The Sound Behavior Index: A Management Tool for Behavior Aspects of Ecosystem Restoration

PugetSoundPartnership
LEADING PUGET SOUND RECOVERY

Introduction

With growing numbers of programs devoted to environmental behavior change, there is a corresponding need for measures of behavior change at a variety of scales. The Sound Behavior Index (SBI) is an ongoing measurement tool developed for the Puget Sound region in Washington State designed to meet this need. The SBI tracks 28 residential-scale practices that can affect water quality and aquatic habitat. The index is based on a survey conducted every two years among a statistical sample of the regions 4.5 million residents. It asks about specific, measurable, repetitive behaviors that are driven by personal choice. The Sound Behavior Index distills the regions environmental performance into a single regional score, which can be tracked across time. The index can be broken down to the county level, providing more meaningful local measures. It can also be used to track each component behavior. Until now, there have been no regional uniform behavior change measures in the region, and no consistent local measures aside from one county. The Sound Behavior Index fills those gaps by measuring long-term shifts in environmental behaviors across the Puget Sound region.

Methods

The project team used a phone survey to gather data. It has been fielded twice among a random sample of residents from all 12 counties in the Puget Sound region. The sample was drawn from Random Digit Dialing, including both listed and unlisted landline phone numbers, and cell phones, including both cell-only and cell-mostly households. The final sample size was over 3,600 respondents in each iteration completed to date. For analysis purposes, the data were weighted to match Census 2010 adult population age categories. Two weights were calculated; one to adjust the data to report results broken out by county and the other to adjust the data to report results for all counties combined.

A preliminary list of questions for the SBI came from several sources:

- Literature review
- Questions from previous surveys conducted by PRR
- A list of priority behaviors provided by the Puget Sound Partnership
- A stormwater behavior prioritization developed by STORM (Stormwater Outreach for Regional Municipalities)
- King County's Environmental Behavior Index

The final list of 28 behaviors across the following topic areas included: **Yard and garden care (7 items), Motor vehicles (3 items), Home maintenance (6 items), Pet waste (2 items), Septic systems (6 items), Livestock practices (2 items), Boat practices (2 items). Behaviors that were repetitive,**

The index includes both positive and negative behaviors. Positive behaviors were practices that have a positive impact on water quality and aquatic habitat such as 'planting native plants in your lawn or garden' and behaviors that negatively impact water quality and aquatic habitat such as 'using weed and feed on your lawn.' Participants responded to each item in the SBI based on the frequency (on a scale) with which they engaged in each behavior. The frequency scale ranged from 1 to 5, with 1 being 'never' and 5 being 'always' for those items that were environmentally friendly. Respondents could also indicate that an item was 'not applicable'. The scoring for the scale was reversed for items that were detrimental to the environment. This reversed scoring ensured that the higher the overall SBI score, the more environmentally friendly the respondent. Each item in the SBI was weighted equally in the overall SBI score.

We developed a single, summary measure of the information in a survey that can be used to benchmark community behavior over time. In the case of the SBI, the challenge was that no predecessor indices existed. The most widely used method in this challenging setting is Principal Components Analysis (PCA). PCA has many uses, but its basic function is to find weights to apply to various survey question responses that explain variance in the responses across the whole survey population.

Applying PCA procedures for the SBI survey questions resulted in a separate SBI score for every respondent. This was derived by multiplying the first principal component weights ("coefficients") from the PCA analysis to the various answers of each respondent. Regional and sub-regional indices were then built up by aggregating (through averaging) the individual scores of the sets of respondents of interest. In the case of the SBI efforts, separate scores were computed for each of 12 Puget Sound counties.

Results (2012)

Puget Sound Behavior Index Survey Results

HELPFUL BEHAVIORS

		ALWAYS	USUALLY	SOMETIMES	SELDOM	NEVER
Residents with yards	Plant or keep native plants on property	40%	16%	21%	9%	14%
	Pull weeds by hand or with tool	43%	24%	20%	7%	6%
Residents with yards along waterways	Plant or keep native vegetation on the banks of waterways on property	29%	6%	6%	6%	53%
Residents with motor vehicles	Check vehicle for fluid leaks or have it checked	46%	24%	16%	7%	8%
	Dispose of recreational vehicle wastewater at an approved facility	35%	5%	8%	4%	52%
All residents	Use non-toxic or natural household cleaners	25%	25%	29%	11%	10%
Residents with dogs	Pick up dog's waste from yard	65%	12%	8%	5%	11%
	Place dog's waste in trash	40%	8%	11%	6%	36%
Residents with on-site septic systems	Spread out laundry loads	35%	16%	17%	9%	21%
	Get septic tank pumped when recommended	46%	17%	13%	6%	15%
	Get septic system annually inspected	27%	8%	16%	16%	29%
Residents with livestock	Cover and compost manure	40%	7%	8%	10%	36%
	Rotate pastures to let grass recover	42%	11%	17%	7%	24%
Residents with boats	Use pumpout stations for boat wastewater	20%	3%	7%	5%	65%
	Check for boat engine fluid leaks	56%	12%	9%	6%	18%

HARMFUL BEHAVIORS

		ALWAYS	USUALLY	SOMETIMES	SELDOM	NEVER
Residents with yards	Use weed and feed products on lawn	5%	6%	22%	21%	45%
	Use chemical products to control or kill moss, weeds, or other plants in yard	5%	5%	24%	24%	41%
	Use chemical products to control or kill insects in yard	4%	3%	15%	25%	53%
	Use fertilizers on lawn or garden	8%	10%	31%	21%	30%
Residents with motor vehicles	Wash vehicles in the driveway, street, or parking lot	10%	7%	22%	20%	40%
All residents	Use chemical drain uncloggers	1%	2%	14%	36%	48%
	Flush or pour chemicals such as paint thinners down the drain	0%	0%	0%	3%	96%
	Flush prescription drugs down the toilet or drain	1%	0%	2%	3%	94%
	Use moss killer on roof	3%	3%	13%	14%	68%
	Use pressure washer with deck cleaners or soap	4%	3%	10%	15%	68%
Residents with on-site septic systems	Use garbage disposal	14%	9%	9%	9%	58%
	Use septic tank additives	7%	3%	12%	12%	67%
	Pour used cooking oil down the sink	4%	0%	5%	4%	87%

Other behaviors were considered and not used because they are: one-time actions that do not reflect ongoing behavior patterns, difficult to track with a telephone survey, expert practices that most residents cannot independently implement, emerging issues that have had little public exposure, or indirectly connected to the health of Puget Sound. Should future surveys reveal improvement in environmental behaviors, the index value will rise. Deterioration in future behavior will reduce the index value. As with many indices, the index value itself has no unit of measure and has no inherent meaning. The index only has value in detecting trends across successive surveys. In time, more iterations of the index will produce greater confidence in any detected trends. County index values can be used to track change over time within each county. Differences in index values between different counties should be interpreted with caution because different locations have different characteristics that influence environmental behaviors.

For example, a person who does not have a boat, lawn, or a septic system does not have the opportunity to pollute via those things. The portions of people who own such things varies from county to county (e.g., more boats per capita in San Juan County, more people without yards in King County, more septic systems per capita in Mason County). Therefore, some locations present a greater opportunity for environmentally harmful behaviors than other locations regardless of the motivations of their residents. One county may superficially appear to exhibit worse environmental behavior than another based on their index values. In fact, however, the opposite might be true if one considers the "opportunity factor".

Regionally, respondents exhibited wide variation in their reported use of yard and garden chemicals and fertilizers, and in motor vehicle washing habits. They also showed wide variation in exterior household maintenance, shoreline vegetation maintenance, and in their treatment of native plants and weeds. Much less variation is detected in septic system maintenance, livestock maintenance, use of household cleaners, and maintenance of motor vehicle leaks. In other words, across the region, residents tend to behave somewhat consistently in these behaviors. It does not mean that their behavior, although consistent, is necessarily environmentally friendly.

Understanding this variation, or lack thereof, may provide resource managers insight into varied strategic approaches needed to address different practices.

Conclusions

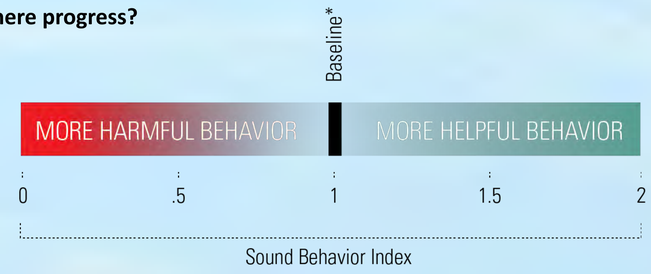
The Sound Behavior Index distills the region's environmental performance into a single score, which can be tracked across time. By measuring long-term shifts in behaviors and practices across the Puget Sound region, the index gives policy makers a tool to set priorities for regional and local programs.

In time, as we gather more data through successive iterations of the surveys, we will look for trends. Increases in the index value, compared to previous iterations, will indicate increased adoption of environmentally beneficial practices across the region. Decreasing values will indicate declining adoption of these practices.

2020 Target

There is no numeric target for the Sound Behavior Index. The index is new in 2012 and the data are insufficient at this time to forecast a specific target. A positive trend, i.e., an increasing index value over time, is desirable.

Is there progress?



The index is currently in its first iteration which means there is one data point (not enough to detect any trends). Data analysis is from the second iteration of the survey is nearly complete and the Vital Sign will be updated as available.

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- For full report please visit: http://www.psp.wa.gov/public_opinion_research.php
- Coastal Management Journal Article: http://www.tandfonline.com/doi/abs/10.1080/08920753.2014.923135?journalCode=ucmg20#preview