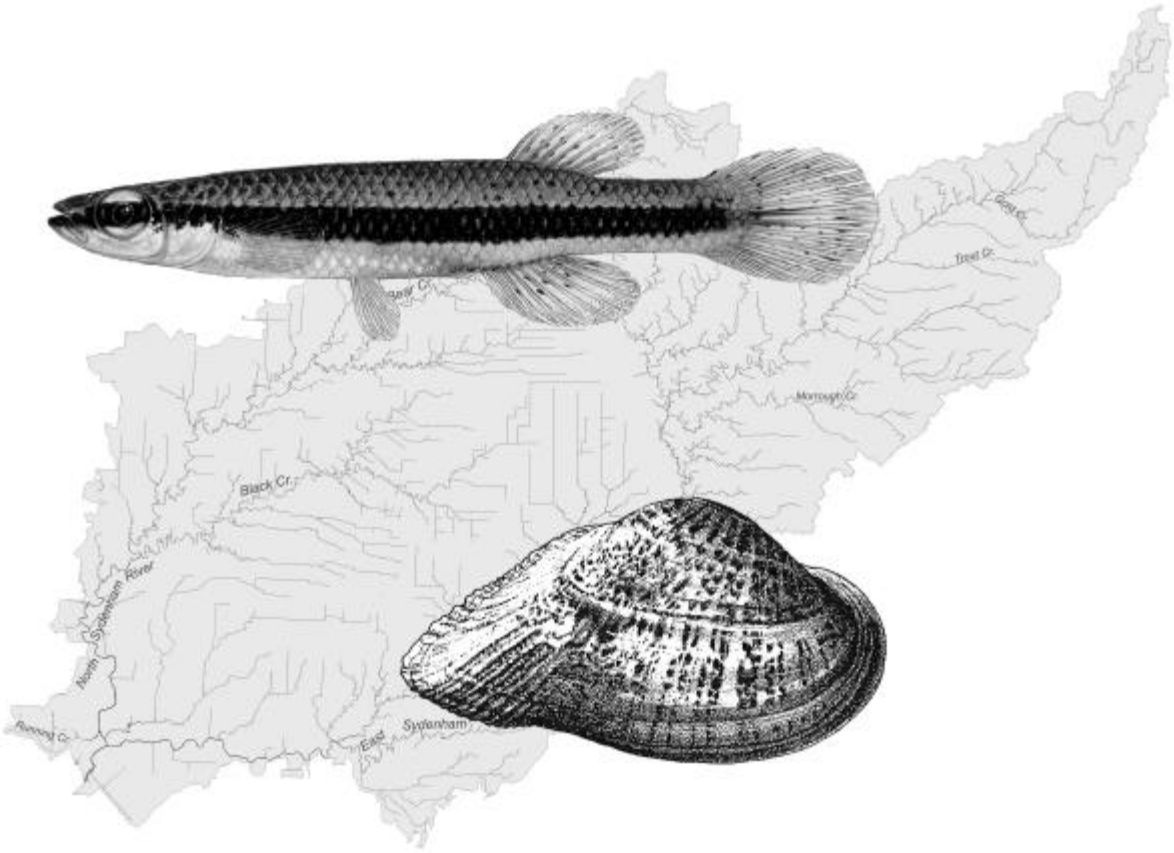
RECOVERY ACTION PLANS FOR SPECIES AT Rrisk IN THE SYDENHAM RIVER



2002-2007

May 2003

Disclaimer

This Recovery Strategy has been submitted by the Sydenham River Recovery Action Groups to identify implementation details for recovery actions necessary to protect and recover aquatic species at risk in the Sydenham River. It does not necessarily represent the views of the individuals involved in the Strategy's formulation or the official positions of the organizations with which the individual team members are associated. The goals, objectives, and recovery approaches identified in these action plans are based on the best existing knowledge and are subject to modifications resulting from new findings and revised objectives. We recognize that implementation of the action plans will be subject to priorities and budgetary constraints imposed by participating jurisdictions and organizations.

Foreword

In 1999, a Recovery Team was formed to develop a strategy to help recover "species at risk" in the Sydenham River. The team adopted an ecosystem approach, which addresses all of these species in a single strategy for the river. This approach involved a consideration of all species in the river, their interactions, and the relationship between the river and the lands in the watershed. The Recovery Strategy was approved in June 2003.

While the Recovery Strategy was being prepared, Recovery Action Groups (RAGs) were formed to develop Action Plans for implementing the Recovery Strategy. The RAGs were established in spring 2002, and four Recovery Action Plans have been developed to address implementation of the Management, Stewardship, Research and Monitoring, and Community Awareness and Outreach approaches identified in the Recovery Strategy.

The successful implementation of some approaches will require the coordinated efforts of more than one RAG, with overall management/coordination by the Recovery Team. The Recovery Team and RAGs recognizes that the development and implementation of successful Recovery Action Plans can take place only with the full involvement and support of landowners and other stakeholders in the watershed. Partnerships, awareness, and stewardship are fundamental components of the Strategy and Action Plans and will continue to play a major role throughout their implementation.

MANAGEMENT

RECOVERY ACTION PLAN

October 2002

SYDENHAM RIVER RECOVERY STRATEGY

This Action Plan details actions that will be undertaken over the period 2002-2007 to address management approaches identified in the Sydenham River Recovery Strategy. Actions identified in this plan address the following objectives in the Sydenham River Recovery Strategy:

I. *Maintain the current geographical distributions and abundances of species at risk.*

II. *Improve water and habitat quality by reducing sediment loads and nutrient and chemical inputs and ensuring base flow rate is maintained.*

V. *Promote stewardship by encouraging a sense of public ownership and involvement among landowners, stakeholders, those working in the watershed and other interested citizens.*

VI. *Generate awareness regarding the Sydenham River and the significance of its natural heritage.*

VII. *Enhance the understanding of key aspects of the Sydenham River ecosystem that will lead to further refinement and prioritization of essential recovery actions.*

The approaches addressed in this plan include matters related to the management of the watershed and involve liaison with various levels of government. The actions include the transfer of information (such as habitat mapping) to planning and review agencies, holding workshops to ensure habitat protection, and attending to all legislative matters. An implementation schedule that identifies lead agencies, costs/potential funding sources and evaluation measures is also included.

Habitat Protection Actions

A1 Habitat Mapping – Identify and map habitat for species at risk based on existing information and ensure that it is transferred to appropriate planning and review agencies.

- Existing information on habitat for species at risk that is housed at The Natural Heritage Information Centre and at Aylmer District MNR should be packaged and delivered to planning and review agencies in the Sydenham River Watershed. These include the Sarnia District Office of Fisheries and Oceans, the St. Clair Region Conservation Authority (SCRCA), the counties of Lambton, Chatham-Kent and Middlesex and appropriate lower-tier municipalities. Sensitivity training will be required for agency staff if site-specific data are transferred. This activity will be lead by MNR with assistance from the SCRCA. Transfer of information should take place in 2002/2003.

A2 Awareness – Hold one-day workshops with municipal staff, and planning and review agencies.

- The key messages that will be delivered through the workshops will be the importance of the Sydenham River from a conservation perspective (i.e., why it is so special), important aspects of the biology of species at risk, the location of important habitats in the river, and threats to these habitats. Two workshops will be held – one with Fisheries and Oceans, MNR, MOE, MAF and SCRCA staff and one with municipal staff. An information package will be prepared and distributed to staff in advance of the workshop. This activity will be lead by MNR with assistance from Fisheries and Oceans, Environment Canada and the SCRCA. The workshop with municipal staff will initially be targeted at the County level. Appropriate mechanisms to deliver the message to lower tier municipalities will be developed based on discussions at the County level workshop. Workshops should be conducted in winter 2003 and should be linked to the transfer of information identified in Action A1.

A3 Drainage – Work with drainage superintendents, drainage engineers and contractors, to explain how to limit the effects of drainage works on species at risk habitat.

- Workshops are probably not the best approach to address drainage issues. The Recovery Action Group believes that Sydenham Species at Risk issues would be best addressed through the current Fisheries and Oceans fish habitat presentations that will be given to drainage superintendents at the level of the individual municipality in 2002/2003. Fisheries and Oceans (Sarnia District Office) is currently developing the presentation materials and will work with MNR and the SCRCA to incorporate specific messages regarding species at risk in the Sydenham River. This should include timing windows for drain maintenance activities to protect sensitive life history stages for species at risk (i.e., spawning). It is also important that messages regarding drain classification and required approvals for maintenance works are delivered to landowners. This should be addressed by the Awareness and Outreach Action Group.
- The Recovery Action Group also believes that it is important to support environmentally friendly drain maintenance works and to showcase these as demonstration projects. The Stewardship Recovery Action Group should investigate the feasibility of financially supporting such projects (e.g., proposed Haggerty Creek drainage works in 2002).

A4 Habitat Mapping – Map known habitats of terrestrial species at risk within 100 m of the river.

- Existing information from the NHIC database will be used to produce maps identifying the location of habitats of terrestrial species at risk within 100 m of watercourses in the watershed. These maps will be given to the Stewardship Recovery Action Group to ensure that habitat improvement projects do not adversely affect the habitats of terrestrial species at risk. This will also offer the opportunity to enhance terrestrial habitats and perhaps increase connectivity. This activity will be led by Fisheries and Oceans, and will be conducted in 2002.

A5 Policy and Legislation – Provide advice to provincial and federal governments on effective legal and policy approaches for the protection of endangered and threatened species.

- None of the aquatic species at risk that occur in the Sydenham River are currently regulated under Ontario's *Endangered Species Act*. The provincial Act only addresses

endangered species (i.e., not threatened and special concern species). The five endangered mussel species have not been regulated because of jurisdictional issues related to aquatic species (mussels are considered as fish and are a federal responsibility). If the proposed federal *Species At Risk Act* becomes law, then it is likely that all threatened and endangered species addressed in the Recovery Strategy (five mussels, two fishes and one turtle) will be regulated under this Act. Regulation is important to provide legal protection to the species and their habitats and to raise the profile of these species. The definition of habitats for regulated species is also extremely important. The Recovery Strategy defines habitats for mussels and fish as the bank-full width of the stream only. Habitat for the eastern spiny softshell also includes basking and nesting areas. It is important that this information be conveyed to Environment Canada and MNR for the purposes of habitat mapping for legal purposes. MNR will lead this activity that will be initiated in 2002, but will likely be of an ongoing nature.

A6 Incentives – Work with MNR to investigate riparian habitat protection incentives that could be developed under the Conservation Land Tax Incentive Program.

- Land owners who currently provide protection for riparian habitats are not eligible for tax relief under the provincial Conservation Land Tax Incentive Program (CLTIP) unless there is an easement granted to a non-profit conservation organization. The Recovery Action Group Chair will approach MNR to discuss possible changes to the eligibility requirements for the CLTIP. Initial contact will be made in 2002, but there will likely be ongoing dialogue on this matter.

A8 Municipal Planning – Encourage municipal planning authorities to incorporate the Recovery Goal in their Official Plans, and to consider a Natural Heritage overlay schedule indicating the species at risk habitats.

- The best mechanism for encouraging the recognition of the Sydenham River Recovery Strategy in official plans will be determined at the workshop with municipal planners that will be held in 2003 (see Action A2). The workshop itself will be useful for communicating with County level planners, but it is likely that presentations to councils will be necessary, particularly for lower tier municipalities. Of particular concern in this regard is the urban area of Strathroy that has experienced rapid growth as a commuter community of London. Increased growth in this community raises concerns for the Sydenham River with respect to storm water management, development in the existing industrial park and perhaps from increased nutrient input from the sewage treatment plant. The Recovery Action Group wants to ensure that the Sydenham River receives high priority protection given that Strathroy is upstream of the highest conservation priority portion of the watershed. Contact will be made with Strathroy-Caradoc municipal staff, consultants and MOE to provide species at risk information and address water quality issues. This activity will be led by SCRCA with assistance from MNR.

Habitat Improvement Actions

A7 Bridges/Road Crossings – Ensure that the design of future bridges and road crossings (or improvements to existing structures) respects natural stream geomorphology.

- An analysis of background information identified several water crossings in the watershed which “pinch” the river due to inadequate spans. These cause downstream scour holes that result in excessive erosion. Information on these problem crossings needs to be

delivered to the managers of these crossings (MTO, counties) so that they can be remedied. The Recovery Action Group must also ensure that new crossings (roads, pipelines) do not cause similar problems through the plan review process. This activity will be lead by the SRCA with assistance from Fisheries and Oceans and MNR. The activity will be initiated in 2002.

Harvest Management Actions

A9 Baitfish – Work with baitfishermen and the Bait Association to protect and monitor fishes at risk that are currently legal baitfish.

- The active bait harvesters on the Sydenham River need to be approached to ensure that their harvest activities do not negatively impact fishes at risk. Several of the species at risk are currently legal baitfish (pugnose minnow, eastern sand darter, greenside darter, spotted sucker) and the Recovery Action Group wants to ensure that they are not inadvertently harvested as bait. In addition to making the harvesters aware of these species and their significance, it may be possible to use the harvesters as a source of information on the occurrence of species at risk. These activities have already been initiated by Aylmer District MNR through the regional MNR/Bait Association of Ontario Committee. This will be an ongoing activity.

Reporting and Evaluation

The Management RAG will report annually (February) to the Sydenham Recovery Team on progress made on Actions. Evaluation measures are identified in the attached Implementation Schedule.

RAG Membership

Alan Dextrase, Ontario Ministry of Natural Resources (Chair)

Dan Bieman, landowner/Rural Lambton Stewardship Network/ Lambton Woodlot Owners Association

Bob Boyd, landowner

Patty Hayman, St. Clair Region Conservation Authority

Larry Lehrbass, landowner

Edzio Nadalin, County of Lambton

Darrell Randell, Rural Lambton Stewardship Network/Ducks Unlimited

Jody Willis, Fisheries and Oceans Canad

Implementation Schedule

Management Action	Priority (Objective)	Lead	Cooperators	2002/ 2003	2003/ 2004	2004/ 2005	2005/ 2006	2006/ 2007	Cost/Funding Source	Evaluation
A1 Identify and map known habitats of species at risk	1 (I)	MNR (Aylmer District)	SCRCA	X	X				in-kind	delivery of habitat information to planning agencies
A2 Workshops with planning staff	1 (I & VI)	MNR	DFO, EC, SCRCA	X					$2.0 K/MNR	two workshops held and evaluated by participants
A3 Transfer of information to drainage superintendents	1 (I)	DFO	MNR, SCRCA	X	X				in-kind	meetings with drainage superintendents
A4 Map habitats of terrestrial species at risk	1 (I & VII)	DFO	MNR, Stewardship RAG	X					$20.0 K/federal Interdepartmental recovery fund	habitat maps delivered to Stewardship Recovery Action Group
A5 Legal and policy approaches for threatened and endangered species.	2 (I)	MNR	DFO, EC	X	X	X			in-kind	legal listing of threatened and endangered species
A6 Conservation Land Tax Incentive Program	2 (I & II)	MNR		X	X				in-kind	changes to CLTIP
A7 Stream crossings	2 (I, II & V)	SCRCA	MNR, DFO	X	X	X	X	X	in-kind	improved crossing designs
A8 Incorporation of recovery goals in municipal plans	2 (I)	MNR, SCRA		X	X	X	X	X	in-kind	incorporation of aquatic natural heritage into municipal plans
A9 Baitfish harvest management	2 (I)	MNR (Aylmer District)	BAO	X	X				in-kind	transfer of information to bait harvesters.

STEWARDSHIP

RECOVERY ACTION PLAN – May 2003

SYDENHAM RIVER RECOVERY STRATEGY

This Action Plan details actions that will be undertaken over the period 2002-2007 to address stewardship (habitat improvement) approaches identified in the Sydenham River Recovery Strategy. Actions identified in this plan address the following objectives listed in the Strategy:

I. *Maintain the current geographical distributions and abundances of species at risk.*

II. *Improve water and habitat quality by reducing sediment loads and nutrient and chemical inputs and ensuring base flow rate is maintained.*

V. *Promote stewardship by encouraging a sense of public ownership and involvement among landowners, stakeholders, those working in the watershed and other interested citizens to foster an ecosystem approach.*

The approaches addressed in this plan include the promotion and delivery of on-the-ground land stewardship which contribute to the improvement of water and habitat quality (and in most cases, long-term farm sustainability). This plan provides guidance in assisting landowners financially to implement these actions through funding programs such as the Government of Canada's Habitat Stewardship Program (HSP) for species at risk. Details of the HSP program for the Sydenham River (initiated in 2000) and funding guidelines for projects are provided in Appendix 1. Evaluation measures and other potential funding sources are also identified in the implementation schedule (Appendix 2).

The Stewardship Recovery Action Group (RAG) recognizes the importance of promoting both financial and technical assistance to implement stewardship projects on private lands. This is important for the success of individual projects and the overall program to be sustainable over the long term. Increasing landowner participation is the key.

Stewardship (Habitat Improvement) Actions

Stewardship actions will focus on the mitigation of the principal stresses affecting populations of species at risk in the watershed. Sediment loadings (causing turbidity and siltation) have been identified as the primary limiting factor for most species at risk and thus their reduction will be a priority for many stewardship actions. Other principal stresses that can be mitigated through good stewardship practices include nutrient loads, toxic compounds (such as pesticides), and thermal effects. Further explanations will be provided in the narrative for each of the individual actions identified below.

In order to increase the cost-effectiveness of habitat improvement, implementation of the following stewardship actions will be prioritized geographically. The stretch of the East Sydenham River from just upstream of Alvinston downstream to Dawn Mills has been identified as a high conservation priority zone and habitat improvement projects benefiting this section of river will be given highest priority.

Note: In conducting stewardship activities and projects, opportunities may arise for co-operation, collaboration, and/or consultation with the Research and Monitoring RAG. Members of the

Stewardship RAG acknowledge this and can help facilitate such opportunities through common membership on both RAGs and regular contact through the Recovery Team. In a recent example, Stewardship RAG members were able to suggest helpful landowners that allowed tile drainage sampling for a research project assessing the impacts of various land management types on sediment/nutrient delivery.

B1: Establish riparian buffer zones and buffer strips through naturalization and plantings of native trees, shrubs, grasses and forbes.

- Riparian vegetation will improve water quality by reducing bank erosion and intercepting overland run-off thus reducing sediment and nutrient loading. Grass buffers provide excellent surface and bank erosion protection while intercepting pollutants. Mature trees and shrubs in the riparian zone provide shading for watercourses which helps reduce high water temperatures due to solar heating. Lush riparian growth adjacent to agricultural areas can also help prevent air born pesticides from drifting into watercourses.
- The composition of individual riparian plantings will vary depending on several factors, including site location and conditions and landowner preferences. Whatever, the choices, cost-effectiveness should be carefully considered. Also, the inclusion of at least some trees and shrubs in native plantings may help ensure the permanence of riparian zones from the encroachment of agricultural fields in the future.
- The RAG agreed that, ideally, riparian areas along the main river and larger tributaries should be 30m wide and include native trees, shrubs and grasses. In agricultural areas, a larger component of grassland immediately adjacent to farm fields would help enhance the ability to trap sediment and nutrients. Although a 30m wide buffer may not be possible in many areas, we should strive to establish buffers as wide as possible with a minimum of 3m suggested by the RAG. The composition of buffers must also take into consideration the requirement of access for drain maintenance where necessary. The presence of the buffer reduces sedimentation of the drains and lowers the long-term maintenance costs of the drain.
- Aside from riparian areas, grassed waterways through agricultural fields should also be established to help further prevent the delivery of sediments and nutrients to watercourses.
- To provide further guidance for riparian restoration, DFO and partners conducted a riparian inventory of the Sydenham River watershed (funded by the Interdepartmental Recovery Fund) which was completed in 2003. The final report (Staton and Doolittle 2003) includes riparian mapping of the entire watershed and identifies priority areas for riparian restoration. In the selection of areas for restoration, those sites that are *not* adjacent to tile drained lands were given highest priority. Sub-surface drains allow sediment laden water to by-pass riparian vegetation, thereby reducing the effectiveness of the vegetation in the reduction of nutrient and sediments. The riparian mapping also includes the locations of terrestrial SAR habitats (data from the Natural Heritage Information Center) which occur within 100m of the river or tributaries. This information will help ensure that habitat improvement projects will not inadvertently affect habitats of other SAR. Overall, this riparian mapping will provide a valuable resource for those involved in the delivery of on the ground stewardship activities and will serve as a baseline for monitoring changes in the quantity and quality of riparian vegetation.
- Riparian restoration work will be supported by funding from the HSP, Healthy Futures, the Ontario Great Lakes Renewal Foundation and the Great Lakes Sustainability Fund (GLSF

will only fund projects in portions of the North Sydenham watershed). Funding from additional organizations is also possible and will be investigated.

B2: Herd management - reduce livestock access to the river.

- In many areas of the Sydenham River watershed, livestock are allowed unrestricted access to the river and its tributaries, causing substantial erosion and nutrient inputs. Restricting livestock and providing alternate watering systems in these areas through fencing will allow riparian vegetation to regenerate and improve water quality.
- As a general guideline, livestock should be restricted access from areas below the 'top of bank' with a 3m minimum setback suggested (with the assumption that 'more is better').
- In areas where fencing is impractical, alternate watering systems and stream crossings for cattle may be considered to minimize the potential for bank and stream bed trampling. A demonstration site employing these methods has been established and its success will be evaluated for use with future projects.
- Pasture paddocks, as part of a grazing management system, also provide a buffer between watercourses and row cropped agricultural fields.

B3: Livestock waste management – establish manure storage and runoff collection systems where necessary.

- Implementing improved livestock waste management will prevent manure from entering waterways thus reducing nutrient loading to the river. It should be further noted that pending provincial legislation (including the Nutrient Management Act) may effect manure storage requirements.
- 'Clean water diversions' can also be used to prevent clean water from being contaminated by manure seepage.

B4: Low water crossings - work with landowners to repair or remove low water crossings.

- Low level water crossings were identified in the geomorphology report as causing major disruptions to flow including erosion and sedimentation, particularly in sections of the North Sydenham. In some cases, these old and deteriorating crossings have backed up flows for over 1 km. The presence of low level water crossings in the high priority section of the East Sydenham needs to be investigated (this will be undertaken by the SCRCA). Where possible, such structures should be removed completely, or altered to respect the hydrology of the watercourse.
- In order to assist landowners with this, all approving agencies should develop and approve a recommended design for such structures. The recommended design for a crossing is a bed level crossing. A bed level crossing is a structure which, when installed in the creek, has a surface at the same level as the natural stream. All water in the stream passes over the structure and therefore it may be necessary to drive or walk through a few inches of water to cross the structure. In some situations, a ford area on a hard stream bed may be all that's needed.

B6: Encourage conservation tillage.

- Conservation tillage has been shown to substantially reduce delivery of both sediments and nutrients to watercourses by reducing both overland run-off and wind erosion. Offering financial incentives to first time practitioners helps provide the funds needed to convert conventional tillage equipment to no-till.
- Middlesex County has the lowest rate of conservation tillage in the watershed with an estimated participation rate of about 50%. Since the other 2 counties enjoy a very high rate of participation, effort should be concentrated on Middlesex County farmers.

B5, B7 & B8: Tile drainage and agricultural drains - establish demonstration projects involving the installation of header tiles and silt traps on tile drain systems and agricultural drains (where possible).

- These actions were combined, since the group felt that both drainage systems are inextricably linked and that in most cases, it would be most effective to combine such projects.
- Tile drainage is extensive throughout the Sydenham River watershed and has been identified as a major source of sediment and nutrients that is unmitigated by riparian vegetation. Many of these tile drains empty separately into receiving waters - usually open agricultural drains. The installation of header tiles simplifies the installation of silt traps for more effective removal of sediments. Demonstration projects should be developed using header tiles, silt traps or other innovative ideas that mitigate these effects and that could be transferred to sites throughout the watershed.
- Such demonstration projects may be considered as a relevant area for 'capital' funding. It is important to promote the uptake of innovative projects that help mitigate sediment, nutrient, and pesticide inputs that may be by-passing riparian buffers altogether. This is particularly important in regions with less relief where most run-off percolates into the soil and into the tile (in such cases, riparian buffers may be providing little direct benefit to improving water quality). One innovative demonstration project completed by the Upper Thames River Conservation Authority utilizes wood chips to help filter out nitrogen.

B9: Encourage soil testing to allow precise applications of fertilizer and pesticides.

- Soil testing is a good farming practice that helps prevent over-fertilization, thus reducing nutrient inputs into the river, while at the same time providing financial incentives to the farmer. Since no funding programs currently provide incentives for soil testing by farmers, this activity will be included in the 'BMPs for SAR' booklet that will be prepared by the Outreach RAG. Stewardship coordinators and other members of the Stewardship RAG can then promote this action verbally and through distribution of the booklet.

B10: Farm Planning - Encourage development of Environmental Farm Plans (EFPs) and Nutrient Management Plans (NMPs).

- NMP – Healthy Future's funding will provide up to 50% of the cost or program maximum for the development of the plan which basically defines "where and when you can spread manure". Costs of these plans generally range between $600 to $3000 and are usually prepared by consultants. The draft plans are sent to OMAF for review and once finalized

are valid until farming practices change. It has been estimated that less than 15% of farmers in the watershed have completed NMPs. It should be further noted that pending provincial legislation and regulations may impact NMPs, possibly requiring revisions to existing plans.

- EFP – Development of these plans is overseen by Ontario Soil and Crop Improvement Association. Costs are significantly less than the NMPs and usually amount to a 2-day educational exercise where the landowner is walked through the program. Completion of an EFP gives the landowner access to a $1500 grant for any worthy project identified under the plan. In some Counties, a completed EFP is required to be apply for Healthy Futures funding.
- Both of these plans encourage the implementation of many BMPs that contribute to improvements benefiting aquatic SAR, including the reduction in sediment and nutrient loading to the watercourse.

B11: Sewage treatment (rural) – Work with landowners to upgrade faulty septic systems.

- Faulty rural septic systems have been identified as a significant source of nutrients. It is believed that the problem has worsened in recent years with the switch by many rural landowners to municipal water supply piped in from Lake Huron. As a result, water consumption has increased in many rural households, thus causing further stress to septic systems. Due to the heavy clay soils in the Sydenham River watershed, raised-bed specific septic systems may be required in some areas.

B12: Habitat improvement (Wetlands) - Investigate the feasibility of re-establishing wetlands in appropriate locations.

- Wetland loss in the Sydenham River watershed has been extensive – from 30% in pre-settlement years (early 1800's) to the present level of less than 1%. Most of these wetlands are now drained and converted to intensive agricultural production. As a result, many of the ecological functions and benefits provided by wetlands have been lost to the watershed. Re-establishing wetlands will help restore these functions, including trapping sediments and nutrients, maintaining less flashy flow regimes and in some cases augmenting low flows during the dry season (this may become more important with the increase in dry summers expected due to climate change).
- 'Appropriate locations' may be very opportunistic and dependent on landowner interest, however, we should try to target historic wetland areas, possibly emphasizing their utility as catch basins for sediments and nutrients from agricultural drains.
- The OMNR (Aylmer office) is currently working on a 'Wetland Drain Restoration' project which is attempting to identify possible sites to re-establish wetlands. A 'How to Guide' for this project will be released early in 2003. More information on this project is available through Dave Richards (519) 773-4731.
- Approval agencies and landowners must work together to undertake appropriate and permissible projects in a timely fashion.

Reporting and Evaluation

The Stewardship RAG will report annually (in April when reporting to the HSP has been completed) to the Sydenham River Recovery Team on progress made on actions. Evaluation measures have been provided in the implementation schedule.

RAG membership

Lee McLean (Chair)
Shawn Staton, Fisheries and Oceans Canada
Brian McDougall, St. Clair Region Conservation Authority (SCRCA)
Lindsay Anderson, Rural Lambton Stewardship Network (RLSN)
Norm Giffen, SCRCA
Thom Heiman, Fisheries and Oceans Canada
Doris McCormick, Landowner
Chris Richardson, SCRCA
Dan Schaefer, Middlesex Stewardship Committee (MSC)
Steve Shaw, SCRCA
Ron Ludolph, RLSN
Mark Emery, Stewardship Kent (SK)

References

Staton, S.K. and Doolittle, A. 2003. Sydenham River Riparian Inventory. Annual Report to the Interdepartmental Recovery Fund (IRF). Department of Fisheries and Oceans, Burlington, ON.

Appendix 1: SYDENHAM RIVER HABITAT STEWARDSHIP PROGRAM

October23, 2002

Project Priority Setting Guidelines

All projects must meet the following criteria:

1. Habitat projects must seek to improve water quality and aid the recovery of fish, mussel and turtles which are species at risk in the Sydenham River.
2. Habitat projects must be located in Chatham-Kent, Lambton and Middlesex Counties, along the Sydenham River and its tributaries.

Projects that meet criteria 1 and 2 above will be considered for funding based upon the following priority setting criteria:

3. The section of river between Alvinston and Dawn Mills is of special interest since several threatened and endangered fish and mussel species occupy this section of the river. Projects that influence this area, which can include areas upstream, will be a higher priority.
4. Riparian Areas will be targeted.
5. County Official Plans, Natural Heritage Studies and Maps, the Existing & Potential Natural Heritage Corridor Mapping will be used to help target priority areas to do habitat work and define the type of habitat to be completed.
6. Habitat projects which improve or expand existing habitat, are in corridor zones, anchor zones or in linkage areas or can provide direct benefit to other species of concern will be given higher priority.
7. Habitat projects which meet or exceed the guidelines established in the Stewardship Recovery Action Plan of the Sydenham River Recovery Strategy will be prioritized.
8. Value for the dollar (leveraging $ or in-kind).
9. Habitat projects that are innovative and may be used as demonstration projects will be given higher priority than similar projects which are not innovative or potential demonstration projects.
10. Private land will be a priority over public land.
11. Priority will be given to projects previously approved for funding which are submitted again due to partial or complete failures which occurred due to circumstances beyond the landowners control.

Funding Limits

1. Project will be funded to a maximum of 50% of the total project cost unless otherwise stated within this document.
2. Funding for repair or replacement of a faulty septic system will not exceed 50% or a maximum of $2,000.00 in grant. (As defined by Environment Canada)
3. In kind contributions to the projects (such as land or the installation costs) are eligible for the applicants contribution of the total project cost.
4. No individual or individual farm operation will be eligible for total grants which exceed $10,000.00 in any one given year. The Committee reserves the right to exceed $10,000 for large projects at their discretion.

Operating Procedures

Committee Membership

The committee will be comprised of nine voting members. Two members of the St. Clair Region Conservation Authority Board of Directors (selected annually) {Norm Giffen and Bill Bilton for 2002-2003}, two members from each of the County of Middlesex and the Municipality of Chatham-Kent and three members from the County of Lambton who are landowners and represent various facets of agriculture and various areas within the watershed and are appointed by Stewardship Kent, Middlesex Stewardship Committee and the Rural Lambton Stewardship Network. A Chairman will be elected from the Committee membership to Chair meetings and endorse the required documentation.

Committee Meetings

Meetings will be scheduled as required based on approved funding and potential projects as applied for through the Authority. The number of meetings required annually will be based on the total grant available and the number of applications requiring review.

Voting Procedures

Authority staff will present projects to the committee with like projects arranged into groups. Only information pertinent to the project itself will be presented to the Committee. No personal information will be provided to the Committee during the presentation of the project. Photographs, aerial photographs, mapping, general location information and, when required specific location information (ie. Lot & Concession), will be provided to the Committee to assist in decision making.

The Committee will support, recommend design changes, recommend funding levels and approve projects which they deem worthy of financial support and a motion will be propose, seconded and then voted on. All motions will require a majority vote to be passed. All motions will be recorded in minutes for each meeting which will be circulated to the Committee membership and the Technical Support staff.

A quorum will be attained when 50% or more of the Committee members present.

Conflict of Interest

Committee members and their families are eligible for grants. Therefore, at any meeting where a member knowingly has a conflict of interest, the member will confirm the conflict at the beginning of the meeting or where appropriate and shall remain present for the entire meeting. If Authority staff are aware of a potential conflict being presented to the Committee, Authority staff will inform the respective Committee member of the potential conflict so that the Committee member may declare their conflict. Without the presentation of personal information and with the absence of the knowledge of a project, Committee members who fail to declare a conflict of interest with a project which they were unaware of cannot being construed as having a conflict of interest. During the presentation and discussion of the project the member will refrain from

entering the discussion or voting on any motions associated with the project therefore removing themselves from any conflict of interest.

Technical Support Staff

Technical support staff present project applications and provide technical advice and recommendations to the Project Review Committee. Advisory staff may include but are not limited to the following:

Peter Johnson, OMAF
Shawn Staton, DFO
Darrell Randell, DU
Mark Emery, SK
Lindsay Anderson, RLSN
Donald Craig, SCRCA
Darren Bertrand, SCRCA
Don Hector, OMNR
Bob Booth, DU
Dan Schaefer, MSC
Ron Ludolph, RLSN
Muriel Andreae, SCRCA
Steve Shaw, SCRCA
Brian McDougall, SCRCA

Appendix 2: Implementation Schedule

Stewardship Action	Priority (Objective)	Lead	Cooperators	2002	2003	2004	2005	2006	Cost/Funding Source	Evaluation
B1: Establishment of riparian buffer zones (and strips) with native vegetation	1 (I, II & V)	SCRCA, SK, MSC, RLSN	Landowners	X	X	X	X		HSP; Healthy Futures	1. Area of riparian zone restored; 2. Length of buffer; 3. Vegetation type and # (trees, grasses, shrubs); 4. Length and #of grassed waterways
B2: Herd management - reduce livestock access to watercourses	1 (I, II & V)	SCRCA, SK, MSC, RLSN	Landowners	X	X	X	X		HSP, Healthy Futures	1. Meters of fenced shoreline (and setback); 2. Livestock units fenced from the river; 3. # of alternate watering systems; 4. # of crossings
B3: Livestock waste management - Manure storage and run-off collection systems	1 (I, II & V)	SCRCA, SK, MSC, RLSN	Landowners	X	X	X	X		HSP, OGLRF	1. # and volume of projects; 2. 'livestock units' that have been 'contained'; 3. #of days of storage
B4: Repair or remove low level crossings	1 (I, II & V)	SCRCA, SK, MSC, RLSN	Landowners			X	X		HSP	1. # of crossings repaired
B6: Encourage Conservation Tillage	2 (I, II & V)	SCRCA, SK, MSC, RLSN	Landowners	X	X	X			Healthy Futures, HSP	1. # of acres (and # of farms) converted to conservation tillage
B5, B7 & B8: Tile drainage demonstration projects (header tiles, sediment traps and innovative technology)	1 (I, II & V)	SCRCA, SK, MSC, RLSN	Landowners	X	X	X	X		Healthy Futures, HSP	1. # of projects; 2. area of field covered; 3. # of outlets reduced by
B9: Encourage soil testing	2 (I, II & V)	Landowners		X	X	X	X		As part of NMP	1. # of NMPs
B10: Environmental Farm Plans and Nutrient Management Plans	2 (I & V)	OSCIA , OMAF	SK, MSC, RLSN, landowners, SCRCA	X		X	X		NMP - Healthy Futures	1. # of NMPs; 2.% of farms that have a plans completed
B11: Sewage treatment (rural)	1 (I, II & V)	SCRCA, SK, MSC, RLSN	Landowners	X	X				Healthy Futures, OGLRF	1. # of projects
B12: Investigate the feasibility of re-establishing wetlands in appropriate locations	2 (I)	SCRCA, SK, MSC, RLSN, DUC	Landowners	X	X	X			HSP, DUC, Wetland Habitat Fund	1. # of projects; 2. area of wetlands created or enhanced

COMMUNITY AWARENESS AND OUTREACH

RECOVERY ACTION PLAN April 2003

SYDENHAM RIVER RECOVERY STRATEGY

This Action Plan details actions that will be undertaken over the period 2002-2007, to address the outreach approaches identified in the Sydenham River Recovery Strategy. Actions identified in this plan address the following objectives listed in the Recovery Strategy:

V. Promote stewardship by encouraging a sense of public ownership and involvement among landowners, stakeholders, those working in the watershed and other interested citizens

VI. Generate awareness regarding the Sydenham River and the significance of its natural heritage.

The group specifically intends to:

- Increase the awareness and appreciation of the landowners and general public for the significance of the Sydenham River and its Species At Risk
- Increase awareness of incentive programs available, and Best Management Practices, to promote good land stewardship which will aid in the recovery of the species at risk
- Increase awareness of the threat from exotic species
- Disseminate information throughout the watershed on recovery actions of the recovery groups and encourage participation in these actions
- Work in conjunction with other recovery action groups (management, stewardship, and research and monitoring) in order to provide awareness to aid them with their objectives

The development of the Recovery Strategy has raised awareness of the uniqueness of the Sydenham River, but local knowledge of the Species At Risk (SAR) remains low throughout the watershed. Outreach and awareness needs to be directed at particular audiences within the watershed, as outlined below. These actions are prioritized (Table 1) and laid out in an implementation schedule (Table 2). During this five year period, two Awareness Surveys will help measure the effectiveness of the RAG's actions.

Community Outreach and Awareness Actions:

1. Pamphlet on conservation incentive programs, and Species At Risk

The group should produce an inexpensive pamphlet, which gives general information on the various conservation incentive programs which are available to the farming community, and general information on the significance of the Sydenham River watershed for Species at Risk. The pamphlet will refer the interested landowner to staff at the Conservation Authority and Stewardship Councils.

2. Poster on Species At Risk

The group should produce a full-colour poster, which includes a map of the watershed, general information on the Sydenham's significance, and biological information on the aquatic Species at Risk. The poster should include logos of all project partners, and be available in English and French.

The current version of the poster (2000 data), is popular with teachers, members of outdoor clubs and organizations, watershed libraries, those who attended public meetings on the Sydenham, and members of the RAGs. They will continue to be distributed at events, and displayed, and a supply can be mailed to appropriate organizations for their distribution. RENEW may wish to mail copies to those involved in SAR issues, nationally. Copies could also be distributed at the annual Latornell Conservation Symposium.

As the status of SAR is revised, new versions of this poster will be needed. For example, two additional mussel species that occur in the Sydenham will be assigned COSEWIC status in May 2003, and the Northern Madtom has since been uplisted from "Special Concern" to "Endangered". Updated information on the status of most SAR is now available after extensive surveys during the past two years.

3. Best Management Practices booklets

The following Best Management Practices (BMP) booklets have been produced by Agriculture Canada and the Ontario Ministry of Agriculture and Food:

A First Look - Practical Solutions for Soil and Water Problems
Farm Forestry & Habitat Management
Field Crop Production
Nutrient Management
Soil Management
Water Management
Irrigation Management
Integrated Pest Management
Fish & Wildlife Habitat Management
No-Till: Making it Work
Water Wells
Pesticide Storage, Handling and Application
Nutrient Management Planning

These booklets are available from OMAF, at cost. Copies will be made available at the SCRCA and local libraries.

A BMP booklet specific to the Sydenham watershed, and incorporating the relevant portions of the 13 booklets produced by OMAF and Agriculture Canada, will be developed and distributed to interested rural landowners.

4. Display at agricultural fairs

The SCRCA will develop a free-standing display, for use at rural fall fairs (four consecutive weekends in fall, concluding with Brigden, the first weekend in October) and the Plowing Match. At the 2002 Rural Expo in Glencoe, the SCRCA had an interactive display including question and answer sheets on five species of mussel shells, and petri dishes with preserved benthic

organisms. In future, the display should include display boards on the Recovery Plan and stewardship projects, and an interactive component. It may include live mussels in an aquarium, and a video, and the SAR poster and brochures will be available.

5. Presentations on Species At Risk and incentive programs at farmers' meetings

Members of the Outreach RAG should make presentations to organized farm groups in the region which include commodity groups (Lambton Pork Producers, Lambton Cattlemen, Lambton Corn Producers, Lambton Wheat Producers, Lambton Soybean Producers), county Soil and Crop Improvement Associations and county Federation of Agriculture groups. Crop Input meetings, and Machinery days are also opportunities.

Time would be most effectively spent in speaking to the Soil and Crop Improvement Associations for the three counties, as those members are more likely to be receptive to stewardship initiatives.

This presentation is currently available in lecture format, with slides for illustrations. A Power Point version will also be prepared.

6. Public Service Announcement with neighbouring watersheds

A Public Service Announcement delivering the Outreach messages and water quality concerns is needed. The neighbouring watershed of the Ausable and Thames have many similar species and concerns, and the Conservation Authorities will work together to develop a message which can be broadcast on the television stations which blanket this region. This will integrate well with the SAR initiatives in these neighbouring watersheds, and if broadcast on the two stations in this region (CKCO and New PL) will be relevant to the whole viewing audience.

7. Display at community fairs; Sydenham Canoe Race; public venues

The display developed for agricultural fairs will also be used for other venues, such as the annual Sydenham Canoe Race. The interactive components will be customized for the audience and the season and the level of support available.

8. Website including SAR and incentive programs information, and student-friendly component

The website www.sydenhamriver.on.ca has been active since January 2001, and has been recognized as a useful tool for public access and involvement in developing the Recovery Strategy. At present, it includes the background reports on Species At Risk, Stream Channel Analysis and Land Use Patterns (2000),and the Synthesis Report (May 25 2001); and the Management Recovery Action Plan (2002). It also has links to various sites of interest and directs interested landowners to SCRCA and RLSN staff for information on current incentive programs.

This website will be expanded and elaborated to provide more resources for teachers and students. It should include research materials for students, with pictures and diagrams which can be downloaded. Age-appropriate material should be available for all grades. Details on education programs, and potential classroom activities should be available on-line. The web site should include the available brochures, current activities of the RAGs and examples of stewardship projects in the watershed.

9. Newspaper articles on topical items

Local media are interested in topical stories, and coverage has been very good to date. They are very receptive to a news release, particularly with a photo opportunity. To date newspapers in Strathroy and Chatham have had detailed articles on the Recovery Plan itself, the mussel monitoring work and the Habitat Stewardship Program grants. More media coverage will be encouraged through news releases and inviting the media to events such as release of the Recovery Strategy, River Clean Up days, the bus tour and suitable monitoring surveys.

10. Video in popular format

A short video on the Sydenham monitoring work, in a popular format, will be a valuable vehicle to reach students, municipal staff, interested landowners and general public audiences. It will include footage of live animals - mussels, fish and turtles, and the river "in action" - in a format which is readily transported and appreciated by a wide audience. It could include electro-fishing, musselling in the river, benthic sampling and mussels siphoning coloured-water, in an aquarium. A 15 to 20 minute video, directed at senior public school age, will be a useful vehicle.

11. Presentations to service clubs; interest groups; outdoor clubs; hunting and fishing groups; naturalist clubs; campers at conservation areas

Watershed groups include the Strathroy Rotary Club, Lambton Women's Institute, local Horticultural Societies, Bluewater Anglers, Farmers and Friends of Conservation, Lambton Conservation Club, McIlwraith Field Naturalists, Sydenham Field Naturalists, Lambton Field Naturalists, Enviro-Friends of Coldstream, Friends of Campbell, Friends of Henderson and Friends of Warwick. Presentations should be made to as many groups as possible.

12. Signage on public land at river access points, and at marinas, on SAR and exotic species

The Species At Risk poster (2000 date), and the Ontario Federation of Anglers and Hunters "Invasive Exotics" sign, have been displayed at five public locations along the Sydenham. More signs should be erected and maintained at all popular points of access to the river.

Public bridges are another good location for signs which will recognize the significance of the river, and increase its public profile. These signs may recognize a local historic or cultural name, or may refer to the river's rare species, or may simply identify the watercourse.

13. River Clean Up days

For several years, the SCRCA has coordinated a River Clean Up day in Strathroy. This has been in partnership with the Strathroy Rotary, two classes from each of three local elementary schools, Badder Bus Lines, Cuddy Foods and the Town of Strathroy-Caradoc.

The Environment Club at LCCVI in Petrolia is interested in a similar project in Petrolia, and a Steering Committee has been organized. A similar project in the lower Sydenham, with schools in Dresden or Wallaceburg, should be encouraged.

This provides an opportunity for public education, media coverage and buy-in from hands-on involvement of local citizens, youths, industry, the municipality and local service clubs.

14. Exhibit of art, photography and/or creative writing

“Seasons of the Sydenham”, “Sydenham Through the Seasons”, “Celebrate the Sydenham” and “Mussel Muck-about” are some of the topics suggested for an exhibit. This could be a project of one high school class, or one school, or jointly between many local schools. Both the English and the Art Departments of LCCVI have indicated an interest, and been provided with background information. Spring field trips on the Sydenham are being planned for these classes.

Other schools in the watershed should also be approached, to see if there are staff interested in this topic.

15.Newsletter

A colourful, 11 x 17" double-sided newsletter should be produced annually and distributed throughout the watershed in the weekly newspapers. It should engage the reader in this issue, and present all the key messages.

16. Interpretive trip by bus, foot, canoe or kayak

An interpretive field trip would be an opportunity to demonstrate the work of the Recovery Action Groups, and see the watercourse, get wet and dirty, and actually see and touch some of the Species At Risk. Outdoor clubs would be an audience, and eco-tourism might finance these trips, or the “Volunteer for Nature” groups.

Development of this program should be encouraged.

17. Curriculum-based classroom programs on water quality and mussels, fish and turtles.

To reach the maximum number of school-age students, programs must be offered in the classroom, and have themes which directly relate to the current curriculum guidelines. Programs have been developed which meet these requirements and address the topics of Water Quality and aquatic Species At Risk.

18. Curriculum-based field trips on water quality and Species At Risk

Programs which are offered in the field are popular with students, and the field experience augments and reinforces the learning process. However, field trips are expensive and require supportive teachers, parents and administrators. Age-appropriate, curriculum-based field outings which teach about Water Quality and aquatic Species At Risk should be developed.

19. Presentation and activities for youth groups

Girl Guides and Scouts Canada (Strathroy, Petrolia and Wallaceburg) have badge requirements relating to environmental activities and endangered species. Other regional youth groups, with relevant interests include the, Ducks Unlimited Green Wings in Sarnia and Junior Farmers in the Glencoe area. Age-appropriate presentations and activities should be offered to these youth groups.

20. Mailing of pamphlet and poster, with covering letter

Current Sydenham SAR literature should be mailed with a covering letter to companies and industries located in the region, and to agricultural companies which are active in the watershed.

Industries whose activities influence the Water Quality should receive information on the Recovery Strategy, and the Power Point presentation should be offered to them. Opportunities for partnerships on stewardship and outdoor education should be proffered.

21. E-mail and mail updates

The Outreach RAG should maintain current contact information for the membership of all four RAGs and include their activities in regular newsletters.

22. Provide support when requested

The Outreach RAG should provide appropriate support (presentations, activities, field trips, newsletter, video, etc.) when requested by the other RAGs.

Table 1: Outreach and Awareness Actions for the Sydenham River Aquatic Species at Risk Recovery Strategy **(Priority=1 urgent-5 beneficial)**

Audience	Message	Product	Priority
A. Farmers in the region	Awareness and appreciation of Species at Risk (SAR) and the Sydenham "Good water quality helps you and helps them".	1. Pamphlet on conservation incentive programs, and SAR 2. Poster on SAR 3. BMP/ Sydenham BMP booklets 4. Display at agricultural fairs 5. Presentations on SAR and incentive programs at farmers' meetings 6. Public Service Announcement with neighbouring watersheds	1 available available 1 1 1
B. General public in the region: rural non-farming landowners; outdoor clubs; hunting and fishing clubs; Conservation Area campers; bait harvesters; anglers; boaters	Awareness and appreciation of SAR, the Sydenham, hazard of exotic species and actions by RAGs "Celebrate the Sydenham"	7. Display at community fairs; Sydenham Canoe Race; public venues 2. Poster for display in public places and free distribution 8. Website including SAR and incentive programs information 9. Newspaper articles on topical items 10. Video in popular format 11. Presentations to service clubs; interest groups; outdoor clubs; hunting and fishing groups; naturalist clubs; campers at CAs. 12. Signage on public land at river access points, and at marinas, on SAR and exotic species; Signage at bridges 13. River Clean Up Days 14. Exhibit of art, photography and/or creative writing 15. Newsletter 16. Interpretive trip by bus, foot, canoe or kayak	1 available 1 1 1 2 2 2 2 3 3
C. School-age children and teenagers in the region: youth groups; Scouts, Guides; 4H; Greenwings	Awareness and appreciation of SAR, the Sydenham and actions by RAGs	17. Curriculum-based classroom programs on water quality and mussels, fish and turtles. 18. Curriculum-based field trips on water quality and SAR 19. Presentation and activities for youth groups 8. Website - student-friendly component	1 1 2 1
D. Industries, Companies in the region; Agricultural Companies	Awareness and appreciation of SAR, Sydenham RAGs' actions	20. Mailing of pamphlet and poster, with covering letter	3
E. Other Sydenham RAGs	Updates on actions	21. E-mail and mail updates 22. Provide support when requested	1 1

Table 2: Implementation Schedule

Outreach Action	Priority/ Objective	Lead	Cooperators	02-03	03-04	04-05	05-06	06-07	Cost/Funding Source	Evaluation
Awareness Surveys	3	MNR	Volunteers					X	In kind	# participants
1. Pamphlet	1 (V&VI)	SCRCA	DFO	X	X	X	X	X	HSP, in kind	# distributed
2. Poster on SAR displayed/ distributed	1 (VI)	SCRCA	Recovery Team	X	X	X	X	X	HSP, in kind	# distributed
3. BMP Booklets/Syd. BMP available	1(V & VI)	SCRCA	Recovery Team	X	X	X	X	X	HSP, in kind	# distributed
4. Display at agricultural fairs	1 (V&VI)	SCRCA	Volunteers	X	X	X	X	X	HSP, in kind	Dates
7. Display at Canoe Race; public venues	1 (V&VI)	SCRCA	Volunteers	X	X	X	X	X	HSP, in kind	Estimate of attendance
5. Presentations – at farmers' meetings	1 (V&VI)	SCRCA	Volunteers	X	X	X	X	X	HSP, in kind	Dates, #attending
11. Presentations – service clubs; interest groups etc.	1 (V&VI)	SCRCA	Volunteers	X	X	X	X	X	HSP, in kind	Dates, #attending
19. Presentations – to youth groups	1 (V&VI)	Volunteers	SCRCA		X	X	X	X	HSP, in kind	Dates, #attending
6. PSA with neighbouring watersheds	1 (V&VI)	CAs	Recovery Team, volunteers		X				HSP, in kind	Awareness survey
8. Website – SAR/incentives and student-friendly	1 (V&VI)	SCRCA	Teachers and Students	X	X	X	X	X	HSP, in kind	# hits
9. Newspaper articles	1 (V&VI)	SCRCA	Watershed media	X	X	X	X	X	In kind	# articles

10. Video – popular	1 (V&VI)	high school	Recovery Team	X	X				HSP, in kind	Distribution
12. Signage	2(VI)	SCRCA	Municipalities	X	X	X	X	X	HSP, in kind	# locations
13. River Clean Up Day	2(V&VI)	SCRCA	Municipalities; schools; clubs		X	X	X	X	HSP, corporations	# attendees
14. Exhibit of art, photos, writing	2(VI)	Volunteers	Schools; CA; corporations		X		X		SCRCF	# entries
15. Newsletter	3(V&VI)	SCRCA			X		X		HSP, in kind	# distributed
16. Interpretive trips	3(V&VI)	Volunteers	SCRCA			X	X	X		# attendees
17. School classroom programs	1(V&VI)	SCRCA		X	X	X	X	X	SCRCF, HSP	# attendees
18. School field programs	1 (V&VI)	SCRCA		X	X	X	X	X	SCRCF, HSP	# attendees
20. Mailings to corporations	3(V&VI)	SCRCA				X			HSP, in kind	# distributed
21/22. Support to other RAGs	1	SCRCA		X	X	X	X	X	In kind	# issues

Membership of Community Awareness and Outreach Recovery Action Group
February 2002 – April 2003

Ed Allen
Muriel Andreae
Judy App
Rick Battson
Alan Broad (resigned November 2002)
Kim Gledhill
Dana Jarrett
Kelly McNichol
Mike Nelson
Wayne Sanders
Daelynn Woolnough
Dave Zanatta

RESEARCH AND MONITORING

RECOVERY ACTION PLAN – April 2003

SYDENHAM RIVER RECOVERY STRATEGY

This Action Plan details actions that will be undertaken over the period 2002-2007 to address research and monitoring approaches identified in the Sydenham River Recovery Strategy. Actions identified in this plan address the following objectives listed in the Strategy:

I. Maintain the current geographical distributions and abundances of species at risk.
II. Improve water and habitat quality by reducing sediment loads and nutrient and chemical inputs and ensuring base flow rate is maintained.
III. Reduce the risk of the introduction of exotic species in the watershed.
IV. Establish a broad-based monitoring program that assesses the physical, chemical and biological characteristics of the system.
V. Promote stewardship by encouraging a sense of public ownership and involvement among landowners, stakeholders, those working in the watershed and other interested citizens.
VII. Enhance the understanding of key aspects of the Sydenham River ecosystem that will lead to further refinement and prioritization of essential recovery actions.

This Plan addresses the science component of the Strategy, including the monitoring program, species inventories and species-specific research, evaluation projects, sediment modeling, and other areas identified as 'knowledge gaps' for the watershed. Implementation schedules that identify the recommended actions, agencies, costs/potential funding sources and evaluation measures are also included.

Research and Monitoring Actions:

Ecosystem Recovery Actions:

C1: Monitoring program for species at risk (SAR) – Establish index stations for SAR (surveyed once every 3-5 years); include in-stream habitat assessments.

- The monitoring program will allow the RAG to track changes in the distribution and abundance of SAR and the overall structure of the fish and mussel communities in the river. The program will also enable us to detect the presence of exotic species. Monitoring programs will be developed for mussels, fishes and the eastern spiny softshell, as follows:

- Mussels: A monitoring protocol for mussels was developed in consultation with an internationally recognized expert who has developed similar protocols for assessing the status of federally endangered mussels in the U.S. The protocol was field tested in 1999 and a network of 15 index stations has been established. Baseline data on population demographics were collected from 2 sites in 1999, 3 sites in 2001 and 5 sites in 2002; data will be collected from the remaining 5 sites in 2003 to complete the network. The RAG recommends that index stations be monitored every 5 years. This activity is being led by NWRI, EC and is jointly funded by NWRI, the IRF and SARCEP.

- Fishes: Standardized protocols are being developed (for wadeable and non-wadeable sections) to assess the status of the eight fish SAR and identify factors limiting their distributions in the Sydenham River. A network of index stations will be established; 50 sites were sampled in 2002 and more sites will be added in 2003, particularly in the lower reaches. The project involves a comparative analysis of gear types to determine the best methods to use in follow-up monitoring, and an analysis of various biological, chemical and geomorphological limiting factors. Site selection was coordinated with the water quality, benthic invertebrate and mussel monitoring programs to maximize data comparability. The Ontario Stream Assessment Protocol (2002) was used to characterize the habitat at each index site; this information will also be useful for the mussel and spiny softshell monitoring programs. This activity is being led by DFO and the University of Guelph, with funding from DFO's SARCEP and potentially the IRF in 2003.
- Eastern spiny softshell: A draft Recovery Strategy for the Eastern spiny softshell (ESS) was prepared in 1996 and updated in 1998. No new data have been collected along the Sydenham River over the past five years. The largest populations of the ESS occur in the Thames and Sydenham Rivers and at Long Point and Rondeau Bay in Lake Erie. Surveys to determine the current status of these populations are required. This activity is being led by the Upper Thames River Conservation Authority (UTRCA) with funding from the Trillium Foundation and various other organizations. Dependant on staffing and funding, bi-weekly surveys for the ESS will be conducted between May and September, 2003. All sites will be geo-referenced. The surveys will also categorize and delineate the habitat, river attributes (e.g. flow, substrate), and human impact (noticeable pollution, agriculture, run-off, etc.). Surveys for odonates will be conducted concurrently (see Knowledge Gaps section). This activity is being led by the NHIC with funding from OMNR. The Ontario Herpetofaunal Atlas will also be consulted for additional information on the occurrence of the ESS.

C2: Monitoring program for water quality and benthic invertebrates - Develop a water quality and benthic invertebrate monitoring program.

- The monitoring program will allow the RAG to track changes in water quality in the river as recovery actions are implemented, and will also assist the RAG in determining measurable water quality targets.
- OMOE reinstated a limited water quality monitoring program in the Sydenham River in 2002. Water samples will be collected from 8 sites, 8 times per year and analyzed for a wide spectrum of water quality parameters including heavy metals. This program falls short of the Strategy's objective of a 20-site network of index stations. The SCRCA began sampling water quality at 12 locations throughout the watershed in January 2002, with funding from the Habitat Stewardship Program (HSP). Water samples are being analyzed for temperature, pH, ammonia, total Kjeldahl nitrogen, total phosphorus, conductivity, suspended solids, and chloride. Unfortunately, the HSP will not fund this activity beyond 2002. The RAG will seek further support for water quality monitoring.
- The SCRCA initiated a benthic community monitoring program in 2000. In May and June of 2002, samples were collected from 68 locations throughout the watershed. All invertebrates were identified to the family level and the data were used to calculate a Family-level Biotic Index (FBI) for each site. The FBI is recommended for rapid assessment of the general status of organic pollution in streams, i.e., as a screening tool to identify areas with poor water quality. Since the samples are preserved, the organisms can be identified to a lower taxonomic level at a later date if a more refined assessment is needed. A network of 30 permanent reference sites will be sampled each year. There will be an annual summary of the data collected, and detailed interpretation of the work in year 5. The SCRCA intends to work with the OMOE which has hired

staff and is developing a standard reference condition approach for analysis of benthic invertebrate communities.

C3: Sediment and nutrient modeling – Conduct research on the impact of land management practices on the influx of nutrients and sediments to the Sydenham River.

Identifying and quantifying key sources of nutrients and sediments will aid in the prioritization of restoration actions and assist in determining measurable water quality targets.

- Site-specific erosion modeling will be used to estimate overland sediment and nutrient inputs. Once obtained, the estimates will be compared to measured concentrations of sediment and nutrients entering the river from tile drainage.
- In 2002, tile and river water samples were collected from six locations with different management practices and texture, and analyzed for sediment, ammonium, nitrate and ortho-phosphate. Further sampling is planned for 2003. These activities are being led by AAFC, with funding from the IRF and AAFC in-kind.

C4: Sewage treatment (municipal) – Evaluate nutrient contributions from municipal sewage treatment plants (STPs) and work with municipalities to reduce inputs as appropriate.

- This activity will improve water quality by determining the contributions of STPs to nutrient loading in the watershed and reducing inputs where necessary.

  Data on the concentrations of N, P and suspended solids in sewage effluent were received from the municipalities of Strathroy, Wyoming, Dresden, Wallaceburg, Alvinston, Watford, Petrolia and Oil Springs. Data will be used to prepare a nutrient budget for the river and determine if further controls on STP's are needed. Compilation of the nutrient budget from STP's is being prepared by AAFC.

C5: Riparian inventory – Conduct an inventory of riparian buffers and their health.

- The extent and quality of riparian vegetation throughout the East Sydenham priority zone, i.e., the area that currently supports the greatest diversity and abundance of SAR, must be assessed in order to guide and prioritize restoration activities. The inventory would also serve as a baseline for monitoring change over time in the quantity and quality of riparian vegetation, and may also be used in the development of a mass balance sediment model for the watershed.
- It was decided that the inventory could be conducted most cost effectively through the creation of a GIS coverage with existing digital information, including recent classified satellite data and infrared aerial photos. Tile drainage mapping would also be included in the analysis to further prioritize areas for restoration. Since tile drainage is sub-surface, it allows sediment and nutrient-laden waters to by-pass riparian vegetation - effectively preventing riparian filtering. As such, riparian areas lacking vegetation that are NOT adjacent to tile drained lands have the greatest buffering capacity and will be given highest priority for restoration.
- The riparian inventory was conducted in 2002, as follows: Vegetation within 50 m of the river was categorized using data from the late 1990s. A wider zone was characterized on the main

stem of both branches. High resolution photographs were used for the majority of the main stem and larger tributaries, and the smaller tributaries and other gaps were filled using a classified infrared coverage supplied by the OMNR. A final report and a set of subwatershed maps will be available in the spring of 2003. This activity is being led by DFO with funding from the IRF.

C6: Base flow – Establish a research program that will address knowledge gaps related to trends and sources of base flow and related water quantity issues.

- River base flows may be particularly important for the survival of many species of fish and mussels. For example, base flows could limit the distributions of riffle species by reducing available habitat during the most stressful summer months. Base flows may become more critical over time due to the impacts of climate change. Base flow also has implications for the river's ability to assimilate loadings of sediment, nutrients and pesticides.
- Research is needed to determine if base flows have decreased over time and, if so, what the causes are. The available information shows that base flow increased after tile drainage was installed, but has decreased over the past 30 years. The SCRCA operates stream gauges in the river, and these data will be examined in detail to confirm trends. Possible causes of reduced base flow could include increased water taking for irrigation during summer droughts and increasing urban demand on groundwater resources. Research is also needed to identify important sources of base flow to the river, such as areas of groundwater up-welling, which should be protected. The determination of critical base flow requirements for the survival of SAR would allow the RAG to recommend base flow targets to agencies responsible for managing the river.
- The OMOE issues water taking permits to land owners, but does not systematically monitor the amount of water that is being removed from the system. The OMOE is currently reviewing its policy, and the RAG will attempt to monitor any policy changes and their implications for the recovery plan. The cooperation of landowners is clearly required in any activity concerning water quantity. Stewardship implications will be referred to the Stewardship RAG for consideration.
- A firm understanding of base flow patterns may also help us assess the impacts of historical wetland loss and provide guidance regarding the importance of re-establishing wetlands throughout the watershed. The OMNR is currently looking at the role of wetlands and forests in water quantity management, and the RAG recommended that the Sydenham River be included in this study.

C7: Distribution and impacts of Exotic Species – Investigate the distribution and abundance of exotic species and implement controls if feasible.

- Aquatic invasive species have the potential to dramatically alter the structure and function of aquatic ecosystems and can result in the extirpation of some sensitive native species. The RAG expects that the presence of exotic species in the Sydenham River will be detected during routine monitoring for SAR and/or during other recovery-related activities. If exotic species are detected, their impact will be evaluated to determine if controls are necessary. Control of Common Carp, for example, may result in lower levels of suspended solids in the water column.
- A report on the presence and impact and known control methods for exotic species in the Sydenham River will be prepared by OMNR in FY 2004-05.

C8: Habitat Mapping – Field work to further refine and map important habitat features.

- Under SARA, critical habitat is defined as "the habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species' critical habitat in the recovery strategy or in an action plan for the species." Guidance for identifying, protecting, managing and monitoring critical habitat is currently being developed by the Interdepartmental Critical Habitat Working Group, and a draft discussion paper was released on 8 October 2002. DFO has established a parallel working group to examine the issue of critical habitat in an aquatic context and to develop guidelines for identifying critical habitat for aquatic species. All RAGs should be aware of these working groups and should be prepared to incorporate their recommendations into RAP activities that relate to defining and mapping critical habitat.

C9: In-stream improvements - Investigate the feasibility of increasing bank roughness at select locations in the watershed.

- The purpose of increasing bank roughness is to improve water quality by reducing bank erosion and aiding in sediment deposition. It also increases habitat complexity, which may lead to an increase in species richness.
- Increasing bank roughness essentially directs stream flow to the centre of the river. Several sites where in-stream habitat work was needed to resolve erosion problems were identified during the 2002 field season. A pilot project could be attempted on the 150 acres of land owned by the SCRCA in Strathroy-Caradoc. The feasibility of conducting this type of work in large watercourses is uncertain; therefore, a thorough review of the stream restoration literature will be conducted before proceeding with this activity.

C10: In-stream improvements - Investigate the feasibility of improving substrate of riffle areas in Bear Creek, and monitor the results of any alterations made.

- The Rural Lambton Stewardship Network has expressed interest in altering riffle areas in Bear Creek, with the goal of improving available habitat for walleye and some of the species at risk.
- The Research and Monitoring RAG would like the opportunity to review any proposed alterations to the existing habitat and monitor the results of any changes that are made.

Knowledge Gaps:

River flow rates. Although research on base flows was already addressed in the Research an Monitoring Actions, further investigation surrounding flow rates issues is required. Parish Geomorphic Ltd. (2000) examined long term flow data for the river and noted a declining trend in maximum instantaneous flow rates. Possible causes of declining flow rates include dams, changes in precipitation patterns (climate change), and an increase in water taking for crop irrigation. If flow rates are dropping, then effluent from sewage treatment plants may now account for a greater proportion of the total flow than in the past. On the other hand, the recent piping of water from Lake Huron for domestic use within the Sydenham watershed could have a positive impact on flow rates by reducing the demand on local groundwater resources.

- The relationship between precipitation patterns and flow rates in the river requires further study. Data from stream gauge networks maintained by Environment Canada and the SCRCA will be

obtained and examined. Additional sources of information (e.g., Bill Annable's Ph.D. thesis from the University of Waterloo) will also be consulted.

- The RAG is aware of a water supply enhancement project currently underway in Norfolk County, that is being funded by Healthy Futures. Twenty-seven ponds will be created or expanded to store about 23 million gallons of water when it is abundant, to be used to irrigate crops when water levels in local streams are low. Other project activities include introducing alternate day water-taking, conducting engineering surveys, drilling wells and designing water control structures. The Norfolk Water Supply Enhancement project is expected to be completed by March, 2003. It is being expanded into Elgin County. The RAG will follow these projects to determine if they would be applicable to the Sydenham River watershed.

Dams. There are two dams on the east branch of the Sydenham River, located at Strathroy and Coldstream. Dams disrupt natural sediment movement in rivers, causing sedimentation upstream and erosion downstream. Dams also reduce maximum instantaneous flow rates, raise stream temperatures through solar warming and present barriers to the upstream movement of fish. The installation of fishways would improve the passage of non-jumping fishes; however, such fishways could also permit the passage of spawning sea lamprey. Reservoirs provide ideal habitat for common carp and those with retention times greater than 20-30 days have the potential to support dreissenid mussel colonies, if these exotic bivalves were ever accidentally introduced to the Sydenham River.

- The functions of the St. Clair Region Conservation Authority's dams and reservoirs should be reviewed to determine if there is potential for their re-naturalization or modification to their operation.
- A strategy for the management of the Strathroy dam is under development. Alternatives being considered include removing or retiring the dam, or maintaining it and installing fishways. A fish passage project has also been proposed for the Coldstream dam. There is little doubt that the installation of fishways would facilitate the passage of sea lamprey and other exotic species, although none of the dams on the Sydenham River currently meet the criteria required to block spawning runs of sea lamprey. The potential for successful use of the river downstream of Strathroy by sea lamprey is considered to be low by the Sea Lamprey Control Centre because of poor water quality, marginal habitat and the fact that Lake St. Clair and the western basin of Lake Erie are not preferred habitat of adult lamprey. Although successful reproduction of sea lamprey has never been documented in the river, additional surveys for larval lamprey are required before proceeding with the fishway projects.

Local historical knowledge. Due to the lack of long-term data on water quality and general river conditions, long time community members could be interviewed to document anecdotal information. Such information may prove to be invaluable, but it is often overlooked.

- The Strathroy Middlesex Museum has secured funding for a Virtual Museum Exhibition, which should be in place by April 2003. The title of the project is "Sydenham River - A Source of History, a Resource for Tomorrow". The project goals are to create an "educational and entertaining Virtual Museum Exhibition that focuses on the historic and contemporary use of the east branch of the Sydenham River. The Virtual Museum Exhibition will look at environmental and ecological heritage and serve as a resource for recreation users, tourists and students." The Recovery Team should both contribute to and benefit from this project.

Other rare aquatic species. The Recovery Strategy focuses on the 14 COSEWIC-listed species, but also considers a number of other provincially rare species of mussels, fish and

odonates (dragonflies and damselflies). The Strategy also recognizes that rare species of other invertebrate groups, such as Ephemeroptera (mayflies), Plecoptera (stoneflies) and Coleoptera (beetles) may also occur in the Sydenham River and that these species should be identified.

- Surveys will be conducted to determine the occurrence, distribution and population size of rare species of odonates in the river. Other rare species of invertebrates observed during these surveys will also be recorded. This activity is being led by the NHIC with funding from OMNR.

Assessment protocols and data management. The Ontario Stream Assessment Protocol (OSAP) is being developed by OMNR to guide the assessment and monitoring of fish, macroinvertebrates and their habitat, including water quality. Data have been collected from hundreds of locations within the Lake Ontario watershed over the past six years. Several modules of the protocol will be published soon. Database design and data management are included in the protocol. There are several limitations to the protocol as it relates to the Sydenham River Recovery Strategy; e.g., it only applies to wadeable streams (there are numerous deep sections between the wadeable sections in the river), and the database would have to be modified to include data on fishing gear, mussel communities, etc.

- The RAG should be kept up to date on the status of the protocol and its various models. The RAG should also be involved, where appropriate, on further development and modification of the protocol.

- A data management plan that supports the activities of all four RAGs must be developed as soon as possible. Such a plan would involve decisions on what type of data should be included and in what format, who would be responsible for maintaining the database, who would have access to the data, etc. Sensitivity training for users dealing with data on SAR will also be required. A workshop on data management is the logical first step. A user needs study for such a database is currently being supported by the IRF.

Current land use. The most recent land use information available to us dates back to 1983. The Team is aware that there have been significant changes in land use over the past 20 years that must be quantified. For example, livestock farming is on the decline; the proportion of cropland in soybean production has increased; and there has been an upward trend in the conversion from conventional to conservation tillage. Changes in land use must be considered in the development of recovery plans.

- Land use information is available from several sources. Agri-census data is available from Statistics Canada; the most recent data available is from 1996. Coverage is coarse, i.e., the data are lumped into polygons roughly the size of a township. A report offering "seamless coverage" of land use for the year 2001 is being prepared by OMNR. Information from these and other sources will be examined and considered in the development of recovery approaches.

- The proportion of land converted from conventional to conservation tillage must be quantified. There is some evidence that this proportion may fluctuate from time to time in response to the application and removal of the federal subsidy on residue cover. Conservation tillage is expected to have a very significant impact on surface run-off, and this must also be quantified. The impact of conservation tillage on tile water is less clear and requires further research.

Impacts of Pesticides and Other Toxic Chemicals. Agriculture is the dominant land use in the Sydenham River watershed and the application of pesticides may impact the aquatic community, including SAR. Urban applications, primarily for cosmetic purposes, are also a

potential source of pesticides to the river and should not be ignored. At the present time, there are virtually no data available on the types and amounts of pesticides in use within the watershed as a whole or in the various sub-basins, or how pesticide use patterns may have changed over time.

- A pilot study, involving parties with a thorough knowledge of local pesticide use and toxicology, should be conducted to identify types, locations and approximate rates of application of pesticides within the watershed. This study will help identify high priority areas for assessing potential impacts to aquatic organisms, including the SAR.
- Water sampling for pesticide analysis should be conducted in the high priority areas identified in the background study. Identities and concentrations of pesticides found should be compared with the toxicology literature and any available guidelines for the protection of freshwater organisms to determine if pesticides are likely to be impacting the aquatic community of the river.
- Although water sampling should be given first priority, sampling for pesticides and other toxic chemicals in other components of the ecosystem (e.g., fishes) should also be considered. The RAG should actively identify agencies and funding sources that may be interested in obtaining pesticide/toxic chemical data from the Sydenham River and may therefore be willing to form a partnership with the Recovery Team to conduct this type of work.
- The RAG has learned of a federal initiative to identify watersheds for study with respect to pharmaceuticals, bacteria, endocrine-disrupting chemicals, etc. The RAG will continue to actively follow up on such initiatives and promote the Sydenham River as a study site. For example, the Sydenham was proposed as a potential watershed for study to the leader of the AAFC's new Theme on Water Quality and Quantity.

High chloride levels. Chloride levels in the North Sydenham River were once significantly above toxic levels. There was most certainly an effect of these high chloride levels in the past. Chloride levels in the East Sydenham River appear to be rising steadily, probably due to the increased use of road salt, although they are still well below chronic toxic levels.

- Information should be sought on the aquatic communities in the North Sydenham River at the time of the high chloride levels. Such information could be compared with current data on aquatic communities to determine if the river is still in the process of recovering from this impact.
- Monitoring of chloride levels in the East Sydenham River should continue. Correlation between chloride levels and the distributions of fishes, mussels, and other aquatic organisms (e.g. benthic community) should be examined to determine if there is any indication of a relationship. If so, cause-effect studies should be conducted.

Tile drainage. Characterization of the sediment and nutrient content of water from tile drains is needed to determine the impact of tile drainage originating from various types of land use, e.g., pasture, various types of crops, till vs. no-till management, and to compare it with input from road run-off, town storm drains, etc. The influence of soil texture on tile water quality must also be investigated.

- There is a need for improved tile drain design to optimize sediment control and techniques that will intercept sediments before reaching the municipal drain. Installing regularly maintained sediment pools into municipal drains would also reduce the quantity of sediment that enters the Sydenham River.

Species-Specific Recovery Actions:

A) MUSSELS ¾ Species-Specific Recovery.

Wavy-rayed Lampmussel (surveys) - Conduct targeted sampling for this species near Alvinston where fresh shells have been recently found.

- Evidence to date suggests that this mussel may be extirpated from the Sydenham River. Intensive surveys of sites within the historical range of the species were conducted in 2002. Surveys for this and other mussel SAR will be conducted in the Ausable River (2002) and the Maitland River (2003) to locate potential sources of animals for re-introduction to the Sydenham. This activity is being led by the NWRI with funding from the IRF and SARCEP.

Wavy-rayed Lampmussel (host fish surveys) - Conduct surveys for the host fish (smallmouth bass); investigate feasibility of re-introduction if necessary.

- The loss of the Wavy-rayed Lampmussel may be due to a reduction in the population of its host fish, the smallmouth bass. Information on the distribution and abundance of smallmouth bass will be captured during fish community monitoring that is being conducted by DFO and the University of Guelph with funding from SARCEP.
- The life history variation of smallmouth bass across several watersheds is currently being investigated by OMNR. This information will help the RAG evaluate the health of the smallmouth population in the Sydenham River relative to other systems. The occurrence of the Wavy-rayed Lampmussel is negatively correlated with increasing turbidity. This relationship may be direct or indirect, i.e., due to a relationship between turbidity and the occurrence of the mussel's host. The relationship between turbidity and the occurrence of smallmouth bass will be investigated using data collected during fish community monitoring and stream habitat assessment activities being conducted by DFO and the University of Guelph.

Northern Riffleshell (surveys) - Conduct additional quadrat surveys throughout known range.

- Further quantitative sampling is needed to determine if the Northern Riffleshell population in the East Sydenham River is stable or declining, and to collect baseline demographic data. These data will be captured during index monitoring being conducted by the National Water Research Institute with funding from the IRF.

Northern Riffleshell (recovery planning) - Contact American authorities regarding their efforts for this subspecies and investigate the possibility of an international recovery plan.

- The coordination of international recovery efforts would improve the effectiveness of our recovery plan for the Northern Riffleshell. This activity falls within the Framework for Cooperation Between the U.S. Department of the Interior and Environment Canada in the Protection and Recovery of Wild Species at Risk, which aims to protect shared or "borderline" species. Unfortunately, there is no formal funding mechanism and preliminary inquiries have not been fruitful. However, further attempts will be made.
- A joint proposal of the National Water Research Institute, University of Guelph and Miami University in Ohio was submitted to the U.S. Fish & Wildlife Service's Freshwater Mussel Conservation Fund in 2000, but it was unsuccessful. NWRI will continue to investigate alternative partnerships and sources of funding, such as the Commission for Environmental Cooperation under the North American Free Trade Agreement.

Snuffbox (surveys) - Conduct additional surveys.

- This species occurs at extremely low densities, and additional information is needed to fill gaps in its known range and to collect baseline demographic data. These data will be captured during index monitoring being conducted by the National Water Research Institute with funding from the IRF.

Snuffbox (surveys for host fishes) - Conduct surveys for Logperch and Blackside Darters.

- Logperch and Blackside Darter have been identified as the most likely hosts for the Snuffbox in the Sydenham River. Information on the current status of these fishes is needed to determine if host fish access is a factor limiting the distribution of the Snuffbox in this system. Such information will be captured during fish community monitoring that is being conducted by DFO and the University of Guelph with funding from SARCEP.

Confirm fish hosts for Northern Riffleshell, Rayed Bean, and Snuffbox - Extend existing research on host fish determination for these species.

- Identification of the host fish(es) for the Northern Riffleshell, Rayed Bean and Snuffbox is critical to the development of recovery strategies for these mussels. Host fish testing will be conducted by the University of Guelph with funding from SARCEP and the Endangered Species Recovery Fund. Artificial infestations of a variety of wild fishes will be conducted at the University of Guelph's Hagen Aqualab. A new recirculating system that will improve the existing facilities is scheduled for construction in 2003.
- The selection of fish species for host testing is based on the availability of species that occur in the Sydenham River. Thorough knowledge of the distribution and status of fish species that are identified as potential mussel hosts is important to guide future recovery actions.

Mudpuppy Mussel (surveys) - Conduct species-specific surveys for fresh shells.

- Little information is available on the distribution and abundance of this species due to its preferred habitat, i.e., burrowed in soft sediment under large flat rocks. This is one of the few species of freshwater mussels for which the presence of live animals may have to be inferred from the presence of fresh shells. The occurrence of live Mudpuppy Mussels or fresh shells will be noted during index monitoring for mussels. In addition, any specimens found incidentally during the collection of gravid female mussels of other species for host fish testing will be recorded.

Mudpuppy Mussel (surveys for Mudpuppy host) - Conduct Mudpuppy surveys.

- Surveys to determine the distribution and abundance of Mudpuppies in the East Sydenham River are required to determine if host access is a factor limiting the distribution of the Mudpuppy Mussel.
- The status of the Mudpuppy will be assessed over a two-year period. In the first year, baited traps will be set at 7-10 sites and relative abundance estimates will be determined. Such estimates will be compared with those from other sites in the Great Lakes Basin. Animals will be measured to determine age class distribution and toe-clipped to allow mark-recapture studies in the second year for the purpose of obtaining density estimates. Blood samples will be taken from the larger animals for contaminant analysis. Mudpuppies will also be examined for the presence of mudpuppy mussel glochidia encysted on their gills. This activity is being led by CWS with funding from the IRF.

B) FISHES ¾ Species-Specific Recovery.

Eastern Sand Darter (monitoring) - Identify suitable habitat patches in the East Sydenham River and conduct targeted sampling to define range.

- The complete delineation of range of this species is required to identify long term monitoring sites.
- Sampling protocols for fish SAR are being developed by DFO and the University of Guelph with funding from SARCEP, and a network of index monitoring stations will be established in 2002 and 2003. The monitoring program will provide data on the range of the Eastern Sand Darter in the East Sydenham River.

Eastern Sand Darter (habitat protection) - Protect existing habitat and map sources of sand upstream of occupied sites.

- The Eastern Sand Darter is very habitat specific, requiring a fine sand substrate and an upstream source of sand. Such areas will be located and mapped under item C8 in Overall Strategies/Approaches to Recovery. The patches of fine sand substrate in the 15km stretch of river between Florence and Dawn Mills are an example of critical habitat for the Eastern Sand Darter.
- Land-use practices that contribute to siltation, and change the channel structure and with the deposition of sand are likely detrimental to the Eastern Sand Darter and measures should be taken to mitigate the impacts of these practices in areas that support this species.
- Bank stabilization projects that are being proposed to resolve erosion problems (see item C9 under Overall Strategies/Approaches to Recovery) could be harmful to Eastern Sand Darter populations, and should not be undertaken in areas that currently support this species.

Northern Madtom (monitoring) - Identify habitat requirements through discussions with U.S. researchers. Determine if the species is extant in the Sydenham River through targeted sampling in suitable habitat.

- Evidence to date suggests that this fish may be extirpated from the Sydenham River. Further targeted surveys in the stretch of the East Sydenham River between Alvinston and Florence will be conducted in 2003. In addition, voucher specimens of fishes collected during index monitoring in 2002-03 will be carefully examined to determine if any specimens of the Northern Madtom are present as this species is easily confused with the more common Brindled Madtom.

Northern Madtom (re-introduction) - If the species is not found, develop a plan for re-introduction at Florence.

- Re-introduction of the Northern Madtom will not be attempted until the reasons for its disappearance are understood.

Spotted Gar (monitoring) - Identify suitable habitat in the lower East Sydenham River and conduct targeted sampling. If the species is not found, then no further recovery efforts should be directed towards this species in the Sydenham River.

- It cannot be said with certainty that the Spotted Gar was present in the Sydenham River historically. Therefore, no recovery efforts will be taken unless the species is found to be extant in the system. Surveys will be conducted in all suitable habitats in 2002-03 to determine if the species is present.

Spotted Sucker (monitoring) - Identify habitat requirements through discussions with U.S. researchers. Targeted sampling is required during the spring spawning period and summer. Movements should be determined through marking and radio telemetry.

- Index monitoring for fish SAR in 2002-03 will provide the data needed to improve our understanding of this species and its habitat preferences in the Sydenham River. Such data may also help improve our understanding of the population dynamics of this species in the Sydenham.

Pugnose Minnow (monitoring) - Identify suitable habitat patches in the North Sydenham and lower East Sydenham rivers and conduct targeted sampling to determine distribution.

- This species was most recently reported from the non-wadeable regions of the lower East - Sydenham in the reaches downstream of Dawn Mills. These areas will be target of sampling effort for this species in 2003. The results of the index monitoring for fish SAR conducted in 2002-03 will provide the data required to delineate the range of this species in the Sydenham River.

Blackstripe Topminnow, Greenside Darter, Bigmouth Buffalo (monitoring) - The range and abundance of these species should be monitored as part of routine surveys.

- Index monitoring for fish SAR in 2002-03 will provide trend-through-time data on the status of the Sydenham River populations of these species.

C) EASTERN SPINY SOFTSHELL ¾ Species-Specific Recovery.

Monitoring - Repeat population survey in the East and North Sydenham rivers every 5 years in the spring and early summer.

- These surveys will aid in the determination of current range and to a lesser extent, abundance of this species. Current knowledge of the range of this species in the Sydenham is limited. Visual surveys are effective for females during the months of May and June but thermoregulatory behaviour is less pronounced after oviposition (mid-June to mid-July). Males of this species bask on a much more inconsistent basis, but can be sporadically sighted during the months of May and June as well. Five year intervals or less are recommended in order to maintain accurate records, as surveys are not always consistent due to variations in temperature and weather conditions. Dependent on funding, the East and North stretches of the Sydenham will be surveyed over a five to ten day period in 2003.

Monitoring - Identify and describe nesting and overwintering habitats, and factors that affect habitat quality.

- This action will allow for the identification and protection of critical nesting areas. Visual surveys, public reports and aerial photography can be used to aid in the discovery of nest sites throughout May, June and July. Eggshell fragments, still remaining from predated nests, can also be identified to species, indicating a nest site.

- Radio telemetry is necessary to determine over-wintering sites. Transmitters are expensive and permits to capture turtles from the Sydenham River are required. This action will proceed based on time and funding constraints.

Habitat protection - Determine extent of nest predation and erect nest enclosures if required.

- Monitoring nest predation is required to develop specific threat mitigation techniques. Nest protection will aid in increasing juvenile recruitment and has further benefits through the collection of natural history information. All information on reproductive output, seasonal variations and overall reproductive health will prove to be beneficial over the long term. Cycles, trends and various other data may help predict negative pressures on this population in the future.

- Nest protection with wire cages is very labour intensive. Assistance from stewardship groups in the Sydenham watershed would be required to implement this action.

Habitat protection - Reduce successional encroachment on nesting sites where succession is a problem.

- Vegetative encroachment can render known ESS nesting sites unsuitable for oviposition. The ESS appears to be show nest area fidelity, as opposed to nest site fidelity. Adequate sites may be utilized if they contain the proper substrate, humidity and lack of vegetation. Females will avoid sites with thick vegetation.

- If funding allows additional nesting habitat will be constructed prior to oviposition, by clearing vegetation from adequate sites. Areas will be maintained throughout the incubation period in order to sustain acceptable temperature and humidity within the nest chamber.

Habitat protection - Supply landowners of all nesting areas and other significant sites (basking areas, overwintering sites) with information on the ESS.

- Interested landowners will be approached to take an active role in conservation and information gathering. Information on active and passive stewardship will also be made available to landowners.

Awareness - Build on the ESS Recovery Team's efforts to raise awareness of the ESS in the Sydenham River.

- Public awareness is vital in promoting species and habitat protection. High quality photographs and accompanying text will help improve public opinion, awareness and support for stewardship activities and information gathering. Educational materials will also prompt members of the public to report sightings, aiding in field research.

Coordination - Work cooperatively with the ESS Recovery Team to ensure priority actions and research needs are addressed.

- The efforts and resource pooled resources of the Sydenham Recovery Team and the ESS Recovery team will be coordinated.

- Data sharing among the recovery teams will be encouraged to avoid redundant activities.

D) ADDITIONAL RECOVERY ACTIVITIES

The following activities, not identified in the Recovery Strategy, were deemed an important component of recovery planning in the Sydenham River watershed.

Genetic research requirements - Conduct research on the conservation genetics of mussel and fish SAR.

- The need for genetic studies was not identified in the Recovery Strategy. However, it is widely recognized that maintaining the genetic variation of a species is critical to its survival, and the conservation and management of SAR requires knowledge of the genetic structure of populations. Genetic factors come into play when determining minimum viable populations sizes, the impact of inbreeding on sustainability and the degree of differentiation among fragmented populations, and when identifying potential source populations for the reintroduction of extirpated species and/or captive breeding programs, and defining core and satellite populations. Recent genetic techniques are also available that are useful in identifying source v. sink populations. Such information would be particularly relevant in the delineation of 'critical habitat'.
- Genetic studies relevant to the conservation of fish and mussel SAR in the Sydenham River will be pursued through connections with universities and their graduate students.

Surveys for candidate mussel species – Kidneyshell, Round Hickorynut, and Round Pigtoe.

- COSEWIC status reports on the Kidneyshell and Round Hickorynut have been completed, and these two species will be designated at the May 2003 meeting of COSEWIC. A status report on the Round Pigtoe is currently in preparation; this species will likely be designated in May 2004. Data on these species will be collected during index monitoring for mussel SAR.

Timing windows - Applying timing guidelines for in-water works.

- The OMNR is moving ahead with the development of the Timing Windows Tool. The tool will provide timing guidelines for in-water works (drain clean-outs, dredging, construction) that have been developed for the South Central Region of Ontario. These guidelines aim to minimize the adverse effects of in-stream works to fish populations.
- Current timing guidelines consider the sensitive period for fish to be March 15 to June 30. The critical times for the SAR, may not occur at this time of year. There is a need to clarify the critical periods for each of the SAR (mussel, turtle, and fish) in the Sydenham River and its tributaries so that in-water works can be completed with minimal adverse effects.

REPORTING AND EVALUATION

The Research and Monitoring RAG will report annually to the Sydenham Recovery Team on Progress made on actions. Evaluation measures are identified in the attached implementation schedules.

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