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Eliminating Emerging Contaminants Upstream: Education and Prevention

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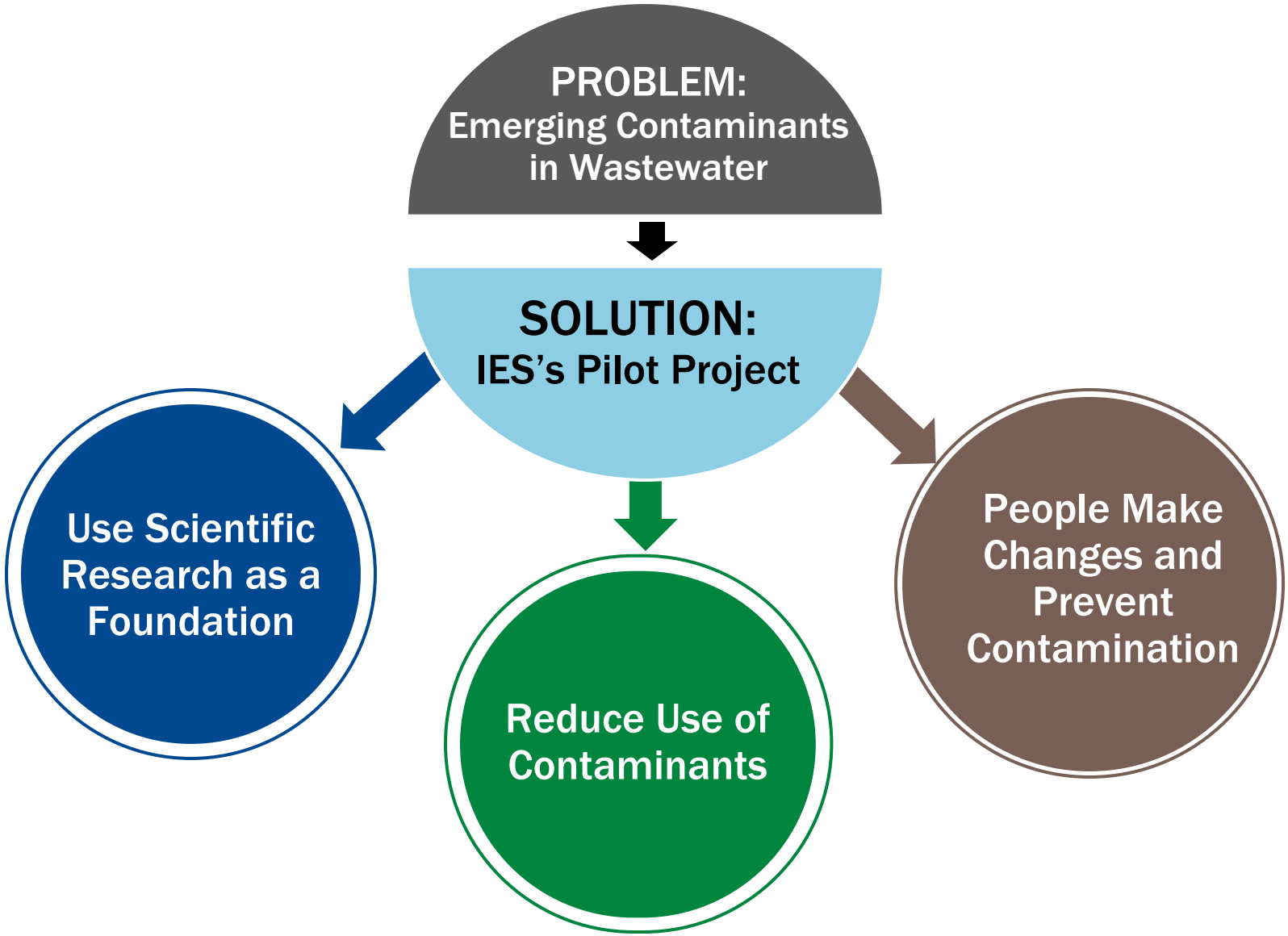
Presentation Overview



IES's Pilot Project

Use education and community-based social marketing to mitigate and prevent household and personal care contaminants in the downstream water supply.

Voluntary Upstream Prevention Provides Numerous Consumer Benefits

Benefits:

- Is cheap
- Saves consumer money
- Reduces immediate **human exposure** and **potential health impacts**
- Reduces **wildlife and environmental impact**
- Can achieve **100% contaminant reduction**
- Has **no negative side effects**

Pilot Project Scope

1. Background Research

2. Education

3. Water Analysis

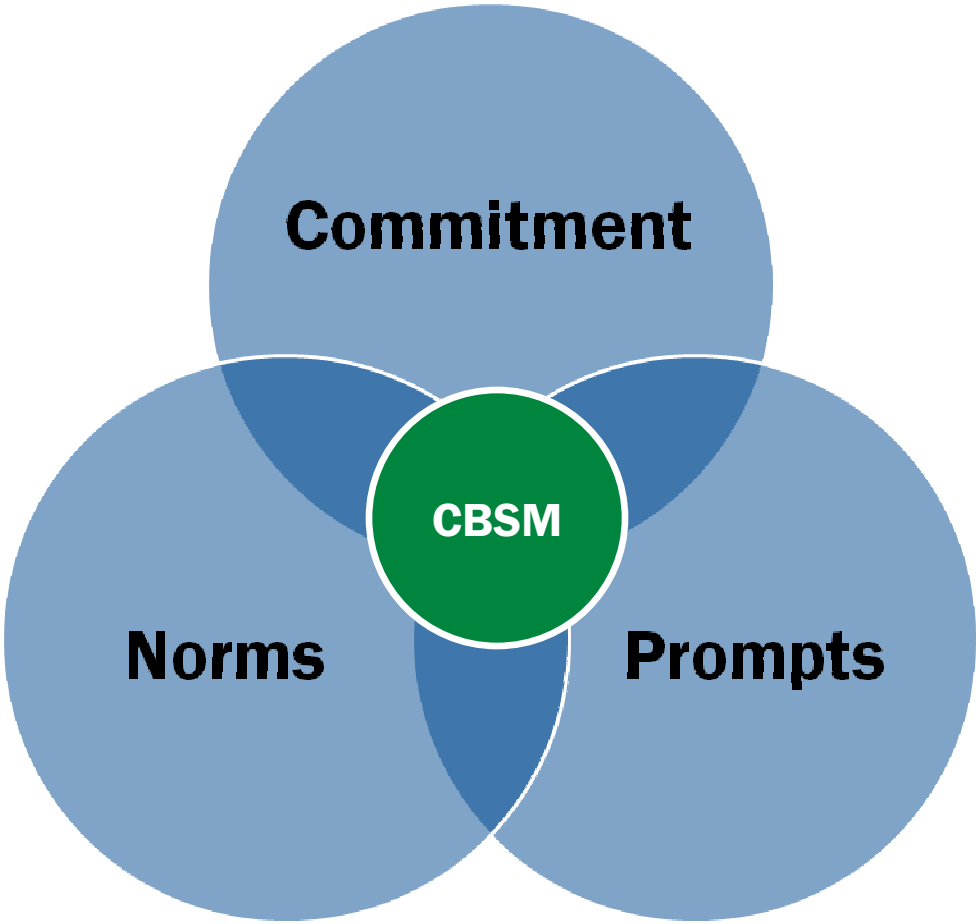
4. Community Interviews

Pilot Project Focused on Personal Care and Household Products

Why?
Breadth of compounds covers most personal and household **sources**, **pathways**, and **chemical properties.**

Target Compounds	
Benzophenone	UV blocker
Butylated hydroxyanisole (BHA)	Food preservative
Bisphenol A (BPA)	Plasticizer (hard, clear plastics; epoxy can linings)
Caffeine	Stimulant
Methylparaben	Antifungal, used as preservative in personal care products and foods
Musk ketone	Artificial fragrance
Nonylphenol, octylphenol	Surfactant degradate (in detergents, cosmetics, other products)
Triclosan	Antimicrobial agent (soap, toothpaste, deodorant, clothing)

Reduce Use of Contaminants Through Community-Based Social Marketing (CBSM)



SOURCE:
www.CBSM.com

Targeted Education Program Increased Community Awareness of ECs in Local Waters

1. Develop and find alternative EC-free products and practices
2. Conduct community workshops
3. Provide educational materials

Contaminants of Emerging Concern (CECs)
Guide to Contaminant-Free Shopping

How to Use This Guide

This buyer's guide is intended to help consumers avoid exposure to harmful contaminants through making informed shopping choices. This guide includes a glossary of CECs, and then provides information covering the categories of food and personal care products. The guide provides information about each CEC to watch out for, where it is found, alternative product choices, and local stores to purchase the safer items. Consult this buyer's guide when you are making your shopping list or bring it along to the store to consult for safe product purchases.

Glossary

Parabens: Parabens are an anti-fungal agent used in many cosmetics and personal care products. They are estrogenic, and can affect the endocrine system of both humans and wildlife. Parabens include methylparaben, ethylparaben, propylparaben and butylparaben.

Butylated Hydroxyanisole (BHA): BHA is an antimicrobial preservative used in food and cosmetics. It is suspected to be carcinogenic, toxic, and an endocrine disruptor.

Benzophenone (Oxybenzone, Avobenzone): Benzophenone is a UV blocker used to preserve color and scents in many personal care products. It is an endocrine disruptor, affecting the endocrine system by attaching itself to the receptor sites and mimicking hormonal activity. It has been found to bioaccumulate in fish.

Fragrances: Synthetic or artificial fragrances can be highly toxic, and can accumulate in the environment and wildlife. Some fragrances have also been found in human breast milk. Synthetic fragrance is used for its scent, but serves no other useful purpose in products.

Triclosan: Triclosan is an anti-microbial chemical commonly found in soaps, and toothpastes. It has been shown to bioconcentrate in fish and human breast milk. It is also linked to thyroid disorders in wildlife and can react with sunlight in surface waters to form harmful pollutants.

Bisphenol A (BPA): BPA is a toxic chemical used in certain plastics and resins that are found in bottles, packaging, containers, and metal (stainless steel and aluminum) bottle and can linings. The National Institutes of Health and the Food and Drug Administration are concerned about the potential effects of BPA on the brain, behavior, and prostate gland in fetuses, infants, and young children.

Surfactants: Surfactants are chemicals that break down grease. They are primarily used in laundry detergents and dish soaps. They are often not listed on labels, so it can be difficult to determine if they are present in products. Surfactants break down into chemicals that are toxic to aquatic wildlife. The U.S. Environmental Protection Agency is moving towards regulation of these chemicals. Their use is already restricted in most of Europe.

Atrazine: Atrazine is a pesticide used to prevent broadleaf and grassy weeds. It is used primarily in large farming communities. Traces of the chemical have been found in streams and groundwater in and around those areas. It is a proven endocrine disruptor. Exposure by pregnant women can cause birth defects in children.

Caffeine: Caffeine is a chemical found in coffee, tea and many sodas. Traces of caffeine have been found in groundwater samples. Caffeine activates biotransformation enzymes and can lead to DNA damage.

DEET: DEET is a topical insecticide used in many bug repellent sprays. It can cause skin irritation and, in rare cases, anaphylactic reactions in humans, and can be toxic to fish.

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What are Contaminants of Emerging Concern (CECs)?

As a result of everyday household use, trace amounts of chemicals from consumer products are accumulating in downstream water sources. CECs are known or suspected toxins or endocrine disruptors, meaning they interfere with the normal functioning of hormones, and may be linked to mutations and other biological abnormalities in aquatic life and human health risks. Traditional wastewater treatment does not effectively remove all CECs, allowing their release into the environment even after water has been treated. Scientists have not yet characterized what level of exposure to these suspected toxins and endocrine disruptors is harmful to humans.

Institute for Environmental Solutions

Education Program was Successful

CBSM successful

Interactive, hands-on education

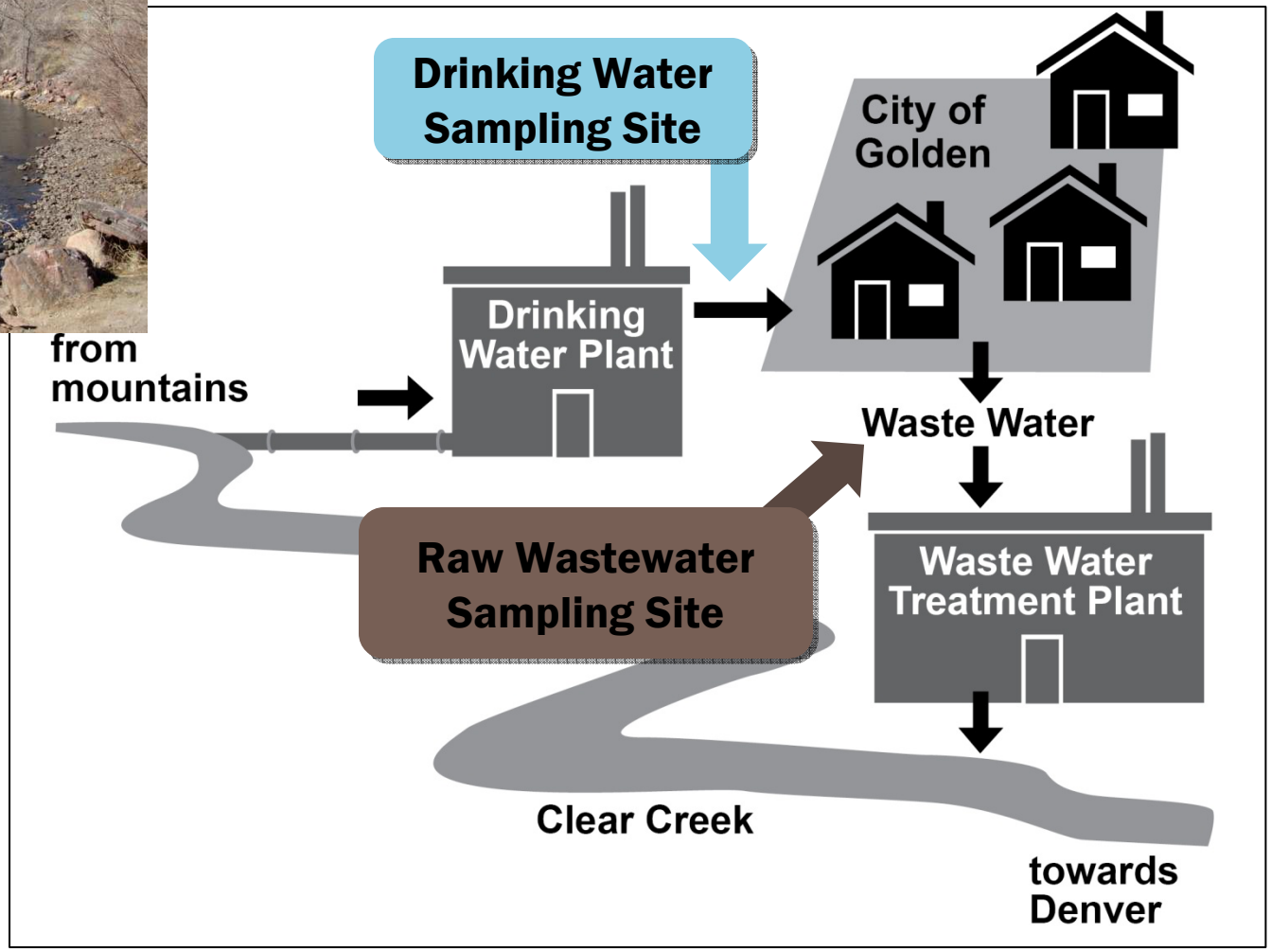
- Make your own products
- Free samples

Easy-to-understand and readily-accessible information

- Wallet cards, refrigerator magnets, shopping guide

Make changes in easy, small steps

Water Analysis

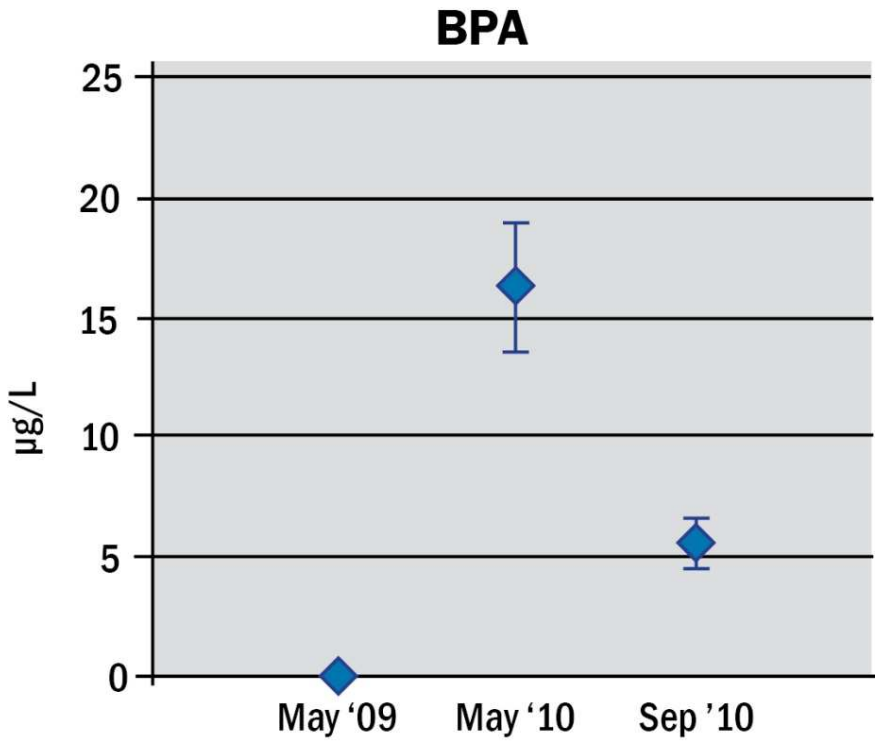


Results of Water Analysis

- Detectable levels of contaminants found in wastewater
- No ECs in drinking water except for caffeine
- In this study, the local community is the source of ECs in wastewater
- Analytical methods to analyze raw wastewater still under development

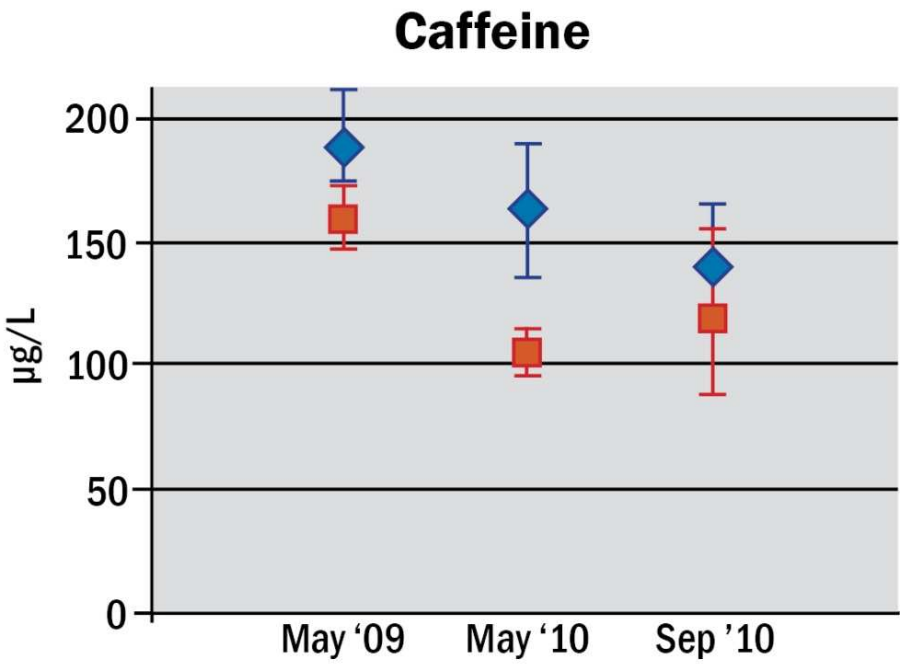
Results of Water Analysis

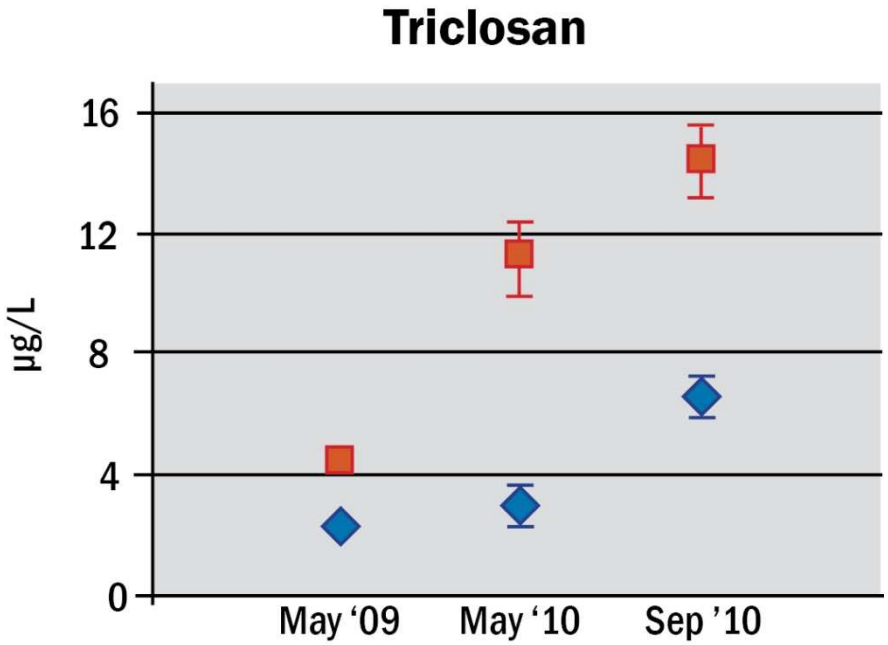
LCMS



Sampling Period	Sample number (n)	Preservative (NaN_3) used?	Holding time
Spring 2009	14	Yes	13.5 months
Spring 2010	4	Yes	3 months
Fall 2010	13	No	3.5 days

Results of Water Analysis



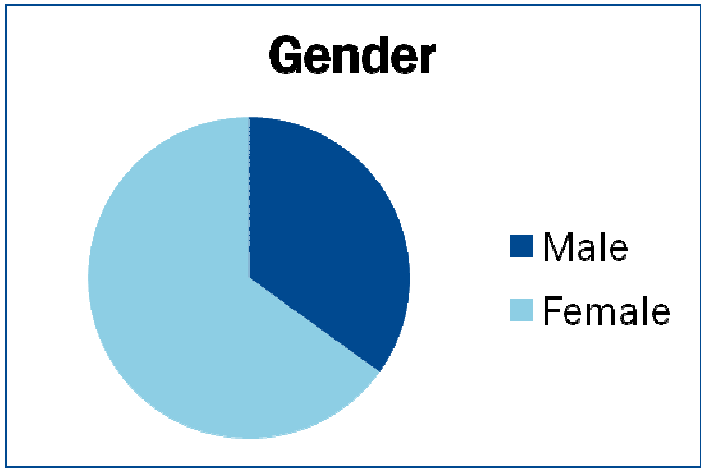


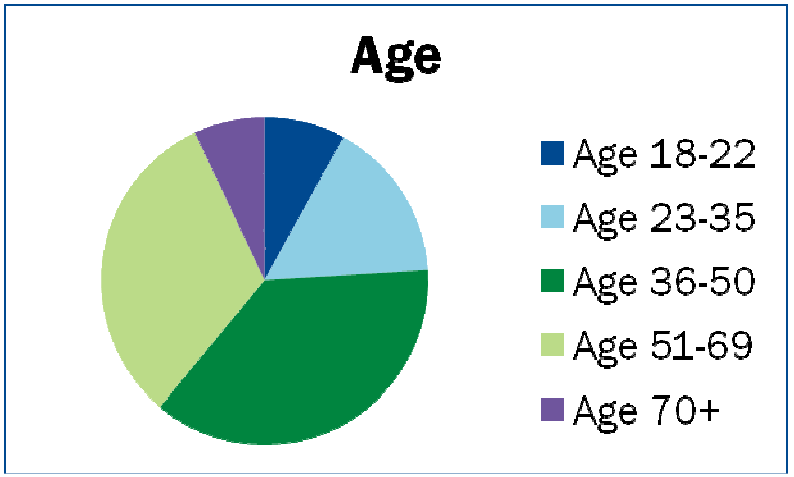
Community Surveys and Interviews

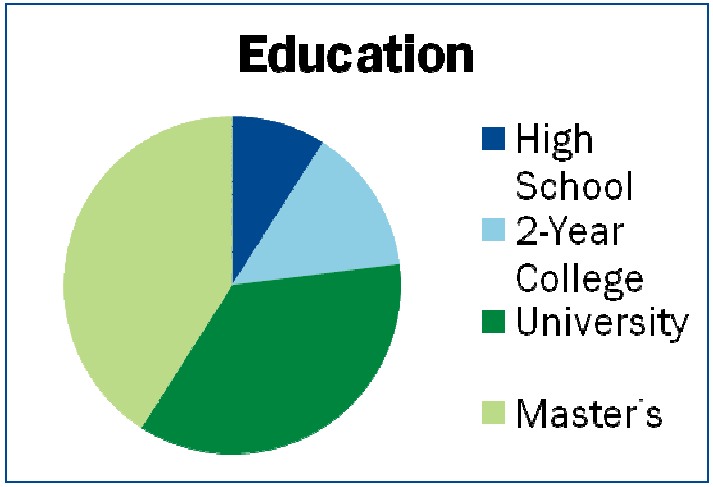
- **One-to-one in-person surveys:**
  - 338 surveys conducted in Summer-Fall 2009
  - 287 in Summer-Fall 2010
  - 625 Total

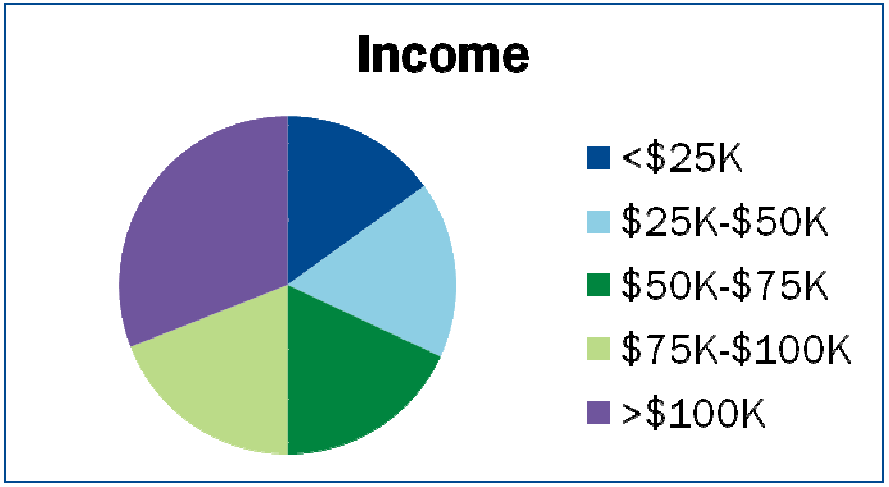
- **Initial design to evaluate change in behavior before and after education program**
- **Scope of survey and scope of education program both too small to provide statistically detectable changes**
- **Valuable characterization of personal and household habits related to products that contain ECs**

Key Findings – Survey Respondents





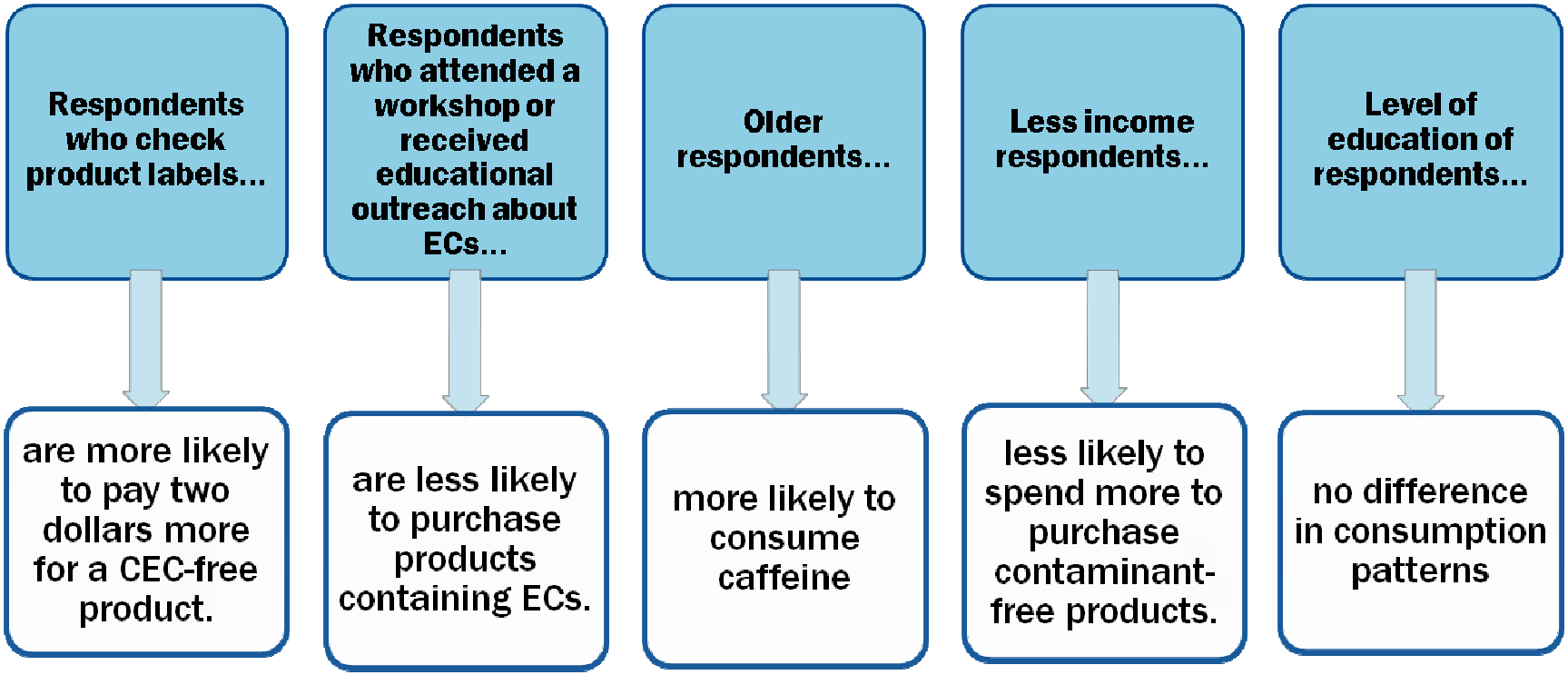




Key Findings – Personal Habits

- **60%** Respondents purchase personal care products **scented with fragrance**
- **40%** Respondents don't know if **fragrances are natural or synthetic**
- **55%** Respondents don't know if their **personal care products are paraben-free**
- **85%** Respondents would **not purchase detergent that was harmful** for the environment
- **68%** Respondents would **pay $2 more for detergent without any harmful ingredients**

Key Findings - Correlations



Community Survey - Conclusions

- Community knowledge about ECs and potential harm is very low
- People are willing to change their behavior in response to community-based one-to-one education and outreach
- Survey population probably not representative of the community
- Surveys valuable for a snapshot of the community and some insights

Pilot Program Conclusions

LIMITATIONS:

Pilot: very small scale (limited scope) and short term

Difficult to obtain quantitative analytical comparison (water analysis and surveys)

Need better way to measure CBSM effectiveness / behavior changes

- EC research is **critical to support action to reduce pollution**
- EC pollution **prevention** from personal care and household products is **feasible**
- IES's CBSM-based outreach and education leads to **better water quality and better health**

Pilot Program Conclusions

"The Institute for Environmental Solutions did a fabulous job. I feel like I am much better equipped now. I have an understanding of what to avoid when purchasing cleaning products and also know how to make my own!"

-Amy Alcorn, IES Workshop Participant

- People can and will change their habits to reduce and prevent pollution
- Traditional education / outreach is not effective
- CBSM strategies are effective
- Cheaper and easier to keep ECs from entering waterways than to treat downstream

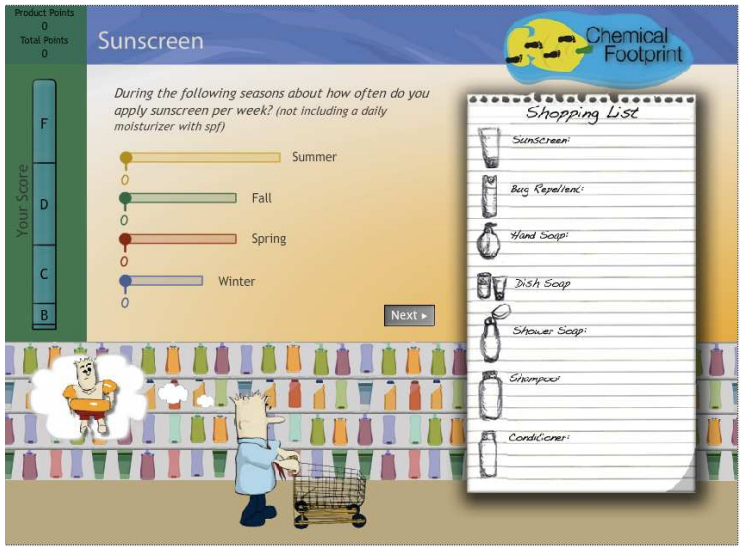
Making EC Pollution Prevention Sustainable

Blue Crew Water Stewards

- Promote water stewardship through existing social networks
- Establish an environmental ethic
- Develop a taskforce of local leaders to educate about ECs
- Reduce and prevent water pollution at the household level
- Neighborhood leaders trained to lead “Blue Crews”

Making EC Pollution Prevention Sustainable

www.ChemicalFootprint.org



- Online interactive application – series of questions about everyday household product use
- Identify ECs found in products currently used, safe product alternatives, and educational tips to reduce your chemical footprint
- Receive your "chemical footprint" score based on how much ECs used and exposed to
- Help you make better purchasing decisions in the future

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Thanks

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For You

Quarterly e-newsletter: Newsletter@i4es.org
Samples: Wallet cards, Top ten list, Bumper stickers

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CONTAMINANTS OF EMERGING CONCERN

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