-sec. schools / HHWSP 	 <u>2008-2012</u>: Contact all landowners of natural areas and watercourses. A minimum of one Watershed Steward Award Recipient and one rehabilitation project to be completed; Partners: CITY / FSRT / HCA / Ont. Stewardship Council / school boards / landowners & citizens / HHWSP 	
	 2008-2009: Utilize workshops, information sessions, literature, webpages, interpretive signage & direct private landowner contact to create awareness regarding the importance of riparian buffers & natural areas; Partners: HCA / Ont. Stewardship Council / HHWSP 2009-2012: Create demonstration sites on public lands that focus on varying types of terrestrial and aquatic restoration projects; Partners: CITY / FSRT / HCA / Ont. Stewardship Council / school boards / landowners & citizens / HHWSP 	 2008-2009: Assess landowner motivation for increasing forest, wetland, riparian & meadow / prairie habitat; Partners: CITY / HCA / post-sec. schools / HHWSP 	 2009-2012: Undertake a minimum of one restoration project per year on public lands, with an emphasis on utility corridors, for connectivity and demonstration sites; Partners: CITY / FSRT / HCA / Ont. Stewardship Council / school boards / landowners & citizens / HHWSP 	

STRESS	STEWARDSHIP ACTIONS			
	Awareness Opportunity	Special Study Opportunity	Restoration Opportunity	
On-line Ponds & Culverts (PC)	 <u>2008-2012</u>: Utilize workshops, information sessions, literature & webpage, interpretive signage & direct landowner contact to create awareness regarding environmental effects of online ponds; Partners: DFO / HCA / MNR / Ont. Stewardship Council / HHWSP 	 By 2010: Assess landowner motivation for removing/retrofitting existing on-line ponds; Partners: HCA / MNR / post-sec. schools / local eng. co.'s / HHWSP 	 2008-2012: Rehabilitate/retrofit a minimum of one on-line pond; Partners: DFO / CITY / HCA / post-sec. schools / local eng. co.'s / HHWSP 	
		 2008-2012: Use local colleges / universities or volunteer consultants to complete studies & design for rehabilitation of on-line ponds projects; Partners: HCA(P&E) / MNR / post-sec. schools / local eng. co.'s / HHWSP 		
	 <u>2008-2011</u>: Utilize workshops, information sessions, literature & webpages, interpretive signage & direct landowner contact to create awareness regarding environmental effects of perched & closed bottom culverts; Partners: DFO / HCA / MNR / Ont. Stewardship Council / HHWSP 	 2010: Assess landowner motivation for removing/retrofitting existing perched and/or closed bottom culverts; Partners: HCA / MNR / post-sec. schools / local eng. co.'s / HHWSP 2008-2012: Use local colleges / universities or volunteer consultants to complete studies & designs for rehabilitation of culverts projects; Partners: HCA(P&E) / MNR / post-sec. schools / local eng. co.'s / HHWSP 	 2008-2012: Rehabilitate/retrofit a minimum of one perched & closed bottom culvert; Partners: DFO / CITY / HCA / post-sec. schools / local eng. co.'s / HHWSP 	

STRESS	STEWARDSHIP ACTIONS			
OINEOO	Awareness Opportunity	Special Study Opportunity	Restoration Opportunity	
Phosphorus Loading (PL)	Awareness Opportunity 2008-2012: Utilize workshops, information sessions, literature & webpages, interpretive signage & direct landowner contact to create awareness regarding environmental impacts of phosphorus loading & alternatives to lawn fertilization; • Partners: HCA / RBG / HHWSP / Green Venture	 In 2009: Develop reduction in phosphorus loading targets & identify potential mitigation sites for each subwatershed; Partners: HCA(P&E) / RBG / post-sec. schools / HHWSP 2009: Assess landowner motivation for reducing lawn fertilization; Partners: HCA / RBG / post-sec. schools / HHWSP / Green Venture 	 <u>2009-2012</u>: Work toward an 80% reduction in phosphorus loading by encouraging citizens to conduct a reduction in lawn fertilization (20% reduction/yr through the promotion of over-seeding, mulching & BMPs); Partners: CITY / HCA / Ont. Stewardship Council / HHWSP / Green Venture 	
		 <u>In 2008:</u> Model phosphorus loading in the subwatersheds and compare against RAP objectives; Partners: HCA / RBG / post-sec. schools / RAP 		
Pesticide Use (PS)	 <u>2008-2009</u>: Utilize workshops, information sessions, literature & webpages, interpretive signage & direct landowner contact to create awareness regarding environmental impacts of pesticide / herbicide use & alternatives to pesticide / herbicide use; Partners: Green Venture / Hamilton Coalition on Pesticide Issues / OMAFRA 	 <u>In 2008:</u> Determine percentage of pesticide / herbicide use in each subwatershed; Partners: Green Venture / HCPI / OMAFRA 	 <u>By 2011:</u> Work toward decreasing pesticide use by 50% and by 75% in 2012 using integrated pest management, lawn naturalization, over- seeding, mulching, BMPs, etc.; Partners: Green Venture / HCA / Hamilton Coalition on Pesticide Issues / Ont. Stewardship Council / OMAFRA 	
	 2008-2012: Support the City's Pesticide By-law; Partners: Green Venture / Hamilton Coalition on Pesticide Issues / OMAFRA 	 <u>In 2009:</u> Develop reduction in pesticide / herbicide use targets & potential mitigation sites for each subwatershed; Partners: Green Venture / HCPI / OMAFRA <u>In 2009:</u> Assess landowner motivation for reducing pesticide use; Partners: Green Venture / HCPI / OMAFRA 		

STRESS	STEWARDSHIP ACTIONS			
OTREOG	Awareness Opportunity	Special Study Opportunity	Restoration Opportunity	
Plowed Watercourse (PW)	 2008-2012: Utilize workshops, information sessions, literature & webpages & direct private landowner contact to create awareness regarding environmental effects of plowed watercourses; Partners: DFO / HCA / OMAFRA / Ont. Stewardship Council / HHWSP 	By 2010: Determine percentage of agricultural landowners with Environmental Farm Plans & potential to increase the number of workshops held; • Partners : HCA / OMAFRA / HHWSP / OSCIA	 2008-2012: Reduce sedimentation through the creation of a minimum of one riparian buffer on private lands, target 15m from top of bank for warm water systems and 30m from top of bank for coldwater systems; Partners: HCA / landowner / HHWSP 	
		 <u>2010:</u> Assess landowner motivation for installing grassed waterways and riparian buffers; Partners: HCA / OMAFRA / HHWSP / OSCIA 		
Storm Sewer Outfalls / CSOs (SO)	 <u>2008-2012:</u> Implement the Stream of Dreams and Yellow Fish Road Programs with local schools, scout, girl guides and other children's groups, to create awareness regarding stormwater input & the impacts of CSO outfalls on stream systems; Partners: BARC / CITY / FSRT / HCA 	 <u>2008-2012</u>: Conduct water quality testing at storm sewer outfalls to support a study on illegal sewer hookups, Sewer Use Bylaw enforcement, & restoration efforts; Partners: CITY / HCA / post-sec. schools 	 <u>2008-2010</u>: Reduce flows & sedimentation through riparian buffer establishment downstream of CSO outfalls (public lands); Partners: CITY / FSRT / Green Venture / HCA / Ont. Stewardship Council / landowners & citizens 	
	 2008-2012: Support Sewer-Use Bylaw enforcement (City of Hamilton By-law No. 04- 150); Partners: BARC / CITY / FSRT / HCA 	 2008-2012: Conduction water quality testing at CSO outfalls pre and post mitigation to support mitigation measures; Partners: CITY / HCA / post-sec. schools 	 By 2012: 80% of connected downspouts to be disconnected & rain barrels to be utilized as an alternative; Partners: CITY / FSRT / Green Venture / HCA / Ont. Stewardship Council / landowners & citizens 	

STRESS	STEWARDSHIP ACTIONS			
STRESS	Awareness Opportunity	Special Study Opportunity	Restoration Opportunity	
Storm Water Mismanagement (SWM)	 2008-2012: Continue to promote Best Management Practices as per HCA Planning and Regulations Policy and Guidelines and new provincial directives for new developments; Partners: CITY / Green Venture / HCA(P&E) 	 <u>By 2010:</u> Determine percentage of landowners with connected downspouts; Partners: CITY / Green Venture / HCA 	 By 2012 80% of connected downspouts to be disconnected & rain barrels to be utilized as an alternative; Partners: CITY / Green Venture / HCA / landowners 	
	 <u>2008-2012</u>: Utilize workshops, information sessions, literature, webpages & direct landowner contact to create awareness regarding BMPs for storm water source control measures (i.e. disconnected downspouts, roof gardens, rain barrels, biofilters, trees, pervious pavement, rain gardens); Partners: CITY / Green Venture / HCA 	By 2010: Assess landowner motivation for disconnection & implementing source control measures; • Partners: CITY / Green Venture / HCA	 2008-2012: Retro-fit a minimum of one existing storm water management pond to a wet pond based on water quality, aquatic habitat & erosion control benefits; Partners: CITY / Green Venture / HCA / landowners 	
Water Contamination through Transportation Corridors	 <u>2008-2012</u>: Host training sessions for City staff to create awareness & encourage environmentally friendly road salt alternatives & proper snow removal practices; Partners: CITY / DFO / HCA / MTO / Ont. Stewardship Council 	By 2010: Determine the best method to mitigate contamination from transportation corridors into watercourses by studying alternatives to road salt for de-icing & incorporating into a road salt management plan; • Partners : CITY / HCA / MTO / post-sec. schools	 <u>2010-2012</u>: Implement road salt management plans & reduce use of salt for de-icing by 15% over 5yrs; Increase use of vacuum street sweepers; Increase vegetated filter strips / grassed swales along medians & roadsides, where ditches are present incorporate non-invasive native vegetation; Partners: CITY / MTO 	



The following has been extracted from the Spencer Creek Conservation Authority's publication, The Spencer Story (1965), which was used in local high schools to engage youth in watershed stewardship:

Canada is a country of great natural wealth. With her present growing population and industrial expansion, the 1990's should see her among the wealthiest nations of the world. But, do we want to live in a land of vanishing beauty, of increasing ugliness, of shrinking open spaces, and an over-all environment that is diminished daily by pollution, noise, blight and drought?

Dr. Edward G. Pleva of the University of Western Ontario and a speaker and conservationist of note, suggests that if a line is drawn from Quebec City through Montreal, Kingston, Toronto, Hamilton, London to Windsor, and then if we think of the land twenty-five miles on both sides of the line, we locate the living and working area of three-fifths of the population of Canada, the situation of four-fifths of the country's industrial activity, and the source of two-fifths of the agricultural crop value. It is in this corridor which he has named the Grand Trunk Corridor, that the greatest expansion population-wise and industrially is taking place and will continue to do so. It is here that the questions asked in the preceding paragraph is most pertinent. We can misuse the land and diminish or even destroy our resources, or we can create a land in which physical and spiritual welfare will go hand in hand. This is the conservation decision we must make in the 1960's.

A new theory of history is creeping into our textbooks, namely, that earlier civilizations passed away because their people did not learn to live in harmony with nature and to work with her not against her. The great empire of Babylonia situated on the lower reaches of the Tigris and Euphrates Rivers, which we are told was the site of the Garden of Eden and which lasted for over 2000 years, depended on man-made canals to bring the necessary water from the rivers to the dry lands around. When wars and neglect caused the canals to fill with silt and fail in their purpose, fewer and fewer people could live there. Finally, the Garden of Eden changed into a desert. Roman farms were quite fertile at first but suffered from erosion, continual cropping without returning anything to the soil, and poor land management. The Roman Empire had to look to other sources for food but they too eventually could not feed the masses of the Empire and in 455 A.D. the city of Rome was captured and burned by tribes from Northern Europe. The stories of Babylon will happen again and again until mankind learns to work with nature and not try to be her master.

The concept that mankind must work with nature and use the resources of his country wisely knowing that none of these is unlimited and that they were intended also to serve the needs of generations yet unborn, must become part of the way of life of our young people especially, if this land of ours is not to follow in the destructive footsteps of Babylonia and Rome. Teachers know that one of the fundamentals of their profession is to teach from the near to the far. It follows then, that if our young people are to grow up and become the future stewards of the land, they must first of all know the story of the watershed in which they live and understand something of its particular problems. To help in the development of this concept is the chief reason for the publication of the Spencer Creek Story, 1965.

We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect.

SPENCER CREEK WATERSHED

The Spencer Creek watershed is the largest watershed within the jurisdiction of the Hamilton Conservation Authority (HCA) at 279 km², or 59% of the HCA watershed, and outlets directly into Cootes Paradise Marsh. The HCA notes this watershed as being comprised of 15 subwatersheds. However two of these, Borer's Creek and Chedoke Creek, feed directly into Cootes Paradise Marsh, and not the Spencer Creek system itself. The Spencer Creek watershed is characterized by wetlands, rural land use and rural communities in the upper part of the watershed and urban development in the lower portion. The subwatersheds of Spencer Creek are located within the City of Hamilton and the Township of Puslinch.

The Niagara Escarpment and Dundas Valley are significant natural features located in the lower portion of the watershed, while the Beverly Swamp is located in upper portion of watershed. There are two large dams located on the Spencer Creek watershed, Christie Dam & Valens Dam. Both of these dams are managed by the Hamilton Conservation Authority. Spencer Creek is a 6th order stream and travels about 40 km before reaching its outlet at Cootes Paradise Marsh, a provincially significant coastal wetland (Source Water Protection Halton-Hamilton Region, January 2006).

For a full characterization of the Spencer Creek watershed refer to the *Preliminary Watershed Description Report for the Hamilton Conservation Authority's Watersheds* (Source Water Protection Halton-Hamilton Region, January 2006) and any updates thereof.

The Spencer Creek Stewardship Action Plans succeed the current Spencer Creek Watershed Management Plan (HCA, 1997) and are deliverables of the Hamilton Conservation Authority Five-year Strategic Plan (2007-2011), within which the completion of up-to-date subwatershed plans are listed as strategic water management objectives. The plans within this document will also contribute to both, the Hamilton Harbour Remedial Action Plan (HHRAP) and the Five-year Strategic Plan (2007-2011) for the HCA's Stewardship Program, also known as the Hamilton-Halton Watershed Stewardship Program.

The Hamilton Harbour was declared an Area of Concern (AOC) in 1987 by the International Joint Commission due to its high contamination of toxic sediments and degradation of water quality and aquatic habitat. As a result, the HHRAP was initiated in order to de-list the Hamilton Harbour as an AOC. The HHRAP aims to remove this designation by 2015 by meeting specific targets as they relate to water quality and bacterial contamination, urbanization and land management, toxic substances and sediment remediation, fish and wildlife habitat, public access and aesthetics, education and public information, and research and monitoring. The HHRAP is implemented by the Bay Area Implementation Team; which is made up of industrial, commercial and government representatives within the limits of the Hamilton Harbour watershed. The Bay Area Restoration Council was formed in response to the HHRAP and works towards community involvement and awareness on the issues surrounding this AOC and the best management practices that are needed in order to de-list this watershed. The Stage 2 Report & Update was released in 2002 listing the targets met to date as well as those stresses still in need of mitigation. The Spencer Creek watershed makes up 57% of the Hamilton Harbour watershed.

The Hamilton-Halton Watershed Stewardship Program is a joint program between the HCA and Conservation Halton. It began in 1994 in cooperation with the Bay Area Restoration Council (BARC) in order to deliver education outreach and complete restoration projects that will directly contribute to the HHRAP efforts as they relate to private landowners within the Hamilton Harbour watershed. This program has effectively created environmental awareness on various issues including the importance of riparian buffers, terrestrial and aquatic habitats, species at risk, water quality, and septic and well water education. Additionally, restoration projects involving water quality improvement and habitat restoration have been completed and annual environmental monitoring protocols have been implemented. This work has been completed by undertaking direct landowner contact by: mail, telephone, door-to-door campaigns, open houses and issue specific workshops. To date this program has contacted landowners of over 1800 properties within the Spencer Creek watershed and more specifically over 700 within the Ancaster, Chedoke and Tiffany (ACT!) subwatersheds. Of these landowners contacted, 254 have entered into hand-shake

agreements to remain watershed stewards, 38 of these are within the ACT subwatersheds. The Spencer Creek watershed makes up 19% of the Hamilton-Halton Watershed Stewardship Program's jurisdiction.

A detailed Geographical Information Systems analysis of watershed characteristics and monitoring data was conducted to prioritize the order in which the Stewardship Action Plans would be developed for the 15 subwatersheds of Spencer Creek. Additionally, HCA staff and staff of local environmental agencies were consulted to provide expert input into the prioritization exercise. This analysis resulted in the selection of the urban subwatersheds of Spencer Creek as they demonstrated poor water quality, a lack of riparian vegetation and the absence of protective legislation. More specifically, Ancaster, Chedoke and Tiffany Creeks were identified as priority subwatersheds due to these concerns and their direct impact on the health of Cootes Paradise Marsh, a provincially significant wetland found on the western coast of Lake Ontario and adjacent to Hamilton Harbour. Maps of the Spencer Creek watershed and its subwatersheds, as well as a schedule for the development of future Stewardship Action Plans can be found within Appendix A, as excerpts from the HCA ACT Work Plan (March 2007).

ACT SUBWATERSHEDS

The ACT subwatersheds are approximately 48 km², or 17% of the Spencer Creek watershed's 279 km² area. The waters of Ancaster, Chedoke & Tiffany Creeks drain into the Cootes Paradise Basin. Cootes Paradise is a provincially significant coastal wetland located at the western end of Hamilton Harbour. While Ancaster Creek feeds directly into the main branch of Spencer Creek, Tiffany Creek does not as it is a tributary of Ancaster Creek. Technically, Chedoke Creek is a subwatershed separate of the Spencer Creek system. However for the purpose of this study it has been included within the Spencer Creek watershed as was the case in the existing Spencer Creek Watershed Management Plan (HCA, 1997).

Of the fifteen subwatersheds of Spencer Creek, Ancaster, Chedoke and Tiffany Creeks are the most urbanized and have been targeted for increased development and urban intensification in the Growth Plan for the Greater Golden Horseshoe (2006) and the Greenbelt Plan (2005). In response to the strict urban boundaries being defined within the City of Hamilton as a result of these recently passed legislations, the City has developed the The purpose of the Spencer Creek Stewardship Action Plans are to create awareness by educating the public on the environmental issues within their local subwatershed, and to in turn, improve the ecological functions of the subwatershed through restoration initiatives. These plans provide a comprehensive strategy to support environmental watershed stewardship within the Spencer Creek subwatersheds by focusing on stewardship activities such as, education & awareness, habitat restoration and stress mitigation efforts. Additionally, these plans will help to guide sustainable development for the Spencer Creek watershed. Stresses acting on the subwatersheds, priority areas for restoration, and awareness needs of the communities are specifically identified within these plans.

Growth Related Integrated Development Strategy (GRIDS) which aims to meet population, employment and development needs throughout the City over the next 30 years.

Chedoke Creek is predominantly residential land use with supporting institutional, commercial and utility land uses present. Ancaster Creek and Tiffany Creek are both currently in various phases of development as the headwaters of both subwatersheds are intended for development as outlined in the City of Hamilton's GRIDS project.

Major stresses noted within these plans that are observed to be impacting these three subwatersheds are: channelized / buried streams, detachment from nature, development, encroachment, erosion, eco-tourism, habitat loss and fragmentation, on-line ponds, culverts, phosphorous loading, pesticide use, plowed watercourses, storm sewer outfalls and combined sewer overflows, storm water management, and water contamination through transportation corridors.





PLAN LIMITATIONS

Although measures were taken to complete a thorough analysis of the subwatersheds of Ancaster, Chedoke and Tiffany Creeks, some data was missing from this analysis as some research and monitoring has not been completed to date. The following is a list of the data gaps that are present in these plans. It is important that research and monitoring regarding the status of the following characteristics within these subwatersheds is undertaken and kept up-to-date in order to measure our success through the use of these plans. For more information on fisheries assessments within the ACT subwatersheds, refer to Appendix B.

Data Gaps

- Stream morphology data (none)
- Erosion hot-spots and as it relates to development & natural occurrences
- Fisheries & benthics data
 - Fisheries need to be assessed in all of Chedoke, and parts of Ancaster & Tiffany
 - Benthics data is collected only in Ancaster Creek at Hamilton Golf & Country Club, at Old Dundas Rd, and at Cootes Dr., and in Tiffany Creek at Tiffany Falls
 - Fisheries inventory is collected only in Ancaster Creek at Golf Links Park, at Hamilton G&C Club, and in Tiffany Creek at Tiffany Falls

- Riparian buffer data (1999 last time collected)
- Water quality data (surface & groundwater)
 - o Only collected in Ancaster Creek at Rousseaux St.
- Flow data (surface & groundwater)
 - o Only collected in Ancaster Creek at Rousseaux St.

Additionally all efforts were made to identify every future and current stress within these subwatersheds, however the stresses identified within this document are not exhaustive and therefore there may be stresses located within these subwatersheds that are not noted within these plans.

These plans are to be used as guidelines to outline the current and future stresses acting upon the Spencer Creek subwatersheds of Ancaster, Chedoke and Tiffany Creeks (ACT) as well as the Stewardship Actions that have been identified to mitigate the impacts of those stresses. This document also provides approximate time frames and partner agencies to be used by the Stewardship Action Plans Implementation Team in developing strategic plans and priorities for the implementation of the Stewardship Actions over the next 5 years (2008-2012).

Detailed Catchment Maps note the specific locations of site-level stresses and corresponding Catchment Datasheets describe these site-level stresses. The catchment datasheets also describe potential ecological linkages between tracts of natural areas and ecological and water quality monitoring data which can be used to better understand the inter-relationships working within each catchment. The information reported within these documents was collected through public consultation, the ACT Stakeholder Advisory Committee and an internal HCA working group.

Within the Stewardship Action Plans, Subwatershed-wide Stresses that are known to be acting on each subwatershed as a whole have been identified. Specific incidences relating to the Subwatershed-wide Stresses, known throughout these plans as Site-level Stresses, have then been inventoried for each catchment basin of each subwatershed. Subsequently, the Site-level Stresses have been categorized as Future or Current Stresses. The Future Stresses are predominantly development related and as such may not be apparent at the present time, while Current Stresses are known to be impacting the local landscape presently.

Through Stakeholder consultation, Stewardship Actions have been developed that address each type of Subwatershed-wide Stress identified. These Stewardship Actions are meant to guide the activities of local agencies to prevent and mitigate the impacts of these stresses that are acting upon the natural environment of the subwatersheds. The Stewardship Actions that have been developed include: Awareness Opportunities, Special Study Opportunities and Restoration Opportunities. Lists of local partner agencies to assist with the implementation of the Stewardship Actions as well as approximate time frames for their expected completion are included with each Stewardship Action. The themes of each of the Stewardship Actions are described below:

Awareness Opportunity:	education and outreach opportunities involving residents, public or private landowners, or active associations / organizations
Special Study Opportunity:	detailed analysis to better understand the events taking place in a specific location or area of the subwatershed
Restoration Opportunity:	on-the-ground restoration work

Implementation Supplements for each of the Stewardship Action Plans have been generated through the compilation of ancillary information gathered during the Stress identification and Stewardship Actions development processes.

A Spencer Creek Stewardship Action Plans Implementation Team will be established to carry out the Stewardship Actions identified within the Stewardship Action Plans of all 15 subwatersheds of Spencer Creek; HCA will serve as the coordinating body for this effort. Biannual meetings will occur throughout each implementation year. Upon the completion of each Subwatershed Stewardship Action Plan, appropriate Subwatershed Stakeholder Advisory Committee members will join the Implementation Team, and as such the Stewardship Actions identified for that subwatershed will be incorporated into the Implementation Team's workplan for the following year. Implementation Team meetings will be held in the following months of each year in order to discuss the topics noted:

March

• Development of annual workplan, outlining Stewardship Actions to be initiated by each partner during the coming implementation year.

September

 Report on progress from each partner as to which Stewardship Actions were initiated and/or completed during the implementation year. In most cases, the implementation of the Awareness Opportunity will need to precede all other Stewardship Actions developed. It is possible for any Special Study Opportunity to be implemented concurrently with an associated Awareness Opportunity; however Restoration Opportunities will be the final Stewardship Action to be completed for each stress identified. An approximate time frame for the completion of each Stewardship Action has been developed and all are noted within the Stewardship Actions Tables in each of the Stewardship Action Plans.

Three Dominant Subwatershed-wide Stresses were identified through this process, with a variety of other Subwatershed-wide stresses identified as being "associated" with those Dominant Stresses. At the outset, Implementation should focus on the Stewardship Actions related to the three Dominant Stresses, followed by the Stewardship Actions for the "associated" stresses. Additionally, each Dominant and Associated Stress has Site-level Stresses identified on the catchment maps, the details of which are within the corresponding catchment datasheets.

Implementation should begin with the Stewardship Actions that address the Subwatershedwide Stresses followed by the Stewardship Actions that address the Site-level Stresses identified within each of the subwatershed catchments. For example, the Awareness Opportunities associated with Detachment from Nature should be carried out over the entire subwatershed, followed by the Special Study and Restoration Opportunities that have been developed to address Detachment from Nature at the site level.

The Stewardship Actions noted in these documents are guidelines to be used by the Implementation Team to define priorities as they relate to funding, budgeting and staffing requirements of each project. Stewardship Actions noted in this document can be modified by the Implementation Team as they see fit but should be used as a reference when determining appropriate measures in which to mitigate the stress at hand. Additionally, the Implementation Team will need to define detailed implementation strategies and in some cases site plans to follow through with the implementation of each Stewardship Action.

Assessing landowner motivation for participation in restoration activities will be key in determining remediation priorities. It is recommended that the assessments of landowner motivation be completed at the outset of implementation. This will aid in determining funding and staffing requirements for upcoming initiatives, as well as provide a knowledge base for working efficiently to achieve both landowner and partner goals.

It is suggested that the following methods be utilized and built-upon when approaching landowners.

Landowner Contact Procedure Recommendations (private & public)

- Direct Contact
 - a. Door-to-door contact; deliver brochure with personalized explanation of reason for contact (stapled to brochure)
 - i. For those unavailable by door-to-door contact, leave a brochure and follow up with a mailed letter to landowner will additional information regarding the benefits to the environment and landowner
 - b. Phone landowner to set-up a site visit and/or to discuss their concerns in more detail
 - c. Add landowner to a contact list (mailing / phone) regarding relevant topics to their area or natural feature (workshops / educational sessions / activities in the area)
- Indirect Contact
 - a. At neighbourhood associations / community councils / rate-payers organizations (i.e. police associations) host:
 - ii. Information / education sessions,
 - iii. Workshops, and/or
 - iv. Deliver relevant literature

Some major projects that could be undertaken within the first year of implementation for the ACT watershed are as follows:

Community-based Implementation with Partners

Demonstration sites on public lands

Habitat Restoration

City of Hamilton. GRIDS Master Plans

The Growth Related Integrated Development Strategy (GRIDS) is a balanced growth strategy. Its purpose is to identify the most ideal places for growth and the type of growth based on environmental priorities, social issues, economic opportunities and population studies as well as to identify strategies to fund the servicing of these areas. GRIDS, approved by Council in May 2006, includes a strategy to accommodate a projected population of 700 000 and 100 000 additional households by 2031. Essentially is the implementation of the City's Vision 2020 Strategy. GRIDS is 'integrated' because it uses the model of sustainability to draw together land use planning and infrastructure investment planning (water, wastewater, stormwater and transportation) within a framework that considers social/cultural, environmental and economic implications of growth and development. Coupled with a development staging plan, the strategy enables a more coordinated, time efficient and cost efficient investment process for the public and private sectors (see City of Hamilton. Staging of Development Program, Draft Document. Unpublished, November 2006).

City of Hamilton, Planning and Economic Development. "Vacant Urban Residential Land Inventory." 19 Oct 2007. <u>http://www.myhamilton.ca/myhamilton/Cityand</u> <u>Government/CityDepartments/PlanningEcDev/LongRangePlanning/InformationPlanning/Vacant+Urban+Residential+Land+Inventory.htm</u>

This website provides maps and reports on a quarterly basis that updates the development of vacant urban residential lands (subdivision update being completed biannually). Vacant residential lands are based on secondary plans and the City's Official Plan and are therefore related to subdivisions and condominium developments. Vacant residential lands refer to lands with residential potential but with no draft plans submitted. These reports and maps include the development status for potential development, pending, draft approval, and registered plan. The reports contribute to stewardship actions by determining how many households are within a new development area and therefore how many contacts are needed and the best method in which to complete the awareness task.

City of Hamilton. <u>Staging of Development Program, Draft Document</u>. Unpublished, November 2006.

This document is a multi-purpose tool that has been prepared to establish the City's intention toward processing of plans of subdivision for residential and industrial development to draft plan approval and then to registration. This plan ensures that growth and staging conforms to the City's Official Plan and the Places to Grow Strategy. In addition to assisting the City and the development industry in determining where development is likely to occur between 2007, 2008, 2009 and beyond, this document will assist in the preparation of the Development Charge background studies and related activities, and highlights areas where the completion of planning studies and major capital works are required prior to development proceeding. This document is related to the City's GRIDS project, in meeting a strategy that is coordinated, time efficient and is a cost efficient investment process for the public and private sectors. The Development Engineering section of the Planning and Economic Development Department with input from internal divisions, the Public Works Department, Corporate Services Department and the development industry is responsible for preparing this report on a yearly basis for Council approval and documents the City's intention for processing and registration of subdivision applications. This report includes the staging plan preparation and process, as well as maps illustrating the development staging plan, subdivision plan detail sheets, unbuilt unit and blocks counts for each plan of subdivision, existing secondary plans, and master plans and major engineering studies. This report contributes to stewardship actions by determining upcoming contact targets for new subdivisions and condominiums.

Dwyer, J. et al. <u>Nature Counts: Hamilton Natural Areas Inventory</u>. Hamilton Naturalists' Club, 2003.

This document is a biological inventory of natural areas within the City of Hamilton. Biologists identified plants, animals, birds, butterflies, fish and other significant species living in each natural area which in turn have identified areas of important habitat in need of protection. The inventory is meant to serve as a benchmark against which changes in the environmental health of the habitats can be measured as changes on the landscape take place. The Inventory provided the framework for determining the qualifying criteria for Environmentally Significant Areas identified in the study area.

Hamilton Conservation Authority. <u>A.C.T.! A Work Plan for Ancaster, Chedoke & Tiffany Creeks Stewardship Action Plans.</u> Watershed Planning & Engineering Division, March 2007.

The A.C.T. work plan outlines the goals specific to all of the Spencer Creek Stewardship Action Plans, as well as goals specific to the Ancaster, Chedoke and Tiffany Creek Stewardship Action Plans. The document also outlines the Plan Development Phases and actions to be taken during each phase, which were followed during the development of the Ancaster, Chedoke and Tiffany Creek Stewardship Action Plans. This work plan will also be the guiding document for the methodology of the development process for the remaining twelve Subwatershed Stewardship Action Plans that are to be developed for the Spencer Creek Watershed.

Hamilton Conservation Authority. <u>Hamilton Waterfalls & Cascades</u>, Edition 2. Watershed Planning & Engineering Division. November 2007.

This report outlines the set of criteria for examining waterfalls in the City of Hamilton which was used to inventory each waterfall in Hamilton that met these criteria and to evaluate and rank these waterfalls from a visitors' perspective. This information is used to provide updated and consistent information, as well as coordination and guidance, for the Waterfalls Project Advisory Team and their parent organizations so that educated decisions will be made in regards to Hamilton's waterfall visitor potential. This report also provides an international benchmark to which others can define or identify a waterfall.

O'Connor, K. M. <u>Remedial Action Plan for Hamilton Harbour: Stage 2 Update 2002</u>. Hamilton Harbour RAP Stakeholder Forum, 2003.

This document examines the works completed as of 2002, undertaken in an effort to reach the Hamilton Harbour Remedial Action Plan objectives, and ultimately the delisting of the Hamilton Harbour as an Area of Concern by 2015. This document resulted from the recall of the RAP Stakeholder Group, now called the RAP Forum, to the task of reviewing water quality, toxic contamination, fish and wildlife, land management and public access data and comparing it against the baseline data submitted by the RAP Stakeholders in the Stake 1 Report to the International Joint Commission in 1989. Task groups made up of scientists and Stakeholders reported findings to the forum and these reports were used as the basis for modifying the original report.

Hamilton Region Conservation Authority. <u>Tiffany Creek Subwatershed Plan</u>. Watershed Planning & Engineering Division. July 2000.

This document serves to expand upon the preliminary information with regard to the Tiffany Creek Subwatershed that was included in the Spencer Creek Watershed Management Plan, produced by the HCA in 1997. This document included the assemblage of the existing information and expanded on that base data, including detailed descriptions of significant natural features, the identification of land/water linkages and processes, the identification of land use pressures within the subwatershed and highlighting opportunities for improved protection, enhancement, rehabilitation and sustainable development. The document elaborated further with assessments of management strategies for natural areas and corridors, open space, water quality and quantity, proposed development, stewardship activities and the establishment of monitoring requirements and an implementation framework.

Hamilton Region Conservation Authority. <u>Spencer Creek Watershed Management</u> <u>Plan</u>. December 1997.

This report was completed in cooperation with a variety of local Stakeholders, including community organizations and government agencies. This Management Plan is an integrated watershed management plan for the Spencer Creek ecosystem. The project incorporated a review of data and qualitative data gathered over 30 years by the Hamilton Conservation Authority as well as data and information from other agencies in the watershed. The development process included public consultation as well as reviews by the steering committee and technical working groups. The plan has been endorsed by the Hamilton Conservation Authority and the local municipalities. The Plan identifies the natural environmental attributes of the watershed and recommends appropriate strategies for the protection, restoration and enhancement of the features with consideration for the social and economic needs of the watershed residents. The plan also includes implementation and monitoring strategies.

Hamilton Region Conservation Authority. <u>Aquatic Resource Monitoring Program</u>. 2004.

The Aquatic Resource Monitoring Program outlines the protocol for routine monitoring of fish, fish habitat and benthic macroinvertebrates throughout the watersheds of the Hamilton Conservation Authority. The program assists HCA staff in identifying areas within the watersheds where net gains in fish habitat can be undertaken, thereby increasing the productive capacity of the fishery within the watersheds. The ARMP focuses of monitoring parameters that are indicators of ecological health.

Hamilton-Halton Watershed Stewardship Program. <u>Watershed Riparian Buffer</u> <u>Mapping & Analysis using GIS</u>. Hamilton Conservation Authority, 2003.

Based on 1999 ortho-rectified aerial photography riparian buffers were digitized and analyzed. This data was not used within this study due to the inaccuracies that exist between 1999 and 2007. However this document will give a general idea of the riparian habitat within the ACT! watershed and will also serve as a guideline for future riparian buffer analysis.

Source Water Protection Halton-Hamilton Region, <u>Preliminary Watershed Description</u> <u>Report: Hamilton Conservation Watersheds</u>. Unpublished, January 2006.

The preliminary watershed description is a detailed examination of the physical and human characteristics of the Source Water Protection Planning Region, specifically the Hamilton and Halton Conservation Authorities' respective jurisdictions. Numerous maps and tables support a textual report on what makes up the watershed. Topics include population, geology, vegetation, land use, infrastructure, government, hydrology, physiography, hydrogeology, etc.

Thomson, T.M. The Spencer Story. Spencer Creek Conservation Authority, 1965.

This publication outlines the history of the Spencer Creek Watershed and the origin of the Hamilton Conservation Authority as the agency responsible for its management. Topics addressed in this historical account of the watershed are: physiography, cultural heritage, land use, flooding and the installation of flood control structures, natural heritage, recreation and an account of the founding years of Spencer Creek Conservation Authority.

van der Woerd, M. <u>Water Quality & Impacts of Land Use on Tiffany Creek</u>. Redeemer University College: April 2007.

This study provides water quality data from 2006 and 2007 for the Tiffany Creek Watershed. Six locations were selectively chosen to adequately represent the major land uses in the watershed. The goal of the study was to determine if correlations exist between water quality and land use practices on adjacent lands and to determine if predictions can be made as to the effects that land use practices will have on stream conditions. The study concluded that water quality degradation, in the form of nutrient loading and erosion, was evident in areas of the watershed where urbanization had occurred.

APPENDICES (available at the Hamilton Conservation Authority Main Office)

APPENDIX A: MAP OF SPENCER CREEK WATERSHED & STEWARDSHIP ACTION PLAN DEVELOPMENT SCHEDULE

APPENDIX B: FISHERIES INVENTORY

APPENDIX C: SIGNIFICANT SPECIES

APPENDIX D: WATER QUALITY ASSESSMENT AT ANCASTER CREEK

APPENDIX E: SURFACE WATER FLOW ASSESSMENT AT ANCASTER CREEK

APPENDIX F: DATA REFERENCES