



2022 REPORT

Merrimack River User Survey

The Merrimack River Watershed

0 10 20 Miles

95%

of river users are concerned/very concerned about the condition of the river

73%

believe it's unhealthy to be in the water of the Merrimack and to use it as a drinking water source

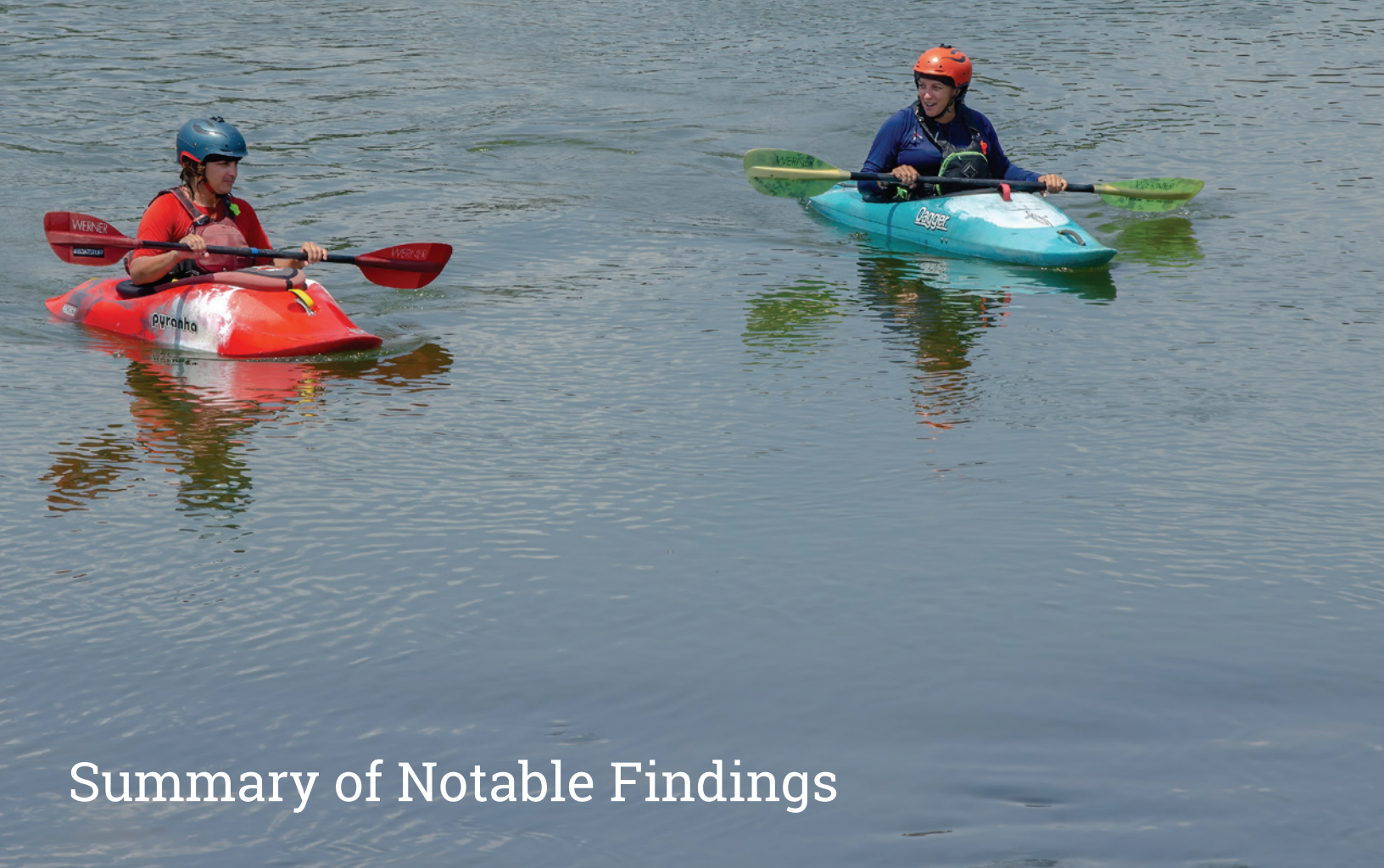


UPPER RIVER

River source
to the Lawrence Dam

LOWER RIVER

Lawrence Dam
to the Ocean



Summary of Notable Findings

ACES has wrapped up its 3-year, two-phase opinion survey of Merrimack River “users” to determine how they feel about the health and condition of the river and the insights are disturbing.

In 2019, an initial Pilot Study—among the Merrimack River rowing community—indicated significant concerns about the health of the river. A Phase 2 survey, involving over 550 Merrimack River general users, was conducted in 2021 throughout the 117-mile watershed. The analysis of the data has been completed with survey responses indicating that **95% of river users are concerned to very concerned about the current and future condition of the Merrimack River** and **73% of respondents believe its unhealthy to be in the water of the Merrimack and to use it as a source for drinking water**, which over 600,000 people currently do!

Examining narrative comments submitted by most of the survey takers revealed that most of those non-suitability perceptions relate to concerns about combined

sewer overflow releases experienced in the lower sections of the river, which have often been in the news, and are particularly noted by users in the lower sections of the river.

With significant governmental funds directed at health issues and communities focused on the environmental and economic health of the river, ACES provides this survey data to help inform the dialog and with the hope that it leads to a “River Rescue” movement. We believe it will need to involve a collaboration of all river-interested individual stewards and organizations, such as the Merrimack River Watershed Council and the Merrimack Conservation Partnership, as well as the Merrimack Valley Planning Commission and numerous NH and MA municipal, regional and federal political leaders.

The following report provides specific data based on an analysis of the responses to the specific questions that were asked of the individual users.

Supplies drinking water to

600,000

residents

Spans 5,000 square
miles and sustains

2.5

Million citizens

Runs through more than

200

Northeast communities



Nearly 500 million gallons of polluted stormwater and sewage are dumped into the river on an average year. In 2021, a relatively wet year, the combined sewer overflows (CSOs) release volume was **822 million gallons**, the highest release volume since 2013.

Background

The Merrimack River has a fascinating history and provides a great recreational opportunity for hiking, fishing, boating, or sunning by the water. The 117-mile-long river drains a watershed of 5,000 square miles that sustains a population of over 2.5 million citizens, supplies drinking water to 600,000 residents, and provides major recreational opportunities, diverse fish and wildlife habitat, and stunning scenic beauty to more than 200 New Hampshire and Massachusetts communities.

The river begins in the city of Franklin, New Hampshire, at the confluence of the Pemigewasset and Winnepesaukee rivers and flows south through Concord, Manchester, and Nashua. After entering Massachusetts, it turns east and north winding through towns and cities including Lowell, Lawrence, Haverhill, and Amesbury, to its mouth at the Gulf of Maine between the city of Newburyport and the town of Salisbury. In this report, the reference to the UPPER and LOWER River is descriptive of the river from the source to the Lawrence, MA dam and from this last dam on the river to the ocean. It's this free flowing, Ebb, Slack and Flood tides in the tidal zone that plays a large role in changing the use and interests regarding the river, and also the fisheries.

The Merrimack was once a pristine salmon and sturgeon river before being dammed and polluted in the 19th century Industrial Revolution, when several towns and cities on the Merrimack's banks (including Concord, Manchester, and Nashua in New Hampshire, and Lowell, Lawrence, and Haverhill in Massachusetts) took advantage of waterpower available from the river to build textile, paper and flour mills, tanneries, and even foundries along the riverbanks. The Merrimack

not only provided power to these industries but also served as a means for the transportation of their manufactured goods. Unfortunately, the river functioned as a sewer for industrial waste as well. During the heyday of the textile mills, the color of the Merrimack River changed daily depending on what materials were being dyed at the factories.

Today, the Merrimack has been somewhat revitalized by *The Clean Water Act* mandated wastewater treatment plants, typically meeting water quality criteria for safe swimming and shell fishing. However, on the rainiest days, surges of excess storm water flowing into antiquated sewer systems force the release of untreated sewerage into the river. These events are called combined sewer overflows (CSOs). Because treatment plants can't handle these larger surges of storm water, nearly 500 million gallons of polluted stormwater and sewage are dumped into the river during an average year. In 2021, a relatively wet year, the CSO release volume rose to 822 million gallons, the highest since 2013.

Despite significant improvements in environmental guidelines and supportive funding over the last half century, newer threats have emerged against the Merrimack: increased contaminated nonpoint source stormwater runoff; more frequent contamination from point source CSO releases; and the impacts from unsustainable development on land, forests, and critical habitats. Heavy rain events, which are expected to increase because of climate change, cause more water to flow off impermeable surfaces (think roads and parking lots) picking up chemicals before entering drainages.

River Users Survey Program—The Rationale

For the past four to five years, the Alliance of Climate and Environmental Stewards (ACES) has been supporting the importance of an ongoing broad-based, multi-state coalition that can raise community, state, and federal awareness of the urgency for a clean, safe Merrimack River. Because of public concern about the health of the river and its importance to communities in the river basin, water quality monitoring has been going on in the basin for years, but these programs have been sporadic at best and not coordinated basin-wide. These programs make a good start, but larger coordinated multiyear data collection programs still need to be established.

Since the citizens, towns and cities, and businesses are all potentially impacted by degrading conditions in the river, we all have the responsibility to change the course of events. But first we need an awareness of the urgency of the situation.

To this end, ACES has spent several years collecting anecdotal information to complement the physical

and chemical data gathered by local, state, and federal organizations. This will provide a comprehensive user perception of the health of the Merrimack River. In 2019/2020, ACES conducted an insightful pilot survey of one hundred twenty-eight Master Level Rowers on the Merrimack. The results of that survey project are available on our website: <https://www.aces-alliance.org/post/merrimack-river-study-rowing-community>. Then in 2021, ACES conducted a more comprehensive general users survey to engage a broader range of recreational and commercial users of the Merrimack River. After all, these stakeholders, who regularly use the river, are crucial sources of information.

This document summarizes some of the results of this survey. We hope this will provide authorities with information to help plan and fund necessary actions to make a healthier Merrimack. A more detailed Comprehensive Merrimack River Users Survey Report with technical appendices will be available in October for public use.

We believe that the perspectives and experiences of the actual users of the river are critical for a more total understanding of the watershed's health.

General Survey Results

A SURVEY RESPONDERS

The survey targeted actual users of the Merrimack River from New Hampshire and Massachusetts. We didn't ask responder's gender, race, age, or marital status. We only asked survey responders who are familiar with the river about their connections to the river and their opinions about the condition and health of the river. We received responses from hundreds of people who care about the river, who use the river regularly, and who are concerned about the river's health.

We found that 82% of our survey takers live in communities that border the Merrimack River and of those 94% live on or near the Merrimack and about 6% live on or near a tributary of the Merrimack. Most Massachusetts respondents (78%) live from Haverhill downstream to the mouth of the Merrimack, where cumulative effects of all upstream pollution have their greatest impact. Because this area is downstream of the last dam on the Merrimack River, many users not only enjoy direct contact with the water but also take advantage of the region's access to the ocean.

Of those who responded to the survey, 69% use the river one or more times per week and 19% use the river once or twice a month. That's a total of 88% who use the river it least monthly for their chosen activities. On an annual basis, 78% of survey takers use the river in the months of April to October and 94% in the three summer months (June-August). Only 22% of the annual usage occurs in the months of November—March where monthly survey taker usage varies between a high of 43% in November down to about 29% in December.

Geographically, 81% of the survey responders' Merrimack River usage is in lower segments of the river, between Lawrence and the mouth of the river at Newburyport/Salisbury. The remaining 19% of responder river usage is in upper segments of the river between Lawrence and New Hampshire. Tributary usage (but not exclusive usage) ranges from between less than 1% up to 3% of total usage throughout the river basin.

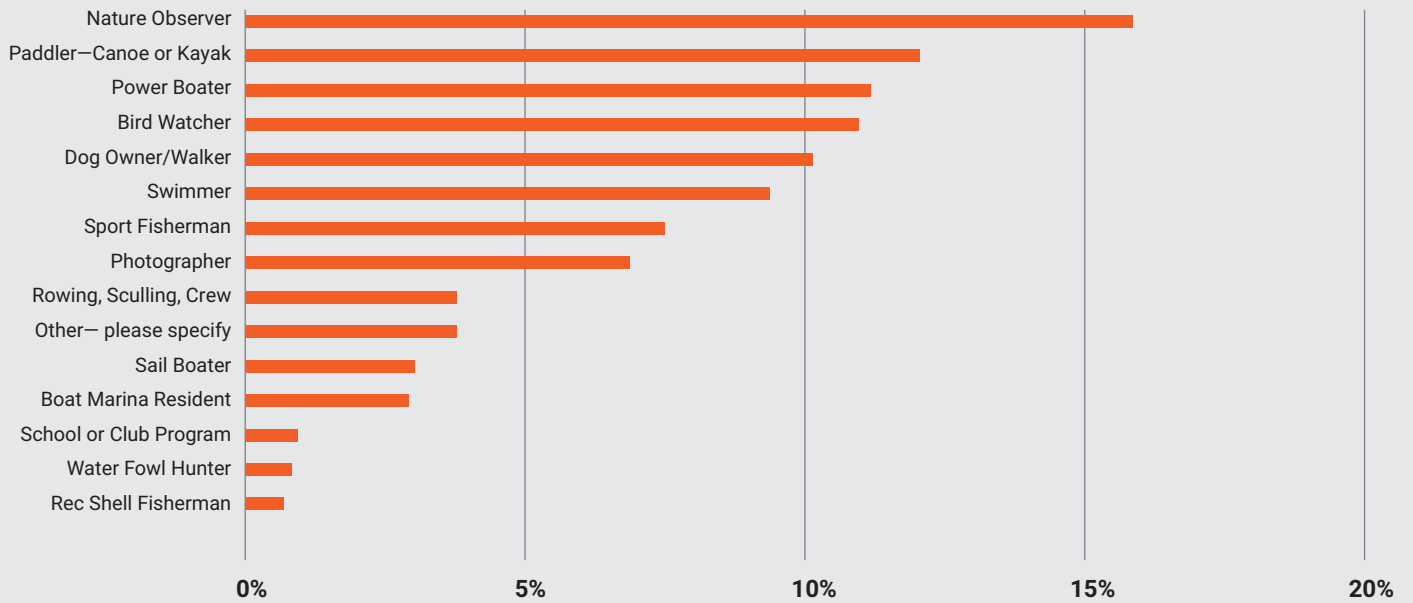


B USE OF THE RIVER

? If you enjoy the benefit of being on or in the Merrimack River and nearby beaches, please note the (non-commercial) activities in which you participate.

90% of over 550 responders indicated that they participated in more than one activity on the river. The remaining 10% of single activity responders were primarily (in descending order); Power Boaters, Rowers, Paddlers, or Dog Walkers. Over 70% of the survey takers said that they enjoyed using the Merrimack River in six or more of the fifteen survey-designated activities available for selection (Figure 1).

Figure 1. Survey Responder River Use by Activity Category



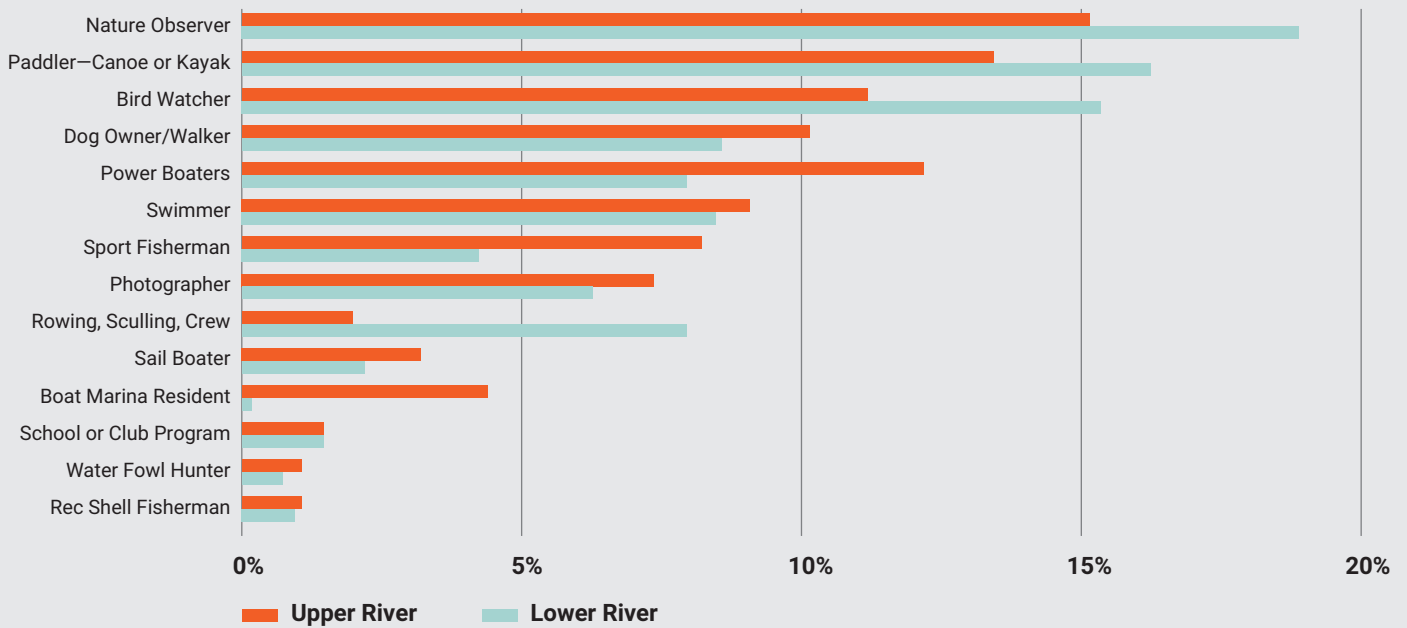
Activities vary from river segment to river segment, but patterns of similar relative use emerge (Figure 2). In the upper river segments above Lawrence, the use of the Merrimack favors observing nature, paddling, bird watching, and rowing, whereas in the lower segments of the river, below the last dam on the river in Lawrence where the river is in the ocean tidal zone; power boating and sport fishing dominate.

DISTINCTION OF UPPER AND LOWER RIVER SECTIONS

Upper River: River source to the Lawrence Dam

Lower River: Lawrence Dam to the Ocean

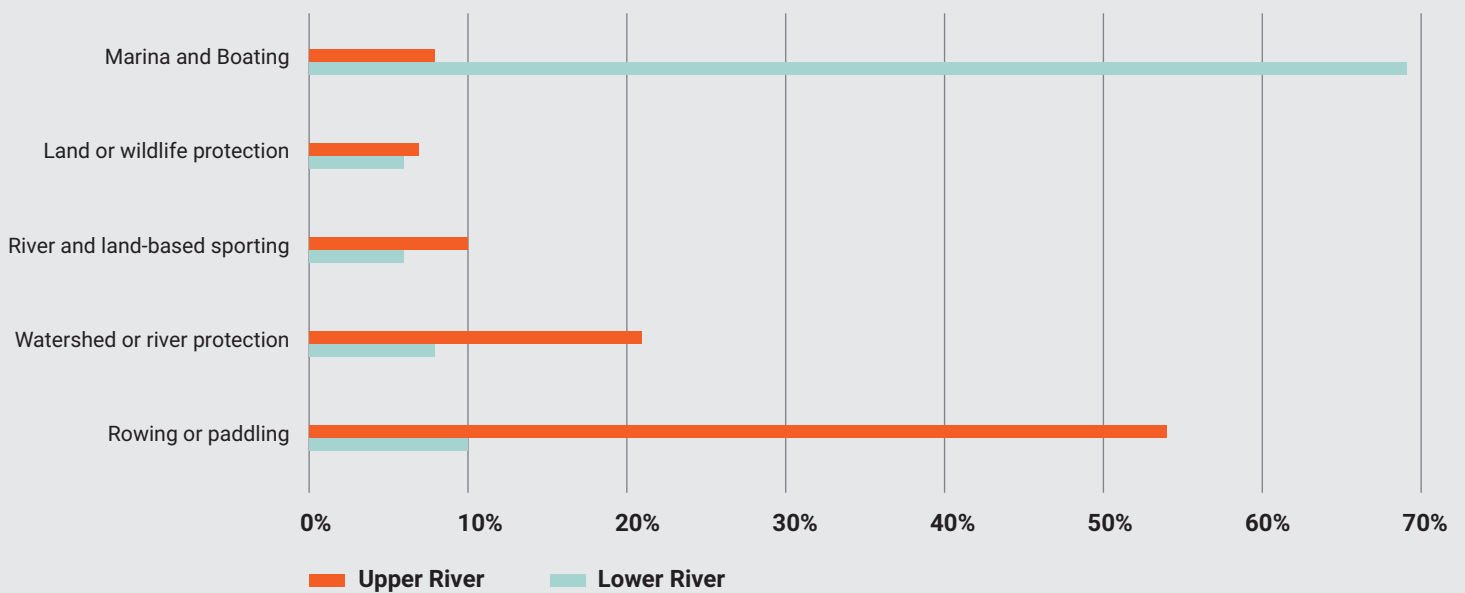
Figure 2. Percent Activity Usage for Upper and Lower River Sections



❓ Please tell us of the Marinas, Clubs, or other organizations which you may belong to for participating or supporting your activities on the Merrimack River?

To better understand the types of professional or commercial organizations with which our respondents are affiliated, we grouped the organizations into five generic categories: Marina and Boating, Land or Wildlife Protection, River or Land-based Sporting, Watershed or River protection, and Rowing or paddling. (Figure 3) indicates that Marina and boating affiliations in the lower river far surpass those in the upper river, while rowing and paddling affiliations in the upper river far surpass those in the lower river.

Figure 3. Percent of Marina, Club or other Organization Memberships in Upper and Lower River Sections

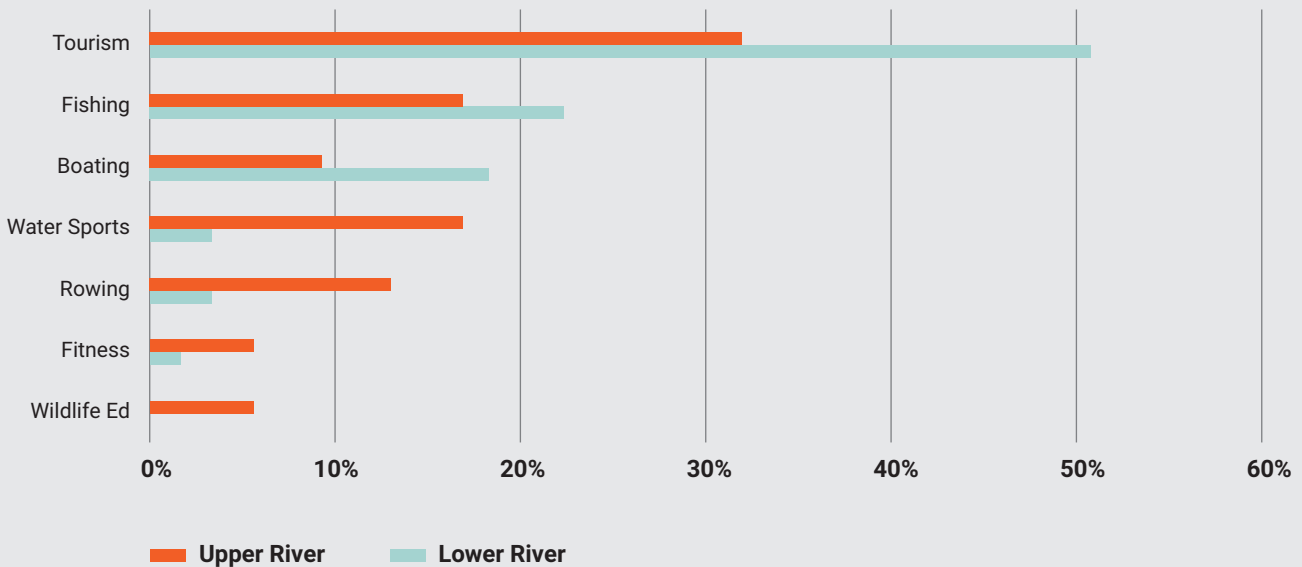


C ECONOMIC BENEFITS FROM THE RIVER

? If you recognize a potential benefit from an economic activity regarding the Merrimack River, please note them. Examples may be tourism, fishing, sporting business or activities that might bring people to the region.

Responders believe that the greatest driver of economic value for both the lower and upper river is tourism. Along with fishing and boating, tourism is responsible for most of the economic value of the lower river, while water sports, rowing, fitness, and wildlife education play a greater role in the upper river. (Figure 4)

Figure 4. Percent Perceived Economic Value by Use Category for Upper and Lower River



D SUITABILITY OF THE RIVER FOR VARIOUS USES

? Related to the section of the river you typically use; please indicate your opinion of the suitability of the Merrimack River in each of the included list of activities for the river.

Survey takers were asked their opinions about the suitability of the river for their personal uses and its use as a source of drinking water. The activities that the 479 responders evaluated were combined into four use-categories, including one related to the suitability of the river as a source of drinking water (see below). Use-category data were then sorted by three suitability categories: Not Suitable to Borderline Suitable, Neutral or No Opinion, and Suitable to Very Suitable.

GENERIC RIVER USE CATEGORIES BASED ON TYPE OF ACTIVITY:

On-water Use Category: boating, canoeing/kayaking, rowing crew, paddleboarding

In-water Use Category: swimming, wading

Near-water Use Category: observing nature, bird watching, dog walking, photography

From-water Use Category: fishing, shell fishing, hunting

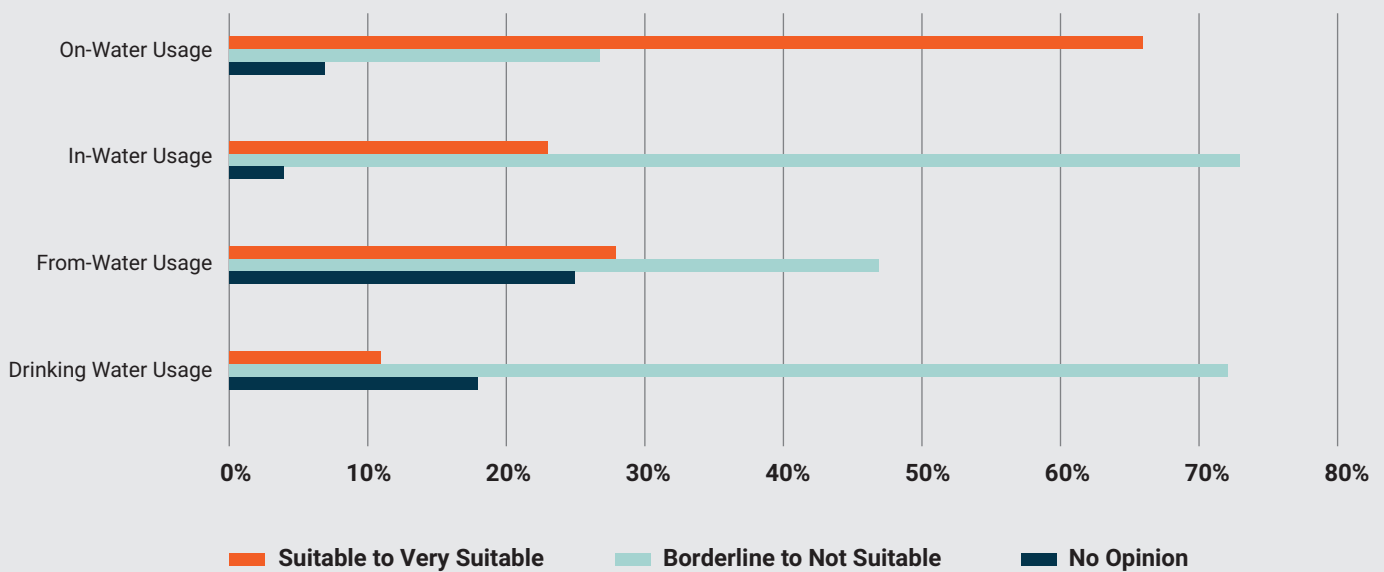
Given their perception of existing water quality conditions in the Merrimack River, 66% of responders believe being on the water was a suitable to very suitable use of the river (Figure 5). However, within that category, 81% believe that being on a boat was more suitable but only 49% believe that being on the river on a paddleboard in more direct contact with the water was suitable and 40% believed it was not.

As to being in the river (e.g., swimming or wading), only 23% of responders felt that it was a suitable use of the river and 73% felt that it was not (Figure 5). In the swimming category, 79% of responders indicated that it was not a suitable use of the river. Wading in the water was evaluated a little less harshly with 67% of responders believing that it was an unsuitable use.

Regarding taking aquatic resources (food) from the river, 47% of responders feel that it is borderline to not suitable practice in the Merrimack River (Figure 5). Within the taking food from the river category, only 7% believe that shell fishing in the river is a suitable activity and 56% believe that it is not suitable. An amazing 36% of respondents were uncertain or had no opinion about taking shellfish from the river for food. However, regarding fishing in general, opinions were almost opposites with 39% of responders feeling that it is not suitable and 48% believing that it is suitable to even very suitable. The remaining 13% were uncertain or had no opinion on the fishing activity.

The final category evaluated was the suitability of the Merrimack River as a source for municipal drinking water. Responses indicated that 72% of survey takers feel that it is borderline to not suitable to use the Merrimack River as a source for drinking water and only 11% felt that it was a suitable to very suitable use (Figure 5).

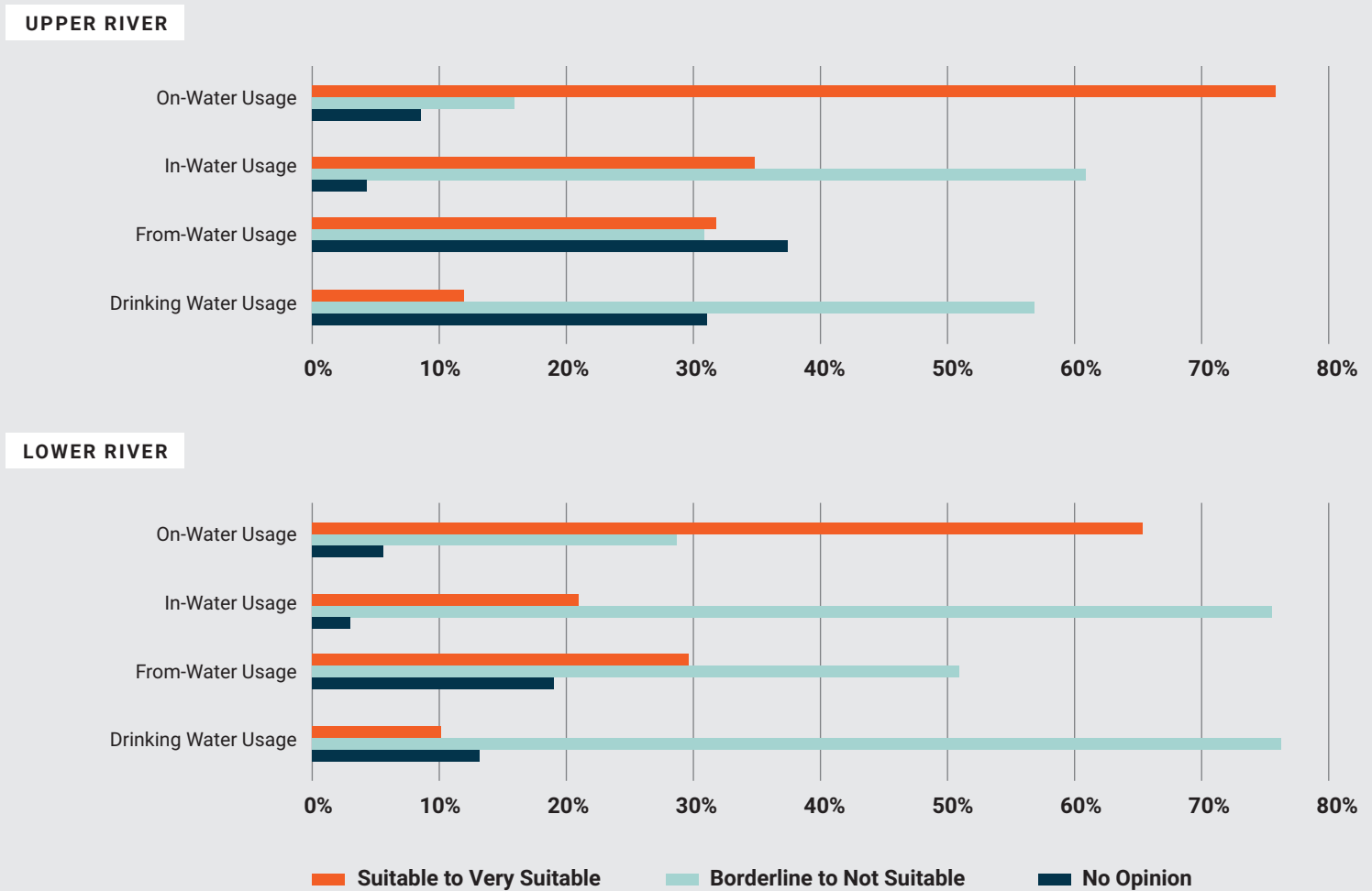
Figure 5. Suitability of Merrimack River for Designated Use Categories



? How does that perception vary between upper and lower sections of the river for various river uses?

Direct comparison of the upper and lower river suitability responses can be seen by examining the difference between the percentage responses in the upper and lower river sections (Figure 6). While there are sizeable differences (up to 20 percentage points) between the dominant responses from upper and lower river users, the overall conclusion is that they do not alter the significant level of concerns that all of the users have about using the river water.

Figure 6. Comparing Perceived Usability or the River in Upper and Lower Sections



In summary, the perception of the majority of lower river users is that the waters of the lower Merrimack River are not suitable for all use categories that bring users into any direct contact with the water or as a source for drinking water. The perception of the majority upper river user's is that the waters of the upper Merrimack River are not suitable only for use categories that put the user in the river itself or as a source for drinking water. Most survey takers who were neutral on the suitability of Merrimack waters for all use categories were users of the upper Merrimack River.

E CSO'S AND THE THREAT TO HUMAN AND PET HEALTH

When survey takers were asked if they knew what CSO's were and understood what caused them, only 86 people responded to the question, possibly because most responders know what a CSO is don't completely understand the how and why of what causes CSO events. Almost 80% of the responders (68 total) indicated that they do know and understand what causes combined sewer overflows and the other 18 responders were uncertain or did not know what causes CSOs.

When asked if the periodic overflow of sewage into the Merrimack River causes human health hazards, 88% of the 479 responses agreed or strongly agreed that CSO discharges into the Merrimack River do pose a hazard to human health. Only 7% of responders indicated that they disagreed or strongly disagreed with the statement and only 5% of responders were neutral on the topic. Many of the survey takers (12%) stated that they have had friends or themselves need to seek medical attention because of contact with the water from the Merrimack River. The most common impacts, 76% of reported human incidents, were due to skin infections (and several eye and ears infections), particularly due to infected scratches or minor injuries (diagnosed as Cellulitis – often requiring emergency room visits). The second most common impacts, 24% of reported incidents, were from gastrointestinal or stomach infections (also often requiring emergency room visits—several diagnosed as Giardia infections). Six of the responders also reported infections in dogs including skin, eye and ear infections.

Regarding danger to their pets, 73% of responders indicated that contact with the river presents a likely or very likely health hazard to pets such as dogs. Only 11% feel that it is unlikely or very unlikely that contact with the river presents a health hazard to pets and 16% of responders said that they were neutral on the potential for pet health risk. Regarding actual occasions of a pet getting infections that required a visit to the veterinarian, 50 of the 473 responders (11%) answered yes and 47 yes-responders elaborated on their experiences. The largest impacts (60% of reported incidents—all dogs) to pets were due to skin, ear or eye infections after coming in contact with the river waters (about 2/3 reporting skin infections and 1/3 reporting ear or eye infections). The remaining 40% reported incidents were pets suffering from gastrointestinal or stomach infections (often requiring emergency visits to their vets). One death was reported.

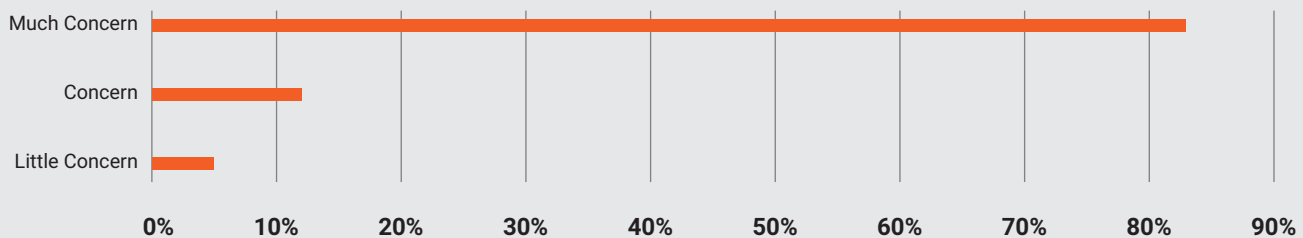
88% of survey responders agree or strongly agree that periodic discharges of untreated sewage into the Merrimack River (CSO's) are a hazard to human health.

CONCERNS ABOUT RECENT CHANGES IN THE CONDITION OF THE MERRIMACK RIVER

? Please indicate the degree of concern that you have about the overall condition of the river.

Of the 553 people that answered the survey, 472 answered this specific question, 280 of whom left written comments. The results indicate that the majority (83%) of the respondents expressed “Much Concern” about the condition of the Merrimack River. Only 5% of respondents have “Little Concern” and 12% of respondents hold a position that represents an intermediate level of concern. (Figure 8.)

Figure 8. Percent of All Responses Selected in the Three Degree-of-Concern Categories

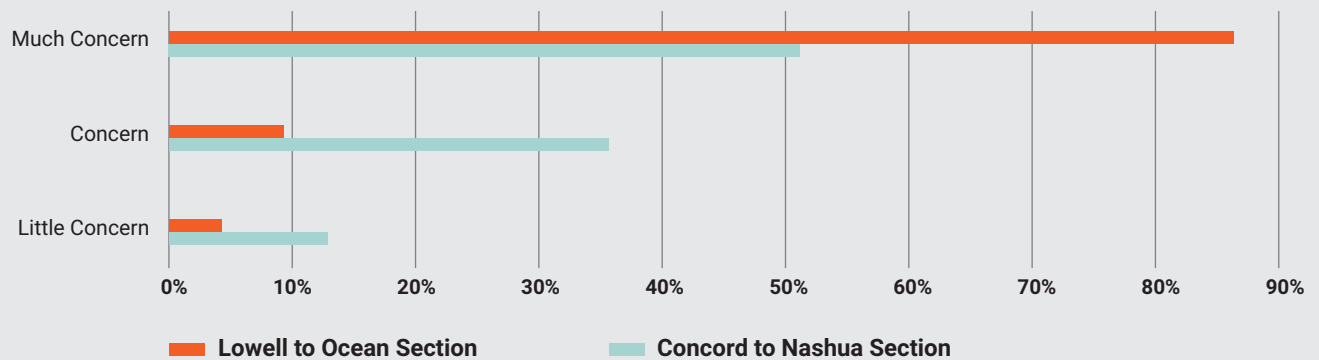


Significant differences appear in the response patterns between upper river segments, above Nashua, and lower river segments, below Lowell, with the Nashua to Lowell segment response pattern being a transitional region of the river (Figure 9).

In the lower segments of the river downstream of Lowell, the percent of respondents who have “Much Concern” about the condition of the river (over 85%) far outweighs the 50% with that level of concern in the upper river segments. Without trying to understate the fact that fully one-half of the upper river segment responders are still very concerned about the condition of the Merrimack. On the other end of the spectrum, only about 3% of lower river respondents have little to no concern about the condition of the Merrimack compared to about 13% in the upper river, a factor of almost x 4 in difference. This suggests perceptions of water as being cleaner in northern portions. This also suggests that users of the upper river segments have less concern about the condition of their part of the river than users of the lower river have about their part of the river.

83% of survey responders expressed MUCH CONCERN over the condition of the Merrimack River and over half provided written comments overwhelmingly (98%) expressing concern.

Figure 9. Comparative Percent Responses by Degree-of-Concern Category for Sections of the Lower and Upper River



Two other independent parameters were examined to see if they might possibly influence how the condition of the Merrimack is perceived by survey takers: the frequency of visits to the river—weekly or monthly—and the activity category engaged in when visiting the Merrimack. No matter the frequency or the type of river usage, the fact that such a high percentage of respondents expressed “much concern” points to some major perceived problems with the health and condition of the Merrimack River.

Of the 280 user comments submitted to the question, almost 98% cite concerns about river condition, with 44% directly mentioning sewage pollution and CSOs. This points towards a major concern on the part of the participating public about sewage overflows as they relate to the health of the Merrimack River, with the perceived worst river sections being below Lowell.

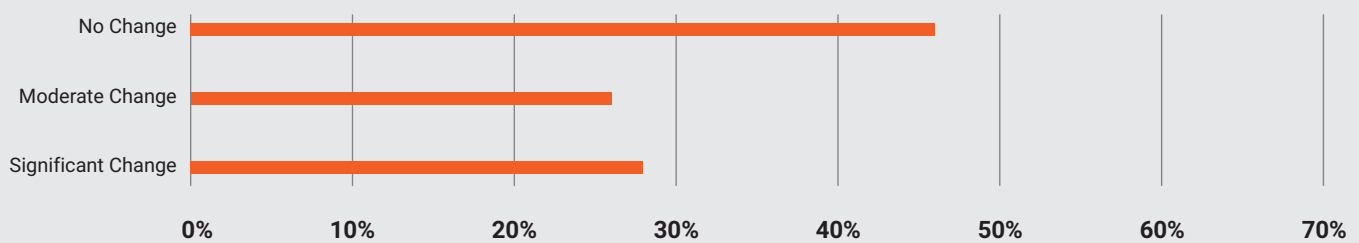


CHANGING CONDITIONS IN THE MERRIMACK RIVER AND POTENTIAL FOR ECONOMIC IMPACTS

? Have you experienced or noticed any changes in the condition of the Merrimack over the past two years?

Over one-half of the 438 respondents (232) left written comments, 28% of the respondents felt that they had observed a significant change in the condition of the Merrimack River over the last two years (Figure 10). But approaching one-half (46%) of respondents saw no change to at most a little change in the condition of the river and 26% said that they had viewed only a moderate degree of change.

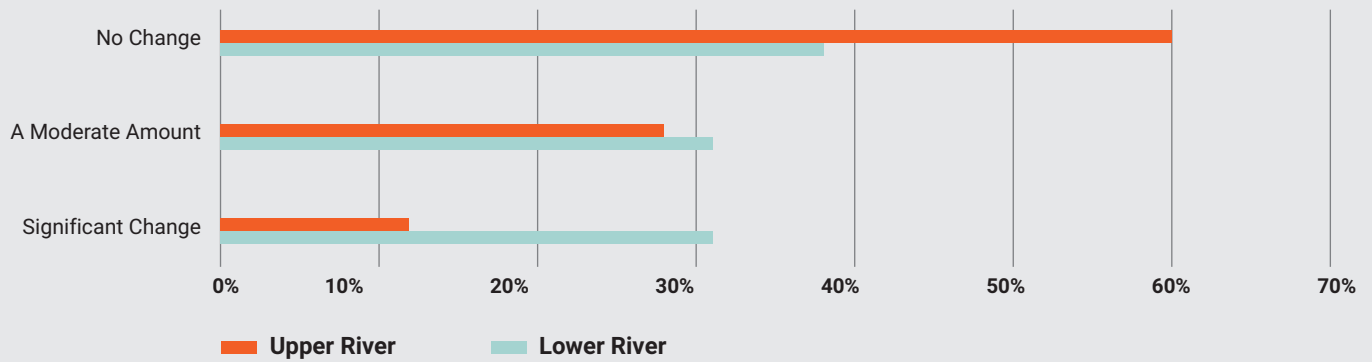
Figure 10. Percent of All Responses Selected in the Three Degree-of-Change Categories



When degree-of-change observations were grouped by where responders used the river, two distinct patterns or groups seem to exist comprised of the upper five segments of the river, Concord to Haverhill, and the lower three segments of the river, Haverhill to the ocean. Degree-of-change data from these two groupings were combined to form an upper river grouping (Concord to Haverhill segments) and lower river grouping (Haverhill to the Ocean) based on the segment of the river used by each survey taker. A chart has been made to compare the overall responses between the upper and lower sections of the river (Figure 11).

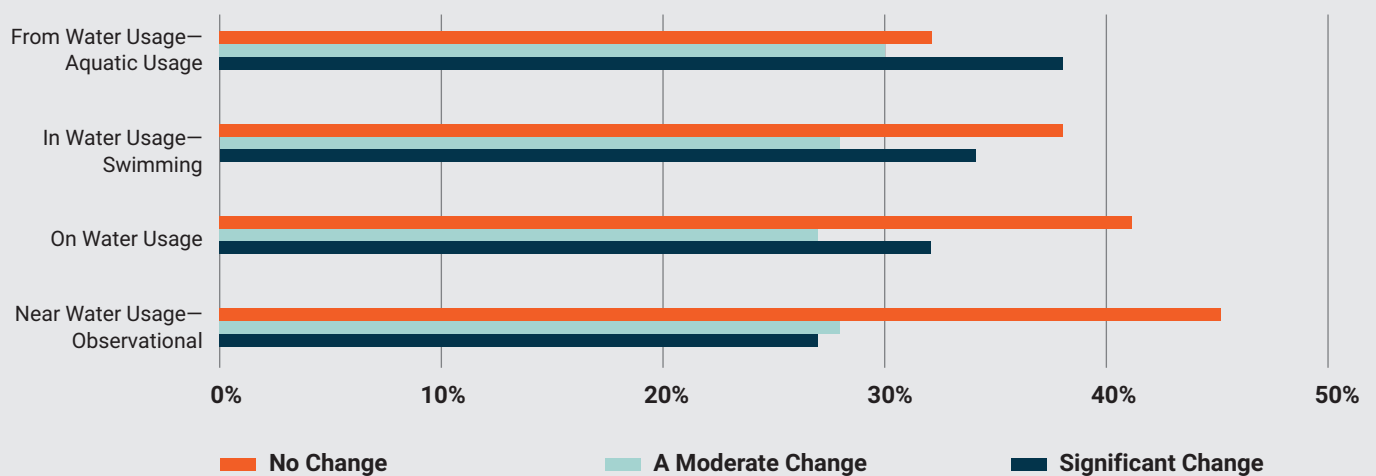
Data from the upper river (Concord to Haverhill sections) show that the majority of users (60%) have seen no change in river condition over the past two years, with only about 12% seeing any significant change (a factor of x5 difference in the two categories). By comparison, the lower river (Haverhill to the Ocean) data are more evenly distributed across the three change categories compared to the five upper river segments with 38% seeing no change and 31% seeing both moderate and significant change. Comparing the upper river significant change section (12%) to the lower river section (31%) there is about a x2.5 difference between the two sections of the river. These differences reflect the fact that there are many fewer access points in the upper river and suggest significantly more experiences and observations that result in an intense concern in the lower sections of the river downstream from Haverhill than in the sections upstream from Haverhill.

Figure 11. Percent of Observed Change Concord to Haverhill vs. Haverhill to Ocean River Sections



When considering what activity(s) the survey responder participated in when visiting the river (Figure 12), survey responses indicate, not surprisingly, the closer your contact with the water, the more likely you are to see change in the river. Also, other data show that the more frequently you go to the river (weekly vs. monthly), the more likely, by a factor of x2, you are to see a change in conditions.

Figure 12. Percentage Response by Activity Category in the Three Degree-of-Change Categories



Summarizing, if you use the Merrimack River upstream of Haverhill, you are much more likely to perceive no changes in the condition of the Merrimack River over the past few years and if you use the river downstream of Haverhill you are much more likely (x2.5 more likely) to have seen significant changes in the conditions of the river. Perhaps this signals more CSO awareness.

A majority of respondents believe the Lower River economy is highly dependent on three primary river related uses: tourism, fishing and boating. The Upper River economic dependence on the Merrimack is perceived to be more diverse, relying on tourism, fishing, water sports, rowing, and to a somewhat lesser extent boating. A majority (76%) of the 363 respondents indicated that they believe that there will be potential negative economic impacts as the river continues to deteriorate. In addition, over 222 of those 363 concerned respondents registered their concerns by providing written descriptions and personal comments relating to those potential impacts.

H**ACTIONS THAT SHOULD BE TAKEN IMMEDIATELY TO MITIGATE EXISTING AND POTENTIAL FUTURE IMPACTS**

When asked what they believe to be urgent actions that need to be taken immediately to improve the Merrimack River, 84% of all survey takers put “Finding and fixing pollution hot spots and point source pollution” on their action list for protecting the health of the Merrimack River; 66% identified this as their highest priority for helping to improve the Merrimack River.

Their second most urgent action item (14%) was to “Develop an Alert System for combined sewer overflows.” Ninety-three percent (93%) of survey takers indicated that they agreed or strongly agreed that residents and users of the river resources should be given timely notification, information, level of risk, and possibly acceptable types of usage when sewage or potentially harmful material is released into the river. Since this survey was conducted, initial actions have been taken to establish this type of a warning system.

Their third priority (at 11%) was to “Improve habitat for fish and wildlife.” Other choices like preparing for the next big flood, conserving water to mitigate drought, and promoting more recreational opportunities each came in equally at about three percent (3%) each.

Additionally, 230 survey takers responded when asked if they were aware that the Merrimack River is littered with both large and small forms of debris including cars, household appliances, plastic bottles, mattresses, tires, hypodermic needles, shoes, construction materials, bicycles, and furniture. Over 90% of these respondents indicated they were aware of the problem and regarded this as a significant issue for the health of the river. They also believe that a portion of the funding from any future Combined Sewer Overflow (CSO) elimination programs should be allocated to cleaning debris from the Merrimack.



Acknowledgements

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Clean River Project

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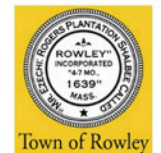
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