

Pre- and Post-TV Campaign Surveys of Stormwater Awareness & Behavior in the Clean Water Education Partnership Service Area: Comparisons and Findings

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Introduction

Many local governments and other entities are using mass media to conduct outreach to educate the public about nonpoint source water pollution, or polluted stormwater runoff, and the role that the behavior of individuals plays in contributing pollution to runoff as it flows over yards, driveways, and roads. The NC Clean Water Education Partnership (CWEP) is a cooperative effort of approximately 30 local governments in the eastern half of North Carolina that pool resources to purchase radio and television airtime, maintain a website (www.ncCleanWater.org), and develop outreach materials. The Partnership has administrative support by agreement with Triangle J Council of Governments (www.tjcog.org).

In 2006, CWEP applied for and received a Section 319 grant from the NC Department of Environment and Natural Resources to conduct a television campaign and to evaluate its effectiveness. The null hypothesis was that CWEP’s campaigns would not produce a measurable effect on behavior, which is a valid postulation based on research presented at the 2005 Chicago EPA Nonpoint Source Education conference and the fact that a previous survey conducted by the NC Department of Environment and Natural Resources (Bartlett, 2006) showed little difference between urban jurisdictions, which have been conducting outreach since 1990 under Phase I rules, and non-urban jurisdictions (however, there is not a perfect alignment between Census-defined “urban” communities

and Phase I communities, and immigration and outmigration may dilute the effects of outreach).

The objective of this project was to collect information on the effects of mass media outreach campaigns on stewardship behaviors. CWEP routinely collects data on campaign outputs, or the quantitative and easily measured portions of the campaigns that are under the control of those conducting outreach. The survey work conducted as part of this project was an attempt to evaluate the outcomes and impacts of mass media outreach on the target audiences. Summaries of the media campaigns described below are available on the CWEP website under “Outreach.”

Pre-Campaign Survey Methodology

The ZIP-code specific sub-sample of 234 was pulled from data collected in 2005 for a Stormwater Awareness Survey sponsored by NC DENR. The sample for the original research was comprised of 1,000 responses spanning the entire state of North Carolina (95% confidence level with a ± 3.1 confidence interval). This sub-sample of 234 (95% confidence level with a ± 6.4 confidence interval) represents the NC Clean Water Education Partnership jurisdictions and serves as comparison data for a follow-up survey on awareness and behavior regarding stormwater conducted after media campaigns were run covering the region.

CWEP Outreach Campaigns

CWEP originally planned to run a single, extra-heavy television campaign in the spring of 2007 and measure changes based on that campaign. However, due to delays in survey deployment, two additional campaigns were conducted before the post-campaign survey was conducted: a summer radio campaign and a Fall television campaign.

The Spring 2007 and Fall 2007 television campaigns both evenly rotated the 30-second “Johnny Fishpatrick” spot (developed by NCDENR) and the 30-second “Buffer Improvement” spot (developed by CWEP). Johnny Fishpatrick depicts general principles of residential stormwater contamination (yard care, car washing, storm drains not treated), and the Buffer Improvement spot emphasizes the importance of planting riparian vegetation. Both campaigns were targeted to men aged 25-54. The Spring campaign included an extra run of spots broadcast during the 2007 ACC basketball tournament.

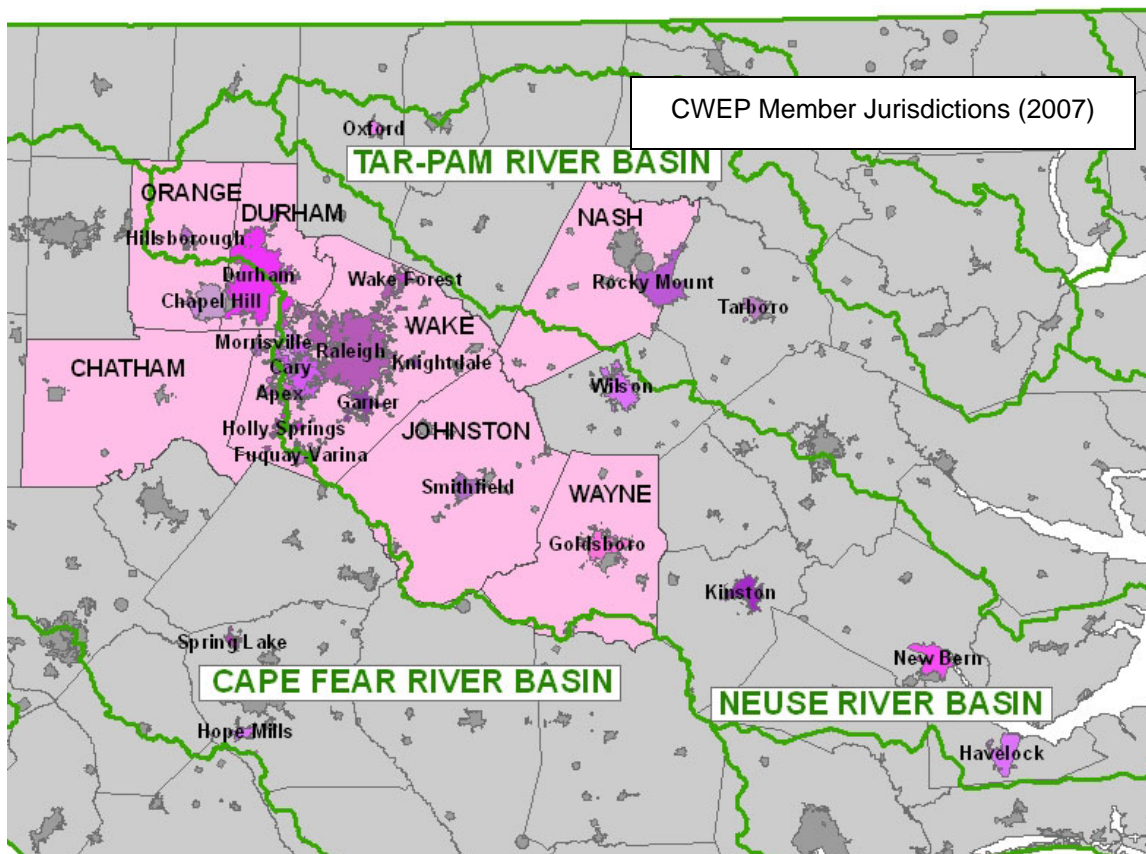
The summer radio campaign evenly rotated two 60-second spots throughout the CWEP area and was also targeted to young and middle-aged men of various ethnic backgrounds (Latino, African-American, and Other). One spot focused on proper disposal of used motor oil and the other on car washing practices. The campaign was run three weekends in June 2007.

Traffic on the CWEP website was tracked during all three campaigns. During the Spring TV campaign, a web poll was also deployed asking visitors how they came to the site. More than half of the web poll respondents said they were visiting the website because they saw a television spot. Media campaign and web traffic summaries are available on

the CWEP website under Outreach by outreach medium (radio, television, and website). See Appendix C of this report for information on CWEP website traffic.

Post-Campaign Survey Methodology

A 26-item survey instrument was created in partnership with East Carolina University's Center for Survey Research. There were two components to the post-campaign survey: a phone instrument and a mail instrument. They were designed to measure awareness, perceptions and behaviors related to water quality and stormwater runoff in specific areas of North Carolina. The same instruments gathered respondent data on gender, age, income, education and ethnicity. The survey instruments were very similar to the 2005 NCDENR survey instrument except that we added a question about whether respondents recalled seeing an ad about stormwater on television. We created the mail instrument to facilitate a high rate of timely participation, since time elapse was an issue due to the question about media ad recall. (See Appendix B for survey instruments.)



The sample of 8,000 telephone numbers was purchased from a reputable survey sampling company. Respondents for the mail survey were selected from a random sample of directory-listed households within CWEP member government ZIP codes. This sample of 1,500 names and addresses for the mail survey was purchased from the same sampling company. For the telephone survey, respondent telephone numbers were coded as urban, suburban or rural dwellers by the survey sampling company who provided the sample.

Data for the surveys were collected between September 2007 and October 2007. Over 8,000 calls were placed to capture 479 completed telephone surveys, and 1,500 mailings

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were sent to yield 236 completed mail surveys. With a total sample size of 715, the confidence level is 95 percent and the confidence interval is ± 3.7 . The telephone survey was administered by twelve interviewers, trained and employed by ECU's Center for Survey Research using a computerized telephone-assisted interview (CATI) software system. The mail survey was administered by students employed by the Center for Survey Research.

The data were compiled and analyzed by the ECU Center for Survey Research. After validity and reliability were established, data were analyzed using frequencies and cross-tabulations. For all statistical findings, significance levels were set at $p \leq .05$. Cross-tabulations were performed on the survey questions using all demographic data points: area (for telephone respondents), gender, race, education level, age, household income, and retirement status. These cross-tabulations are available upon request and on the CWEP website as appendices to the report for the post-campaign survey. Another cross-tabulation was run separately and is discussed here: whether respondents recalled seeing a television ad about stormwater.

Comparison of Findings

Both pre- and post-campaign surveys began with three questions to establish basic demographic information, which were followed by 3 questions to assess stormwater knowledge, 12 questions about behavior, and finally 6 demographics questions. ECU produced detailed reports for both surveys, including demographic cross-tabulations and goodness of fit analyses of the survey population compared with US Census data, that are available on the CWEP website.

Demographics

County Distribution - Top 4 Counties

Percent of Responses	
Pre-Campaign	
Wake	35.0
Durham	7.7
Wayne	6.8
Johnston	5.1
Post-Campaign	
Wake	35.1
Durham	8.3
Orange	7.8
Johnston	7.0

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Demographic Percentages

	Pre-Campaign (Percent)	Post-Campaign (Percent)
Gender		
Men	42	44
Women	58	56
Retired		
Yes	31	33
No	69	67
Area of Residence		
Urban	31	32
Suburban	47	47
Rural	22	21
Education Level		
Some high school or less	16	5
High school graduate	25	17
Some vocational/technical school	7	4
Graduated from voc/ tech school	6	6
Some college/2 yr college grad	21	19
4-year college graduate	15	26
Post-graduate degree	10	23

Demographic Percentages

	Pre-Campaign (Percent)	Post-Campaign (Percent)
Age Group		
18-24	12	5
25-34	11	11
35-44	36	17
45-54	18	23
55-64	11	20
65 and Over	12	24
Race		
Black/African-American	18	13
Asian	4	1
White	52	78
Hispanic	11	4
Other	7	2
Don't Know/Refuse to Answer	8	2
Income Level		
Less than \$12,000	8	5
\$12,000 to \$25,000	15	8
\$25,000 to \$35,000	10	9
\$35,000 to \$50,000	16	12
\$50,000 to \$75,000	18	14
\$75,000 to \$100,000	8	14
Over \$100,000	7	17
Don't Know/Refuse to Answer	18	21

A chi-square goodness of fit test showed a significant difference between the number of males and females in both the pre-campaign and post-campaign samples compared to the expected number in 2007 Census data for the region. A significant difference was also

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noted between both the pre-campaign and post-campaign samples and the population with regard to the race categories of African-American, Asian, White, Hispanic and Other. Data on age, household income, education levels and household income could not be evaluated using this measure due to overwhelming differences in the categorization of the data in the survey instrument compared to census data categories.

Responses for knowledge and behavior questions are compared for each survey and discussed below. A version of the question respondents were asked is listed first. Then, pre-campaign and post-campaign responses are shown side-by-side as percentages of respondents giving that response. Then, post-campaign responses are further broken out by respondents' responses to the other question of whether they recalled seeing a television ad about stormwater. Correct or desirable responses are highlighted in yellow, and the highest frequency responses are in boldface type. For all comparisons, "Don't know" and "Refuse to answer" responses were eliminated from statistical calculations.

Opinions of Water Quality

Based on your current knowledge, do you think the overall water quality of the rivers, streams, lakes, estuaries, etc. in your area is... (poor/fair/good/excellent)

[There is no "correct" or desirable response to this question.]

	Pre-Campaign (Percent)	Post- Campaign (Percent)
Poor	14	15
Fair	41	49
Good	39	30
Excellent	4	2
Don't Know/Refuse to Answer	2	4

Participants were asked to rate the quality of water on a scale of 1 to 4, where 1 = Poor and 4 = Excellent (see Table 4). An independent samples t-test was used to determine whether there were significant differences between perceived water quality in the pre- and post-campaign data. The difference between the two groups was significant, ($t(913) = 2.59, p = .01$), in that slightly more pre-campaign participants ($M = 2.34$) thought that the water quality was better than those in the post-campaign survey ($M = 2.20$). There were not substantial differences in the post-campaign response set between those who recalled seeing a television spot and those who did not.

Post-campaign opinions of overall water quality by television ad recall

	Did recall (percent)	Did not recall (percent)
Poor	14	16
Fair	51	50
Good	31	27
Excellent	2	3
Don't know	2	4

Knowledge about Sources of Water Pollution

I am going to read you a list of possible sources of water pollution, and I would like you to tell me which one you think is the biggest source of water pollution in North Carolina.

	Pre-Campaign (Percent)	Post-Campaign (Percent)
Litter (Trash dumped into rivers and lakes)	6	13
Wastewater from industrial plants	33	17
Wastewater from sewage treatment plants	33	12
Runoff from yards, parking lots and streets	9	23
Runoff from farms and agricultural operations	17	29
Don't know/Refuse to answer	2	6

A chi-square test was employed to gauge differences in responses from one campaign to the other. There were, in fact, significant differences in responses between the two surveys, $\chi^2 = 82.6, p < .001$. Pre-campaign respondents were more likely to cite wastewater from various types of plants as the most important source of water pollution, whereas those in the post-campaign survey cited types of runoff as the most important. There was a substantial increase in the percentage of respondents giving the correct desired response, “runoff from yards, parking lots, and streets.” Whether or not people recalled seeing a television spot was significantly correlated with knowledge of where stormwater comes from ($\chi^2 = 12.047, N = 626, p = .034$).

Post-campaign knowledge of sources of water pollution by television ad recall

	Did Recall (percent)	Did Not Recall (percent)
Litter	12	13
Wastewater from industrial plants	12	19
Wastewater from sewage treatment plants	11	12
Runoff that has flowed over yards, parking lots, etc.	30	19
Runoff from farms and agricultural operations	31	29
Don't know	4	8

Knowledge about Stormwater Runoff Destination

Stormwater is the water that collects on streets and parking lots after a rain storm, which is often collected in gutters at the curb and storm drains. Now, oftentimes folks don't really know much about this, and that's ok, but if you had to pick one of the following options for here stormwater runoff goes after it goes down a storm drain, would it be that it goes to...

	Pre-Campaign (Percent)	Post-Campaign (Percent)
A sewage or wastewater treatment plant	27	19
A special/separate treatment plant	12	10
Nearby fields and yards	7	7
The closest river, stream, or lake	45	57
Don't know/Refuse to answer	9	7

There were slightly significant differences between pre- and post-campaign participants, $\chi^2 = 8.13, p = .043$. A much lower percentage of respondents gave the very undesirable incorrect response “a sewage or wastewater treatment plant” (which is never the case in North Carolina), a slightly lower percentage gave the also incorrect response of a special/separate treatment plant, and there was a substantial increase in respondents giving the correct desired response of “the closest river, stream, or lake” (45% to 57%). Those who recalled seeing a television spot were more likely to give the correct response, but the difference between those who recalled seeing a spot and those who didn't is not that substantial.

Post-campaign knowledge of stormwater runoff destination by television ad recall

	Did recall (percent)	Did not recall (percent)
A sewage/wastewater treatment plant	17	19
A special separate treatment plant	7	10
Nearby fields and yards	6	7
The closest river, stream, or lake	64	55
Don't know	6	9

Lawn Care Behaviors

Do you have a grass lawn or yard that you maintain?

	Pre-Campaign (Percent)	Post-Campaign (Percent)
Yes	94	80
No	6	20

Significantly more pre-campaign respondents did have grass to mow ($\chi^2 = 24.55, p < .001$) than post-campaign survey respondents.

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[Those who responded “yes” were also asked:] *What do you do with the grass clippings?*

	Pre-Campaign (Percent)	Post-Campaign (Percent)
Collect and put in garbage	27	13
Leave in yard	54	61
Blow them in a gutter or ditch	2	--
Compost or mulch them	12	22
Other	4	4
Refuse to answer	1	--

A significant difference also exists between the two survey groups ($\chi^2 = 32.3, p > .001$) for this question. Pre-campaign respondents were more likely to leave them in the yard or put them in the garbage, while post-campaign respondents more often left them in the yard or used them for compost/mulch. However, differences in the post-campaign survey population between those who recalled seeing a television spot and those who did not were not substantial.

Post-campaign grass clipping disposal reported behavior by television ad recall

	Did recall (percent)	Did not recall (percent)
Put them in the garbage	10	14
Leave them in the yard	62	57
Dump them into a gutter or a ditch	---	---
Mulch/compost them	22	22
Other/not sure	2	4
I don't mow the yard	4	3

Do you use fertilizer on your lawn?

	Pre-Campaign (percent)	Post-Campaign (percent)
Yes	49	52
No	51	48

There were no substantial differences in the amount of people using fertilizer on their lawns between the first survey and the second. Differences in the post-campaign survey population between those who recalled seeing a television spot and those who did not were similarly negligible.

Post-campaign fertilizer use reported behavior by television ad recall

	Did recall (percent)	Did not recall (percent)
Yes	55	52
No	45	48

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[Those who responded “yes” were also asked:] *How often do you fertilize your lawn?*

	Pre-Campaign (percent)	Post-Campaign (Percent)
Monthly	7	6
Two to three times a year	47	43
Once a year or less	46	48
Don't know/Refuse to answer	--	3

There were no statistically significant differences with regard to the frequency with which people apply fertilizer to their lawns between the first survey and the second. Post-campaign respondents who did recall seeing a television spot were somewhat less likely to give the desired response “once a year or less.” It is not likely that the CWEP media campaigns were a factor in this difference.

Post-campaign frequency of fertilizer application reported behavior by television ad recall

	Did recall (percent)	Did not recall (percent)
Monthly or every other month	6	7
Two/three times a year	49	40
Once a year or less	45	53

[Those who responded “yes” to whether they fertilize their lawn were also asked:] *Does anyone ever test the soil to determine fertilizer needs?*

	Pre-Campaign (percent)	Post-Campaign (percent)
Yes	41	29
No	59	71

There was a slightly significant difference between those who reported having their soil tested and those who did not ($\chi^2 = 4.1, p = .043$), in that fewer participants in the post-campaign survey reported having their soil tested (an undesirable change). It is unlikely that the CWEP media campaigns are an explanatory variable, since television ad recall was slightly positively associated with soil testing behavior.

Post-campaign soil testing reported behavior by television ad recall

	Did recall (percent)	Did not recall (percent)
Yes	36	29
No	63	66
Don't know	1	5

Car Washing Behaviors

Do you have a car/truck or other vehicle?

	Pre-Campaign (Percent)	Post-Campaign (Percent)
Yes	90	95
No	10	5

[Those who responded “yes” were also asked:] *How do you wash your vehicle?*

	Pre-Campaign (Percent)	Post-Campaign (Percent)
At home	38	37
Take it to a car wash	47	57
Other	15	2

There were differences in how respondents wash their vehicle(s) ($\chi^2 = 17.12, p < .001$) between surveys. Post-campaign respondents take their car to a car wash more frequently than those in the pre-campaign survey do. Additionally, pre-campaign respondents were more likely to choose some other car washing option than those in the post-campaign survey. The differences here may be partly due to the wording and response options they were given in the two campaigns. The first campaign included “someone else washes it” with the other option. This may be a reason more pre-campaign participants responded “other” to the question than did post-campaign respondents.

Car wash location reported behavior by television ad recall

	Did recall (percent)	Did not recall (percent)
At home	41	33
Take it to a car wash	47	54
Take it to a volunteer car wash	1	2
Other	6	4
I don't wash my vehicle	5	7

[Those who responded “yes” they washed their car at home were also asked:] *Where does the soapy water flow?*

	Pre-Campaign (percent)	Post-Campaign (percent)
Into the grass, dirt, or gravel	59	58
Into the street or driveway	40	21
It varies	1	7
Don't know/Refuse to answer	--	14

There was a significant difference between surveys regarding where respondents reported letting the car wash water flow ($\chi^2 = 17.12, p = .006$). Post-campaign participants were less likely to let the soapy water flow into the driveway than those in the pre-campaign survey, a positive (desirable) change. Respondents who reported having seen a television spot were more likely to give the desired response and less likely to give the undesired response than those who did not recall seeing a television ad.

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Runoff from vehicle washing reported behavior by television ad recall

	Did recall (percent)	Did not recall (percent)
Into the grass, dirt, or gravel	64	56
Into the street or driveway	15	23
It varies	9	7
Refuse to answer	12	13

Oil Changing and Disposal Behaviors

Do you change your own oil at home?

	Pre-Campaign (percent)	Post-Campaign (percent)
Yes	28	28
No	72	72

[Those who responded “yes” were also asked:] *How do you dispose of the used oil?*

	Pre-Campaign (percent)	Post-Campaign (percent)
With other garbage (dumpster, trash bags)	16	3
Pour it down a storm drain	28	2
Take it somewhere to be recycled	50	90
Other	4	4
Don't Know/Refuse to Answer	2	1

Large significant differences were found between responses for the two surveys ($\chi^2 = 55.47, p < .001$). Respondents in the pre-campaign survey were more likely to pour the used oil down a storm drain, a highly undesirable behavior. Participants in the post-campaign survey were much more likely to take the oil somewhere to be recycled. However, those who recalled seeing a television ad and those who didn't were almost equally likely to report properly disposing of oil. However, our survey asked if respondents recalled seeing an ad on television, and CWEP's campaign addressing motor oil was run on the radio. It is possible, though somewhat unlikely, that respondents mentally differentiated the two media, giving the desired response and not attributing it to a television campaign. It is also possible that some exogenous factor is in play.

Method for disposing of used oil reported behavior by television ad recall

	Did recall (percent)	Did not recall (percent)
Put it with garbage	2	4
Pour it down a storm drain	0	2
Take it to be recycled	94	89
Other	4	4

Pet Waste Disposal Behaviors

The question regarding whether respondents had a pet was changed somewhat from the pre-campaign survey to the post-campaign survey. 87% of pre-campaign survey

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respondents reported having a pet that they walked. 44% of post-campaign survey respondents reported having a dog.

[Those who responded “yes” they had a dog or pet they walked were also asked:] ***How often do you pick up your pet’s waste from walks or from the yard?***

	Pre-Campaign (percent)	Post-Campaign (percent)
Always/Almost always	36	36
Sometimes	15	19
Rarely	19	11
Never	27	34
Refuse to answer	3	--

There was no statistically significant differences between the pre-campaign and post-campaign survey with regard to whether respondents picked up their dog’s waste. The largest portion of respondents in both the pre- and post-campaign surveys that walk their pets or have dogs, always (or almost always) pick up the waste. Oddly, the percentage of respondents reporting that they always pick up their pet waste was higher for those who reported recalling a television ad, and the percentage reporting that they do so only “sometimes” was slightly higher for those who did recall a television ad. It is unlikely that the media campaigns are a causal variable; more likely this reflects natural variation in the response set.

Frequency of picking up pet waste reported behavior by television ad recall

	Did recall (percent)	Did not recall (percent)
Always	28	38
Sometimes	24	18
Rarely	13	9
Never	35	34

Summary

The data collected show a number of interesting trends. These findings are summarized in the table below.

Topic/behavior	Direction of change?	Statistically significant?	“Correct” response(s) positively correlated with TV ad recall?
Major sources of water pollution are nonpoint, not point sources	+	Yes	Yes
Stormwater goes to nearest creek or stream	+	Yes	Yes
Car wash flow onto grass or gravel	+	Yes	Yes
Proper disposal of used motor oil	+	Yes	Yes
Leaving grass clippings on lawn, not put in garbage	+	Yes	Yes (mildly)
Fertilizing frequency	+	No	No
Soil testing to determine need for fertilizer	–	Yes	Yes
Pick up after pet	Mixed	No	Trend was mixed

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Further research and analysis would be needed to help definitively ascertain whether the changes in behavior reported were correlated with media ad recall.

CWEP did request that ECU analyze correlatory relationships between responses to knowledge questions and responses to behavior questions. These were performed on both pre- and post-campaign samples. Two questions were proxies for participant knowledge: (1) What is the biggest source of water pollution in NC? and (2) Where does stormwater go once it enters a storm drain? Behavior questions included those regarding lawn grass clipping disposal methods, frequency of fertilizer application on lawns, soil testing to determine lawn fertilizer needs, how respondents washed their cars, where they allow soapy car wash water to flow, used oil disposal methods for those who change their own motor oil, and pet waste pickup.

It was hypothesized that the more knowledgeable the participant was about stormwater, the more likely they were to exhibit desirable behaviors with regard to nonpoint source water pollution. There were three significant correlations within the pre-campaign survey data. One was positive, meaning that more knowledge relates to better behaviors. The other two were negative, indicating a relationship between more knowledge and bad behaviors.

Pre-Campaign Correlations between Participant Knowledge and Behaviors

	What is the biggest source of water pollution in NC?	Where does stormwater go once it enters a storm drain?
What do you do with the grass clippings after you mow your lawn?	.174*	.003
How often does someone fertilize your lawn?	-.285*	.011
Has anyone ever tested the soil to determine how much fertilizer it needs?	-.043	.027
How do you get your vehicle washed?	-.009	.040
When you wash your vehicle at home, where does the soapy water flow?	-.051	-.484**
If you change your own oil, how do you dispose of the used oil?	.184	.111
How often do you pick up your dog's waste?	-.106	.188

**Correlation is significant at the .05 level*

***Correlation is significant at the .01 level*

The desired response for the question asking the respondent to identify the biggest source of water pollution was “runoff from yards, parking lots, and streets.” Those who gave the desired response were more likely to give responses indicative of better methods of grass clipping disposal. Those who were more knowledgeable were more likely to leave their grass clippings on the grass, spread them in the yard, or mulch/compost them ($r = .174$, $p = .035$). However, those who gave the desired response were also more apt to fertilize their yard more than once a year ($r = -.285$, $p = .026$).

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Participants who knew more about where stormwater goes were more likely to exhibit poor car washing behaviors. The best choice for where stormwater goes once it enters a storm drain is “to the nearest stream.” Those choosing this answer were more likely to allow their soapy water to flow into the street or driveway ($r = -.484, p = .001$). Conversely, participants who chose the poorer answers for where stormwater goes were more likely to allow the soapy water to flow into the dirt or gravel, which is a better behavior.

The same set of correlations was conducted on the post-campaign data. There was only one significant correlation. There is a positive relationship between more knowledge about where stormwater goes and used oil disposal. Those who knew that stormwater goes to the nearest stream once it enters a storm drain were more likely to take the used oil somewhere to be recycled ($r = .164, p = .028$). Those who chose the poorer answers for where stormwater goes were more likely to perform harmful behaviors with their oil disposal (putting it with the garbage, pouring it down a storm drain, or something else other than recycling).

Post-Campaign Correlations between Participant Knowledge and Behaviors

	What is the biggest source of water pollution in NC?	Where does stormwater go once it enters a storm drain?
What do you do with the grass clippings after you mow your lawn?	.041	.050
How often does someone fertilize your lawn?	.008	.018
Has anyone ever tested the soil to determine how much fertilizer it needs?	-.019	.020
How do you get your vehicle washed?	-.039	-.032
When you wash your vehicle at home, where does the soapy water flow?	.084	.044
If you change your own oil, how do you dispose of the used oil?	.060	.164*
How often do you pick up your dog’s waste?	.030	.074

**Correlation is significant at the .05 level*

In general, there are poor correlations between better knowledge and better behavior. This is consistent with research that even if people know about watershed functions, their behaviors may not be appropriate, and vice versa. This further reinforces the fundamental concept that in order to effectively change behaviors that contribute to nonpoint source water pollution, those conducting outreach need to focus on the behaviors themselves. Increasing knowledge may have other benefits, such as increasing willingness to pay for environmental services or support for environmentally protective policies.

This research conveys a number of interesting findings for those conducting and evaluating the effectiveness of mass media campaigns directed at changing public behaviors. Most broadly and most notably, in this case, information dissemination alone appears to have brought about changes in self-reported behaviors. However, our research cannot confirm whether people actually DID change their behavior, or whether they maintained the new behaviors.

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The claim that our media campaigns brought about changes in awareness of stormwater issues can be made more conclusively, at least with regard to desirable behaviors, as awareness is necessary for people to give the correct responses. After the campaign, a greater proportion of respondents generally gave desirable responses on questions both about stormwater generally and about individual behaviors that contribute pollutants to stormwater runoff. It appears that the CWEP media campaigns conducted in 2007 were effective in bringing about overall increases in awareness and improvements in behaviors that contribute to the nationwide problem of polluted stormwater runoff.

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Appendix A – Jurisdictions Participating in the NC Clean Water Education Partnership in 2007

Municipalities

Apex	Kinston
Carrboro	Knightdale
Cary	Morrisville
Chapel Hill	New Bern
Durham	Oxford
Fuquay-Varina	Raleigh
Garner	Rocky Mount
Goldsboro	Smithfield
Havelock	Spring Lake
Hillsborough	Tarboro
Holly Springs	Wake Forest
Hope Mills	Wilson

Counties

Chatham County	Nash County
Durham County	Wake County
Johnston County	Wayne County
Orange County	

Appendix B – Mail Survey Instrument

Clean Water Education Partnership Survey

Please circle the letter to show your response. Thank you!

1. Are you...
 - a) Male
 - b) Female

2. What county do you live in? _____

3. What is your ZIP code? _____

4. Based on your current knowledge, do you think the overall water quality of the rivers, streams, lakes, etc. in your area is...
 - a) Poor
 - b) Fair
 - c) Good
 - d) Excellent

5. The following is a list of possible sources of water pollution. Please tell us which one **YOU** think is the biggest source of water pollution in North Carolina:
 - a) Litter
 - b) Wastewater from industrial plants
 - c) Wastewater from sewage treatment plants
 - d) Runoff from yards, parking lots, and streets
 - e) Runoff from farms and agricultural operations

6. If you had to pick **ONE** of the following options to describe where rainwater goes **after** it goes down into a storm drain (see picture), would you say that the rainwater drains to....



- a) a sewage/wastewater treatment plant
- b) a separate special treatment plant
- c) nearby fields and yards
- d) the nearest stream

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7. Do you recall seeing any ads on TV recently about rainwater or stormwater runoff (water that runs off streets and parking lots after it rains) or how the land next to a stream should be maintained?

- a) Yes
- b) No
- c) Not sure
- d) I don't watch TV

8. Do you have a grass lawn or a yard that you maintain?

- a) Yes
- b) No (skip to #13)

9. When you mow the grass, what do you do with the grass clippings?

- a) Collect them and put them with the garbage
- b) Leave the clippings on the grass or spread them in the yard
- c) Dump them in a gutter or ditch
- d) Pile them in the yard, or compost/mulch them
- e) Other
- f) I don't mow

10. Does anyone fertilize your lawn?

- a) Yes
- b) No

11. About how often would you say someone fertilizes your lawn?

- a) Monthly or every other month
- b) Two or three times a year
- c) Once a year or less

12. Has anyone ever tested the soil on your lawn to determine how much fertilizer it needs?

- a) Yes
- b) No

13. Do you have a car, truck, or other vehicle?

- a) Yes
- b) No (skip to #18)

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14. How do you get your vehicle washed?

- a) I wash it at home or have it washed at home
- b) I take it to a commercial car wash
- c) I take it to a volunteer car wash
- d) It depends / Other
- e) I don't wash my vehicle (skip to #16)

15. If/when you wash your vehicle at home, does the dirty washwater flow...

- a) Onto grass, dirt, or gravel
- b) Onto the street or driveway
- c) It varies
- d) Not sure where it goes
- e) I don't wash my vehicle at home

16. Do you ever change your own oil?

- a) Yes
- b) No (skip to #18)

17. If you change your own oil, how do you dispose of the old used oil? Do you...

- a) Put it with garbage
- b) Pour it down a storm drain, into the yard, or into a ditch
- c) Take it somewhere to be recycled
- d) Other (specify): _____

18. Do you have a dog?

- a) Yes
- b) No (skip to #20)

19. Do you pick up your dog's waste (from walks or from in the yard)...

- a) Always or almost always
- b) Sometimes
- c) Rarely
- d) Never

To help us interpret the range of responses we will receive, please tell us a little about yourself. All answers are completely confidential.

20. Are you retired?

- a) Yes
- b) No

21. Do you own or rent the place where you live?

- a) Own
- b) Rent
- c) Other

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22. Which of the following best describes your formal education?

- a) Some high school or less
- b) High school graduate
- c) Some vocational or technical school
- d) Vocational or technical school graduate
- e) Some college or 2-year college graduate
- f) 4-Year college graduate
- g) Post-graduate degree or more

23. Which of these categories best describes your age?

- a) 18-24
- b) 25-34
- c) 35-44
- d) 45-54
- e) 55-64
- f) over 65

24. To ensure our survey has a proper representation by race, are you...

- a) Black or African-American
- b) White or Caucasian
- c) Asian
- d) Hispanic or Latino
- e) Other

25. Which of the following categories best describes your total annual household income before taxes? Remember, this information will only be associated with your other responses to this survey and never with you as an individual.

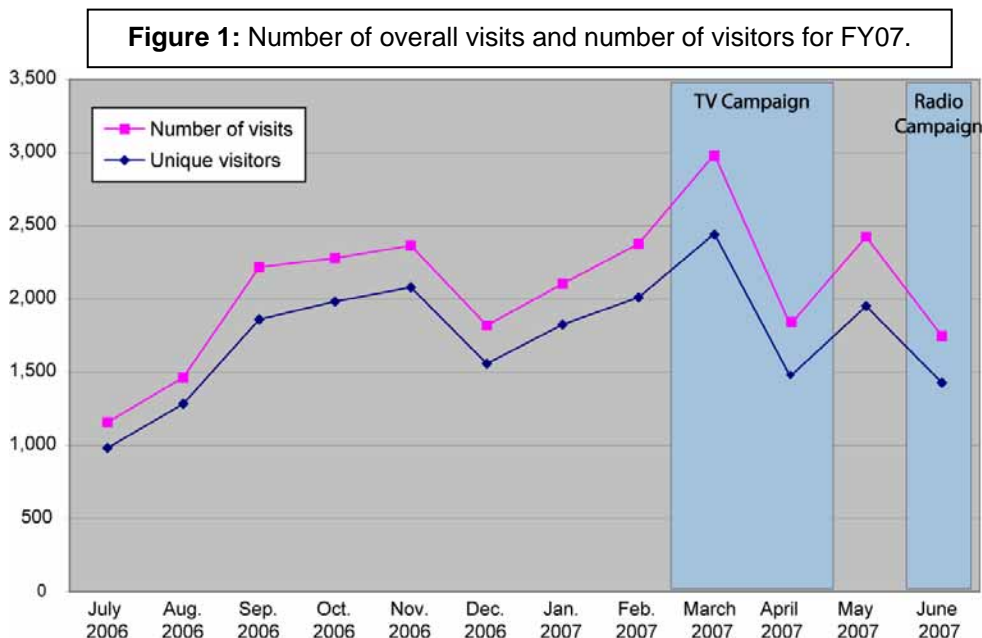
- a) Less than \$12,000
- b) \$12,000 to \$25,000
- c) \$25,000 to \$35,000
- d) \$35,000 to \$50,000
- e) \$50,000 to \$75,000
- f) \$75,000 to \$100,000
- g) over \$100,000

Thank you for participating in this important survey! We greatly appreciate your time and assistance.

To find out more about why we are conducting this survey, call (919) 558-9343 or email cwep@tjcog.org.

Appendix C – Web Traffic and Mass Media Campaigns

There was a discernible spike in web traffic associated with our Spring 2007 TV campaign. Traffic during the radio campaign was low overall, probably because web traffic is generally lower in the summer anyway. One explanation for why there was an increase with television and not with radio is that people were inside and near their computers when they are watching TV, whereas radio listening tends to be associated more with outdoor activities and driving. Also, it is possible that TV viewers have an easier time remembering a URL than might radio listeners because the URL is displayed visually on television.



Some springtime web traffic may also be attributable to the “tile” (small sidebar advertisement) we ran on WTVD during our TV campaign linked to our website. At a cost of \$1,000, CWEP’s tile was shown 90,319 times (\$.011 per impression). 130 WTVD website visitors “clicked-through” the tile to our website while the tile was online.

We polled visitors to our www.ncCleanWater.org website from March – April 2007 with the following question posted to our homepage: “What brings you to our website today?” Responses were as follows:

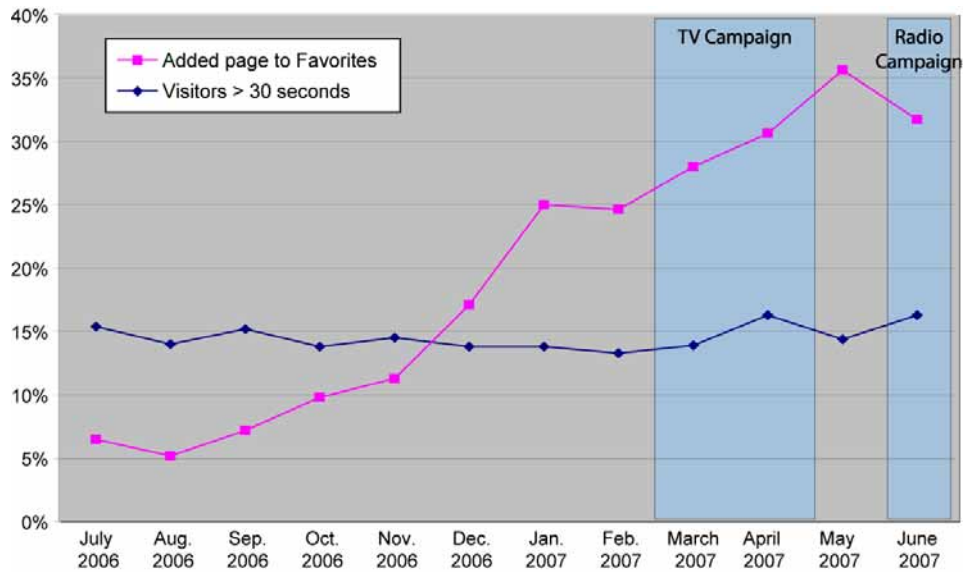
Response	Number	Percent of total responses
I saw one of your commercials on television	29	46%
I clicked a link on another website	12	19%
I have visited before	11	17%
Other	6	10%
I used a search engine	5	8%
Total	63	100%

It seems clear from this poll that a major driver of traffic to the website during that period was the television campaigns.

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Another metric of effectiveness is the number of people who visited our website overall and how many added the site to their “Favorites” list. The percentage of visitors staying more than 30 seconds stayed approximately constant with the increase in traffic, which is good. The percentage if visitors who added the site to their Favorites increased consistently over the fiscal year; the increase may or may not have been due to the media campaigns.

Figure 2: Percentages of visitors adding page to favorites and staying more than 30 seconds



These campaigns were conducted in a very intensive fashion, with broadcast times purchased at highly desirable time slots when viewership is high, such as during the 2007 ACC Tournament.

Run	Time Period	Total Impressions	Cost
Spring 2007 (FY07) TV	February-April 2007	27,402,654	\$103,409.85
Summer 2007 (FY07) Radio	June 2007		\$19,962.00
Fall 2008 (FY08) TV	September 2007	8,948,428	\$55,068.50

In total, CWEP spent \$156,128 on media campaigns during the time period, of which \$21,370 was paid for by NCDENR. For details on the individual media campaigns conducted, please visit the CWEP Website, www.ncCleanWater.org and click on “Outreach.”