Boat Inspection and Decontamination for Aquatic Invasive Species Prevention

Recommendations for the Adirondack Region



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Executive Summary

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As of 2013, nearly 90 waterways in the region had one or more AIS however, more than two out of three waterways surveyed, at least 230, are still free of AIS, which presents an opportunity to limit their spread. While there are many AIS pathways, recreational boating remains one of the most significant in the Adirondac region. As a result, groups are promoting the expansion of the boat launch steward program, which conducts education and inspections at boat launches. Data from 25,000 boating parties surveyed in 2012 show that boaters are traveling from more than 600 destinations, and 35 are not taking any spread prevention measures. This signals the need for additional focus on the importance of cleaning recreational equipment.

Prevention efforts promoting clean boating practices are underway and include education, such as brochures, signage, presentations, news releases etc. inspections, i.e. volunteer and paid boat launch stewards local laws prohibiting the transport of aquatic species and, boat washing, i.e. decontamination. An increasing emphasis on inspection and decontamination among lake communities highlights the need for determining its role in a regional AIS prevention program.

This report evaluates the concepts of inspection and decontamination and uses existing datasets to inform recommendations for the region. The process involved five steps: 1) reviewing peer-reviewed scientific literature on recreational watercraft as an AIS pathway and the effectiveness of inspections and decontamination in removing AIS, 2) compiling Adirondack AIS distribution and boat access data, 3) compiling Adirondack boat launch steward data, 4) analyzing information in aggregate to understand trends, and 5) developing recommendations appropriate to the region. The process began in anuary 2013, and several drafts of the report were shared with a team of reviewers and the Adirondack Aquatic Invasive Species Committee members for input.

Though the peer-reviewed literature on the effectiveness of inspection and decontamination is limited, the papers that are available are credible, informative, and provide important guidance on integrating inspection and decontamination in a regional prevention stratety reference material is further enhanced by white papers and state reports from across the country. In addition, the AIS distribution and steward data available for the Adirondack region are among the most complete in New York State and were instrumental for informing the specific recommendations presented here. Because it is difficult to forecast which AIS will arrive, survive, and reproduce in Adirondack waterways, it is necessary to take a multi-species, long-term approach to AIS prevention efforts in the region. Therefore, in order to address all possible threats and offer the highest possible protection to the region, the recommendations presented include methods showmtostbel/HFWLYH L&PRYLADGL&RPHFDVHVNLOOLADEGHD&HRI

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Executive Summary

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I. Introduction: The Need for Resource Protection

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II. Aquatic Invasive Species Impacts and Pathways of Spread

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II. Aquatic Invasive Species Impacts and Pathways of Spread

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Species Name	Number of	BY OD (E) (B)
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		<i>■RDDVLBEH</i>
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%O₩EDFN₩UULQ Alosa aestivalis		
%ULWWOH1DIMajas minor		
REPERQUS Cyprinus carpio		
		$\mathbf{B} \cap \mathbf{W} \cap \mathbf{B} \cap \mathbf{W} \cap $
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(MRSHD6)%G Scardinius ervthronhthalmus		DQV[IDQDWR&D]
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neteropnyllum		
:DWHUKHWKW/ Irapa natans		DBDV/ BARDEN
:KLWH3HUFK Morone americana		\$SABHARRAX FOF
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=HEUDOMO Dreissena polymorpha		RBRDTXDWQQWDQDVLM
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(Figure 1), reinforcing the opportunity to prevent the spread of AIS among inland waterways in the Adirondack region.^e

Preventing the spread of aquatic invasive small-bodied organisms that are already in the Adirondack region, such as zebra mussel and Asian clam juveniles and spiny waterflea, is of special concern. Asian clam and spiny waterflea have demonstrated their ability to survive and reproduce in Adirondack waterways. Due to their limited calcium and pH tolerance ranges, zebra mussels are not predicted to survive and reproduce in most Adirondack waterways; however, waterways can receive excessive inputs of calcium from human activities creating situations where populations can persist. For example, calcium chloride is often used for roadway deicing in the winter. When calcium chloride is applied for these purposes in close proximity to waterways, or streams that drain into them, the compound can be transported into the waterway during periods of high runoff (e.g. spring snowmelt) or through the soil. This results in localized areas of lake shoreline with high calcium concentration, which can increase the potential for zebra mussels to colonize, as shown in Lake George by the NYSDEC.²⁵ Furthermore, the possibility exists for zebra mussel populations to evolve genetic adaptations to local ecological conditions.²⁶ Thus, zebra mussels do pose a risk to waterways within the Adirondack region and actions should be taken to limit their spread.

Figure 1. Cumulative number of invaded waterways and waterways monitored by APIPP volunteers where no invasive species were detected. The increase between 2001 and 2002 is accounted for by the inception of a standardized regional volunteer monitoring program (2001 was pre-volunteer surveys and 2002 was the first year of systematic volunteer surveys). The increase between 2008 and 2009 is accounted for by the inclusion of variable-leaf watermilfoil as an invasive species, rather than as a watched species. The increase between 2011 and 2012 is accounted for by the inclusion of thorough, systematic surveys on numerous waterways performed by the Aquatic Rapid Response Team. APIPP began including invasive animal data in 2009.



^e AIS and survey data are summarized in the Adirondack Park Invasive Plant Program 2012 Annual Report.

DRINHDEOVIO VXRXQBRORHRDEELKH MINDOSHROVDWARI	₹ DBV	Table 2. Examp York region out	les of priority AIS in the New side of the Adirondacks.
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		GULOOBydrilla	verticillata
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& RONHR & PPS & O	Hydrilla	4ØJJD0MO	Dreissena rostriformis bugensis
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Figure 2. Total number of known aquatic non-native and invasive species in the regions hydrologically connected to the Lake Champlain Basin as of 2011.²⁸



DATA SOURCE: UVM, Lake Champlain Sea Grant, Great Lakes Environmental Research Laboratory, Lafontaine and Costan 2002, and Strayer 2012.

AIS Distribution at State-operated Boat Access Points

KHSUHM@HRI\$6 LØDUJHODRFLDWHGZWKDWHUDZWKSEOLFERDWDFFH&IWKH@YHUZWRI :LFRQ@DGLR@WRHDUZWRDILYHHDUW&PRQWRULQLQDQDWHUDWRHYDOBWHWKHUDWHD PHFKDQPRISUHDGRI\$KHSUHOLPLQUUH&WIURPWKLW&KRZVKDWLQDQDWHUDZWKSEOLF ERDWDFFHDUHPRUHOLNHOWREHFRPHL@HWHGWKDWKRZODNHZWKQSEODDERDDWDFFHV SUHOLPLQUDQOZRIDWHUDYYHHGIRU\$E@VKH&LURQDFNKRZVKDWSHUFH@/RIWKHDWHUDV ZWKERDWOD@KHDUHL@DGHGKLOHRQSHUFH@/RIWKHDWHUDZWKRWERDWOD@KHDUHL@ HYHUDOFDHKREYHUWKHL@DGHGDWHUDZWKRWERDWOD@KHDUHKGURORJLFDOOFR@FV DWHUDWKDWGRKDYHERDWOD@KHKHHILQLQZJHWWKDWLWLFULWLFDOWRIRF&UHDGSUJ HIIRUWR@WHUDZWKSEOLFERDWDFFHZ@UGHUWROLPLWWKHSUHDGRI\$6

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¹LIIHUHEHIØUHWDWLWLFDOOMIOLFDØ/EDHGROSUHOLPLOUKL6TISUHDOOMIGHUIRUPHGESDØ6PLWKKOOHJH LERUSRUDWLIGGDWDSURYLGHGEWKHSLURODFN3DUN,ØDMH3ODØ/3URJUDP ³6RPHØWHUØKOYHPRUHWKDROESKOLFERDWDFFHIØRLØ/7KHUHDUHSKOLFWDWHRSHUDWHGERDWDFFHIØRLØ/V KDUGMIDFHUDPSIØGEHDFKDQKDQODKKHVØ/KHSLURODFN35,60DWDSURYLGHGEWKH1&(&

Current AIS Spread Prevention Efforts

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Status of Inspections

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	PHDX/HKHD/0/PLWKY	RHORGW5HJLV	
	ROOHJH:DWHUKHG&WHDUG	SIGNI SHD	
	BRJUDPWKHDNHHRUJHDN	IDNH)OREU	
	WHDUGBRJUDPDGWKHDNH	DNHØDFLG	
	KDPSODL&DWD&KWHD UG	DNHODFLG200DJ1	
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LRSHUDWLRGRUPDHD UV		ØPSJURØ	
		RØDNH	
KHUHJLR MUWDGODUJHWER	DWOD®KWHBUGSUR.IUDPWI	OHDEKDPDNH	
RIWKROOHIH DWHIIKHGWH	BUGKI SRIR HUDP WDUWHGI (2JKRGRQ	
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		KNH ULQ	
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Table 4. Boat launch steward programs in the Adirondack region. & VØEÐV&ØXVØ&&VEÐD BHØWR®I&HRIERDØX&ØØ\$R@PVLÐVØ&@RØN#RØ&&SÐW :LØSÐGØ@WWWRLPSÐØØØ\$R@PVEXW&QLVØ&QÐØ`R IRPÐØDU BWØSR@PN&ØEÐØMQ										
Waterway name	Organization	# of launches with a steward	Years of steward coverage to-date	General coverage						
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Alternatives to Inspections

A common concern among lake communities is that AIS can be spread when stewards are not on duty. One tool that is available during those times is the Internet Landing Installed Device Sensor (I-LIDS). A private company in the mid-west developed I-LIDS, which is a motion-activated camera installed at a boat launch. When a boater enters or exits the launch, the camera is triggered, playing an audio message reminding boaters to inspect and clean their gear and taking images and videos of the boat. This technology was in its third year of use on Raquette Lake in 2013, which is complementary to the steward program. Boat launch stewards review the videos to check for signs of AIS on boats and trailers to record frequency of usage and number of instances where plant material is visible.



Status of Washing and Decontamination

Boat launch stewards generally focus on inspecting boats, removing or draining any water, and hand-removing any aquatic plants and debris, but often they do not have the time or the equipment to wash or decontaminate boats entering and exiting launches. Boat washing involves rinsing and flushing boat compartments and recreational equipment, which removes AIS, whereas boat decontamination involves high-pressure, hot water spraying, which removes and often kills AIS.

While some boaters may be able to wash their watercraft and gear at their homes, this may not always be the case. Boaters may visit various waterways in a short period of time while recreating or vacationing. In the last decade, shoreowners and municipalities have expressed increasing interest in offering public boat wash and decontamination stations. Currently, there are several active public boat wash and decontamination stations in the Adirondack region.

Upper St. Regis Lake

Upper St. Regis Landing in the Town of Harrietstown has a high-pressure, cold water boat wash with a catchment vault and screen-protected overflow pipe to Upper St. Regis Lake. The Upper St. Regis Foundation sponsors 7-day per week steward coverage at this moderate-to-lightly-used boat launch. When speaking with boaters, the boat launch steward recommends that they use the wash station upon entering and exiting the launch.

Buck Pond

Buck Pond State Campground has a low-pressure, cold water hose at the R.V. dump station adjacent to the boat launch into the Kushaqua Narrows. The boat launch steward recommends that boaters use the hose upon entering and exiting the launch.

Paradox Lake

Paradox Lake State Campground has a frequently used low-pressure, cold water boat wash station.

Lake George

In 2006 and 2007, as part of the pilot Lake Steward Program on Lake George, the Lake George Watershed Coalition purchased two portable boat wash units for use at launch locations. The units consisted of pressure washers powered by portable gas-powered generators. Boat launch stewards washed boats on a large mat

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Other

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Boater Trends

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Figure 3. Boater-reported AIS spread prevention measures (Paul Smith's College WSP, 2012)Some boaters take more than one spread prevention measure for their boat, which is why the spread prevention measures exceed 100 percent. Not all boats have bilges, carry bait buckets, or have live wells, and boat launch stewards did not record the presence or absence of live wells.



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RV

©LIRD®/DER®/VEL®/NHERPHD@LIEXN®/VRU DTXDUXP&PSL&BR®L@RD®X&BV&D®D®L@B®/ LØRGFWLR@DVWHPDRWEHFRYHDØWHOD®SHEHØVRIWHWLPH7KVKJØLJW/VWHRHGWRWKQ FUWLFDOODERW/SWWSHVRIFRYHDJHZOORIIHØVHJHDWHVWDPRØVRISRWHFWLRØ2P\$6

,QGGLWLRWRWDFNLISHYHWLRRHDVMVWDNHQDWDFROOHFWHGDOVRGHVFLEHWIASHYLRXGHVWLQWL ØWHEDIW2IWIASHEHWRIYLVLWRWWR&LEQDFNERDWOD&HVW&WHSRWDSHYLRXOVLVLWHGØWHØ\ otherW&WIAVDPHODNHFHWDLIZWHØVVHHKJIKWLVLWDWLRQWHV\$SHQL[7K6DDQF/DNHF&LQ /DNH&PSODL@NHHRUHWI&VRGLYH6DDWRJD/DNH/DNH3ODFLGDQWI6W/DØH5LYHDH FRPPRQPHWLREG&WHUUTMWHVSRWHLVW&WWIASHYLRXOVLVLWHGØWHØDV&BAFK LVRIWHWIHVSRWHIUTMWHVSRWHLVW&WWIASHYLRXOVLVLWHGØWHØDV&BAFK LVRIWHWIHVSRWHIUTMWHVSRWHLVXLUHWDOERDWVHDW6DFDQDJD/DNHKFRVWVVSLQ ØWHUDHDDVSHFLHVRIJBEUFREHQVDOVRDSRS&DODNHGHVWLQWLR@FRIWHVHFRPPRQSHYLRXO\ YLVLWHGØWHØVRVWVRERERHSIW/HULJWHQWMWIADWRI\$GWDQSRWDPRUGLEQDFN ØWHØV

\$WH&&WH&&WFRPPRQDPHGSHYLRXYLVLWORFDWLR&SHVH&VRQSHH#WRIJ&&VLQ DQSH#H&/LQQSH#H&/DJHVGHFOL&L&DOMIRHDF&RL&/RIRUL(DF&PHGZWHZ/ L&MWRSHSHVH&VDWLDFWLR&ISHYLRXYLVLWVRZYHW/MYDVW diversityRISHYLRXYLVLWVLVPRH LPSRW/D&/WRFR&LGHJ&LVLWRWHSRW/HG 590 different waterwaysDVRUJLQWLR&RL&/VIR9HYLRX YLVLWV7MERDWVYLVLWL&&L&QDFNZWHZVSRVHVRPHUNNRIWD&SRWL&WMRUDQVPVHVLGL&Q &DO\ 600 origination waterwaysPRVWZW%&HVVWMDHL&/HBHSWHGEERDWHWDQR#RDWOD&K VWHZ&V1RWDOO,&PDVMLYHZAWEGKHGRZYHUWLVDUVN&WMOHVV

V. Inspection and Decontamination: Efficacy and Considerations

DV&&&DLRPPXQDVL&WD&D&D&VRI&SDSDR&DVX& DDDDDDDDQRQ&D&QARD&RDVXDDDDIWQSDR&ERDDX&D DDI&DDR&MWGHD&RRIIL&L&&D VSD&&EDVNRIL&&EDDDV&X&URUW_DDR PDVX&DHPSD&R&L&DWUHRX0&DLSDDP&WRR&L&DUQ DDIWQSDRD&DPLOWRQ&D&SDSDR&DWV

Inspection and Hand-removal

9LMOLMHFWLRDDDPSRUWDDVSUHYHDVLRDVHWRWDNHWRPLDPLHWKHULMRISUHDGLCSSYLDUHFUHDWLRDO DWHUFUDIVWVSESRWKOLMHUJHUHWDOKREIGWKDWYLMOLMHFWLRDQKDQUHPRYDOFDQHGRH WKHDPRWVRISODDVRDERDWESHUFHDV SHUFHDV 6(:KLOHWKHWUDMRUWRIDTWVLF L&DVHSODDVFDEHSUHYHDVHGZWKDKLJKSUREDELOLWWKURXKYLMOLMFFWLRDQKDQUHPRYDOYLMO L&HFWLRDVHDDLOWRGHWHFWMHGPDOOERGLHGRUJDDPDQUHWLDJJJWDJHRIRWKHUSHFLHV ,IWKH SUHDGRIDT&WLFL&DVYHPDOOERGLHGRUJDDPMKDSLDWHUIOHDDQHEUDPMOMXHDOHRU WKHGHDGONLKSDWKRJHQLUDOHPRUUKDJLF6HSWLFHPLD9LUX&YLRIFREHUXLMOLMFWLRDQ KDQUHPRYDOZOORWSURYLGHGHWHFWLRDQUHPRYDOZWKKLJKSUREDELOLW\

Decontamination

1RHURRHWKRGDUHMGWRGHFROUDPLOWHERDWWUDLOHUDQUHFUHDWLROUHT&SPHOVELFKLEO&H DIELOGULOGKHPLFDODQRWKHUOLT&GDQIUHHJ.OGRPHFRPSREDOVRIDWHUFUDIWDUHPRUHMOWLYH WRGLW&EDEHWKDRWKHUDQWKHUHIRUHKER&GEHGHFROVDPLOWHGGLIIHUHOVO\

Washing

 RZ SUHXIHDKLQPDQWIXOUHPRYHDOO\$6 and does not killWH\$56W&WDHHWDLQGRQ/HERDWV\$

 VW&E5RW&LVEHUHHWDOVRØGO
 RZSHVVMØVKQDWSVLØVOHVVHIIHFWLYHDWHPRYLQ

 SODQ/VRIIRIDERDWSHHHQ/
 SHHQHPRYDODWHW&BJ&HVVMØVKQDWSVLØVOHVVHIIHFWLYHDWHPRYLQ

 SHHQHPRYDODWHLJ&HQ/VKQDWSVLØVVMØVKQDWSVLØVOHVVHIIHFWLYHDWHPRYLQ

 RUDQ/VRIIRIDERDWSHHQ/VKQDWSVLØVVMØVKQDWSVLØVOHVVHIIHFWLYHDWHPRYLQ

 RUDQ/PRYDODWHLJ&HVVMØVKQDWSVLØVVMØVKQDWSVLØVPDOOERGLHG

 RUDQ/PVRIIRIDERDW
 SHHQ/YABHQ/VKQDWSVLØVVMØVKQDWSVLDQ&QHPRYDO

 ØHOHVVHIIHFWLYSHHQ/V
 SHHQ/QQSHHQ/V
 SHHQ/HVVSHFWLYHO\

2WKHUW&LHMYDO&WHHIIHFWLYHORXIKRWØWHUSUDNRUGHFRØ/DPLQWLQUHFUHDWLRQOØWHUFUDIW)RU HQPSOHSUDDWJUHDWHUWKDQUHT&OWRGHJUHH)DKUH©HLWIRUILYHMFRQØUHKRØ/REH SHUFHØ/OHWKDOIRUT&JJDPMOV)RUHEUDPMOSUDRIJUHDWHUWKDQUHT&OWRGHJUHHV)DKUH©HLWIRUPRUHWKDØFRQØQSUDRIJUHDWHUWKDQUHT&OWRGHJUHH)DKUH©HLWIRUPRUH WKDQYHMFRQØUHERWKSHUFHØ/OHWKDO

 7KH86)HGHUDO\$\$ØWLF1&07eH6SHFLH77DM)RUFH\$67)UHFRPPHQ\$7UDLQWKHERDWK&O
 DQ

 HWHUQO\$10FH27WKKLJKSUH\$14JEA6SHFLH77DM)RUFH\$67)UHFRPPHQ\$7UDLQWKHERDWK&O
 DQ

 HWHUQO\$10FH27WKKLJKSUH\$14JEA6SHFLH77DM)RUFH\$67)UHFRPPHQ\$7UDLQWKHERDWK&O
 DQ

 HWHUQO\$10FH27WKKLJKSUH\$14JEA6SHFLH77DM)RUFH\$67)UHFRPPHQ\$7UDLQWKHERDWK&O
 DQ

 HWHUQO\$10FH27WKKLJKSUH\$14JEA6SHFLH77DM)RUFH\$10HH
 DKUH\$20HKUH\$12HH

 HWHUQO\$10FH27WKKLJKSUH\$14JEA6SHFLH77DM
 7KH

 %14D7715HF0DPDWLRQ
 DQ6WRS\$587WLF12WFKKLNHUV
 J&GHOL\$20GH42056H47L0DUKLJKSUH\$14HKRW\$17WHU

 UHFRPPHQDWLR\$10
 HKRW\$17WF
 140GH22

DQ

Drying

UL@ERDWWUDLOHUD@UHFUHDWLRQOHTKSPH&/FRPSOHWHOLD@IIHFWLYHPHWKRGWRNI SUHDGRIPD@HDWKHUD@KRLGLWLPSDFWGUL@WLPHKH^WÖHULGLD@WLDWLYHRPDULH/ GUL@WLPHSDUDPH<u>WHWSZ/KPHULGLD@UJ</u>^K:DWHUFUDIWZWKEDOODWDWHUD@WRUDJHWJ FD&WEHFRPSOHWHOGUDL@GKRØGEHWUHDWHGGLIIHUH@/OGUL@WLPHRIILYHGDV//HFRP @EHURIRK/FHU@O&L@WKH&WRS\$DWLFŁWFKKLNHUMEL/WH<u>KWWSZURWHFWRKDWHU@</u>W KRZIYHUWKLPD&WEHMLFLH@WRNLOOPDOOERGLHGRUJDQPWKDWFD@GK/HSHULRGRIGHU ^WÖHULGLD@WLDWLYHJKGHOL@DUHPRUHWUL@H@DQ%JHWHYHQGGLWLRQOGD/RUDWF

RIGULQWLPHIRUWHPSHUDWKHVDQLQURPGHJUHH)DKUHQHLWKHQHODWLYHKKLGLWHF SHUFHQV

Chemicals and Other Liquids

KH\$%GRHQWUHFRPPHQWKHXIRIFKHPLFDOSURSKODFWLFRUGLVQHFWDQVDDSULPDUPHWKR GLVQHFWLRQHPLFDOPDGDPDJHHTKSPHQVSRHULXWRWKHHQLURQHQVDQKDYHYDULQOHYH HIIHFWLYHQIKH\$%WKHUHIRUHDGYLHWKDWFKHPLFDOFRQVURORQEHXIGLIWKHDUHSURYH PRWHIIHFWLYHGLVQHFWLRQHWKRGIRUDSDUWLF&DDSHFLHKHXHDRI5HFODPPQViar@5 and Cleaning Manual for Equipment and Vehicles to Prevent the Spread of Invasive Species PDNHVD&EHU RIHFRPPHQDWLRQIREMPLFDOGLVL@IFWLRQRVWRIWMHFRPPHQDWLRQSBYLGHGDHLQHQHGIRWM FRQ/BORIDOOVWDJHVRIGHLVVHQFXVHOFRQDPLQWLRQALEO&HWMIROORZQPHWRGVVDOWSHEHQ VDOWVROWLRQREMPNLQWLPH6&DPHHFRPPHQDWLRQL@JD@LOWHGKWHYLQJDERQDFW IRELQHVDQEOHDF&LOWHGRXHROGEOHDFKROWLRQHEHQVRGL&KRF&RLWHDW D FRQHQDWLRQIWMHR&HVEOHDFWRILYHJDOORQRIDWHIMRQRM

7#25PD&ODOVRHFRPPHQVW#XHRISRWDVVL&SHDDDDQWHVROWLRQDQT&WHDDPPRD& DQSROT&WHDDPPRD&FRPSR&VZW&WDSSOLFDWLRQWHLD&BDWLRQH8WDKYLVLRQI:LOGOLIH 5HVR&HVHFRPPHQVW#XHRISRWDVVL&F&RLGH.&DWSDWVSHDLOOLRQ SSPDQW#XHRI T&WHDDPPRD&LQQG&WVV&&V3DWDVRO.HQOVRO)RB&DDQ)DWDVWLNDWI&OVWHQWK IROORZQDDEHOLQW&WLRQIRGLVLQIF&WL&QHPLFDOROLT&GGHFRWDPLQWLRQHW&GVPXWEHLQ FRPSOLDQHZW&&(BJ&DWLRQ

Freezing

)UHHLQLØQWKHURSWLRQRUGHFR&DPLQWLQDWHUFUDIWDQUHFUHDWLRQOHTKSPH&KH UHFRPPHQWHHLQJHDUDWGHJUHH)DKUHQHLWIRUDSHULRGRIDWOHDWIRKKR&&RWKRM IUHHHUPDL&DLQVHPSHUDWKHPKKFROGHUWKDQVKLRWKHFDQHMGWRHIIHFWLYHOGHFR PDOOHUSLHFHRIHTKSPHQ

Decontamination of Specific Watercraft Components

RPHFRPSR@WRIDWHUFUDIWDUHPRUHMWWLYHWRGLWKJED@HWKD@WKHUD@WKHUHIRUI GHFRWDPLQWHGGLIIHUHWOKH1DWLRQO2FHDQFDQ\$WPRSKHULF&PLQWUDWLR@\$LKHULH PD®ORQ Preventing Invasive Species: Cleaning Watercraft and EquipmentSBYLGHVJKGD@HR&Z/R FOHDQDLQQGVSHFLILFZWHEDIWSDWVVK&VFRPSDWPHWV&OVbDFHVD&RWWDLOHVDQ HQLQV7HPD&ODOVRSBYLGHVJKGD@HR&Z/RFOHD&HDVLDSKLFDOHPRYDOPHWRGVVK&V EVK@YDFRL&DQXL&DG&VLYHBOOHV

^ĸ7KLMCRUPDWLRØGHYHORSHGLERRSHUDWLRØVKU0F0DKR©URPWKH8D/HUWVRI7HDØOLØVRQ [\]1R®RIWKHFKHPLFDOØHØ/LR®GDUHØHFLILFDOO`ODEHOHGIRU\$6FRØ/UROD@DUHWKHUHIRUH®WOHJDOWRMAIRUERDW GHFRØ/DPLOWLRØDH&UN

Motorized and Non-motorized Watercraft

Both motorized and non-motorized vessels are able to transport AIS however, motorized vessels, including personal watercraft, have more compartments and places in and on the motor where plants, animals, and water, which can contain small-bodied organisms not visible to the naked eye, can be transported. AIS may be transported via other locations in motorized vessels, including live wells, bilge water, on anchors and ancho lines, and on trailers. Non-motorized vessels such as kayaks and canoes have compartments, lines, and rudders where AIS can attach or hidstand-up paddleboards are growing in popularity, and mud and plant material can cling to those surfaces as well. Most of these motorized vessel components are more easily accessed and may be easier to drain or dry out. Few published papers exist that describe the risk of non-motorized vessels transporting AIS however, Paul Smith's College Watershed Stewardship Program (WSP) data show whilenon-motorized vessels transport AIS, they pose less of a risk for transporting AIS than motorized vessels are 40 times more likely to transport AIS than are kayaks⁴¹ Despite this, inspecting, cleaning, draining, and drying non-motorized vessels is still important.

Invaded and Uninvaded Waterways and Inspection upon Exit and Entry

Determining where and when to implement prevention efforts when resources are limited can be a challenge and depends on the scale of the prevention program and its goalsry and Rothlisberger (2008) investigated the question of whether containing invasive species at invaded sources slows their spread more than preventing entry to uninvaded destinations. Results show that protecting only uninvaded, isolated waterways, rather than containing the invaded ones early on in the invasion process, allows AIS to spread from invaded sources at an unguarded rate to many other unprotected uninvaded locations. Recently invaded waterways can then become sources of AIS and contribute to the landscape-level spread. Therefore, early in an invasion, when the goal is to slow the spread of AIS through a collection of waterways, the best way to protect uninvaded areas is to allocate resources to containing invaded afe because the number of invasive-free waterways in the Adirondack region is more than 2.5 times that of invaded waterways, it is beneficial to implement spread prevention measures at invaded areas. Visual inspection handremoval and or decontamination of boats and equipmenter they exitDDQDGHGDWHDDHHVVHQ/LDOVWDWHJLHVWRHGKH WMVSHDGRI\$6DFRVVWHODQVFDSH

UXDQ5RWKOLEHUJHUDORGLFKHQWLØSSURSULDWHWRDOORFDWHUHRXFHWRSURWHFW ØWHUØVDWKHUWKDQRQ/DLQRQ/GIGQQDVRQURQURGKWLRQDGHGØWHUØVWKHEHW WUDWHJEHFDXLWLHOGØRHUSHUGHWLQWLRQQ/URGKWLRQDWHØWSURWHFWHGVWHW ØPHREHURIVWHØRWKHDGYLHWKDWKHQVKHJRDOLWRSUHYHQ/\$&Q/URGKWLRQQ/RQQDGHG ØWHUØZWKKLJKFRQUYDWLRQDOKIRUHDPSOHSURWHFWLQWKDWØWHUØLWKHEHWWUI KHUHIRUHYLØOLSHFVXGRQDGUHPRYDODQRUGHFRQ/DPLQXWEMQDH DSSESLDWHDQ HIIHFWLYHVWDWHJLHVWRSEWHFWRQDGHGØWHØVODWHUQ/KLQDVLRQBFFRSHYHQ/\$&LQ/RGKWLRQ LSURUMØWHØVZFKRØGEHGHWHØLQGEFRQHVDWLRQDOK/DPRQRWMIDFWRV

VI. Landscape-level Spread Prevention Concepts

ÐÐXVEÐINÐ BARQLÐ URÐ XDUÐ PSÐÐ URRISÐ RORD PV, VA/ SÐ RORD PDUÐ DOLV XDON ÐEXSLETI ON HÐ URDV DÆRÐ SRUMU/ RÐ WRÐ BAÐ VIÐ SÐ SÐ STI ÞOÐ HÐ 10/

Landscape-level Analysis

2YHUWKHODWHYHUDOHDUWKHPRWHWDEOLKHGERDWODKKWHDUGSURJUDPWWKHGLUR DØPLWKROOHJH: DWHUKHGWHDUGKLSBRJUDPWKHDNHHRUJHDNHWHDUGBRJUDPDGWK **KDPSODL**ADWDAKWHDUGBRJUDPKDYHRUNHGWRJHWKHUWRFROODERUDWHRWDIIWUDL DQUHIL@WDQDUGSURFHGKHDQWRKDUHILQLQJRUHUHFHQVOWKHFROODERUDWRUKDYHS DQOHGGDWDIURPERDWOD&KWHDUGSURJUDPWRDUULYHDWDUHJLRQO&HUWDQL&RIWKH WKURXKSDWWHUBIYLIWRUM)RUWKLSDSHUWKHERDWODBKWHDUGSURJUDPFRPELGGDO **IURP** DQIRUD&UHFHGHWHGFRPSUHKHWYHDQOVRIDWHUDVHSUHHWHGE\ WKHWKUHHSURJUDPØORL@OGLØWKHERDWOD®KWHØUGSURJUDPU®WKH(DWKRUHFKURI &FLDWLR@RUGHUWREHJLQHVQUHODWLYHULNRI\$SUHDGDQLPSOLHGDOORFDWLRQIERDWI DQGHFR&DPLQWLREIDNHGDHULHRITHWLRØERWWKHØWHUDØQDUUDØHGWKHILQLØUQ DFRPSUHKHØYHULNDMPHØWDEOH\$SHQL[KLSURFHVHYHDOHGWKDWWKHODNHØUHGLII PD&VPSOL@@@HGDQVWH\$HFLILF\$UHDGSUHYH@VLRQH\$R@JRUHDPSOHD&WHU&PLJKW EHKHDYLOVLIWHGLWHUPRIUDIZEHUEWWKHYLIWRUPLJKWRULJLQWHIURPDFRPSDUDWL SUHYLRØVLVWHGDWHUDVURGODNHPLJKWHSHULH@HRYHUKHOPLQMEPRWRUERDWDGDQ **QQRWRULHGDWHUFUDIW2UDDILQOHDPSOHDODNHRWKHGLURQDFNSHULPHWHUWKDWD** ULNR&FHRIDSDUWLFØDU\$PLJKWLODFWQWRULJLQWHYHUPDQWER&YLVWWRSULWLQODN WKHGLURQDFNKLFRPSUHKHQYHDQOVØOOREGWREHJLQVR&HUWDQWKHGQPLFKI LWHUFR@FWLRDWKLWKHODNHGLURQDFN:DWHUKHGWHDUG1HWRUN

Invasion Spread Hubs

¾DĽR&UHDGKEĎUHODWLYHOĖJĔRĖHSWLWKHFLHWLILFOLWHUDWEHRIIHUMI®JEGDĖHRĖ UHGEHWKHODĢFDSHOHYHOSUHDGRI\$EWKHĠLURĢDFNUHJLR,ŒDĽR&UHDGKEĎUHGHILĖJGJ LŒDGHGĎWHUĎZWKFRPSDUDWLYHOKLJERXWIREIILFWUDYHOLŒWRĖŒDGHŒĎIMHUMØ WDUJHWHGWROLPLWWEHIŒĦŪſRĖŖRĦPIŒŒEPDUHWULFWWEHWUDĖRUWRI\$DQUHGEHWEH SUHGLFWHGUDWHRIECZŒDĽ

EQH\$EQDVRQUHDGKEDUHGHWHUPLQGEKHWKHUDGKRZUHTKIQVOEBADWithgLQDGHG ZWHZVWDYHORYHODQWRZWHZVQWFMQVOLQDGHGZWW/4,%6LQAVWLRQVAQVAEVDH GHILQGEVSHFLHV7&WLVDODNHPLJWEHDQQDVLRQSHDGKIRWLDQODPEHFDXHLWLVHODWLYHO\ &LVSHVHGLQVA&LQQDFNHJLRQQ notVHMHDVDQQDVLRQSHDGKIRWDVLDQWHBLOIRLO EHFDXHLWDOHDGLVSHVHQLQVAGHVWLQWLRQDNHVFRQFWHGWRWAODNHLQAVWLRQDZQWAPRVW FRPPRQHVWLQWLRQIRQYHODQERDWWDYHOZWKQVA&LQQDFNHJLRZOOMOSWRLGHQVLISRVVLEOHLQDVL VSHDGKV

¹⁹KH\$LURQDFN:DWHUKHG6WHØUG1HW&UNL&HIL@GDWKHODNHR&LFKERDWOD&KWHØUGØUHSUH#@/DQ GDWDLØYDLODEOH%RDWOD&KWHØUGØMYLWRURQ&DWODNHWKHYLWVHGODWUDWKHUWKDQML@LWRUWRSUHGLFW &DWODNHWKH&OOYLWV@[V7RGHWHUPL@RWER&YLWVØDQO]IGSUHYLR&YLWVHGODNHL&UPDWLR&F& WKRMODNH&WKERDWOD&KWHØUGØUH#@/FKHMYLWVUHSUH#@/FR&UPHGWULSWURPR@ODNH&WKL@KH&LURQDFN :DWHUKHG6WHØUG1HW&UNWRD&WKHU7KHW&WRILYHPRWFRPPRQRFF&UL@GHWLQWLRQDNHI&UHDFKODNHED#G RQDWDZWKL@KH&LURQDFN:DWHUKHG6WHØUG@W&UNFDEHIR&L@KH&LURQDFN:DWHUKHG 6WHØUG1HW&UN%57KUHDW&OM\$SHQL[FROR@OR@WKWKHSHUFH@/RIRWER&YLWWR&20GHG ODNH&WKL@KH&UNWKLWKUHDWDQOM#R@/ULE&WHGWRWKHGHW/QWLR@SLURQDFNL&DK&V

®WRWXWRQR:DWWBWDVXVEPDSWBWW DPRDDVLWWSSEBLWVWLDDWSRWHVXSSOEXVLRW DOVRIROLPRXERXEDERDWQSRWHDDVLWRQR:DWA BURWDVELEVDEWSPEIDEDWQSRWR&RLQ ERDWVEDDWDWVLPSODWRQIR&SDEDVRWSPRVWXWXWRX&WDWRQ IRDONHWWSSER&PPRDPSWSRPRVWXWRQR :DWWBWWWQWRQIRERDWDLWDWXDDNR&ONH &PSDLODDDPDNH

ØNPROMLØXEØNVRILDØRDØVDØRØDØVDL BNVENDØØDLØNØNPROGØRØLPXOURGI&BPLDØ RØRØØVEØØVELRØLØØRØEØNHLØ & RØNEØØVELRØLØDRØEØNHLØ & RØNEØØDVELRØLØDVØSRO RØXEØNVPDEVRIKØDVØSVERDØXØDØØRH&BWVRDO SDWRI&RØHBRBAVØVRØKØR&IRØDØØSROQVDØXEØNV LVXODDWVDPØEVRIERDØX&VOØLØLDILDØRWRØRI&RØHBRO HORØØDORDØXØØØSRØPVLØDVLØDWRØERMØRO RXWLRI&RØXØVKØRODVLØDVLØDWRØERMØRO FRØDWRQWDWRØNØPSOLØVL&ØPRLØRRXGBRØHRO IRPØØØRDØIRMX&SPØI&RØNRØØSRØRØRA XØNPDSLVØIXODUIL&ØØQ&SRØW

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Preliminary Adirondack Overland Transport Sub-networks: Northway, High Peaks, and Fulton Chain

highest-volume RWER&YLVLWVFHDWHVV&@W&NVRitrongly associatedØWHØV\$SHQL[7ASDWWHQXJHVWVD I&WLRQOVHSDDWLRQIØWHØVLQA&LQQDFNLQHURUBPWRVHRQAPDULQ2QV&QW&N FRQLVWVRIHDW6DFDQDJD/DNH6DDWRJD/DNH6F&RQDNH/DNH&PSODLQQ/DNHHRUH(DFRI WAVHODNHV&V(&VLDQWHBLOIRLODQDOOEW6F&RQDNH&YHRQRBRHDT&WLFLQDVLYHVPDOO ERGLHGRUDQVPVVSLQWHIOHDJHEDPXVHOVRØLDQODPV&OOHFWLYHOWKVV&QW&NAHDIWHU HIHHGWRDVWA1RW&YHW&NIRUWVSBLPLWWR,FRQVDLQWAPDMRUWRIDT&WLFLQDVLYHVPDOO ERGLHGRUDQVPRFF&GHVLQV&SLQDFNHJLRQ

EFROLOWRWARYHODQWDQSRWPRGHOWA1RWZMHWZNLVFRPSDDWLYHOLVRODWHGIQPLQHURU ELQQDFNZWHZVRZYHWAQWZNPRGHOLQLFDWHVDKJKROZHRWERQWDYHOFRQFWLRQZP /DNH&PSODLQ/R&WHDXDXDNH/DNH3ODFLGDQ6HFRQ3RQZFKHWHVDVWAEUGJHIQPWA 1RWZMHWZNWRWALJXHDNV1HWZNZFKVFRPSUVHGRI&WHDXDXDNH/DNH)ORZI/DNH 30DFLGWA6DDQF/DNHVDQ7XSH/DNH7ALJXHDNV1HWZNLVVLPLODOLVRODWHGHFHSWIRDQ LQRQFRQFWLRQZPVQHMDNHDQDQWERQFRQFWLRQHWZHZXSH/DNHDQ/RA/DNH XFKVVWQQ0FRQFWHGWRWA)ØWRQLQHWZNFRPSUVHGRI/RA/DNH5DTAWWH/DNH)RW/K /DNH6HYHQ/KONHDQ(LJW/KONH

:KOHWAVHILQLQVRIERDWHMHSDWWHQDHSHOLPLQWAFR&G&YHYDOALQURUWLJLQ%SVSHDG SHYHQVLRQVRMHVDF&VVVK&QSDQLYHODQVFDSHRIKJKDOADT&WLFHVRMHV(DF&WHQ\ GRHV&WIDFHWAVDPHNLQVRIWMDWVDQHDF&RVHVGLVWLQWOHYHOVRIUNNIRWARWAQWHQVLQVA HJLRCKVDQOVLVVXJHVWVW&WWAHLVDQVHWLQRPSOHWHOMAHWWRRGF&LQIFRQFWLYLWDQ

VI. Landscape-level Spread Prevention Concepts

V#X**HIMDVIDWXGBRLB**RDDLPXPVS**DSB**R LPSDW QPD**D#Ø**/

Linkage Waterways

KHDQOLKIRYHUODQWUDQRUWRIUHFUHDWLRQODWHUFUDIWKRDJHSDWWHUQPRQFHUW WKDWIRUPGWRUNSUHYLRØGHFULEHGDWKH1RUWKDŁJKBDNDQ)ØWR&DLQGWRUNKH WKUHHDSSDUHQGWRUNDUHFRGFWHGEKDWEIGHLJQWHGDØLQDJHDWHUDKLFKPDHUYH WUDWHJLFFRQUROSRLQWRLQHUUSWWKHUHJLRQOSUHDGRIYDULR&QDJHDWHUDH WKDWFRGFWWKH1RUWKDŁJKBIDNDQ)ØWRQGWRDQWKHUHIRUHDORKRØGEHSULRULWL LPSOHPHQLQSUHYHQLRQHDZHUQHWKHPDDOORZVKHWUDQRUWRI\$DRRQWKHHV GWRUNV

Applying Scientific Principles to Prevent the Spread of AIS in the Adirondack Region

8JHYHQVLQWKHODQFDSHOHYHOSUHDGRIERDWHUGLSHUMG\$6.DWRSSULRULWLQAKHGLURQJ UHYLHRIWKHFLHQVLILFOLWHUDW&HLQLFDWHWKDWWHSFDQHWDNHQVRUHGKHWKHSUF SODQVDQFDOOERGLHGRUJDQFKHOLWHUDW&H&SRUWWKHIROORZQJ&GLQSULQLSOH}&HFWJ UHFUHDWLRQODWHUQ&JMD/ COOOLPLWWAVSHDGRIDTØWLFSODQV, QSHFDQLQ GHFRQVDPLQWLQHFHDWLRQODWHFDIWZWKJ&HVVMRWDWHØRQ exitingDWHDVZW&TØWLF LQDVLYHVPDOOERGLHGRUDQVPVZOOOLPLWWALWSHDG\$SOLQLQSHFWLRQQGHFRQVDPLQWLR&JK SHVVMRWDWHUQHMHQVLRQ WRHFHDWLRQODWHFDIMVEring and exitingDWHDVW&WVHMHDV LQDVLRQSHDG&VZOOHGKHWASHGLFWHGDWHRI@ZQDVLRQ



Iandscape-level spread of AISDQIQLUDQUVRØHVDU OLPLWHGVSUDGSUYHQ/LRQHDVUVVRØGEHLPSOHPHQ/HGDWLQDGHGDQVHOHFWSURUWQQDGHG ØWHØV6SUDGSUYHQ/LRQUJDPVWQWDUDOUDGQUHØ\RUQLYLGØOØWHØVLQ/AGLQQDFN UJLRQRØGFRQ/LQLQGHU/RVDIHJØGWRVHØWHV

LJ&UVV&RWZWH&VEHHQHOHFWHGDVW&SUIHUGPHWRGWRGHFR&VDPLQWHUFUDWLRQOZWHUDIW RQODQVFDSHOHYHOVFDOHEHFD&HLWHIIHFWbMUUR&VOWPDOOERGLHGRUDQVPVDQZGHO\ UFRPPHQHGEVDUR&OLWHDW&VR&HVDQQWLRQODJHQLHVV&&VW&86)HGHDO\$&WLF1&VDQH 6SHFLHV7DVN)RUHWA&D&I5HFODPDWLRQQ6WRS\$&WLFLWF&NHV 7&IROORZQ UFRPPHQDWLRQL&R&RDWHUVNDVVHVVPHQ/DQUJLRQOFUWHUDDQDUJ&&HGEW&SUPDU FRQLGHDWLRQHYDO&WHGLQ/AVFLHQ/LILFOLWHDW&7DEOH

Tab	le 5. Recommendations for preventing the landsc	ape-level spread of AIS in the Adirondack
regi	ion based on scientific literature reviewed and reg	ional factors.
5\$	5LVN\$VHVVPHQV&OOVPDNHGZWBQDLFDWH	WHSURLWDFWLRWREHWDNHQDVHGRW

OLWHDWWDOVPDNHGZW& BQLFDWHDGGLWLRQODFWLRQWREHWDNHQQQHWRSHYHQ B&CQ/BGKWLRQ ,QSHFWLRQFFWZWGHFRQ/DPLQWLRQQLWEHFDXHWKVHSQFHVVHVDHFRP&DHQ/DMLVØOLQSHFWLRQ FDQLHFWGHFRQ/DPLQWLRQLGHQ/LLQORFDWLRQRQFHDWLRQOZWHDDIWWØWDHHVSHFHGERBOXHRLO \$\$FOLQLQWRWAPDQSODQ/VFDQHHPRYHGEIQQ

	,QSHFW 8SRQ (Q/U	HFR10/DPL10,WLR0 8SR(00/U	,ØSHFW8SRØLW	HFRØ/DPLØWLRQ 8SRØ/W
,©DVLROSHDGKEV				
OLQDJH	3	3	,	3
,&DGHGEVPDOO ERGLHGR IJDQ VPV	5\$	5\$;	;
,&DGHGE\$ODØ∕V RQ\	5\$		1	
3URLWXQQDGHG	,	5\$		

Invasion Spread Hub Waterways

&UWDLDWHUDWWKH&LURQDFNDUHSRS&DUUHFUHDWLRQOERDWLQGHWLQWLRWRURWK YLWRUKHPDDORHUYHDWDUQDWR&UHDGKKKHHDDWHUDKDYHKLJKMDUHNQWREH L&DGHGE&HFLHWWZGH&UHDGLWKHUHJLR&DYHERDWWKDWIUHTMWOGHSDUWWKHHDW WUDYHOWR&&DGHGDWHUDDQQUHOLNHOWRKDYHBZWURGKWLR&FF&RSUHYHWODQFDSI SUHDGIURPL&DWR&UHDGK&DQWRUHGKHLWURGKWLR&IBZWURGKWLR&FF&RSUHYHWODQFDSI SUHDGIURPL&DWR&UHDGK&DQWRUHGKHLWURGKWLR&IBZWURGKWLR&IGDWRU OD&KWHDUGDQERDWGHFRWDPLQWLR&DWLR&R®GEHSRWLR&IGDWRU EDUL&DWRWHDUGDQERDWGHFRWDPLQWLR&R®GRFF&EHIRUHUHFUHDWLR&ODWWH WKHHDWHUDW&HFWLRQQGHFRWDPLQWLR&R®GRFF&EHIRUHUHFUHDWLR&ODWWH WKHHDWHUDW&HFWLRQQGHFRWDPLQWLR&R®GRFF&EHIRUHUHFUHDWLR&ODDWWH WKHHLWDDWHD VFWL&DGHGZWHDWR&QDGHGDWHDV&QOVLVRI&GFWLR&QGERDWHMHSDWWHQLQ WA&L&DGHGDWHZWR&SHOLPLQGHVLJQWLR&IL&OVLR&SHDG&V7DEOH\$SHQL[†]

Table 6. Preliminary invasion spread hubs in the Adirondack region.HQWHDWHUDZWKDFWLYHERDWODQKWHDUGSURJUDPUQHQWHDWHUDZWKDFWLYHERDWODQKWHDUGSURJUDPUQERDWGHFRQ/DPLQWLRQWLQ

KDWHDXDDNHOLWRQUDQOLQ

)R&WKDNHHUNLPHU

UHDW**Ø**FD**Q**DJD**D**NH)**Ø**WR**Ø**UDWRJD

DNHKDPSODKQLQVRQH[DKLQWRQ

DNH)ORHU)UDQOLQ

DNHHRUJHDUUH@KL@WRQH[

ØUDWRJDDNHØUDWRJD

HFRQRQ)UDQOLQ

₿DWOD®KWH⊅UGUHSRUWHGWKDWRPHERDWHU∐UHWUDYHOLQIURP₱FDQDJDDNHWRRQ DNHDNHHRUJHDQ₱UDWRJDDNHИFDИ₱FDQDJDDNHKDSL₽WHUIOHDE₩RQDNH FKURRQNHDQ₱UDWRJDDNHGRQW₱FDQDJDDNHKDWKHSRWH&LDOWRИUYHD₱QQDUR&UF KEIRUSL₽WHUIOHDИFDИWKHUHLYHUOLPLWHGERDWOD®KWH⊅UGGDWDIRU₱FDQDJDDN EHFRQGHUHGDQQDUR&UHDGKEDWWKLWLPHKHSODFHPHQ/RIERDWOD®KWH⊅UG₽W₱FDQJ &ØGDOORIRUPRUHGDWDFROOHFWLRQQ/KLSHFLILF⊅WHUDKLFKRØGLQVØ&HOSWRFODULI &LURQDFNRYHUODQWUD&RUWPRGHO

Linkage Waterways

LQDJHDWHUDMUYHDEULGJHWKDWFRQFWWKH1RUWKDEJKBDNDQ)ØWRQQWRUQ WKHUHIRUHDORKRØGEHSULRULWLHGIRULPSOHPHQ/LQSUHDGSUHYHQ/LRQHD&HVQHWKF WUDQRUWRI\$DPRQWKHMAQIW&UNDEOH\$SHQLKHWKUHHOLQDJHDWHUDVGHQ/LILHGLQ SUHOLPLQUDQOMDUHRQDNHDQSSHUDNH&LFKDUHERWKLQDGHGZWKYDULDEOHOHDIDWI DQDNH&DPSODLQLFKLDORDQQDVRQUHDGK&DQKDDB@EHURIDTØWLFLQDVYHSODQ/DQ PDOOERGLHGRUJDQPQWHWZGHSUHDGLQ/KHUHJLRQWKHMODNHGLGQWFRQFWWKHKQIWI WKH\$EWKLQDFKRIWKHXQW&UN&ØGEHPRUHOLNHOWREHFRQ/DLQGR@WIRV&KIND/G WKHODQFDSHOHYHOSUHDGRI\$PDEHUHGKHG

> Table 7. Preliminary linkage waterways in the Adirondack region. HQWHDWHUDZWKDFWLYHERDWODQKWHDUGSURJUDPLQ

RODNHÐPLOWRQ

SHUDNH)UDQOLQVDEHQH

DNH&DPSODLQ

Overland Transport Sub-networks

\$FRUGLQWRWKH&LURQDFNRYHUODQWUD&RUWPRGHOSDWWHU&IKLJKHWYRORHRWER&] XQW&UNRIWURQODRFLDWHGDWHUDKHH&QW&UN&QO&HWKH1RUWKD&JKBIDNDQ)&WR&DLQHW&UN5HJLRQOSODFHPH&RIERDWGHFR&/DPLQWLR&/DWLR&WWKHRYHUOD& QW&UNFD&UHYH&/WKHOD&FDSHOHYHOSUHDGRI\$\$SHQL) Waterways Invaded by Small-bodied Organisms

ŴOHDWŁ₽WHUDŁWKHĠŁURGDFNUHJŁRGDYHRGRUPRUHDTBWLFL&DŁYHPDOOERGLHGRU KLĠLWULEWLRQØLPLWHGFRPSDUHGWRWKHSUHGRPLQ@HRIL&DŁYHSHFLHDQL&DGHGDW WKHUHJLR&ULWLFDORSSRUW&WHLWWROLPLWWKHSUHDGRIDTBWLFL&DŁYHPDOOERGL UHJLR&DUWLF&DUOLQLJKWRIODFNRIDYDLODEOHFR&VUROIRUPD&HFLH&SUHYH&VODQFD DTBWLFL&DŁYHPDOOERGLHGRUJDQPŁRDWOD&KWHDUGDQERDWGHFR&VDPLQWLR&/DWLF SRLWLR&GDWRU&DUDWHUD&HUHDTBWLFL&DŁYHPDOOERGLHGRUJDQPDUHSUHH&VDEOF DWHUDPDDORKDYHDTBWLFL&DŁYHSOD&V&WLSOHWHDUGDQWDWLR&DEH&FHDUIRUOD DWHUD\$JLNDHPH&ZOOGHWHUPL&LIDQ&HFWLRQGGHFR&VDPLQWLR&R&WUDUH&FHDU HFR&VDPLQWLR&R&LWKR&GDOD&FFKIL@HWKRHDWHUDDUHN&&/RKDUERUDTBWLFL&DLYI PDOOERGLHGRUJDQPV

 Table 8. Waterways with aquatic invasive small-bodied organisms in the

 Adirondack region through 2012.

 HQWHDWHUDZWK DFWLYHERDWODQKWHDUGSURJUDPVQ

 HQWHDWHUDZWKDFWLYHERDWODQKWHDUGSURJUDPDGERDW

 GHFRQVDPLQWLRQWVQ

 DUDWRJDDNHLØRFDWHGRWVGHRIWKHGLURQDFNDUNEWLVQ

 UHDWDFDQDJDDNH)ØWRQUDWZGMU

DNHKDPSODKOLWRQM[DKLQWRQ

DNHHRUJH:DUUH@KL@WRQH[& & A

BIFNDNH)ØWR&X

ØFDQDJDDNHĐPLOWRØ*V*\

WHDUWWLGJH5HHUWQUDWRMD\

OUDWRJDDNHOUDWRDDD

Waterways Invaded by Plants Only

\$VOHDWDWHUDWWKH&LURQDFNKDYHDT®WLFL@DWHSODW\$SHQLW&LKRWKDWYLDO LSHFWLRQIUHFUHDWLRQODWHUFUDIWLMLFLHWWROLPLWWKHLUSUHDGRSUHYH@ODQ DT&WLFLQDWHSODWDOUHDGLW&HDWODB&WHDGVVR@GEHSLRUWLHGDWWDLOHUGERDW DFFHVVSRL@VRDWHDVEHDT&WLFL@DVLYHSOD@VDUSUVH@&VNDVVHVVPH@ZOOGHWHBLQLIDQ LQSHFWLR&RQ@UVQFHVVDJ@SHFWLR@SRQLWVR@GDODVRFFMLQHWRVHDWHDVDU NQDR&BRU@DVLYHSOD@VDQUPRYDORIYHJHWDWLR@PUFUDWLRQODWHEDIWZOOSUYH@VMLWSUDG WRRWMDWHDV

Priority Uninvaded Waterways



QSELOO

©VRIDDVVX&DEREVEVSRLEGSE[DDIDDURUWODDDVLDLERDDFVLOPLDTXDUEDVLBD0/ LD&EDRVDDVLDLERDDFVLOPLDTXDUEDVLBD0/ LD&EDRVDDVLDPDERGED0VPVDEVVLEDDVN DVVFVPDDLDRDWKLVNIRUD0/SRUUVNDVVFVPD0/ DTARDUVKLVNW © ROUPLDURDØLDNERREILDØ&EDTXDUEDVLH/PD0 ERGED0VPV

Summary of Recommended Waterways for Boat Decontamination Stations

KDWOD®KWHDUGL®HFWER®ERDWGHFR@/DPLQWLR@WDWLR@DWVSHFLILFZWHZVZOOMOSWROLPLW WMVSHDGRIDT&WLFL@DVLYHVPDOOERGLHGRUDQVPVDQDOVROLPLWWMVSHDGRI@Z@/&G&WLR@WRWM HJLR@DEOH2IW&VHZWHZVVHYH@YHDT&WLFL@DVLYHVPDOOERGLHGRUDQVPVIRMHWHDV L@DVLR@SHDG&VDQWZVHWHDVOL@DJHZWHZV1RWHW&WVRPHZWHZVDHL@RHW&&Q FDWHJR®VR@WHW&WWMVHDHSHOLPLQHFRPPHQDWLR@EDVHGRQQOVHVRIDYDLODEOHGDWDDQ L@SHFWLR@DQGHFR@VDPLQWLR@WDWLR@DWDGGLWLRQOZWHZVPDEHZD@VHG

Table 9. Summary of waterways recommended for boat launch steward inspections <i>and</i> boat decontamination stations.
● :DWHZVW&WVHYHDVL&DVLRQSHDGKV
‡:DWHZUVW&WVHUHDVOLQDJHZWHZUV
■:DWHZUV ZWKDTØWLEØDVLYHVPDÐRCGLHGRUDQVPV
/DNH&PSODLQ● ‡∎
HDW6DFDQDJD/DNH ● ■
/DNHħR₩H ● ■
6DDWRJD/DNM ■
&WHD¥DXDNH ●
)RM////DNH ●
/DNH)OR₽U●
6HFRQ3RQ •
/RQCDNH ‡
738SHUDNH ‡
3HFN/DNH
6DFDQDJD/DNH∎
6WHZUU/VUGJH5HVHURLU

Proposed Tiered Approach for Using Boat Inspection and Decontamination in an Integrated AIS Prevention Strategy

\$HQ(HFXXLYHDQHJLØDWLYHJKGDQHUHRK/FHDYDLODELOLWVWHUHTKUHPHW/DQSKOLFRSI GHWHUPLQDQPSOHPHWDWLRSODQRUSUHYHW/LQWKHSUHDGRI\$LWKHGLURQDFNUHJLR&H DSSURDFKHDUHFDWHJRULHGLWHUPRIOHYHORISURWHFWLRQQULMPDQJHPHWEDMGRQM DQYDULRØFWLR@EOH1RWH1RWDOOL&DGHGDWHUDKDYHWUDLOHUHGERDWDFFHMJRPHI DWHUDØDFNWUDLOHUHGERDWDFFHEWDUHKGURORJLFDOOFRQFWHGWRL&DGHGDWHUJ ERDWDFFHKHMGLIIHUHWWLHUDSSOWRDWHUDWPHGL@EOHDQKMWRIDWHUDWPHGLQ \$SHQLFHDQ,

Platinum

- δ at allLQDVLRQSHDGEVDQOLQDJHDWHDV,QSHFWLRQQ GHFRQVDPLQWLRQQQVLand HLW
- at overla
 δ at all
 D WH D V E WLFL D
- ,QSHFWLRRFFMRRQ/GHFRQ/DPLQWLRRFFMLIRFHVVDHFRQ/DPLQWLRRFFMRRLW
- allZWHZVZW&T&WLFL&DVLYHSOD&VW&W&YHWDLOHHGERDWDFFHVV ,&SHFWLR&FFMR&WV andHLW
- all_iS&RUW&&DGHGZ/WHZ/V,@SHFWLR&FF&R&@/V

Gold

- δ at allLQDVLRQSHDGEVDQOLQDJHDWHDV,QSHFWLRQFFMRQ HQ/Uand HLWHFRQ/DPLQWLRQFFMLIQFHVVDU
- δ at all ØWHØVØWØTØWLFL@DVLYHVPDOOERGLHGRUDQVPV HFRØVDPLQWLR&FFØR&LW
- allØWHØVZW&T&WLFL&DVLYHSOD&VW&W&YHWDLOHUGERDWDFFHVV ,&SHFWLR&FFMR&WV and HLW
- all SORDW& DGHGDWHDV, & SHFWLR&FFMR& WV

Silver

- ρ ρ ρ
 DWHDV, QSHFWLRQQGHFRQ/DPLQWLRQFFMRQQ/U
- ρ ρ ρ
 Near allØWHØVZW&T&WLFL&DVLYH
 VPDOOERGLHGRUDQVPVHFR@VDPLQWLR@FFMR@LW
 AllØWHØVZW&TØWLFL&DVLYH
- all ØWHØVZWØT&WLFLQDVLYHSODQVVWØWØYHWDLOHHGERDWDFFHVV ,QSHFWLRQFFMRQLW
- all SURUM&@DGHGZ/WHZ/V,@SHFWLR&FFM/R&@/U

Bronze

- ρ ρ ρ
 near high traffic DWHD Ø DW DVLF
 LØDVLYHVPDOOERGLHGR UD QVPVHFR Ø VDPLQWLR Ø F DØ RØLW

Table 10. Proposed tiered approach for using inspection and boat decontamination in an integrated										
AIS prevention pr Visual inspection: # Decontamination: # BYD&WSDVIRULMR VR&BVOREDPXVV	OGRAM. 2VXDQQSBURDØQ ⊾KSHVXBVLVSD 201800RUXDDPXVV &	₽RDO VV Ø₩DØ₩SDVIRU	HEMDERLEDW HEMDERLEPD	DO ERG R Ø	QVPV					
	ØVLRQSÐG KEVQQDH	BDQ G DDQSRW VXBBDUV	, De VPDŒRGE R D QVPV	, DA S DW RQ	BRUW XDØG					
© ₩&₽	RDW RDPLDWRQ VDWRVatall DDV LVSEARDQ RDPLDWRQ RDV and HW	ERDO SDAPEYI ERDW RODPLDURQ VODURQDWXE EMVV	RDW RDPLDWRQ VDWRQatall DDV LQSEURRQ BV RDPLDWRQ LIEVDN RDPLDWRQ RDPLDWRQ RDW	RDDVXQ VEVOYDW all DEVV EOW DH DVLE9 ERDDVFIV LQSEURQQ BY and EW	RDWDXQ WDWDW DXQRQ all DDV LQSDRQQ DV					
RG	RDW RODPLDWRQ VDWRQatall DDV LQSD/RQQ BV and HW RODPLDWRQ RKVLI BVDN		RDW RODPLDWRO VDWRQatall DDV RODPLDWRO RDW	RDDVXQ VEVOV DVall DEDVVDW DH DVLD ERDDVRV LQSEVRQ DV and HW	RODVXQ VDVG DW DXQCRQ all DDV LQSDARQQ QV					
Ь. Ю	IDWF WRDO SDRBYI ERDW RIDPLDWRO VIDWRQnear DBV LQSB/RDQ RIDPLDWRO ROBY		Image: Constraint of the constraint	RDDVXQ VEVV atall DEVVEVW DM DVLEV ERDDVFV LV2SAVLRORQ HW	RDDOXD WDOY DW DXBURQ all DDOV LQSDURDQ DD/					
₿₽			Image: Constraint of the second se	RDDVXQ MeDV/DW high-traffic DBDV DOW DM DVLD ERDDM/V LQSAVLRQRQ LW						

Applying the Recommendations

KHUHSRUWZOOEHMGLWKUHHLWULDODKHUHSRUWZOOEHGLWULEWHGWRWDNHKROGHU PDNHUØRFDOJRYHU@HWØDNHDKFLDWLMCOGU@HWDOJURSDPRORWKHUWREHFROGHUHG KHSODQOSURJUDPV KHDWKRUZOOWDNHWKHUHFRPPHQDWLROWRFROGHUDWLRWK UHJLRQOSUHYHWLRSURJUDPL@OSLOSODFHPHWRIERDWODORKWHHUGWHUGLFWLRWUDW KKDLJQJHDZIOODIRUHDUOGHWHFWLR@RQWRULOSULRULWLHKHRYHUODQWUDSRUWPRG WHWGIDFKHDUDEIGDWDEHFRPHDYDLODEOHWRHØHWKHYDOLGLWRIWKHUHODWLRØLSLO SUHOLPLQUDQOLV

LF&RQUH&HUDDWORFDOUHJLRQODGWDWHZGHFDOHDER&UPSOHPHQUQERDWL&HFWLRQ GHFRQ/DPLQWLR&URJUDPDWLQLYLGDOODNHDWHWBWD&HDDHDHJUR&UQ SDUWLF&DUDUHLPSRUWDQ/DGYRFDWHIRUSURWHFWLRQQLQD@DHDUHKRØGHULQWKHFR DQPDQJHPHQ/DORQZWKP&FLSDOLWLH&HHHIIRUWKRØGEH&SRUWHGDQFRQ/L&IG&PSRUWD HWWHSLWRHYDODWHWKHIHDVELOLWRILPSOHPHQ/LQWKHUHFRPPHQDWLRQQ/KHFRQ/H WUDWHJDQSUHYHQ/LQODQFDSHOHYHO&UHDG)HDVELOLWGHSHQRQHR&FHDYDLODELOLV SROLWLFDO&SRUWWKHUHJØDWRUHQLURQHQ/DQRKLDODFFH&WIDRHNLQL@ROODERUDWLF ZWKWDWHDJHQLHHOHFWHGRIILFLDOKRUHRE/U&QRYHUQHQ/DOJUR&ERDWHUDQDGGLWL WDNHKROGHU/

Using Existing Partnerships

KFH₩OLQ/HJUDWLQYLDOLQHFWLRQQGHFRQ/DPLQWLRQQ/RD∰UHDGSUHYHQ/LRQURJUDPL GLURQDFNUHJLRQHTKUHKQDQWUHQWKHQQHLWLQSDUWQUKLSKQOQ&LQWKWKH1HZ RUNWDWH2IILFHRIDUNGHFUHDWLRQQŁWRULFBH₩UYDWLRQGOQECOJRYHUQHQ/ØDNH DWFLDWLRD,6SDUWQUØHJLØDWLYHOHDGHUDQERDWHUDPRQRWKHUDEHURIHIIRUWDUH &HUDEYDULRDJHQLHDQRUJDQDWLRQ/KDWFDQHHQDQHGWREROWHUDWURQHUSUHYHQ/L SURJUDP&Q/LEIGDWWHQ/LRQ/RDFROODERUDWLRQPRQYDULRKUJDQDWLRQQHSDQRQI\$6 SUHYHQ/LRQURJUDPDUHHHQVLDO

Efforts Underway by the New York State Department of Environmental Conservation

7KH16&ODVDYLWDOUROHL&UHYH&/L@WKHVSUHDGRIERDWHUGLVSHUVHG,%DGHIIRUWVDUHXGHUD ERWKL&KH&LUR&DFNUHJLRD&GDWWKHVWDWHZGHOHYHO7KHVHHIIRUWVDUH&FHVVDUWRVXSSOHI L&SHFWLRD&GHFR&VDPLDWLR&URJUDPV6RPHRIWKH16&FWLYLWLHVL&OXGHL&RUSRUDWLQ L&RUPDWLR&WKHLU&EVLWHSRVWLQ%SUHYH&/LR&LJDJHDWERDWODX&KHVR&RWKL&DGHGD&XQ DWHUDVD&SRVWL&L&DGHGDWHUDVZWKVSHFLDOVLJDJHDWERDWODX&KHVR&RWKL&DGHGD&XQ GLVWULEXWL&D&L&RUPDWLRDOWLSVWULSWROLFH BH&ER SDUWLFLSDWL&L&OD&HCRUPDWLRDOWLSVWULSWROLFH BH&ER SDUWLFLSDWL&L&OD&HPR&RUCLDD PDDJHPH VLWHYLVLWVFRRUGLOWL WKHGHYHORSPH WRIDVWDWHZGH,%ODQJHPH W3ODD&GHYDOXE UHJXODWRU LPSURYHPH WV

2SSRUWEWLHDORHLWWRLQUHDHSUHYHQVLRQUIRUWEDHGRQVKHUHFRPPHQDWLREUHHQV LQVDQHHDFKRIWKHHLJKWGHVJQWHGLQDVRQUHDGKEDWHUDKDVHRUNOVDWHRQGSEOLF DFFHSRLQVKH 16 (KDFDPSJURQDWIRURIWKHMDWHUDKHUHIRUHWKQU FDSODD

VIII. Next Steps

& ØPSEXQ

ФЬФРЅ®ХQWIILBRWRSWSDRI&WDHHVWDWIIROSRPRH SØRQDDHA GRQNDNDVLØBWDPWXDLWRGDWBVRDPDØNH ØPSDLØVL&DPRRIIDLQBWDPS&XQDWRQVWIIBVLQWHVLRQ SRL&WIILBSDSØRDNDVDWWIIDQ&XRXHWGVKVVBSDG SØRQHVDHØWWIIDQDBKHWDQRQWBRSUVXDQQSBRØTXH ØRXGBHRPEVWIIDØX&DQDPS&XØQ&RRMDLQQV JBWDNBDDDLQQ

©WRDQDXV&NIDDYNVDVDUDDTXDUXSEHDQSRDU &SLDUXDURDDORKELERDWIRPD&DLD DQPDQRURDDQQRLORKELDVLDDX&RXOLQDRD&DWRDERXDQ &REDIUOWRQQDEOROPLDQDSUSDBIERDUVSU &VLVRISDUXDUPSRODDRVHDVLRQSD&EDDVDL&NIDHQ SXEQDHVSRLOXBROVLBEHDRDQWSUD&AURQISRKELOU LQVLMSEHVLDRPPEDODDVVXDVDDDDDTXDUDDQMDIRRG & &V ØX0000/RU

Efforts Underway by the New York State Office of Parks, Recreation and Historic Preservation

ҜҤıҤҜ҇UN&VDWH2IILFHRIBUNӡHFUHDWLRQQŁWRULFBHHIUYDWLRQBBUNHQQQSKOLF NQOHGJHDQSDUWLFLSDWLRQQRLQWKHSUHDGRI%28@DQKHGDHGKDWLRQDPSDLJQ DWLWERDWODQKLWHWDWHLGHKJLQERDWHUWRKHOS&VRS\$BWLFŁWFKKLNHUEULGGLQV SRWHQVLDOOKDUPI®\$EHIRUHDQDIWHUHDFKYLLWWR&VDWHBUNPDULQDQERDWODQKHV

:LWK(@LUR@H@/DO&JRWHFWLR@&&SRUWWKURXK1H&UNHSDUWPH@/RI&/DWHD@WKHHSDU (@LUR@H@/DO&@UYDWLR@FHDQQUHDWDNH\$URJUDP2\$&HYHORSHGDQL@/DOOHG&/RS\$`BW &WFKKLNHUVJ@@WLCRUPL@YLVWRUØER&/KDWWKHFDQRWRKHOSSUHYH@/WKH\$UHDGRI (DFKVJQHFULEHWHSERDWHUKR@GIROOR?/RFOHDQUDLQQGUWKHLUERDWKHFOHDQUDL@ PHDJHLEHL@WLOLHGERWKHUWDWHDQP@WLSOHIHGHUDORUJDQDWLR@\$&V@/HUHWHGL@ FR@WH@/PHDJLQWRJH&UDWHJUHDWHUSKOLFSDUWLFLSDWLRQ@/KHHIIRUWWRUHGKHW ,@/DOOL@\$&L\$RDOWDWLR@GMDFH@/WRDUNERDWOD@KVWHVSOD&GIRUZWKI@LQSURYLGH E1:RUNKH@EHURIGL\$RDOWDWLR@/REHL@/DOOHGL@D&WHWEHHQHWHUPL&GE&/WKH JRDOLWRKDYHWKHGL\$RDOWDWLR@WDPD&RDWOD@KVWHD\$RVEOHL@DUNWDWHZGH

ĸнıbun¾dwhu₄¤olw®wfrQkwurŵl@dt¤wlfl@dvyhsod@/¤yhWdwhzGhdw⊅whu⊅k fr@huQQo&lQdwhu⊅zwknQ\$®QdGhG∂whuð⊅Qdwhu⊅zwkuduh\$hflh¤lQ wkhи¤yhWkh:dwhu₄¤olw®wprQwru¤ruwkhsuhи@hril@dvyhsod@/₽dnh₽dQjhph uhfrpphQdwlr@Qlpsohph@/⊅Qdvwzwkfr@/urophdฆhkh1&∂vwbunzwkwkh lGh@/lilfdwlrQidtbwlfl@dvyhsod@//

KH:DWHU4ØOLW&WKD&PLWWHGDUHDWDNHJHWRUDWLR@WLDWLYHJUD&DSOLFDWLF DERDWOD&KWHDUGSURJUDPDWWKHDJH&WHDWDNHERDWOD&KWHD@PDULQ&Hi@UNV &DW&WHDUGUHDWDNH/LDJDUDD&WDDH&H25LYHUSURJUDPZOOEHJLQQ@EHDFWLYHIRU PR&KSHQL@I&L@ZWKDIRF&Q@DLYHSHFLHFR&/URO2@IØOWLPHFRRUGLQWRUR@MD&QO OHDGWHDUGDQMD&QOWHDUGZOOHG&DWHDQSURYLGHKDQ&Q@UKWLR&/RSDUNSDWUR YRO&/HHUWRSDUWLFLSDWHLQHFUHDWLRQODWHUFUDIWDQHT&SPH&/GHFR&/DPLQWLRI RI\$6

23£DORUHSRQEOHIRURYHUMHLQ1&DWHUDIHW&&MDQLPDNLQHIIRUWWRHQDQH% LQRUPDWLRQQVUDLQQPDWHULDOWKURXKLQVUKWLRQOYLGHRDQRQVKHLUHEVWH

VIII. Next Steps

Efforts Underway by the Adirondack Partnership for Regional Invasive Species Management

The Adirondack Park Invasive Plant Program serves as the Adirondack Partnership for Regional Invasive Species Management and coordinates more than 30 organizations that work collaboratively on invasive species issues in the region. In summary, the partnership focuses on the following high priority strategies coordinating stakeholders and collaborating on invasive species solutions preventing new infestations by implementing innovative prevention programs and practices enhancing a region-wide early detection network that utilizes professionals andolunteers to detect and report new infestations formalizing Regional Response Teams, comprised of seasonal crews with the training **anp**acity to implement swift controls on new infestations implementing strategic management on existing infestations to limit their spread launching an invasive species education, marketing, and advertising camp**tig**traises awareness about how to stop the spread of invasive species and, leveraging resources to the region to implement the full suite of actions required to stop the spread of invasive species.

Specific AIS actions that APIPP partners are working on include providing guidance to local governments on local transport laws expanding the boat launch steward program providing training to staff and volunteers or AIS identification, survey, and prevention techniques coordinating volunteer monitoring for AIS evaluating applications of new AIS surveillance methods maintaining a database on the distribution of invaded and uninvaded waterways managing AIS infestations ensuring that aquatic invasive species prevention signage i posted at water access sites and that invaded waterways have special invasive species signage designing and distributing AIS educational materials offering educational presentations upon request and, coordinating these and other priority actions as needed.

Numerous lake associations and municipalities in the Adirondack region are working on AIS prevention and management programs, many in partnerships with APIPP, the NYS Federation of Lakes Association, and the Adirondack Lakes Alliance, a network of lake groups throughout the Champlain Valley and beyond.

IX. Conclusion

KISÐRIDTXDWEØVLHISEHEVDQVVXRIDWRDØLDILÐÆPEHRIÐRQ UVÐQRLODIDVÐØRREDØÐØØSRÆXEVFIXÐRLÐDQ R&PLEPSDMRL&VØVURDÐRÐØRVØÐ9EHHILEÐ

&EVIDIDDDCRPDWRQVWLBURDNURCEPHVWDXHDQRQWUDQ LQSURQRDPVIDIDHOPRRDDDBXXSSRBIVX&BRDPVHB BUNDUDTXDWHRXBRDRDPRDHHDVNRGRDDDQ RDDCXSVDQNDBODDBYPSIDEIBURDQDDFBYI LRBLPSDDMIBYISRDRDQPLB/RXB

DDDVL&RQNHRBDL&ILDVL#SEHVLDQ&PSRØBID& RØSØØ&WRQ&DDLVXQTXHØVRIÐWRQ&VKLG&UÐSØIRP &ØWDQCRÐVØHÐVRQEÐ&RQØ&EØVNRI&SÐ&BLQHRXÐ\$ HRIØØWHQDHØVQSERQ&ØPLQWRÐEHEHQPLUØSÐRI DTXDMEØVL&DØDQRD&RQ&DQVPV\$SRSUDØDWRQØL&BRDMØBWRQDEH ØL&D&DU&DDPHVXDV&&BDØDDLVLØØ&BØ DØRØLQDTXDMEØVL&DØØDØRIERDMIRPLØØ XQØDØV

BPLODOWHRIWLGBUDSØL&PELOWRDBRONGVWEXWRODDGRDW XV8DWDEDQWDBPPDWRQRWSBLWRQWEWRVWBMQ SMOQDSØSDRI&VD&DWRQVDILVWBLQOQORDPRBEXVØ SMRGRDPLBRONHRDURXV\$RDPPLQVXØEDDHDQ VWNRØWDØDBRPRBPSØLRDWBL0HRDDH RDQDWRQD&PPXQUMWRNIRWØLWDVLELQWØRXEDXLORU LPSDØWRQ LOPLWA



Appendix A. Invasion curve showing actions appropriate to each stage of invasion.45

Appendix

Appendix B. Distribution of lakes within the Adirondack Partnership for Regional Invasive Species Management that contain aquatic invasive species. 30HDVHUHIHUWRWKHWDEOF WKH&WSDJHWRILGODNHVWKDWFRUUHVSRGWR&PEHUVR@KHPDS



		Key Į (KRSD) ELW											
		(0 ·D P / 0	(O KOVLDQ ; DBALORLO DQ DBW										
LIST OF ADIRONDACK WATERS WITH		ر	ØUDE	9 0 D I D	ORLO	6)	5LX	DHD					
AQUATIC INVASIVE SPECIES		& ± &0 D/					% BBULDG						
		:& :DMXXW & \$/LDODP											
Name (Alphabetized)	#	EWM					EF	Fan	SWF	BN	AC	YFH	
*XDNH	1												
D DYG	2	;											
ON FIRELU	3		;										
BONH	4												
% BURG	5	;											
Ø JDØFR LU	6		;										
ØØ ×DDN RØ	7	,											
ØØ×DDNĐRV	8	;											
ØØXDDN B SH	9	;											
ØXPRØG	10		;										
ØJ ONH	11	;											
&SSÐ VRQ	12	;											
ØÐÐ	13		,										
D B YG	14	,											
H ₽Z	15	,											
ÐÐNKIVH ER B D	16	;											
ÐV B ØRDÐNH	17	,											
(B)NH	18							;					
₽ ØNH	19		;										
)LVBCODDELQ	20	;											
)_V&IBQ	21	;											
JRRBRBQ	22	,											
RØEBØRG	23	;											
DOLDORZ	24	;		;									
XBMOLDIN DNH	25	,	,										
X BHOLD V IVNH	26		,										
X BHOL BX IONH	27	;	,										
X BIO L RO NH	28	;	;										
XBNOLBINH	29	,	,										
XBNDLGDVNH	30	;	;										

Name (Alphabetized)	#	EWM	VLM	CLP	wc	ZM	EF	Fan	SWF	BN	AC	YFH
)&WR & DLØKLUG/DNH	31		;									
ŮD M 5LYHUDW/DPS₩)DOOV	32						;					
ปHDW6DFDQDJD/DNH	33	;							;			
₽GORFN 3R Q	34	;		;	;					;		
hjkod g) rujh/dnh	35	;										
	36	;										
NA//DNH	37							;				
,QLDØDNH)UDØOLQ	38	• •										
-HØDNH	39							;				
.LØØ/DNH	40	• ,										
/DNH\$JRTXQ	41	;										
/dnh k dpsodlq	42	;	;	;	;	;	;			;		;
/DNH R OE\	43	;										
	44		;									
/dnh(dwr (m [45						;					
/DNH)ORØU	46	;	;	;								
/DNH#RUJH	47	• •		• ,		;			• /		;	
/DNH/MUD	48	;		;								
/DNH3ODFLG	49		;									
/LEROGRQ	50	;										
/LWWOH B OE3RQ	51	;										
/LWWOH5LYHU)ORZ	52		;									
/LWWOH6TØUH3RQ	53	• •										
/R@DNH&PLOWRQ	54		;									
/Roßrq(FKR/DNH (MRR)/\	55	;										
/RR/DDNH:DUUH	56	• ,										
0DNLHOG/DNH	57	;		;								
OHDFKDP/DNH	58	,										
0loo3rq6dudwrjd r	59							,				
OLQUYD/DNH	60	,										
orxo/dl92LHZ/DNH	61	,										
1RUWK3RQ	62	,										
2MHWDK/DNH	63	,	,									
3DUDGR{DNH	64	;		;								
3HFN/DNH	65								;			

YFH Name (Alphabetized) EWM VLM CLP WC ΖM # EF Fan SWF ΒN AC 3LHUFHILHOG)ORZ 66 67 5DLER)2DOO177HH/UYRLU 68 5DTHWWH/DNH 69 70 5RFN3R**G**₽PLOWRQ

5rjhuyr g	71					;			
6DFDQDJD/DNH	72						;		
6DUD Q F/DNH/R⊉U	73	;		;					
6DUD Q F/DNH0LGGOH	74	;							
6DUD Q F/DNH8SSHU	75	;							
6FKURRØDNH	76	;		;					
6HFRQ3RQ6DUD Q F K DLQ	77	;	;						
6LPRORQ	78		;						
6RIW0DSOH5HMUYRLU	79		;						
6WHDUW%ULGJH5HHUYRLU	80						•		
6WDUN)DOO y H H UYRLU	81		;						
6WLOODWHU5HMUYRLU	82		;						
7D0RU3R Q	83	;							
7LW X DNH	84	;							
7 % SHU/DNH	85		;						
8 CRIDOO) ORZ	86	;	;						
:HEE5RRH6DPS	87					;			
:HW&URJD/DNH	88	;							

31XVDP3RQ

Appendix C. New York State campgrounds and boat launch sites in the Adirondack Partnership for Regional Invasive Species Management (PRISM).



Adirondack PRISM - Lake Champlain Basin State Campgrounds and Launch Sites

Appendix D. 2011 and 2012 top 50 previously visited waterways with combined data from the Lake Champlain Basin Program (LCBP), Lake George Association (LGA), Paul Smith's College (PSC), and East Shore Schroon Lake Association (ESSLA). OPHODNHYLWV KDYHEHHQHPRYHGHJERDWOD©KWHDUGDWDNHHRUJHQWHGDYHUODUJH@EHURIUHSR@RIDNHHR KH@KHDNHGYLEWRUKHUHWKHKDGEHHQ@KHSUHYLRWR@HNBKDPHODNHUHSR@KDYHEHHQ UHPRYHGEHFDMWKHGRQWUHSUHM@DO@WUD©RUWULNIDFWRU

Top 50 Previously Visited Waterways- Combined Data from LCBP, LGA, PSC, SLA					
Previously Visited Waterbody, 2011	Sum of # Visits	Percent of total visits	Previously Visited Waterbody, 2012	Sum of # Visits	Percent of total visits
None	8267	31.14%	None	10938	38.48%
Saranac Lake Chain	358	1.35%	Rental	733	2.58%
Rental	352	1.33%	Saranac Lake Chain	527	1.85%
Hudson River	293	1.10%	Lake Champlain	313	1.10%
Lake George	215	0.81%	Hudson River	264	0.93%
Lake Champlain	203	0.76%	Lake George	155	0.55%
Lake Placid	162	0.61%	Saratoga Lake	149	0.52%
Saratoga Lake	162	0.61%	Lake Placid	147	0.52%
Lake Flower	158	0.60%	Raquette Lake	123	0.43%
Upper Saranac Lake	129	0.49%	Mirror Lake	113	0.40%
Mohawk River	125	0.47%	St. Lawrence River	113	0.40%
St. Lawrence River	107	0.40%	Oneida Lake	110	0.39%
Lake Ontario	101	0.38%	Lake Ontario	106	0.37%
Schroon Lake	99	0.37%	Fourth Lake	103	0.36%
Tupper Lake	94	0.35%	Mohawk River	98	0.34%
Great Sacandaga Lake	86	0.32%	Atlantic Ocean	93	0.33%
Raquette Lake	85	0.32%	Tupper Lake	89	0.31%
Brant Lake	84	0.32%	Long Lake	82	0.29%
Fourth Lake	82	0.31%	Schroon Lake	82	0.29%
Oneida Lake	79	0.30%	Great Sacandaga Lake	77	0.27%
Atlantic Ocean	77	0.29%	Brant Lake, NY	74	0.26%
Buck Pond	76	0.29%	Lake Flower	72	0.25%
Candlewood Lake, CT	72	0.27%	Sacandaga Lake	70	0.25%
Mirror Lake	72	0.27%	SeventhLake	67	0.24%
Long Island Sound	66	0.25%	Lake Hopatcong, NJ	62	0.22%
Connecticut River	64	0.24%	Indian Lake, NY	60	0.21%
Long Lake	64	0.24%	Upper St. Regis Lake	57	0.20%
Lake Hopatcong	59	0.22%	Lower Saranac Lake	52	0.18%
Sacandaga Lake	56	0.21%	Did not ask	51	0.18%
Fish Creek Ponds	50	0.19%	Long Island Sound	51	0.18%
Chateaugay Lake	49	0.18%	Unknown	51	0.18%
Lake Champlain	49	0.18%	Delta Lake	50	0.18%
Little Clear Pond	49	0.18%	Raquette River	48	0.17%
Upper St. Regis Lake	46	0.17%	Black River	43	0.15%
Raquette River	45	0.17%	Candlewood Lake, CT	42	0.15%
Lower Saranac Lake	40	0.15%	Follensby Clear Pond	42	0.15%
Seventh Lake	32	0.12%	Blue Mountain Lake	40	0.14%
Cossayuna Lake	31	0.12%	Lake Bonaparte	39	0.14%
Cranberry Lake	31	0.12%	Canandaigua Lake	38	0.13%
Lake Colby	31	0.12%	Chateaugay Lake	36	0.13%
Lake Bonaparte	30	0.11%	Connecticut River	36	0.13%
Canandaigua Lake	29	0.11%	Lake Colby	36	0.13%
Rainbow Lake	29	0.11%	No Data Collected	35	0.12%
Rollins Pond	29	0.11%	Black Lake	34	0.12%
Osgood Pond	28	0.11%	Fish Creek Ponds	34	0.12%
Rental	28	0.11%	Upper Saranac Lake	33	0.12%
Middle Saranac Lake	27	0.10%	Other (write in notes)	32	0.11%
Saranac River	27	0.10%	Saranac River	31	0.11%
Ballston Lake	26	0.10%	Skaneateles Lake	31	0.11%
Skaneateles Lake	26	0.10%	Kayuta Lake	30	0.11%

G. Number of different . % of previously-D. % of confirmed visited outbound Incoming waterbodies E. % of all H. % of visits to lakes M. Risk of **Boats At-Risk** reported by all boats F. % of all confirmed lakes with no of AIS boat operators encountered boats outbound L. Inbound functioning invasive transport (boa C. Average over the visits to *lakes* transporting encountered animals AIS as invasion operators report a summer. (higher # of boats A. # AIS B. # AIS visit to another with no AIS in present in K. Most frequently occuring outbound connections any organism transporting vulnerability spread hubs waterbody withi values = greater inspected present (launching plus ADK steward within ADK steward network⁵ (lakes that are next in the AIS present AIS (launching ADK steward J. Top 3 previously visited water degree of potential (Columns D + E + (Columns A + B the previous two Lake (plants) (animals) per day² weeks) retrieving)³ plus retrieving) onnectivity) network⁴ network bodies spread vector chain. 2011-2013 data.) G) + C+ F + H + I) Chateaugay Lake Lake Champlain, Second Pond, Meacham Lake 16% 14% 14% Champlain, St. Lawrence, Chazy low Cranberry Lake 11% 2.2% 77 6% Tupper Lake medium low 25 22% St Lawrence Bonaparte Black Eighth Lake 36% 1% Fourth Lake, Seventh Lake, Raquette Lake low low Seventh, Fulton Chain, Raquette 24 3% Forked Lake Rental, Raquette, West Long Lake ow Fourth Lake 31 28% 9% 1.2% 76 7% Raquette Lake, Seventh Lake medium Raquette, Oneida, Seventh medium Great Sacandaga Lake 19% 0.3% 0.0% 42 20% Saratoga Lake, Lake George nedium 2% Saratoga, Lake George, Hudson River ow Hoel and Little Clear Pond 4% 59 Rental, St. Regis, Saranacs not enough data nedium low Lake Champlain 13% 4% 55% Hudson, Candlewood, Lake George Lake George, Saratoga Lake, Chateaugay Lake, Lake Placid, edium Lake Flower 8 23% Saranacs, Placid, Rental ake Placid, Second Pond, Upper St. Regis 2.7% 2.0% 48% Saratoga Lake, Schroon Lake, Lake Champlain nedium Lake George Champlain, Hudson Riv, Saratoga Lake Placid 0.0% 15% ake Flower, Second Pond 259 Mirror, Rental, Lake Flower วพ 24 209 14% 0.29 9% Rental, Raquette, Tupper Long Lake upper Lake, Raquette Lake ow Meacham Lake 44% 5% 17% Chateaugay, St. Lawrence, Upper St. Regis not enough data 26 low Osgood Pond 5% Upper St. Regis Lake St. Regis River, Champlain, Jones Pond low 43% Rainbow Lake 13% 0.1% 52 Champlain, Saranacs, Kushaqua Upper St. Regis Lake nedium low Raquette Lake 2.79 92 5% Fourth, Blue Mountain, Seventh Long Lake, Fourth Lake, Seventh Lake 18 low Saratoga Lake 12% 8 0% 37% Hudson R., Lake George, Champlain Lake George, Lake Champlain, Schroon Lake, Great Sacandaga medium 29 0% 0.0% 45 3% 31% Lake George, Hudson R., Brant Lake Schroon Lake Lake George, Saratoga Lake low 7% 2.29 20% Second Pond Lake Placid, Upper St. Regis Lake medium Rental, Saranacs, L. Placid 9% Seventh Lake 499 4% 50 Fourth, Raquette, Eighth Fourth Lake, Raquette Lake low low Stillwater Reservoir 269 10% 2.39 47 Black, Ontario, Fourth not enough data low Tupper Lake 19% 12% 0.2 6 6% Long Lake, Second Pond, Lake Flower, Cranberry Lake Long L., Saranacs, Rental low วพ Upper St. Regis Lake 489 3% 0.29 88 Second Pond, Lake Placid, Lake Flower, Chateaugay Lake 22% Rental, Lower Saranac, L. Placid low White Lake 6% 57% Oneida, Kayuta, First Lake Fourth Lake low

Appendix E. Adirondack Watershed Steward Network aquatic invasive species threat analysis.

Notes:

Explanation of the assignation of risk colors: The team assigned the three AIS spread risk colors (green = lowest risk; yellow = medium risk; red = high risk) according to defensible breaks in the data and collective judgment. A summary of the categorization rules follows. Column A: low = 0 AIS plants; medium = 2; high >2. Column B: low = 0 AIS animals; no medium-risk category; high > 0. Column C: low = 0-10 boats per day; medium = 11-30; high >30. Column D: low = 0-19% of boats at risk of AIS transport; medium = 20-49%; high >50%. Column E: low = 0-5% organism transport rate; medium = 6-14%; high >14%. Column F: low = 0-2% AIS transport rate; medium = 2-4%; high > 4%. Column G: low = 0-50 previous waterbodies; medium = 51-100; high >100. Column H: low = 0-9% of outbound visits; medium = 11-25%; high >25%. Column I: low = 0-40% of outbound visits; medium = 41-59%; high > 59%.

1. The Adirondack Watershed Steward network consists presently of active boat launch steward programs managed by the Lake Champlain Basin Program, the Lake George Association, Paul Smith's College, and the East Shore Schroon Lake Association.

- 2. Unequal boat launch coverage was accounted for by dividing the total number of boats inspected by total days of service over the field season. Figures for lakes with multiple launches were combined and averaged using available data. These figures are based on 2012 steward coverage from Memorial Day to Labor Day. Not all sites had seven day per week steward coverage. Boat launch steward coverage is limited to working hours (typically eight hours per day), less breaks. Actual traffic is undoubtedly higher at each location for a 24 hour period.
- 3. The AIS transport rate is influenced by the combination of human factors (boat launch steward effort, ability, work pattern) and environmental factors (variation in annual density of vegetation growth, prevailing wind, water temperature, etc.).
- 4. "Outbound visits" take place when a boat is retrieved from one lake and launched in another, within a two-week period. "Confirmed" indicates that these visits are *actual* visits based on voluntary visitor statements about the last waterway they had visited prior to boat launch steward contact. E.g., if a visitor to Lake Placid states that they had visited Lake George last, this counts as a confirmed *outbound* visit from Lake George to Lake Placid.
- 5. This column indicates the lakes most likely to serve as destinations for boats leaving the lake in question. N.B., outbound visits can only be determined for the 24 lakes within the Adirondack Watershed Steward Network. The list includes the top two to five outbound destinations, in descending order. It is possible that other destinations not within the network are more common, but this information is not available. By analyzing these most frequently occurring outbound destination connections, managers can infer typical pathways for the spread of invasive species new to the region, and institute appropriate spread prevention interventions and/or facilities.
- 6. Inbound vulnerability to AIS infestation is an important defensive consideration. Managers must prioritize certain high value or high risk lakes for protection from outside invasion by considering placing boat launch stewards and/or boat washes at these locations.
- 7. In order to determine outbound invasion spread hub status, we looked for patterns of low, medium, and high comparative risk in terms of combinations of the following criteria: # AIS present (plants), # AIS present (animals), volume of boater traffic, how "dirty" boats are at particular locations, and the likelihood of boats departing the waterway to visit uninvaded (by plants and/or animals) waterways. Outbound AIS spread hubs are important to consider for effective and well-resourced intervention. Boat launch stewards and the accessibility of effective boat wash facilities provide boaters departing infested waterways with usable and timely ways to disinfect watercraft, thus providing residual protection to the entire Adirondack network.

Appendix

Appendix F. Preliminary Adirondack Overland Transport Sub-networks maps. 2WKHULGWRUNPDHLWKRHYHUEHFDMERDWOD&KWHDUGGDWDGRH&WHLWIRUDOOSDUWRIWKH& UHJLRWKHSUHM&HRIRWKHULGWRUNL&&&WKLWRWHRDWOD&KWHDUGUHSRUWHGWKDWRPHERDWI HUHWUDYHOL@URP&FD&GDJDDNHWRR@DNH&FKURR@NHDNHHRUJHD&&UDWRJDDNH#FDM&FD&GDJDDNHKDV SL&WHUIOHDEWR@DNH&FKURR@NHD&@UDWRJDDNHGR&W&FD&GDJDDNHKDWKHSRWH&UDOWR#UYHD&@D& SUHDGKEIRUSL&WHUIOHD#FDMWKHUHLYHUOLPLWHGERDWOD&KWHDUGGDWDIRU&FD&GDJDDNHLWFD& WKLSHFLILFDWHUD&KLFKR&GL&W&HOSWRFODULIWKH&SLUR@DFNRYHUODQWUD&RUWPRGHO



Boat Launch Use Network Data, 2011-2013: Primary Outbound Destinations from Boat Launches in the Adirondack Region





AIS Spread Potential from Great Sacandaga Lake



AIS Spread Potential from Lake George



AIS Spread Potential from Lake Champlain



AIS Spread Potential from Cranberry Lake



AIS Spread Potential from Fourth Lake

Appendix G. Adirondack Watershed Steward Network: Invasion Spread Hub Waterways and Linkage Waterways



Appendix H. Waterways with aquatic invasive plants in the Adirondack region through 2012.

HQWHVDWHUDVEWKDFWLYHERDWODXQKVWHDUGSURJUDPVLQ

XM/DNH(M[)øwr g dl gl wk/dnh øplowrq	0LOO3RQ6DUDWRJD
%DUWOHWW \$HQ)øwr g dloxlug/dnh hunlphu	OLQUYD/DNH(M[
%ODNH5HMUYRLU6W/DDHEH	UDM5LYHUDW/DPSRODOOV 6W/DØHEH	ORMA/DLOLHZDNH)UDQOLQ
%UD W /DNH:DUUHQ	ŮHDW6DFDQDJD/DNH)⊗WRQDUDWRJD	1RUWK3RQ:DUUHQ
%XVWHUX2/3RQ(H/[₽GORFN3RQ: DKLQWRQ	2HHWDK/DNH)UDQOLQ
&UU)DOO\#HHUYRLU6W /D\#HEH	ŀ±ikod g) rujh/dnh(h [3DUDGR{DNH(H [
&dwhdxdxdnh/r⊉u)udQolQ	RUMKRH3RQ)UDQOLQ ± ØÐ	3lhufhilhog)orzw/d uheh
Kadwhdxdxdnh1duurx)udosolq	₩//DNH6DUDWRJD	3₩V D P3RQ(₩[
Kowhdxdxdnh8sshu@l@/rq	,qld@nh)udqolq	5DLERØDOOØHMUYRLU6W /DØHEH
KEDRRW/3RQ6W/DDHEH	-HØDNH6DUDWRJD	5DTMWWH/DNH@PLOWRQ
Koxon Kolovro	.LDD/DNH)UDQOLQ	5RFN3RQ₽PLOWRQ
Resshudgrq)udqolq	/DNH\$JRTX#PLOWRQ	5RJHUØRQ(M/
&DEHUUXDNH6W/DØHEH	/DNH&DPSODLQ	6DUDQF/DNH/REU)UDQOLQ
DJJHWW3RQ: DUUHQ	/DNH &OE)UDQOLQ	6DUDQF/DNH0LGGOH)UDQOLQ
HHU5LYHU)ORJUDQOLQ	/DNHMDØ/₽PLOWRQ	6DUD Q F/DNH8SSHU)UD Q OLQ
(DJOH/DNH(M/E ± 7LFRQHURJD	/dnh(dwr ()	6FKURRØDNH(H/[DUUHQ
(DW&URJD/DNH)&WRQ	/DNH)ORØU)UD QOLQ	6HFRQ3RQ6DUD D F&DLQ)UDQOLQ
(IQU/DNH6DUDWRJD	/DNHHRUJH :DUUH@DKL@VR(DM[6LPRGRQ)UDQOLQ
(OGRØDNH₽PLOWRQ	/DNH/HUD:DUUHQ	6RIW0DSOH5H₩UYRLU/HZV
)LUW3RQ6DUD D F&DLQ)UD Q OLQ	/DNH3ODFLG(H [6WDUN)DOO𝔄H₩UYRLU6W /D☑H€H
)lk/&hhn3rg)/ud&olq	/LEROGRQ(M[6WLOODWHU5HHUYRLUHUNLPHU
)ORRGERG3RQ)UDQOLQ	/LWWOH&OE3RQ)UDQOLQ	7D0RU3RQ0L0/RQ
)ROOH (2020) HDU3RQ) UDQOLQ	/LWWOH5LYHU)ORXU/DDHEH	7LWXXDNH)UDQOLQ
)UDQOL)DOO)ORJUDQOLQ	/LWWOH6TØUH3RQ)UDQOLQ	78/SHU/DNH)UDQOLQW /DØHEH
)&WR & DL)QIWK/DNH&PLOWRQ	/R@DNH@PLOWRQ	80R)000)/0RØLØ/RQ
)ØWRKODL)QUW/DNH HUNLPHU	/RØRQ(FKR/DNH(M/[:HEE5RKH6DPS(M[
)ØWRKCDL)RAWK/DNH HUNLPHU	/RRØDNH:DUUHQ	:HW&URJD/DNH)&WRQ
)⊗WR&DL©HFRQ/DNH ⊭UNLPHU	0DNLHOG/DNH)ØWRQ	
)⊗WRKCDLGHYHO2/K/DNH ⊕PLOWRQ	OHDFKDP/DNH)UDQOLQ	

Appendix I. Waterways surveyed where no aquatic invasive species have been observed in the Adirondack region through 2012.

In the man onduck regio	n un ough aoia.		
ØGHU RQ(M [(LJKWKDNH Ð PLOWRQ	LWWOHLOOBG RG ĐPLOWRQ	5RFN RQ(V I
ФЕОНDNH RHU(И[(ONDNH(M]	LWWOHRARGEIDUNDURG)UDSOLQ	5RFNRQ)UDNOLQ
ØEOHDNH8SHU(Ø[)D © NH Đ PLOWRQ	LWWOHRORGEDU)LKRG)UDSOLQ	5RFNRQHEV
WLRG:DUUHQ)HUDNHOLWRQ	LWWOH5DQLQQ(M	5ROOL&Q)UDNOLQ
MOIRKIDNH (MI	LKRG)UDNOLQ	LWWOHSSHUDNHĐPLOWRO	5RHRGHUNLPHU
)POOHER OUD		
	JKNWKDNH:DUUHQ		5MWWKG(M
	JUDELIONHHLV	KUDNH2HLGD	5KDQNHĐPLOWRQ
MDYHUDNHHEV)UHQKRQHEV	RORGUDSIOLQ	ØJDPRUHDNHÐPLOWRQ
L JORRHDNHHUNLPHU)ULHQDNH:DUUHQ	RORGHEV	OLW5HJLØNHREIU)UDNOLQ
VJRG(VI[DUGWDNH:DUUHQ	RORGEVIDEIHEH	ØLW5HJLØNH8SHU)UDNOLQ
1/J:ROIDNH)UD&OLQ	LOPDQNHĐPLOWRQ	RRQNH)UDQOLQ	DGRG(YI[
ØDFNRGEIDUREIUW5HJLØNH	OHBG)UDNOLO	RWRGUUDNOLO	KDOOR RGH UNLPHU
JUDNOLQ	01120,0022024		
ØDFNRG EDU:KHRG)UDSOLQ	RRGQZORZM[oDUYL&Q)UD&OLQ	KLQOHKDQ/RGĐPLOWRQ
ØMORWDLQNHÐPLOWRQ	RRИ RQ (И[oD RQ NH Đ PLOWRQ	£DPHИRGRE U:DUUHQ
ØØL&GSHFWDFOH&G)UDØOLQ	UHHON H)ØWRQ	oDØØISLHDNHWDØHQH	CDPHHRQ8SHU:DUUHQ
KJRQ)UDNOLQ	UHHRQ)UDQOLQ	oFDYDQXKRQ)UDQOLQ	LOYHUDNHOLWRQ
KRWWUHHRGWDE HQH	ØORQ(W	oLGGOHRQ)UDQOLQ	6.OYHUDNH6002/HQH
WDQUHWKDNHĐPLOWR Q	ØORGWDEHOH)UDNOLQ	oLOORG(M	6.DNHHUNLPHU
1/2DWLQKDP/DNHHZ V	ĐUULØNH(M	oLUURUDNH(1/1	ODDRQ)UDOOLQ
WREDFWRGREUUDPLOWRO	HDYHBG)UDNOLQ	ORKHJDDNHĐPLOWRO	RWKRGDPLOWRO
			SONUDDLOWRQ
WFDGHDNH ĐPLOWRQ	,GLDQNHĐPLOWKQ		WHHOH5HMUYKLUDUDWKJD
ØFDGHDNHRHU(M[,UHODQODUDWRJD	ORAZ DLARGEIDUMURIKG)UDSTOLQ	WREIUDNH(DWÐPLOWRQ
₿₽DGHDNH8SHU(¥I[-DEH RG: DUUHQ	ORWDL&GEIDUHGJH&G)UD&OLQ	WRWHHNRGYUDOOLQ
&WDPR&/RG&/DE/HQH	-DFNR@PLW5HHUYRLU)ØWRQ	o &rqhz ∨	WUHHWHUDNHWDZHQH
&GDU5LYHU)ORDPLOWRQ	-RH,QLD & QWDDHQH	oKUHPRNHRQ(14[ENHUDNHWDZHQH
MWHURG PLOWR Q	-RKBBBG(VI	1HOOLHRQ)UDQOLQ	DQKHURG(M
KDOOLRG(M	-REIRG)UDQOLQ	1HERPEDNH(M	KDHUDNHĐPLOWRQ
KDWDNHHZ V	-RUGDQNHWDZHQH	1HSRUWRG(M	KLUWHHW/KDNH:DUUHQ
&DWLHPDNH:DUUHQ	.H GORG ĐPLOWRQ	1LFNØNHHUNLPHU	KKIPDBQQ(WI
KEDNHĐPLOWRO	DNHEDONHHĐPLOWRO	1RUWKDNHHUNLPHU	ROHRGNUDTHOH
KKIFKRG)UDNOLQ	DNH&UIRQDFNĐPLOWRO		RØ LERGEVDEHOH
ODPKHOORQ)UDNOLQ	DNH@HDU)UDØOLQ	2JRRGRQ)UDNOLQ	ULSSRQ:DUUHQ
ØHDURGEDU5DLERDNH)UDSOLQ	DNH@HDU2WOHW)UDQOLQ	2WWHUDNH2 @ LGD	URWDNHHZ V
OHDURG(M	DNH(DWRQPLOWRQ	2YHQRWDL&G:DUUHQ	KWOHRG)UDSOLQ
©HDURGEDUoHDFKDPDNH)UDQOLQ	DNH.KDTØ)UDØOLQ	2ERDNHĐPLOWRQ	ZWFKHOODNHHUNLPHU
OHDURGHE V	DNHLODĐPLOWRO	DFN)RUHWDNH:DUUHO	STRAIDU)LKRG)UDSOLO
OHDUR GW/DFIHAH			
	DNH2RODWDFHAH	BHDNHHF/	
	HGJHRQ)UDNOLO	ROOLRJRG)UDNOLO	HWBA3 RG)UDNOLO
HHURGEPLOWRO	HØNH·DUUHO	BIRFWRURG(MI	·KHRQ)UDNOLO
		-DMD0///D2010	
(FKKDNHÐPLOWKQ	LWWUHUHHKAQ)UDQOLQ	5LFKDNH(M	₽FNKG(M

Appendix J. NYSDEC campgrounds with aquatic invasive species present and boat launches in the Adirondack region. 5HFRPPHQHGDFWLRQDMGRQTØWLFLQDVYHSHFLHCLWULEWI GDWDERDWODQKWHDUGGDWDDQFLHQVLILFOLWHUDWKH

Campground Name	Waterway Name	Aquatic Invasive Plants	Aquatic Invasive Small-bodied Organisms	Actic	'n
\$JHU,ØDQ)RØWK/DNH			, SCHFWLRKODG	UHPRYDO
₩EOH3RL102/	/DNH & DPSODLQ	;	•	, © HFWLR © DQ DQGHFR © / DPLC	UHPRYDO) WLRQ
QURJD/DNH	(DW&URJD/DNH	•		, Se hfwlr Kodg	UHPRYDO
& DEHUUXDNH	& DEHUUXDNH	;		, SCH FWLR KODG	UHPRYDO
&RØRLØ/	/DNH & DPSODLQ	;	•	, 120 HFWLR 120 Q DQGHFR 120 / DPL 12	UHPRYDO) WLRQ
(DJOH3RL Ø /	6FKURRØDNH			, SCHFWLR KODG	UHPRYDO
)lkkuhhn3rq	6TØUH3RQ)LK &HHN3RQ			, Ø HFWLR KODQ	UHPRYDO
Roghomhdfk	5DTMWWH/DNH	;		, SCH FWLR KODG	UHPRYDO
/DNHMD100/	/DNHMD100/	;		, Se hfwlr Kodg	UHPRYDO
/LEROBRG	/LEROBRQ	;		, Se hfwlr Kodg	UHPRYDO
OHDFKDP/DNH	OHDFKDP/DNH			, Ø HFWLRØD Q	UHPRYDO
ORIILWW%HDFK	6DFDQDJD/DNH		•	HFR@/DPL D WLF	<u>RO</u>
1RUWKDPSWR 1 HDFK	UHDW6DFDQDJD /DNH	;	;	, South FWLR KODG DG <u>GHFR KO</u> /DPLC	UHPRYDO) WLRQ
3DUDGR/DNH	3DUDGR[DNH	;		, SCHFWLR KODQ	UHPRYDO
3XVDP3RQ	3XVDP3RQ	;		, Se hfwlr Kodg	UHPRYDO
5RJHU S RFN	/DNH#IRUJH	;	•	, Some Head and American Ame American American Ameri American American Ame American	uhprydo) wlrq
6DUD Q F /DNH,ØDQV	/RØUOLGGOH6DUD D F /DNH	;		, Mahfwlr Kodg	UHPRYDO
6FDURRODRU	6FKURRØDNH	;		, Se hfwlr Kod g	UHPRYDO
7DØRU3RQ	7DØRU3RQ	;		, Se hfwlr Kod g	UHPRYDO

Appendix K. NYSDEC campgrounds without aquatic invasive species in the Adirondack region. 1RWH2@FDPSJURXGOHDGREURRNGRHV&WKDYHDWHUDFFHVV7KUHHFDPSJURXGV&DFDGDJD

region. 1RWH2@FDPSJURXGOHDGREURRNGRHV&WKDYHDWHUDFFHVV7KUHHFDPSJURXGV&DFDGDJD 6DFDGDJD5LYHU6KDUSØLGJH6FKURR&LYHUDG:LOPLØWRORWFK:HVWØD&KXVDEOH5LYHU&DYH&WEHHQ VXUYHHG

Campground Name	Waterway Name
%UR Ø UDFW3R Q	/REU%UREQUDFW3RQ
%KN3RQ	%FN3RQ/DNH.McDTØ
(LJKWK/DNH	(LJKWK/DNH
)RUNHG/DNH)RUNHG/DNH
,QLDØDNH,ØDQV	,QLDØDNH
/DNH(DWRQ	/DNH(DWRQ
/DNH&UULV	/DNHÐUULV
/HØXDNH	/HEIXDNH,QLDQ /DNH
/lphnlo@dnh	/lphnlo@dnh
/LWWOH6DQ3RLØ/	3LM/FR/DNH
/MUD)R&WK/DNH
1LFNXDNH	1LFNXDNH
3rl@/&piruw	3LM/FR/DNH
3RSODU3RLØ/	3LMFR/DNH
5ROOLØRQ	5ROOLØRQ

References

& RONBNDVLDBDDP&RONBN\$XDUKLVD6EHDOPP0

©00 <u>&DOLDVLMRP\$XDWF7RXF7@%\$\$G</u>\$\$7\120 @

& ROA: DHARWAHDHARVYKSRIDP&PPDRIRIDPVDQ

\$XDUKLVD**B**EHDVNR**R**&DM&L**BB'RBD**RI\$XDUDVLH SEHBXBDURDBULUH

<u>&D&DVNIR₩₩₩BX₩₩₽₩₽₩₽₩₽₩₽</u> @

\$XDUKLVD**B**EMDVNRBDDB DØ BUDQIDVNIR BUDQSIS BYVE

[™] W D H E K D V L D D B L O N L O NY IOP N

- %VVH@BHN-0.DIW&DQ1HNROD-&HGLFWLR®IORØGLVWD@HGLVSHØDOXLØJDYLW\ PRGHOVHEDPXVHOLØDVLR®ILQDQODNH/Ecological Applications, 11,
- **KØØDQ**3DGLOOD'.3**H**GLFWL**Q**/VKIOLNHOLKRGRI(**Ø**VLD**Q**/WH**B**LOIRLOS**H**VH**G**/LQDNHVD PDF**B**S**W**/HPR**Q**/WR**LQ**/VRRŒcological Applications, 10,

&PHD&5DL&LOOH6&OGZXWL(HWWHƏHUH6&VV&Q:R@+ 6XFHSWLELOLWRIT&JJDPXVHOréissena rostriformis bugensisWRRW2WHVSDVDVDPHD&RI 2WHEDIWGHFR&DDLQWUBR&ouling, 27

- MCDQ5RWK0LVEHUH12IIHQHDQGHIHQHLQDQVFDSHOHYHOLQDVLRERQVEO Oikos, 117,
- (PLOHROWSHVRQOFRPP&FDWLRQDBK

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-RØRØSLFFLDØL\$DØDWRØ2YHODQGLVSHVDORIDTØWLFLØDVLYHVSHFLHVDLVN DVVHVVPHØVRIWDØLHØVHFHDWLRQOERDE660@gical Applications, 11,

.HOOH53&\$9DARR&GJHDHERWODQ5RW&LVEHWHYBPEDLW VRSVWRWHIRHVWIORRHDW/EBXHDQGLVSRVDOEDQOHV American Midland Naturalist, 158,

/DNH&PSODL&VL\$\$\$\$WLF,`&DVLYH6SHFLHV5DSLG5HVSR`&H7DVN)REH6SL&WHL@HDDSLG HVSR`&HL@VH`@H@)DOOVD@&PSODL&QOV <u>KVWSDFESRUB)VDLVW/IBVSL®HFSGI</u> \$\$FHVVHG0D@

/DNH&PSODL&VL&BJDP,\$66SHDG3HYHW/LRQ <u>WWSDFESRUDWHU</u> <u>HWLBRHWDTWVLFLWDVLYHVSHFLHVDTWVLFLWDVLYHVSHFLHV</u>&FSHDVHG\$@

References

ÐN&PSÐLØVL&DP&#N#&NÐ&VV#QÐ#?V5RW</th><th></th></tr><tr><td>BWREISREILRGHILBYTXDWEIDVLHISEHIRXWLEIDVLBO</td><td>BVBØ/</td></tr></tbody></table>
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XBVVERN-DABDWSDDVDQTXDWELRALDQQVLRQWWPDWQVSHD0RHDQDDVLRQBiological Invasions, 8,

/HXXXNH-0DQ/RGJH03HGLFWLQLQDVLRQSESDJØHSHVVMDQWMJDYLWRI DOOHHHIIHEddd/ogy, 85,

0DF, VDDF+REHO\900KHDG-5DQDDHB3&FNFDVWLQDQIRHFDVWLQ ELRORJLFDOLQDVLRQRILQDQOEbHbgical Applications, 14,

0RVH-7\$VHVVLQWKHIIHFWVRIDSSOLFDWLRQVLPHDQWHPSHDWMRQVKHIILFDFRIKWDWHU VSDVWRPLWLJDWHIRØLQDbeissena polymorphaHEDPXVHOV3DOODV Biofouling, 25

0KHDG-5DQ0DF, VDDF+HYHORSPHØ/RILQDQ0DNHVDVKVLQQ0DVLRQWRN Journal of Applied Ecology, 42,

 1HZN, QDVLYH6SHFLHVQHDLQRXHGLOOD
 Hydrilla verticillata /I5ROH

 WWSZVLQRLQHSKDFWLRQQDVLYHBGHWDLOLG
 \$FHVVHG\$

1H&N, &DVLYH6SHFLHV&HDLQRXH6SLQWHLOHD Bythotrephes longimanus <u>WWSQVLQRLQHS&DFWLRQ.&DVLYHBGHWDLOLG</u> \$FHVVHG0D@

1HZW&5&YLHZI(&VLDQWHOLOIRLOLPSDFWVDQPDQJHPHQVLQWLV&ORELD In: 3&F)LVW,QV6PSRQWHOLOIRLO Myriophyllum spicatumDQHODWHGDORDJDFHDHVSHFLHV \$\$\&WLF30DQV0DQJHPHQV6RFLHW,QSS

3**x//x0DQ**3RVW06W/**&L_QL**&DVLR**&**YH**/2**PLVVHGW**/4**ERDW"

Ecology Letters, 8,

5DPF&D&DGLOOD:DQRGVRQ0RGHOVWR3HGLFW3RWHWLDO2FF&AHDQHWLW\ RIWHHED0XVHO Dreissena polymorpha. Canadian Journal of Fisheries and Aquatic Sciences, 49,

5RWØLVEHUHUBGGHWRØDF1ØW\DQ/RGJH0\$ØWLFLØDVLYHVSHFLHVWDØSRW/ YLDWDLOHUGERDWVØWLVEHLØPRYHGKELVPRYLØLWDQØWFDQHGRQ Fisheries, 35

6F&LGHUOOLV&Q&PLQV.6\$VDQSRWDWLR&RGHODVVHVVPHQ/RIW&LVNWR QWLYHPXVHOFRPPQWLHVI&PHEDPXVHOVSHDG Conservation Biology, 12,

6WDWHRYHQHWRI9LFWRUD, & DVLYH3ODW/VDQ&PDOV3ROLF), DPHEN WWSESLYLFJRYDØJUFØWMSHVWVGLVHDVHVDQ ZHGVSRWHFWLQ/LFWRUDSHVWDQPDOV ZHGVL&DVLYHSODW/VDQPDOSREFIIIIVVHG0D@

6WRNVWDG()HDHGTØJJDPXVHOWØSLØVWHBQWHG6WDWHV Science, 315,

6WRS\$\$&WLF&WF&NHWH&DO3HYH@/LR&BFHG&/VIR6WRSSL@\$&WLF&WF&NHW\$XWHDGIRDOO HFHDWLRQOXHW<mark>&/WSSR/WHFWR&WHV&WSHYH@/LR&H@/LR&JH&UFS&</mark>\$FHVVHG 6HSW@ XDQBRPILERPEDDDAX

Ambient Levels of Calcium and

Chloride in the Streams and Stormsewers That Flow into Lake George (Warren County), New York \$EDQt6HSDWPHQRI(QLBQHQDO&QHVDWLRQ

- 7KI)RDJHBHVV//GLEQDFN)DFW6KIHW <u>WWSDGLEQDFNKVWRERPDGNIDFWV</u>KEPHVVHG 2FW@
- 8: 0DGLVR&WHIRULP&ORJ, WDVLYHV&WF&LGHVZW&DWHW1RW&GV WWSOLP&ORJZVFHG&ORJFDWHJRLWDVLYHVSHFL&FHVVHG0D@
- 86HSDWPHWRIWH,WHURMDRI5HFODPDWLR,WSHFWLRDQ&HDQDD&OIR(JT&SPHW) DQ9H&FOHVWR3HYHWWH6SHDGRI,WDVLYH6SHFLHV <u>WWSXEURYPXVHOVSHYHWLRQRFV(T&SPHW,WSHFWLRDQ&HDQDD&OSGI</u> \$FHVVHG6HSW@



7KH)RUDJHU3UH**W/&**LURQDFN)DFW6KHHW 2FW@ KWWSDGLURQDFNKLWRUKRPDGNIDFWKWP>\$FHMG

\$LURQDFN3DUN,@DWH3OD@/3URJUDP&LURQDFN3DUN\$&WLF1&D@H6SHFLH@DDJHPH@/ 30DQ<u>KWWSDGNL@DWHFRP\$&WLF5HR&FH@RFRH@/\$\$6),1\$SGI______</u>>\$FHMG2FW@

\$LURQDFN3DUN, @DWH3OD@/3URJUDP\$LURQDFN3DUN\$&WLF1&DEH6SHFLH@DDJHPH@/ 30DQ<u>KWWSDGNL@DWHFRP\$&WLF5HR&FKH@/\$\$6),1\$\$GI</u>>\$FHMG2FW@

(PLON%ROWSHURDOFRPP&FDWLRDDUFK

\$&WLF1&DEH6SHFLH7DM)RUFH:KDWDUH\$6" 0DU@ KWWSD100/D1MIRUFHJRYD102KS >\$FHMIG

1HØRWK35\$HYLHBI(MDMDØWHUPLOIRLOLPSDFWØQPDDJHPHØ/L@ULWLK&ORELD In: 3BF)LWW, ØY6PSRØWHØLOIRLO Myriophyllum spicatumDQHODWHGĐORDJDFHDHVSHFLHV\$ØWLF3ODØ/ 0DQJHPHØY6RFLHW)QSS

 ØWHV, MM (5DQ: HEE HØVLD ØWH ØLOIRLO
 Myriophyllum VSLFDW ØK/L Ø/H

 7HQVVHHYDOOH ØGDWHR ØLRORJD QFR ØV BO
 In: 3BF)L ØW, ØV6 PSR ØWH ØLOIRLO
 Myriophyllum

 spicatum DQH ODWHG ØOR DJDFH DHVSHFLHV \$ ØWLF30D ØV0 DQJHPH ØV6 RFLHW, QSS

1HZN, ØDVLYH6SHFLHVØHDLØRXH6SLØWHLØHD WWSØVLØRLQHSØDFWLRQØDVLYHBGHWDLOLG

WWSDQWDVNIRBHJRYDQS**&**FHVVHG

Bythotrephes longimanus

\$FHVVHG0D@

\$&WLF1&VD&H6SHFLHV7DVN)R&H:&WDH\$6" \$@

/DNHKAPSODLØVL\$NØWLF,&DVLYH6SHFLHV5DSLG5HVSRØH7DVN)REH6SLIØWHLØHDDSLG HVSRØHLØVHOHØ)DOOVDGKAPSODLØQOV <u>KVWSIØFESRUB)VDLVW/IBVSLIBHFSGI</u>\$FHVVHG 0DØ

%VVHQBHN-0.DIW&DQ1HNROD-&HGLFWLRQIOR@GLVWDQHGLVSHWDOXLQJDYLW\ PRGHOVJHEDPXVHOL&DVLRQILQDQODNHVEcological Applications, 11,

-RØRØ5LFFLDØLØG&OWRØ2YHODQGLVSHVDORIDTØWLFLØDVLYHVSHFLHVDLVN DVVHVVPHØ/RIWDØLHØ/HFHDWLRQOERÆK6LØgical Applications, 11,

/HXXXVVHQRHN-0DQ/RGJH0KDWVSDWZVDQDT&WLFELRORJLFDOL&DVLR& HVWLPDWLIGLVSHVDOSRWHWLDOZWKDYLVBRRGHOVInvasions, 8,

0DF, VDDF+REHO\900KHDG-5DQDDHE386FNFDVWLQDQIRHFDVWLQ ELRORJLFDOL&DVLR&RILQDQOEbbHbgical Applications, 14,

0KMDG-5DQ0DF,VDDF+HYHORSPHWRILQDQ0DNHVDVKVLQQWDVLRQWRN Journal of Applied Ecology, 42,

6F&LGHUOOLV&Q&PLQV.6WDQSRWDWLRQRGHODVVHVVPHQVRIWHUVNWR QWLYHPXVHOFRPP&WLHVIQPHEDPXVHOVSHDG Conservation Biology, 12,



/H&&&UDNH-0DQ/RGJH03UHGLFWLQUXD U R&UJRSDJ&HSUHMHDQWKHJUDYLWRI DOOHHHIIHFW ECology, 85,	
6WRNVWDG()HDHGTØJJDPXVHOWØØSLØVWH8DWHG6WDWHV Science	e, 315,
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-RIQRQ5LFFLDGLDG&OWRQ2YHODQGLVSHVDORIDTØWLFLQDVLYHVSHFLHVD DVVHVVPHQ/RIWDQLHQ/HFHDWLRQOERIEMMIQgical Applications, 11,	LVN
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-RØRØSLFFLDØLØQØOWRØ2YHØDQGLVSHØDORIDTØWLFLØDVLYHVSHFLHVD DVVHVVPHØVRIWDØLHØVHFHDWLRQOERDØØlgical Applications, 11,	LVN
5RWI&LVEHUHUBAGGHW/R@0F1&W\DQ/RGJH0\$%&WLFL&DVLYHVSHFLHV WDWSRWYLDWDLOHHGERDWV&WLVEHL@PRYHG&LVPRYL@LWDQ&WFD&HGR&	Fisheries, 35
6₩/#0DQ-:@RRPILHOG-&PED0/57DQ:HVW7&ELH0//HYHOVRI&OFL&DQ &RUGHL0/#6WHDPVDQ6WR0VH21V7&W)ORZ0/R/DNHHRUH:DH&0/%H&N\$0EDQ 16HSDU/PH0/RI(0/L&RH0/DO&0/HVDWLRQ	
5DPF &D& DGLOOD!DQRGVR&00RGHOVWR3HGLFW3RWHW/LDO2FF M EHDQ HWLWRIWHHED0X/VHO Dreissena polymorpha. Canadian Journal of Fisheries and J	Aquatic Sciences, 49,
1HXN, &DVLYH6SHFLHV&HDLORXHGLOOD Hydrilla verticillata /I5ROF WWSZVLORLQHS&DFWLRQ&DVLYHBGHWDLOLG \$FHVVHGX@	4
/DNH&PSODL&VL&BJDP6WDWHRIWK/DNHDQ(FRVVWHP,QLFDWRV5HSRV/ WWSVROOFESRUELRGLYHVLWBDT&WLFL&DVLYHVSHFLHVRWVL(###UVH&600	SW@
8: 0DGLVR&WWHIR/IIP&ORJ\\&DVLYHV&WF&LGHVZW&DWHW1RW&&V <u>WWSOLP&ORJZVFHG&ORJFDWHJRW&DVLYHVSHFL</u> &FHVVHG0D\@	
/DNH & PSODL & VL & BJDP,\$66SHDG3HYH W /LRQ <u>WWSDFESRUDWHU</u> <u>H&LBRHW/DT&WLFL&DVLYHVSHFLHVDT&WLFL&DVLYHVSHFLHV</u> &FSHDVHG\$@	<u>J</u>
₽©₽©&@(:LOH\(GLWRV):DWHVIAG6WHZ0GVKS3BJDP6₽PD&I3BJDPVDQ 5HVHDB&D⊗6PLWKK©L&QDFN:DWHVIAG,QWLWX/HRI3D⊗6PLWKK&OOHJH	
³² 5RWKOL&HUJHU-&DGGHUWRQOF1&WADQ/RGJH0\$&WLFL&DWH&HFLHV WD&RUWYLDWUDLOHUHGERDW&DWL&HL@PRYHG&RL&RYL@WDQ&DWFD&HGR&	Fisheries, 35
5RWKOLEHUJHU-KEDGGHUWRØ0F1&W\DQ/RGJH0\$&WLFL&D\YHSHFLHV WUDERUWYLDWUDLOHUHGERDWKEDWLEHL@PRYHGKERLFRYLOLWDQKEDWFDEHGRED	Fisheries, 35

5RWKOLTHUJHU-KADGGHUWRQOF1&WADQ/F WUDSTRUWYLDWUDLOHUHGERDWKZDWLTHLO	!GJH0\$ØWLFLØD₩H 9 HFLHV ₽RYHG K RL₱RYLØWD GK DWFD E HGRÐ	Fisheries, 35
&PHD&5DL&LOOH6&OGZ&WL&HWH 6XFHSWLELOLWRIT&JJDPXVHOxeisser &WHEDIWGHFR&VDPLQWLER@ouling, 27	ସିମ୍ୟାମକ୍ଷେVV&Q:RQ+ na rostriformis bugensisWRRWØWHØ	IS DV DVDPHD Ø RI
ORUM-7WMMOWKHHIIHFWRIDSSOLFDWLRØ/LPH SUDWRPLWLJDWHIRØLOE\ Dreissena pol	DQWHPSHUDW&HRWKHHIILFDFRIKRWE ymorpha }HEDPX VHOV3DOODV Biofe	δ₩НU ouling, 25
\$&WLF1&DEH6SHFLH7DM)RUFH9RO&/DU&GF ,&DWH6SHFLH7KUR3K5HFUHDWLRDO&WLYLW KWWSD0/DMIRUFHJRYOHHWL008-&5HFUHDWL	iol g: Wr3uhyh@/wkh6suhdgri\$&wlf /Lhv R <mark>D</mark> ob&Ghol 0 \$Gi>I	₿FH M G-&@
86HSDUWPHØ/RIWKH,Ø/HULRU%ØHDRI5HF0 (T&SPHØ/DQ9HKLFOHWR3UHYHØ/WKH6SUHD KWWSRUJRYPMOS/UHYHØ/LRQRF(/T&SPHØ/,ØHF) 6HSW@	DDPDWLR(W HFWLR DG: @HD DDDD ØOIRU GRI, XDWH6SHFLHV <u>WLRDG:&HDDDDD</u> ØOSGI	>\$FHMG
6WRS\$\$&WLF&WFKKLNHU\$#@UDO3UHYH@/LR DOOUHFUHDWLRQO&U <u>\$\$WWSSURWHFWR&@</u> @	®URFHGMHNRU6WRSSL®SPWLFHWFKKLNI <u>WHUM2WSUHYHØ/LR©UHYHØ/LRBJHÐULF</u>	hu rw uhdgiru <u>sks</u> >rsfh m g6hsw
1DWLRDO2FHDDFDQ&VPR&KHULF&PLDWUDV :DWHUFUDIWDQ(T&SPHØV KWWS&DELWDW&DDJRYSGIEHWBPDDJHPHØV PHØVSGL_>\$FHMG2FW@	vlr)dikhulh&huylfh3uhyho/loxodiyh6 BSUDFWlfho2hdoori:dwhufudiwdq(t)	SHFLH®UHDDΩ ⊻S

 SLURQDFN:DWHUKHG,W/LWXVH:DWHUKHG6WHDUGKLS3URJUDP6KPDURI3URJUDP0Q

 5HMDUFK
 KWWSDGNLQDWHFRP\$SeWLF5HRWFHQRFKHQV.633URJUDP6KPDUSGI

 >\$FHMG)HE@

U&:V6DQ5RWK0LEHUJHU-211HDDQGHIHDLQDQFDSHOHYHOLODMRERO/URO Oikos, 117,

M6DQ5RWØLVEH**UH**12IIHØHDQGHIHØHLQDQVFDSHOHYHOLØDVLRØRØ/BO Oikos, 117,

0KMDG-5DQ0DF, VDDF+HYHORSPHWRILQDQ0DNHVDVKVLQQWDVLRQWRN Journal of Applied Ecology, 42,

6WDWHRYHQHQARI9LFWRLD, QDVLYH3ODQVVDQQPDOV3ROLF),DPHXN WWSZESLYLFJRYDØJLFØWMSHVWVGLVHDVHVDQZHGVSQWHFWLQYLFWRLDSHVWDQPDOV ZHGVLQDVLYHSODQVDQPDOSRCFFFFVVHG0DQ0